

International Civil Aviation Organization



**AUTOMATIC DEPENDENT
SURVEILLANCE – BROADCAST SEMINAR
AND FOURTEENTH MEETING OF
AUTOMATIC DEPENDENT
SURVEILLANCE – BROADCAST (ADS-B)
STUDY AND IMPLEMENTATION TASK
FORCE (ADS-B SITF/14)**



Christchurch, New Zealand, 14 – 17 April 2015

Agenda Item 2: Review the outcomes of the APANPIRG/25 on ADS-B SITF/13 and the report of SEA/BOB ADS-B WG/10 Meetings

**REVIEW REPORT OF THE TENTH MEETING OF SOUTH-EAST ASIA
BAY OF BENGAL SUB-REGIONAL ADS-B IMPLEMENTATION WORKING GROUP
(SEA/BOB ADS-B WG/10)**

(Presented by the Secretariat)

SUMMARY

This paper presents the progress achieved by the tenth meeting of the South-East Asia and Bay of Bengal Sub-regional ADS-B Implementation Working Group.

1. INTRODUCTION

1.1 APANPIRG/18 in 2007 agreed to establish a South-East Asia sub-regional ADS-B implementation working group (SEA ADS-B WG) and adopted Conclusion 18/38.

1.2 The following meetings of the WG have been held:

- SEA ADS-B WG/1 15-16 November 2007, Singapore
- SEA ADS-B WG/2 27-29 February 2008, Bali, Indonesia
- SEA ADS-B WG/3 2-3 July 2008, Putrajaya, Malaysia
- SEA ADS-B WG/4 9-10 February 2009, Melbourne, Australia
- SEA ADS-B WG/5 21-22 January 2010, Jakarta, Indonesia
- SEA ADS-B WG/6 24-25 February 2011, Singapore
- SEA/BOB ADS-B WG/7 28-30 November 2011, Chennai, India
- SEA/BOB ADS-B WG/8 5-7 December 2012, Yangon, Myanmar
- SEA/BOB ADS-B WG/9 30 Oct. – 1 Nov. 2013, Beijing, China
- SEA/BOB ADS-B WG/10 11-13 November 2014, Singapore

1.3 The Seminar on Space-based ADS-B and the Tenth Meeting of the South East Asia and Bay of Bengal Sub-Regional ADS-B Implementation Working Group (SEA/BOB ADS-B WG/10) were held in Singapore from 11 to 13 November 2014. The events were hosted by the Civil Aviation Authority of Singapore (CAAS). 70 Participants participated in the seminar and the meeting.

1.4 The whole report of the Working Group is also available on the ICAO APAC website: <http://www.icao.int/APAC/Meetings/Pages/2014-SEABOB-ADSBWG10.aspx>

1.5 Mr. Lo Weng Kee, Deputy Director (Engineering Operations) CAAS and moderator for the Seminar and Mr. Yeo Cheng Nam, Director (Aeronautical Telecom & Engineering) CAAS was the moderator for the meeting. The meeting considered 12 WPs, 6 IPs and 7 SPs.

1.6 The Working Group reports to APANPIRG through the ADS-B Study and Implementation Task Force and CNS Sub-group.

2. DISCUSSION

2.1 0.1) The following subjects were covered by the Seminar:

- System concept and performance of space based ADS-B;
- CONOPS and ATM applicability of space based ADS-B;
- Introduction on Satellite Payload for Space-based ATS;
- Case study by Navcanada;
- Case study by ENAV, Italy;
- Introduction on space with ADS-B with GOMX-1 satellite mission; and
- Australia's position on space based ADS-B.

Main outcome of seminar was recorded as follows:

1) Space-based ADS-B has been endorsed by ICAO, so it is good to learn more about it and be updated about its status as well as upcoming activities. It is appropriate to have this Seminar, one day before the 10th meeting of the ICAO South-East Asia and Bay of Bengal Sub-Regional ADS-B Implementation Working Group Meeting so that meeting participants could be updated about this surveillance alternative/tool with great potential.

2) Aireon gave 2 presentations, sharing with the participants about its development and schedule of space-based ADS-B. Full surveillance coverage is expected by end 2017, with test validation possible to be carried out in late 2016. Aireon also shared with the participants about its Cost-Benefits Analysis (CBA). From the subsequent Seminar discussion, it could be seen that individual State would have to do its own CBA, taking into account its own requirements, FIR and airspace configurations, terrain, etc. as there would not be a one-size- fits-all template relevant to all States.

3) Thales Alenia Space gave a presentation about its satellite payloads for space-based Air Traffic Services (ATS), among which include space-based ADS-B with communications infrastructure. The participants were informed that an European Satellite Operator is now looking into the use of Thales' space-based ATS payloads on board its satellites.

4) GomSpace also presented the first results of its space-based ADS-B with the GOMX-1 satellite mission, which were encouraging. Participants were informed about possibility of having custom-built space-based ADS-B coverage with the GomSpace’s satellites.

5) Airservices Australia presented its approach to Space Based ADS-B which was to encourage those with strong business cases and to consider carefully the use of ADS-B from space taking into account performance, risks and costs.

6) Nav Canada and ENAV of Italy, pioneer users of satellite-based ADS-B also shared with the participants about their considerations and approaches in adopting this new surveillance technology.

Review implementation and coordination activities and sub-regional implementation plans

2.2 ADS-B and MLAT Implementation Plan in Bangladesh (IP/02)

2.2.1 The meeting was informed that Bangladesh had undertaken a Public – Private Partnership project that included installation of primary and secondary surveillance radars (PSR and SSR) at Dhaka and Chittagong, and 4 ADS-B ground stations at Dhaka, Cox’s Bazaar, Barisal and Saidpur. The ADS-B installations were intended as both a backup to current and proposed radar systems, and to fill the surveillance coverage gap in the Bay of Bengal area. The project also included a Multilateration (MLAT) system at Dhaka to provide surveillance for surface movement control, supplemental TMA coverage and as a backup to SSR.

2.2.2 The project was expected to be completed by December 2017. Bangladesh was willing to share ADS-B data and VHF air/ground communications with neighboring States.

2.3 Update on ATC Surveillance Activities in Australia (IP/03)

2.3.1 Australia provided updates on ATM surveillance activities including the Australian Mode S Terminal Area Radar Replacement (AMSTAR) project and En-Route Radar Replacement Project (ERRP), the Wide Area Multilateration (WAM) systems in Tasmania and Sydney, and the Advanced Surface Movement Guidance and Control Systems (A-SMGCS) at Melbourne, Sydney and Brisbane.

2.3.2 33 ADS-B sites were currently operational, and additional ADS-B data was received from operational WAM systems. 13 new ADS-B ground stations were planned to be installed from 2014 to 2016, together with improvements to the digital communications network carrying ADS-B data from the ground stations to ATC centres.

2.3.3 The Defense Radar Filter (DRF) Project was progressively transitioning data from military-operated radars that were used for civilian ATC purposes to a new IP-based radar data communications system.

2.3.4 The figure below provides status of increase percentage in ADS-B Equipped Flights

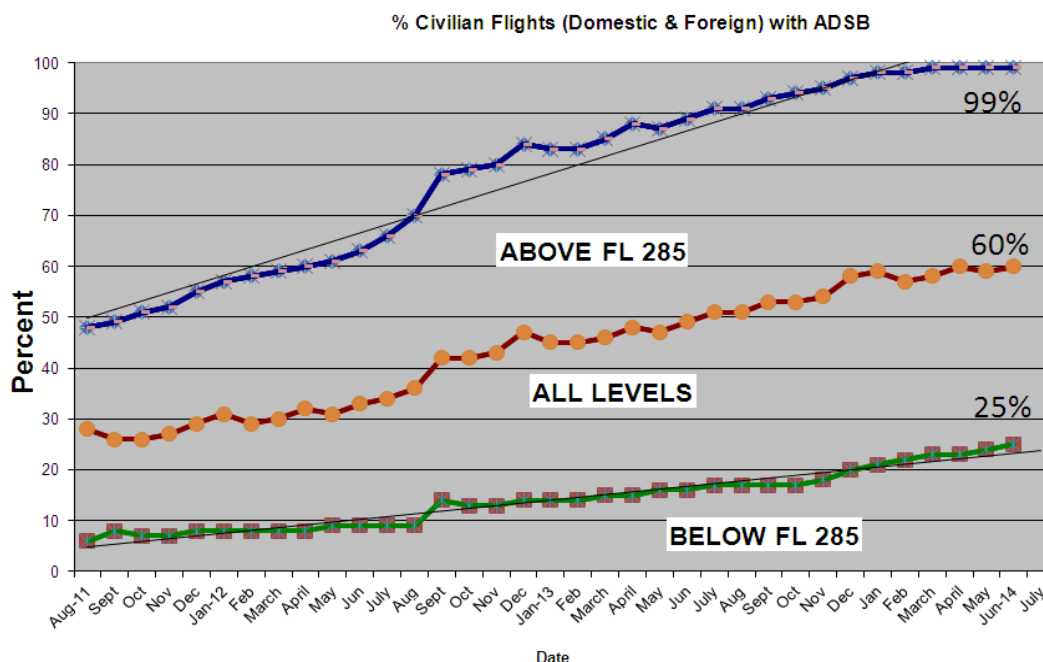


Figure: Increase in ADS-B Equipped Flights

2.3.5 The next significant date would be the introduction of a a mandate for the carriage and use of ADS-B for all aircraft operating within 500NM East/North of Perth to enhance ATC services in Western Australia, and for all aircraft operating at A-SMGCS airports to have Mode S. This applies in Australian airspace (domestic and foreign aircraft) from 4th February 2016.

2.3.6 Information was also provided on the total program of current and future requirements for the carriage and use of Mode S and ADS-B, flight planning and detection of Mode S capability, operational use of Flight ID from radar, and the use of Mode S Downlinked Aircraft Parameters (DAPs) to enhance current and future ATM in Australia.

2.4 ADS-B Implementation Plan in Sri Lanka (IP/05)

2.4.1 The meeting was informed of Sri Lanka’s ADS-B implementation plan, including the establishment of 5 ADS-B ground stations. A central processor for distribution of received ADS-B data, including the capability for sharing ADS-B data with neighbouring States, was also planned. Stand-alone Air Situation Displays (ASDs) would initially be used, with ADS-B data later integrated into the Colombo Area Control Centre and Bandaranaike International Airport ATM systems.

2.4.2 It was estimated that the ground stations and central processor would be ready for operational trials by 4th Quarter 2014. An AIC on the introduction of ADS-B services within TMA of Colombo FIR had been issued on 10 November 2014 (A02/14) with effective date from 1 September 2015.

2.5 ADS-B Implementation in Sanya FIR (IP/06)

2.5.1 China informed the meeting that in order to provide ADS-B based surveillance capability for ATS routes L642 and M771 to achieve seamless implementation, China undertook an implementation ADS-B project in Sanya FIRs. The project includes four ADS-B ground stations, ATM Automatic system upgrading, ADS-B information network and GPS RAIM system. The structure and configuration of the system was introduced. It was also clarified that ADS-B trial

operations was provided and the ATM Automatic System was being upgraded to be integrated with ADS-B input. It was further informed that Sanya FIR was covered by SSR.

2.6 Indonesia Updates

2.6.1 Indonesia planned to mandate ADS-B equipage from 25 June 2015 for 3 ATS routes: B472, M768, R592, subject to safety assessment process. IATA commented that this was different from the existing AIP SUPP (for a defined air space), and urged Indonesia to at least issue a NOTAM to promulgate the amended requirements.

2.7 Update on the ADS-B Collaboration Project in the South China Sea (WP/12)

2.7.1 Singapore presented the progress of the South China Sea collaboration project among Indonesia, Singapore and Vietnam and announced that it has been operationalised. The separation between aircraft were reduced from 50NM to 40NM on 12 Dec 2013 and further reduced to 30NM on 24 Jul 2014. It is expected that **the separation will be further reduced in 2015**. Singapore also highlighted some issues faced during the implementation. These issues include the difficulties faced when doing the safety case for ADS-B under radar environment.

Outcomes of the Ad-Hoc Working Group on the Review of APANPIRG Conclusions Relating to ADS-B (which will be discussed under separate WP)

2.8 Benefits of Cross Border ADS-B Data Sharing (WP/10)

2.8.1 Singapore presented the benefits of cross-border data sharing. The benefits include improved situation awareness for ATC as the controller is able to detect unreported deviations and get better traffic information. With the implementation of ADS-B, longitudinal separation between suitably equipped aircraft has been reduced from 50NM to 30NM. More aircraft is assigned their optimum heights. Less greenhouse gases were emitted due to better fuel efficiency.

2.8.2 The meeting recalled that previously, CANSO together with CAAS, FAA and IATA conducted a cost benefit study on the South China Sea collaboration project, based on projected figures and several assumptions. In view that the project is now operational, the meeting recommended that a similar cost benefit study should be done based on actual figures.

2.8.3 Accordingly, Singapore agreed to work with CANSO, FAA and IATA to examine the previous cost-benefit study with a view to quantifying the benefits and dis-benefits of the ADS-B mandate (**ACTION ITEM 1**). **Status of this action item needs to be updated.**

2.9 Review of outcome of South East Asia (SEA) and Bay of Bengal (BOB) Sub-regional Projects

2.9.1 The meeting reviewed the updates of the Sub-regional ADS-B implementation projects as presented by the Ad Hoc working groups at SEA/BOB WG/10 meeting. The discussions were based on the outcome of previous meetings of the SEA/BOB WG/9. The outcome of discussions by Ad Hoc working groups is provided in **Appendix B** to the meeting Report which could serve as a basis for further development of the sub-regional implementation plans at its next meeting.

2.9.2 The meeting urged India and Myanmar to sign the agreement on data sharing by the end of 2014. (**Status needs to be updated**)

2.9.3 IATA suggested that Philippines' intentions for ADS-B implementation were not clear, and that this was a significant component of South China Sea surveillance improvement. The Secretariat would correspond with Philippines to obtain firm information on their plans for ADS-B ground-station installations (**ACTION ITEM 2**).

2.9.4 The meeting also reviewed the ADS-B Implementation Status in the APAC Region. The updated status is provided in the **Appendix C** to the meeting Report.

2.10 Monitoring of the ADS-B stations and the avionics (WP/11)

2.10.1 Singapore presented her monitoring of the ADS-B stations and the avionics. It was observed that while the performances of the ADS-B stations are good enough for operations, the performance is nowhere close to the theoretical figure. Singapore shared that, about 90% of the airframes were equipped with DO-260 avionics, about 6% were equipped with DO-260A avionics and 4% were equipped with DO-260B avionics.

2.10.2 In October, an aircraft indicated good NUC while the showing misleading position data. It was observed that initially, the ADS-B data reflected the correct position. When the aircraft made a turn at a way-point, the ADS-B data indicated that the aircraft was still travelling straight. The transponder corrects this error only after more than 30NM of misleading data. Air service Australia has reported the problem to Boeing and Boeing is conducting the investigation with the support of Australia, Canada and Singapore. Australia advised that this anomaly was had been observed in one new aircraft only, and had been rectified by replacement of the aircraft's integrated surveillance equipment. The relevant avionics parts were sent back to Boeing for analysis. (Action Item, provided feedback to States/Administrations).

2.11 ATC Procedures for Surveillance Anomalies (WP/07)

2.11.1 Australia presented the paper sharing their operational ATC procedures to ensure overall system integrity through the systematic identification and reporting of radar or ADS-B anomalies.

2.11.2 Australia agreed to prepare working papers and a tutorial on the reporting and analysis processes, and recommendations, for consideration by next meeting of the ADS-B SITF (**ACTION ITEM 3**). The meeting also discussed the need to update the Regional ADS-B Implementation and Operations Guidance Document (AIGD). Australia, Singapore and Thailand would jointly address this task, with Singapore agreeing to take the lead role.

2.12 ADS-B Implementation Related Issues (WP/08)

2.12.1 India identified some issues in the working paper related to regulatory approval for use of ADS-B. While analysis of ADS-B data had indicated that the latest ATM automation systems were equipped with robust checking and alerting functions, the regulatory authority's interpretations of potential vulnerabilities had impeded ADS-B implementation.

2.12.2 India suggested that those States that had approved ADS-B for operational use could share their experience in the context of potential vulnerabilities, to best practices to be considered by other States seeking regulatory approval. The meeting was invited to consider that ADS-B SITF should develop guidance material addressing potential vulnerabilities, to support States' regulatory framework for operational use of ADS-B.

2.12.3 The meeting discussed security vulnerabilities, including the need to ensure that the safety benefits of ADS-B were not sacrificed for overly conservative responses to perceived vulnerabilities that already existed in other surveillance systems. It was further mentioned that State laws should have already provided legal protecting safety services from security threats.

2.13 Updates on ADS-B Implementation in Hong Kong China (IP/04)

2.13.1 Hong Kong China was unable to participate in the meeting. The following updates on the latest development were provided to the meeting through the Secretariat.

2.13.2 Implementation of ADS-B operation in Hong Kong FIR was re-scheduled to December 2016. An AIP Supplement was issued on 29 August 2014 to notify airspace users on the change.

2.13.3 Regarding the proposal to establish an ADS-B Avionics Problem Reporting Database (APRD) for sharing of monitoring results of avionics performance of ADS-B aircraft for the region, Hong Kong China has been working with the ICAO RSO to develop detailed specifications of the database, as well as a prototype to illustrate the look-and-feel of the database, with inputs/comments from Singapore and Australia. During the CNS SG/18 meeting held in July 2014, Hong Kong China presented a working paper outlining the proposal and progress in establishing the APRD with a view to enhancing aviation safety for the Region, which gained support and endorsement from the meeting. A Discussion Paper would be presented in the coming 51st DGCA Conference to provide the latest update while seeking support from the Conference.

2.14 Future Focus of the Working Group (WP/09)

2.14.1 A proposed future direction for the SEA/BOB ADS-B WG was presented by Singapore. The paper noted that while many States had either implemented or commenced implementation of ADS-B, the progress of regional collaboration was slow. Since establishment of the Working Group 7 years ago it had identified at least 8 collaboration projects. Only 4 collaboration agreements had been made and implemented, involving only 6 Administrations (Australia, China, Hong Kong China, Indonesia, Singapore and Viet Nam).

2.14.2 The Working Group discussed the possible areas of focus for the Working Group in future. It was noticed that while several data-sharing projects were identified in the past, the implementation progress has been slow. Data sharing is the key to provide seamless ATM and is therefore important. The Working Group discussed and was of the view that it would be useful if ICAO could highlight the importance of data-sharing to the top management of administrations. The Working Group hence formulated a recommendation asking ICAO Secretariat to highlight the importance and the very slow progress of cross-border ADS-B data sharing during the DGCA conference. As the deadline for discussion papers, the importance and issue was highlighted by CANSO at the DGCA Conference.

2.14.3 The meeting also noted that there were a lack of separation minima standards for ADS-B with CPDLC and ADS-B with “DCPC” type (i.e., without operators) of Satcom voice, in remote areas. The availability of such standards would provide benefits to the aviation community. In view of this, the Working Group formulated the following draft conclusion for consideration by the ADS-B SITF:

Draft Conclusion SEA/BOB ADS-B WG 10/4 – Need guidance on separation Minima

That, ICAO (SASP) be invited to study the separation minima that can be applied using ADS-B with CPDLC and ADS-B with “DCPC” type (i.e., without operators) of Satcom voice in remote area space outside the range of VHF voice communications of the responsible ATC unit.

2.14.4 With the emerging of space-based ADS-B, it would also be useful to study its application in the Asia Pacific region. For benchmarking individual system’s performance, it would be necessary to work out the required ADS-B performance standards. Therefore, the Working Group formulated the following draft Decision:

Draft Decision SEA/BOB ADS-B WG 10/5 – Study the application of space based ADS-B

That, the ADS-B SITF Task Force be invited to

- a) study the application of space-based ADS-B in the Asia Pacific region; and*
- b) develop recommendations on the required performance standards for ADS-B.*

2.14.5 It was noted in the paper that some States may have faced a number of challenges including political, resource, ATC automatic system upgrading and communication between ANSPs.

2.14.6 It was also informed that OPLINK Panel (Operational Data Link working group) was developing the concept of Performance Based Communications and Surveillance (PBCS), for which the Working Group or the ADS-B Study and Implementation Task Force could establish a list of Required Surveillance Performance (RSP) specifications for ADS-B, with consequent monitoring of performance against the specifications. Navcanada recommended that the WG may also consider to develop an **operational concept of using combinations of different communication means with ADS-B** such as CPDLC and SATCOM Voice which would contribute study by relevant panel at global level.

2.14.7 The member Administrations participated meeting provided their view on the future direction and focus of the WG. Some common points included the following:

- Based on current TOR, focusing on phase II of South China Se.*
- Addressing of operational approval for using ADS-B based surveillance service issues with DGCA;*
- Continue efforts on data sharing and collaborations projects;*
- Identification of implementation issues and solutions;*
- Clear distinction of roles between WG and SITF, and ensuring WG won’t do unnecessary duplication work with other groups;*
- Better documentation of the challenges and successes for the benefit of other States that could learn from the world-leading work of Asia/Pacific;*

- *Need to study using ADS-B to replace SSR, with a view to making recommendations to States with little resources.*

2.14.8 The meeting discussed the need for greater understanding and engagement by regulatory authorities. It was recommended that a seminar oriented specifically towards regulator education and guidance should be organized.

2.15 Review of Terms of Reference of the SEA/BOB ADS-B Working Group (WP/03)

2.15.1 The meeting reviewed the ToR of the SEA/BOB ADS-B Working Group. Based on the discussions on WP/09, the meeting agreed to slightly amend the ToR to include “to identify implementation issues and propose solutions for the identified issues”. Accordingly, the meeting made following Decision:

Decision SEA/BOB ADS-B WG 10/6 - Revised ToR of the SEA/BOB ADS-B Working Group

That, the revised TOR of SEA/BOB ADS-B Working Group provided in Appendix D to this Report be adopted.

2.16 Applicability of Circular 326 in Complexity Airspace

2.16.1 Australia was requested to provide clarification on applicability of ICAO Circular 326 AN188 in complexity air space including the definition of the low-complexity (ACTION ITEM 4).

Date and venue for the next meeting and any other business

2.17 The meeting identified the need to organize another meeting to progress implementation of the sub-regional plan. The Secretariat will coordinate with member States of the Working Group for hosting the next SEA ADS-B WG meeting in late 2015. The exact dates will be informed to the members States by the Secretariat at due course.

2.17.1 IATA indicated that a **WP on data sharing over FIR boundaries using potential spaced based ADS-B will be prepared for the next meeting of ADS-B Study and Implementation Task Force in April 2015.**

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

- a) note activities and efforts being made by SEA/BOB ADS-B WG;
- b) note the relevant action items formulated by the WG and Decision ***SEA/BOB ADS-B WG 10/6*** ;
- c) ***Consider Draft Conclusion SEA/BOB ADS-B WG 10/4 and Draft Decision 10/5;***
- d) note other draft Conclusion on operational approval will be considered under a separate working paper;

- e) Update Appendix C - ADS-B Implementation Status in the APAC Region; and
- f) encourage States concerned to expedite implementation of the project in the South China Sea and Bay of Bengal area.

REPORT FROM SOUTHEAST ASIA SUB GROUP
(Singapore, 12-13 November 2014)

States Present

Australia
China
Indonesia
Thailand
Singapore
Vietnam

Previously Identified Projects

The South East Asia Group provide an update on the near term implementation of the following projects that were identified in the last task force meeting.

Project 1 – ADS-B Data Sharing Between Australia and Indonesia

Phase 1a

Indonesia and Australia sharing data from the following stations:

- Saumlaki ADS-B (Indonesia) (Installed)
- Merauke ADS-B (Indonesia) (Installed)
- Waingapu ADS-B (Indonesia) (Installed)
- Kintamani - Bali (Indonesia) (Installed)
- Thursday Island ADS-B (Australia) (Installed)
- Gove ADS-B (Australia) (Installed)
- Broome ADS-B (Australia) (Installed)
- Doongan ADS-B (Australia) (Installed)

Data Sharing Agreement signed in November 2010.

Benefits

- Data used for air situational awareness and safety nets;
- Enhanced Safety at FIR boundary;
- Operational service commenced by Australia in February 2011; and
- Indonesia has published their ADS-B mandate in 2013 to be effective after 2015.

Phase 1b

Indonesia and Australia sharing data from the following additional stations:

- Semarang (Indonesia) (Installed)
- Alor (Indonesia) (Installed)
- Timika (Indonesia) (Installed)
- Kupang (Indonesia) (Installed)
- Christmas Island (Australia) (Not yet installed)
- Timor Sea oil rig (Australia) (Not yet installed)

Data Sharing Agreement signed on 18 June 2014.

Project 2 – ADS-B Data Sharing In South China Sea

Phase 1

Under the near term implementation plan, China, Hong Kong China, Indonesia, Singapore and Vietnam would share the ADS-B data from the following stations:

- Singapore ADS-B (Singapore provide data to Indonesia) (Installed)
- Natuna ADS-B (Indonesia provide data to Singapore) (Installed)
- Matak ADS-B (Indonesia provide data to Singapore) (Installed)
- Con Son ADS-B (Viet Nam provide data to Singapore) (Installed)
- Sanya ADS-B (China provide data to Hong Kong China) (Installed)
- Three more Sanya ADS-B (China provide data to Hong Kong China) (To be installed by end 2014)

VHF radio communication services (DCPC) would be provided from the following stations to Singapore and Hong Kong China. This is to enable implementation of radar-like separations in the non-radar areas within the Singapore FIR as well as routes L642 and M771.

- Natuna VHF (Install for Singapore by Indonesia) (Installed)
- Matak VHF (Install for Singapore by Indonesia) (Installed)
- Con Son VHF (Install for Singapore by Viet Nam) (Installed)
- Sanya VHF (Install for Hong Kong China by China) (Installed)

ADS-B Data sharing and DCPC services agreement between Singapore and Indonesia signed in December 2010.

ADS-B Data sharing and DCPC services agreement between Singapore and Vietnam signed in November 2011.

DCPC services agreement between China and Hong Kong, China signed in 2005.

ADS-B Data sharing agreement between China and Hong Kong China signed in 2013.

Operational Status

Singapore agreed on separation minima with Vietnam and have commenced on ADS-B operations.

All 4 Administrations (China, Hong Kong China, Singapore, Viet Nam) recommend that there should not be a need for operational approval.

Initial Benefits

The above sharing arrangement will benefit L642, M771, N891, M753 and L644. Enhanced safety and reduced separation has been applied. Mandate was effective in 2013.

Phase 2

The Philippines CNS ATM project includes Manila ADS-B stations.

Singapore signed an MOU with the Philippines to share ADS-B data from Quezon Palawan.

Brunei previously in-principle agreed to share ADS-B data with Singapore and provide the VHF facilities for Singapore. The Brunei CNS ATM project includes ADS-B stations. The locations of the stations are yet to be determined.

China can share the data from the ADS-B data processing sub-centre in Sanya FIR with neighbouring States. Technical details will be discussed further.

Phase 3

Vietnam has ADS-B coverage at the Southern part of L625 and N892 and Vietnam is willing to share the ADS-B data with the Philippines and Singapore.

Project 3 – ADS-B data sharing between Indonesia and Malaysia (No updates, info based on previous reports)

Indonesia is willing to share the ADS-B data from the following stations:

- Aceh ADS-B (installed) - to help cover Kuala Lumpur FIR
- Tarakan ADS-B (installed) - to help cover Kota Kinabalu FIR
- Pontianak ADS-B (installed) - to help cover Kota Kinabalu FIR.

The project is still under discussion between Malaysia and Indonesia.

Initial benefits

Enhanced Safety at FIR boundary

Malaysia currently has 1 ADS-B station at Terengganu. Malaysia plans to install more ADS-B stations before 2020. The stations may be shared in future.

Project 4 – ADS-B data sharing between Cambodia, Thailand and Viet Nam (No updates, info based on previous reports)

Cambodia is willing to share the ADS-B data from the following stations:

- Phnom Penh International Airport ADS-B (installed)
- Siem Reap International Airport ADS-B (installed)
- Stung Treng City ADS-B (installed)

Viet Nam is planning to install stations in the south of HCM FIR from 2015 to 2016. Viet Nam is willing to share with Cambodia and Thailand.

Discussions between the three States are on-going.

Initial benefits

For redundancy

Project 5 – ADS-B data sharing between Indonesia and the Philippines (No updates, info based on previous reports)

Indonesia is willing to share the ADS-B data from the following stations:

- Manado ADS-B (installed)
- Galela ADS-B (installed)
- Tarakan ADS-B (installed)

Where possible, Indonesia would like to receive ADS-B data from the Philippines from ADS-B stations near the Manila FIR – Ujung Pandang FIR boundary

Currently, the Philippines has no plans to install ADS-B stations at the Southern part of Manila FIR.

The project is still under discussion between Indonesia and the Philippines.

Initial benefits

Situational awareness

Project 6 – ADS-B data sharing between Australia, Indonesia and Papua New Guinea

Data Sharing between Australia and Papua New Guinea

- Thursday Island (Australia) (installed)
- Gove (Australia) (installed)
- Kintore (Australia) (installed)
- Burns Peak – Port Moresby (PNG) (tender awarded)
- Mt Dimo Dimo (PNG) (tender awarded)
- Mt Robinson (PNG) (tender awarded)

Data Sharing between Indonesia and Papua New Guinea

- Burns Peak (PNG) (tender awarded)
- Mt Nauwein (PNG) (tender awarded)
- Mt Robinson (PNG) (tender awarded)
- Merauke (Indonesia) (installed)
- Timika (Indonesia) (installed)
- Biak (Indonesia) (installed)

The project is still under discussion between Australia, Indonesia and Papua New Guinea.

Harmonization Plan for L642 and M771			
No.	What to harmonize	What was agreed	Issue / what needs to be further discussed
1	Mandate Effective	SG, HK, VN: 12 Dec 2013 CN: Dec 2015.	
2	ATC Operating Procedures	No need to harmonize	Refer to SEACG for consideration of the impact of expanding ADS-B surveillance on ATC Operating Procedures including Large Scale Weather procedures.
3	Mandate Publish Date	No need to harmonize	To publish equipment requirements as early as possible.
4	Date of Operational Approval	Recommended to do without operational approval	Pending endorsement by APANPIRG
5	Flight Level	SG, HK, VN, CN: - At or Above FL290 (ADS-B airspace) - Below FL290 (Non-ADS-B airspace) SG: AIC issued 28 Dec 2010, AIP Sup issued 6 Nov 13 VN: AIP Sup issued 31 Oct 13 HK: AIC issued 24 May 2011, AIP Sup issued 29 Oct 13	
6	Avionics Standard (CASA/AMC2024)	SG - CASA or AMC2024 or FAA (ES) HK - CASA or AMC2024 or FAA (ES) VN - CASA or AMC2024 or FAA (ES) CN - CASA or AMC2024 or FAA (ES)	Indonesia will consider and have a willingness to upgrade their stations shared with other States.

SEA/BOB ADS-B WG/10
Appendix B to the Report

		SG, HK and VN confirmed that their ADS-B GS can accept DO260, DO260A and DO260B.	
7	Aircraft Approval		
7a)	Procedures if Aircraft Not Approved or Aircraft without a Serviceable ADS-B Transmitting Equipment before Flight	SG: FL280 and below. HK, CN, VN: Dependent on situation. ADS-B equipped aircraft will be given priority to operate above FL280.	
7b)	Aircraft Approved but Transmitting Bad Data (Blacklisted Aircraft)	For known aircraft, treat as non ADS-B aircraft. (China, Hong Kong - China and Singapore)	Share blacklisted aircraft among concerned States/Administration.(Hong Kong China, Singapore and Vietnam) China to be confirmed.
8	Contingency Plan		
8a)	Systemic Failure such as Ground System / GPS Failure	Revert back to current procedure.	
8b)	Avionics Failure or Approved Aircraft Transmitting Bad Data in Flight	Provide other form of separation, subject to bilateral agreement. From radar/ADS-B environment to ADS-B only environment, ATC coordination may be able to provide early notification of ADS-B failure.	Address the procedure for aircraft transiting from radar to ADS-B airspace and from ADS-B to ADS-B airspace.
9	Commonly Agreed Route Spacing	SEACG	Need for commonly agreed minimal in-trail spacing throughout.

REPORT FROM BAY OF BENGAL AD HOC WORKING GROUP
(Singapore, 12-13 November, 2014)

States Presented:

Bangladesh
India
Indonesia
Pakistan
Sri Lanka
Thailand

Maldives and Myanmar were not present in the WG meeting.

The participants met to update the status of implementation of ADS-B and possible Data sharing between the neighboring States.

1. Bangladesh has planned to install ADS-B ground stations at four locations i.e. Dhaka, Barisal, Saidpur and Cox's Bazar by 2H2016. Bangladesh is willing to share ADS-B data with India and Myanmar.
2. India informed that 21 ADS-B ground receivers have already been installed and AIP SUPP has been prepared to use ADS-B in the provision of ATS surveillance service. The AIP Supplement will be issued once the approval for operational use of ADS-B data for surveillance is obtained from the regulator. The data sharing agreement between India and Myanmar can be signed by 2H2014. India is willing to share ADS-B data with Bangladesh, Indonesia, Maldives and Sri Lanka.
3. Indonesia informed that ADS-B ground station at Aceh is already operational and will share data with India (Portblair – Aceh) by 2H2015.
4. Maldives has installed and commissioned ADS-B ground stations at three locations. The integration of data to the ATM systems has already been completed. Maldives is willing to share ADS-B data with India and Sri Lanka (Expected date: 2015). Also, Maldives has planned to implement exclusive ADS-B airspace at and above FL290 by 2016.
5. Nepal is planning to install ADS-B ground stations in future. New MSSR system is going to install and the project will be completed by 2015. MLAT is under the process for a tender.
6. Pakistan has informed the meeting that most of the Pakistan airspace currently is already under RADAR surveillance; some gaps in the West, Northern mountain regions and some portion in the South and the South-West airspace need to be brought under positive feasibility or surveillance. PCAA considers ADS-B, a potential option to fill up the gaps in radar surveillance and also considers using ADS-B to provide partial back-up to the existing radar. Regarding data sharing neighboring countries will be coordinated through PCAA.
7. Sri Lanka is planning to install ADS-B ground stations at five locations and the system will be ready for test operations by October, 2015. AIC has been recently issued. Sri Lanka is willing to share data with India and Maldives.
8. Thailand informed that a new ATM system with capability of processing ADS-B data is expected to be operational in 2017.

REPORT FROM BAY OF BENGAL AD HOC WORKING GROUP
(Singapore, 12-13 November, 2014)

ADS-B DATA SHARING

The following locations for data sharing were agreed upon during the sub-group (Ad hoc) Meeting:

INDIA – BANGLADESH
Agartala and Dhaka (2H2016)

BANGLADESH – MYANMAR
Coxs Bazaar and Sittwe (2H2016)

INDIA – MYANMAR
Agartala – Sittwe (2H2015)
Portblair – Coco Island (2H2015)

INDIA – INDONESIA
Portblair – Aceh (2H2015)

INDIA – MALDIVES
Trivandrum – Kulhudhuffushi (2H2015)

MALDIVES – SRI LANKA
Male – Colombo (2H2016)

INDIA – SRI LANKA
Trivandrum – Colombo (2H2016)

ADS-B IMPLEMENTATION STATUS IN THE APAC REGION

State/ Administration	ADS-B Ground Infrastructure and ATC System readiness or Implementation plan	Date of issue/effectiveness date of equipage mandate	Mandated Airspace and/or ATS-routes	Intended separation criteria to be applied	Remarks
AFGHANISTAN	ADS-B & Multi Lateration system installed.				subject to safety assessment
AUSTRALIA	<p>A total of 33 ADS-B stations and 28 WAM stations are currently used.</p> <p>ATC system readiness since 2004.</p> <p>ADS-B data sharing with Indonesia operational since 2/2011.</p> <p>ASMGCS using multilateration is operational in Brisbane, Sydney & Melbourne. It is being installed in Perth.</p> <p>Additional 13 ADS-B stations from 2014-2016.</p> <p>OneSKY replacing current ATM system is estimated for full operational around 2020.</p>	<p>2009/effective date of mandating in UAP 12/12/2013.</p> <p>A forward fit ADS-B mandate also applies from 2/2014 for all IFR aircraft at all flight levels.</p> <p>An ADS-B for all IFR aircraft applies from 2/2017.</p>	<p>at/above FL290 UAP from 12/2013 for domestic & foreign aircraft.</p> <p>Mandates for additional flight level are considered for 2015 & 2017.</p> <p>WAM is operating in Tasmania since 2010 delivery 5 Nm separation service.</p> <p>WAM is also operating in Sydney for 3 Nm separation service in TMA and for precision runway monitoring function.</p>	<p>5 NM</p> <p>3 NM SYDWAN</p>	

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State/ Administration	ADS-B Ground Infrastructure and ATC System readiness or Implementation plan	Date of issue/effectiveness date of equipage mandate	Mandated Airspace and/or ATS-routes	Intended separation criteria to be applied	Remarks
BANGLADESH	Bangladesh has a plan to commission four ADS-B ground stations to be installed at Dhaka, Cox's Bazar, Saidpur and Barisal Airports by 2016. ADS-B data will be integrated with new ATS system at Dhaka.				
CAMBODIA	3 ADS-B ground stations have been installed in Cambodia since 2011 and able to provide full surveillance coverage for Phnom Penh FIR.				
CHINA	<p>5 UAT ADS-B sites are used for flight training of CAFUC.</p> <p>8 ADS-B stations installed by end of 2012. 200 ADS-B stations nationwide will deployed as 1st phase.</p> <p>1 ADS-B station operational in Sanya FIR since 2008. Sanya ATC system ready since July 2009 to support L642 nd M771.</p> <p>Chengdu-Jiuzhai project finished in 2008 with 2 ADS-B stations and additional site is planned to enhance the surveillance</p>	NOTAM issued on ADS-B trial operation			ADS-B signal alone won't be used for ATC separation

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State/ Administration	ADS-B Ground Infrastructure and ATC System readiness or Implementation plan	Date of issue/effectiveness date of equipage mandate	Mandated Airspace and/or ATS-routes	Intended separation criteria to be applied	Remarks
	<p>coverage.</p> <p>Chengdu - Lhasa route surveillance project completed with 5 ADS-B stations using 1090ES since 2010. Trials planned from May 2011.</p> <p>1 ADS-B site installed in Sanya FIR since 2008. 3 additional ground stations planned, Trial planned for Jun, 2011.</p>				
HONG KONG CHINA	<p>A larger-scale A-SMGCS covering the whole Hong Kong International Airport put into operational use in April 2009.</p> <p>Data collection/ analysis on aircraft ADS-B equipage in Hong Kong airspace conducted on quarterly basis since 2004.</p> <p>ADS-B trial using a dedicated ADS-B system completed in 2007. ADS-B out operations over PBN routes L642 and M771 at or above FL 290 within HK FIR are planned in December 2013 and within HK FIR at or</p>	<p>AIP supplement issued on 29 Oct.2013/12 Dec. 2013 as effective date.</p>	<p>L642/M771 ATS routes.</p>	<p>To be determined.</p>	<p>ADS-B signals being fed to ATC controllers under an operational trial programme.</p> <p>ADS-B operation in Hong Kong FIR re-scheduled for Dec. 2016. An AIP Supplement was issue don 29 Aug. 2014.</p>

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State/ Administration	ADS-B Ground Infrastructure and ATC System readiness or Implementation plan	Date of issue/effectiveness date of equipage mandate	Mandated Airspace and/or ATS-routes	Intended separation criteria to be applied	Remarks
	<p>above FL 290 in December 2014.</p> <p>ADS-B ground station infrastructure completed in 2013.</p> <p>ADS-B trial using ADS-B signal provided by Mainland China to cover southern part of Hong Kong FIR commenced in 2010.</p>				
MACAO, CHINA	Mode S MSSR coverage available for monitoring purposes.				
DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA	ADS-B has been used as back-up surveillance of SSR since 2008.				
FIJI ISLANDS	ADS- B /multilateration ground stations installed. Situations awareness service will be provided in 2013.				
FRANCE (<i>French Polynesia</i>)	Project launched to install 9 ADS-B stations. 2 stations to be installed in 2014; 3 in 2015 and 4 will be installed in 2016.			5 NM for airspace under coverage.	
INDIA	<p>ASMGCS (SMR + Multilat) is operational at Delhi, Mumbai, Chennai, Kolkata, Bangalore and Hyderabad Airports.</p> <p>ASMGCS is also being installed at 05</p>	AIP supplement issued on 17 th April 2014 with effective date of implementation from 29 th May 2014.			ADS-B in India to provide redundancy for radar and filling the surveillance gaps.

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State/ Administration	ADS-B Ground Infrastructure and ATC System readiness or Implementation plan	Date of issue/effectiveness date of equipage mandate	Mandated Airspace and/or ATS-routes	Intended separation criteria to be applied	Remarks
	<p>more international airports.</p> <p>ADS-B Ground Stations installed at 14 locations in phase one across continental and Oceanic airspace at Port Blair. 07 more ADS-B Ground stations in phase two in 2014.</p> <p>ATS systems at 12 ACCs are capable of processing ADS-B data and provide the information on Display.</p> <p>Wide area Multilateration pilot project is being planned in Kolkata TMA to augment the surveillance coverage.</p>				<p>Currently study the integrity of ADS-B data and evaluating in both Non-radar and radar environment for ATC purposes.</p>
INDONESIA	<p>30 Ground Station successfully installed.</p> <p>Since 2009, ATC Automation in MATSC has capabilities to support ADS-B application.</p> <p>ADS-B Task Force team established to develop planning and action concerning ADS-B Implementation within Indonesia FIR</p>				<p>ADS-B Task Force Team is considering a mandate in 2016.</p> <p>Mandate for 3 ATS routes: B472, M768, R592 from 25 June 2015 subject to safety assessment process.</p>

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State/ Administration	ADS-B Ground Infrastructure and ATC System readiness or Implementation plan	Date of issue/effectiveness date of equipage mandate	Mandated Airspace and/or ATS-routes	Intended separation criteria to be applied	Remarks
	ADS-B data sharing with Australia and Singapore.				
JAPAN	<p>Multilateration Systems for surface monitoring have been implemented at seven airports and are being implemented at another one airport.</p> <p>PRM (WAM) is planned to be implemented at Narita Airport. (Operation will start in 2014).</p> <p>Basic design of en-route WAM system completed in FY2013. Plans to start manufacture in FY2014 and estimated operational in FY2018.</p> <p>Plan to evaluate accuracy of ADS-B information and has intension to introduce ADS-B to the oceanic direction.</p>				
MALAYSIA	Malaysia planned to start mandate ADS-B requirement in KL FIR in 2018 and full implementation of ADS-B service at specific routes/exclusive airspace by end of 2020.	Plan to issue mandate with target effective date end of 2018.			

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	Plan to install two ADS-B stations at Pulau Langkawi and Genting Highland by 2016. Data sharing with neighbouring by mid. 2017.				
MALDIVES	<p>4 ADS-B stations installed in Nov. 2012 (2 at Male' Ibrahim Nasir Intl Airport, 1 at Kulhudhuffushi Island in the North and 1 at Fuaah Mulah Island in the South to cover 95% of the FIR at/above FL290. Maldives' ADS-B is integrated with the ATM system (in November 2013), and under observation prior to commencing trials.</p> <p>Maldives has plan to share ADS-B data with its adjacent FIRs.</p>				Seaplane in Maldives equipped with ADS-B for AOC purpose. These seaplanes have ADS-B IN functions as well.
MONGOLIA	<p>Five ADS-B ground stations for combination with SSR will be implemented first quarter of 2013.</p> <p>Full coverage for surveillance gaps will be implemented by 2015-2016.</p>				
MYANMAR	ADS-B ground stations to be installed at Sittwe, Co Co Island by end of 2014 as 1 st phase Yango ,				Supplement radar and fill the gaps to improve safety and efficiency.

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State/ Administration	ADS-B Ground Infrastructure and ATC System readiness or Implementation plan	Date of issue/effectiveness date of equipage mandate	Mandated Airspace and/or ATS-routes	Intended separation criteria to be applied	Remarks
	<p>Lashio and Myeik - 2015 as 2nd phase; Kengteng, Myitkyina in 2016.</p> <p>Completion of integration to Euro Cat. C. in 2014.</p> <p>Agreed to share ADS-B data with India, agreement on sharing being negotiated.</p>				<p>ADS-C/CPDLC integrated in Yangon ACC since 2010.</p>
NEPAL	<p>ADS-B feasibility study conducted in 2007.</p>				
NEW CALEDONIA	<p>Three ADS-B ground stations commissioned in 2010 to cover international traffic at La tontouta airport serving Tontouta ACC & APP. It is used for Situation awareness and SAR.</p>				
NEW ZEALAND	<p>MLAT being used in Queenstown area (WAM) and Auckland (airport surface movements).</p> <p>ADS-B data available from all MLAT & SSR sites.</p> <p>New Zealand Navigation and Airspace and Air Navigation Plan “New Southern SKY” issued May 2014</p>			<p>5 NM Surveillance Separation</p>	

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State/ Administration	ADS-B Ground Infrastructure and ATC System readiness or Implementation plan	Date of issue/effectiveness date of equipage mandate	Mandated Airspace and/or ATS-routes	Intended separation criteria to be applied	Remarks
PAKISTAN	Feasibility study for using ADS-B is in hand. One station was installed at ACC Karachi and evaluation is in progress.				
PAPUA NEW GUINEA	Legislation mandating ADS-B and guidelines for aircraft equipage and operational approval to be issued by 31/12/2011 with target mandatory date by mid-2015 and plans to provide ADS-B service above FL245 within Port Moresby FIR and also in specific higher traffic areas domestically.				
PHILIPPINES	One (1) ADS-B ground station in Manila ATM Center will be available in 2016.				
REPUBLIC OF KOREA	ADS-B implemented 2008 for SMC in Incheon International Airport. ROK is developing ADS-B system since 2010 through R&D group. The testbed at Gimpo Airport supporting both 1090ES and UAT, undergoing operational testing (2013-16). At Incheon Intl Airport, promotion of surface surveillance (2014-17) In 2 nd phase				

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State/ Administration	ADS-B Ground Infrastructure and ATC System readiness or Implementation plan	Date of issue/effectiveness date of equipage mandate	Mandated Airspace and/or ATS-routes	Intended separation criteria to be applied	Remarks
	from 2015 to 2016, ADS-B ground stations will supplement to the radar in the terminal area and fill up the gap between radar coverage. The last phase from 2017 to 2020, ADS-B will be deployed for entire Incheon FIR.				
SINGAPORE	<p>The airport MLAT system was installed in 2007 and “far-range” ADS-B sensor was installed in 2009.</p> <p>ATC system has been processing ADS-B data since 2013.</p>	<p>AIC was issued on 28 December 2010/effective from 12 December 2013.</p> <p>AIP supplement published in Nov 2013 to remind operators of ADS-B exclusive airspace implementation.</p>	<p>L642 and M771.</p> <p>At and above FL290. Also affect the following ATS routes N891, M753, L644 & N892</p>	<p>40nm on ATS routes L642, L644, M753, M771, N891 and N892</p> <p>30nm planned for 26th June 2014 on ATS routes L642, M753, M771 and N892;</p> <p>20nm planned for end 2015</p>	<p>Safety case was completed end of November. 2013.</p>
SRI LANKA	<p>ADS-B Trials planned for 2012 and implementation in 2013. 5 ADS-B ground station was planned and willing to share ADS-B data with neighbouring States through a central processor which is ready for trial in 4th Quarter 2014.</p>				<p>An AIC on ADS-B services with TMA of Colombo FIR issued on 10 Nov. 2014 (A02/14) with effective 1 Sep. 2015.</p>
THAILAND	<p>Multilateration implemented in 2006 at Suvarnabhumi Int'l. Airport.</p>				

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State/ Administration	ADS-B Ground Infrastructure and ATC System readiness or Implementation plan	Date of issue/effectiveness date of equipage mandate	Mandated Airspace and/or ATS-routes	Intended separation criteria to be applied	Remarks
	<p>ADS-B Ground Stations have been installed in Thailand for internal research and development project. ADS-B is planned to be part of future surveillance infrastructure. New ATM System to be in operational in 2017 will be capable of processing ADS-B data.</p>				
TONGA	<p>Trial planned for 2017</p>				
UNITED STATES	<p>As of 31 March 2014, 634 radio sites had been installed; these sites cover the “baseline” set of Service Volumes planned by the FAA in 2007. Since 2007, FAA has planned and funded activities to activate additional Service Volumes that will constitute an additional 29 radio sites.</p> <p>Approximately 100 of the 230 U.S. air traffic control facilities are using ADS-B for ATC separation; all facilities are planned to be using ADS-B by 2019.</p>	<p>The U.S. ADS-B Out rule (14 CFR 91.225 and 14 CFR 91.227) was issued in May 2010 and specifies that the ADS-B Out mandate is effective on 1 January 2020.</p>	<p>Class A, B, and C airspace, plus Class E airspace above 10,000 ft MSL. See 14 CFR 91.225 for details.</p>	<p>The U.S. is using both terminal and en route (5nm) separation criteria, depending on the specific airspace and available surveillance information. Terminal separation includes the following separation criteria:</p> <ul style="list-style-type: none"> - 3nm - 2.5nm - independent parallel approach operations down to 4300 ft centreline 	

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State/ Administration	ADS-B Ground Infrastructure and ATC System readiness or Implementation plan	Date of issue/effectiveness date of equipage mandate	Mandated Airspace and/or ATS-routes	Intended separation criteria to be applied	Remarks
				separation - dependent parallel approach operations down to 2500 ft centreline separation (currently 1.5 nm diagonal distance).	
VIET NAM	Two phases ADS-B implementation plan adopted. Phase 1 implemented in March 2013. Phase 2 for whole lower and upper airspace of Ha Noi and Ho Chi Minh FIR to be completed by 2016.	AIC issued on 20 June 2013/ADS-B mandating effective from 12 December 2013 in Ho Chi Minh FIR.	M771, L642, L625, N892, M765, M768, N500 and L628 At/above FL290.		Operators required to have operational approval from State of aircraft registry.

TERMS OF REFERENCE

SOUTHEAST ASIA AND BAY OF BENGAL SUB-REGIONAL ADS-B IMPLEMENTATION WORKING GROUP

Terms of Reference

APANPIRG18 Conclusion 18/38 agreed to the establishment of a sub-regional ADS-B implementation Working Group in the South-East Asia area (SEA ADS-B WG) by the end 2007 to develop the *terms of cooperation* and an *implementation plan* for near-term ADS-B applications in the sub-region.

APANPIRG/22 Decision 22/34 agreed to rename the Southeast Asia Sub-regional ADS-B Implementation Working Group to “South East Asia and Bay of Bengal Sub-regional ADS-B Implementation Working Group” and tasked the new Working Group to develop a revised Terms of Cooperation and work programme in the sub-regions.

The outcome of the ADS-B Working Group will report to APANPIRG through the ADS-B Study and Implementation Task Force.

The SEA/BOB ADS-B WG shall

(a) Develop Terms of Co-operation which will include :

- establishing model documents for possible use by States when :
 - Agreeing to share ADS-B data, and DCPC (such as VHF radio voice communication) capability between adjoining States for various ADS-B applications (including a sample letter of agreement); or
 - Establishing ADS-B avionics fitment mandates
- identifying optimum coverage for ADS-B ground stations and associated VHF radio voice communication in the sub-regional FIR boundary areas.

(b) Develop an implementation plan for near term ADS-B application which will delivery efficient airspace and increased safety on a regional basis that include :

- schedule and priority dates to bring into effect ADS-B based services taking into account;
 - Timing of any equipage mandates.
 - Timing of any ATC automation upgrades to support ADS-B.
 - Timing of commissioning of any ADS-B data and associated VHF radio voice communication facilities.
- consideration of major traffic flows

(c) Coordination for implementation of the plan **and identify implementation issues and solutions**

Composition: The Group will be composed of experts nominated by States in the Sub-region including: Australia, Bangladesh, Brunei Darussalam, China, Hong Kong China Cambodia, India, Indonesia, Malaysia, Maldives, Myanmar, Nepal, Pakistan, Philippines, Singapore, Sri Lanka, Thailand, Vietnam, IATA and CANSO.

Reporting: The Group will present its report to ADS-B Study and Implementation Task Force.
