



ICAO

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The Ninth Meeting of the APANPIRG ATM Sub-Group  
(ATM/SG/9)

Video Teleconference, 01 – 05 November 2021

**Agenda Item 5: ATM Systems (Modernisation, Seamless ATM, CNS, ATFM)**

**MAIN OUTCOMES OF CNS SG/25**

(Presented by the Secretariat)

**SUMMARY**

This paper presents the recent developments in the CNS area that may be of interest to the ATM Sub-group, under the scope of CNS SG/25 meeting which was held from 18 to 22 October 2021.

**1. INTRODUCTION**

1.1 The Twenty Fifth Meeting of the Communications, Navigation and Surveillance Sub-group (CNS SG/25) of APANPIRG was held from 18 to 22 October 2021 via video teleconference. The meeting was attended by 215 participants from 23 States/Administrations, 4 International Organizations and some industry partners. CNS SG/25 working papers, information papers, and other resources can be accessed at <https://www.icao.int/APAC/Meetings/Pages/2021-CNS-SG-25.aspx>.

1.2 A number of contributory bodies of APANPIRG have held their meetings listed below which contributed discussion outcomes to CNS SG/25, and webinars/workshops held to increase awareness and understanding on various topics for the Region to support their planning and implementation. All these activities were held via video teleconference:

No.	Meeting/Seminar/Workshop in 2021
1	SRWG/5 (15-17 March)
2	DAPs WG/4 (29-31 March)
3	SURSG/1 (20-22 April)
4	CRV OG/8 (17-19 May)
5	APA TF/7 (7-9 June)
6	<a href="#">Cyber Security Webinar (14 June)</a>
7	ACSICG/8 (21-23 June)
8	PBNICG/8 (6-8 July – RSO)
9	<a href="#">SWIM Workshop (6-7 July)</a>
10	<a href="#">Implementation of CRV Webinar (20 July)</a>
11	SWIM TF/5 (9-11 August)
12	SURICG/6 (24-27 August)
13	<a href="#">ADS-B Implementation Webinar (1 September)</a>
14	ATMAS TF/2 (14-16 (September)
15	SBAS/GBAS TF/3 (27-28 September)

## 2. DISCUSSION

### Outcome of SRWG/5 Meeting and Frequency Spectrum related Issues

2.1 The space-based VHF frequency compatibility study has commenced in International Telecommunications Union (ITU) Working Party 5B (WP5B) meetings and the ICAO Frequency Spectrum Management Panel (FSMP) is the designated ICAO point of liaison with ITU WP 5B. It was noted that ITU WP5B had requested for technical information pertaining to aircraft VHF and the future space-based VHF system for the purpose of the compatibility study for space-based VHF (WRC-23 Agenda Item 1.7). ICAO secretariat would be the point-of-contact to track and monitor and to take the suggestions for improvement as well as concerns on the space-based VHF issue.

2.2 The agenda items for the International Telecommunication Union (ITU) World Radiocommunication Conference 2023 (WRC-23) was discussed in SRWG/5 including points of aeronautical interest and provided the ICAO Position for these agenda items. The ICAO Secretariat presented them again in CNS SG/25 with highlight on space based VHF COM, RPAS C2 Link and sub orbit vehicles. Member States were invited to consider the ICAO Position when developing State's position for WRC-23 and to support the ICAO Position during WRC-23.

2.3 An overview of the frequency coordination process in the APAC Region and the administrative measures implemented to improve the efficiency of the current process via the adoption of Conclusion *CNS SG/24/8(SRWG/4/3) Establishment of a list of focal points responsible for the operation of Frequency Finder in States* were presented by the ICAO Secretariat.

2.4 The initial draft of the regional guidance material on aeronautical frequency spectrum management for APAC States was reviewed in the meeting.

2.5 The ICAO secretariat presented a plan to simulate the VHF COM for APAC in 2030 per Conclusion *CNS SG/24/7(SRWG/4/2) – Simulation of VHF COM Frequency requirements for next 10 years*. A new round of simulation for VHF COM frequency assignment based on new operational requirements of States to 2030 as necessary would be conducted. A State Letter has been issued and responses from 7 States received.

2.6 CNS SG/25 reviewed the discussion in SRWG/5 on the actions taken in France to mitigate interference into Radio Altimeters systems from 5G/MFCN in the band 3.4-3.8 GHz and the protection of interference to radio altimeters from 5G applications in the Asia-pacific which was presented by Boeing Australia. CNS SG/25 noted that SRWG/5 developed an action item to take necessary follow up action at regional level, to support CAAs working with State's spectrum regulators to avoid the future safety issues on radio altimeter due to 5G implementation. Furthermore, ICAO issued a state letter with the Subject: Potential safety concerns regarding interference to radio altimeters (Ref.: SP 74/1-21/22), the Member States and Administrations are encouraged to consider as a priority, public and aviation safety when deciding how to enable cellular broadband/5G services in radio frequency bands near the bands used by radio altimeters. The meeting was invited to report to ICAO APAC Regional Office in a timely manner once the interference to radio altimeters by these broadband technologies happens.

2.7 Hong Kong, China shared their observations on potential impacts of departing aircraft on arriving aircraft under runway mixed-mode operation with respect to LOC signal fluctuations. States/Administrations are invited to note the importance of extending protection of ILS CA/SA from 2D (horizontal) context to 3D, especially for LOC. ICAO APAC Regional Office has shared the working paper to secretary of the ICAO NSP for consideration by Conventional Nav-aids and Testing Working Group (CNTWG).

2.8 Civil Aviation Administration of China (CAAC) shared in CNS SG/25 on the progress of the application of Aeronautical Mobile Airport Communications System (AeroMACS) technology in China, which the technology has been deployed in 23 airports in China, and applications based on AeroMACS including D-TAXI and runway intrusion prevention were introduced.

2.9 The ICAO Secretariat presented the information about approval of Annex 10, Volume VI dedicated to the SARPs on the “C2 Link Procedures” and the “C2 Link Systems”. It was informed that the first edition of Volume VI to Annex 10 and Amendment 90 to the ICAO SARPs, Annex 10-Aeronautical Telecommunications, Volume V - Aeronautical Radio Frequency Spectrum Utilization were adopted by the Council at the fifth meeting of its 222nd Session on 1 March 2021. The Amendment 90 arose from the recommendations developed by the RPASP/13 which concerns the specifics of the frequency bands which can be used for the C2 Link. The first edition of Volume VI becomes effective on 12 July 2021 and it will be applicable from 26 November 2026.

#### Outcome of ACSICG/8 Meeting

##### *CRV Implementation Plan Amendment*

2.10 Based on the recommendation of CRV OG/8 and ACSICG/8 on adjusting assigned IP address range in the CRV Implementation Plan for broadcasting space-based ADS-B data, the CNS SG/25 meetings adopted the **Conclusion CNS SG/25/01 (ACSICG/08/01(CRV/08/01)) – CRV Implementation Plan amendment**. By this conclusion, certain IP addresses are assigned to third party Service Provider (e.g. AIREON LLC providing Automatic Dependent Surveillance - Broadcast data over CRV) depending on Service Providers’ technical requirements.

##### *CRV Solution for Pacific Islands and small ANSPs*

2.11 With the slow CRV implementation progress by the Pacific Island States and small ANSPs in the region to date, CNS SG/25 meetings endorsed the **Draft Conclusion CNS SG/25/02 (ACSICG/08/02 (CRV/08/02)) - Implementation of CRV for small Pacific Islands and small ANSPs in the region using CRV Solution, PCCWG SLA Package D.** for further consideration by APANPIRG/32.

##### *Other updates in ACSICG/8 and CRV OG/8*

2.12 CRV Landing Page, which provides the overview content to CRV, has been created on the ICAO APAC Website at <https://www.icao.int/APAC/Pages/Join-CRV.aspx>.

2.13 Expert groups of CRV OG on Service Strategy, Design, Transition and Operations have been established with objectives, various tasks and activities and working methodology to incorporate the outcomes into CRV Operational manual.

2.14 The ATN/AMHS/AIDC implementation table and the CRV implementation table was endorsed by CNS SG/25. ATN/AMHS/AIDC implementation table and the CRV implementation table are provided at **Appendices A and B**.

2.15 AMHS Readiness Table for Supporting IWXXM Traffic updated in the ACSICG/8 meeting was noted by CNS SG/25. It was also noted that while some States are ready to support IWXXM exchange via AMHS, no end users of those States have indicated to plan for system upgrades to receive IWXXM yet.

#### Outcome of APA TF/7 Meeting

2.16 The Graphical Display on the AIDC implementation and planning status of APAC Region was updated based on the inputs provided to the meeting by States.

2.17 China, India, Indonesia, Lao PDR, Malaysia, Philippines, Singapore and Thailand shared their AIDC implementation plan by different WP/IPs. China informed about China and Laos AIDC Pre-Operational Trials, Hybrid Application of AIDC and OLDI, and application of Electronic Handover Technology between High Level and Low Level Sectors by IPs. India also shared Lessons Learnt in their AIDC Implementation.

2.18 The APA TF/7 meeting reviewed and discussed the total remaining 105 consolidated implementation issues, and the summary of LHD Hot Spots presented in RASMAG/25.

2.19 With the significant achievements made by APA TF since its establishment including the preparation of AIDC Planning Table in the Regional Air Navigation Plan, development of AIDC Implementation and Operations Guidance Document, maintenance of AIDC Issues Report, summary of AIDC focal points, the Implementation Status Chart as well as the sharing of the experiences gained by States/Administration in the challenging process of AIDC implementation, the ToR will be reviewed based on the scope and work may be undertaken by ATMAS TF within available time and resources.

#### Outcome of SWIM TF/5 Meeting

2.20 A survey on SWIM implementation plan and status of Asia/Pacific Member States was proposed to create a baseline picture of SWIM implementation plan and status within the region. The meeting agreed the views of MET, ATFM and other SWIM users should be included in the response of Asia/Pacific SWIM Implementation Plan and Status Survey. As such, based on the recommendation of SWIM TF/5, CNS SG/25 adopted **Conclusion CNS SG/25/03 (SWIM TF/5/01) – Asia/Pacific SWIM Implementation Plan and Status Survey**.

2.21 CNS SG/25 reviewed the SWIM TF Work Plan and the Action List, with a wording modification in Section (c) of ToR for SWIM data to be carried “*principally* over CRV”. The CNS SG/25 meeting remarked that ToR is a living document which needs to be reviewed in a regular and timely manner. The meeting also reminded the SWIM TF to consider other IP-based network technologies in their forthcoming review on ToR, which CNS SG/25 advised SWIM TF to further consider other modifications proposed to the CNS SG/25 in coming SWIM TF/6 meeting. As such, CNS SG/25 adopted the **Decision CNS SG/25/04 (SWIMTF/05/02) – Revised SWIM TF Terms of Reference**.

2.22 The meeting discussed an overview of Multi-Regional Trajectory Based Operation (MR TBO) Demo by Japan, Singapore, Thailand, USA, and Canada to validate TBO concept as well as to showcase the TBO operational values and technical capabilities required to support TBO.

2.23 A proof-of-concept (POC) for surveillance data sharing on SWIM is to be conducted in Hong Kong China for States’ reference. It was noted that hybrid model has been successfully demonstrated during the SWIM in ASEAN Demonstration in November 2019 and is considered as a suitable infrastructure for SWIM implementation in APAC.

2.24 The *ICAO APAC SWIM Workshop* was attended by 231 participants from 21 States/Administrations, one International Organization, a group of airlines industries and one observer. A total of 13 presentations including one demonstration were delivered by Experts from different parts of the World in the Workshop.

#### Other Outcomes on Aeronautical Fixed Service

2.25 The ICAO EUR/NAT Office initiated a coordination with ICAO APAC Office on interregional AMHS connection issue to support future AIRM data, such as IWXXM. Current links are listed below:

- |                       |      |
|-----------------------|------|
| a. Bangkok-Rome       | AFTN |
| b. Beijing-Khabarovsk | AFTN |
| c. Fukuoka-Moscow     | AFTN |
| d. Singapore-London   | AMHS |

2.26 CNS SG/25 noted that Singapore would continue to provide this bilateral link to maintain the inter-connection between APAC and EUR/NAT region. The Rome-Bangkok AMHS connection is waiting for the readiness from the Rome side for the AMHS transition, and Thailand (AEROTHAI) commissioned one MPLS and tested the inter-operability between AMHS systems. China, Japan and Russia are interested in switching to AMHS exchange between Beijing and Khabarovsk, and between Fukuoka and Moscow, the transition to AMHS of these two connection is expected as soon as possible, once Russia joins the CRV network.

Outcome of PBNICG/8 Meeting

2.27 The ICAO Secretariat presented global PBN implementation status as available in ICAO iSTARS. It was informed that regarding key requirement of ICAO Assembly Resolution A37-11, the implementation of approach procedures with vertical guidance (APV) for all instrument runway ends by 2016, the APAC Region was behind global achievement. However, implementation of PBN SID/STAR was above the global implementation status in Table below.

March 2021	LNAV(including LNAV only)	APV		PBN SID	PBN STAR
		LNAV/VNAV	LPV		
Global (%)	71.4	59.4	34.4	49.4	44.8
Asia/Pacific (%)	57.5	47.1	0	71.6	68.8

2.28 The Secretariat presented the implementation status of the regional transition plan for RNP APCH chart identification from RNAV to RNP, Asia/Pacific Regional Transition Plan for RNP APCH Chart Identification from RNAV to RNP as adopted by APANPIRG/30 vide Conclusion APANPIRG/30/14. The Secretariat reminded the States about the target date as November 2022 for RNP transition.

2.29 ICAO informed that the issue about the discrepancy in the list of international airports in iSTARS and APAC Air Navigation Plan (ANP) was discussed with ICAO HQ and it was agreed that ANP to be used as a reference for a number of international airports. This issue was also discussed at AOP SG/4 and APANPIRG/31, States have been urged to update their list in ANP Vol-I & Vol-II. The ICAO Secretariat informed the meeting about the progress of each action item, and the meeting agreed to close both items after deliberations.

Outcome of GBAS/SBAS ITF/3 Meeting

2.30 The ICAO Secretariat informed the meeting that a GBAS-SBAS Information Sharing Platform had been created on the APAC website for benefit of all States. This platform contains all those reference documents required for the implementation of GBAS/SBAS listed there with applicable links.

2.31 The ICAO Secretariat presented a summary of Amendment to Annex 10 - Vol-I to include DFMC GNSS & SBASs, as well as Galileo & BDS Standards, to be applicable from 2 Nov 2023. This will help States to plan their GBAS/SBAS Implementation. This amendment will also allow some flexibility in the location of GBAS system in an airport.

2.32 The Co-Chairs reviewed the GBAS safety assessment guidance document related to anomalous ionospheric conditions and identified items to be updated. States were requested to nominate members to constitute an expert group for updating this document.

2.33 A framework of guidance reference for the implementation of GBAS/SBAS developed by the Co-Chairs was presented, which is a high level framework of guidance reference document on the implementation process for GBAS/SBAS was introduced. The framework will be taken as a reference for the task force expert group to draft the guidance document for the Region.

2.34 The Secretariat presented about GBAS/SBAS Flight Procedure Design Overview to describe the differences of these procedures vis-a-vis conventional procedures. The Action List of the task force was discussed, with description, relevance and priority being assessed by the meeting.

#### Outcome of Navigation-related Discussions

2.35 China presented the status of the BeiDou Navigation Satellite System (BDS) standardisation activities in ICAO and the BDS application practices in search and rescue in civil aviation, including the BDS SARPs development and validation in ICAO Navigation Systems Panel (NSP), and the DFMC GNSS standardisation in civil aviation. China informed certain GBAS ground stations were upgraded to be compatible with GPS, Galileo, and BDS. BDS has also been put into search and rescue. 20 aircrafts were fit with BDS tracking and positioning devices, and all China's civil aviation fleet is planned to support BDS DFMC GNSS by 2025.

2.36 The ICAO Secretariat presented the State Letter Ref.: AN 7/62.1.4-21/41 dated 6 July 2021 regarding the Proposals for the amendment of Annex 10, Volume I to : a) support the introduction of dual-frequency, multi-constellation (DFMC) global navigation satellite system (GNSS) by adding provisions for additional frequencies of operation for the global positioning system (GPS), the global navigation satellite system (GLONASS) and the satellite-based augmentation system (SBAS), and by introducing provisions for the new BeiDou Navigation Satellite System (BDS) and Galileo system; and b) support ionospheric gradient mitigation for the ground-based augmentation system (GBAS). This proposed amendment to Annex 10, Volume I is envisaged for applicability on 2 November 2023.

2.37 China introduced a new method for analysing the operational quality of ILS by comparing to flight airborne DAR (Digital ACMS Recorder) data. China introduced their ILS operation quality monitoring platform, which can monitor key parameters of LOC and GP in real time and discover hidden hazards in daily flights. China shared ILS operational problems and suggestions found by this research.

#### Outcome of Flight Inspection-related Discussions

2.38 The 11th edition of the updated Catalogue of Asia and Pacific Flight Inspection and Flight Validation Service Providers were presented in CNS SG/25 and adopted as **Conclusion CNS SG/25/05 – The Catalogue of Asia and Pacific Flight Inspection and Flight Validation Service Providers**. The last update in 10<sup>th</sup> edition of the Catalogue was published in April 2018. The updated Catalogue will be uploaded on ICAO APAC e-doc portal soon and Member States will be informed by a State Letter.

2.39 China and Hong Kong China proposed to update in Flight Inspection Guidance Material (FIGM) on the frequency for flight inspections of surveillance radar systems, by supplementing the frequency for flight inspections of Primary Surveillance Radar and Secondary Surveillance Radar (PSR/SSR) in the document. Some other minor amendments, including the latest guidelines on Flight Inspection periodicity considerations for radio navigation aids and the glossary of FIGM, are also proposed to be made. CNS SG/25 hence adopted **Conclusion CNS/SG/25/06 - Update of Flight Inspection Guidance Material (FIGM) for APAC Region**.

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Outcome of SURICG/6 Meeting and Surveillance related Issues

*Interrogator Code (IC) Planning*

2.40 The CNS SG/25 reviewed the proposal to amend formerly adopted three APANPIRG Conclusions related to II codes and extend the consideration to the use of SI codes, including Conclusions APANPIRG/19/40, APANPIRG/20/56 and APANPIRG/20/57. As such, the **Draft Conclusion CNS SG/25/07 (SURICG/6/1) (Draft Conclusion DAPs WG/4/1, Draft Conclusion DAPs WG/4/2, Draft Conclusion DAPs WG/4/3) - Interrogator Code (IC) Planning and Coordination** was adopted by CNS SG/25 for consideration in APANPIRG/32. In such connection, the Table for SSR Mode S Interrogator Code Coordination was reviewed.

2.41 The ICAO Secretariat provided latest updates about Mode S II codes coordination in the APAC Region. An ongoing discussion on allocation of II codes 14 and 15 with matching SI codes was shared. States were encouraged to provide updates and coordination with ICAO APAC Regional Office for updating the SSR II code list through appropriate focal points to eliminate duplicated II code implementation in overlapped coverage at boundary areas.

2.42 As Doc 9924 Aeronautical Surveillance Manual does not contain sufficient information to help APAC region to plan the implementation of II and SI mixed code environment, a small working party was formed in DAPs WG/4 to amend the Doc 9924 to provide necessary guidance material. A proposal was submitted to the Surveillance Panel- Aeronautical Surveillance Working Group (SP-ASWG) to initiate the review. DAPs WG would continue work on this matter in parallel with the Surveillance Panel with the view to improve current guidance in Appendices H and J of Doc 9924.

*Transition to II and SI Mixed Code Operation*

2.43 The CNS SG/25 reviewed the strategy of transition from II code to II and SI mixed code proposed by DAPs WG/4 and endorsed by SURICG/6 that States with Mode S radar capable of performing II/SI mode operations are encouraged to transit from II code to II and SI mixed code, so as to ease the shortage of II codes. States planning to perform the transition shall coordinate with ICAO APAC Regional Office to obtain the SI codes. As such the **Draft Conclusion CNS SG/25/08 (SURICG/6/2) (DAPs WG/4/4) - Transition from II code to II and SI mixed code** was adopted by the CNS SG/25 for consideration in APANPIRG/32.

*Roadmap for Mode S Implementation*

2.44 The CNS SG/25 reviewed the revised Regional Roadmap proposed by DAPs WG/4 and endorsed by SURICG/6. The **Draft Conclusion CNS SG/25/09 (SURICG/6/3) (DAPs WG/4/5) - The APAC Regional Roadmap for Mode S Implementation** was endorsed by the CNS SG/25 for consideration in APANPIRG/32. The meeting noted that the implementation of Conspicuity Code will need the collaboration between Mode S radars and ATM automation systems.

2.45 CNS SG/25 noted the outcome of the Survey on Current use and Future planning of Mode S Enhanced Surveillance (EHS) Implementation resulted from an Action Item from Mode S DAPs WG/4. The outcomes of the survey based on response from 12 member states concluded that Member States are not facing any challenges in implementing APANPIRG/31/14 Conclusion. Additionally, the commercial fleet in APAC, North America, and MENA already possess Mode S ELS and EHS Mode S capability.

*Mode S DAPs Implementation and Operations Guidance Document (IGD)*

2.46 A proposal for revised draft Edition 3.0 of the Mode S DAPs Implementation and Operations Guidance Document (IGD) was endorsed in SURICG/6 for consideration in CNS SG/25. The main amendments include advice to mandating Mode S transponder, other protocols for DAPs extraction, use of parameters in the ATM automation system, Mode S DAPs application examples and identified issues, and Mode S radar parameter information. After review, CNS SG/25 adopted **Conclusion CNS SG/25/10 (SURICG/6/4) (DAPs WG/4/6) - Mode S DAPs IGD 3.0.**

*Regional Supplement to ASTERIX Interface Control Document (ICD)*

2.47 EUROCONTROL published the System Area Codes (SAC) for the various regions except for APAC. The DAPs WG/4 meeting proposed the considerations to publish the APAC SAC at the EUROCONTROL website. Additionally, States have their own control over the use of their System Identification Code (SIC) without the need for ICAO APAC to manage. As such, the **Conclusion CNS SG/25/11 (SURICG/6/5) (Draft Conclusion DAPs WG/4/7 and Draft Decision DAPs WG/4/8) - Revision of the Regional Supplement to ASTERIX Interface Control Document (ICD)** was adopted in CNS SG/25 meeting.

2.48 The ICAO Secretariat presented the recent updates to the Regional Supplement to ASTERIX ICD for APAC Region and introduced the planning criteria and current usage of SAC in APAC region. SURICG/6 noted that current allotments would be enough to cater the actual and planned increase of surveillance sensors and automation systems in the APAC Region.

*ToR of Surveillance Study Group and Updates*

2.49 CNS SG/25 reviewed the revised ToR of SURSG and adopted by the **Decision CNS SG/25/12 (SURICG/6/6): Revised ToR of Surveillance Study Group (SURSG).**

2.50 SURICG/6 reviewed a proof-of-concept (POC) for surveillance data sharing on SWIM to be conducted in Hong Kong China which was formerly discussed in SWIM TF/5. The POC was explained by a high-level system block diagram in the paper. SURICG/6 expressed support to the POC and on-going work of the SURSG. In addition, SURICG/6 discussed the proposed Concept of Operations (CONOPS) by Hong Kong China on behalf of SURSG for sharing of surveillance data among multiple parties using platform such as SWIM along with the objective of the CONOPS, so as to solicit suggestions/concerns from SURICG for consideration by SURSG in formulating the CONOPS.

*ADS-B Implementation*

2.51 CNS SG/25 noted that SURICG/6 reviewed the ADS-B Implementation Status in the APAC Region as provided at **Appendix C**. SURICG/6 reviewed other relevant documents through ad-hoc working groups on ADS-B Data Sharing Implementation Status in the APAC Region and Reports on the Sub-regional ADS-B Implementation Plan/Projects presented by South East Asia (SEA) and Bay of Bengal (BOB) Ad Hoc Working Groups. During the discussion in Ad Hoc Working Groups, some States had shared to the meeting that with the implementation of space-based ADS-B, the original ground-based ADS-B data sharing project would have to be re-evaluated.

2.52 FAA provided a description of two ADS-B avionics issues observed in the USA with DO-260B/ED-102A systems, its details and actions taken by FAA in the paper. SURICG/6 agreed to incorporate these issues in the paper into AIGD for easy reference in this region.

*Aircraft Address and Target Identification*

2.53 Hong Kong China presented the observation on recurring inconsistencies of ICAO Aircraft Address and Target Identification between ADS-B / MLAT / Mode S data and flight plan for some aircraft flying within Hong Kong Flight Information Region despite repeated effort had been spent to follow up with concerned airlines. Such issues have caused safety implications to ATC operation and induced additional workload to both ATC and to supporting staff for following up with the concerned airlines. As such, **Conclusion CNS SG/25/13 (SURICG/6/7) - Integrity of ICAO Aircraft Address and Target Identification in ADS-B / MLAT / Mode S Data and Flight Plan** was adopted by CNS SG/25 to urge States/Administrations to proactively follow up with air operators to address such discrepancies.

*ToR of SURICG*

2.54 SURICG ToR was reviewed in SURICG/6 in the view of integration of SEA/BOB ADS-B WG ToR and presented by draft Decision for consideration of CNS SG/25 which was further adopted in CNS SG/25. The revised SURICG ToR was adopted by CNS SG/25 in **Decision CNS SG/25/14 (SURICG/6/8): Revised ToR of Surveillance Implementation Coordination Group (SURICG)**.

*Other Surveillance-related Outcomes*

2.55 The ICAO APAC Webinar on Implementation of ADS-B was successfully conducted on 1 September 2021 via Video Tele-Conference (VTC) using Microsoft Teams. The objectives of the Webinar were to review concepts, benefits of Automatic Dependent Surveillance – Broadcast (ADS-B), and share implementation experiences that include ADS-B mandate, ADS-B data sharing, implementation issues, and measures to support ADS-B operation. The latest ADS-B technologies including space-based ADS-B were also discussed during the Webinar. Total 298 participants attended the webinar and four presentations were delivered during the Webinar.

Outcome of ATMAS TF/2 Meeting and ATM Automation System related Issues

*Conspicuity Code*

2.56 The ATMAS TF/2 meeting reviewed and agreed that the implementation of conspicuity code (Mode A code 1000) in ATM Automation Systems is necessary to support Mode S operations in the Region, which is stipulated in the APAC Regional Roadmap for Mode S Implementation as adopted in **Draft Conclusion CNS SG/25/09**. ATM SG is invited to note on the outcome.

*Repository of the ATM automation systems*

2.57 To follow up ACTION ITEM 1-1 of ATMAS TF/1: *Develop a table to list the current ATMAS status for all states for this task force to establish a repository of the ATM automation systems implemented by States*, a draft Table of Current ATMAS Status was proposed to ATMAS TF/2 for all States and invited States/Administrations to review and provide inputs to this regional repository. The meeting suggested that the table should make reference to the revised version of the ATMAS IGD and agreed to create an ad-hoc group to consider the suggestions provided by the meeting and work out a revised version of the table before conduct a survey. ATM SG is invited to note and consider contribute the input after the draft has been endorsed.

*Automation System Problem Reporting Database*

2.58 The feasibility of expanding the current ADS-B Avionics Problem Reporting Database (APRD) to cover the report and sharing of ATMAS-related problems by States/Administrations in APAC region was studied. Hong Kong China provided a detailed proposal to expand the existing APRD with pages, and concluded that it is technically feasible and cost-effective to implement ATMAS PRD by leveraging the framework and hardware resources of APRD with no additional hardware resource requirement. The ATMAS TF/2 meeting agreed to create an ad-hoc group to further progress the development of ATMAS PRD and consider including AIDC implementation issue as well. ATM SG is invited to note and consider report ATM Automation System and AIDC related issues in this Problem Reporting Database.

*ATM Automation System Implementation and Operations Guidance Document*

2.59 Following the conclusion of ATMAS TF/1, the framework of Recommended Functions and Performances of ATM Automation System (RFAP ATM AS) Edition 0.0, which was led by China, Hong Kong China and Singapore in preparing, had been adopted. The completed draft guidance document was sent to Member States/Administrations on 6 August 2021 for review, China revised the draft guidance document according to the comments and additional materials received. In order to align with the naming convention of other IGDs for APAC, Hong Kong China suggested to adopt "Air Traffic Management Automation System Implementation and Operations Guidance Document (ATMAS IGD)" instead of the original document name Recommended Functions and Performances of ATM Automation System (RFAP ATM AS) as the official name. The meeting agreed that the advance draft of ATMAS IGD to be taken forward to seek further comments and inputs from States and that the ICAO APAC Regional Office should issue a State Letter to circulate the advance draft of ATMAS IGD to States/Administrations, who should provide feedback within one month after receiving the State Letter.

*Dissolution of APA/TF*

2.60 The CNS SG/25 adopted the **Decision CNS SG/25/16 (ATMAS TF/2/1 (APA TF/7/1)) - Dissolution of APA/TF** as most of the tasks outlined in the ToR have been achieved and the completion of residual part of action items will be undertaken by ATMAS/TF.

2.61 After dissolution of the APA TF, the ongoing APAC regional AIDC implementation work will be taken up by ATMAS TF while ACSICG would handle communications related issues. In order to integrate APA TF ToR into ATMAS TF ToR, the revised ATMAS TF ToR proposed by the ATMAS TF/2 was adopted by CNS SG/25 as **Decision CNS SG/25/17 (ATMAS TF/2/2) – Revised ATMAS/TF Terms of Reference**.

*Other Updates from States*

2.62 China introduced the industry standards document MH/T 4029.3 "Civil Aviation Air Traffic Control Automation System - Part 3" to solve the problem of data synchronisation and interaction between ATM automation systems. ATMAS TF/2 agreed that information on the MH/T 4029.3 should be translated into English by China first for better understanding by other Member States/Administrations before conducting a demand survey on such standards if needed.

2.63 Singapore presented the concept of Open ATM as future ATM development trends and explained the benefits comparing to the original ATM Automation Systems. The meeting was informed that Singapore and the industry are working on exploration of Open ATM together.

2.64 China introduced the research and practice of using Mode S downlink aircraft parameters (DAPs) which enhances the safety net of ATMAS based on trajectory prediction, detects air-ground inconsistency, and reduces the instruction deviation events caused by human factors. The existing problems of DAPs were summarised, such as BDS SWAP should be considered to avoid nuisance and false alerts.

2.65 Hong Kong China informed CNS SG/25 that with the implementation of enhanced Wake Turbulence Separation (eWTS) scheme for arrival traffic of Hong Kong International Airport (HKIA), an Approach Spacing Tool (AST) is being implemented at the HKIA to assist controllers in handling final approach operation under eWTS scheme while improving consistency in delivering the arrival traffic according to the intended runway capacity. ATMAS TF/2 noted that the relevant design considerations of AST have been incorporated into the ATMAS IGD.

#### Regional CNS-related Requirements

2.66 CNS SG/25 reviewed the Regional CNS requirements specified in the three Volumes of ICAO APAC e-ANP, Seamless ANS Plan (Version 3.0, November 2019) and discussed relevant updates on National Air Navigation Plan (NANP). The meeting participants were invited to review all CNS-related information affecting their administration in the e-ANP and provide feedback to ICAO APAC Regional Office to update as necessary. States/Administrations are also invited to formulate their NANP to comply with commitments to Beijing Declaration by 2022. Member States/Administrations were requested to provide updates in a timely manner for State's CNS-related information and requirements in these documents aforementioned.

2.67 The ICAO Secretariat informed that for e-ANP amendments, Member States are no longer constrained by update cycles as it was for former Doc 9673. At present, the ICAO Secretariat manage amendments submitted by Member States in PfA format. Amendments may be processed and incorporated in the e-ANP at any time. If the part that CNS is amending has elements in other domains, there would be automatic coordination between the sections internally before submitting a PfA by ICAO Secretariat. For ATM SG's concern, The Chair of CNS SG invited the ICAO Secretariat to carry out the same review on e-ANP volumes in ATM aspects.

2.68 CNS SG/25 noted that ATM/SG/9 would consider **Draft Conclusion ATM/SG/9-X: National Air Navigation Plan Reporting Form** and subsequent adoption of APANPIRG which reports the implementation progress on various Basic Plan Elements (BPEs) in the Form.

2.69 There were certain Member State(s) requested CNS SG/25 to consider modifications in deadlines of Beijing declaration commitments due to current challenging situation. The meeting considered that Member States may put up the proposal for modifications in deadlines set by Beijing declaration to APANPIRG/32.

#### Review Status of CNS Deficiencies

2.70 The list of Air Navigation Deficiencies in the CNS field was reviewed in CNS SG/25. The only outstanding issue was related to unreliability of AFS communication between Afghanistan and Pakistan. The ICAO Secretariat invited the meeting, particularly BBIS States including Thailand and India to implement CRV as soon as possible to provide convenient connections to BIS States.

#### Cybersecurity of CNS/ATM systems

2.71 The ICAO Asia Pacific Regional Cybersecurity Webinar was held on 14 June 2021 via VTC. The Webinar was attended by 317 participants from 26 States/Administrations, 6 International Organizations and 2 Technology/Solutions providers (Nokia and Thales).

2.72 ICAO Headquarter introduced the information security requirements for exchange of information over IP from PANS-IM and information security framework aspect. The meeting was informed about the ICAO provision on draft PANS-IM, information service, and guidance material. The requirements of the information security framework were shared including scalable, minimum requirements to ensure trust, common practices based on NIST and ISO, etc. Furthermore, the scope and layered approach of information security framework were elaborated with emphasising on the IPv6 dedicated block of addresses and the impact of the loss of information security on safety.

#### Application of New Technologies

2.73 China informed that their Unmanned Aerial System (UAS) application research team has been developing a leading and practical PAPI flight inspection technology and explained the prototype of the UAS-Based PAPI Flight Inspection System. 13 trial flights had been carried out to test the UAS plus the payload's functions and performance, evaluate the technology concept, verify the mission module, and integrated system at both plain and plateau airports. Despite limits of the prototype were identified, the UAS-based PAPI inspection technology has great potential to benefit both the flight inspection service provider and the airports. While there could be natural limitations such as distance to runway and wind speeds that restricted the type of flying objects, China envisaged a greater applicability in the future in calibration of equipment in addition to current ILS, VOR, DME, NDB, ADS-B and PAPI through working with various parties such as regulatory bodies.

2.74 Hong Kong China also shared their experience in making use of advanced computer modelling to proactively develop integrated safeguarding surfaces for CNS equipment, aerodrome and flight procedures, and publish them under a regulatory framework to uphold flight safety while minimising constraints to infrastructure/building developments to cope with the pressing needs for lands for developments in the Hong Kong territories. States/Administrations were encouraged to be fully aware of the potential risks induced by the protrusion of safeguarding surfaces and take proactive steps to engage advanced computer modelling to enhance protection of their CNS equipment operation while facilitating infrastructure/building developments.

2.75 China informed CNS SG/25 that CAAC published the first technical specification of fixed-wing/hybrid-wing UAS-based civil aviation flight inspection system in September 2020, as a big move of the standard establishment plan for UAS-based flight inspection technology and application. The issued standard specifies essential functions, performance requirements, system components, antennas, and requirements of the core units, including inspection receiver, signal acquisition unit, evaluation and processing unit, etc. as well as requirements for tag, documentation, transportation, and storage.

#### Discussion on ATM related issues

2.76 Key outcomes from the technical working groups established under the oversight of the Air Traffic Management and Regional Airspace Safety Monitoring Advisory Sub-Groups of APANPIRG, and information relevant to CNS Sub-Group were reviewed in CNS SG/25.

~~2.77~~ The SAIOACG/10 and SEACG/27 presented the survey conducted to determine which ATC separation standards were being applied within the Asia/Pacific Region, in accordance with the provisions of the Asia/Pacific Seamless ANS Plan. The SAIOACG/10 and SEACG/27 meeting agreed to form the **Draft Conclusion SAIOACG/10 and SEACG/27-1: Implementation of Efficient ATS Horizontal Separations and Transfer of Control Aircraft Spacing** and invited CNS SG/25 to discuss. CNS SG/25 meeting deliberated and supported the proposed draft conclusion and noted that the draft conclusion will be further endorsed by ATM/SG/9 and APANPIRG/32 meeting.

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Updates of ICAO Secretariat

2.78 The ICAO Secretariat summarised the impact of COVID-19 on CNS works in 2021, and informed about alleviations to the Standards of the Annexes and its associated system named COVID-19 Contingency Related Differences (CCRD) and [Roadmap to OPS Normal \(icao.int\)](https://www.icao.int). It was added that Flight inspection periodicity considerations for radio navigation aids is provided under Air Navigation Services section at <https://www.icao.int/safety/OPS/OPS-Normal/Pages/AN-Services.aspx>, States/Administrations were encouraged to send representatives to join meetings taking advantage of virtual platform, and contribute Subject Matter Experts to support webinars on various topics.

**3. ACTION BY THE MEETING**

3.1 The meeting is invited to:

- a) note the information contained in this paper;
- b) note the updated ATN/AMHS/AIDC implementation status provided in Appendix A, CRV Implementation Status in Appendix B and ADS-B Implementation Status in Appendix C; and
- c) discuss any relevant matters as appropriate.

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State/Organization	ATN G/G Boundary Intermediate System (BIS) Router/AMHS	AMHS Vendors Selected	AIDC	ATM System selected to support AIDC and Associated ICD (Implementation Status of the Basic 5 message set supported)	Remarks
AFGHANISTAN					
AUSTRALIA	<p>ATN tests were conducted. BIS Router and Backbone BIS Router and AMHS implemented. CRV operational since May 2019.</p> <p>AMHS over CRV with: Singapore, New Zealand, Fiji and USA</p> <p>AMHS over leased line with: South Africa</p> <p>Planning to migrate existing AFTN connections over leased line with Indonesia and PNG to AFTN over CRV (2021) prior to upgrading to AMHS over CRV (TBC)</p> <p>Extended AMHS with FTBP in support of IWXXM exchange in operation since Nov. 2020.</p>	Frequentis Comsoft	<p>AFTN/AMHS based AIDC Implemented between Brisbane and Melbourne.</p> <p>For neighbouring ANSP of <u>Brisbane</u>, AIDC implemented with Auckland, Nadi, Oakland, Port Moresby, Ujung Pandang</p> <p>For neighbouring ANSP of <u>Melbourne</u>, AIDC implemented with Johannesburg and Mauritius.</p>		CPL and CDN exchange limited
BANGLADESH	In Q1/2013, Bangladesh installed ATN/AMHS and BIS Router at Dhaka (VGHS) with User Agents at Chittagong (VGEG) and Sylhet (VGSY).	COMSOFT	Tentative date of implementation of AIDC is Q4 of 2023 with Kolkata and Yangon.		Implementation of AIDC is included in the “Modernization of CNS-ATM System of CAAB” project which is going on G2G agreement with French Government and likely to be implemented by the end of 2023.
BHUTAN	ATN/AMHS circuits, using IP over VPN, with Thailand (Bangkok) and India (Mumbai) commissioned in June and July 2017 respectively.	AEROTHAI’S AMHS System	Currently not applicable. If required in the future, will decide after CRV implementation.		

	IOT and POT with Mumbai completed on 27 <sup>th</sup> June 2017. IOT and POT with Thailand completed on 2 <sup>nd</sup> May 2017. TMC signing with both countries signed.				
BRUNEI DARUSSALAM	ATN BIS Router planned for 2015 and AMHS planned for 2015				
CAMBODIA	BIS Router and AMHS installed.  Cambodia (CATS) AMHS connected with Bangkok via VSAT IP link since 10 December 2013	AVITECH	AIDC function and capability made available.  Ready for testing with neighbors ATS Facilities starting from 2017 and target date of implementation with Bangkok in 4Q2019	THALES which supports AIDC ICD Version 1.	
CHINA	ATN Router and AMHS including NCC deployed in 2008 which is being upgraded to support ATN/IPS with target date of completion in December 2013.  The Beijing-Hong Kong AMHS link was put into operation in 2018;  With Thailand was put into operation in Q12020	IN-HOUSE (Aero-Info Technologies Co., Ltd)	AIDC between some of ACCs within China has been implemented.  AIDC between several other ACCs are being implemented.  AIDC between Sanya and Hong Kong China put into operational use since 8 Feb 2007.	ATN Router and AMHS including NCC deployed in 2008 which is being upgraded to support ATN/IPS with target date of completion in December 2013.  The Beijing-Hong Kong AMHS link was put into operation in 2018;  With Thailand is completed POT, after sign the TMC circuit and was put into operation in Q12020	IN-HOUSE (Aero-Info Technologies Co., Ltd)

	<p>AMHS/ATN technical tests with Macau completed in 2009. Plan for ATN/AMHS implementation with Macao China is TBD.</p> <p>ATN/AMHS circuit with ROK has been put into operation since June 2011.</p> <p>ATN/AMHS tests with India has been put into operation since 2016.</p> <p>ATN and AMHS IOT with Mongolia is completed in May 2018. Plan for commissioning after POT completion in 2021</p> <p>Connection tests with Nepal is TBD.</p> <p>AMHS testing with Japan was completed in March 2021. It will put into operation after TMC is signed.</p> <p>AMHS testing with Russia in 2021.</p>		<p>AIDC between Dalian and Incheon implemented in Nov. 2016;</p> <p>AIDC between Sanya and Hong Kong China put into operational use since February 2007. (duplicate)</p> <p>AIDC between Shanghai/Guangzhou and Tapei China put in to operational use since 2013.</p> <p>AIDC between Dalian and Incheon put into operational use since October 2016.</p> <p>AIDC between Guangzhou and Hong Kong China put into operational use since May 2018.</p> <p>OLDI between Shenyang and Khabarovsk put into operational use since Oct.2019.</p> <p>AIDC between Kunming and Vientiane put into pre-operational trails since January 2021.</p> <p>AIDC technical test between Beijing ACC and Ulaanbaatar ACC conducted since 2018.</p>	<p>AMHS/ATN technical tests with Macau completed in 2009. Plan for ATN/AMHS implementation with Macao China in 2019.</p> <p>ATN/AMHS circuit with ROK has been put into operation since June 2011.</p> <p>ATN/AMHS tests with India has been put into operation since 2016.</p> <p>ATN and AMHS IOT with Mongolia is completed in May 2018. Plan for commissioning after POT completion in 2021</p> <p>Connection tests with Nepal is TBD.</p> <p>with the Beijing - Japan AMHS link was put into operation in 2020.</p> <p>AMHS testing with Russia in 2021</p>	
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			<p>Kunming/Yangon under test and progress since May 2017</p> <p>AIDC technical test between Sanya ACC and Hanoi ACC conducted since 2019.</p>		
HONG KONG, CHINA	<p><b>Manila / Philippines</b></p> <p>CRV/AMHS circuit was put into operation in May 2019.</p> <p><b>Beijing / China</b> CRV/AMHS circuit was put into operation in April 2021</p> <p>Macao / China ATN/AMHS circuit was put into operation in December 2009. Wait for Macao to join CRV.</p> <p><b>Bangkok / Thailand</b> ATN/AMHS circuit was put into operation use in 2014. Wait for Thailand to join CRV.</p> <p><b>Fukuoka / Japan</b> CRV/AMHS circuit was put into operation in September 2020.</p> <p><b>HoChiMinh / Vietnam</b> Currently on AFTN. Simple AMHS IOT was conducted in Dec 2019. Wait for Vietnam to join CRV.</p> <p><b>Taipei</b> CRV/AMHS circuit was put into operation in June 2020.</p>	COMSOFT	<p>AFTN-based AIDC with Sanya put into operational use in Feb 2007.</p> <p>AIDC with Taipei put into operational use in Nov 2012.</p> <p>AIDC with Guangzhou put into operational use in May 2018. AIDC with Manila put in operational use in May 2019.</p>	<p>Raytheon ATM system Support AIDC ICD Version 3 commissioned in November 2016.</p>	<p>Already support exchange of IWXXM messages based on FTBP.</p> <p>Support of IHE is planned since November 2020.</p>
MACAO, CHINA	<p>ATN/AMHS interoperability test with Beijing commenced in March 2009.</p> <p>ATN/AMHS circuit with Hong Kong put into operational use in end Dec 2009.</p> <p>Upgrade of ATN/AMHS to support IPS and IWXXM planned with tentative target date of Q3 2021.</p>	COMSOFT	[Not applicable for using AIDC, looking into the possible application between TWR and ACC/APP]		
COOK ISLANDS					
DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA	The ATN BIS Router and AMHS planned for in 2011.		With neighboring ACCs to be implemented		

<p>FIJI ISLANDS</p>	<p>ATN BBIS IPS router and AMHS implemented over CRV for connection to USA in April, 2019 with Australia planned for June, 2019.</p> <p>For connections with sub-regional centers:</p> <p>For New Caledonia using AMHS since 2017; For connection with Kiribati using UA/AMHS implemented in 2015.</p>	<p>COMSOFT</p>	<p>AFTN based AIDC implemented between Nadi/ Brisbane, Auckland and Oakland.</p>	<p>- Support and implemented AIDC messaging: ABI, EST, CPL, CDN, ACP, TOC, AOC with all three centers</p> <p>- AIDC ICD version 2.0 implemented with Auckland and Oakland.</p> <p>- AIDC ICD Version 1.0 implemented with Brisbane</p>	<p>B2B connection between Nadi AMHS and Brisbane AMHS planned for Q3, 2021 as backup for CRV.</p>
<p>FRANCE (French Polynesia Tahiti)</p>	<p>Planned for implementation of AMHS in 2022 (T1).</p> <p>Using IP with New Zealand since 2017.</p>		<p>Implementation of AIDC (based on Version 3) with adjacent centers (Oakland and Auckland) since 2009.</p>	<p>THALES EUROCAT for AIDC</p>	<p>Alternate routing for backup between Tahiti and Christchurch via Tahiti/New Caledonia IP link</p>
<p>INDIA</p>	<p>Dual stack ATN/IP router and AMHS implemented at Mumbai in 2011.</p> <p>Operational AMHS connections with Bangkok, Dhaka, Singapore, Kathmandu, Karachi implemented.</p> <p>With Beijing implemented in 2016; With Colombo implemented in May2017; With Bhutan implemented in July 2017;</p> <p>(IOT/POT) between Mumbai – Muscat is scheduled with mutual agreement between India &amp; Oman between 0600-0900 UTC from 21.06.2021 onwards.</p> <p>IOT with Nairobi in September 2020 failed due to compatibility issues noticed at Nairobi, which has Thales system, Messages from Mumbai did not go out of the transmit queue. System software level compatibility problems need to be resolved by Nairobi taking the OEMs on board.</p>	<p>COMSOFT</p>	<p>Initially-15-May-2017, AIDC implemented between Chennai and Kuala Lumpur with ABI and EST messages.</p> <p>India is currently using APAC AIDC ICD version 3.</p> <p><b>A. Implementation within India:</b></p> <p>Testing &amp; trials:</p> <p>I. At Delhi with: Ahmedabad, Varanasi, Nagpur</p> <p>II. At Chennai with: Mumbai, Kolkata, Trivandrum, Mangalore, Trichy, Hyderabad, Bengaluru</p>	<p>Mumbai: Raytheon Auto track-III</p> <p>Chennai- Raytheon Auto track-III +</p> <p>Delhi: INDRA Aircon</p> <p>Kolkata: INDRA Aircon</p> <p>Bengaluru: SELEX</p> <p>Hyderabad: SELEX</p> <p>Ahmedabad: INDRA Aircon 2100</p> <p>Nagpur: INDRA Aircon 2100</p>	<p>INDIA</p>

		<p>III. At Kolkata with: Chennai, Nagpur, Varanasi, Guwahati  IV. At Mumbai with: Chennai, Ahmedabad, Nagpur</p> <p>Operational:</p> <p>Chennai- Mumbai; Delhi-Nagpur; Delhi-Ahmedabad,</p> <p>Functional:</p> <p>Delhi-Varanasi, LOA to be signed shortly.</p> <p><b>B: Implementation with Neighboring States:</b>  The status on AIDC implementation with following ATSUs of neighboring FIRs is as under:</p> <p>I. <b>Chennai &amp; Kuala Lumpur (Malaysia)</b>  – ABI, EST successful. CDN is done with voice confirmation. TOC/AOC is implemented w.e.f. 1<sup>st</sup> Jan 2021. LOA signed on 26<sup>th</sup> May 2021 effective from 1<sup>st</sup> June 2021.</p> <p>II. <b>Chennai &amp; Male (Maldives)</b>  –Trails have been successful. LOA in process. Safety Assessment conducted on 9<sup>th</sup> April 2021 for implementation</p> <p>III. <b>Chennai &amp; Colombo (Sri Lanka)</b> - Colombo in process to address the syntax errors in ABI. Thereafter, trails will be conducted. LOA in progress.</p> <p>IV. <b>Chennai &amp; Yangon (Myanmar)</b> – Trials commenced in January 2018. Issues of incorrect reference number in Counter CDN from Yangon persists. Yangon has intimated that, they will inform Chennai for conducting the Test, as soon as they are ready</p>	<p>Varanasi: INDRA Aircon 2100  Guwahati: INDRA Aircon 2100  Trivandurm: INDRA Aircon 2100  Mangalore: INDRA Aircon 2100  Trichy: INDRA Aircon 2100</p> <p>All these systems follow APAC AIDC ICD Ver 3.0 of 2007</p>	
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			<p><b>V. Mumbai &amp; Male (Maldives)</b> – Safety Assessment conducted on 9<sup>th</sup> April 2021 for implementation. Final LOA to be signed shortly.</p> <p><b>VI. Mumbai &amp; Mogadishu</b> - Successful trials conducted in March 2021. Minor adaptation system issues with Mogadishu automation system identified. Resolution awaited from Mogadishu.</p> <p><b>VII Mumbai &amp; Muscat</b> - Successful trials conducted in March 2021. System issues with Muscat’s automation system identified. Resolution awaited from Muscat ATCAS vendor</p> <p><b>VIII. Ahmedabad &amp; Karachi (Pakistan)</b> – Automatic message exchange (e.g. ABI, EST) happens for most of the East bound flights between Karachi &amp; Ahmedabad. Karachi Automation system not generating auto ACP message in response of EST messages. Pakistan is currently doing technical trials between Lahore and Delhi ACCs in first phase. Pakistan will take up test trials between Karachi and Mumbai &amp; Karachi and Ahmedabad in second and third phase respectively.</p> <p><b>IX. Delhi &amp; Lahore (Pakistan)</b>- Under test trails. During the first test trials during the March’2021 it was identified that Lahore Automation system not generating automatic ACP messages. Also Delhi system is rejecting the AIDC messages because of the extra space in messages from Lahore.</p> <p><b>X. Kolkata &amp; Yangon (Myanmar)</b> – Initial trials were conducted in Q4 of 2018 in which some ABI and message reference errors were encountered. Vendor at both ends modified the software and issues were mitigated. In the next trials in Q1 of 2020 most message exchanges were successful. LOA to be negotiated and signed.</p>	
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			<p><b>C. Under Planning</b></p> <p>I. To conduct operational trials between Kolkata-Dhaka, Mumbai-Karachi (Pakistan), Chennai-Jakarta and Varanasi-Kathmandu subject to readiness from the concerned states.</p> <p>D. Seychelles and Sana ATSU do not have a compatible ATM Automation system in place for AIDC coordination with Mumbai ATSU</p> <p>E. Delhi – Karachi: AIDC between Delhi &amp; Karachi will not be required due to restructuring of FIRs</p>		
INDONESIA	<p>ATN BIS Router and AMHS with Singapore implemented since February 2018;</p> <p>AMHS Trial (IOT) with Brisbane pending for CRV implementation.</p>	IDS	<p>AIDC implementation in Ujung Pandang ACC conducted as follows:</p> <p>1) Ujung Pandang ACC –Brisbane ACC:</p> <p>Implemented since July 2017.</p> <p>2) Ujung Pandang ACC – Manila ACC:</p> <p>Implemented since 4Q 2020;</p> <p>3) Ujung Pandang ACC – Kota Kinabalu ACC:</p> <p>- Successfully tested and target date for operational trial in 4Q2020;</p> <p>- Target date for implementation 4Q2021.</p> <p>4) Ujung Pandang ACC – Oakland ARTCC:</p> <p>- Successfully tested and target date for implementation in 4Q2021.</p> <p>5) Ujung Pandang ACC – Port Moresby ACC:</p>	Thales TopSky in Makassar able to support ICD version 3 since December 2015.	For CRV, target of contract in 3Q2021 and implementation in 4Q2021.

			<p>- Successfully tested on 7 July 2020;</p> <p>- Target date for operational trial in 3Q2020.</p> <p>- Target date for implementation 2Q2021.</p> <p>6) Ujung Pandang ACC – Jakarta ACC;</p> <p>- Target date for operational trial in 3Q2021.</p> <p>- Target date for implementation 4Q2021;</p> <p>AIDC implementation in Jakarta ACC will be carried out with the following priorities:</p> <ol style="list-style-type: none"> <li>1) Jakarta – Ujung Pandang (4Q2021);</li> <li>2) Jakarta – Chennai (2Q2022);</li> <li>3) Jakarta – Melbourne (3Q2022);</li> <li>4) Jakarta – Colombo (4Q2022);</li> <li>5) Jakarta – Singapore (2Q2023);</li> <li>6) Jakarta - Kuala Lumpur (3Q2023);</li> <li>7) Jakarta – Kota Kinabalu (4Q2023).</li> </ol>		<p>Priority is in accordance with Hot Spot identified by RASMAG/23</p>
JAPAN	<p>ATN BBIS router and AMHS installed at USA in 2000. Connection tests with USA in 2000 - 2004 and put into operational use in 2005.</p> <p>ATN BBIS router (to apply to Dual Stack) and AMHS (to upgrade in 2015. The connection test with each country which is not currently connecting is started after update.</p> <p>Hong-Kong</p> <p>AMHS/FTBP over CRV was put into operation in September 2020.</p>	NEC	<p>AIDC implemented between Fukuoka ATMC and Oakland ARTCC in 1998.</p> <p>AIDC implemented between Fukuoka ATMC and Anchorage ARTCC in 2005.</p> <p>AIDC implemented between Tokyo ACC/Fukuoka ACC and Incheon ACC in 2010.</p> <p>Implemented between Fukuoka and Incheon since June 2009.</p>		<p>Japan and USA conducting testing AIDC over AMHS and cutover date is 5 May 2017.</p>

	<p><b>Singapore</b></p> <p>AMHS/FTBP over CRV was put into operation in December 2020.</p> <p><b>Beijing/China</b></p> <p>AMHS/FTBP over CRV test was all completed in March 2021. It will put into operation after TMC is signed</p> <p><b>Taipei</b></p> <p>Plan for AMHS/FTBP over CRV</p> <p>IOT in July 2021 POT in 1Q 2022 Incheon/Korea Plan for AMHS/FTBP over CRV IOT in 4Q 2021</p>		<p>AIDC implemented between Fukuoka ACC/Naha ACC and Taipei ACC implemented.</p> <p>AIDC between Fukuoka ACC and Shanghai ACC under negotiation.</p>		
KIRIBATI	Connection with Nadi using UA/AMHS implemented in 2015.				
LAO PDR	<ul style="list-style-type: none"> <li>- ATN BIS Router and AMHS Implemented with Bangkok and Phnom Penh.</li> <li>- AFTN used with Hanoi and Kunming.</li> <li>- For Yangon we have no direct link the connection is used via Bangkok.</li> </ul>	THALES	<ul style="list-style-type: none"> <li>- Vientiane ACC AIDC used for coordination between Bangkok and Phnom Penh ACCs since 2020.</li> <li>- Operation trials are on going with Kunming, Hanoi and Yangon ACCs.</li> </ul>	THALES which is able to support ICD Version 2	
MALAYSIA	<p>ATN BIS Router completed 2007.</p> <p>AMHS for Malaysia – Singapore implemented in March 2020.</p>	FREQUENTIS	<p><b><u>Kuala Lumpur ACC and Bangkok ACC</u></b></p> <p>AIDC technical test between Kuala Lumpur ACC and Bangkok ACC conducted since November 2016 (ABI/EST/ACP/LAM/LRM/CDN/REJ/TOC/AOC).</p>	SELEX which is able to support ICD Version 3.	

	<p>AMHS for Malaysia – Thailand implemented in Dec 2019.</p>	<p>The operational trial commenced in August 2019 (EST/ACP/LAM/ LRM).</p> <p>The operational implementation commenced on 14<sup>th</sup> March 2020 (EST/ ACP/LAM/LRM).</p> <p><b><u>Kuala Lumpur ACC and Chennai OCC</u></b> AIDC technical test between Kuala Lumpur ACC and Chennai OCC conducted since 31<sup>st</sup> July 2013. The operational trial implemented in phases from September 2016 (ABI/EST/MAC/LAM/LRM/ACP). Review on the CDN message implementation conducted in August 2017. SOP signed 26 April, 2017. The MOU signed on March 2020. The operational implementation commenced on 1<sup>st</sup> April 2020 (ABI/EST/ ACP/LAM/LRM/CDN/REJ/MAC).</p> <p>The operational trial for TOC/AOC started on 1<sup>st</sup> July until 1<sup>st</sup> August 2020.</p> <p>The operational implementation for TOC/AOC commenced on 1<sup>st</sup> January 2021.</p> <p>The updated LOA signed on 26<sup>th</sup> May 2021.</p> <p><b><u>Kuala Lumpur ACC and Singapore ACC</u></b> AIDC technical test between Kuala Lumpur ACC and Singapore ACC conducted since April 2015 (ABI/EST/ ACP/LAM/LRM/CDN/REJ). The operational trial started on September 2018 (EST/ACP/LAM/ LRM). The operational implementation commenced on 1<sup>st</sup> November 2019 (EST/ ACP/LAM/LRM).</p> <p><b><u>Kuala Lumpur ACC and Ho Chi Minh ACC</u></b></p>		
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		<p>AIDC technical test between Kuala Lumpur ACC and Ho Chi Minh ACC To Be Discussed (TBD).</p> <p><b><u>Kuala Lumpur ACC and Jakarta ACC</u></b> AIDC technical test between Kuala Lumpur ACC and Jakarta ACC TBD.</p> <p><b><u>Kota Kinabalu ACC and Manila ACC</u></b> AIDC Technical Test 1 between Kota Kinabalu ACC and Manila ACC started on 21 – 22<sup>nd</sup> May 2019 (ABI / EST / ACP / LAM / LRM / TOC / AOC / MAC). Technical Test 2 was conducted on 21 – 22<sup>nd</sup> October 2019 (ABI / EST / ACP / LAM / LRM / TOC / AOC / MAC). Upcoming AIDC Technical Test between Kota Kinabalu ACC and Manila ACC to be conducted in Q32021</p> <p><b><u>Kota Kinabalu ACC and Ujung Pandang ACC</u></b> AIDC Technical Test 1 between Kota Kinabalu ACC and Ujung Pandang ACC started on 7 – 8<sup>th</sup> August 2019 (ABI / EST / ACP / CDN / LAM / LRM / REJ / MAC). Technical Test 2 was conducted on 23 – 24<sup>th</sup> October 2019 (ABI / EST / ACP / LAM / LRM / TOC / AOC / MAC). Technical Test 3 was conducted on 11<sup>th</sup> March 2020 (EST / ACP / LAM / LRM). Upcoming AIDC Technical Test between Kota Kinabalu ACC and Ujung Pandang ACC to be conducted in Q32021</p> <p><b><u>Kota Kinabalu ACC and Jakarta ACC</u></b> AIDC Technical Test between Kota Kinabalu ACC with Jakarta ACC is to be discussed.</p> <p><b><u>Kota Kinabalu ACC and Singapore ACC</u></b> AIDC Technical Test between Kota Kinabalu ACC and Singapore ACC started on 22<sup>nd</sup> September 2015 (ABI / EST / ACP / CDN / LAM / LRM / REJ / MAC). AIDC Technical Test 1 was conducted on 18 – 19<sup>th</sup> November 2019 (ABI / EST / ACP / CDN / LAM / LRM / REJ / MAC).</p>		
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			<p>Technical Test 2 was conducted on 16<sup>th</sup> January 2020 (EST / ACP / LAM / LRM). AIDC Operational Trial started since 16<sup>th</sup> November 2020 and to be extended until 30<sup>th</sup> June 2021. Agreement on Operational Implementation has been materialized on 3<sup>rd</sup> June 2021. Operational Implementation is agreed to be conducted on 1<sup>st</sup> July 2021 (EST / ACP / LAM / LRM)</p> <p><b><u>Kuching ACC and Singapore ACC</u></b> AIDC Technical Test (First and Second) between Kuching ACC and Singapore ACC was conducted both on 11 November 2015 and 24-25 November 2015 (ABI, EST, LAM, CDN, ACP, REJ, and LRM). However, it was discontinued until November 2019</p> <p>The AIDC Technical Test (Third and Fourth) was conducted both on 20-21 November 2019 and 14 January 2020 (ABI, EST, LAM, CDN, ACP, REJ, and LRM)</p> <p>AIDC Operational Trial was started on 20 July until 18 October 2020. Then it was continuing until 31 January 2021. Agreement on Operational Implementation has been materialized on 12 January 2021 via videoconference. The operational implementation was on 1 February 2021. The AIDC messages included for exchange are EST, LAM, LRM and ACP.</p> <p><b><u>Kuching ACC and Jakarta ACC</u></b> AIDC between Kuching ACC and Jakarta ACC TBD.</p>		
MALDIVES	In the process of replacing the existing operational AFTN system by AMHS. It is expected to complete the installation before the end of 2019.		<p>Connection established with all the adjacent ATSUs.</p> <p>Interoperability tests successfully completed in 2017.</p>	SELEX which is able to support ICD Version 3.	

	<p>With the new AMHS, it is planned to establish a new IP connection between an additional neighboring ATSU as the current link is an X.25 connection between Colombo.</p> <p>Also will look for the possibility of implementing the CRV network to use with AMHS and AIDC during the same phase.</p>		<p>LOA signed for operational trials between Mumbai, Chennai, and Trivandrum. Operational trials were also successful with these ATSUs, while several issues were resolved from both ends.</p> <p>Ready to sign LOA with Melbourne and is expected during the 2nd quarter of 2019.</p> <p>Trials with Colombo had few issues, which Colombo is working to resolve it on their end with the automation system supplier.</p> <p>Connections between all 5 ATSUs are turned ON in the ATS automation system to conduct pre-notified operational trials.</p>		
MARSHALL ISLANDS					
MICRONESIA (EDERATED STATES OF)					
Chuuk					
Kosrae					
Pohnpei					
Yap					
MONGOLIA	<p>AMHS/AFTN gateway implemented 2012.</p> <p>ATNBIS router implemented in 2014.</p> <p>ATN and AMHS IOT with China was completed in May 2018. Plan for commissioning after POT completion in 2019.</p>	COMSOFT	<p>ATM automation system supports both AIDC and OLDI.</p> <p>Coordinating with Russia on OLDI connection in target date 2016.</p> <p>Coordinating with China on AIDC connection between Beijing/Ulaanbaatar technical trials in progress.</p> <p>Planned date of testing in 2019.</p>	INDRA Aircon 2100 supporting AIDC ICD Version 2.	

MYANMAR	AMHS including AFTN/AMHS gateway implemented in Nov 2011.  Connection with Thailand implemented in 4Q2016. Planned for AMHS connection with Beijing. Target date TBC.	THALES	AIDC connection pre- operation test with Thailand conducted in 4Q2017 and Target date of implementation 4Q2020; AIDC testing with Chennai, Kolkata and Vientiane conducted in 2020. Myanmar improved ATS Surveillance Coverage at coordination point with China and will start AIDC test again with Kunming ACC in 2020.	THALES Automation system (Topsky ATC) supports APAC AIDC ICD Ver. 2.	AMHS including AFTN/AMHS gateway implemented in Nov 2011.  Connection with Thailand implemented in 4Q2016. Planned for AMHS connection with Beijing. Target date TBC.
NAURU					
NEPAL	AFTN/AMHS Gateway implemented in 2012.  AMHS implemented with India since June 2014.  AFTN connection with China. Plan to test AMHS connection soon.	COMSOFT	Nepal uses custom built ATM system from NEC.  Some issues regarding ICD need to be resolved in order to proceed ahead with AIDC testing with India and China.		
NEW CALEDONIA	New router and AMHS commissioned December 2016	COMSOFT			
NEW ZEALAND	AMHS connection with the USA over CRV was implemented in April 2019. AMHS connection to Australia over CRV is scheduled for June 2019.	COMSOFT	AIDC implemented between New Zealand, Australia, Fiji, Tahiti, Chile and USA.	Supported the Basic 5 message set. ATM systems are LEIDOS and ADACEL	
PAKISTAN	ATN/AMHS connections with Mumbai and Kuwait since 2015 and 2018 respectively.  AMHS connection with Beijing, Kabul, Tehran and Muscat will be provided after up gradation of existing AMHS at Karachi which is already in progress.	Existing COMSOFT  After up gradation ISD	Implemented between Karachi and Lahore ACCs.  Lahore/Delhi ACC AIDC trials are being carried out which started in March 2021 (Phase-1), Karachi/Mumbai & Karachi/Ahmedabad are planned in Phase-2.  After modification of Lahore/Karachi FIRs boundaries, trials between Karachi/Delhi ACC are not required.	ATM system from Indra AIRCON 2100 version-2 in Lahore and Karachi ACC,  Si-ATM version-3 in Islamabad ACC	Existing ATM system are likely to be upgraded in Lahore and Karachi ACC.
PAPUA NEW GUINEA	Currently AFTN over IP.	COMSOFT is the supplier of PNG AFTN/AMHS system	AIDC using AFTN operational with Australia, testing/trial with Oakland (USA) started late last year and in progress.	New ATM System from Thales (TopSky-ATC) implemented and operational now supports AIDC V3.	

	AMHS implementation is planned for after successful implementation of CRV this year. AMHS implementation planned for 2020.		AIDC implementation with Indonesia to happen after CRV implementation this year.		
PHILIPPINES	<p>ATN/AMHS Boundary Intermediate System was installed at the new Manila CNS/ATM Center;</p> <ul style="list-style-type: none"> <li>• Site Acceptance, Oct. 2015</li> <li>• Commissioned &amp; operational, March 2018</li> </ul> <p>AMHS implementation over CRV with;</p> <ul style="list-style-type: none"> <li>• <b>HONG KONG</b> - May 2019</li> <li>• <b>TAIPEI</b> - Sept. 2019</li> <li>• <b>SINGAPORE</b> - Dec. 2020</li> <li>• <b>OAKLAND</b> - April 2021</li> </ul>	<b>Frequentis - Comsoft</b>	<p>AIDC implementation status/update over AMHS with the following FIR's;</p> <p><b>HONG KONG</b> – Implemented, May 2019</p> <p><b>SINGAPORE</b> – Implemented, December 2020</p> <p><b>TAIPEI</b> – Implemented, December 2019</p> <p><b>UJUNG PANDANG</b> – Implemented, December 2020 via <b>BBIS</b></p> <p><b>HO CHI MINH</b> – Awaiting OPS trial. Technical Test conducted on June 15-16, 2021.</p> <p><b>KOTA KINABALU</b> – Next progress AIDC test to be scheduled, target 3Q2021</p>	THALES which is able to support ICD Version 2.	<p>The New ATN/AMHS of Manila CNS/ATM center has been in domestic operations since March 2018. And with the implementation of CRV, AMHS connection has been implemented with the following adjacent FIR's;</p> <p><b>-HONG KONG</b></p> <p><b>-TAIPEI</b></p> <p><b>-SINGAPORE</b></p> <p><b>-OAKLAND</b></p>

			OAKLAND – 1 <sup>st</sup> test to be scheduled, target 3Q2021		
REPUBLIC OF KOREA	<p>Plan to upgrade AMHS support IWXXM from 2023 over CRV Frequentice</p> <ol style="list-style-type: none"> <li>1) AMHS/CRV IOT with China and Japan in 4Q of 2021</li> <li>2) AMHS/CRV POT with China and Japan in 4Q 2022</li> <li>3) Cutover to AMHS/CRV with Chi na and Japan in Q1 2023 after POT</li> <li>4) Implementation of AMHS/CRV with Japan Q1 2023</li> </ol>	FREQUENTIS	<p>AIDC implemented between ACC and Fukuoka ATMC in 2010</p> <p>AIDC between Incheon and Dalian implemented in Nov. 2016.</p>	Rockheed Martin System	
SINGAPORE	<p>AMHS implemented with:</p> <ol style="list-style-type: none"> <li>1) AMHS circuit with India put into operational use in Mar 2011.</li> <li>2) AMHS circuit with UK put into operational use in Mar 2012.</li> <li>3) AMHS circuit with Thailand put into operational use in Dec 2014.</li> <li>4) AMHS circuit with Australia put into operational use in Oct 2016.</li> <li>5) AMHS circuit with Indonesia put into operational use in Feb 2018.</li> <li>6) AMHS circuit with Malaysia put into operational in Mar 2020.</li> <li>7) AMHS circuit with Japan put into operational in Dec 2020.</li> </ol>	<p>FREQUENTIS</p> <p>COMSOFT</p>	<ol style="list-style-type: none"> <li>1) Operational with Ho Chi Minh implemented Jul 2014.</li> <li>2) Kuala Lumpur operational trial started since Sep 2018 and is implemented Nov 2019.</li> <li>3) Implemented with Kuching ATCC in Feb 2021.</li> <li>4) Operational trial ongoing with Kota Kinabalu ATCC since Nov 2020 and implementation date on 1st July 2021.</li> <li>5) Manila operational trial started in Feb 2019. Implementation Nov 2019.</li> <li>6) Technical trials with Jakarta ACC will be initiated once the Jakarta ACC ATMS renewal is completed.</li> </ol>	THALES supports ICD Version 3 since December 2018	

	<p>8) AMHS circuit with Philippines put into operational in Dec 2020.</p> <p>Inter-Operability Test (IOT) with Vietnam started in 2019. IOT with Sri Lanka, Bahrain and Brunei to be confirmed.</p>				
SRI LANKA	<p>ATN BIS Router Planned for 2013. IP based AMHS implemented by Oct. 2017.</p> <ul style="list-style-type: none"> <li>- Mumbai tested May 2017 operational planned for Q4 2017;</li> <li>- Singapore testing in Q4 2017 operational for 2018;</li> <li>- Male testing and operational date TBD.</li> </ul>	IDS	<p>Trials with Male planned for in 3Q2019.</p> <p>Trial with Chennai on-going. Plan for implementation in 2018 and with Melbourne plan for 1Q2018.</p>	INTELCAN which is able to support ICD Version 3.	
THAILAND	<p>BBIS/BIS Routers already implemented.</p> <p>Connection with Bangladesh, Bhutan, Cambodia, China, India, Lao PDR, Myanmar, Singapore, Hong Kong China, and Malaysia implemented.</p> <p>Bangkok -Viet Nam Circuit</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> IOT Test: Done</li> <li><input type="checkbox"/> POT Test: <b>Planned for end of 3Q2021</b></li> </ul> <p>Bangkok - Rome Circuit</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> IOT Test: <b>Planned for 3Q2021</b></li> </ul> <p>Connection with SITA (SITA AMHS Gateway inter-connections) implemented.</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> POT Test: <b>Planned for end of 4Q2021</b></li> </ul>	AEROTHAI's AMHS System	<p>The implementation with</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Lao PDR has done since 14th July 2020</li> <li><input type="checkbox"/> <b>Cambodia has done on 22<sup>nd</sup> feb 2021</b></li> </ul> <p>In addition, it is planned to implement AIDC with Myanmar.</p>	THALES which supports AIDC feature APAC AIDC ICD V.3	

TONGA	AMHS planned for 2008. The provider is linked to the New Zealand AFTN				CPDLC and ADS-C is not considered for lower airspace
UNITED STATES	<ul style="list-style-type: none"> <li>- Australia</li> <li>- Fiji</li> <li>- New Zealand</li> <li>- Japan</li> <li>- Philippines</li> <li>- Papua New Guinea (2021)</li> <li>- Indonesia (2022)</li> <li>- Russia (Planned)</li> </ul>	IN-HOUSE	<ul style="list-style-type: none"> <li>- Fiji, Japan, New Zealand</li> <li>- Tahiti (via New Zealand),</li> <li>- Papua New Guinea via Australia (Direct planned for 2021)</li> <li>- Philippines (2021)</li> <li>- Indonesia via Australia (Direct planned for 2022)</li> <li>- Russian Federation (pending joining CRV)</li> </ul>	IN-HOUSE which is able to support APAC and NAT ICDs currently Version 2.	
VANUATU					
VIET NAM	<p>AMHS (basic) implemented from 4Q/2018.</p> <p>Plan AMHS extended from Q4 2022</p> <p>IOT with Singapore from 10/2019 to 8/2020</p> <p>IOT with Hong Kong 12/2019</p> <p>IOT with Thailand 6/2020, POT 8/2020.</p>	IN-HOUSE	<p>Operational between Ho Chi Minh and Singapore since July 2014.</p> <p>Operational trial for additional messages sets on-going.</p> <p>Technical testing between Ho Chi Minh with Philippines on going</p> <p>Technical testing with Cambodia already done;</p> <p>Technical testing between Hanoi and Vientiane, Lao. PDR-already done with Malaysia TBC</p> <p>For operation trial TBC.</p> <p>Operation trial between Ho Chi Minh and Hanoi ongoing.</p>	<p>Support ICD Version 1.0 with THALES at Ho Chi Minh ATM system.</p> <p>Support ICD Version 3.0 with Selex at Hanoi ATM System.</p>	

Wallis and Futuna (FRANCE)	AMHS implementation planned for end of 2017			COMSOFT	
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CRV IMPLEMENTATION TABLE

State/ Administration	Intended date for CRV cut-over	Applications targeted	Migration scheme	Prerequisites/ dependencies
<b>Australia</b>	Contract in May2018 and service readiness in 3Q 2018	AFTN, ADS-B, AMHS, Voice With: <b>Australia</b> February,2019(AMHS/AIDC), March,2019(Voice) <b>Fiji</b> March,2019 (AMHS June 2019/AIDC, Voice completed April) <b>New Zealand</b> , February, 2019 (AMHS June 2019, AFTN May 2019/AIDC), March, 2019 (Voice April 2019 completed) <b>Indonesia</b> 4Q2019 (TBC) (AMHS/AIDC, Voice, ADS-B); <b>PNG</b> 4Q2019(TBC), (AMHS/AIDC, Voice) <b>Singapore</b> 2Q2019 TBC (AMHS/AIDC, Voice); <b>South Africa</b> TBC  3Q2019 TBC (AMHS/AIDC, Voice); <b>Japan</b> would be end of 2019.	staged approach	Termination of current COM contract
<b>Bhutan</b>	Contract signed on Oct 2019.  CRV installed successfully in Dec 2021.  CRV P2P Test between Paro-Mumbai & Paro- Bangkok to be done once India and Thailand join CRV	AMHS first and Voice & ADS-B will follow up after AMHS.		Dependent on India and Thailand for utilization of CRV network.

State/ Administration	Intended date for CRV cut-over	Applications targeted	Migration scheme	Prerequisites/ dependencies
<b>Cambodia</b>	As early as convenient, dependent on neighboring countries			Internal decision making
<b>China</b>	Contract signed on 21 June 2020.	Applications targeted: Data(AMHS) With: Hong Kong 3Q2020; Japan 4Q2020; Thailand TBD; India TBD. Republic of Korea 4Q2020 ATFM test with Japan and ROK at Sep 2020 over CRV	staged approach	
<b>Democratic People's Republic of Korea</b>	Contract in 3Q2018 and service readiness in 4Q2018	AFTN and VoIP		
<b>Hong Kong, China</b>	Contract signed on 6 April 2018.  Connection was installed successfully in June 2018.	<b>With Manila</b> CRV-Voice put into operation in August 2018 CRV-AMHS put into operation in May 2019  <b>With Taibei</b> CRV-AMHS put into operation in May 2020  <b>With Fukuoka</b> CRV-AMHS put into operation in September 2020  <b>With Beijing</b> CRV - AMHS POT in March and operation in April 2021	staged approach	Need to coordinate with relevant CAAs/ANSPs in joining CRV in a harmonized manner, etc.

State/ Administration	Intended date for CRV cut-over	Applications targeted	Migration scheme	Prerequisites/ dependencies
		<b>Bangkok and Hochiminh</b> Subject to their readiness		
<b>Macao, China</b>	Service readiness in Q4 2021	To be confirmed	Staged approach	Migration from X.25 to IPS
<b>Fiji</b>	Contract in May 2018 and service readiness in 3Q 2018.	Data (AMHS) and VoIP With: Australia ATS voice April 2019 completed, AMHS completed in July 2019, NZ ATS voice completed April 2019 and USA ATS voice completed in March 2019 and AMHS completed in April 2019.	Staged approach	CBA, safety case
<b>France (New Caledonia and French Polynesia)</b>	2023 is target for DNSA to sign contract subject to internal security assessment (done).	ATS Voice, AMHS with Fiji & AIDC, AMHS with USA, AIDC/AMHS with NZ.		CBA, cost must be affordable <i>Wallis and Futuna: no dedicated connection to CRV</i>
<b>India</b>	Contract for CRV implementation with M/s PCCW in India will be signed in 3Q of 2021 and CRV Service will be ready in 4Q of 2021.	AFTN/AMHS, ADS-B, AIDC, ATS Voice	staged approach	Internal Administrative approvals & safety case

State/ Administration	Intended date for CRV cut-over	Applications targeted	Migration scheme	Prerequisites/ dependencies
<b>Indonesia</b>	Contract in 3Q2021 and service readiness in 4Q2021.	AFTN, AMHS, ADS-B and voice		CBA completed
<b>Japan</b>	Contract signed in Nov.2017 and service readiness in 1Q 2018 for Fukuoka	Data first with: Hong Kong completed 3Q2020 USA completed 1Q2019 Singapore completed 4Q2020 China completed 1Q2021  Voice Plan with: USA 2Q2021 Daegu and Incheon (R.O.K) started in 1Q2021	staged approach	
<b>Malaysia</b>	Contract to be signed 4Q 2020 and service readiness in 1Q 2021	AFTN, AMHS, ADS-B and ATS voice	staged approach	New ATC centre operational in 2021 Contract issue with the new ATC main contractor. COM Project is part of the main contract.
<b>Myanmar</b>	Contract will be signed 4Q2020.	AFTN/AMHS, AIDC, ADS-B and voice	staged approach	One of counterparts join in
<b>Nepal</b>	Nepal intends to join CRV on staged approach with AMHS data connectivity as first priority and intends to sign the contract with PCCW within 2020.			

State/ Administration	Intended date for CRV cut-over	Applications targeted	Migration scheme	Prerequisites/ dependencies
<b>New Zealand</b>	Contract signed in July 2018 and service implemented December 2018	Australia Voice Completed March 2019 and AMHS June 2019 Completed USA Voice Completed March 2019 and AMHS March 2019 Completed  Fiji Voice Completed April 2019  French Polynesia AMHS and Voice  Chile AMHS (SAM regional network REDDIG)	Awaiting French Polynesia joining.  Awaiting outcome of inter-regional network connectivity discussion. For Chile	CBA attractive if all counterparts join in.
<b>Philippines</b>	Contract signed in March 2018 and service readiness in 2Q2018	Completed:  with <b>HONG KONG</b> AIDC - 2Q2019; AMHS - 2Q2019; Voice - 3Q2018.  with <b>TAIPEI</b> AIDC 4Q2019; AMHS 3Q2019; Voice 1Q 2019.  with <b>SINGAPORE</b> AIDC – 4Q2019; AMHS –4Q2020; Voice – 1Q2020.  with <b>USA</b> AMHS – 2Q2021; Voice – 4Q2019;	staged approach	Success transition to the New ATM centre in 4Q2018

State/ Administration	Intended date for CRV cut-over	Applications targeted	Migration scheme	Prerequisites/ dependencies
		with <b>INDONESIA</b> AIDC – 4Q2020.		
<b>Republic of Korea</b>	Contract in 3Q 2019 and service readiness in 4Q 2019	Completed: with Japan Voice –March 2021  Planned; With Japan Voice additional lines-from 2022 to 2023 AMHS-4Q 2022  With China Data(AMHS)-4Q 2022	staged approach	
<b>Singapore</b>	Contract signed in May 2019 and service readiness in Dec 2019	Data (AMHS over IP) with: Australia Dec 2020 (completed); Japan Nov 2020 (completed); and Philippines Dec 2020 (completed);and Malaysia Q3 2021.  Voice with: Philippines Mar 2020 (completed).	Staged approach	<b>Singapore</b>
<b>Sri Lanka</b>	As soon as CRV is available	AMHS connectivity with Mumbai, Singapore and Male.  Direct Speech facilities with Chennai, Trivendrum, Mumbai, Male, Jakarta, Melbourne, Singapore	Phased approach with the implementation of CRV	CBA

State/ Administration	Intended date for CRV cut-over	Applications targeted	Migration scheme	Prerequisites/ dependencies
<b>Thailand</b>	Contract in 3Q2021 and service readiness in 1Q2022	Data first Then voice, subject to safety case: China 1Q2022 Hong Kong 1Q2022; Singapore 1Q2022; India 2022.	Staged approach	
<b>United States</b>	Contract in January 2018	<p>1) AMHS with Australia Fiji Japan Philippines New Zealand Papua New Guinea (2021) Indonesia (2022)</p> <p>2) AIDC with Fiji Japan New Zealand Papua New Guinea (Direct planned 2021) Tahiti (via New Zealand) Indonesia (Direct planned 2022) Russia (when join CRV)</p> <p>3) VoIP with Fiji Japan Philippines New Zealand Papua New Guinea (direct planned 2021) Indonesia (2022) Russia (when join CRV)</p>	Staged approach	

<b>State/ Administration</b>	<b>Intended date for CRV cut-over</b>	<b>Applications targeted</b>	<b>Migration scheme</b>	<b>Prerequisites/ dependencies</b>
Viet Nam	To be confirmed later (After discussed with PCCW Global)			

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**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 ATIS-routes	Intended separation criteria to be applied	Remarks
<b>AFGHANISTAN</b>	ADS-B & Multi Lateration system installed.				subject to safety assessment
<b>AUSTRALIA</b>	<p>A total of 50 ADS-B ground stations and 28 WAM stations are operational (Total 78)</p> <p>ATC readiness since 2004 ADS-B data sharing with Indonesia operational since 2/2011.</p> <p>ASMGCS using multilateration and ADS-B is operational in Brisbane, Sydney, Melbourne and Perth</p> <p>November 2016 – ADS-B converted to “radar like” Cat 48 for use in Melbourne Terminal Area and Perth Terminal Area in early 2017.</p> <p>CMATS replacing the current ATM system is expected to be fully operational in 2026 period.</p>	<p>2009/effective date of mandating in upper airspace 12/12/2013.</p> <p>An ADS-B mandate for all IFR aircraft applies from 2/2017.</p> <p>Some limited exemptions for foreign registered aircraft and some private operations.</p>	All airspace for IFR aircraft from 2/2017	<p>2.5NM, 3NM and 5 NM surveillance separations.</p> <p>3/2016 - Manual of ATC updated to include 3 nautical mile separation using ADS-B in terminal control unit.</p> <p>3/2017 – 2.5NM separation authorized using ADS-B when also used with radar.</p> <p>Vectoring allowed using ADS-B</p> <p>Precision Runway Monitoring for Sydney WAM</p>	<p>WAM is operating in Tasmania since 2010 with 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>CASA has approved the use of reduced specification ADS-B avionics to support ADS-B IN and ATC situational awareness for VFR aircraft</p>

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
<b>BANGLADESH</b>	<p>Bangladesh has a plan to install four ADS-B ground stations to be installed at Dhaka, Cox’s Bazar, Saidpur and Barisal Airports by 2019.</p> <p>ADS-B data will be integrated with new ATM system at Dhaka.</p> <p>Bangladesh has also a plan to install MLAT stations to provide surface movement control at HSIA, Dhaka as well as TMA coverage as a backup and complimentary RADAR coverage to the Dhaka MSSR.</p>				Bangladesh is willing to share ADS-B data with neighbouring States to enhance the safety and surveillance capability in the sub-region.
<b>BHUTAN</b>	ADS-B ground infrastructure feasibility study will be completed in the middle of 2020.	Equipage mandate will be issued once after the completion of feasibility study.			
<b>BRUNEI DARUSSALAM</b>	<p>5 ADS-B ground stations with WAM functionality installed in 2015 and full operation in October 2016. ADS-B/WAM data are fused with radar data in the TopSky ATC Automation system (Thales) to enhance full radar surveillance coverage for Brunei Darussalam.</p> <p>Memorandum of Understanding (MOU) on ADS-B data sharing</p>				

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
	with Singapore and Brunei Darussalam is expected to sign in April 2019.				
<b>CAMBODIA</b>	3 ADS-B ground stations installed at Phnom Penh, Siem Reap and Stung Treng City since 2011 and able to provide full surveillance coverage for Phnom Penh FIR. Cambodia is willing to share data with others.				
<b>CHINA</b>	<p>5 UAT ADS-B stations are used for flight training of CAFUC. The upgrade to 1090ES ADS-B stations project has already started in 2017, and the project is planned to finish by 2022.</p> <p>308 ADS-B stations nationwide have already finished the final acceptance activities.</p> <p>4 ADS-B stations operational in Sanya FIR since 2008.</p> <p>Chengdu-Jiuzhai and Chendu - Lhasa route with 9 ADS-B stations.</p>	<p>The operation of national ADS-B Service is implementing in step -by-step way.</p> <p>Phase I: from October 10, 2019</p> <ul style="list-style-type: none"> <li>➤ ADS-B control services will be provided in APP where radar control services are not available;</li> <li>➤ ADS-B control services will be implemented in control area above 8400m (inclusive) where Radar control services are not available;</li> <li>➤ Radar control services will be provided, using integrated surveillance data of ADS-B and radar, in control areas above 8400m (inclusive) where radar control services are available.</li> </ul> <p>Phase II: from December 31, 2020</p>	The ADS-B mandate published in October 2020, in a separated AIC Nr.09/19 named “Implementation of ADS-B Control Services”		

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>9 ADS-B stations deployed on the routes H15 and Z1 by the end of 2015.</p> <p>19 ADS-B stations at the small airport.</p>	<ul style="list-style-type: none"> <li>➤ ADS-B control services will be provided in APP and ACC where radar control services are not available;</li> <li>➤ Radar control services will be provided, using integrated surveillance data of ADS-B and radar, in APP and ACC where radar control services are available; and</li> <li>➤ ADS-B equipment will be used at the tower of transport airports to display flight movements.</li> </ul>			
<p><b>HONG KONG CHINA</b></p>	<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.</p> <p>ADS-B out operations over PBN routes L642 and M771 at or above FL 290 within HK FIR</p>	<p>AIP supplement issued on 29 Aug 2014 with 8 Dec 2016 as effective date.</p>	<p>HKFIR at or above FL290</p>	<p>5NM surveillance separation</p>	<p>Fully implemented ADS-B in HKFIR by phased approach to ensure safe and smooth integration of ADS-B into the Air Traffic Management System to provide aircraft separation service since November 2018.</p>

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	<p>was effective in December 2013 and within HK FIR at or above FL 290 has been effective since December 2016.</p> <p>ADS-B ground station infrastructure completed in 2013.</p> <p>ADS-B signal provided by Mainland China to cover southern part of Hong Kong FIR commenced in 2010 and has been put into operational use after commissioning of the new ATMS since November 2016.</p>				
<b>MACAO, CHINA</b>	Mode S MSSR coverage available for monitoring purposes.				Airspace – ATZ only
<b>DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA</b>	ADS-B has been used as back-up surveillance of SSR since 2008.				
<b>FIJI ISLANDS</b>	ADS- B /multilateration ground stations installed. Situations awareness service provided in 2013.	ADS-B mandate commencing from 31 <sup>st</sup> December 2013	Mandate for domestic registered aircraft.		

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<p><b>FRANCE</b> <i>(French Polynesia)</i></p>	<p>ATM system is ready for ADS-B sensors/Installation of 5 first GS expected at beginning of 2017. 2<sup>nd</sup> stage with implementation of 7 GS and associated VHF coverage.</p>			<p>5 NM for airspace under coverage.</p>	
<p><b>INDIA</b></p>	<p>ASMGCS (SMR + Multilat) is operational at Delhi, Mumbai, Chennai, Kolkata, Bangalore, Hyderabad, Jaipur, Amritsar, Lucknow, Ahmedabad and Guwahati Airports.</p> <p>ASMGCS (SMR+MLAT) proposed at Cochin and Bhubaneswar (VOCI&amp;VEBS) Expected to be completed by March 2022.</p> <p>ADS-B Ground Stations are installed at 36 locations to cover continental and Oceanic airspace. Out of these 36 ADS-B ground receivers, 25 receivers have been operationalized and remaining 11 ADS-B ground receivers will also be operationalized soon.</p> <p>ATM automation systems at 22 ATC Centres are capable of</p>	<p>AIP supplement issued on 25<sup>th</sup> October, 2018 with effective date of implementation from 01<sup>st</sup> January 2019 which was subsequently revised through NOTAM G1995/18 to be effective from 01<sup>st</sup> January 2020.</p>	<p>On all ATS Routes within continental airspace at and above F290.</p>	<p>a) 5 NM within 60 NM of ADS-B ground station i.e. in the terminal airspace served by the ADS-B receiver.</p> <p>b) 10 NM beyond 60NM of ground station i.e. in the en route airspace.</p>	<p>Standalone ADS-B based APP Surveillance service provided at VOCL, VOCL, VEPT, VEAT and VIJP.</p> <p>MSSR/ADS-B integrated mode APP Surveillance service provided at VILK, VOML, VEBN and VANP.</p>

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	processing ADS-B data.				
<b>INDONESIA</b>	<p>All 30 ADS-B ground station have been met with DO260B in November 2019;</p> <p>The 18 new ADS-B ground stations, with DO260B capability, will be established to cover the traffic in terminal and area. The 7 ADS-B ground station has been installed in Papua. The rescheduling of completion for 11 ground stations in 4Q2021.</p> <p>The ADS-B ground stations has been integrated to 9 ATC systems and 3 others will follow after being upgraded.</p>		<p>Starting on 23<sup>rd</sup> April 2020, Indonesia has implemented mandatory ADS-B equipment for all transport aircraft category flying at all level (SFC up to FL600) in 2 ACCs, 9 TMAs and 10 Airports.</p>	<p>Using 5 NM separation standard.</p>	<p>ADS-B data sharing had been conducted by Indonesia with Australia and Singapore.</p> <p>LOA of collaboration in ADS-B data sharing has been achieved with India.</p> <p>LOA of collaboration in ADS-B data sharing are under reviewing by Malaysia, Philippines and PNG.</p>

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<b>JAPAN</b>	<p>Multilateration Systems for surface monitoring have been implemented at eight airports</p> <p>PRM (WAM) has been implemented at Narita Airport and Haneda Airport.</p> <p>En-route WAM system have manufactured for four areas and will be put into operation in FY2021</p> <p>Plan to evaluate accuracy of ADS-B information under RAD condition.</p>				
<b>KIRIBATI</b>					
<b>LAO PDR.</b>	<p>2 ADS-B ground stations were installed in Vientiane and Luangprabang Int'l Airport in 2015 and the ADS-B data is fused with MSSR data target in the ATM Automation system.</p> <p>3 additional ADS-B ground stations (DO-260B compliant) will be completed the installation at existing MSSR sites (Xiengkhouang, Savannakhet and Champasack)</p>				

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	by 2016 to Q1 of 2017 to enhance the full ADS-B coverage of Lao FIR.				
<b>MALAYSIA</b>	<p>Ground Infrastructure: Kuala Lumpur FIR: 1. Installation of two (2) ADS-B GS in Langkawi and Genting has been completed in October 2017. 2. Upgrading of Kuala Terengganu ADS-B for ADS-B Version 2 capability is to be completed at the end of Dec 2021. 3. Operation of all three ADS-B in new Kuala Lumpur ATC System is to be completed in Dec 2021.</p> <p>Kota Kinabalu FIR: Four (4) new ADS-B will be installed in Kuching, Bintulu, Kota Kinabalu and Sandakan, to be completed in Dec 2021.</p> <p>Implementation Plan:</p> <p>Phase 1: ADS-B services on specific ATS routes and Flight Levels within Kuala Lumpur FIR, target date Mar 2021.</p> <p>Phase 2: ADS-B as secondary means of surveillance within the</p>	<p>AIC Issued on September 2017.</p> <p>AIP Supp on 16 Jan 2020.</p>	<p>Phase 1: On ATS routes N571, P628, L510, P627, L645 and P574 at FL 290 to FL 410 within Kuala Lumpur FIR</p> <p>Phase 2: En-route airspace</p>	ICAO approved surveillance separation.	

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	<p>Kuala Lumpur FIR for en-route airspace. Target date: Mar 2022.</p> <p>Phase 3: ADS-B used as the primary means of surveillance for en-route airspace. (TBA)</p>				
<b>MALDIVES</b>	<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 Fuah Mulah Island in the South to cover 95% of the FIR at/above FL290.</p> <p>Maldives' ADS-B is integrated with the ATM system (in November 2013), and under observation prior to commencing trials.</p> <p>Maldives has planned to share ADS-B data with its adjacent FIRs. Updated by email</p>				<p>Seaplane in Maldives equipped with ADS-B for AOC purpose. These seaplanes have ADS-B IN functions as well.</p>
<b>MARSHALL ISLANDS</b>					
<b>MICRONESIA (FEDERATED STATES OF)</b>					

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MONGOLIA	Ten ADS-B ground stations for combination SSR and filled the surveillance gaps implemented in 2015 and integrated with ATM system and trial operation in early 2016.				
MYANMAR	<p><b>a) The ADS-B Implementation Update</b></p> <ul style="list-style-type: none"> <li>- The five ADS-B ground stations have been installed in Myanmar. Among them, SITTWE and CoCo Island ground stations are installed in 2014, and are DO260 compliant. The other 3 stations, YANGON, MANDALAY and MYEIK airport ground stations are DO260B compliant and installations were finished in 2016.</li> <li>- All ADS-B data are fused with MSSR data in the TopSky ATC Automation system (Thales) in 2016 and using as MSSR backup in Yangon ACC.</li> </ul> <p><b>b) The ADS-B data sharing update between neighbouring States</b></p> <ul style="list-style-type: none"> <li>- Myanmar and India signed the MOU agreement for ADS-B</li> </ul>	Doing ADS-B data analysis and statistic for ADS-B equipped Aircraft in Yangon FIR.			Supplement radar and fill the gaps to improve safety and efficiency ADS-C/CPDLC integrated in Yangon ACC since 2010.

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	<p>data sharing on 6<sup>th</sup> May 2015. ADS-B data sharing test between Agartala (India) - Sittwe (Myanmar), and Port Blair (India)</p> <p>- CoCo Island (Myanmar) have been accomplished between technical teams since June 2018. At present, the shared ADS-B data from Myanmar side is now using as backup automation system at Kolkata for test purpose. But, Myanmar side is needed to discuss with ATM manufacturer for operational use of the India's Data at Yangon ACC.</p> <p>- Myanmar have planned to install new ADS-B Station in the 2<sup>nd</sup> quarter of 2019 at LASHIO Airport located in north-eastern part of Myanmar closed to the China-Myanmar border near the LINSO transfer point on A599 ATS route. After the installation finished, the ADS-B data sharing process can be proceeded between Myanmar and China.</p>				

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NAURU					
NEPAL	Four ADS-B ground stations have been installed in 2019 at Kathmandu (Phulchowki), Bhairahawa, Nepalgunj and Dhangadi.				Safety assessment will be done soon.
NEW CALEDONIA	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.				
NEW ZEALAND	<p>MLAT and ADS-B data from WAM system centred in and around Queenstown. Provides surveillance coverage for TOWER and Approach Surveillance using 5NM separation for NZQN and ENROUTE coverage of the southern half of the South Island of New Zealand</p> <p>MLAT and ADSB data from the NZAA MLAT system to support surface movements control at NZAA</p>	<p>Current: ADSB mandate FL245 and above in the NZZC FIR from DEC 31, 2018, active</p> <p><b>Proposed:</b> ADSB mandate for all controlled airspace from DEC 31, 2022, promulgated by NZCAA (Delayed from 2021 by 1 year due to COVID)</p> <p><b>Current:</b> Since July 2018, all new aircraft registered in New Zealand, or any currently registered aircraft upgrading transponder(s) are required to install DO260B transponder(s) which meet the NZCAA rule set. The rule</p>	<p>Current: All controlled airspace within the NZZC FIR FL245 and above.</p> <p><b>Proposed:</b> All controlled airspace within the NZZC FIR</p>	<p>5NM surveillance separation in enroute controlled airspace, and 3NM surveillance separation in Terminal approach controlled (Class C) airspace.</p>	<p>Currently situational awareness surveillance targets are displayed for ADS-B targets from which the data supplied does not meet the requirements for surveillance separation.</p>

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	<p>ADSB data at 6 domestic aerodromes to provide ADSB APT surface movements control</p> <p>34 ADSB-B Ground stations for Enroute, Terminal and ADSB APT services</p>	<p>specifies the minimum Technical Standing Orders (TSO) or transponder GNSS receiver models for position input into ADS-B</p>			
<b>PAKISTAN</b>	<p>Tender for procurement of 5 ADS-B stations issued to be installed at Pasni, Lakpass, Rojhan, Dalbandin and Laram-top. Contract expected to be finalized by end of 2016. These stations will be DO260B compliant and operational by end of 2017.</p>				
<b>PAPUA NEW GUINEA</b>	<p>Initially 7 ADS-B sites to be deployed across PNG to provide seamless coverage above FL285.</p> <p>Three (3) sites installed as of December 2017. Two (2) of these are operational. First site to be installed May/June 2017, with remainder to be completed in 2018.</p> <p>Additional 7 sites to be rolled-out in the 2018/19 timeframe. Site location will be dependent on infrastructure, security and</p>	<p>An ADS-B mandate is on CASA PNG roadmap, however legislation yet to be developed.</p> <p>The Australian mandates will largely drive equipage for overflights (e.g. East-Asia to Australia/South Pacific).</p> <p>Expectation is that PNGASL (the ANSP) will lead development of ADS-B mandate framework.</p> <p>Initial steps may include mandate above F245 – but will depend on performance of Phase 1 ADS-B deployment.</p>	None	<p><b>Air Traffic Control</b></p> <p><u>Approach/ Arrivals</u></p> <p>2018 – 5NM 2019 – 3NM (approach)</p> <p><u>Upper Airspace (&gt;FL245)</u></p> <p>2017/18 – Situational awareness.</p> <p>2018/19 – 5NM</p>	

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	<p>an analysis of Phase 1 site performance.</p> <p>PNGASL (ANSP) will commence a transition to new ATM automation system in May 2018.</p> <p>The system will support fusion of ADS-B and RADAR data.</p> <p>5 mile separation to be provided using ADS-B and fused ADS-B/Radar from May 2018.</p> <p>From 2018 onwards, PNGASL will be looking to share ADS-B data with Indonesia and Australia.</p>	<p>Country-wide mandate not envisaged before 2021/22.</p>		<p>Note: Implementation dictated by training requirements and new ATM system transition priorities.</p> <p><b>Flight Service</b></p> <p><u>Directed Traffic (FIS)</u></p> <p>2019 – Situational awareness</p>	
<p><b>PHILIPPINES</b></p>	<p>One ADS-B GS installed at the Manila ATM Center for situational awareness.</p> <p>One ADS-B Ground Station installed at Bataraza, Palawan for data sharing with Singapore.</p> <p>Additional ground stations are planned to be installed in Laoag Airport, Tagaytay, Jomalig Island, Puerto Princesa Airport,</p>				

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	Mt. Majic Mactan, and General Santos “Tambler” Airport.				
<b>REPUBLIC OF KOREA</b>	Installed 10 ADS-B receivers and in operation since May 2020. 3 more receivers will be installed by 2024.	To be confirmed.	To be confirmed.	To be confirmed.	
<b>SINGAPORE</b>	<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 Dec.2013.</p> <p>ADS-B OUT equipment requirement for all aircraft operating on selected ATS routes within the WSSS FIR from 27 January 2022.</p> <p>ADS-B OUT equipment requirement for all aircraft operating within the WSSS FIR from 26 January 2023.</p> <p>AIP updated in May 2018 to reflect the ADS-B equipment certified as meeting:</p> <ul style="list-style-type: none"> <li>a. EASA - (AMC 20-24), or</li> <li>b. EASA CS-ACNS (Subpart D - Surveillance - SUR), or</li> <li>c. FAA - Advisory Circular No: 20-165A (or later versions), or</li> </ul>	<p>At and above FL290, affecting the following ATS routes L642, L644, M753, M771, N891 &amp; N892</p> <p>At and above FL290, affecting the following ATS routes L517, L625, L649, M758, M767, M768, M772 &amp; N884.</p>	<p>40nm implemented on ATS routes L644 and N891.</p> <p>20nm implemented on ATS routes L642, M771, M753 and N892.</p>	Safety case was completed end of November. 2013.

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		d. The equipment configuration standards in Appendix XI of Civil Aviation Order 20.18 of CASA.			
<b>SRI LANKA</b>	Total of 5 ADS-B Ground Receiving Stations and 01 Central Processing Station have been installed in March 2017. ADS-B Data is fused with Multi-sensor Data, including MSSR and ADS-C in the ATM system at Colombo ACC Ratmalana was launched for operational used on 15 Nov. 2017. New ATM system planned for operational at APP Centre in 2018 will also be capable of fusing Multi-sensor Data, including MSSR and ADS-B	Revised Date of Equipage mandate would be 31st Dec 2020.  Ref: AIC A02/16 (Initially AIC A02/14 was issued in November 2014)	All ATS Routes within Colombo TMA	Initially 5 NM within Approach Radar Coverage, 8 Nm within Area Radar Coverage & Procedural Separation minima outside Radar Coverage.	On completion of a safety assessment, use of ADS-B alone for ATC separation purposes.
<b>THAILAND</b>	Five ADS-B ground stations (DO-260B and lower compliant) have been primarily installed for research and development purpose and are being undergone the approval process to be used for air traffic services with a target date by the end of 2021.	The airspace re-structure and aircraft equipage mandate are planned to be studied in 2021 and are expected to be started implementation in 2022.	TBD	TBD	

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	<p>The new ATM automation system was successfully implemented in Q1 2020. It can</p> <p>The ATS surveillance data sharing with the adjacent FIRs was approved in principle in October 2018.</p>				
<b>TONGA</b>	Trial planned for 2017				
<b>UNITED STATES</b>	<p>The US identified required ADS-B Service Volumes in 2007. Using data from over 600 terrestrial radio sites, the US domestic ADS-B system became operational in 2014. As of 1 January 2020, ADS-B aircraft equipage is mandated in most controlled airspace within the US. Over 160,000 US registered aircraft are now equipped. ADS-B is available to U.S. air traffic control facilities for ATC separation; all En Route Centers and major Terminal facilities are using ADS-B for ATC separation.</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"> <li>- 3nm</li> <li>- 2.5nm</li> <li>- independent parallel approach operations down to 3600 ft centreline separation</li> <li>- dependent</li> </ul>	<p>The U.S. has implemented integrated WAM/ADS-B in the following terminal areas: Charlotte LAX</p> <p>Implementation of integrated WAM/ADS-B is being considered for additional U.S. terminal areas.</p>

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				parallel approach operations down to 2500 ft centreline separation (currently 1.0 nm diagonal distance).	
<b>VANUATU</b>					
<b>VIET NAM</b>	Two phases ADS-B implementation plan adopted. Phase 1 implemented in March 2013. Phase 2 commenced in 2015 for whole lower and upper Hanoi FIR and 2018 for Ho Chi Minh FIR	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.

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