International Civil Aviation Organization

The Twenty-Second Meeting of the APANPIRG ATM/AIS/SAR Sub-Group (ATM/AIS/SAR/SG/22)

Bangkok, Thailand, 25 – 29 June 2012

Agenda Item 4: Review outcome of relevant meetings

ADS-B SITF OUTCOMES

(Presented by the Secretariat)

SUMMARY

This paper presents information on the ADS-B Seminar and Eleventh Meeting of Automatic Dependent Surveillance – Broadcast (ADS-B) Study and Implementation Task Force (ADS-B SITF/11, Jeju, Republic of Korea, 24 to 27 April 2012) relevant to Air Traffic Management (ATM).

This paper relates to –

Strategic Objectives:

A: ***Safety*** *– Enhance global civil aviation safety*

C: ***Environmental Protection and Sustainable Development of Air Transport*** *– Foster harmonized and economically viable development of international civil aviation that does not unduly harm the environment*

Global Plan Initiatives:

GPI-12 Functional integration of ground systems with airborne systems
GPI-16 Decision support systems and alerting systems
GPI-17 Data link applications
GPI-21 Navigation systems

1. INTRODUCTION

1.1 The ADS-B Seminar was attended by 238 participants and the meeting was attended by 71 participants from Australia, Bangladesh, Cambodia, China, Hong Kong-China, Macao-China, Fiji Islands, India, Indonesia, Japan, Malaysia, Mongolia, Myanmar, Nepal, the Philippines, Republic of Korea, Singapore, Thailand, USA, CANSO, IATA and representatives from aviation industries.

1.2 Twenty-one (21) working Papers, thirteen (13) information Papers (IP) and eleven (11) presentations were made, covering a comprehensive list of topics on ADS-B.

2. DISCUSSION

Related Meetings

2.1 The following outcomes from the APANPIRG/22 meeting related to ADS-B were noted by the ADS-B SITF meeting:

- adopted guidance material on ADS-B including Guidance Material on Building a safety case for the delivery of an ADS-B separation service and the revised Sample Agreement for Data Sharing;
- adopted amendments to the ADS-B Implementation Guidance Document (AIGD) consequential to amendment to the Flight Plan and on the reliability and availability for ADS-B ground system;
- urged States to support provision of VHF radio voice air/ground communication infrastructure to adjacent States and co-ordinate with the ICAO Regional Office and their national Telecommunication Regulator for assignment of VHF radio frequencies to be used by the adjacent States;
- adopted a Conclusion to support DO260 B Compliant Avionics and urged States to upgrade their ADS-B ground stations in time (2012-2015) to receive DO260B standard transmissions, in addition to those aircraft transmitting ADS-B data compliant with DO260 and DO260A;
- made a Decision to rename the SEA ADS-B Working Group to the Southeast Asia/Bay of Bengal (SEA/BOB) Sub-regional ADS-B Implementation Group;
- urged States to expedite ADS-B implementation project in South China Sea area, including coordination to achieve the implementation; and
- the meeting generally supported a proposal and adopted a Conclusion to amend the Regional Supplementary Procedures (Doc 7030) to include regional requirements on ADS-B.

2.2 Based on the discussions at ATM/AIS/SAR/SG/21 meeting, APANPIRG/22 adopted Conclusion 22/8 to allow States intending to implement ADS-B based services to mandate the carriage and use of ADS-B in a defined airspace or provide priority for access to such airspace for aircraft with operative ADS-B equipment over those aircraft not operating ADS-B equipment. The ADS-B SITF meeting noted the complexity of State rules and regulations for priority and also noted that the Air Navigation Concept of Operation would be helpful in guiding State planning.

2.3 The Seventh meeting of the SEA/BOB ADS-B Working Group meeting supported the proposed Australian ‘black list’ process, which removed the requirement for individual aircraft approvals, and listed aircraft not transmitting or capable of transmitting correct ADS-B data. The current ‘white list’ approval process could be slow and meant that some aircraft were not provided with an ADS-B based ATC separation service. Australia highlighted that the Australian ADS-B fitment will become mandatory at the end of 2013.

2.4 The ADS-B SITF meeting was apprised of the development of Seamless ATM Principles being drafted by the Asia/Pacific Seamless ATM Planning Group (APSAPG) and the development of new PBN standards. The meeting encouraged the APSAPG to make provision for general aviation.

2.5 The meeting was informed that the 189th Air Navigation Commission session had conducted a preliminary review of Annex 10 Vol. IV, which included updates for transponder requirements related to compatibility with the new 1090 MHz extended squitter ADS-B Version 2 format. This amendment would be incorporated into Amendment 88 of Annex 10, scheduled to be adopted by the ICAO Council in March 2013.

2.6 The ADS-B SITF was also informed that the Second Edition of the Doc 9871 (Technical Provisions for Mode S Services and Extended Squitter) had been finalized by the ASP. The Second Edition also included material on DO 260B, but publication of the Second Edition was still being prepared for publication.

2.7 ICAO Headquarters had not yet published Circular 326, which was intended to replace the withdrawn ADS-B Circular 311. The ADS-B SITF meeting noted that information contained in the Circulars contained important material on the application and operational use of ADS-B and multilateration (MLAT) for ATM.

2.8 In particular, the material included basic operational parameters (aircraft position accuracy and integrity standards), which had been recommended by the Separation and Airspace Safety Panel (SASP), along with a significant amount of guidance material on the operational implementation and use of ADS-B surveillance. The meeting expressed concerns about the delay in the publication of Circular 326 and requested the secretariat to convey such concerns to ICAO HQ and request ICAO HQ to upload the unedited Circular on the ICAONET pending the formal publication and release of the Circular.

ASTERIX Category 21 ADS-B Messages (WP/6)

2.9 The meeting discussed Draft Guidance Material on generation, processing and sharing of ASTERIX Category 21 Messages presented by Hong Kong, China and Australia. The paper analyzed the generation, processing grouping and sharing of ASTERIX Category 21 format ADS-B messages to ensure system interoperability and harmonize ADS-B implementation in the Asia/Pacific Region. The paper also highlighted deployment of an ADS-B format conversion and filter system, to enable ADS-B data to be shared with other states in a cost-effective manner and provide the necessary data protection with flexibility to cope with future changes in ASTERIX standards. The ADS-B SITF meeting supported the concept and considered the guidance material should be adopted, based on the Seamless ATM Planning concept.

2.10 The meeting further discussed whether filtering information was required and the role of bilateral agreements. Singapore was concerned about the possibility of lost information during a conversion and filtering process. The issue was with Category Group 3 (Optional Data Items) - a potential problem for data sharing. For Category Group 2 (Desirable Data Items) information, if any field was received, then it must be transmitted. In view of the foregoing, an amendment was made to include the above concern and the meeting formulated the following draft Conclusion:

Draft Conclusion 11/2 - Guidance Material on generation, processing and sharing of ASTERIX Category 21 Messages

That, the guidance material on generation, processing and sharing of ASTERIX Category 21 ADS-B Messages provided in ***Appendix C*** *to the report be adopted.*

Amendment to the Australian ADS-B Rule

2.11 Australia informed the meeting of recent amendments to the Australian ADS-B rule (included in Civil Aviation Orders applicable to both Australian and foreign registered aircraft) for flight in Australian airspace at or above FL290. The changes related to the date for forward fit of SA Aware within the GNSS avionics used as a position source for ADS-B and conditions under which an aircraft may undertake flight in Australia with unserviceable ADS-B equipment.

2.12 Based on feedback resulted from aviation industry consultation on the amendment proposal undertaken in September 2011, Australia had decided on 8 December 2016 for forward fit of SA Aware in the GNSS avionics. In making this decision, Australia was aware that the safety impact of not having SA Aware had been offset to a large extent by a recently approved lowering of the level

of the aircraft transmitted position integrity (Navigation Uncertainty Category) parameter acceptable in the ADS-B ground system for display of ADS-B targets to ATC.

ADS-B Equipage and NUC value analysis (WP/19)

2.13 Singapore presented a paper analyzing the quality of the ADS-B reports observed by the Singapore ADS-B ground station and the level of ADS-B equipage within the Singapore Flight Information Region (FIR). The Chairman noted that more analysis was required to move from an overall system performance assessment to specific problem analysis. The Secretariat noted that there was no equivalent of RVSM and data-link monitoring for ADS-B performance monitoring.

2.14 As result of discussion, the meeting agreed that it was not useful to use a separate quality threshold (NUC or Navigation Integrity Category - NIC) for monitoring of procedural standards. Few reports of NUC values less than 3 were transmitted and the value of building systems to use a separate threshold was not warranted. It was noted that the Australian regulator was in the process of approving NUC 3 for the application of 5NM separation.

ADS-B Implementation

2.15 Cambodia implemented three ADS-B AX680 Thales ground stations during 2011, located at Phnom Penh, Siem Reap and Steung Treng, with coverage to about 250 NM in addition to their three radars. Surveillance data from the radar and ADS-B stations were sent to EUROCAT-C system for processing and the display system, which was upgraded from Eurocat-1000 at the end of 2011. Cambodia was willing to conduct trials with Thailand, Laos and Viet Nam for testing ATS Inter-facility Data-link Communications (AIDC) and Amendment 1 to Doc 4444. Cambodia also advised that 10NM separation was being used with the implementation of these surveillance systems.

2.16 China had selected 1090 MHz ES (extended Squitter) as the ADS-B data-link for air transport and general aviation and advised of major ADS-B implementation projects. A series of Advisory Circular and provisions on surveillance technology policy, ADS-B applications, Airworthiness and operational approval of ADS-B, and ATC procedures had been issued since 2008. China announced that it would publish a significant ADS-B plan in third quarter 2012.

2.17 CAAC was developing Wide Area Multilateration (WAM) standards/specifications, and WAM equipment/system had been developed by China's aviation industry. Some WAM validations showed that the system's accuracy was 60-150m (EPU). China had conducted validation of ADS-B data and some security problems were found. Remedial technical solutions to the problems observed had been developed, using Time Difference of Arrival (TDOA) to evaluate the position data. Other issues of ADS-B data would continue to be studied.

2.18 Hong Kong, China highlighted progress in ADS-B equipage along two ATS routes L642 and M771, and recommended extending the ADS-B Harmonization Framework over the South China Sea to other high density routes in the Asia/Pacific Regions. Concerned CAAs/ANSPs were also encouraged to continue liaison with IATA/airlines to equip their fleets in a timely manner in compliance with the published ADS-B mandates. The Chairman recommended Hong Kong, China to further investigate the root cause of aircraft NUC = 0 issues noted in their paper, and liaise with regulators/airlines concerned for timely rectification.

2.19 Fiji presented a paper on the status of implementation of ADS-B and MLAT in Fiji. The paper provided introduction of characteristics of Nadi FIR. A minimum of eight ADS-B Ground Station sites were identified (including the remote Rotuma station) with three additional sites required for MLAT operation near Nadi. Fiji also advised that the ADS-B airspace mandate date was 13 December 2012.

2.20 India presented an update on India's preparedness towards ADS B implementation plan which would provide ATS surveillance in remote areas to cover existing radar gaps, especially around Port Blair to enhance the safety and efficiency of aircraft operations. As a proof of concept, ADS-B had also been integrated with the ATC Automation System at Chennai ATC. India was planning to install and commission 14 ADS-B stations across the subcontinent in the first phase, including one station at Port Blair which would provide surveillance coverage over Bay of Bengal up to the FIR boundary of Chennai / Kuala Lumpur and Kolkata / Yangon. The data to be derived from Port Blair ADS-B station would be fed into ATC automation systems at Chennai and Kolkata respectively.

2.21 The process for issuance of mandate for carriage and use of ADS-B equipment in the entire Indian airspace has already been initiated. An ADS-B site survey had been completed for all 14 locations and installation was scheduled to be completed by mid-2012. India planned to operationalize ADS-B stations by December 2013.

2.22 Japan advised that the CARATS (Collaborative Actions for Renovation of Air Traffic Systems) plan included implementation of WAM and ADS-B nationwide, with SSR coverage within the Fukuoka FIR, with a target of 2019 for the first commissioned en-route WAM with ADS-B capability. Japan would also implement SSR/SSR and SSR/WAM/ADS-B target data fusion equipment for all en-route sectors, and would mainly use fused target data between SSR and WAM in the early stages.

2.23 After the safety assessment and increase of ADS-B equipage, JCAB would shift to use fused target data derived from SSR/WAM and ADS-B. Japan confirmed that the nationwide WAM and ADS-B programme would eventually result in a rationalization of SSR stations. In addition to unreliable/non-accurate ADS-B position data, Japan still had some concerns with ADS-B data use, such as the mixture of ADS-B avionics versions 0 and 2 and ADS-B aircraft and non-ADS-B aircraft.

2.24 The Republic of Korea advised that four ADS-B systems had been operational since 2008 for airborne and surface vehicles to provide efficient RIMCAS (Runway Incursion Monitoring and Conflict Alert System) functions and to enhance air traffic efficiency at Incheon International Airport. They encouraged more aircraft to be equipped with ADS-B equipment to improve position accuracy. Currently ADS-B reports were compared with data derived from ASR/SSR radars and verified before integration within the MRT (Multi Radar Tracking) system.

2.25 It was emphasized that an aircraft with a NUC value of zero (0) should not be considered as error with a major positional displacement as data received from such aircraft should not be processed because its data integrity should not be trusted. In order to gain more confidence using ADS-B for airport surface surveillance, the Republic of Korea was considering installing a multilateration (MLAT) system in addition to the ADS-B/ASDE radar.

ADS-B Data Sharing

2.26 Australia presented draft *Guidance material addressing military concerns regarding sharing ADS-B data*. Singapore advised that they had no issues with defense agencies in data-sharing. The meeting agreed the Guidance Material which would be very useful for the APSAPG to consider for civil/military cooperation aspects. In view of the foregoing, the meeting formulated the following Draft Conclusion for consideration by APANPIRG.

Draft Conclusion 11/3 - Guidance Material on Advice to military authorities regarding sharing ADS-B data

That, the guidance material on advice to military authorities regarding sharing ADS-B data provided in ***Appendix E*** *to the Report be adopted.*

2.27 The meeting noted an update provided by Australia and PNG on the potential ADS-B data sharing project between Australia and Papua New Guinea (PNG), with a possible extension of data-sharing between PNG and Indonesia. The meeting noted that PNG ATMS modernization programme, which included plans to deploy ADS-B as one of its surveillance sources. PNG's Notice of Proposed Rule Making (NPRM) was being prepared and would be published in mid. 2012. The NPRM would specify the same requirements as in the Australian 2013 FL290 mandate, but would apply in 2014. PNG was planning to utilise ADS-B surveillance within its Class A and C controlled airspace above FL245.

2.28 Indonesia provided information about the predicted coverage of potential ADS-B sites to be shared with Manila, Port Moresby, Kuala Lumpur, Kota Kinabalu and Chennai FIRs. It was noted that backup system of the Jakarta system that supported ADS-B would be fully operational in July 2012.

2.29 The Maldives advised their plan for installation of two ADS-B stations. The Maldives expressed their desire to share ADS-B data with India and Sri Lanka. The ADS-B station was proposed to be installed at Hanimadhoo, to enable overlapping coverage with the Chennai Upper ACC and Trivandrum ACC. This would provide redundancy of surveillance data to Chennai Upper ACC and Trivandrum ACC.

2.30 India announced its plan to share ADS-B data with Indonesia and Maldives to enhance the surveillance capability. Nepal, Bangladesh, Thailand, Singapore, Indonesia, Maldives, Seychelles, Oman were requested to take necessary action for sharing ADS-B data with India.

Sub-Regional Planning

2.31 CANSO highlighted a call to action by the recent 48th DGCA Conference to harmonize and expedite ADS-B implementation in the region and called for the development of concrete plans for ADS-B implementation over the Bay of Bengal and enhanced ADS-B coverage over the South China Sea. Three possible projects were identified – one over the eastern part of the South China Sea involving Singapore, Philippines and Brunei and two over the Bay of Bengal involving India and Myanmar.

2.32 In this regard, the meeting supported a proposal by CANSO to facilitate a two day focus group meeting in Singapore in July 2012 for the parties concerned to focus on specific project deliverables and milestones using the framework/model developed for the initial phase of the South China Sea project. The focus group meeting could comprise India, Myanmar, Maldives and possibly Sri Lanka for Bay of Bengal and Indian Ocean; and Singapore, Philippines and Brunei for the eastern part of the South China Sea.

2.33 A project for the implementation of ADS-B in the South China Sea area involved collaboration between Singapore and Indonesia, as well as between Singapore and Viet Nam. The VHF ground station at Natuna was installed in January 2012. The VHF at Matak (or another suitable location nearby) was expected to complete by August 2012. On 24 November 2011, Singapore and Viet Nam signed the ADS-B Collaboration Agreement. The installation and setup of ADS-B and VHF stations and the necessary lines were targeted to be complete by the second half of 2012.

Non-Radar ADS-B Applications

2.34 Australia presented information that addressed the issue of EASA AMC-20-24 defining a means of airworthiness and operational approval of the 'Enhanced Air Traffic Services in Non-Radar Areas using ADS-B Surveillance' (ADS-B-NRA) application – but did not refer to a RAD service. Australia stated that the non-radar environment appeared to be more demanding than a radar environment, so questioned the need for differentiation of the radar environment for ADS-B environment. The USA stated that they are not using NRA.

ADS-B RVSM Height Monitoring

2.35 India had committed to provide data from ADS-B locations for Regional Monitoring Agency (RMA) RVSM height monitoring. IATA also presented a paper on the availability of ADS-B as a cost effective solution to enable long-term height monitoring capability, and encouraged States to consider utilizing ADS-B for this function as they implemented ADS-B in the Region.

2.36 The Secretariat advised that the next Regional Airspace Safety Monitoring Advisory Group meeting (RASMAG/17, 28-31 August 2012) would be updated on RMA progress on the usage of ADS-B data for height monitoring. The meeting was also informed that RASMAG/17 was expecting to discuss updated *the Asia/Pacific Regional Impact Statement for RVSM monitoring* to incorporate reference to ADS-B as a preferred solution, given the cost advantages of using ADS-B for airlines.

2.37 In this connection, the meeting noted that the Monitoring Agency for the Asia Region (MAAR) based in Thailand had agreed to receive and process ADS-B data for RVSM monitoring. However, calculating Altimetry System Error (ASE) using ADS-B data would largely depend on the availability of the ADS-B data from States and how to retrieve ADS-B data directly from the ADS-B messages by States. It was also required to forward all relevant data to States once the reports of calculation and analysis are completed.

2.38 The meeting recommended RASMAG to develop a requirement and procedure for collection of ADS-B data for height monitoring at its next meeting.

ADS-B Performance Monitoring

2.39 The meeting recognised the need for States to influence the ADS-B environment (correct ADS-B transmissions, correct Flight ID, fitment rate etc.) rather than simply measuring and reporting, so by providing appropriate feedback networks, a good ADS-B environment could be achieved. In view of the foregoing, the meeting considered it necessary to establish a database for the region to maintain a list of identified ADS-B airframe problems.

2.40 Australia was requested to establish and maintain such a database and States were requested to provide required information for entry in the database for sharing. Accordingly, the meeting formulated following Draft Conclusion for consideration by APANPIRG.

Draft Conclusion 11/5 – Database of Blacklist Airframe broadcasting misleading ADS-B Data

That,

a) Australia be requested to establish and maintain a Database of Blacklist airframe broadcasting misleading ADS-B data for sharing with other Administrations in the Asia/Pacific Region; and

b) States implementing ADS-B based surveillance service be encouraged to provide the identified occurrences of airframe broadcasting misleading data to Australia for entry into the ADS-B Blacklist Database.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper; and

b) discuss any relevant matters as appropriate.

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