



ADS-B RELATED DEVELOPMENTS BY AN Conf/11 AND APANPIRG & OBJECTIVE OF AND PROGRESS BY ADS-B TASK FORCE

Presented by the Secretariat

ADS-B SEMINAR
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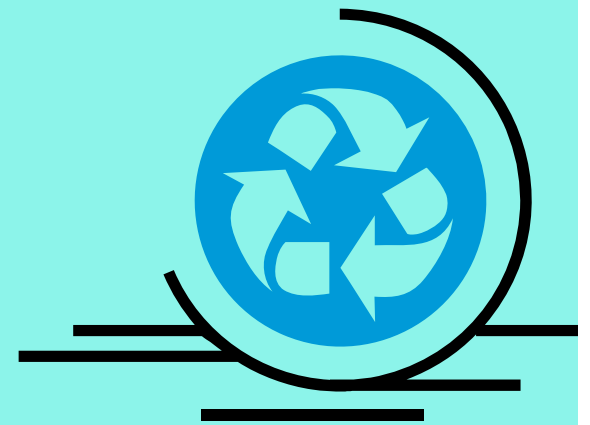
Contents of this presentation



- ✈ Global perspective for using ADS-B
 - Global Air Navigation Plan for CNS/ATM Systems, and
 - AN Conf/11;

- ✈ Regional perspective
 - Actions taken by APANPIRG;

- ✈ Progress made by ADS-B Task Force





ADS-C

Automatic Dependent Surveillance-Contract



Review 2 TERMS of Automatic Dependent Surveillance ADS-C and ADS-B

- The C stands for contract. An ADS-C message is only sent after a link “contract” between the aircraft and the ground has been established.
- ADS-C is currently using SATCOM or VHF/HF data links.



ADS-B

Automatic Dependent Surveillance-Broadcast



ADS-B is a broadcast twice per second of the aircraft's position, mainly derived from the GNSS system. It provides the pilot of a suitably equipped aircraft a display where other aircraft are in relation to his aircraft.

Radar like service resulted from such position data received by ground station and processed by ATM system.



Global AN Plan for CNS/ATM on ADS-B



- ➔ Global Air Navigation Plan for CNS/ATM Systems Doc9750 AN/963 2nd Edition 2002 recognizes ADS-broadcast (ADS-B*) as emerging technology for dissemination of aircraft position information.
- ➔ It is stated that using the technology, aircraft periodically broadcast their position to other aircraft as well as to ground systems. Any user, whether airborne or on the ground, within range of the broadcast, receives and processes the information. All users of the system have real-time access precisely to the same data, via similar displays, **allowing a vast improvement in traffic situational awareness.**
- ➔ It is envisaged to be applied for surface movement, thus also making it **an alternative to airport surface Radar.**



Global AN Plan for CNS/ATM on ADS-B



- ➔ A-SMGCS* will give ATM providers an enhanced surveillance capability of the aerodrome surface and will assist in taxi route planning and conflict detection/resolution.
- ➔ Surface movement management will be automated with aircraft/vehicle positional information being derived from on-board systems such as automatic dependent surveillance — broadcast (ADS-B)*.
- ➔ For the future trend: ADS-B* has the potential to complement SSR in terms of coverage (gap filler) and even to replace SSR for low- to medium-traffic density. If aircraft are adequately equipped, the ADS-B* information can also be used as a basis for a cockpit display of traffic information (CDTI)*.



Next Edition of Global Plan

- ➔ Global Plan was called *Global Coordinated Plan for Implementation of ICAO CNS/ATM Systems* before 3/1998;
- ➔ AN Conf/11 Rec. 1/9: “That ICAO develop a formal review and agreement process for the *Global Air Navigation Plan for CNS/ATM Systems* (Doc 9750);
- ➔ Secretariat is developing a proposal for amendment of the Global Plan (with 3 Vols) to incorporate the ATM Implementation Roadmap (From Concept to Reality) and to present the proposed amendment to the ANC for review in June 05 then to ALLPIRG/5 meeting in early 06 followed by acceptance by Council 6/2006.



AN Conf/11 on ADS-B



- ✈ The 11th Air Navigation Conference (2003), held in Montreal from 22 Sep - 3 Oct 03 , was attended by a total of 686 participants from 122 Contracting States and 24 observer delegations.
- ✈ 13-15 Jan 04, ANC reviewed and acted 52 of 61 recommendations and the ICAO Council, on 10 March 2004 approved the Report of AN-Conf/11. The Council, in confirming ICAO's role in the follow-up to recommendations, called upon States, international organizations, all PIRGs and all the CNS/ATM partners to initiate action on specific recommendations as necessary.



AN Conf/11 on ADS-B



Recommendations directly related to ADS-B

- ➔ 1/6 Endorsed “ADS-B concept of use”;
- ➔ 7/2 Support of longer term ADS-B requirements (ADS-B Link);
- ➔ 7/1 **Strategy for the near-term introduction of ADS-B:**
That States note that a common element in most of approaches currently adopted for early implementation of ADS-B is the selection of the SSR Mode S extended squitter as the initial data link; and
take into account this common element to the extent possible in their national and regional implementation choices in order to facilitate global interoperability for the initial introduction of ADS-B



AN Conf/11 on ADS-B

- ✈ ICAO issued [State Letter ST 12/4-04-65](#) dated 30 June 2004 on follow-up action for recommendation 1/7 of AN-Conf/11 on ADS-B applications for global interoperability.
- a) recognize ADS-B as an enabler of the global ATM operation concept bringing substantial safety and capacity benefits;*
 - b) support the cost-effective early implementation of packages of ground and airborne ADS-B applications, noting the early achievable benefits from new ATM applications; and*
 - c) ensure that implementation of ADS-B is harmonized, compatible and interoperable with respect to operational procedures, supporting data link and ATM applications.*



APANPIRG/13 Decisions



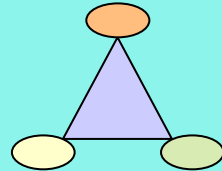
- 13th Meeting of APANPIRG held in Sep 2002 made two decisions:
- Establishment of ADS-B Study and Implementation Task Force;
- Identified ADS-B as new key priority and included it in the list of key priorities for CNS/ATM System.



Driven by ADS-B related development



➔ Why?



- ➔ Australia, Mongolia (Sep/01) conducted ADS-B trials, USA Capstone project, Russian's intension, Northern European Trials;
- ➔ 1090ES; VDL Mode4; UAT???
- ➔ Australia offered to host the 1st TF meeting end of 2002.



1st Meeting of ADS-B TF

- ✈ The 1st TF meeting was held in Brisbane in March 03 and attended by fifty-three experts from Australia, China, Hong Kong China, Fiji, India, Japan, New Zealand, Pakistan, Singapore, Thailand, United States, IATA, IFALPA and SITA.
- ✈ The meeting was also participated and supported by representatives from Industries including Airbus, Boeing, Thales ATM, Honeywell and Sensis.



TOR of ADS-B TF



- ➔ Conduct a study for the selection of ADS-B link for use in the Asia/Pacific Region. The work to be addressed were identified as follows:
- ➔ review the available link technology* for ADS-B and recommend the most suitable technology for selection as a preferred link for implementation in the Asia/Pacific Region in the near term and long term taking into account cost /benefit studies;
- ➔ identify and quantify near term and long term benefits of ADS-B;
- ➔ develop a recommended implementation plan including a recommended target date of implementation taking into account availability of SARPs and readiness of airspace users and ATS providers for a coordinated implementation of service and benefits.



Task Identified based on TOR



- ➔ Identify near term and long term benefits of ADS-B;
- ➔ Recommend the most suitable technology for selection as a preferred link for implementation in the near term;
- ➔ The cost impact on avionics of mandatory carriage of the ADS-B link selected;
- ➔ Recommend the most suitable technology for selection as a preferred link for implementation in the long term;
- ➔ Develop a recommended implementation plan including a target date for the mandatory carriage of the selected ADS-B link.



TF/1 Reviewed ADS-B related activities

- ✈ a) Reviewed OPLINK Panel ADS-B activity;
- ✈ b) Reviewed SASP ADS-B activity;
- ✈ c) Reviewed SCRSP
- ✈ d) ACP ADS-B activities;
- ✈ d) Reviewed activities by Asia/Pacific States
in trials and demonstration of ADS-B;
- ✈ e) Reviewed the developments by Industries.



APANPIRG Concl.14/22



✈ Conclusion 14/22 - Needs for development of ICAO SARPs for ADS-B

That, in view of the progress made by States with operational trials for the implementation of ADS-B, ICAO be requested to give priority to:

a) the inclusion of positional source data accuracy and integrity requirements for ADS-B services in the appropriate standards; and

b) development of separation standards for ADS-B surveillance



Near term applications of ADS-B



- ➔ a) ground based radar-like services in areas not covered by radar ;
- ➔ b) support surface movement surveillance ;
- ➔ c) operational control for operators
-surveillance data to airlines;
- ➔ d) improve military-civil coordination based on common surveillance;
- ➔ E) SAR support ;
- ➔ F) provide enhanced pilot situational awareness.



APANPIRG Concl. 14/20 (2003)

✈ Conclusion 14/20 - Near term ADS-B datalink selection

That, Mode S Extended Squitter (1090 ES) be used as the data link for ADS-B radar like services in the ASIA/PAC Region in the near term.



The near term benefits identified



- ✈ a) Move from procedural to radar-like service;
- ✈ b) reduction in the cost of the provision of air traffic services through operational efficiencies;
- ✈ c) Enabling a seamless “gate-to-gate” surveillance service, not only to international civil aviation but should include general aviation and military operations;
- ✈ d) Increased safety and efficiency through the use of aircraft-derived data in a variety of systems;
- ✈ e) Increasing airport safety and capacity, especially under low visibility conditions;



The near term benefits identified

- ✈ f) Changes to airspace sectorisation and route structure resulting from improved surveillance;
- ✈ g) Reduced infrastructure costs;
- ✈ h) Cost savings achieved from ADS-B based surveillance system rather than the lifecycle expenses associated radar-based surveillance;
- ✈ i) Possibility of overall savings if associated with relevant navigation changes;
- ✈ j) Improved SAR efficiency;
- ✈ k) Reduced impact on the environment.



APANPIRG Concl. 14/21



➔ Conclusion 14/21 - Target date of ADS-B Implementation

That States, where necessary to do so, be encouraged to implement “ADS-B out” for ground-based surveillance services in ASIA/PAC Region on a sub-region by sub-region basis with a target date of January 2006.



2ND Meeting of ADS-B TF

- ✈ The 2nd TF meeting was held in Bangkok in 22-26 March 2004 and attended by 33 experts from Australia, China, Hong Kong China, Fiji, India, Indonesia, Japan, Mongolia, New Zealand, Singapore, Sweden, Thailand, United States, IATA and SITA.
- ✈ The meeting was also attended by representatives from Industries including SENSIS and Thales ATM.



Revised TOR for ADS-B TF



- ✈ Complete an industry wide ADS-B cost/benefit study for the near term use of ADS-B throughout the ASIA/PAC Region.
- ✈ Develop an implementation plan for near term ADS-B applications in Asia Pacific including target dates taking into account available equipment standards and readiness of airspace users and ATS providers.

Note: 1.The Task Force, while undertaking the task, should take into account of the work being undertaken by OPLINK, SAS, SCRS and AMC Panels with a view to avoid any duplication.

2.The Task Force should report to the APANPIRG meeting to be held in 2004 and subsequent meetings.



Work done by ADS-B TF/2



- ➔ In order to develop an implementation plan at sub regional bases, A number of issues were also highlighted including:
- ➔ each State needs to evaluate the age of their radars and whether potential exists to replace them with ADS-B;
- ➔ there is a need to consider ADS-B in surface movement solutions



Work done by ADS-B TF/2



- ➔ ADS-B surveillance data sharing identified:
- ➔ Plan at the early stages of deployment to share data.
eg.: there is potential to share data at least in the following areas:
 - ➔ Australia & Indonesia (Christmas Is, Timor area, Bali...)
 - ➔ Australia & Papua New Guinea
 - ➔ Australia and Fiji
 - ➔ Australia and New Zealand
 - ➔ Indonesia & Singapore
 - ➔ China & Japan



APANPIRG Concl. 15/26 (2004)



➔ ADS-B surveillance data sharing identified:

➔ **Conclusion 15/26 – Exchange of ADS-B surveillance data with neighbours**

That, States be encouraged to share ADS-B surveillance data with neighbouring States and to develop mechanisms to achieve this as ADS-B ground infrastructure requirements are being identified during the design phase.



Work done by ADS-B TF/2

- ✈ Task Force established a problem-reporting database similar to that used successfully by ISPACG for ADS-C. The meeting endorsed the proposal of establishment of a database, which will be initially managed by Australia. Accordingly
- ✈ www.airservicesaustralia.com/adsb/issues

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Definition of terms agreed

- ➔ **“Near-Term” means implementations, approximately in the next 5 years. It was recognised that these implementations would have a life of at least 10 to 15 years.**
- ➔ **It was agreed by the Task Force that the highest priority of the Task Force should be on the near term implementation.**
- ➔ **ADS-B air to ground surveillance (ADS-B OUT) including both “ATC radar like services” and airport surface surveillance, using 1090ES downlink**



WG Meeting of ADS-B TF

- ✈ The ADS-B WG meeting and one day ADS-B Seminar were held in Singapore October 04 and attended by 46 participants from Australia, China, Hong Kong China, Fiji, India, New Zealand, Singapore, Thailand, United States, IATA, SITA;
- ✈ Industries including Raytheon, Sensis, SES Systems Pte. Ltd, Thales ATM and Qinetiq supported the Seminar and most of them participated the meeting.



Information presented to WG



- ✈ US Technical Standard Order (TSO)-C166 Extended Squitter ADS-B and TIS-B Equipment Operating on 1090 MHz became effective on 20 September 2004 which can be electronically downloaded at :
- ✈ [http://www.airweb.faa.gov/Regulatory and Guidance_Library/rgTSO.nsf/MainFrame?OpenFrameSe](http://www.airweb.faa.gov/Regulatory_and_Guidance_Library/rgTSO.nsf/MainFrame?OpenFrameSe)
- ✈ TSO-C166 is for manufacturers of 1090 MHz ADS-B and TIS-B equipment applying for a TSO authorization or approval of design.



Information presented WG



- ➔ Airbus has certified in 2003 three new Mode S transponders, capable of ELS (Elementary Surveillance), EHS (Enhanced surveillance) and 1090ES (Extended Squitter, first implementation of ADS-B out). These three Mode S transponders ELS/EHS/ES capable are:
- ➔ Honeywell TRA-67A, P/N 066-01127-1402
- ➔ Collins TPR-901, P/N 822-1338-021
- ➔ ACSS XS-950, P/N 7517800-10005



Surveillance data exchange format

- ✈ It was proposed to use Eurocontrol ASTERIX. Cat. 21 as data exchange format and noted that USA use ASTERIX Cat 33. Australia and USA were tasked to make further study contacting Eurocontrol for the latest development or version on data exchange format.
- ✈ **Decision 1/1 –ADS-B data exchange format**
That, members from Australia and USA conduct study on ADS-B data exchange format and present result to the next ADS-B Task Force meeting.



Decision made by WG



✈ Decision 1/4 - Develop a checklist for implementation of ADS-B at Sub-regional basis

That, member of ADS-B Task Force from New Zealand and Singapore develop a checklist for implementation of ADS-B at sub-regional basis and present to the next meeting of ADS-B study and implementation Task Force meeting.

✈ It has been incorporated into the AIGD



Information sharing



- The meeting appreciated the live and recorded demonstrations on ADS-B provided by Raytheon, Sensis and Thales ATM during the Seminar and the meeting.
- It showed and demonstrated that ADS-B ground stations for demonstration could be setup within a few hours of arriving on site.



3rd Meeting of ADS-B TF

- ✈ The 3rd TF meeting was held in Bangkok in 23-25 March 2005 and ADS-B Seminar was held on 21-22 March which were attended by 52 participants from Australia, Bangladesh, China, Hong Kong China, Macao China, Fiji, Japan, India, Indonesia, Laos PDR, Malaysia, Mongolia, New Zealand, Philippines, Republic of Korea, Singapore, Thailand, IATA, SITA.
- ✈ The meeting was also participated by representatives from Industries including SENSIS and Thales ATM.



Work done by ADS-B TF/3



✈ The meeting endorsed a Decision made by Singapore meeting

Decision 3/2 - Use of ADS-B in an air space of North Asia

That, Member from IATA prepare and present a paper on study of using ADS-B technology in an airspace of North Asia at next Task Force meeting.



APANPIRG/16 on ADS-B and ADS-B SITF/3



- ➔ **APANPIRG/16 and Asia Pacific DGCA Conf/42 noted works accomplished by ADS-B SITF/3. It was also noted that an ADS-B Seminar was held in conjunction with the Task Force meeting. The meetings also noted the outcome of the ADS-B working group meeting held in Singapore in October 2004. APANPIRG16 reviewed the updated activities of ADS-B by States, industry and in other region.**
- ➔ **APANPIRG/16 adopted following ADS-B related Conclusions and Decisions:**



APANPIRG/16 Action on ADS-B SITF/3



✈ APANPIRG Conclusion 16/35 - ADS-B Data Exchange format

That,

- 1) the Eurocontrol Cat 21 version 0.23 or later message format be adopted for ADS-B data exchange in the Asia Pacific region.**

- 2) ICAO seek agreement from Eurocontrol to use the Eurocontrol Asterix Cat 21 document in the Asia Pacific region as was done for radar data exchange in the region.**



APANPIRG/16 Action on ADS-B SITF/3

✈ APANPIRG Conclusion 16/36 - ADS-B Implementation and Operational Guidance Document (AIGD)

That, the ADS-B Implementation and Operational Guidance Document as provided in Appendix G to the Report on Agenda Item 2.2 be adopted and circulate to States in the Asia/Pacific Region and International Organizations.

✈ APANPIRG appreciated efforts made by the TF in completing the AIGD.



APANPIRG/16 Action on ADS-B SITF/3

- ✈ APANPIRG Decision 16/58 - Amendment to the Regional Plan for the CNS/ATM System to include ADS-B**

That the ASIA/PAC Regional Plan for the New CNS/ATM System be amended to include ADS-B element for the surveillance systems as indicated in the Appendix C to the report on Agenda Item 3.



APANPIRG/16 Action on ADS-B SITEF/3

✈ APANPIRG Conclusion 16/37 – Amendment to Table CNS-4 – Surveillance System

That, the existing Table CNS-4 – Surveillance System provided in ASIA/PAC FASID, Part IV CNS be replaced with an updated Table in accordance with established procedure.



APANPIRG/16 Action on ADS-B SITE/3

→ An amendment to the revised (22 Feb.2005) Basic Operational Requirements and Planning Criteria (BORPC) to allow using ADS-B in the different conditions.

- APANPIRG Conclusion 16/56 - Amendment to Surveillance Part of revised BORPC**
That, the paragraph 7.2 of the revised BORPC be amended in the next cycle of update as follows:



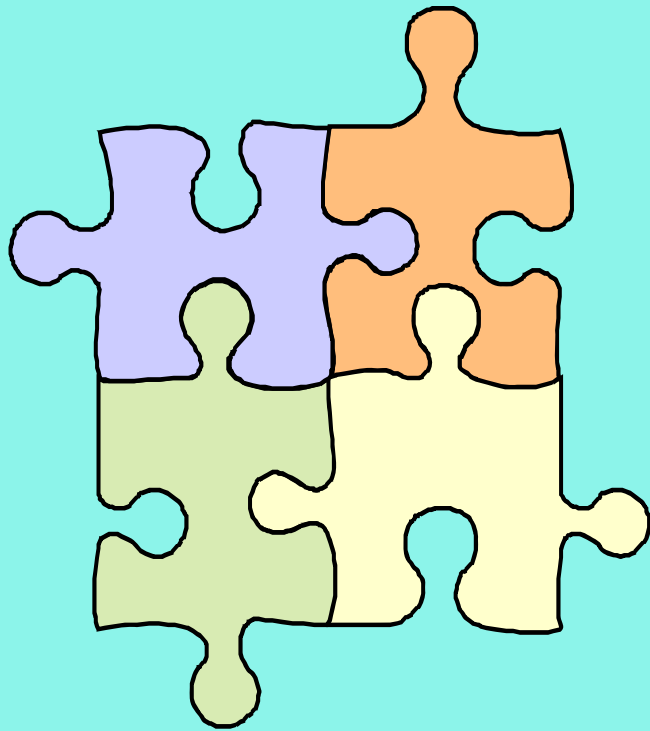
APANPIRG/16 Action on ADS-B SITE/3

- ✈ 7.2 Surveillance should be provided as an integral part of air traffic control where practicable and desirable or necessary in the interest of safety, efficiency and economy of operations, in particular for those areas where traffic density and/or the multiplicity or complexity of ATS routes creates constraints. Primary and/or secondary surveillance radar systems may be used to fulfill this requirement. Subject to availability and cost effectiveness and provided that the required level of safety is maintained, ADS and ADS-B may be used in airspace where surveillance by radar is impracticable or cannot be justified. (removed)



APANPIRG/16 Action on ADS-B SITEF/3

- ✈ **APANPIRG/16 adopted the updated Subject/Task List based for ADS-B Task Force under Decision 16/38.**
- ✈ **APANPIRG/16 noted with appreciation the next ADS-B Task Force TF/4 will be in Fiji Mocambo Hotel, Nadi, Fiji hosted by Airports Fiji Limited (AFL) from 24-28 October 2005 starts with a seminar on 24-25 Oct.**



Any questions?

Thank you!!