INTERNATIONAL CIVIL AVIATION ORGANIZATION
ASIA AND PACIFIC OFFICE

DRAFT REPORT
OF
THE NINETH MEETING OF ADS-B STUDY AND IMPLEMENTATION TASK FORCE

JAKARTA, INDONESIA
18 – 19 AUGUST 2010

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- Review report of the Fifth meeting of the South East Asia ADS-B Implementation Working Group;
- Divide into working groups as follows and subsequently report conclusions to Plenary;
  - Regulatory authorities working group;
  - South East Asia working group
  - Bay of Bengal and South Asia working group;
- Develop a sample document for the regional harmonized requirements for ADS-B Out avionics equipage. (expected to build on outcome of ADS-B regulators workshop).

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1. INTRODUCTION

1. The Regulator's Workshop on Automatic Dependent Surveillance – Broadcast (ADS-B) Avionics Equipage Requirements Regulatory Workshop and the Ninth Meeting of ADS-B Study and Implementation Task Force (ADS-B SITF/9), hosted by Directorate General of Civil Aviation (DGCA), Indonesia was held from 16 to 19 August 2010 at the Mandarin Oriental Hotel, Jakarta, Indonesia.

2. OPENING OF THE WORKSHOP AND MEETING

2.1 The workshop and meeting was opened by Mr. Yurlis Hasibuan, Director of Airworthiness and Aircraft Operation on behalf of Mr. Herry Bakti, Director General of DGCA. In his opening remarks, he extended warm welcome to all the participants to Jakarta. Mr. Yurlis emphasized the importance of regional cooperation for implementation of advanced technologies like ADS-B which will increase the capacity and efficiency of air navigation services. He highlighted the importance of the workshop for exchanging information and experience gained between States. He thanked ICAO for organizing these ADS-B events in Indonesia and expressed their pleasure in hosting the events. He informed that Indonesia will be running for the council election during ICAO Assembly session in 2013 and hope to have supports from the States. He further stated that through compliance to ICAO standard and requirements, implementation of ADS-B will improve the Indonesian domestic and regional air navigation service. Indonesia conducted an ADS-B regional trial in 2006 to validate the effectiveness of the technology. The success of this trial provided the basis for roadmap and a phased approach for the early commissioning an ADS-B network across Indonesia. He wished the workshop and meeting success in its outcome.

2.2 On behalf of Mr. Mokhtar A. Awan, Regional Director, ICAO Asia and Pacific Office, Mr. Li Peng, Regional Officer CNS of the ICAO Regional Office expressed gratitude and appreciation to the DGCA for hosting series of ICAO regional meetings in Jakarta this year and for the excellent arrangements made. He highlighted significant activities in CNS fields since last meeting of the Task Force. He mentioned the tasks completed by the Task Force and outlined the objective of the ADS-B regulatory Workshop and the Ninth Task Force Meeting. He emphasized the important role of the Task Force and the workshop in exchanging ADS-B related information in particular for avionics standard and equipage requirements for the identified ADS-B Out application in the region. He thanked all the contributors and guest speakers for their active support to the workshop and the meeting.

2.3 While thanking DGCA hosting the ADS-B events and wonderful arrangements made for the events, Mr. Greg Dunstone, Chairman of the Task Force, thanked the organizing team for the significant efforts made at short notice after the change of date and venue for the meeting. He also expressed condolence for the sudden loss of Mr. Keith William Tebby who was the Business Development Manager for Asia of Sensis Corporation and often provided contributions to the ADS-B Seminars in the past. He also expressed sympathy to participants from Pakistan for the damage and victims caused by the recent flooding. He emphasized the need to progress the work of the Task Force and encouraged participants for fruitful deliberations. He also reminded the meeting of the need for action after the meeting.

3. ATTENDANCE

3.1 The regulatory Workshop was attended by 84 participants and the Meeting was attended by 53 participants from Australia, Brunei Darussalam, China, Hong Kong China, Macao China, Fiji Islands, Indonesia, Japan, Malaysia, Nepal, New Zealand, Pakistan, the Philippines, Republic of Korea, Singapore, Thailand, USA, CANSO, IATA and representatives from industrial groups. List of participants is at **Attachment 1.**

4. OFFICERS AND SECRETARIAT

4.1 Mr. Greg Dunstone, Surveillance Program Leader of Airservices Australia chaired the workshop and the meeting. Mr. Brian Harris, Airways Engineer of Civil Aviation Safety Authority, Australia facilitated the discussions on the regional harmonization of ADS-B Out avionics requirement. Mr. Li Peng, Regional Officer CNS, ICAO Asia and Pacific Office was the Secretary.

5. ORGANIZATION, WORKING ARRANGEMENTS AND LANGUAGE

5.1 The Seminar and the Meeting met as a single body except on 19 August 2010, when the three ad hoc working groups (Regulators' WG, SEA WG and BoB & SA WG) met to progress proposals for regulatory related issues and sub-regional implementation plans and development of guidance material for the regional harmonized requirements for ADS-B Out avionics equipage.

4.2 The working language was English inclusive of all documentation and this Report. List of Working Papers and Information Papers presented at the Seminar and the Meeting is at **Attachment 2.**

6. REGULATOR'S WORKSHOP ON ADS-B AVIONICS REQUIREMENT

6.1 The Regulator's Workshop on ADS-B Avionics Equipage Requirements was conducted in conjunction with the ADS-B SITF/9 which was organized in accordance with APANPIRG Conclusion 20/51. The objective of the workshop was to:

- inform APAC Regulators of the existing and proposed technical standards and national rules for aircraft ADS-B OUT avionics equipment;
- establish the primary operational requirement (if any) of each State and APAC generally for the use of ADS-B in the decade to 2020.
- note APANPIRG Conclusion, for Regulators to define their State's intention in establishing:

  a) ADS-B OUT fitment requirements for international aircraft fitment;
  b) Proposed compliance timelines;

- agree the content of a draft rule that addresses the APAC operational requirements/compliance timings for ADS-B; and
- prepare an APAC rule template

6.2 The workshop was supported by Australia, USA. A number of speakers from various States, International Organizations and Industries provided valuable contribution on ADS-B equipage requirement related information. 24 presentations covering a list of topics on the ADS-B equipage requirements as follows were presented to and discussed by the Workshop:

- ADS-B Concept Introduction
- Operational role of ADS-B in the Asia and Pacific Region
- Standards and equipment
- Review existing equipage mandates
- Existing and Future Equipment Certification
- Need to harmonize and compliance timing
- Avionics products
- View of air space users and ANSPs
- Harmonization and guidance material

6.3 The States, attended the workshop provided their status of ADS-B implementation plans. The workshop reconfirmed the significance of Conclusion 19/37 regarding the revised mandate for the regional ADS-B. States intending to implement ADS-B based surveillance service were urged to publish mandate as soon as possible and no later than 2010 with the implementation target date after mid. 2012.

6.4 A dinner reception hosted by Director General of DGCA in honor of participants of the ADS-B events was sponsored by the COMSOFT GmbH on the Indonesia's National Day.

6.5 A demonstration on ADS-B data processing system using 1090 ES link was also provided by the COMSOFT GmbH during the Seminar.

6.6 The outcome of deliberation by the Workshop was presented to the Task Force meeting for further consideration.

6.7 Based on the feedback survey conducted during the ADS-B events, the ADS-B Workshop was very well received by the participants.

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Agenda Item 1: Adoption of Agenda

1.1 The agenda adopted by the meeting was as follows:

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Agenda Item 2: Review the outcome of the APANPIRG/20 on ADS-B SITF/8 and SEA ADS-B WG/4 Meetings

Agenda Item 3: Review progress made by ADS-B related ICAO panels

Agenda Item 4: Review the Terms of Reference and Subject/Tasks List as attached to this provisional agenda below

Agenda Item 5: Report and updates by the leading member of the Task Force on Tasks assigned

Agenda Item 6: Review States' activities and interregional issues on trials and implementation of ADS-B and multilateration

Agenda Item 7: Development of Asia/Pacific Regional ADS-B implementation plan and sub-regional based ADS-B implementation plan

- Review report of the Fifth meeting of the South East Asia ADS-B Implementation Working Group;
- Divide into working groups as follows and subsequently report conclusions to Plenary;
    - Regulatory authorities working group;
    - South East Asia working group
    - Bay of Bengal and South Asia working group;
- Develop a sample document for the regional harmonized requirements for ADS-B Out avionics equipage.

Agenda Item 8: Any other business

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Agenda Item 2: Review the outcome of the APANPIRG/20 on ADS-B SITF/8 and SEA ADS-B WG/4 meetings

Outcome of APANPIRG/20 on ADS-B

2.1 The meeting noted that the APANPIRG/20 reviewed the work accomplished by the Eighth Meeting of the ADS-B Study and Implementation Task Force and the Fourth Meeting of the SEA ADS-B Working Group. The report of the Eighth Meeting of ADS-B Task Force was also reviewed by CNS/MET SG/13 held in Bangkok from 20 to 24 July 2009 and noted by ATM/AIS/SAR SG/19 in June 2009.

2.2 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 X** to this report.

2.3 APANPIRG/20 expressed gratitude to CAAV and VANSCORP for hosting the ADS-B Seminar and ADS-B SITF/8 meeting and to 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 has been posted on the following ICAO ASIA/PAC website: http://www.bangkok.icao.int/edocs

2.4 The meeting reviewed and discussed the APANPIRG decision 20/47 which was developed by the *seminar on Navigation and Surveillance Facilities and Validation of Flight Procedures* held in August 2009. APANPIRG/20 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.

2.4.1 In this connection, the meeting noted that one of major topics being studied by Aeronautical Surveillance Panel is to develop guidance on flight testing of ADS-B and Multilateration system s.

2.4.2 While recognizing that the flight inspection/validation of coverage of ADS-B ground stations may be required, the meeting considered that it could be substituted by other means. Further monitoring outcome of ASP study in this regard is also required.

2.4.3 When considering APANPIRG conclusion 20/47, the meeting noted that while ADS-B OUTprovided similar surveillance capability to radar, the architecture of the system design means that it has more similarities in function to a VHF radio.

2.4.4 Furthermore while a flight validation/ testing process for the implementation of a radar provides ground engineers the ability to confirm the optimisation of the site after determining a significant number of site specific parameters, most ADS-B systems have minimal numbers of such settings affecting site performance.

2.4.5 ADS-B is a datalink between aircraft and ground. The positional accuracy performance of a radar must be verified since it is the position measuring device. The position of an aircraft using ADS-B is provided by the aircraft itself and should not be affected by the Ground

station function.

2.4.6 While it is necessary to validate the theoretical coverage against predictions, this can be done by alternate means. The risk of mismatch between theoretical charts and practice is much reduced in ADS-B compared to radar due to the significantly reduced factors determining coverage. In most cases coverage is limited by line of sight limitations.

2.4.7 Flight testing requirements could baseline the coverage envelope including cone of silence (if any) with a minimum transmit power transponder. Flight testing as part of SAT has higher value when testing the "first of type" of a particular vendor's product.

2.4.8 However, the benefits of such activity need to be compared to the significant costs to conduct the flight test. Alternatives to flight testing can be achieved using

- targets of opportunity in the period between installation of equipment and prior to the introduction of operations by recording and mapping the receipt of actual ADS-B transmissions from aircraft;

- measuring and monitoring the minimum signal strength at the antenna necessary to generate an ADS-B report; and

- measurement in-band interference at the site and assessing its impact on detection

2.5 The meeting was advised that Australia did not perform flight tests when commissioning 29 ADS-B ground stations in the continent and does not plan to do so with future sites based on the limited benefits derived from the activity.

2.6 The ADS-B SITF agreed that the conduct of a formalised flight validation/ testing program of ADS-B ground station should not be considered a mandatory requirement. While the meeting noted that States may at their own discretion conduct such a program, this was beyond the minimum requirements. As such the ADS-B SITF recommends that there is no need for the development of guidance material.

2.7 The meeting also noted that ATM/AIS/SAR/SG/19 meeting 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.

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Agenda Item 3: Review progress made by ADS-B related ICAO Panels

Update of ICAO Panels on ADS-B Related issues

Aeronautical Surveillance Panel (ASP)

3.1 The meeting noted that the following developments made by the Working Group of the Whole (WGW/1) of the Aeronautical Surveillance Panel in December 2008 was adopted by the ICAO Council in March 2010 for inclusion in Amendment 85 to Annex 10 to be applicable in November 2010:

a) updates to existing SARPs on secondary surveillance radar (SSR), automatic dependent surveillance — broadcast (ADS-B) and airborne collision avoidance system (ACAS) in light of operational experience;

b) introduction of new requirements for forward fit (from 1 January 2014) and retrofit (by 1 January 2017) of aircraft ACAS installations with an upgraded collision avoidance logic (known as TCAS Version 7.1);

c) introduction of new chapter in Volume IV entitled "Multilateration Systems" that contains system and functional requirements with an emphasis on the protection of the 1 030/1 090 MHz radio frequency environment from excessive interrogations; and

d) introduction of a new chapter in Volume IV entitled "Technical Requirements for Airborne Surveillance Applications" that contains system –level and functional requirements for onboard systems/equipment used for processing and displaying other traffic/aircraft based on information received from ACAS and ADS-B IN.

3.2 Other major products of the ASP WGW/1 were the following:

a) the new Aeronautical Surveillance Manual (Doc 9924) which combines the updated and relevant parts of outdated *Manual of the Secondary Surveillance Radar (SSR) Systems* (Doc 9684) and *Manual on Mode S Specific Services* (Doc 9688) with new guidance material on systems such as multilateration, ADS-B, surveillance data sharing and so on in a single document. The new manual is posted on the ICAO-Net pending its publication in the ICAO languages. Once the new manual is published, the aforementioned old manuals will be taken out of circulation; and

b) information and/or guidance on "*sustainability of the 1 030/ 1090 MHz RF environment*", "*incorrect SSR practices by some military authorities"*and "*guidance on ground testing of SSR transponders*" that were sent out via State letter SP 44/1-09/88 dated 2 December 2009.

3.3 The meeting also noted that ASP is also expected to finalize the data formats of a new set of 1 090 MHz extended squitter (ES) messages used for automatic dependent surveillance — broadcast (ADS-B) and traffic information service — broadcast (TIS-B) at its next working group meeting in October 2010. The new set of messages (called Version 2) that are in line with the latest industry standards (essentially the RTCA DO-260B, Minimum Operational Performance Standards (MOPS) for 1090 MHz Extended Squitter Automatic Dependent Surveillance – Broadcast (ADS-B) and Traffic Information Services – Broadcast (TIS-B) issued in December 2009 and the EUROCAE ED-102A - MOPS for 1090 MHz Extended Squitter Automatic Dependent Surveillance - Broadcast (ADS-B) & Traffic Information Services - Broadcast (TIS-B) - Issued in December 2009) will be included in the second edition of *Manual on Technical Provisions for Mode S Services and Extended Squitter* (Doc 9871). The respective changes to SARPs invoking Version 2 of ES messages will be

proposed at the second meeting of the Working Group of the Whole (WGS) in October 2011 and are expected to be incorporated in Annex 10 — *Aeronautical Telecommunications*, Volume IV — *Surveillance and Collision Avoidance Systems* as part of Amendment 86 for applicability in November 2013.

3.4 Other major topics being studied and developed by ASP include:

a) increasing the capacity of 1 090 MHz ES by introducing additional phase modulation;

b) guidance on flight testing of ADS-B and Multilateration systems (MLAT);

c) multistatic primary radar (using emissions from sources like radio and TV transmitters);

d) possible need for a new generation of ACAS; and

e) sense & avoid (in terms of avoiding collision with other aircraft) for unmanned aircraft system (UAS).

3.5 The Aeronautical Communications Panel (ACP) will soon be finalizing a new set of messages for the universal access transceiver (UAT) (in line with Version 2 of 1 090 MHz ES messages) for incorporation in *Manual on the Universal Access Transceiver (UAT)* (Doc 9861) in harmony and coordination with the ASP.

3.6 The newly established Airborne Surveillance Task Force (ASTAF) had its first meeting in Montreal from 26 to 28 May 2010 mainly to organize itself for carrying out the work. It was agreed that the first product of the task force should be a manual containing guidance material for initial applications enabled by the use of ADS-B IN.

3.7 The meeting also noted that the newly established Airborne Surveillance Task Force (ASTAF) had its first meeting in Montreal from 26 to 28 May 2010 mainly to organize itself for carrying out the work. It was agreed that the first product of the task force should be a manual containing guidance material for initial applications enabled by the use of ADS-B IN. The approved work programme of the ASTAF by end of 2011include *air traffic situational awareness (ATSA)-in-trail procedure (ATSA-ITP) in oceanic airspace and identification of the reference aircraft in radiotelephony (e.g. ICAO three-letter designator versus call sign), etc.*

3.8 The Chairman of the Task Force noted that correct use of 24 bit aircraft address is very important for providing ADS-B and multilateration based surveillance service. The work of ASTAF on ITP is also relevant for the APAC Region.

<u>Separation and Airspace Safety Panel (SASP) and Operational Data Link Panel (OPLINKP)</u>

3.9 SASP completed the development of guidance material to support In-Trail Procedure (ITP) which included the planned proposed amendments to *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM, Doc 4444) in 2009. The material will be presented to the Air Navigation Commission during the fall of 2010. The draft circular entitled "*Safety Assessment for the Development of Separation Minima and Procedures for In-Trail Procedure (ITP) using ADS-B (Version 1.5.3)*" which contains, among other things, the planned proposed amendments to PANS-ATM is currently being subjected to coordination by various bodies of experts.

3.10 Finally, SASP and OPLINKP will be developing provisions (SARPs, Procedures for

Air Navigation Services (PANS) and/or guidance material) in the 2012/2013 timeframe including the following subjects:

- in-trail climb using ADS-B and controller-pilot data link communications (CPDLC); and

- Criteria for the use of ADS-B and MLAT for the provision of 3 NM separation.

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Agenda Item 4: Review the Terms of Reference and Subject/Tasks List

4.1 Under this agenda item, the meeting reviewed the revised TOR as adopted by APANPIRG/18 and discussed Subject and Tasks for the Task Force assigned by APANPIRG.

4.2 The TOR was considered appropriate and the meeting did not propose any changes to the TOR.

4.3 The meeting reviewed and updated the Subject/Tasks List adopted by APANPIRG/20 meeting and formulated the following draft Decision.

Draft Decision 9/1 - 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 XX** to the Report be adopted.

Processing and Display of ADS-B Tracks

4.4 The meeting, under this agenda item reviewed the progress on tasks assigned to members of the Task Force. Australia presented a draft Guidance Material on Processing and Display of ADS-B tracks at Air Traffic Controller Positions. The draft material was further updated based on a recommendation made during the meeting including replace "SHALL" with "SHOULD" and additional guidance on using WGS84. The meeting considered appropriate to recommend it for adoption by APANPIRG as a regional guidance material. Accordingly, the meeting formulated the following draft Conclusion:

Draft Conclusion 9/2 – Guidance Material on Processing and Display of ADS-B Tracks on Air Traffic Controller Positions

That, the Processing and Display of ADS-B Tracks on Air Traffic Controller positions as provided in the **Appendix XX** be adopted.

Building a safety case for ADS-B separation service

4.5 The meeting further reviewed a draft guidance material on building a Safety Case for delivery of an ADS-B separation services presented by Australia.

4.5.1 It was introduced that the Draft document makes reference to and takes extracts from two highly relevant existing ICAO documents, as well as some other guidance material derived from a previously prepared Safety Case covering an ADS-B separation service in Australia. The Civil Aviation Safety Authority Australia has previously produced a Civil Aviation Advisory Publication (CAAP) on the topic of Safety Case preparation. It also provides generic guidance material. The CAAP is titled **'Guidelines for the Preparation of Safety Cases covering Airways Systems'**. It can be accessed on the CASA website at the following internet link: http://casa.gov.au/wcmswr/_assets/main/download/caaps/airways/airway_1.pdf

4.5.2 The draft material provides guidance on the steps and contents i.e. the topic headings, with a brief description of each topic that may be included under each heading for inclusion in an ADS-B Design and Implementation Safety Case. This topic content listing has been derived by reference to the Safety Case for the ADS-B Upper Airspace Program (UAP) prepared in Australia by the ANSP.

4.5.3 The meeting noted that the ICAO document Circular 311 as referenced in draft Guidance Material was pulled out of circulation and replaced by Circular 326 which will be available by December 2010. The meeting considered it more appropriate to defer the adoption of the Draft material till new Circular 326 available. In the same time, the members of the Task Force were requested to

review the structure and contents of the draft Guidance Material as provided in **Appendix XX** and provide comments and other feedback to the Mr. Brian Harris the lead member for this task. The draft guidance material will be further updated with information in new Circular 326 and comments by members of Task Force and provide updated version for review by the next meeting of the SEA ADS-B working group meeting and ADS-B SITF to be held in first half of 2011. Accordingly the meeting made following Decision.

Decision 9/3 – Development of Guidance Material on Building a safety case for delivery of an ADS-B separation service

That, the draft Guidance Material on Building a safety case for delivery of an ADS-B separation service be further updated for review by the next meetings of SEA ADS-B WG and ADS-B SITF/10.

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Agenda Item 5: Report and updates by the leading member of the Task Force on Tasks assigned

5.1 Under this agenda item, the meeting noted the relevant information prepared by Australia for Task No 16 which requires developing guidance material on a sample ADS-B avionics mandate for the APAC Region.

5.2 The following four source documentation were identified that may be considered in the development of any template for a regulatory mandate.

- **CASA Australia Civil Aviation Order.** The ADS-B mandate that has actually been issued in final regulatory application is the relevant Civil Aviation Order of the Australian Civil Aviation Safety Authority Australia. That is one source of material for consideration for use in forming a template. The Australian rule has been based on operations in a NRA environment but may also be satisfactory for a RAD environment.

- **Eurocontrol ENPRM/10-003A.** In April 2010, Eurocontrol issued its ***ENPRM/10-003 Surveillance Performance and Interoperability (SPI) Requirements*** under its Single European Sky Mandate on Surveillance. The ENPRM proposes a 2015 mandate for application in a RAD environment. It is considered to be another source of material for use in forming a template. The ENPRM webpage: http://www.eurocontrol.int/enprm/public/standard_page/enprm1003.html

- **EASA AMC 20-24.** ***EASA AMC 20-24 'Certification Considerations for the Enhanced ATS in Non-Radar Areas using ADS-B Surveillance (ADS-B-NRA) Application via 1090 MHZ Extended Squitter'*** was issued on 02/05/2008 as an Acceptable Means of Compliance for the airworthiness and operational approval of aircraft installations.

- **FAA Final Rule for ADS-B Out equipage mandate**

Revised Australian Standards for Aircraft ADS-B Avionics

5.3 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 int oconsideration 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.

5.4 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 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;
- CNS/MET SG/13 meeting held in Bangkok in July 2009; and
- the APANPIRG/20 meeting held in September 2009.

5.6 The existing date of 12 December 2013 after which all aircraft operating in airspace at a nd 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 coordinated 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 XX** to this report (Attachment to IP02 – Extract from CAO 82.5).

5.7 IATA reiterated position of airspace users regarding the equipage requirements. According to standing Conclusions adopted by APANPIRG, IATA encouraged States to publish equipage mandates as soon as possible for near term implementation plans (APANPIRG Conclusion 19/37) recognizing the timeline required of a minimum 4-5 years for establishment of equipage mandates (exclusivity arrangements). It was also suggested to consider arrangements for the sharing of approval database information to simplify the approval processes.

5.8 With respect to guidance sample template for mandating ADS-B avionics, timelines, words on standards to be provided as result of the ad hoc working group

To be inserted by Ad Hoc working group on procedures. Geoff and Ron
WE need a draft Conclusion for APANPIRG/21 to adopt with text as appendix to the report.

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Agenda Item 6: Review States' activities and interregional issues on trials and implementation of ADS-B and multilateration

Updates on ADS-B Upper Airspace Project

6.1 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 29 ADS-B ground station sites and one Wide Area Multilateration system comprising 14 sites. The meeting was informed that operational feedback since commissioning has been extremely positive and more than 73 per cent of all scheduled international flights in Australia are ADS-B approved aircraft.

6.1.1 The last ADS-B ground station of UAP Phase 1 at Broken Hill was commissioned in February 2010. Additional 18 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.

6.1.2 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 provided positive feedback received from one airline as response time of clearance to requests for changing flight level has been reduced.

ADS-B development in China

6.2 China provided updates on the ADS-B development and deployment plan. ADS-B technology is considered as an important surveillance technology over western airspace and a significant supplementary measure for the radar surveillance in eastern part of China. ADS-B application in oceanic areas and airport surface will be also promoted and 1090ES has been chosen as the primary data link. In April 2010, CAAC issued the Chinese Technical Standards Orders of "Extended Squitter Automatic Dependent Surveillance-Broadcast (ADS-B) and Traffic Information Service-Broadcast (TIS-B) Equipment Operating on the Radio Frequency of 1090 Megahertz" for manufactures applying for Chinese Technical Standard Order Authorization for 1090ES ADS-B and TIS-B equipment. In May 2010, CAAC issued the advisory circular of "Airworthiness and Operational Approval of Automatic Dependent Surveillance-Broadcast Application in Non-Radar Areas via 1090 MHz Extended Squitter" for the manufactures or modification units who want to get airworthiness approval for ADS-B airborne equipment.

6.3 In March 2009, CAAC set up an ADS-B station serving ATS Routes L642 and M771 in the South China Sea area. In addition to the Chengdu-Jiu Zhai ATS route, CAAC is now working on a project of the communication and surveillance with 5 ADS-B ground stations covering Chengdu-Lhasa ATS route to be completed by the end of 2010. CAAC also has plan to install ADS-B stations along Lhasa-Ali route and B215 route from Yinchuan to Urumqi. Further, CAAC has scheduled to build ADS-B stations nationwide according to "the twelfth five-year plan". In the same period, the relevant automatic air traffic management systems will be also upgraded to be able to receive process and display ADS-B data.

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;

Indonesia

6.3.1 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.

6.3.2 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.

6.3.3 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.

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.

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

Singapore

6.3.5 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.

6.3.6 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.

6.3.7 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.

GPS Time Tagging Issue

6.4 The meeting noted the GPS Time Tagging issues as presented by Australia. GPS time currently differs from Coordinated Universal Time (UTC) by 15 seconds due to UTC "leap seconds" some GPS receivers erroneously output GPS time (as if it were UTC) until a new offset is received in a GPS navigation message. It can be 14 minutes before such a message is received. If these GPS receivers are used for ADS-B time tagging, before the offset arrives false position reports can be shown to ATC. A number of protections can limit the impact of this issue as follows :

a) Operational procedures that do not put the ADS-B ground station back into service until 15 minutes after switch on; and

b) ATC system functionality that tests the reasonableness of the time tag. If the time tag is say more than 5 seconds old, or more than 0.5 second ahead of current time, then the data could be discarded.

6.4.1 The same issue could impact ATC centres, radars, multilat and other systems that use or generate time tags. States were encouraged to check their ADS-B systems if they suffer from this time tagging problem.

6.4.2 While discussing this issue which would be easily overlooked, it was recommended to uses dedicated GPS products for aviation use which should have been tested validated and approved. There would be side effect if low end and non aviation products are used for aviation purpose.

Presentation by ITT on ADS-B OUT Implementation in USA

6. 5 A presentation by ITT provided current status of ADS-B deployment for FAA into National Airspace System of USA. It introduced the system coverage by 794 radio sites. The meeting noted the implementation status and high level programme schedule in the presentation. The 800 ground station will be commissioned by end of 2013. It was concluded that ADS-B technology is proven. It was informed that ITT Team has successfully designed, developed, and integrated an exceptional ADS-B ground infrastructure solution.

ADS-B Seminar for Civil Aviation Authority of the Philippines (CAAP)

6. 6 CANSO informed the meeting that an ADS-B seminar for the CAAP was conducted by the CANSO in Manila on 11 August 2010. The Seminar discussed the benefits of the Philippines participating in the South China Sea project and recommended that apart from the ADS-B site at Puerto Princesa, the CAAP considers adding another ADS-B station, taking into account the need to provide coverage of the 2 trunk routes (N884 and M767). A possible site identified was Quezon Palawan. The seminar recommended the CAAP considers that location of additional ADS-B sites based on possible cost allocation to other user States.

6. 7 CANSO also reported on the recent visit to DCA Brunei where Brunei was encouraged to participate in the South China Sea project. An ADS-B station in Brunei coupled with an ADS-B ground station in Quezon Palawan would enable surveillance coverage over the two trunk routes N884 and M767 and allow for a significant increase in airspace capacity and efficiency. The proposed ADS-B station in Brunei could also serve as a backup to its radar and user for airport surface movement surveillance.

6. 8 The meeting discussed the need to optimize overall benefits of ADS-B implementation for flights in South China Sea airspace and supported the recommendation for the Philippines to install an ADS-B station on a site in the South like Quezon Palawan to cover the above two trunk routes. In this connection, the meeting also supported the recommendation that Brunei consider installing an ADS-B ground station in Brunei. (The chart shown the location of proposed stations is provided in the **Appendix XX** to this Report – from addendum to WP/13)

Review of CNS/ATM Implementation and Planning Matrix

6. 9 The Secretariat presented the matrix reflecting implementation status of CNS/ATM systems in Asia/Pacific Regions. It was noted that the CNS/ATM Implementation Planning Matrix was developed in accordance with the Conclusion 11/37 of APANPIRG and the Matrix has since been updated regularly. CNS/ATM Implementation Matrix reflects the status of implementation of major CNS/ATM elements in the region which includes ATN, AIDC, CPDLC, GNSS, ADS-C and ADS-B. The meeting was informed that the Matrix was updated by the Fifth meeting of ATN Study and Implementation Task Force held in May 2010 and will be further updated at the next ADS-B Study and Implementation Task Force meeting to be held in middle August 2010.

6. 10 The meeting encouraged the member States of the Sub-group to provide updates to the information contained in the Table from time to time. It was considered unnecessary to wait for meetings to update the information.

6. 11 The meeting reviewed and updated the information in the Matrix in particular on surveillance related information which is provided in **Appendix XX** to this Report.

Review Regional Surveillance Strategy for APAC Region

6. 12 The meeting reviewed regional surveillance strategy for Asia and Pacific Regions adopted by APANPIRG/19 in 2008. It was recalled that initial version of the strategy was developed by the ADS-B Study and Implementation Task and Force and the CNS/MET SG/12 meeting endorsed the amended Surveillance Strategy proposed by an ad hoc working group.

6. 13 The meeting updated the strategy taking into account comments from fourteenth meeting of CNS/MET Sub-group of APANPIRG held in July 2010 which suggested to include information into the consideration part regarding newly developed standard DO260B (Version 2 ES being developed by ICAO to be applicable in November 2013) and insert additional word “cooperation” at last bullet paragraph as follows: 12. Ensure civil-military *cooperation and* interoperability.

6. 14 The updated regional surveillance strategy for Asia and Pacific Regions as provided in the **Appendix XX** to this report was recommended for adoption by APANPIRG and the meeting formulated the following draft Decision:

Draft Decision 9/4 – Revised Regional surveillance strategy for Asia and Pacific Regions

That, revised Regional surveillance strategy for Asia and Pacific Regions as provided in the **Appendix XX** to the Report be adopted.

Agenda Item 7: Development of Asia/Pacific Regional ADS-B implementation plan and sub-regional based ADS-B implementation plan

- Review report of the Fifth meeting of the South East Asia ADS-B Implementation Working Group;
- Develop a sample document for the regional harmonized requirements for ADS-B Out avionics equipage.
- Divide into working groups as follows and subsequently report conclusions to Plenary;

Updates on the Implementation Plan in the South China Sea Area

7. 18 Indonesia and Singapore updated the implementation plan in the South China Sea area. It was informed that 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 and VHF radio facilities sharing.

7. 19 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 XX** (from WP/16**)** to this Report.

7. 20 IATA supported efforts made by the 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.

7. 21 The meeting supported task and milestones as specified in the paper. 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.

7. 22 It was clarified that confirmation to the final version of the timeline was not received from Viet Nam. As Viet Nam was not represented at the Task Force meeting, the ICAO Secretariat was requested to seek comments from Viet Nam on the implementation timelines and milestones as indicated in the proposed roadmap presented by Indonesia and Singapore. Accordingly the meeting made following Decision:

Decision 9/5 - Development of roadmap of the ADS-B Implementation serving ATS Routes L642 and M771

That, the Secretariat be requested to seek comments from Viet Nam on the implementation Timelines and milestones as indicated in the proposed roadmap for the ADS-B Implementation in the South China Sea area servicing ATS route L642 and M771.

Australia-Indonesia Data Sharing Project

7. 23 Australia and Indonesia provided an update on their data sharing project between the Brisbane Pandang FIRs. 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.

7. 24 The meeting noted that four ADS-B ground stations at Merauke, Saumlaki, 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.

7. 25 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 1 November 2010.

7. 26 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: Broome, Doongan in Australia and Kintamani, Kupangv in Indonesia. The Phase 2 would transit to full 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.

7. 27 The meeting congratulated Indonesia and Australia for progress on ADS-B data sharing and appreciated efforts made. IATA emphasized that cost effective solution of surveillance service is achieved through ADS-B data sharing and commended two states on the enormous achievements for ADS-B data sharing as good example for the cooperation. CANSO also echoed and cited it as an excellent example of neighbouring ANSPs working together for the common benefits of aviation.

Sample agreement for data sharing

7. 28 Indonesia and Singapore shared with the meeting on their experiences on the adoption of the sample agreement. It was explained that the entire agreement has been revamped quite a bit as the parties tried to make the agreement more comprehensive, precised, simple, easier to read and more acceptable by both parties. At the same time, the number of annexes was agreed to be reduced. In addition, the agreement was subject to vetting by various authorities, which resulted in further amendments. However, the intents of the original sample agreement remain unchanged. The brief description of the currently updated draft is attached in **Appendix XX** to this report.

7. 29 The member States of the Task Force were requested to provide comments and feed back on the proposed updates and changes to Singapore and Indonesia. Singapore was requested to provided updated version based on the signed version of the data sharing agreement to next SEA ADS-B Working Group meeting to be held in early 2011.

Approved Aircraft and Avionics

7. 30 Australia informed the meeting that currently 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.

7. 31 The approved types of airframe and avionics combinations by Australia up to Mid July 2010 are provided in the **Appendix XX** to this report. There are 1341 approved airframes.

Misleading ADS-B transmissions (WP17)

7.15 Australia presented paper indicating that a number of ADS-B avionics products transmit ADS-B data which could be considered misleading.

Examples of this are :

- A product which transmits messages formats similar to, but not the same as DO260, DO260A or DO260B. When interpreted as DO260 messages, these can be misinterpreted as a good integrity messages with an incorrect position.

- A product which transmits DO260 NUC based solely on the accuracy value HFOM instead of the integrity value HPL. This can be interpreted as a DO260 message with good integrity when in fact integrity is poor.

- Other transponder and GPS products that fail to meet the published requirements of the Australian regulations

In environments where all airspace participants are required to have compliant equipment, the risk of using such misleading data is low because of existing regulatory controls

However, in airspace in which does not mandate ADS-B equippage, ADS-B transmissions may still be used, and the risk of use of such misleading data is higher. Examples include the following :

- In Airspace where ATC separation services are delivered in voluntary equipage airspace

- In Airspace where ADS-B is used for ATC situational awareness only and ADS-B equipage is not mandatory

- In Airspace where ADS-B IN may be used

7.16 Australia published regulations, first in 2007, which prohibit transmission of data which does not comply to the published standards. An updated version of this regulation is applicable today in Australian airspace even during the period before mandatory fitment applies. The following extract from the Australian Civil Aviation Order 82.5 illustrates the rule.

> *5. 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.*

The exception related to transmission of NIC or NUCp=0 is made because NIC or NUCp = 0 indicates that the data has no integrity and the Australian ATC system will discard such messages. Many aircraft with compliant ATC transponders, without GPS systems, transmit inertial positional data in ADS-B messages with NUC or NIC=0. It is also expected that ADS-B IN systems will discard NUC, NIC=0 data.

7.17 The meeting agreed Guidance Material developed by the Task Force related to ADS-B regulations should include the following to ensure that safety is maintained in airspace where ADS-B equipage is voluntary:

> *1. After* ***<insert earliest date that ADS-B may be used for any relevant operational purpose>*** *if an aircraft carries ADS-B transmitting equipment which does not comply with* ***<insert technical requirement, including relevant positional data source requirement>*** *the aircraft must not fly in* ***<description of airspace volume or route>*** *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.

2. Regulators should take appropriate action to ensure that such regulations are complied with.

3. ATC systems should discard ADS-B data when NUC or NIC=0

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

7. 18 The meeting reviewed the updates on the Sub-regional ADS-B implementation projects from Bay of Bengal/South Asia (SA) and South East Asia (SEA) as presented by the ad hoc working groups at the ADS-B SITF/9 meeting. The discussions were based on the previous outcome of discussions by ADS-B SITF/8 and SEA ADS-B WG/5. The outcome of discussions by Ad Hoc working groups are provided in the **Appendices XX and XX** to this report that could serve as a basis for further development of the sub-regional implementation plan.

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Agenda Item 8: Any other business

Review Regional Performance Framework Form on ADS-B

8. 1 The meeting reviewed the regional Performance Framework Objective (APAC Objective 10) on ADS-B which was reviewed by SEA ADS-B WG/5 meeting in January and CNS/MET SG/14 meeting held in July 2010. The updated Performance Framework Form (PFF) on ADS-B provided in **Appendix XX** to the Report will be incorporated into other updated PFFs for consideration by APANPIRG/21 in September.

Note of appreciation

8. 2 The meeting expressed its appreciation and gratitude to the Diretorate General of Civil Aviation, Indonesia for hosting the ADS-B Regulatory Workshop and the Ninth Meeting of ADS-B Study and Implementation Task Force (ADS-B SITF/9) meeting, for the hospitality, excellent support provided and for all activities organized during the meeting.

Time and Venue of Next Meeting

8. 3 The sixth meeting of SEA ADS-B Working Group is scheduled in early 2011 in Singapore and the next meeting of ADS-B Study and Implementation Task Force is scheduled in April or May 2011. Since no offer for hosting the next meeting was received during meeting, the members of the Task Force will be informed well in advance of the exact date and venue of the meetings after consultation with the concerned.

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