INTERNATIONAL CIVIL AVIATION ORGANIZATION

ASIA AND PACIFIC OFFICE

REPORT OF

THE FIFTH MEETING OF THE SOUTH EAST ASIA SUB-REGIONAL ADS-B IMPLEMENTATION WORKING GROUP

(SEA ADS-B WG/5)

Jakarta, Indonesia
21 - 22 January 2010

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1. INTRODUCTION

1.1 The Fifth Meeting of the South East Asia Sub-Regional ADS-B Implementation Working Group hosted by Directorate General of Civil Aviation (DGCA), Indonesia was held from 21 to 22 January 2010 at the Mandarin Oriental Hotel, Jakarta, Indonesia.

1.2 On behalf of Director General of DGCA, Mr. Ichwanul Idrus, Director of Air Navigation, DGCA extended warm welcome to all the participants from States and Industries to Jakarta. He emphasized the importance of harmonized implementation of ADS-B for enhancing flight safety and efficiency. He also highlighted current status of implementation of ADS-B in Indonesia and importance of cooperation and collaboration across all of industry for implementation. He encouraged fruitful and productive deliberations.

2. ATTENDANCE

2.1 The meeting was attended by 57 participants from Australia, Cambodia, Hong Kong China, Indonesia, Malaysia, and Singapore, CANSO, IATA and representatives from industries. List of participants is at **Attachment 1**.

3. OFFICERS AND SECRETARIAT

3.1 Mr. Bambang Sutarmadji, Deputy Director for Standardization of Directorate of Airworthiness and Aircraft Operation of DGCA, moderator nominated by Indonesia chaired the Meeting. The meeting was also facilitated by Mrs. Yudhi Sari, Deputy Director of Air Navigation and Surveillance Facilities, DGAC. Mr. Li Peng, Regional Officer CNS of the ICAO Asia and Pacific Regional Office acted as Secretary of the meeting.

4. ORGANIZATION, WORKING ARRANGEMENTS AND LANGUAGE

4.1 The meeting met as a single body. The working language was English only inclusive of all documentation and this Report. The meeting considered 7 Working papers and 8 Information papers. List of Working Papers and Information Papers is provided at **Attachment 2.**

Agenda Item 1: Adoption of Agenda

1.1 The agenda adopted by the meeting was as follows:

Agenda Item 1: Adoption of Agenda

Agenda Item 2: Review of the outcome of the ADS-B SITF/8, APANPIRG/20 on ADS-B

Agenda Item 3: Review of the Terms of Reference

Agenda Item 4: Updating States' activities and issues on regional trials

Agenda Item 5: Review of sub-regional implementation plan

- Near-term implementation plan, including operational plan
- Harmonization of ADS-B regulations, rules and procedures

Agenda Item 6: Any other Business

Agenda Item 7: Date and Venue for the Next Meeting

Agenda Item 2: Review of the outcome of the ADS-B SITF/8 and APANPIRG/20 on ADS-B

2.1 Under this agenda item, the meeting reviewed the outcome of the Eighth Meeting of the ADS-B Study and Implementation Task Force and APANPIRG/20 on ADS-B as follows:

2.2 The meeting reviewed outcome of the Twentieth meeting of APANPIRG held in Bangkok from 7 to 11 September 2009. The meeting noted that APANPIRG/20 appreciated the efforts and progress made by the ADS-B Study and Implementation Task Force and the SEA ADS-B Working Group. APANPIRG/20 adopted the revised guidelines for ADS-B OUT planning and implementation. APANPIRG/20 also adopted several Conclusions relating to implementation of ADS-B including the comprehensive amendments to FASID CNS Tables on Surveillance and Automation Systems. The extract from the report of APANPIRG/20 on ADS-B is provided in **Appendix A** to this report.

2.3 APANPIRG/20 expressed gratitude to Civil Aviation Administration of Vietnam (CAAV) and VANSCORP for hosting the ADS-B Seminar and ADS-B SITF/8 meeting. The meeting also thanked Airservices Australia for hosting the fourth meeting of the SEA ADS-B Working Group. The meeting noted that relevant guidance material adopted by APANPIRG/20 had been posted on the following ICAO ASIA/PAC website: http://www.bangkok.icao.int/edocs

2.4 The meeting noted APANPIRG Decision 20/47 that ADS-B SITF was tasked to study the need for developing guidance material for flight inspection/validation of ADS-B ground stations.

2.5 The meeting noted that APANPIRG/20 adopted a Decision tasking ADS-B SITF to study the need for developing guidance material for flight inspection/validation of ADS-B ground stations based on a proposal made by the ICAO Seminar on Testing of Navigation and Surveillance Facilities and Validation of Flight Procedures held in August 2009.

2.6 The meeting also noted that ATM/AIS/SAR Sub-group of APANPIRG supported the ADS-B ITP operational trials conducted by FAA in the South Pacific, noting the significant economic and efficiency benefits for both the service providers and the airspace users. Australia informed the

meeting that Airservices is conducting the trials jointly with FAA and Airbus which is expected to offer ADS-B IN option in 2009-2010 time-frame. IATA reminded the meeting that ADS-B IN is not part of the TOR of the SEA ADS-B Working Group. Australia noted that ITP standards are defined in DO-312.

Agenda Item 3: Review of the Terms of Reference

3.1 The meeting recalled that the SEA ADS-B WG/1 meeting developed Terms of Reference for the working group based on a proposal made by Singapore. The SEA ADS-B WG/3 meeting had reviewed the Terms of Reference of the SEA ADS-B Working Group and agreed to include Cambodia and CANSO as members of the working group. The TOR was revised to include "Coordination for implementation of the plan" as sub-paragraph c). In addition to the ADS-B ground stations, the requirement for provision of VHF radio communication service had also been identified and included in the TOR.

3.2 The SEA ADS-B WG/4 meeting recognized that the area of interest to the working group for sharing ADS-B surveillance data is not only limited to air space between Australia and Singapore, and South East Asia but also covered most part of South China Sea area, the working group agreed to invite other States that have interest to participate in the future meetings of the working group. The meeting agreed to include Brunei Darussalam as member of the working group. The Secretariat was requested to invite China and Hong Kong China to the next meeting of the working group.

3.3 The meeting reviewed the TOR and considered it broad enough as it stands. The meeting did not identify need to further amend the TOR. Hong Kong China informed the meeting that Hong Kong China will confirm later its readiness for joining the working group as a member.

3.4 While reviewing the TOR, the meeting discussed following issues:

- The meeting agreed that closer coordination and information sharing with relevant ATS TF or groups of APANPIRG for South China Sea area should be encouraged to achieve maximum operational benefit for increasing capacity and efficiency;

- The need for early consideration of eastern part of Bay of Bengal for ADS-B data sharing and introduction of the ADS-B by States for providing radar like separation service was identified. This would require India and Myanmar to join the working group. The meeting was reminded that ad-hoc working group of ADS-B SITF for BoB and SA has been discussing and identifying the requirement and potential locations for optimum coverage;

- With regard to the requirement to identify optimum coverage of ADS-B ground stations and associated VHF radio voice communication in the sub-regional FIR boundary area, CANSO noted that in the previous meetings, some States had informed the Working Group of their plans to install such facilities on an ad-hoc basis. It was considered useful if coordination was carried out early on a Sub-regional basis to ensure optimum coverage. In this connection, Singapore agreed to take lead to further develop a coverage chart based on additional information for review by the working group. The updated chart based on the available information was reviewed by the meeting and is provided in **Appendix B** to this Report.

Agenda Item 4: Updating States' Activities and Issues on Regional Trials

Australia Upper Airspace Project

4.1 Australia informed the meeting that the ADS-B Upper Airspace Project (UAP) was operationally commissioned on 19 December 2009 and air traffic controllers are now authorized to provide 5 NM separation services using ADS-B based surveillance service for air traffic at and above FL290. The coverage is currently available across the whole continent from 27 ground station sites. The meeting was informed that operational feedback since commissioning has been extremely positive and more than 70 per cent of all scheduled international flights in Australia are ADS-B approved aircraft.

4.1.1 It is planned that the last ADS-B ground station of UAP Phase 1 at Broken Hill will be commissioned in next few weeks followed by the first ground station of Phase 2 at Loard Howe Island in April 2010. Additional 16 sites are planned to be installed as part of UAP Phase 2 to provide
ADS-B coverage within existing SSR coverage to provide a backup and improve tracking performance which will extend ADS-B coverage to all en-route sectors. The meeting also noted that that testing of the Tasmanian WAM system had been completed which includes 14 receivers each of which is ADS-B capable. Multilateration systems at Sydney will replace PRM E-Scan SSR and ASMGCS at several major airports are being installed. This system will include ADS-B capability.

4.1.2 The meeting congratulated Australia for commissioning the Upper Airspace Project which indicates significant milestone for ADS-B implementation that has been achieved. It will motivate other States for early implementation. While commending the achievement, IATA informed the meeting that feedback received from one airlines was positive as response time of clearance to requests for changing flight level has been reduced.

Indonesia

4.2 Indonesia informed the meeting that 27 ADS-B Ground stations with dual system had been installed at Makassar, Sorong, Natuna, Kupang, Merauke, Banda Aceh, Matak, Cilacap, Soekarno Hatta Airport-Jakarta, Tarakan, Pangkalan Bun, Palu, Kintamani - Bali, Waingapu, Alor, Galela, Ambon, Saumlaki, Medan, Pakanbaru, Palembang, Pontianak, Timika, Biak, Kendari, Manado, and Surabaya. Amongst which 18 Stations in the Eastern part of Indonesia are connected to Makkasar Air Traffic Service (MAATS) ATM system and 9 ADS-B Ground Station in the Western part of Indonesia are linked to the Remote Control Monitor System (RCMS) in JAATS-Jakarta. The Test-Bed system at DGCA Headquarters is able to monitor and control the ADS-B Data from these 27 ADS-B Ground Stations.

4.2.1 MAATS-Makassar has been upgraded from Eurocat-X version 2.4 to version 3.15 integrating with ADS-B capabilities and was commissioned in December 2009. DGCA will establish Implementation Team for ADS-B implementation. Required regulations such as Operational Concept, Safety Assessment, ADS-B Procedure will be developed and introduced into CASR. For Near Term, DGCA has a plan to use ADS-B for Situational Awareness in MAATS Center. Cross FIR boundary operational data sharing has been identified as the initial application of ADS-B Services. Based on experience gained in using ADS-B for situational awareness, Indonesia will provide separation services using ADS-B.

4.2.2 The meeting congratulated Indonesia for the work completed and significant milestone achieved. In response to a query, it was clarified that ADS-B based separation service is expected to be provided in 2013. The meeting also supported the intension of Indonesia for ADS-B data sharing from which huge benefits could be derived.

Singapore

4.3 Singapore informed the meeting that the Civil Aviation Authority of Singapore (CAAS) installed an ADS-B station and an ADS-B data processor in Singapore on 7 December 2009.

The installation will:

a) complement the existing surveillance coverage by the Long Range Radar;
b) allow Singapore to perform operational trial using ADS-B data; and
c) complement the coverage of Indonesia and Vietnam through data sharing.

4.3.1 The ground station supplied by Comsoft GmbH supports ASTERIX Cat 21 versions 0.23, 0.26 and 1.3 with coverage of about 290 NM based on targets of opportunity. The ADS-B data processor can also process versions 0.23, 0.26 and 1.3 of ASTERIX Cat 21. The processing system is able to fuse ADS-B data from various sources and customized filtered dataset for each user.

4.3.2 It was also informed that the ADS-B data is currently used mainly for technical evaluation and familiarization. CAAS considers purchasing a stand-alone controller position to conduct operational trials, before the commissioning of the new ATM automation system in early 2012. Singapore is ready to share ADS-B data with other States.

Malaysia

4.4 Malaysia provided following updates:

- DCA Malaysia had a discussion with DGCA Indonesia at Special Coordination Meeting which was held in June 2009 regarding ADS-B data sharing from Banda Acheh for ATC surveillance in Bay of Bengal. The discussion is still on-going;

- Malaysia had started upgrading the ATM System which will be able to integrate all the surveillance data inclusive of ADS-B. The project is scheduled to be completed in April 2011;

- Malaysian airspace is covered by radar except for a small portion in the Bay of Bengal which at the moment is covered by ADS-C. Nevertheless DCA Malaysia has submitted in 10th Malaysia Plan to install ADS-B station and also upgrade and refurbish the present radars;

- DCA Malaysia expects the timeline for ADS-B mandatory equipage in Kuala Lumpur and Kota Kinabalu FIRs to be before 2020.

4.4.1 Malaysia was encouraged to advance planning for providing ADS-B based surveillance service for its air space in BoB area.

Hong Kong, China

4.5 Hong Kong China reconfirmed its plan for:

- mandate ADS-B carriage, by end 2013 for aircraft flying over ATS routes L642/M771;

- mandate ADS-B carriage, by end 2014, for aircraft flying within Hong Kong FIR; and

- mandate ADS-B carriage, after 2015 to be confirmed, for low flying aircraft including general aviation aircraft and helicopters.

Cambodia

4.6 The meeting was informed that airspace of Phnom Penh FIR is covered by radar. Cambodia has no immediate plan for the implementation of ADS-B. With assistance provided by JICA, Cambodia has developed a master plan for CNS/ATM systems implementation including ADS-B. Cambodia has coordinated the implementation plan with neighboring States – Laos and Viet Nam. Cambodia has also initiated coordination with Thailand.

Agenda Item 5: Review of sub-regional implementation plan

- Near-term implementation plan, including operational plan
- Harmonization of ADS-B regulations, rules and procedures

Review Outcome of the SEA ADS-B WG/4

5.1 The meeting reviewed actions agreed by the Fourth meeting of SEA ADS-B WG to expedite ADS-B implementation in South China Sea area. The meeting also reviewed and updated the status of action items of Task List arising from the SEA ADS-B WG/4. The meeting noted that results of those completed action items were presented to ADS-B SITF/8 meeting.

5.1.1 With respect to the task No. 3, the meeting was informed that certain aircraft types carrying the following equipage list while approved for the Australian ADS-B OUT operations required equipage upgrade, approved ramp test and/or certification to meet the AMC 20-24 requirements. These can incur significant costs either on per aircraft or a per fleet basis. Aircraft equipage known to be affected (although not exhaustively) are as follows:

1) Honeywell MMR RMA-55B with part number 066-50029-1161
2) Honeywell GPSSU GR-550 with part numbers HG2021GC01/GC02
3) Honeywell GPSSU GR-550 with part number HG2021GP01

5.1.2 For task No.2, Singapore and Indonesia agreed to prepare a paper on further updates to the data sharing template based on experience gained in using the template for next ADS-B SITF meeting to be held in May 2010.

Australia-Indonesia Data Sharing Project

5.2 Australia and Indonesia provided an update on their data sharing project. Airservices Australia has approved Phase 1A. Indonesia's DGCA has also approved Phase 1A and an ADS-B Filter has been installed in MAATS, Makassar. The ADS-B Filter has been tested and integrated into the ATC System in MAATS (Eurocat-X). The tests were conducted between two States and the result of the test was successful. The need to re-establish satellite channel previously used between Bali and Brisbane had been identified.

5.2.1 The meeting noted that four ADS-B ground stations at Saumlaki, Merauke, Thursday Island and Gove have been installed and are operating. A draft agreement is in the final stage of co-ordination for signature by the two States. The draft is based on large part of the sample agreement developed by SEA ADS-B WG. The meeting noted the planned schedule of the projects and target dates of some specified milestone. Recognising that the agreement needs approval from Foreign and Defence Ministries of Indonesia, the meeting encouraged DGCA to make every effort to get it approved by the authorities as early as possible.

5.2.2 It should be clarified that no issue of sovereignty is involved as the data derived from aircraft has been shared in ADS-C applications for years. The difference between ADS-C and ADS-B is updating rates. It is not like radar data which may involve liability concerns. The target date of using ADS-B data for situational awareness and safety nets by ATC is set for 2010 for Australia and 2011 for Indonesia. The expected outcome and benefits of the project Phase 1A are as follows:

- reduced numbers of safety incidents at the FIR boundary;
- earlier detection of ATC and pilot errors (co-ordination errors, incorrect Flight level etc);
- increased support and confidence in data sharing to allow introduction of radar-like separation at the FIR boundary in a future phase; and
- technical & operational analysis of data in preparation for future application of radar like separation services.

5.2.3 The project is expected to extend to Phase 1B and possibly Phase 2. The Phase 1A shall be operational before requesting approval to commence phase 1B which would comprise following additional sites:

Australia: Darwin, Broome, Doongan
Indonesia: Waingapu, Kintamani, Kupang
(All these stations are already operational except Darwin)

5.2.4 The Phase 2 would transit to radar-like separation when both parties have in place suitable infrastructure such as duplicated data communication links and DCPC capability. The meeting appreciated the progress made by the two States and supported the continued execution of the project.

Updates on ADS-B Data Sharing in South China Sea area

5.3 Singapore updated the implementation plan in the South China Sea area. Indonesia, Singapore and Vietnam have been jointly working on the installation of ADS-B ground stations and VHF radios. Discussions were also held between the parties concerned on the ADS-B data sharing and the use of the VHF radio facilities at other party's premises. It was explained that confirmation to the final version of the paper was not received from Viet Nam.

5.3.1 ADS-B operations will be implemented in the Singapore FIR in 2 phases. In Phase I, ADS-B operations will apply to ATS routes L642 and M771 while other ATS routes in the Singapore FIR could be covered in Phase II. ADS-B operations will be exclusive and applicable between FL310 and FL410. Aircraft intending to operate in ADS-B airspace will need to be ADS-B equipped and certified accordingly. The task list and proposed milestones to achieve this is shown in **Appendix C** to this Report.

5.3.2 CANSO congratulated Indonesia, Viet Nam and Singapore for the project and for coming up with the project timeline and milestone so that all parties could work towards timely completion of the project. It was further stated that this was an excellent example of regional collaboration involving multiple ANSPs which would pave the way for the wider implementation of ADS-B in the ASIA/PAC Region.

5.3.3 IATA supported efforts made by the three States to enable ADS-B data and DCPC capability sharing. IATA totally endorsed the proposed steps and emphasized the very important role of the project with clear timelines. Member Airlines are expecting to receive early benefits as best equipage should be able to receive best service.

5.3.4 The meeting supported task and milestones as specified in the paper and provided in the Appendix C. States concerned were urged to progress the project according to the proposed timelines. Indonesia informed the meeting that JAATS will be ready by the end of 2012.

Review of Bay of Bengal/South Asia (SA) and SEA Sub-regional Projects

5.4 The meeting reviewed the outcome of the discussions on the Sub-regional ADS-B implementation projects from Bay of Bengal/South Asia (SA) and South East Asia (SEA), ad hoc working groups at the ADS-B SITF/8 meeting which could serve as a basis for further development of the sub-regional near-term implementation plan.

5.4.1 While reviewing outcome of SA ad hoc working group of the ADS-B SITF, IATA indicated interest for implementation ADS-B in part of BoB area and highlighted importance of sharing ADS-B and VHF DCPC in eastern part of the area. The meeting agreed that the State to host the next meeting of the Working Group should issue letter of invitation to Myanmar and India.. The Secretariat will also facilitate the invitation to the States concerned.

5.4.2 The meeting was of the view that the priority and focus should be maintained to the identified projects in the South China Sea area and ATS routes between Australia and Indonesia to be implemented first. The area covered should not be very broad. Other Sub-regions will follow good example once it is implemented.

Revised Australian Standards for Aircraft ADS-B Avionics

5.5 Australia informed the meeting that CASA has amended its legislation that specifies the standards for aircraft ADS-B equipment configurations for use in Australia. The main issue taken into consideration was the Selective Availability Aware (SA Aware) capability of the GNSS equipment. The revised Australian standards for ADS-B avionics were issued and it took effect on 22 December 2009.

5.5.1 The previous Australian rule required SA Aware in the aircraft GNSS system after June 2012. Most airline aircraft, other than those manufactured in the last 4-5 years, do not have that feature. The amendment now permits aircraft manufactured before June 2012 to retain existing equipment not having the SA Aware feature. The result is significant cost savings by not replacing existing equipment. However, aircraft manufactured after 28 June 2012 will be required to be fitted with GNSS equipment having SA Aware. The GNSS integrity features of Fault Detection and Exclusion (FDE) and the output of Horizontal Protection Limit (HPL) are retained for all aircraft.

5.5.2 The revised rules are applicable to Australian aircraft and foreign aircraft operating in Australia. Existing airline aircraft having FDE and HPL technology in their GNSS systems are not affected. This includes most existing airline aircraft used on international services.

5.5.3 CASA has taken account of recent representations and information from a number of sources including airline aircraft manufacturers, airlines, IATA, as well as information presented at several APANPIRG Meetings: ADS-B SITF/8 Meeting held in Hanoi in May 2009; the CNS/MET SG/13 meeting held in Bangkok in July 2009 and the APANPIRG/20 meeting held in September 2009.

5.5.4 The existing date of 12 December 2013 after which all aircraft operating in airspace at and above FL290 must have ADS-B equipment is not affected by the amendments. As this change has an effect on air traffic surveillance by ATC, the proposal was co-ordinated with Airservices Australia. Safety outcomes will not be affected as Airservices is planning to make changes to the current NUC and NIC integrity level thresholds of aircraft ADS-B transmissions for display on ATC screens. The revision will not impose any additional requirements on aircraft operators. A copy of amended Australian ADS-B rule is provided in the **Appendix D** to this report.

Indonesian ADS-B Filter for Data Sharing

5.6 The meeting was informed that Indonesia has decided to develop a server based ADS-B Filter to manage ADS-B data sharing with other countries. The first installation of the Filter serves as a gateway for data exchanged between the Eastern Part of Indonesia and Australia. A simulation was conducted in Canberra between DGCA Indonesia and ASA Australia on 18 December 2009. During the simulation, DGCA Indonesia provided the sample data from two Ground Stations at Merauke (Sensis) and Saumlaki (Thales), and ASA Australia provided the sample data from two Ground Stations Thursday Island and Gove (Thales). Through the successful simulation, some data format incompatibility was detected and will be resolved.

5.6.1 Data Format Adaptation: the Filter is easy to be integrated with ATC system and has capability to convert Asterix21 version 0.23 to version 0.26, and vice versa. The Filter is basically functioning as a gateway to the foreign ADS-B Networks. ADS-B messages from Indonesia is filtered before sending it to other countries and at the same time it also could blocks unwanted ADS-B messages from the foreign ADS-B network before entering Indonesian ATM system. Based on Draft Data Sharing Agreement between Indonesia and Australia, criteria for some parameters will be applied such as Asterix21 field (SIC/SAC, FOM, Altitude, Latlong, etc), Geographical criteria (distance from FIR, route, etc).

5.6.2 A technical presentation on ADS-B data filter from PT. Infokom Elektrindo was made and some clarifications were provided to the questions raised on various subjects related to the Filter. The meeting noted that Indonesian ADS-B Filter was developed in December 2009 and has been successfully tested for integration with ATC system in MAATS Makassar. It was stated that the filter is upgradeable.

5.6.3 Singapore suggested that rule for setting parameters of filter and any dropping or amendment of ADS-B data should be further addressed by the working group. The meeting agreed to include this new requirement into the updated sample template on data sharing as mentioned in the paragraph 5.1.2. Singapore and Indonesia agreed to provide draft updated template to the next ADS-B SITF and WG.

Approved Aircraft and Avionics

5.7 Australia informed the meeting that before ATC use ADS-B data in Australia, approval must be obtained for each airframe from the safety regulator (CASA). This process is being used to ensure that equipment which does not meet the performance requirements is not inadvertently used during the transition to ADS-B technology. Australia hopes to remove the aircraft by aircraft approval process in the future.

5.8 The approved types of airframe and avionics combinations by Australia up to Mid January 2010 are provided in the **Appendix E** to this report.

Agenda Item 6: Any other Business

Review Regional PFF on ADS-B

6.1 The meeting reviewed the Regional Performance Objective on ADS-B. The updated Performance Framework Form on ADS-B is provided in **Appendix F** to this report.

6.2 The meeting expressed appreciation and gratitude to DGCA, Indonesia for hosting the meeting and hospitality extended to the participants.

6.3 Australia made a presentation on ADS-B GA avionics which had been also presented to the ADS-B Seminar held in Hanoi in May 2009.

Agenda Item 7: Time and Venue of the Next Meeting

7.1 The meeting identified the need to organize another meeting to progress the sub-regional plan. Singapore indicated that if no other member States wishes to host next WG meeting, Singapore would host the Sixth Meeting of the SEA ADS-B Working Group in early 2011. The exact dates will be informed to the members States by the Secretariat at due course.

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EXTRACT FROM REPORT OF APANPIRG/20 (7 – 11 SEPTEMBER 2009) ON ADS-B

3.4 CNS/MET matters

The meeting reviewed the outcomes of the Thirteenth Meeting of Communications, Navigation and Surveillance/Meteorology Sub-Group (CNS/MET SG/13) of Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG) held in Bangkok from 20 to 24 July 2009.

Seminar on Testing Of Navigation and Surveillance Facilities and Validation of Flight Procedures

3.4.44 The meeting was informed that in accordance with APANPIRG Conclusion 19/32 a *'Seminar on Navigation and Surveillance Facilities and Validation of Flight Procedures'* was held at the Regional Office, Bangkok from 5 to 7 August 2009. It was jointly hosted by ICAO and Aeronautical Radio of Thailand (Aerothai). After reviewing the outcomes of the Seminar, the meeting adopted the following Decision recommending assessment of the need for developing guidance for inspection/validation of ADS-B ground stations.

Decision 20/47 - Guidance material for flight inspection/validation of ADS-B ground stations

That, ADS-B SITF be tasked to study the need for developing guidance material for flight inspection/validation of ADS-B ground stations.

Surveillance Systems

Review Report of the Eighth Meeting of ADS-B Study and Implementation Task Force

3.4.75 The meeting reviewed the outcome of ADS-B Seminar and the Eighth Meeting of Automatic Dependent Surveillance – Broadcast (ADS-B) Study and Implementation Task Force (ADS-B SITF/8), hosted by CAAV and VANSCORP Viet Nam in Ha Noi, Viet Nam from 18 to 22 May 2009.

3.4.76 The objective of the ADS-B Seminar was to provide information to the participants on ADS-B planning and implementation and to facilitate discussions at the meeting. The Seminar covered a comprehensive list of topics on the ADS-B implementation and was well received by the participants.

Terms of Reference and Subject/Tasks List of the ADS-B Study and Implementation Task Force

3.4.77 The meeting noted that no changes to the TOR was proposed and agreed with the Subject/Tasks List updated by the ADS-B SITF and adopted the following Decision:

Decision 20/50 - Subject/Tasks List of ADS-B Study and Implementation Task Force

That, the Subject/Tasks List for ADS-B Study and Implementation Task Force provided in **Appendix P** to the Report on Agenda Item 3.4 be adopted.

3.4.78 The meeting considered it essential to develop common understanding for the regulators to publish equipage requirement for ADS-B OUT based service. The meeting supported to organize a regulators workshop on ADS-B OUT equipage requirement before May 2010 as recommended by the Task Force. Australia and USA reconfirmed to support the workshop through coordinating and providing experts including those from industry for the Workshop. Accordingly, the meeting formulated the following Conclusion:

Conclusion 20/51 - Workshop on ADS-B OUT equipage requirement

That, ICAO be invited to organize a workshop on ADS-B OUT equipage requirement before May 2010 with the assistance from Australia and USA.

Updates on ADS-B Planning and Implementation

3.4.79 The meeting reviewed implementation status updated by States at the Task Force meeting and noted some issues observed during the trials and implementation.

Australia

3.4.80 Australia provided explanation and analysis on requirements for TSO 145/6 GPS receiver that includes FDE and SA Aware capabilities and examined ADS-B NUC values for various GPS MMR and transponders. Australia encouraged other States to perform similar analysis to further confirm or refute Australian findings with respect to SA ON avionics ADS-B service reliability.

3.4.81 The meeting noted that a PC based ADS-B Filter called Foreign ADS-B Filter (FAF) is being developed by Australia to control the exchange of ADS-B data between Australia and its neighbors. The development of FAF is expected to be completed in 2009. The functional and system requirement were provided for consideration by other States who wish to share ADS-B derived data. The meeting felt that the FAF could be installed at either site or at both the sites which should be specified in the data sharing agreement. The reliability and redundancy of FAF should also be taken into account when a PC based system is used.

3.4.82 The meeting noted experience gained and lessons learnt in deploying Wide Area Multilateration in Tasmania, Australia. The project started in May 2006 and the Site Acceptance testing commenced in May 2008. A number of flight tests have been conducted as part of Site Acceptance Testing. Final flight test and conclusion of SAT is expected in 2009.

China

3.4.83 China provided the result of the Trial & Evaluation Project conducted in South Western part of China to support ADS-B implementation. Several issues including analysis of the invalid data were identified. The meeting discussed and analyzed some issues resulting from the ADS-B evaluation project including velocity and heading evaluation, low updates rate, etc. The issues and findings observed in the real flight testing were considered very useful.

Hong Kong, China

3.4.84 It was noted that Hong Kong, China plans to:

a) mandate ADS-B carriage, by end 2013, for aircraft flying over L642/M771;

b) mandate ADS-B carriage, by end 2014, for aircraft flying within the Hong Kong FIR; and

c) mandate ADS-B carriage, after 2015 (TBC), for low flying aircraft, including general aviation aircraft and helicopters.

New Caledonia

3.4.85 Three ground stations were installed at the existing VHF sites in New Caledonia in March 2009. Technical testing will be conducted during October to December 2009 and operational testing will start from end of 2009 and will be completed by mid. 2010.

Pakistan

3.4.86 The meeting noted that most of the Pakistan airspace currently is already under radar surveillance, some gaps in the west, northern mountain regions and some portion in the south and southwest airspace need to be brought under positive visibility/surveillance. PCAA considers ADS-B, a potential option to fill up the gaps in radar surveillance and also considers using ADS-B to provide partial back up to the existing radar. One ADS-B station was installed at Karachi ACC on trial basis for a period of one year.

The Philippines

3.4.87 The Civil Aviation Authority of the Philippines (CAAP) installed a new Mode S SSR capable of processing ADS-B reports based on 1090ES. This enables the monitoring of ADS-B equipped aircraft in the 100NM radius from the radar station. The ADS-B function of the radar will be used to observe and evaluate population of aircrafts equipped with ADS-B within 100 NM. The CAAP has planned to install two stand alone ADS-B stations in Manila and Puerto Princesa by 2012. The CAAP also intends to include the ADS-B function in all other Mode S SSR stations that will be installed in 2012.

Viet Nam

3.4.88 Viet Nam has been participating in South East Asia's programme on ADS-B implementation and has committed to share ADS-B data with its neighboring States. Viet Nam will also consider sharing VHF communication capabilities with neighboring FIR when ADS-B control is applied. Viet Nam had preliminary discussion with stakeholders on upgrading ATM system in Ho Chi Minh AACC to process ADS-B data and sharing of ADS-B data with Singapore.

ADS-B Data Sharing

3.4.89 ADS-B data sharing between Australia and Indonesia is expected to be operational in the 2nd Quarter 2010. This phase (Phase 1A) will use single data communications infrastructure to support situational awareness and safety nets. It is proposed to use an existing satellite data communications link between Australia and Indonesia. Phase 1A, for which funding has been approved will include data sharing from existing ADS-B sites at:

- Thursday Island (installed)
- Gove (to be installed in 2009)
- Merauke (installed)
- Saumlaki (installed)

3.4.90 The meeting noted that Indonesia has offered to share its ADS-B data from Banda Aceh ground station with Malaysia during the fourth South-East Asia sub-regional ADS-B implementation working group meeting. It was noted that the ADS-B data from Banda Aceh station is expected to enhance Malaysia surveillance capability within its AOR in the Bay of Bengal Area. The meeting further noted that the current Kuala Lumpur ATCC ADS-C/Radar integrated workstation for oceanic (Bay of Bengal) Sector is capable of processing and integrating ADS-B data.

3.4.91 Indonesia confirmed that the ADS-B ground station has been installed with data format ASTERIX 21 version .23 and is ready to further discuss with Malaysia data sharing arrangements. It was encouraging to note the initiatives being taken by Malaysia and Indonesia for ADS-B data sharing in the Bay of Bengal area. States concerned were encouraged to consider sharing VHF communication capability wherever they are applicable.

FASID Tables on Surveillance Systems

3.4.92 The meeting noted that the Tables CNS 4A and 4B of the Asia and Pacific Air Navigation Plan, Volume II, FASID, Doc 9673 were reviewed and updated by the Task Force meeting. Table CNS 4 renamed as Table CNS 4A – Surveillance Systems in 2006 specifies Surveillance System requirements and Table CNS 4B renamed from the Table ATS 3 specifies ATS Automation Systems requirements. The meeting accordingly adopted the following Conclusion:

Conclusion 20/52 - Table CNS 4A and Table CNS 4B

That, the FASID Table CNS 4A and Table CNS 4B be replaced with updated Tables provided in **Appendix Q** and **Appendix R** to the Report on Agenda Item 3.4 in accordance with the established procedure.

South East Asia (SEA) ADS-B Working Group

3.4.93 The meeting noted the outcome of the fourth meeting of the South East Asia ADS-B Working group hosted by Airservices Australia in Melbourne on 9-10 February 2009. The meeting agreed with the following actions to expedite ADS-B implementation in South China Sea area:

i) complete installation of ADS-B stations at Natuna and Matak Islands, Singapore and Con Son Island by 2010;

ii) sharing of ADS-B data and DCPC capability between Indonesia, Singapore and Vietnam to facilitate application of radar-like separation standards;

iii) commence ADS-B operational trials in 2010 along air routes L642 and M771; and

iv) the earliest operational trial to be conducted approximately by the end of 2010 depending on new ATC automation system capabilities in the States. It was envisaged that an ADS-B mandate for some flight levels could come into effect in 2013.

Cost benefit study for South China Sea area

3.4.94 CANSO provided information on the outcome of a Cost Benefit Study conducted by CANSO and IATA for initial phase of ADS-B implementation over the South China Sea. The study results indicated a positive business case and highlighted operational efficiencies and savings that can be derived through the implementation. FAA was helping in the analysis, and CAA Singapore was helping with the collection of operational and technical data. The meeting appreciated the outcome of the cost benefit study.

Guidelines for Development of ADS-B Implementation plan

3.4.95 The meeting recalled the "Guidelines for development of ADS-B Implementation plan by States" adopted by APANPIRG/19 meeting under Conclusion 19/35. The meeting endorsed a proposal by Viet Nam and agreed by the Task Force to revise the guidelines with additional information and formulated the following Conclusion:

Conclusion 20/53 - Revised Guidelines for Development of ADS-B Implementation Plan by States

That, the revised guidelines for Development of ADS-B Implementation Plan by States provided in **Appendix S** to the Report on Agenda Item 3.4 be adopted.

Australian ADS-B aircraft mandate

3.4.96 Australia informed the meeting that in March 2009, the Civil Aviation Safety Authority (CASA) issued legislation for an ADS-B aircraft equipment mandate both for Australian and foreign registered aircraft for flight in the upper Australian territorial airspace (at and above FL290), with a compliance date on and from 12 December 2013. The text of the mandate is available on the following webpage: http://www.casa.gov.au/newrules/airspace/jcp/nfrm_jcp_annexb.pdf
The meeting noted additional information provided by Australia at APANPIRG/20 meeting about their plans to revise ADS-B aircraft equipage mandate to make the technical specifications for GNSS position source equipment for aircraft more explicit and extend the date for certain technical compliances (SA Aware) till 2015. These revisions are based on the outcome of various regional meetings which include ADS-B SITF and CNS/MET SG meetings. It was assured that the revision will neither increase the cost nor impose any additional technical requirements. The meeting noted that IATA and their members have been the early supporters of ADS-B and recognized that Australia has been leading the world in many developments. IATA continues to support the intent of the Australian ADS-B mandate.

Options for states to establish Aircraft ADS-B avionics mandate

AMC20-24

3.4.97 The meeting noted the considerations of third meeting of South East Asia ADS-B WG in July 2008 on AMC20-24 published on 25 April 2008 by the European Aviation Safety Agency (EASA) which defines acceptable means of compliance for the airworthiness and operational approval of the "Enhanced Air Traffic Services in Non-Radar Areas using ADS-B Surveillance" The working group meeting agreed that AMC20-24 with proposed changes serves as baseline document for further consideration. The AMC20-24 with proposed changes by SEA ADS-B WG is provided in the Appendix J to the Report of the ADS-B SITF/8.

ADS-B OUT Equipage Standards - IATA

3.4.98 The meeting noted a proposal for ADS-B OUT Equipage Standards proposed by IATA for the Asia/Pacific Region. It was stated that both the Australian approval method and AMC 20-24 are suitable standards for Asia Pacific. EASA AMC20-24 is better recognized as a global benchmark detailing an acceptable means of compliance for operation in non-radar areas. AMC 20-24 should eventually be adopted as the equipage standard for Asia and Pacific. Forward fit aircraft should comply from commencement of operations while retrofit aircraft must comply by 2013.

3.4.99 Regarding approval process for ADS-B OUT, IATA expressed that it should be no different for any other avionics equipment. The contracting States shall recognize as valid an air operator certificate issued by another Contracting State. Australia informed the meeting that a possible way is to endorse the list of CASA approved aircraft that can be provided on request.

Regional ADS-B Equipage Requirement

3.4.100 The meeting noted the information of options for states to establish harmonized Aircraft ADS-B avionics mandates including Australian ADS-B mandate for upper airspace from 12 December 2013, AMC20-24 published on 25 April 2008 by the European Aviation Safety Agency (EASA) which defines acceptable means of compliance for the airworthiness and operational approval of the "Enhanced Air Traffic Services in Non-Radar Areas using ADS-B Surveillance". The meeting also noted the current state of development of the regulations in Canada and USA.

3.4.101 The meeting agreed that the Australian approval method and AMC20-24 are suitable standards for Asia/Pacific Region. However, it was also recognized that some aircraft configurations are currently unable to obtain AMC 20-24 certification without upgrade despite being in compliance with the current Australian standard. In the interim, these aircraft can and should be authorized to operate ADS-B in the Asia/Pacific Region. At the same time, the benefits of SA aware avionics and FDE were recognized and it is recommended that new aircraft should be fitted with these capabilities. Therefore, States are recommended to identify these capabilities as forward fit requirements as soon as reasonable.

3.4.102 The meeting, after considering additional comment from IATA regarding introduction of appropriate regulations to allow any of the stated requirements, adopted following two Conclusions:

Conclusion 20/54 - Regional ADS-B Equipage Requirement

That, States be urged to issue ADS-B authorizations for the interim period 2010-2020 (or until requirements can be harmonized globally) in Non-Radar Areas (NRA) airspace based on:

- AMC20-24 certification or
- Approval by CASA Australia or
- The requirements of the CASA Civil Aviation Order 20.18 Amendment (No. 1) 2009 and Advisory Circular AC21-45

Note: States that have not yet published regulations should implement necessary regulations that recognize that any one of the above requirements is acceptable and not specify an individual requirement

Conclusion 20/55 - Forward Fitment Requirements for SA Aware and FDE functionality

That, ICAO recommend States concerned to adopt forward fitment requirements which include SA aware and FDE functionality as soon as reasonable.

Sub-regional ADS-B implementation projects

3.4.103 The meeting noted the outcome of the discussion by the three ad hoc working groups established during the Task Force meeting to further develop proposals for sub-regional implementation plans for South East Asia, Bay of Bengal and South Asia and Pacific. The outcome is provided in Appendix K to the report of ADS-B SITF/8.

Note of appreciation

3.4.104 The meeting appreciated the efforts and progress made by the ADS-B SITF and the SEA ADS-B WG and expressed its appreciation and gratitude to the Civil Aviation Authority of Viet Nam and VANSCORP for hosting the ADS-B Seminar and the Task Force meeting. The meeting also expressed appreciation to Airservices, Australia for hosting the fourth meeting of the SEA ADS-B Working Group.

Time and Venue of Next Meeting

3.4.105 The fifth meeting of SEA ADS-B Working Group is scheduled to be held during the end of 2009 or early 2010 in Indonesia and the next meeting of ADS-B Study and Implementation Task Force is scheduled for April/May 2010.

Under Agenda Item 3.2 of APANPIRG/20 Report:

USA - Operational Trial of ADS-B In-Trail Procedures

3.2.33 The United States provided an in-depth update on planning by the FAA to conduct an operational trial of ADS-B In-Trail Procedures (ITP) in the South Pacific. For ADS-B ITP, the maneuvering aircraft obtains the flight identification on proximate ADS-B equipped non-maneuvering aircraft using ADS-B 'IN' technologies. Based on the ADS-B data from the non-maneuvering or reference aircraft, a pilot can make an ITP altitude change request to ATC. The controller, who maintains separation responsibility at all times can then approve the manoeuvre. The planned trial will be undertaken with United Airlines B747 aircraft, and will be closely monitored and supervised by the FAA. The ATM/AIS/SAR/SG/19 meeting supported the ADS-B ITP operational trials in the South Pacific, noting the significant economic and efficiency benefits for both service providers and airspace users.

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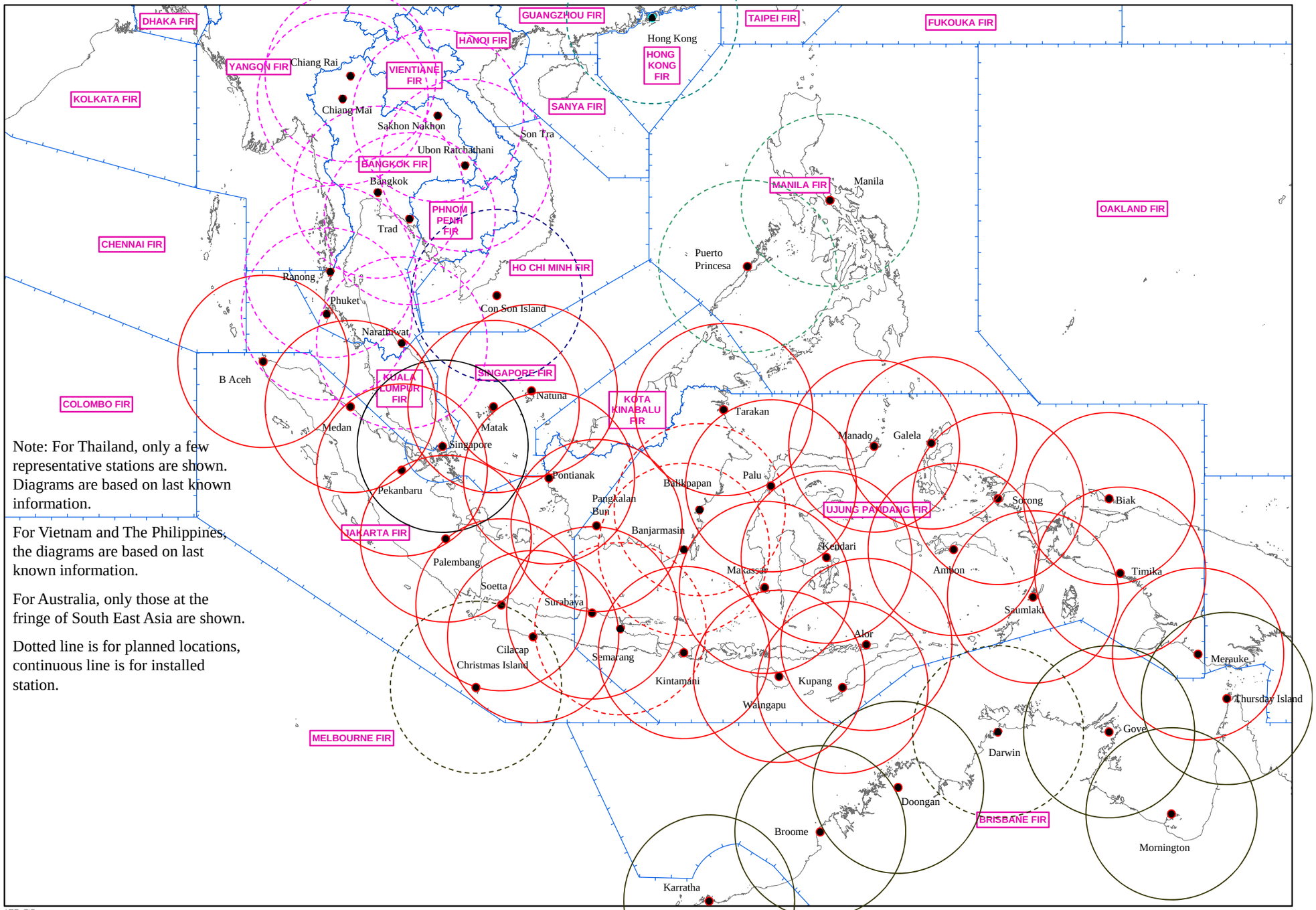

Note: For Thailand, only a few representative stations are shown. Diagrams are based on last known information.

For Vietnam and The Philippines, the diagrams are based on last known information.

For Australia, only those at the fringe of South East Asia are shown.

Dotted line is for planned locations, continuous line is for installed station.

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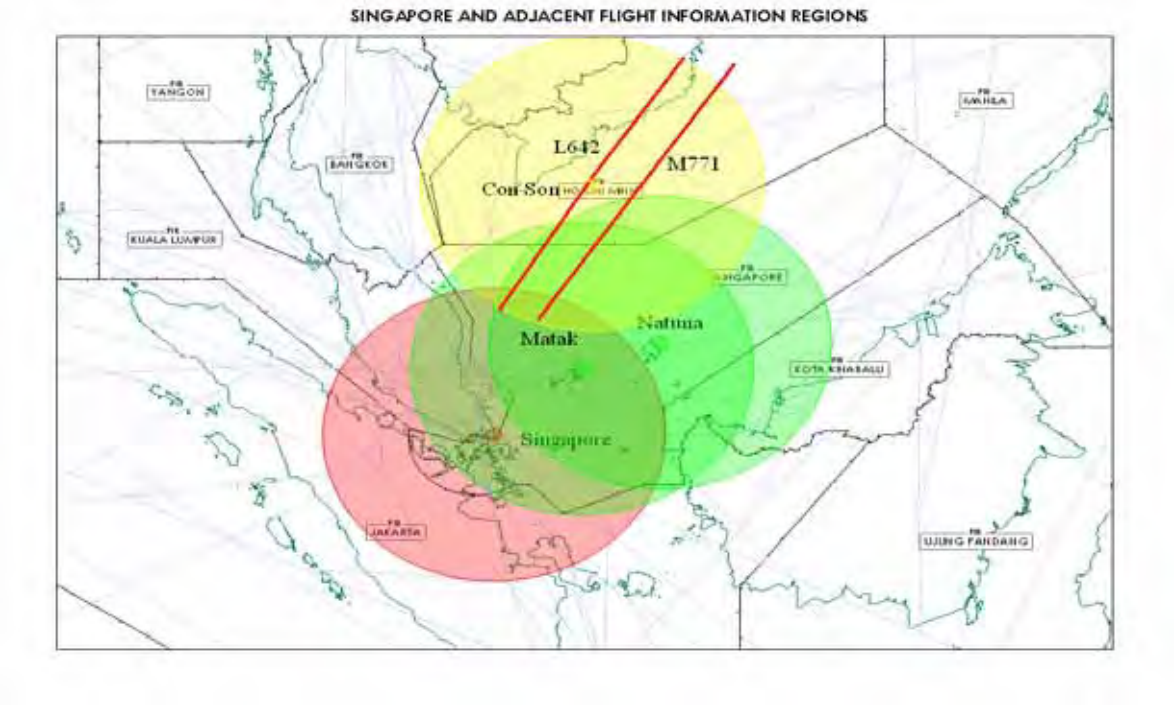
14 Nov 2007


SINGAPORE AND ADJACENT FLIGHT INFORMATION REGIONS
YANGON
BANGKOK
KUALA LUMPUR
L642
M771
Con Son
Matak
Natuna
Singapore
JAKARTA
KOTA KINABALU
UJUNG PANDANG

TASKS AND PROPOSED MILESTONES FOR THE SOUTH CHINA SEA PROJECT

A) Installation of ADS-B ground stations

i)	Natunas and Matak	-	completed
ii)	Singapore	-	completed
iii)	Con Son	-	2H 2010

B) Installation of VHF stations and links

i)	Natunas and Matak	-	2H 2010 (for 1 frequency without equipment redundancy) and 1H2011 (for 2 frequencies with equipment redundancy)
ii)	Conson	-	2H 2010

C) Signing of ADS-B data and VHF radio facility sharing agreement

i)	Between Indonesia and Singapore	-	1H 2010
ii)	Between Vietnam and Singapore	-	2H 2010

D)	Conduct of Safety Assessment	-	2H 2010
E)	Signing of LOA between Ho Chi Minh and Singapore ACCs	-	2H 2010
F)	Issue AIP Supplement on aircraft equipage mandate	-	2H 2010
G)	Integration with Singapore ATC system	-	2H 2011
H)	Conduct of ADS-B monitoring	-	1H 2011
I)	Operational trial without priority	-	2H 2011
J)	Priority for suitably-equipped aircraft and Phase II	-	2H 2012
K)	Implementation of ADS-B operations	-	1H 2014

Note: the Proposed Milestones is subject to final confirmation from Viet Nam.

Civil Aviation Order 20.18 Amendment Order (No. 3) 2009

1 Name of instrument

This instrument is the *Civil Aviation Order 20.18 Amendment Order (No. 3) 2009*.

2 Commencement

This instrument commences on the day after it is registered.

3 Amendment of Civil Aviation Order 20.18

Schedule 1 amends Civil Aviation Order 20.18.

Schedule 1 Amendment

[1] Paragraph 9B.2, definitions

insert

EASA AMC 20-24 means EASA document AMC 20-24 titled *Certification Considerations for Enhanced ATS in Non-Radar Areas using ADS-B Surveillance (ADS-B-NRA) via 1090 MHZ Extended Squitter*, dated 2 May 2008.

FDE means Fault Detection and Exclusion, a feature of a GNSS receiver that excludes faulty satellites from position computation.

GNSS means the Global Navigation Satellite System installed in an aircraft to continually compute the position of the aircraft by use of the GPS.

GPS means the Global Positioning System.

HPL means the Horizontal Protection Level of the GNSS position of an aircraft as an output of the GNSS receiver or system.

NAA has the same meaning as in regulation 1.4 of the *Civil Aviation Safety Regulations 1998*.

Note "***NAA***, for a country other than Australia, means:

(a) the national airworthiness authority of the country; or

(b) EASA, in relation to any function or task that EASA carries out on behalf of the country."

NIC means Navigation Integrity Category as specified in paragraph 2.2.3.2.7.2.6 of RTCA/DO-260A.

NUCp means Navigation Uncertainty Category – Position as specified in paragraph 2.2.8.1.5 of RTCA/DO-260.

RTCA/DO-229D means document RTCA/DO-229D titled *Minimum Operational Performance Standards for Global Positioning System/Wide Area Augmentation System Airborne Equipment*, dated 13 December 2006, of the RTCA Inc. of Washington D.C. USA (***RTCA Inc.***).

RTCA/DO-260 means RTCA Inc. document RTCA/DO-260 titled *Minimum Operational Performance Standards for 1090 MHz Automatic Dependent Surveillance – Broadcast*, dated 13 September 2000.

RTCA/DO-260A means RTCA Inc. document RTCA/DO-260A titled *Minimum Operational Performance Standards for 1090 MHz Automatic Dependent Surveillance – Broadcast (ADS-B) and Traffic Information Services – Broadcast (TIS-B)*, dated 10 April 2003.

SA means Selective Availability, and is a function of the GPS that has the effect of degrading the accuracy of the computed GPS position of a GNSS-equipped aircraft.

[2] Paragraph 9B.6

substitute

9B.6 If an aircraft carries ADS-B transmitting equipment which does not comply with an approved equipment configuration, the aircraft must not fly in Australian territory unless the equipment is:

(a) deactivated; or

(b) set to transmit only a value of zero for the NUCp or NIC.

Note It is considered equivalent to deactivation if NUCp or NIC is set to continually transmit only a value of zero.

[3] Appendix XI

substitute

Appendix XI

Part A

Approved equipment configuration

1 An equipment configuration is approved if it complies with the standards specified in Part B or Part C of this Appendix.

Part B

ADS-B transmitting equipment — standard for approval

2 ADS-B transmitting equipment must be of a type that:

(a) is authorised by:

(i) the FAA in accordance with TSO-C166 as in force on 20 September 2004, or a later version as in force from time to time; or

(ii) CASA, in writing, in accordance with:

(A) ATSO-C1004a as in force on 16 December 2009, or a later version as in force from time to time; or

(B) ATSO-C1005a as in force on 16 December 2009, or a later version as in force from time to time; or

(b) meets the following requirements:

(i) the type must be accepted by CASA as meeting the specifications in RTCA/DO-260 dated 13 September 2000, or a later version as in force from time to time; and

(ii) the type must utilise HPL at all times HPL is available; or

(c) is otherwise authorised, in writing, by CASA for the purposes of subsection 9B of this Civil Aviation Order as being equivalent to one of the foregoing types.

GNSS position source equipment — standard for aircraft manufactured on or after 28 June 2012

3 For an aircraft manufactured on or after 28 June 2012, the geographical position transmitted by the ADS-B transmitting equipment must be determined by:

(a) a GNSS receiver of a type that is authorised by the FAA in accordance with TSO-C145a or TSO-C146a as in force on 19 September 2002, or a later version as in force from time to time; or

(b) a GNSS receiver of a type that is authorised by the FAA in accordance with TSO-C196 as in force on 9 September 2009, or a later version as in force from time to time; or

(c) a GNSS receiver or system which meets the following requirements:

(i) is certified by an NAA for use in flight under the I.F.R.;

(ii) has included in its specification and operation the following:

(A) FDE, computed in accordance with the definition at paragraph 1.7.3 of RTCA/DO-229D;

(B) the output function HPL, computed in accordance with the definition at paragraph 1.7.2 of RTCA/DO-229D;

(C) functionality that, for the purpose of HPL computation, accounts for the absence of the SA of the GPS in accordance with paragraph 1.8.1.1 of RTCA/DO-229D; or

(d) another equivalent system authorised in writing by CASA.

Note The following GNSS receivers meet the requirements of clause 3, namely, those certified to TSO-C145a or TSO-C146a, or later versions, or those manufactured to comply with TSO-C196.

GNSS position source equipment — standard for aircraft manufactured before 28 June 2012

4 For an aircraft manufactured before 28 June 2012, the geographical position transmitted by the ADS-B transmitting equipment must be determined by:

(a) a GNSS receiver or system that complies with the requirements of clause 3, other than sub-subparagraph 3 (c) (ii) (C) which is optional; or

(b) an equivalent GNSS receiver or system that has been approved in writing by CASA.

Note The following GNSS receivers meet the requirements of clause 4, namely, those certified to TSO-C145a or TSO-C146a, or later versions, or those manufactured to comply with TSO-C196. Some later versions of GNSS receivers certified to TSO-C129 may also meet the requirements, i.e. those having FDE and HPL features incorporated.

Altitude source equipment — standard

5 The pressure altitude transmitted by the ADS-B transmitting equipment must be determined by:

(a) a barometric encoder of a type that is authorised by:

(i) the FAA in accordance with TSO-C88a as in force on 18 August 1983, or a later version as in force from time to time; or

(ii) EASA in accordance with ETSO-C88a as in force on 24 October 2003, or a later version as in force from time to time; or

(b) another equivalent system authorised in writing by CASA.

Aircraft address — standard

6 Unless otherwise approved in writing by CASA, the ADS-B transmitting equipment must:

(a) transmit the current aircraft address; and

(b) allow the pilot to activate and deactivate transmission during flight.

Note The requirement in paragraph 6 (b) is met if the ADS-B transmitting equipment has a cockpit control that enables the pilot to turn the ADS-B transmissions on and off.

Part C

Alternative approved equipment configuration — standard for aircraft manufactured on or after 28 June 2012

7 For an aircraft manufactured on or after 28 June 2012, an equipment configuration is approved if:

(a) it has been certified by EASA as meeting the standards of EASA AMC 20-24; and

(b) the aircraft flight manual attests to the certification; and

(c) the GNSS receiver or system complies with the requirements of clause 3 in Part B.

Alternative approved equipment configuration — standard for aircraft manufactured before 28 June 2012

8 For an aircraft manufactured before 28 June 2012, an equipment configuration is approved if:

(a) it has been certified by EASA as meeting the standards of EASA AMC 20-24; and

(b) the aircraft flight manual attests to the certification; and

(c) the GNSS receiver or system complies with the requirements of clause 4 in Part B.

The relevant URL providing the Amended Order is as follows:

CAO 20.18 *Amendment Order (No 3) 2009 (Aircraft Equipment - basic operational requirements): See section 9B and Appendix XI*

http://casa.gov.au/wcmswr/_assets/main/download/orders/cao20/2018.pdf

CAO 82.1 Amendment Order (No 2) 2009 (Conditions on Air Operator's Certificates authorizing charter operations and aerial work operations): See paragraph 5.8 and Appendices 3 and 4

http://casa.gov.au/wcmswr/_assets/main/download/orders/cao82/8201.pdf

CAO 82.3 Amendment Order (No 3) 2009 (Conditions on Air Operator's Certificates authorizing regular public transport operations in other than high capacity aircraft). See paragraph 10.8 and Appendices 6 and 7.

http://casa.gov.au/wcmswr/_assets/main/download/orders/cao82/8203.pdf

CAO 82.5 Amendment Order (No 3) 2009 (Conditions on Air Operator's Certificates authorizing regular public transport operations in high capacity aircraft). See paragraph 10.8 and Appendices 4 and 5.

http://casa.gov.au/wcmswr/_assets/main/download/orders/cao82/8205.pdf

CASA Miscellaneous Instrument 521/09 - Direction - Use of ADS-B in foreign aircraft engaged in private operations in Australian territory.

http://casa.gov.au/wcmswr/_assets/main/rules/miscinst/2009/casa521.pdf

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APPROVED AIRCRAFT TYPES AND AVIONICS COMBINATIONS BY AUSTRALIA

In mid January 2010 there are 1110 approved airframes of the following types:

Aircraft type	Number approved
AIRBUS A320	61
AIRBUS A321	4
AIRBUS A330	163
AIRBUS A340	63
AIRBUS A380	26
BELL 206L	1
De Havilland DHC-8	2
Jabiru	1
Kawasaki BK11	1
BOEING B737	62
BOEING B747	273
BOEING B777	337
PIPER 200T	1
PILATUS PC-12	6
Beechcraft B200	10
Beechcraft B350	3
McDonnell Douglas MD-11	96
	1110

1 Avionics

1.1 The ADS-B avionics comprises a GPS position source and an ADS-B transmitter.

1.2 The following combinations of equipment are currently approved. Other types are in the process of being approved. Others would qualify for approval but have not been submitted for approval.

ADS-B Transmitter	GPS Source	Number of approved aircraft	Comment
ACSS XS-950 ##	Rockwell GLU-920	287	
ACSS XS-950 ##	Rockwell GLU-925	8	SA aware GPS
ACSS XS-950 ##	Honeywell GR-550	49	
ACSS XS-950 ##	Honeywell RMA-55B	24	
Honeywell TRA-67A	Rockwell GLU-920	148	
Honeywell ISP-80A	Rockwell GLU-925	26	SA aware GPS
Honeywell TRA-67A	Rockwell GLU-925	34	SA aware GPS
Honeywell TRA-67A	Honeywell GR-550	61	
Honeywell TRA-67A	Honeywell GR-551	1	
Honeywell KT-73	Honeywell KLN900 **	4	
Honeywell KT-73	Honeywell KLN94 **	9	
Honeywell KT-73	Honeywell KMH 820**	5	
Honeywell TRA-67A	Litton LTN2001Mk	41	
Honeywell TRA-67A	Honeywell RMA-55B	159	
Honeywell TRA-67A	Thales TLS755	24	SA aware GPS
Rockwell TPR-901	Rockwell GLU-920	133	
Rockwell TDR-94D	Rockwell GLU-925	6	SA aware GPS
Rockwell TPR-901	Rockwell GLU-925	55	SA aware GPS
Rockwell TPR-901	Honeywell GNSSU	11	

Rockwell TDR-94D	Rockwell GPS-4000S	7	
Rockwell TPR-901	Honeywell GR-550	16	
Rockwell TPR-901	Honeywell HG2021	1	
Rockwell TPR-901	Honeywell RMA-55	1	
		1110	

** GPS outputs RAIM flags & not true HPL
Transponder must be “Mod A” to use HPL (rather than HFOM)

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REGIONAL PERFORMANCE OBJECTIVE: ***APAC Objective 10***

IMPROVED SITUATIONAL AWARENESS AND SURFACE SURVEILLANCE- IMPLEMENTATION OF THE ADS-B TO GROUND SURVEILLANCE

Benefits

Environment	• Reductions in fuel consumption and subsequent lower gas emissions
Efficiency	• Increased flexibility and flow of traffic operations • Ultimately, when performing *radar-like* control, potential redesign of airspace taking into account the application of reduced separation minima, integrate use of aircraft navigation and surveillance capability
Safety	• Introduction of surveillance in a non-radar environment • Support to search and rescue operations

Strategy
Medium Term (2011-2015)
Short term (2010)

ATM OC COMPONENTS	TASKS	TIME FRAME STARTED	RESPONSIBILITY	STATUS	REMARKS
AOM *(Airspace Organization and Management)* **CM** *(Conflict Management)* **AUO** *(Airspace Users Operations)*	Implementation of ADS-B based surveillance service in the sub-regions.				
ATM SDM (ATM *Service Delivery Management)*	• Compare current technologies with respect to concept of operations, relative costing, technical and operational performance and maturity of alternative technology/solutions (primary, secondary radar including Mode-S, ADS-B, multilateration, ADS-C)	2009	ADS-B Study and Implementation Task Force (ADS-B SITF)	In progress	COMPLETED Regional Guidance material on comparison of technologies issued

	• Develop an implementation plan for near term ADS-B applications in the Asia Pacific Region including implementation target dates taking into account: o available equipment standards; readiness of airspace users and ATS providers; o identifying sub-regional areas (FIRs) where there is a positive cost/benefit outcome expected for near-term implementation of ADS-B OUT; o developing a standardized and systematic task-list approach to ADS-B OUT implementation; and o holding educational seminars and provide guidance material to educate States and airspace users on what is required to implement ADS-B OUT	2009-10	ADS-B Study and Implementation Task Force	In progress	The FASID Table CNS 4A and 4B – surveillance and ATM automation being updated; ADS-B Seminar conducted annually; potential sub-regions for using ADS-B identified; Requirement for avionics specification for the near term application are being developed based on AMC2024 and Australian CASA document.

	• Develop Guidance Material to support harmonized regulation of ADS-B systems required on board the aircraft.	2010	ADS-B Study and Implementation Task Force	To be started	Forty Fifth DGCA Conference, through its Action Item 45/3 invited ICAO APANPIRG ADS-B Study and Implementation Task Force (ADS-B SITF) to develop the guidance material. Regulators Workshop is scheduled for May 2010.
	• Study and identify applicable multilateration applications in the Asia and Pacific Region considering: - Concept of use/operations; - Required site and network architecture; - Expected surveillance coverage; Cost of system; Recommended separation minimas; and - If multilateration can be successfully integrated into an ADS-B OUT system for air traffic control	2011	ADS-B Study and Implementation Task Force	In progress	Concept of using multlateration has been developed; Some states have plan in place to introduce multilateration in particular & integrate it with A-SMGCS and Terminal area and en-route surveillance application

	• Coordinate ADS-B implementation plan and concept of operations with other ICAO regions where ADS-B implementation is going on and with relevant external bodies such as EUROCONTROL, EUROCARE, RTCA and Industry.	2013	ADS-B Study and Implementation Task Force	On- going	Updated information on ADS-B in Europe and North American Regions is provided to Task Force Meeting annually; Some Industry representatives provide input at ADS-B Seminar and meetings
	• Develop **Terms of Co-operation** for SEA which will include: • Establishing model documents for possible use by States when - Agreeing to share ADS-B data and DCPC (such as VHF radio voice communication) capability between adjoining States for various ADS-B applications (including a sample letter of agreement); or - Establishing ADS-B avionics fitment mandates • Identifying optimum coverage for ADS-B ground stations and associated VHF radio voice communication in the sub-regional FIR	2011	South East Asia (SEA) Sub-Regional ADS-B Implementation Working Group	In progress	Terms of co-operation developed; sample agreement of data sharing developed; Some location for ADS-B ground stations identified. CBA for SEA project has been completed; Implementation plan for Australia-Indonesia and South China Sea Data and VHF communication capacity sharing projects are being developed by the SEA ADS-B WG.

	boundary areas.				
	Develop an **implementation plan** for near term ADS-B application in SEA which will deliver efficient airspace and increased safety on a regional basis that includes: • Schedule and priority dates to bring into effect ADS-B based services taking into account: - Timing of any equipage mandates; - Timing of any ATC automation upgrades to support ADS-B; - Timing of commissioning of any ADS-B data sharing and associated VHF radio voice communication facilities • Consideration of major traffic flows:	2013	South East Asia (SEA) Sub-Regional ADS-B Implementation Working Group	In progress	Major traffic flow from Australia to Singapore through Indonesia and Singapore to Hong Hong along L642 and M771 in South China Sea being progressed.
linkage to GPIs	GSI-12 Use of Technology to Enhance Safety; GPI/9 Situational Awareness; GPI/5: RNAV and RNP, GPI/7: dynamic and flexible ATS route management, GPI/17: data link applications and GPI/22: Communication Infrastructure;				
References	• *Report of AN CONF/11;* • *Global ATM Operational Concept (Doc9854);* • *Global Air Navigation Plan (Doc9750);* • *Technical Provisions for Mode S Services and Extended Squitter (Deco9871)* • *APANPIRG/16/17/19/20 report on ADS-B* • *ADS-B related regional guidance materials adopted by APANPIRG*				

FIFTH MEETING OF THE SOUTHEAST ASIA SUB-REGIONAL ADS-B IMPLEMENTATION WORKING GROUP (SEA ADS-B WG/5)

Jakarta, Indonesia, 21-22 January 2010

ATTACHMENT 1 TO THE REPORT

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ATTACHMENT 2

International Civil Aviation Organization

FIFTH MEETING OF THE SOUTHEAST ASIA SUB-REGIONAL ADS-B IMPLEMENTATION WORKING GROUP (SEA ADS-B WG/5)

Jakarta, Indonesia, 21 – 22 January 2010

LIST OF WORKING AND INFORMATION PAPERS

WP/No. IP/No.	Agenda Item	Title	Presented by
1	-	Provisional Agenda	Secretariat
2	2	Outcome of ADS-B SITF/8 and APANPIRG/20 on ADS-B	Secretariat
3	3	Review of Terms of Reference of the SEA ADS-B Working Group	Secretariat
4	5	ADS-B Data Sharing : Indonesia – Australia	Australia & Indonesia
5	5	Review of SEA and SA Sub-regional ADS-B Implementation Projects	Secretariat
6	6	Review Regional Performance Objective on ADS-B	Secretariat
7	5	Implementation of ADS-B Operations in the South China Sea Area	Indonesia, Singapore and Viet Nam
		LIST OF INFORMATION PAPERS	
1	-	Meeting Bulletin	Secretariat
2	5	Revised Australian Standards for Aircraft ADS-B Avionics	CASA, Australia
3	4	Australian ADS-B Update	Airservices, Australia
4	4	Update ADS-B Programme in Indonesia	Indonesia
5	5	ADS-B Filter for Data Sharing Programme in Indonesia	Indonesia
6	5	Outcome of the SEA ADS-B WG/4	Secretariat
7	5	Approved Aircraft and Avionics	Airservices, Australia
8	4	Installation of ADS-B Station by Singapore	Singapore

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