International Civil Aviation Organization

Thirty-Second Meeting of the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG/32)

Video Teleconference, 1 – 3 December 2021

Schedule: 10:00 – 13:15 Bangkok Time [UTC+7]

Agenda Item 3: **Performance Framework for Regional Air Navigation Planning and Implementation**

3.4: **CNS**

REPORT OF THE TWENTY FIFTH MEETING OF CNS SUB-GROUP OF APANPIRG

(Presented by the Secretariat)

SUMMARY

This paper presents the Report of the Twenty Fifth Meeting of the Communications, Navigation and Surveillance Sub-group (CNS SG/25) of APANPIRG held via Video Tele- Conference (VTC) from 18 to 22 October 2021. The meeting is requested to review the summary report and adopt the draft Conclusions and Decisions formulated by the CNS Sub-group.

Strategic Objectives:

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

B: ***Air Navigation Capacity and Efficiency*** *— Increase the capacity and improve the efficiency of the global aviation system*

E***: Environmental Protection*** *— Minimize the adverse environment effects of civil aviation activities.*

Action by the Meeting is in section 3.

1. INTRODUCTION

1.1 The Twenty Fifth Meeting of the Communications, Navigation and Surveillance Sub-group (CNS SG/25) of Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG), was held from *18 to 22 October 2021* via Video Tele-Conference (VTC) using Microsoft Teams. The meeting was attended by 215 participants from 23 States/Administrations (Australia, Bhutan, China, Hong Kong China, Macao China, Fiji, India, Indonesia, Japan, Lao PDR, Malaysia, Mongolia, Myanmar, Nepal, New Zealand, Pakistan, Philippines, Republic of Korea, Singapore, Sri Lanka, Thailand, USA, Viet Nam), and 4 International Organizations (CANSO, IATA, IFALPA and IFATSEA), plus 28 participants from industry partners. A summary of the meeting outcomes for consideration by APANPIRG/32 is provided in **Appendix A** to this paper. Full report and papers of the meeting are available on the following webpage:

https://www.icao.int/APAC/Meetings/Pages/2021-CNS-SG-25.aspx

2. DISCUSSION

2.1 The meeting considered 33 working papers and 26 information papers, 3 flimsies and 5 presentations covering its 14 Agenda Items.

2.2 In accordance with APANPIRG Decision 26/65, Sub Groups of APANPIRG were empowered to adopt Conclusions and Decisions on technical and operational matters. Accordingly, the CNS SG/25 meeting adopted following 8 Conclusions and 5 Decisions:

Reference		Subject
Conclusion CNS SG/25/01 (*ACSICG/08/01(CRV/08/01)*)	-	CRV Implementation Plan amendment *(Version 2.1)*
Conclusion CNS SG/25/03 (*SWIM TF/05/01)*	-	Asia/Pacific SWIM Implementation Plan and Status Survey
Decision CNS SG/25/04 (*SWIM TF/05/02)*	-	Revised SWIM TF Terms of Reference
Conclusion CNS *S*G/25/05	-	The Catalogue of Asia and Pacific Flight Inspection and Flight Validation Service Providers
Conclusion CNS/SG/25/06	-	Update of Flight Inspection Guidance Material (FIGM) for APAC Region
Conclusion CNS SG/25/10 *(SURICG/6/4 (DAPs WG/4/6))*	-	Mode S DAPs IGD 3.0
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)
Decision CNS SG/25/12 *(SURICG/6/6)*	-	Revised ToR of Surveillance Study Group (SURSG)
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
Decision CNS SG/25/14 *(SURICG/6/8)*	-	Revised ToR of Surveillance Implementation Coordination Group (SURICG)
Conclusion CNS SG/25/15 *(SURICG/6/9)*	-	Revised ADS-B Implementation and Operations Guidance Document (AIGD)
Decision CNS SG/25/16 *(ATMAS TF/2/1 (APA TF/7/1))*	-	Dissolution of APA TF
Decision CNS SG/25/17 *(ATMAS TF/2/2)*	-	Revised ATMAS TF Terms of Reference

2.3 The contents of above Conclusions and Decisions adopted by the CNS SG/25 are provided in the **Appendix B** to this paper.

2.4 Based on the outcome of discussions on various agenda items, the meeting developed following 4 Draft Conclusions for consideration by APANPIRG/32 Meeting:

Reference		Subject
Draft Conclusion CNS SG/25/02 *(ACSICG/08/02 (CRV/08/02))*	-	Implementation of CRV for small Pacific Island and small ANSP in the region using CRV Solution, PCCWG SLA Package D.
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
Draft Conclusion CNS SG/25/08 *(SURICG/6/2 (DAPs WG/4/4))*	-	Transition from II code to II and SI mixed code
Draft Conclusion CNS SG/25/09 *(SURICG/6/3 (DAPs WG/4/5))*	-	The APAC Regional Roadmap for Mode S Implementation

2.5 Details of these Draft Conclusions are included in **Appendix C** to this paper.

2.6 Six Action Items arised from the CNS SG/25 meeting, which are summarized in **Appendix D**.

3. ACTION BY THE MEETING

3.1 The Meeting is invited to note information provided in this paper and to:

a) note the summary report on the outcome of CNS SG/25 meeting provided in **Appendix A**;

b) note the Conclusions and Decisions adopted by CNS Sub-group provided in **Appendix B**;

c) consider adoption of Draft Conclusions endorsed and formulated by the CNS Sub-group provided in **Appendix C**;

d) note the Action Items summarized in **Appendix D**; and

e) discuss any relevant matters as appropriate.

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Summary Report of CNS SG/25 meeting

Agenda Item 1: Adoption of agenda and Election of chair of the Sub-group

1.1 The tentative agenda proposed in **WP/01** was adopted by the meeting.

1.2 Proposed by China and seconded by Thailand and Singapore, Mr. Richard Wu, Deputy Director-General of Civil Aviation Department, Hong Kong China was unanimously elected as the Chair of the CNS Sub-group for the second term.

Agenda Item 2: Review outcomes of APANPIRG/RASG Chairpersons review, APANPIRG/31 meeting, ATM Sub-group and other major meetings relevant to CNS Sub-group

Outcomes of APANPIRG/31, APANPIRG/31 Midyear Review and 8th PIRG-RASG Coordination Meeting on CNS (WP/02)

2.1 APANPIRG/31 was held from 14 to 16 December 2020 via video teleconference (VTC). CNS SG/25 reviewed that APANPIRG/31 noted that *CNS SG/24* meeting had adopted 8 Conclusions and 5 Decisions on technical and operational matters, and developed 4 Draft Conclusions which were adopted in APANPIRG/31 with only editorial amendment.

2.2 APANPIRG/31 Midyear Review and the 8th Planning and Implementation Regional Group-Regional Aviation Safety Group (PIRG-RASG) Regional Coordination Meeting were held on 22 July 2021 via VTC. The APANPIRG/31 Midyear Review meeting discussed APAC key challenges in Air Navigation, key outcomes and achievements, updates on APANPIRG/31 Action Plan and outstanding APANPIRG Conclusions/Decisions Action Plan.

2.3 The meeting noted that the outstanding Conclusion C 28/19 **Amendment of the Management Service Agreement for CRV project (RAS14801)** is still open, which will be addressed by CRV OG/9 for a consolidated solution in January 2022.

Updates on CNS SG/24 and APANPIRG/31 Conclusions/Decisions, and Action Items (WP/22)

2.4 CNS SG/25 discussed the latest status and actions taken for various Conclusion/Decision adopted and recommended in the CNS SG/24, Conclusions/Decisions adopted by the APANPIRG/31 related to CNS, along with latest status and action taken on various ACTION ITEMS formulated by the CNS SG/24 meeting for information and necessary follow-ups actions by CNS SG/25. The meeting noted the latest status and discussed the way forward for the conclusion/decisions as well as action items in process.

Air Traffic Management and Airspace Safety Monitoring Outcomes (WP/03)

2.5 CNS SG/25 discussed the 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.

2.6 Regarding the query on the most appropriate Interface Control Document (ICD) for ATS Inter-Facility Data Communication (AIDC) in APAC, the ICAO Secretariat informed that the ***AIDC Implementation and Operations Guidance Document Edition 1.0*** **(July 2017)** document would be the most appropriate to use.

2.7 The **Draft Conclusion SAIOACG/10 and SEACG/27-1:** *Implementation of Efficient ATS Horizontal Separations and Transfer of Control Aircraft Spacing* was discussed in CNS SG/25 and the meeting deliberated and supported the proposed draft conclusion.

2.8 CNS SG/25 was reminded on the issue of missing Departure (DEP) messages. Data from an analysis of missing DEP messages conducted in 2019 indicated that, while there had been some improvement in the Asia/Pacific Region, there were still a number of States that needed to take further action to address the issue.

2.9 The current status was raised on reserving Secondary Surveillance Radar (SSR) Mode A Code 1000 for use as the Conspicuity code for Mode S-equipped aircraft operating in airspace under Mode S surveillance.

2.10 It was reported that at least one State had delayed the necessary update to the AMHS, which was necessary to enable the processing of the new SNOWTAM format. Thus, the processing/handling of SNOWTAM, which will become mandatory from 04 November 2021, may be dependent on the configuration of AFS systems.

2.11 CNS SG/25 was invited to note the importance of PBN and PBCS in collision risk outcomes and the achievement of TLS. The Monitoring Agency for the Asia Region (MAAR) had started a trial process to verify ICAO aircraft address and quality-check other parameters as a by-product of RVSM monitoring. A paper on the MAAR activity in this regard should be submitted to SURICG, which reports to CNS SG.

2.12 The Unmanned Aircraft Systems (UAS) Advisory Group (UAS-AG) of the Remotely-Piloted Aircraft Systems (RPAS) Panel has developed the *ICAO UAS Toolkit*, available at https://www.icao.int/safety/UA/UASToolkit/Pages/default.aspx, which is a repository of information on UAS management that falls outside the scope of Standards and Recommended Practices (SARPs) and Procedures for Air Navigation Services (PANS) developed for RPAS operations.

Member States Support for CNS SG (WP/30)

2.13 The ICAO Secretariat summarised the issues being faced due to delay in submission of registration and Working Papers/Information Papers by Member States for the CNS meetings. The meeting agreed to request Member States to support the ICAO Secretariat by respecting various due dates specified in the meeting Invitation Package/State Letter to conduct the CNS SG and CNS contributory bodies meetings in a more effective manner.

Agenda Item 3: Aeronautical Fixed Service (AFS)

3.1 Under this agenda, the meeting reviewed meeting reports of a number of contributory bodies on the AFS matters.

Review the Report of the Eighth Meeting of the Aeronautical Communication Services Implementation Coordination Group (ACSICG/8) (WP/04)

3.2 The ICAO Secretariat presented the report of the ACSICG/8 held from 21 to 23 June 2021, which included the relevant outcomes of CRV OG/8 meeting.

CRV Implementation Plan Amendment

3.3 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. The proposed *CRV Implementation Plan amendment (Version 2.1*) adopted by the meeting is provided in *Appendix A to the CNS SG/25 meeting report***.**

CRV Solution for Pacific Islands and small ANSPs

3.4 From the recent regional CRV implementation update submitted by PCCWG, it is noted that there has been slow implementation progress with the Pacific Island States and small ANSP in the region to date. With the target date for the implementation of CRV by 2022, CNS SG/25 meetings endorsed the following Draft Conclusion for consideration by APANPIRG/32:

<table>
<tr><td colspan="3">Draft Conclusion APANPIRG/32/XX (CNS SG/25/02) (ACSICG/08/02 (CRV/08/02)) - Implementation of CRV for small Pacific Island and small ANSP in the region using CRV Solution, PCCWG SLA Package D.</td></tr>
<tr><td colspan="2">What: That, the CRV OG should consider the following to assist small Pacific Islands & small ANSP in APAC in the implementation of CRV:
a) Small Pacific Island and small ANSP in the region to consider using CRV SLA package D as the CRV solutions to implement CRV for the exchange of voice & AMHS services
b) With target date to implement CRV by the end of 2021 by APANPIRG Conclusion C 31/12, it is recommended that the CRV OG to work closely with the small Pacific Islands, small ANSP in the region and PCCWG on a cost effective CRV solution to implement CRV.</td><td>Expected impact:
☐ Political / Global
☐ Inter-regional
☒ Economic
☐ Environmental
☒ Ops/Technical</td></tr>
<tr><td colspan="2">Why: To facilitate the implementation of CRV for the small Pacific Island & small ANSP in the region</td><td>Follow-up: ☒Required from States</td></tr>
<tr><td>When: 02-Dec-2021</td><td colspan="2">Status: Draft to be adopted by PIRG</td></tr>
<tr><td colspan="3">Who: ☒Sub groups ☒APAC States ☐ICAO APAC RO ☐ICAO HQ ☒Other: ACSICG</td></tr>
</table>

Implementation updates in ACSICG/8 and CRV OG/8

3.5 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. Member States are encouraged to refer to the Page for necessary information related to joining CRV.

3.6 Expert groups of CRV OG on Service Strategy, Design, Transition and Operations have been established with objectives, various tasks and activities set and working methodology discussed to incorporate the outcomes in CRV Operational manual. The combined kick-off meeting of all four groups was held on 13 September 2021.

3.7 Implementation updates were reviewed in ACSICG/8 and CRV OG/8. The Philippines and the USA presented the completed routing changes associated with the AMHS service between them. India presented a summary of status of ATN/AMHS/CRV implementation in India and urges BBIS and BIS States to resolve the bilateral issues on a priority basis for effective use of the AMHS/CRV network and the resources invested in by the states. Republic of Korea (ROK) presented the current CRV implementation status and the plan to convert direct circuits for voice between ROK and Japan to VOIP lines over CRV. China shared CRV implementation status between China and other States that have joined the CRV. FAA informed that it has expanded its service to more ANSPs including Australia, Fiji and New Zealand about which information shared. Philippines provided an update of AMHS, VOICE and AIDC implementation of the Philippines over CRV service. PNG informed about the implementation of Space-based ADS-B system in PNG and in particular that Space-based ADS-B is now operational and one path is already using CRV for operational surveillance data.

3.8 PCCWG shared Latest CRV Updates and CRV Network Yearly Service Review. PCCWG informed that there are *38 circuits* in *26 cities* with different CRV packages. , States/Administrations including Australia, Bhutan, China, Fiji, Japan, Malaysia, Nepal, New Zealand, Philippines, PNG, Hong Kong China, ROK, Singapore, and USA have joined CRV. It was further informed that 8 cities are planning to join CRV in 2021 which are *Mumbai (India), Jakarta (Indonesia),*

Makassar (Indonesia), Bangkok (Thailand), Moscow (Russia), Khabarovsk (Russia), New Caledonia, and French Polynesia.

3.9 Fiji and PCCWG presented in CRV OG/8 of the PCCW IWXXM Translation and Exchange Services to ACSICG/8, which can serve as an alternative solution for Member States to fulfil the exchange of IWXXM messages as promulgated in Amendment 78 to ICAO Annex 3.

3.10 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-1** and **A-2** to this summary report respectively. Graphical illustrations on ATN/AMHS and CRV implementation status are provided in Figures 1 and 2 below.

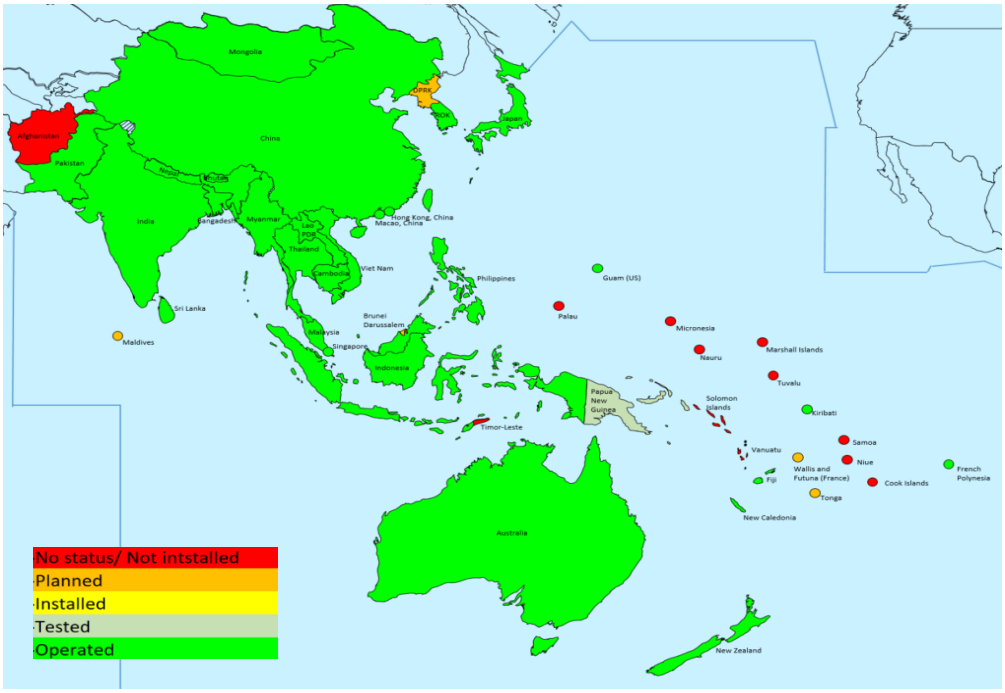

Figure 1 – ATN/AMHS Implementation Status in APAC

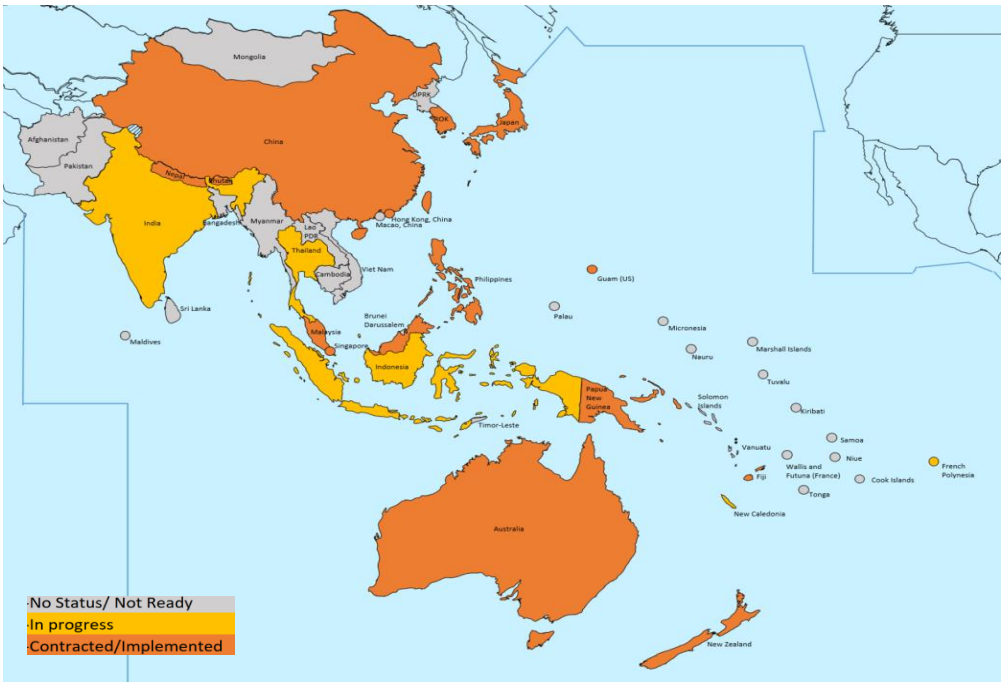

Figure 2 – CRV Implementation Status in APAC

3.11 AMHS Readiness Table for Supporting IWXXM Traffic updated in the ACSICG/8 meeting was noted by CNS SG/25 as in **Appendix A-3** to this summary report, and the graphical illustration is provided in **Figure 3** as follows. It was 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.

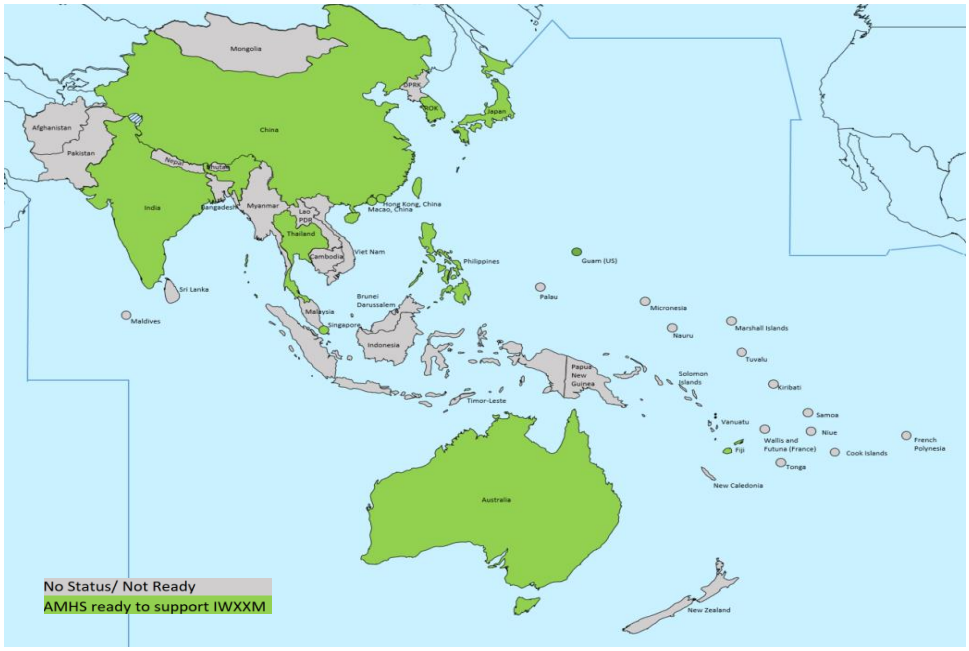

Figure 3 – APAC States AMHS Readiness to support IWXXM

CRV Pioneer State Contribution to ICAO Managed Service Agreement (MSA) updates

3.12 On 15 April 2021, the ICAO Secretariat held an online discussion among TCB, ICAO APAC and ICAO SAM on how to address the unspent funds from the completed CRV project (RAS14801) and the possibility for APAC to refer to the REDDIG II in SAM region. ACSICG/8 meeting agreed the importance to first prepare the safety and security assessment requirement to define scope of the work based on available funds and priorities of work to be done. The issue is planned to be discussed further in CRV OG/9 to be held from *25 - 27 January 2022*.

MPLS/IP Based Inter-Regional Connection

3.13 ACSICG/8 noted that there are communications requirements between APAC ANSPs and SAM ANSPs, CRV and REDDIG II, in order to set up the AMHS P1 connection between AMHS COM Centers of Christchurch (New Zealand) and Santiago (Chile). Technically possible for two nodes of different networks (with different providers) to set up an IP connection was presented. Further discussion on the administrative and technical aspects to establish the required aeronautical communications between APAC and SAM ANSPs through MPLS NNI are in progress.

AMHS readiness status for supporting IWXXM Traffic of the States/Administrations (WP/05)

3.14 The ICAO Secretariat supplemented information for AMHS readiness status for supporting IWXXM Traffic. Two papers were presented in ACSICG/8 on the requirements and latest developments on sharing information on IWXXM-exchange capabilities for APAC States per discussion outcome from CNS SG/24.

3.15 In ACSICG/8, 12 States/Administrations provided their status on AMHS readiness and experience for supporting IWXXM Traffic, while 20 States/Administrations in APAC Region completed the AMHS implementation as per information from the ATS Messaging Management Centre (AMC) informed in ACSICG/7. Although there has been a significant increase in the AMHS readiness

for supporting IWXXM Traffic, the reporting gap as well as the slow progress on the reporting were still identified, States/Administrations were urged to inform ICAO APAC Regional Office on their readiness and implementation progress/plan of AMHS with FTBP as soon as possible.

Review of Outcomes of APA TF/7 Meeting (WP/06)

3.16 The paper presented the report of the Seventh Meeting of the Asia/Pacific ATS Inter-Facility Data-Link Communication Implementation Task Force (APA TF/7), held from 7 to 9 June 2021.

AIDC Implementation

3.17 Singapore provided to APA TF/7 an updated Graphical Display on the AIDC implementation and planning status based on the inputs provided to the meeting via the updates by States to AIDC implementation, which is provided in **Figure 4** below.

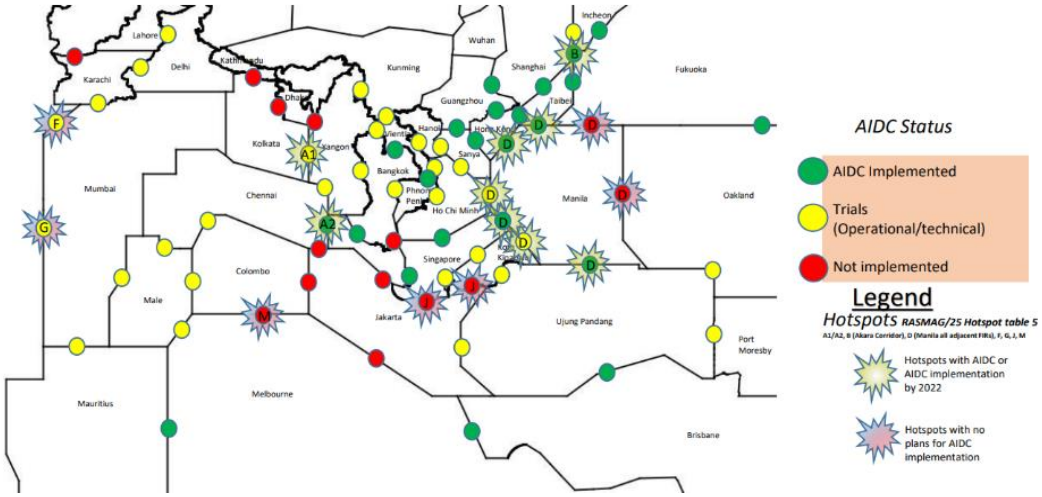

Figure 4 – APAC AIDC Implementation Status (as of June 2021)

3.18 Singapore shared some of the implementation and operational issues which could be taken into consideration by other States in their implementation of AIDC. The first use of the APAC CRV for AIDC was introduced and it was informed that this is a step forward to address any existing latency issues associated with AFTN routing setups noted in some other connections.

3.19 Philippines presented updates on the AIDC trial implementation in Manila FIR. Philippines informed that it has done successful AIDC implementation with Singapore, Hong Kong China, Taipei and Ujung Pandang ACCs. Philippines shared the table with the results of AIDC tests and trial operations with six (6) adjacent centres. China, India, Indonesia, Lao PDR, Malaysia, 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 From AIDC Implementation in India by WP/07.

Implementation Issues

3.20 The APA TF/7 Meeting reviewed and discussed the consolidated implementation issues collected and presented by Indonesia with supports from India and Singapore. Total 105 issues were consolidated. The meeting considered that the issue table would continue to serve as a reference for other States. A summary of the identified issues is shown in the table below.

Fault Categories	APA TF/7 (2021)

	Issues Reported	Closed	Open
a. Communication Link	9	3	6
b. ATM System	61	29	32
c. AIDC Message	17	15	2
d. Airspace Design/Procedures	13	4	9
e. Other	5	2	3
Total	**105**	**53**	**52**

Future of APA Task Force

3.21 The meeting appreciated that significant achievements have been made in enhancing safety since the establishment of this task force in 2015, 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 experience gained by States/Administration in the challenging process of AIDC implementation. The CNS SG/25 was informed that upon dissolution of APA TF, ATMAS TF would undertake AIDC implementation issues while ACSICG would handle communications-related issues. ToR of ATMAS TF will be reviewed as appropriate. The APA TF/7 meeting updated the List of focal points for AIDC Implementation. The focal points should refer to ATMAS TF for sharing any issues or information related to AIDC Implementation.

3.22 Draft Decision (APA TF/7/1) - *Dissolution of APA TF* was proposed by the meeting for ATMAS TF/2 consideration. The ATMAS TF will design future meeting structure to accommodate the AIDC related functions and maintain the effectiveness in promoting AIDC implementation.

Review Report of SWIM TF/5 (WP/07)

3.23 The Co-Chair of SWIM TF presented in CNS SG/25 the report of the Fifth Meeting of System Wide Information Management Task Force (SWIM TF/5) held from 9 to 11 August 2021. SWIM TF/5 noted the relevant information and updates with the highlight on the reviewed outcomes of SWIM TF/4 and relevant discussions of other meetings of CNS SG/24 and APANPIRG/31 on AFS matters. The meeting also reviewed the outcomes of the First Meeting of the Surveillance Study Group (SURSG/1) and the ICAO APAC SWIM Workshop held from *6 to 7 July 2021*.

3.24 *Ms. Kristin Cropf*, SWIM Program Manager, Federal Aviation Administration (FAA) nominated by Singapore and seconded by Australia and Japan was elected as Co-Chair of SWIM TF.

Expansion of SWIM Implementation Philosophy

3.25 In SWIM TF/5, Singapore presented the expansion of the SWIM Implementation Philosophy which was discussed at the SWIM TF/3 through WP/19. The meeting agreed for the expansion of the SWIM Implementation Philosophy to include governance. The meeting noted that implementation of governance is an iterative process and it will be modified based on the lesson learnt throughout the implementation of SWIM.

Asia/Pacific SWIM Implementation Plan and Status Survey

3.26 In SWIM TF/5, Singapore and Thailand presented a proposal for a survey to be conducted by Task 1 group of SWIM TF. Considering the high diversity among Member States in the Asia/Pacific region, it is challenging to devise a regional plan to achieve the region-wide harmonisation while not neglecting the constraints of each Member States. To create a baseline picture of SWIM implementation plan and status within the region, it was proposed to conduct a survey to obtain the current status and views towards SWIM implementation of the Asia/Pacific Member States. CNS SG/25 reviewed and thus endorsed the **Conclusion CNS SG/25/03** *(SWIM TF/5/01) – Asia/Pacific SWIM Implementation Plan and Status Survey.*

Security services

3.27 In SWIM TF/5, Japan, Thailand, and USA presented the technical implementation of security service on SWIM through a scenario-based validation and analysed some concerns and challenges to achieve end-to-end security through a SWIM-based trust framework. It was also informed that, in order to validate the PKI based trust framework concept and the implementation of SWIM TI security capabilities, the test platform has been developed by the team of Multi-Regional Trajectory Based Operation (MR TBO) demonstration led by FAA. The high-level system architecture of MR TBO, the security service components as well as the approaches to implement SWIM TI security functional capabilities and non-functional qualities were discussed. The meeting was requested to provide the paper to Task 2, Task 3, Task 5 and Task 6 groups of SWIM TF along with CRV OG and ACSICG for deliberations.

FIXM version 4.2 Extension development

3.28 Thailand presented to SWIM TF/5 the update on FIXM version 4.2 Extension development to support the information exchange required for cross-border ATFM operations, ATFM/A-CDM integration, and FF-ICE/TBO in the Asia/Pacific Region along with a preliminary list of data attributes to be included in the FIXM version 4.2 Extension being developed. The meeting encouraged that other APANPIRG Working Groups and Task Forces, which are highly likely to have the operational requirements to use FIXM to support their related operations, should submit their consideration to SWIM TF in order to have Extension developed in due course if deemed necessary.

SWIM Discovery Service (SDS)

3.29 ROK and USA informed SWIM TF/5 about USA FAA and ROK Korea Airport Corporation (KAC) efforts to develop SWIM Discovery Service (SDS) to support transparent and replicable discovery of SWIM services in the APAC region. The paper described a brief summary of the SDS concept, the SDS demonstration environment and scenario, and shared the lessons learned from the SDS effort. The meeting congratulated ROK and USA for the successful demonstration of discovery services. Thailand also expressed their interest to join this work.

SWIM Service Level Agreement (SLA)

3.30 USA described the enabling technologies and practices for instituting a SWIM Service Level Agreement (SLA) in the context of APAC SWIM in SWIM TF/5. The SWIM TF/5 meeting discussed that use case-3 SLA management with participation of SLA manager may be appropriate reference for Asia/Pacific region. The next Task Leads coordination meeting may discuss in detail about the way forward for this proposal. It was also proposed that Task 5 group may provide a common SLA template, proposal on SLA management approach, and their validation methodologies.

SWIM Interoperability Assessment Matrix (SIAM)

3.31 USA introduced the SWIM Interoperability Assessment Matrix *(*SIAM) and how the SIAM can be used for interoperability assessments, articulation of requirements and supporting the planning and validation of SWIM components in international geo-organisational settings. The paper concluded that SIAM provides a structural and systematic approach for evaluating interoperability in the context of global SWIM initiatives.

SWIM Registries and their metadata

3.32 Australia and Hong Kong China presented to SWIM TF/5 a review of currently existing SWIM Registries and their metadata fields, and compared them to the proposed PANS-IM Service Overview fields. Recommendations were made with respect to additional APAC fields for

initial version of APAC Service Overview Specification. The proposed additional Service Overview fields for the use in APAC and their advantages were presented. The meeting reviewed the proposed new APAC Service Overview fields and supported the draft version of APAC Service Overview Specification. Australia informed that, in order to capture the feedback and suggestions from the APAC SWIM community on the extensions for SWIM Service Overviews, Australia has set up an "issues" list on GitHub, which can be accessed by the link: https://github.com/icao-apac/service-overview/issues and Australia will also publish the APAC SWIM Service Overview Extensions document at: https://icao-apac.github.io/service-overview/

Regional activities

3.33 IATA on behalf of SWIM TF provided a brief on key SWIM activities being undertaken in Asia & Pacific Region and primarily discussed at other ICAO APAC WG and TF meetings plus other industry meetings and webinars by WP/07 in SWIM TF/5. Mr. John Moore, IATA, resigned from the position of Task Lead of Task 10. However, he would continue to attend SWIM TF meetings, when available, and he will remain the point of contact between the SWIM TF and the airlines. He invited Member States for the nomination for Task Lead of Task 10 and for the contribution to SWIM TF. The meeting appreciated the contribution and consistent hard work of Mr. John Moore for SWIM TF in last five years. The ICAO Secretariat and Co-Chairs of SWIM Task Force extended their gratefulness to Mr. John Moore for very concise and relevant information provided at various meetings.

ICAO APAC-SWIM Secure Portal

3.34 The ICAO Secretariat updated SWIM TF/5 meeting that IMP is in the process of developing a draft SWIM Manual Vol. II Implementation Guidance (Doc 10039) to provide top-level guidance. The participants and concerned parties were encouraged to provide and share SWIM related videos, training materials and other useful information to SWIM TF and Secretariat for future compilation on **ICAO APAC-SWIM** Secure Portal. Dr. Amornrat Jirattigalachote added that APAC SWIM TF is not going to develop a new standard for Asia/Pacific region but SWIM TF need to streamline all outputs from various tasks and need to adopt technical specifications, regional exchange models, information services etc. from a regional perspective.

ToR and Work Plan

3.35 CNS SG/25 reviewed the SWIM TF Work Plan and the Action List. By Flimsy/02 of CNS SG/25, Australia proposed further amendments in draft ToR of SWIM TF adopted by the SWIM TF/5 meeting under consideration by CNS SG/25. The proposed amendments included deletion of "over CRV" word along with some other modifications. USA also shared its concern for using SWIM to transport time-critical information as detailed in WP/32 in CNS SG/25. The SWIM TF Co-Chair advised the meeting that the draft ToR had been thoroughly discussed and agreed during the SWIM TF meeting. Taking into account views from CNS SG, as such she proposed to modify the term "over CRV" to "principally over CRV". The proposal was supported by China, Hong Kong China, Japan, Singapore, Thailand, USA, and IATA. 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. Therefore, with the aforementioned, the proposed ToR of SWIM TF was adopted by the meeting after the modification of the term "over CRV" to "principally over CRV" in section *c* of the proposed ToR. The meeting also advised SWIM TF to consider other modifications proposed by Australia in Flimsy/02 in coming task lead meetings and SWIM TF/6 and to present revised ToR, if any as the outcomes of discussion, in CNS SG/26. **ACTION ITEM 25-1.**

3.36 Upon discussion, CNS SG/25 adopted **Decision CNS SG/25/04** *(SWIMTF/05/02) – Revised SWIM TF Terms of* Reference, which the ToR adopted is provided in *Appendix F to the CNS SG/25 meeting report***.** The meeting suggested and Australia agreed to nominate SWIM experts to participate in SWIM task leads and task force meetings.

Updates on SWIM

3.37 Australia informed SWIM TF/5 that a key aspect for regional (and global) interoperability for SWIM is to define the Technical Infrastructure Profile for the participating stakeholders. Australia informed that currently, there are a number of Profiles in use (or defined) for SWIM (globally) and the most famous SWIM Profile is the EUROCONTROL Yellow Profile. Task 2 lead, responsible for APAC SWIM technical infrastructure development, responded to the five questions raised in the paper regarding the need for APAC Technical Infrastructure Profile. At initial stage, SWIM TF needs to support the APAC Member States to evaluate and build their SWIM capabilities and once some experiences are gained, SWIM Profile for APAC region may be developed. The meeting noted that SWIM TF may get some references related to SWIM Profile in SWIM Manual Vol II being developed by IMP.

3.38 Hong Kong China summarised the updates on the development of IWXXM as discussed in ICAO METP/5 and associated works being carried out by the ICAO METP working groups and WMO Task Team on Aviation Data (TT-AvData) to SWIM TF/5.

3.39 Japan, Singapore, Thailand, and USA presented an overview of MR TBO Demo, a collaborative project undertaken 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 in SWIM TF/5 meeting.

3.40 Thailand presented SWIM TF/5 about an overview of Thailand's SWIM implementation roadmap and lessons learnt during the planning process by WP/16. The meeting also considered utilising Thailand's SWIM implementation roadmap and SWIM knowledge sharing outline as inputs for the tasks to be conducted by Task 1 and Task 11, respectively. It was added that the survey proposed by Singapore and Thailand may use Thailand's SWIM implementation roadmap as a reference for preparation.

3.41 Hong Kong China proposed to SWIM TF/5 a proof-of-concept (POC) for surveillance data sharing on SWIM to be conducted in Hong Kong China for States' reference. Meeting 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. A high-level system block diagram of the POC was shared. Meeting was requested to provide support to the proof-of-concept of surveillance data sharing on SWIM and ongoing work of the SURCG.

3.42 India presented in SWIM TF/5 meeting about the plan and progress of the Proof of Concept (POC) undertaken by India to prepare a roadmap for the ground-to-ground SWIM implementation.

3.43 China presented in SWIM TF/5 meeting the validation and demonstration of FIXM ATMB ATFM Extension Model whose purpose was to validate the feasibility and availability of FIXM extension model in China. China also presented the research progress and plans of Air-Ground SWIM in China, proposed an air-ground information exchange model, and a new SWIM architecture. China also presented to SWIM TF/5 meeting about a hybrid networking solution compatible with legacy systems under IP backbone network and realised compatible transition between legacy systems and SWIM-enabled systems through emulation technology at the transport layer and data protocol conversion technology at the application layer

3.44 ROK shared SWIM TF/5 about its experience on an experimental trial of surveillance data exchange in the SWIM environment and described motivation/requirements, system configuration/architecture, services, SWIM-enabled application, and lesson learned. Based on the experiences gained and the lessons learned by ROK, the meeting agreed to share the IP/05 with SURSG for further deliberations. ROK also presented the SWIM TF/5 meeting the status of SWIM as an ATM backbone network in the ROK and described the national roadmap to implement the local SWIM backbone network.

3.45 In SWIM TF/5 meeting, Australia shared a whitepaper discussing the role that Semantic Technologies will play in the future for the Aviation Industry and outlines a roadmap for SWIM services. The meeting encouraged Member States to refer to the document titled Semantics in the Aviation Industry provided in Appendix to IP/07. Additionally, the meeting noted that https://semantics.aero/ currently hosts several semantic artefacts developed for the aviation domain.

Proof of Concept for Exchanging Aeronautical, Flight and Weather Data through SWIM Platform (WP/29)

3.46 This paper presented to CNS SG/25 on the plan and progress of the Proof of Concept (POC) undertaken by India to prepare a roadmap for the ground-to-ground SWIM implementation. The meeting encouraged India to share their SWIM implementation progress in CNS SG/26 and Member States to contact India for their request for testing and validation of final outcomes of SWIM.

AMHS Connections between APAC and EUR/NAT (IP/02)

3.47 The ICAO EUR/NAT Office initiated a coordination with ICAO APAC Office on interregional AMHS connection issues to support future AIRM data, such as IWXXM. Refer to the APAC Routine Directory for AFTN circuits, for the links between Europe and Asia, there are:

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

3.48 CNS SG/25 was informed that Singapore will continue to provide this bilateral link to maintain the interconnection 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 connections is expected as soon as possible, once Russia joins the CRV network.

Outcomes of ICAO Asia Pacific Implementation of CRV Webinar (IP/03)

3.49 The ICAO Asia Pacific Implementation of CRV Webinar was held on *20 July 2021* via VTC with 121 participants from 18 States/Administrations, 2 airlines industries and a telecommunication provider. Total Four (4) presentations were delivered by CRV experts from New Zealand, Fiji, USA, and Hong Kong China. During the Webinar, Questions and Answers (Q & A) sessions were held at end of each presentation through the Pigeonhole tool. Throughout the Webinar, a total of 40 questions were asked and *more than 15 feedbacks* for the Webinar were provided by Participants with 100% positive responses**.**

3.50 Based on Q&A sessions and submitted survey responses from Member States in the webinar, the need for potential discussion with PCCWG for extension of CRV Implementation deadline beyond the end of 2022 due to COVID-19 crisis as it is continued in 2021, the need for flexibilities in the package options selection by Member States, and the need for a platform for sharing lessons learnt and best practices based on experiences by Member States, which are using CRV, were felt. The ICAO Secretariat is taking necessary action about these potential discussion in CRV OG/9.

Outcomes of SWIM Workshop (IP/04)

3.51 The ICAO Secretariat presented the outcomes of the two days SWIM Workshop organised by ICAO APAC Office with support of SWIM TF key contributors and other volunteer members from *6 to 7 July 2021*. The SWIM Workshop was attended by Two hundred and thirty one (231) participants from Twenty one (21) States/Administrations, one (1) International Organization, a group of airlines industries and an observer namely Frequentis. Dr. Amornrat Jirattigalachote, PhD,

Policy and Strategy Management Bureau Aeronautical Radio of Thailand Ltd moderated the SWIM Workshop. Total Thirteen (13) presentations including one demonstration were delivered by Experts from different parts of the World in SWIM Workshop. Throughout the SWIM Workshop, 57 questions were asked and more than 60 feedbacks for the SWIM Workshop were provided by Participants with *100% positive responses*. The summary of all presentations was provided in the paper. Chair of CNS SG/25 congratulated SWIM TF and other core contributors for organising SWIM workshop with high number of participations and suggested that SWIM TF may plan to conduct similar workshops in future.

CRV Post Implementation Issues in Bhutan (IP/10)

3.52 The paper summarised the issues faced by Bhutan related to CRV post implementation due to the non-readiness of peer States and the action taken by CRV OG and ACSICG for its resolution. During the CRV OG/8 meeting, Bhutan put forward some problems related to CRV post-implementation, as the follow-up action, an ad-hoc group with experts from six countries, including *Australia, Bhutan, India, New Zealand, Singapore, and Thailand* was established to discuss a way out for Bhutan to use its CRV service to some extent temporarily. After first meeting, the ad-hoc group agreed that Bhutan connects to AMHS through CRV tunnel directly to New Zealand, and New Zealand acts as a bridge between CRV and existing AMHS circuits for Bhutan. Bhutan also sent a State Letter to ICAO APAC Office to support on the issue. The second meeting of the Ad-hoc group discussed the AFTN Routing Directory changes and agreed that Bhutan and New Zealand will bilaterally coordinate to implement CRV connectivity and the next meeting will be based on the request from Bhutan and New Zealand.

SWIM Implementation in Japan (IP/18)

3.53 Japan informed that as the implementation of SWIM in Japan is a key enabler of the Collaborative Actions for Renovation of Air Traffic Systems (CARATS) which had been released in 2010, the Japan Civil Aviation Bureau (JCAB) has been consistently carrying out studies, research and development of SWIM. The meeting was informed that the JCAB will start local SWIM operations in 2025, and intended to contribute to the expansion to Regional SWIM and Global SWIM with a strong sense of international collaboration. Japan also requested workshops and seminars at all levels of the aviation industry, for the application of PANS-IM to make a better understanding of SWIM. The meeting appreciated Japan for their various R&D work on SWIM and encouraged Japan to share updates in CNS SG/26 meeting.

Future plans for implementation of New ICAO SARPS compliant AMHS in India (IP/23)

3.54 India presented their plan to implement an ICAO SARPS-compliant PAN-INDIA AMHS thereby completely replacing the existing AMHS in Mumbai and the AFTN in elsewhere in India. The meeting noted the development from India and would appreciate their further sharing in CNS SG/26 meeting.

Agenda Item 4: Aeronautical Mobile Communications Service and Aeronautical electromagnetic spectrum utilization

4.1 Under this agenda item, the meeting discussed several papers and the relevant information from the SRWG/5 Report related to the aeronautical mobile communication and spectrum utilization.

Review Report of SRWG/5 (WP/08)

4.2 The paper presented the report of the Fifth Meeting of the Spectrum Review Working Group (SRWG/5) of APANPIRG, held via VTC from 15 to 17 March 2021.

Space-based VHF Communications

4.3 The ICAO Secretariat informed SRWG/5 that with reference to the ACTION ITEM 24-6 of CNS SG/24 on *Space-based VHF Communications* in 117.975-137 MHz frequency band, the Secretariat coordinated with SRWG chair, ACSICG chair and Singapore to see how to track and monitor the initiative, to take the concerns from States on a regional level. Singapore presented the latest updates to SRWG/5 on space-based VHF issue through Flimsy 02**.**

4.4 *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.

Frequency Coordination Process and Tool

4.5 The ICAO Secretariat presented in SRWG/5 an overview of the frequency coordination process in the APAC Region. Some administrative measures have been implemented to improve the efficiency of the current process with 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.* ICAO holds the view that frequency assignments that have been coordinated with ICAO have priority over those that have not been coordinated. For reported interference caused by frequency implemented by States/Administrations without coordination and registration with Regional Office, it may be considered as a discrepancy to the regional planning requirements, and be further identified as a deficiency upon harmful impact report on international operations.

4.6 The ICAO Secretariat informed SRWG/5 that the current process for frequency coordination is based on a minimum bureaucracy when performing the frequency coordination and registration. A drafted POC list based on participant list of SRWG/4 was provided and it was suggested to nominate one main POC plus two associate POCs for one State/Administration which is capable to do so, to ensure the effective communication between Regional Office and the State/Administration, for normal frequency coordination and emergency coordination under unforeseeable harmful frequency interference to international operations.

4.7 Indonesia reviewed updating process and coordination procedure for aeronautical facilities and services operating in the Frequency List No. 1 and Frequency List No. 2. The ICAO secretariat informed the meeting that ICAO has always encouraged States to update Frequency List 1, 2, and 3. States were urged to update their frequency list regularly and in a timely manner with the coordination with ICAO APAC Regional Office.

4.8 The ICAO Secretariat shared in SRWG/5 the latest updates brought to Frequency Finder. The module for the coordination of SSR Mode S Interrogator Identifier codes has been implemented and is in operation. The work on the development of module for VHF navigation systems (ILS, VOR, DME and GBAS) is near completion and is under evaluation. This module has incorporated the planning criteria for ILS, VOR and DME and GBAS based on Annex 10 - Aeronautical Telecommunications - Volume I - Radio Navigational Aids and the updates of the Handbook on Radio Frequency Spectrum Requirements for Civil Aviation (DOC 9718), Volume II, as recently agreed by NSP and FSMP. Several other updates including an online course development related to frequency management for civil aviation were shared. The meeting was informed that the delivery and implementation of Frequency Finder NAV module (Frequency List 2) would follow a similar practice for COM module (Frequency List 3), and the installation management of Frequency Finder in a States would be based on the coordination between ICAO APAC Regional Office and the respective CAA.

4.9 Thailand proposed to explore the possibilities and benefits of using terrain data in Frequency Finder to increase the efficiency in frequency assignment planning for the frequency band 117.975 – 137 MHz based on the result of the analysis conducted by Thailand. The meeting was informed that Frequency Finder can be considered as electronic version of Frequency List-3 managed

by ICAO and a tool for frequency coordination. The need for different States may vary based on geographical location. Therefore, States may use additional tools for internal frequency requirements need and analysis. The ICAO Secretariat was requested to inform ICAO HQs to consider the feasibility incorporating terrain data into future versions of Frequency Finder.

4.10 Thailand also proposed to have in place a frequency assignment planning tool to support voice communication via satellite and emerging technologies. New technologies such as High-altitude platform station (HAPS) system are now emerging that could potentially be used as a communication relay platform to provide communication between aircraft and air traffic control centres in remote areas or oceanic areas. The meeting requested ICAO to take appropriate follow-up action to improve the awareness on the potential of emerging technologies and the necessity to consider the development of software tool like Frequency Finder to support the frequency assignment planning at regional office in future. The meeting concluded to wait for the outcome of WRC-23 or relevant ICAO SARPs in place for further action on frequency assignment planning tool to support voice communication using satellite and emerging technologies.

Planning Requirements

4.11 India shared the experience in SRWG/5 their VOR frequency allocations and anticipated shortfall of new VOR channels. India proposed consideration of some measures in APAC region to probably ease the shortfall of VOR channels.

4.12 The ICAO Secretariat presented material in SRWG/5 on the use of 50 kHz channels for the ILS/Localizer and VOR. To date, 50 kHz channel spacing has not been introduced in the APAC (as well as the AFI, CAR, MID and SAM Regions). For the introduction of 50 kHz channels for the Localizer and the VOR, the provisions in Annex 10 recognise two options: *General use of 50 kHz channels and restricted use of 50 kHz channels*. In both cases Annex 10, volume V requires a Regional Agreement. No such Regional Agreement has been established to date for any Region. The ICAO Secretariat proposed to have an ad-hoc group to be led by India to further explore the issue along with China, and IATA. This ad-hoc group is tasked to provide the inputs to SRWG/6. Mr. Robert Witzen, Thailand and Japan presented their interest to join the group.

4.13 Previous SRWG/4 considered the development of a regional guidance material on aeronautical frequency spectrum management for APAC States. The current 26-page draft document was presented by China. It was informed by the ICAO Secretariat that the guidance material started with VHF COM and the section on NAV will be drafted later. However, there will not be any surveillance part as these frequencies are universal.

4.14 The ICAO Secretariat presented a plan to simulate the VHF COM for APAC in 2030. CNS SG/24 adopted the *Conclusion CNS SG/24/7(SRWG/4/2) – Simulation of VHF COM Frequency requirements for next 10 years* to conduct a new round of simulation for VHF COM frequency assignment based on new operational requirements of States to 2030 as necessary. A State Letter has been issued and responses from 7 States received. Other Member States were reminded to submit their VHF COM Frequency plans for meaningful simulation and thus facilitate the future planning in the Region.

4.15 India presented Indian VHF projections for 2030 based on future operational requirements and objective review to implement 8.33 kHz channel spacing in a limited manner in APAC region. India suggested that SRWG should deliberate and simulate a transition scenario for voice communication within APAC region from the current 25 kHz to 8.33 kHz channel spacing by taking into consideration the lead time for implementation and equipage. The meeting was further informed that in 2021 it is difficult to predict the surge in the usage of frequencies. It was decided by the meeting to review the outcome of the simulation before any further action is taken. IATA suggested to have a transition plan for future.

Spectrum Use and Interference

4.16 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 on *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. Member States were invited to report to ICAO APAC Regional Office in a timely manner once the interference to radio altimeters by these broadband technologies happens. Outcomes from CNS SG/25 on this issue were also shared to RASG-APAC/11 to alert the potential impact on flight safety.

4.17 Hong Kong China shared their observations in SRWG/5 on potential impacts of departing aircraft on arriving aircraft under runway mixed-mode operation with respect to LOC signal fluctuations. In view of the significance in the protection of ILS CA/SA in 3D, CNS SG/24 adopted the Conclusion CNS SG/24/11 Protection of ILS Critical and Sensitive Areas in Three Dimensional and ICAO APAC Regional Office forwarded the WP/21 and its presentation file to secretary of the ICAO NSP for consideration by Conventional Nav-aids and Testing Working Group (CNTWG).

4.18 China introduced a new initiative in detecting and positioning the source of GPS Radio Frequency Interferences based on QAR data. China introduced the operation of ILS/DMEs using the same frequency with different identifiers at Beijing Daxing International Airport in IP/07, as a possible way to improve frequency utilisation efficiency.

4.19 It was agreed that FF workshop will be conducted after new release of Frequency Finder by ICAO along with online course proposed by ICAO HQ for new release of Frequency Finder is available. The need was recognised to organise a face to face meeting in 2022 to review the outcome of simulations for States and progress the tasks listed in the Terms of Reference.

ICAO Position for ITU WRC-23 (WP/09)

4.20 The ICAO Secretariat reviewed the agenda for the International Telecommunication Union (ITU) World Radiocommunication Conference 2023 (WRC-23), discussed points of aeronautical interest and provided the ICAO Position for these agenda items in this paper. The ICAO State Letter E 3/5-21/37 *ICAO Position for the ITU WRC-23* was issued on *18 August 2021* informing Member States that the ICAO Council approved the ICAO Position for WRC-23 on issues of critical concern to aviation at its 223rd Session, which was held on 14 June 2021, and thus inviting Member States to consider the ICAO Position when developing your State's position for WRC-23 and to support the ICAO Position during WRC-23.

4.21 The ICAO Position is to be considered in conjunction with sections 7-II and 8 of the *Handbook on Radio Frequency Spectrum Requirements for Civil Aviation, Volume I — ICAO spectrum strategy, policy statements and related information* (Doc 9718, Second Edition, 2018). The Position should be seen as being the guiding document wherever conflicts between the Position and the Handbook are observed. The aeronautical aspects on the Agenda for WRC-23 were summarised and the details were given in its attachment. States and international organizations were requested to make use of the ICAO Position, to the maximum extent possible, in their preparatory activities for the WRC-23 at the national level, in the activities of the regional telecommunication organizations and in the relevant meetings of the ITU. The ICAO Position is to be presented to the ITU WRC-23, and the paper will be shared during the 3rd Meeting of the APT Conference Preparatory Group for WRC-23 (APG23-3), which is planned for *8- 13 November 2021,* Virtual/Online Meeting. The meeting encouraged Member States to support ICAO position for ITU WRC-23.

Handbook on Radio Frequency Spectrum Requirements for Civil Aviation (Doc 9718, Volume I and II) (IP/05)

4.22 The latest revision of the Handbook on Radio Frequency Spectrum Requirement for Civil Aviation (DOC 9718), Volume I and Volume II, will be published in *early 2022*. The meeting reviewed the background of discussion and highlights of changes to the document. The ICAO Secretariat initiated the revisions to the Handbook Volume II in 2018. The overall revisions were presented to APAC CNS SG/23 through IP/10 in 2019 and to APAC SRWG/4 through IP/02 in 2020, including a review to Chapter 1, new Chapters 3 - ILS, Chapter 4 - VOR, Chapter 5 – DME, Chapter 6 - GBAS/VDB and Appendix A with conversions and formulas relevant to frequency assignment planning. The "UNEDITED ADVANCE REVISION" of Doc 9718, Volume I and Volume II is uploaded at the Frequency Spectrum Management Panel (FSMP) website at https://www.icao.int/safety/fsmp on 30 July 2021. The Revision included all amendments resulting from FSMP WG/11 (1-12 March 2021, VTC). Doc 9718 Vol I included updates to Chapters 7 and 8 as well as Appendix F (ICAO Position). Doc 9718 Vol II included the new material as received from NSP/6 (2 - 13 November 2020, VTC). The planning requirements contained in the revision for compatibility assessment of frequency assignments to NAV systems (ILS, VOR, DME and GBAS/VDB) have been incorporated in the new release of Frequency Finder tool.

5G Implementation and Potential Impacts on Aircraft Radio Altimeters (IP/06)

4.23 The ICAO Secretariat presented the overall status on the potential interference to radio altimeters due to pressures to implement 5G in the adjacent band in APAC. It was noted that the reported occurrence were mainly in USA and Europe. The ICAO APAC Regional Office was informed through the ICAO FSMP secretary and presented to the ITU Regional Radiocommunication Seminar 2020 for Asia & Pacific in October 2020, while there has been zero reports to the ICAO APAC Regional Office from Member States or IATA.

4.24 Hong Kong China shared their experience and the established mechanism in handling potential interference to radio altimeters caused by 5G implementation. As the issue is considered more appropriate to be followed up under RASG, Hong Kong China shared their plan to inform about this matter by a Working Paper in the upcoming RASG-APAC/11 from 25 to 26 November 2021.

4.25 The meeting agreed that Member States would keep an eye on monitoring the impact of 5G on radio altimeters in their States/Administration with reference to the safety and frequency spectrum issues. In parallel, it was advised that Member States CAA and airworthiness office may collect all relevant information and past issues reported, if any, and inform RASG-APAC in case of any significant concern. The issues related to frequency spectrum may be brought to the attention of CNS section of the ICAO Secretariat for their coordination with RASG-APAC and ICAO headquarter. The ICAO Secretariat will prepare a working paper to present in RASG-APAC/11 as an outcome of CNS SG/25 discussion for considering 5G potential interference with radio altimeter as a potential hazard. **ACTION ITEM 25-2**

Status of 5G Implementation in Australia (IP/12)

4.26 Australia presented the status of activity in Australia to address the potential impact of deployment of wireless broadband services in the 3.4 to 4.0GHz band on Aviation safety. Australian aviation stakeholders with the representation of Civil Aviation Safety Authority, Airservices Australia, Department of Defence, NSW Police, Qantas Airways, Virgin Australia and Boeing Australia have made ACMA aware of potential impacts to the safety of operation of radio altimeter and associated aircraft systems with reference to international studies and mitigations.

Update of AeroMACS Application and Specification in China (IP/17)

4.27 Civil Aviation Administration of China (CAAC) shared the progress on the application of Aeronautical Mobile Airport Communications System (AeroMACS) technology in China. The meeting was informed that up to now, AeroMACS network has been deployed in 23 airports in China, and applications including D-TAXI based on AeroMACS and runway intrusion prevention were carried out. China shared the CAAC Roadmap of New Generation Aviation Broadband Communication Technology issued in April 2021 to promote the application of aviation broadband communication,

build a civil aviation broadband network. Lastly, China provided two AeroMACS network implementation examples and its next step.

Agenda Item 5: Navigation

Review Report of PBNICG/8 (WP/10)

5.1 The Eighth Meeting of the Performance Based Navigation Implementation Coordination Group (PBNICG/8) was held through Video Teleconference (VTC), from 6 to 8 July 2021.

5.2 The ICAO Secretariat presented global PBN implementation status as available in ICAO iSTARS. ICAO informed that regarding key requirement of ICAO Assembly Resolution A37-11, which was 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 (Table 1). State-wise APV implementation progress is given in chart-1 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

Table 1. ICAO Assembly Resolution A37-11 Implementation Status

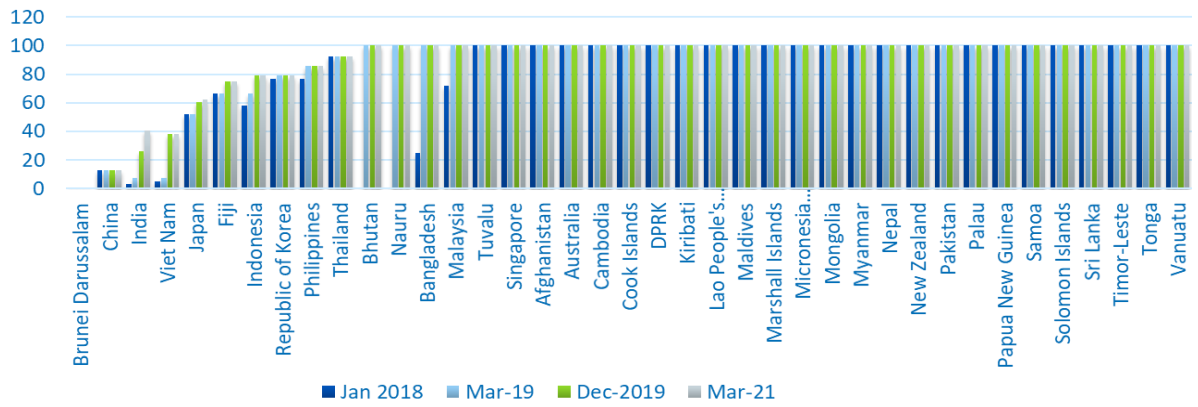

Chart-1 PBN (Approach) Update, as of March 2021(as per iSTARS)

5.3 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. The plan is available at the following link on ICAO APAC webpage: https://www.icao.int/APAC/Documents/edocs/APX.%20B%20-%20Regional%20Transition%20Plan%20for%20RNP%20Chart%20Identification.pdf

5.4 China, India, Indonesia, Myanmar, Nepal and Thailand presented their States PBN Implementation Progress. China informed that they had implemented RNP AR SIDs at some domestic airports. India presented a paper on the implementation of PBN approach procedures on non-instrument runways.

5.5 Bangladesh wanted some guidance on the PBN Ops approval from PBNICG/8, which is a key component of PBN implementation. ICAO explained that some PBN ops Approval activities have been conducted through the COSCAPs. Australia and Nepal shared their experience and provided the web link to their regulations. ICAO will contact COSCAPs and States to provide further information in the next meeting.

5.6 The ICAO Secretariat presented the list of action items agreed by the previous meetings. There were two action items left for discussion at the meeting. ICAO informed the meeting 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.

Review Report of GBAS/SBAS ITF/3 (WP/11)

5.7 The Third Meeting of the ICAO GBAS/SBAS Implementation Task Force (GBAS/SBAS ITF/3) was held by Video Teleconference (VTC) on 27-28 September 2021.

5.8 The 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.

5.9 The USA and India presented about their SBAS program and potential extension to their neighbouring countries. Australia shared the journey for implementation of GBAS with detailed steps involved in each stage of implementation. Japan presented about status of MSAS, GBAS program at Tokyo International Airport (Haneda) and certification framework for GBAS and SBAS. Singapore presented a paper to highlight potential vulnerabilities to Global Navigation Satellite System (GNSS) disruptions, mitigations, and a resultant Concept of Operations (CONOPS) for the successful mitigation of a GNSS Outage in a State. Thailand presented an overview of the GBAS Proof-of-Concept (PoC) Project between Japan and Thailand to install GBAS PoC equipment at Suvarnabhumi International Airport and conduct an experiment for the deployment of GBAS at low geomagnetic latitude area, of which the performance is affected by ionospheric irregularities. The Republic of Korea presented the status of Korean SBAS called KASS (Korea Augmentation Satellite System).

5.10 The 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.

5.11 The Co-Chairs presented a paper regarding the review of 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 and **Decision GBAS/SBAS ITF/3-1:** *Review and revise the GBAS and SBAS safety assessment guidance document related to anomalous ionospheric conditions* was taken.

5.12 Hong Kong China presented a paper to share their strategy and experience in VDB frequency assignment for GBAS as VDB frequency would use the same radio frequency band as other types of ground-based navigational systems. Hong Kong China presented about safety and risk assessment process, covering both engineering and operation aspect, applied for GBAS Trial at HKIA.

5.13 A framework of guidance reference for the implementation of GBAS/SBAS developed by the Co-Chairs was presented. The paper presented a high level framework of guidance reference document on the implementation process for GBAS/SBAS. The framework will be taken as a reference

for the task force expert group to draft the guidance document for the Region and ***Decision GBAS/SBAS ITF/3-2:*** *Draft a Guidance Document on Implementation Process for GBAS/SBAS* was taken.

5.14 The ICAO 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.

Update of Catalogue of Asia and Pacific Flight Inspection and Flight Validation Service Providers (WP/12)

5.15 The paper presented 11th edition of the updated Catalogue of Asia and Pacific Flight Inspection and Flight Validation Service Providers for meeting adoption. The latest edition of flight inspection guidance material adopted by CNS SG/25 will be appended to the catalogue for compilation of relevant documentation. As such, **Conclusion CNS SG/25/05** – *The Catalogue of Asia and Pacific Flight Inspection and Flight Validation Service Providers* was endorsed by CNS G/25.The Catalogue will be uploaded on ICAO APAC e-doc portal soon and Member States will be informed by a State Letter.

The BDS Standardisation and Application in Civil Aviation (WP/23)

5.16 The paper 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. China informed that CAAC is promoting the BDS standardisation work in ICAO with the promotion of the BDS in civil aviation application including completing the BDS SARPs development and validation in ICAO Navigation Systems Panel (NSP), and participating in the DFMC GNSS standardisation work in civil aviation. States/Administrations were encouraged to recognise the important role of BDS in aviation operation, search and rescue, and support BDS DFMC GNSS standardisation. The meeting congratulated China for equipping aircrafts with BDS tracking and positioning devices and the plan for all China's civil aviation fleet equipped by 2025. The meeting encouraged China for promotion of the BDS in their civil aviation application.

Update of Flight Inspection Guidance Material (FIGM) for APAC Region (WP/26)

5.17 As the resolution of conflicting text in Doc8071 Vol III regarding flight inspections presented by Singapore through IP/09, China and Hong Kong China proposed to provide additional guidance in 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. As such, **Conclusion CNS/SG/25/06** - *Update of Flight Inspection Guidance Material (FIGM) for APAC Region* was endorsed by CNS SG/25.

Proposals for the Amendment of Annex 10, Volume I, on DFMC and GBAS (IP/07)

5.18 The ICAO Secretariat presented the main points of State Letter Ref.: AN 7/62.1.4-21/41 dated 6 July 2021 subject: *Proposals for the amendment of Annex 10, Volume I* and the action required. This proposed amendment to Annex 10, Volume I is envisaged for applicability on 2 November 2023.

Compatibility of Other GNSS Positioning Services with Aviation Services (IP/11)

5.19 In Australia, an operational need was identified to provide dynamic positioning services for vehicles operating in road tunnels mainly for police and emergency services. The road tunnel operator has identified a European solution named translator. A trial is undertaken by the road

tunnel operator to prove acceptable operation and monitored by the aviation authorities to ensure no interference to aviation services is experienced. Australia informed that if the trial is successful in meeting the operational needs to the road tunnel operator and is compatible with aviation safety and regularity, then it is expected that this technology will become a standard feature of road and rail tunnel systems in Australia.

Research on Operational Quality Analysis of Instrument Landing System (ILS) Based on Airborne DAR Data (IP/14)

5.20 The paper introduced a new method for analysing the operational quality of ILS based on flight airborne DAR (Digital ACMS Recorder) data. China informed about the 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 about methods for improved positioning accuracy, consistency of data analysis, correlation with flight inspection and facility difference inspection analysis. Lastly, China shared ILS operational problems and suggestions found by this research.

Concept of Operations for GNSS Event Reporting (IP/19)

5.21 Singapore highlighted potential vulnerabilities to GNSS disruptions, mitigations, and a resultant Concept of Operations (CONOPS) for the effective reporting of a GNSS outage in a State. It made recommendations on the GNSS Outage Responses and Reporting, based on ATC and airline operators' feedback.

Status of GBAS implementation in Japan (IP/20)

5.22 Japan introduced the status of operational trial of their CAT-I GBAS implementation at Tokyo Haneda from July 2020, and their research and development related to GBAS. Meeting noted that the information on the operational trial in Tokyo Haneda has been published as AIP supplement. Two Japanese airlines conducted GLS approaches in the trial and the pilots reported that the provided GLS approach was more stable as compared to that of ILS. On research and development, GAST-D experimental prototype has been developed and was installed at Ishigaki in Japan to evaluate the validity of the GAST-D standards under the ionospheric disturbances. Japan informed that he will continue to support refining the GAST-D standards from the results of study in collaboration with the ICAO NSP and will contribute to ICAO activities on DFMC GBAS standardisation.

SBAS Status Update in Japan (IP/21)

5.23 Japan provided information on the status update and the future plans of Japan Michibiki Satellite-based Augmentation Service (MSAS). JCAB has been working on improving the performance of MSAS and aims to realise MSAS-LPV capability with the schedule and details of trial and full scale operation was provided in this paper.

Agenda Item 6: Surveillance

Review Report of the Sixth Meeting of the Surveillance Implementation Coordination Group (SURICG/6) (WP/13)

6.1 The paper reviewed the outcomes of SURICG/6, including the Fourth Meeting of Mode S Downlinked Aircraft Parameters Working Group (DAPs WG/4) and First Meeting of the Surveillance Study Group (SURSG/1).

Interrogator Code (IC) Planning

6.2 The SURICG/6 meeting reviewed the proposal to amend formerly adopted APANPIRG Conclusions related to II codes and extend the consideration to the use of SI codes. After discussion, the following Draft Conclusion was adopted by CNS SG/25 for consideration in APANPIRG/32:

<table>
<tr><td colspan="2">Draft Conclusion APANPIRG/32/XX (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</td></tr>
<tr><td>What: That,

With the need to extend the Use of Surveillance Identifier (SI) in Interrogator Code (IC) on top of Interrogator Identifier (II), the relevant APANPIRG Conclusions are updated as follows:

Coordination Process for SSR Mode S Interrogator Code (IC)
(formerly Conclusion 19/40)

a) in view of the increasing density of SSR interrogator installations in the region, and that States have varying readiness to extend from Interrogator Identifier (II) to both Interrogator Identifier and Surveillance Identifiers (SI) codes, there will be a period whereby both II and SI will be used.

b) while implementing SSR Mode S, States should take into account following issues while assigning IC for these installations:
• for planning the implementation of SSR Mode S interrogators, administrations should ensure that the interrogators with overlapping coverage are not operating with the same IC.
• where, the coverage of the interrogator extends beyond the boundaries of the State, The IC should be worked out in coordination with the ICAO Asia and Pacific Office and the neighbouring States concerned, and
• administrations should inform the ICAO Asia and Pacific Office about the assigned IC for these installations.

Coordination Requirements for SSR Mode S Interrogator Codes (IC)
(formerly Conclusion 20/56)

States be advised to provide the following information on SSR Mode S Interrogator Code to the ICAO Asia/Pacific Office for coordination and registration.

a) Name of country/territory and location of facility;
b) Antenna Coordinates (Latitude and Longitude);
c) Elevation of antenna above the Mean Sea Level (MSL) in meters;
d) Maximum Coverage of SSR Mode S Interrogator in nautical mile;
e) II Code (1 to 15) or SI Code (1 to 63); and
f) Remarks (special configuration such as radar clustering, lockout override, II/SI mode capability)

Planning Criteria for SSR Mode S Interrogator Code (IC) Assignment
(formerly Conclusion 20/57)

The planning criteria for SSR Mode S IC coordination and assignment as provided in Appendix J of Doc 9924 (Third Edition, 2020) be adopted for use in the Asia/Pacific Region.</td><td>Expected impact:
☐ Political / Global
☒ Inter-regional
☐ Economic
☐ Environmental
☒ Ops/Technical</td></tr>
<tr><td>Why: Due to higher density of radars, some States are facing a shortage of II codes. It has to be solved by transiting from II to SI code. It is noted that state may use a mixture of II and SI codes before complete migration to SI code.</td><td>Follow-up:
☒Required from States</td></tr>
</table>

The assignment of interrogator codes (IC), where necessary in areas of overlapping coverage, across international boundaries of flight information regions, shall be the subject of regional air navigation agreements. States still have to coordinate with ICAO APAC Regional Office on the allocation of II codes and SI codes.	
When: 02-Dec-2021	Status: Draft to be adopted by PIRG
Who: ☒Sub groups ☒APAC States ☒ICAO APAC RO ☐ICAO HQ ☒Other: SURICG	

*Note: This draft conclusion will supersede **APANPIRG Conclusions 19/40, 20/56 and 20/57** once adopted.*

6.3 In association, the *Table for SSR Mode S Interrogator Code Coordination* was reviewed in SURICG/6. It was reported that Chairpersons of DAPs WG and the ICAO secretariat approached the Surveillance Panel about the addition of SI code allocation criteria into Doc 9924, and DAPs WG will work to reflect the required updates in Mode S DAPs IGD.

6.4 The Secretariat provided latest updates about Mode S II codes coordination in the APAC Region including a request from Eurocontrol for few new Mode S radars whose coverage overlaps several States in APAC, and another request for assignment of II Codes to 10+ planned Mode S Radars in a State near MID region and EUR region in 2021. 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.

6.5 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 comprising of representatives from China, Japan, Singapore, and the ICAO Secretariat were 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

6.6 The SURICG/6 meeting reviewed the strategy of transition from II code to II and SI mixed code and the following Draft Conclusion was adopted by the CNS SG/25 for consideration in APANPIRG/32:

Draft Conclusion APANPIRG/32/XX *(CNS SG/25/08) (SURICG/6/2) (DAPs WG/4/4)* - Transition from II code to II and SI mixed code	
What: 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.	Expected impact: ☐ Political / Global ☐ Inter-regional ☒ Economic ☐ Environmental ☒ Ops/Technical
Why: Due to higher density of radars, some States are facing a shortage of IC codes, which has to be solved by transiting from II to II and SI mixed code. It is noted that radars using II and SI codes can co-exist, hence there is no need for a big bang approach. However, States still have to coordinate with ICAO APAC Regional Office on the allocation of SI codes.	Follow-up: ☒Required from States

When: 02-Dec-2021	Status: Draft to be adopted by PIRG
Who: ☒Sub groups ☒APAC States ☒ICAO APAC RO ☐ICAO HQ ☒Other: SURICG	

Roadmap for Mode S Implementation

6.7 The SURICG/6 meeting reviewed the revised Regional Roadmap proposed by DAPs WG/4 and submitted by following Draft Conclusion to CNS SG//25 for adoption, which was adopted in CNS SG/25 for the consideration of APANPIRG/32. The adopted APAC Regional Roadmap for Mode S Implementation is provided in **Appendix A-4** to this summary report.

Draft Conclusion APANPIRG/32/XX *(CNS SG/25/09) (SURICG/6/3) (DAPs WG/4/5)* - The APAC Regional Roadmap for Mode S Implementation	
What: That, the APAC Regional Roadmap for Mode S Implementation provided in **Appendix A-4** to this summary report be adopted.	Expected impact: ☐ Political / Global ☐ Inter-regional ☒ Economic ☐ Environmental ☒ Ops/Technical
Why: The revised Roadmap defined the scope and rational steps for the implementation of Mode S in APAC region.	Follow-up: ☒Required from States
When: 02-Dec-2021	Status: Draft To be adopted by PIRG
Who: ☒Sub groups ☒APAC States ☒ICAO APAC RO ☐ICAO HQ ☒Other: SURICG	

6.8 SURICG/6 noted the outcome a *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 concluded that most of twelve States that responded to the survey 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)

6.9 A proposal for revised draft Edition 3.0 of the Mode S DAPs Implementation and Operations Guidance Document (IGD) was discussed in SURICG/6. 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 the **Conclusion CNS SG/25/10** *(SURICG/6/4) (DAPs WG/4/6) - Mode S DAPs IGD 3.0,* which is provided in *Appendix J to the CNS SG/25 meeting report*.

Regional Supplement to ASTERIX Interface Control Document (ICD)

6.10 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, which was adopted by SURICG/6 for consideration of CNS SG/25 by following draft Conclusion. 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, **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 endorsed by CNS SG/25.

6.11 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

6.12 Based on the recommendation of SURICG/6 proposed by SURSG/1, CNS SG/25 reviewed the revised ToR of SURSG and adopted the **Decision CNS SG/25/12** *(SURICG/6/6): Revised ToR of Surveillance Study Group (SURSG)*. The revised ToR of SURSG adopted by the meeting is provided in *Appendix L to the CNS SG/25 meeting report*.

6.13 CNS SG/25 reviewed a proof-of-concept (POC) from SURICG/6 for surveillance data sharing on SWIM to be conducted in Hong Kong China. 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, CNS SG/25 reviewed the proposed Concept of Operations (CONOPS) from SURICG/6 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

6.14 CNS SG/25 reviewed the ADS-B Implementation Status in the APAC Region summrised in SURICG/6, as well as other 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. The ADS-B Implementation Status in the APAC Region is provided in **Appendix A-5 to this summary report**, with a graphical illustration given below in Figure 5. 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.

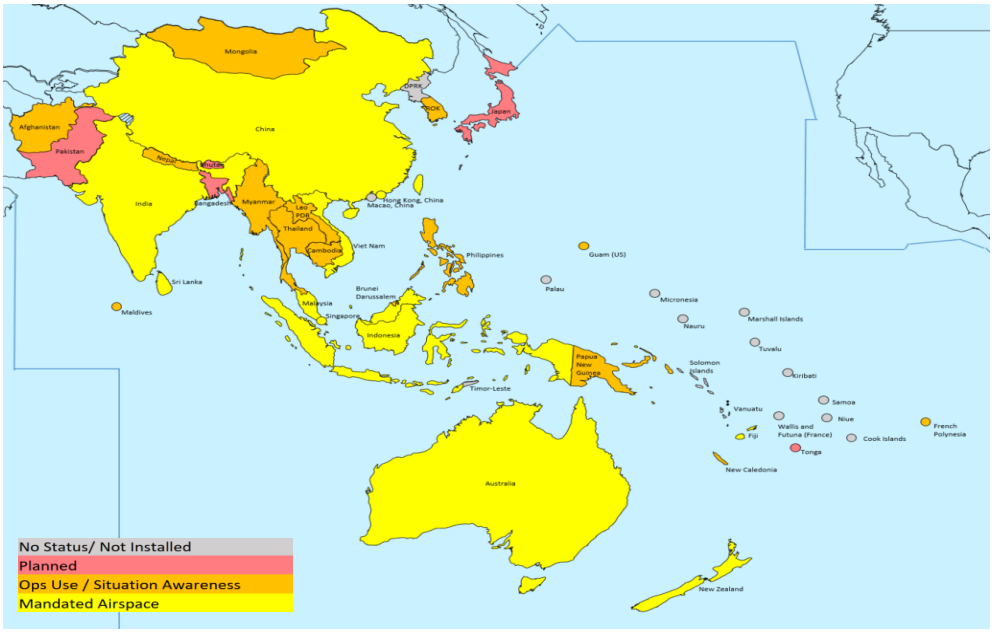

Figure 5 – ADS-B Implementation Status in APAC

6.15 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.

6.16 Aireon presented in SURICG/6 the status of space-based ADS-B as a service which

has been operational for some time in various ANSPs. SURICG/6 noted that space-based ADS-B data was provided into APAC CRV network since 2020 and it is currently supporting Papua New Guinea (PNG) ATC operations. An example from NiuSky Pacific was explained to illustrate the benefits.

6.17 Boeing introduced their ADS-B implementation on their various models of different technology streams, which planned ahead for ADS-B Mandates in Europe and the United States in SURICG/6.

Aircraft Address and Target Identification

6.18 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.

Surveillance Performance Specifications

6.19 ROK presented in SURICG/6 on the issue that surveillance performance specifications in Eurocontrol Standard Document for Radar Surveillance "SUR.ET1.ST01.1000-STD-01-01" were quite old and could not include the recent innovation of surveillance technology. ROK tabulated the common misunderstanding about PSR & MSSR performance specifications with explanation and suggested the practical approach in a list of radar performance specifications. SURICG/6 discussed and suggested to form an Ad-hoc working group to discuss performance specifications and benchmarking of radar for APAC Region, and to prepare a working paper to make a recommendation on the way forward to SURICG/7. China, India, Indonesia, Republic of Korea, and Singapore volunteered to join the group.

6.20 RTCA presented in SURICG/6 that the Combined Surveillance Committee, which made up of RTCA and EUROCAE committees working on ADS-B and Mode-S technologies, jointly published standards of surveillance technology, namely DO-260C/ED-102B (ADS-B), DO-361A Change 1/ED-236A Change 1 (Flight-deck Interval Management (FIM) Change 1), DO-181F/ED-73F Mode-S Transponder in December 2020. It was informed that RTCA has undertaken an update of DO-282B Minimum Operational Performance Standards (MOPS) for Universal Access Transceiver (UAT) and ADS-B to align with DO-260C.

ToR and AIGD

6.21 SURICG ToR was reviewed in SURICG/6 in the view of integration of SEA/BOB ADS-B WG ToR. The revised SURICG ToR was reviewed and adopted by CNS SG/25 in **Decision CNS SG/25/14** *(SURICG/6/8): Revised ToR of Surveillance Implementation Coordination Group (SURICG),* which is provided in *Appendix N to the CNS SG/25 meeting report*.

Other Surveillance-related Outcomes

6.22 SURICG/6 considered the avionics issue on Honeywell Primus II RCZ to be included in revised ADS-B Implementation and Operations Guidance Document (AIGD) and subsequently the following Conclusion was formulated and endorsed in CNS SG/25 as **Conclusion CNS SG/25/15** *(SURICG/6/9) - Revised ADS-B Implementation and Operations Guidance Document (AIGD)*, which is provided in *Appendix O to the CNS SG/25 meeting report.*

Outcomes of ICAO APAC Implementation of ADS-B Webinar (IP/08)

6.23 The ICAO APAC Webinar on Implementation of ADS-B was successfully conducted on *1 September 2021* via 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. The CNS SG Chair congratulated SURICG and ICAO for the good response from participants and encouraged ICAO Secretariat to organise similar webinars in future.

Resolution of Conflicting Text in DOC 8071 VOL III Regarding Flight Inspections (IP/09)

6.24 Singapore informed CNS SG/25 that although the Appendix A of Doc 8071 Vol III stated that flight check is required only during commissioning, unless there is specific problem investigation, or deemed necessary by the maintenance personnel, Appendix B of Doc 8071 Vol III implied that there must be flight inspections every 120 days. These two provisions are contradictory. The meeting was informed that it was discussed in Surveillance Panel members that most ANSPs perform flight checks based on Appendix A of Doc 8071 (i.e. during commissioning unless deemed necessary or for problem investigation) hence changes to Appendix B of Doc 8071 was suggested and discussed in the meeting, which is subject to acceptance by the SP-ASWG during its meeting on 1-5 Nov 2021, then the 4th Surveillance Panel Meeting (SP/4) on March/April 2022, and the submission of SRP report to the ANC in Q4 2022 for the amendment to be published in Q1 2023 after the review by ANC.

Mode S Activities Update in China (IP/13)

6.25 China presented a brief introduction of the Mode S related activities updated in China in recent years and the Mode S activity plans in the near future in CNS SG/25. China shared the related research and promotion activities on Mode S implementation by summarising the outcomes of Mode S implementation in avionic systems, surveillance systems, automation systems, spectrum analysis, ADS-B Implementation, and Mode S DAPs IGD with the reference papers presented in the previous meetings. The meeting appreciated the updates provided by China and invited China to provide updates next year.

Implementation of Space-based ADS-B Surveillance for the Oceanic Regions of Indian FIRs (IP/24)

6.26 India presented in CNS SG/25 on the updates to the implementation of Space-based ADS-B (SADS-B) Surveillance. Airport Authority of India (AAI) signed a contract with Aireon on 25 July 2019 for the Space-based ADS-B. India informed that India has issued ADS-B Avionic mandate that from ***1 January 2020*** with all aircrafts flying over Indian continental airspace at or above FL-290 to be equipped with on-board ADS-B equipment. The regulator is contemplating to provide priority in landing to the aircrafts equipped with ADS-B at airports where ADS-B based approach surveillance services are being provided.

Agenda Item 7: Automation

Review Report of the Second Meeting of ATM Automation Systems Task Force (WP/14)

7.1 CNS SG/25 reviewed the report of the Second Meeting of the Asia/Pacific Air Traffic Management Automation System Task Force (ATMAS TF/2).

Conspicuity Code

7.2 The ATMAS TF/2 meeting reviewed the report of SURICG/6 and discussed 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. China informed that the ATM Automation

System Implementation and Operations Guidance Document (ATMAS IGD) had already provided the recommendation for the ATM Automation Systems on implementation of conspicuity code.

Repository of the ATM automation systems

7.3 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*, Indonesia proposed a draft Table of Current ATMAS Status 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 led by Indonesia, including China, Hong Kong China, Republic of Korea, and Singapore with support of the ICAO Secretariat to consider the suggestions provided by the meeting and work out a revised version of the table before conduct a survey.

Problem Reporting Database

7.4 Hong Kong China informed that it has taken up the action item from ATMAS TF/1 on studying the feasibility of expanding the ADS-B Avionics Problem Reporting Database (APRD) to cover the report and sharing of ATMAS-related problems by States/Administrations in APAC region. 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 that China, Hong Kong China, and Indonesia create an ad-hoc group with support of the ICAO Secretariat to further progress the development of ATMAS PRD and consider including AIDC implementation issue as well.

Updates from States

7.5 The ATMAS TF/2 meeting reviewed the relevant information and updates with the key outcomes of 4 webinars related to CNS, i.e. ICAO APAC Cybersecurity Webinar, Webinar on Implementation of CRV in APAC region, SWIM workshop, and Webinar on Implementation of ADS-B. The ICAO Secretariat agreed that it would be possible to hold a webinar about ATM Automation Systems in 2022.

7.6 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. The definition, application, and benefits of MH/T 4029.3 to exchange fight data in ATM Automation Systems were shared. The ATMAS TF/2 meeting agreed that information on the MH/T 4029.3 should be translated into English by China for better understanding by other Member States/Administrations before conducting a demand survey on such standards if needed.

7.7 China introduced a "One Code to the End" path used in China to maximally maintain the same SSR code for a flight and reduce the conflict of code, and pointed out it will reduce the multiplex rate of the spatial dimensions. In order to solve the problems of code shortages, the spatial dimension distribution strategy suitable for China and the measures used to improve the utilisation rate of the SSR code in the spatial dimension including borrow SSR code, orientation distribution of SSR code, and SSR code sharing with experiences in Chengdu were introduced.

7.8 Singapore presented the likely trends in future ATM development - Open ATM. Singapore introduced the concept of Open ATM and explained the benefits of the Open ATM with comparing to the original ATM Automation Systems. The meeting was informed that Singapore and the industry are working on exploration of Open ATM together.

7.9 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, such as BDS SWAP should be considered to avoid nuisance and false alerts were summarised.

7.10 China presented the analysis of operational requirements of the Tower ATM automation system, data interaction method between the ATM automation system and the Tower ATM automation system, and the data interaction method between main and backup Tower ATM automation systems.

7.11 Hong Kong China informed that the Civil Aviation Department of Hong Kong China (HKCAD) has studied and identified the data diode technology which fulfilled HKCAD's needs to safely disseminate at sufficiently high data transmission rate from internal systems to external users while inhibiting malware and zero-day attacks that are originated from external sources. Hong Kong China encouraged the meeting to invite Member States/Administrations to consider adoption of proven and cost effective technologies to safeguard against cyber threats and enhance cyber resilience.

7.12 Hong Kong China informed that in connection 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. The ATMAS TF/2 meeting reviewed and confirmed that the relevant design considerations of AST have been incorporated into the ATMAS IGD.

7.13 China introduced the background of progress in the implementation of Performance-based Communication and Surveillance (PBCS) in China and the function evolution of ATM automation systems to match the research of PBCS.

ATM Automation System Implementation and Operations Guidance Document

7.14 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. Some suggestions to further improve the ATMAS IGD were discussed. 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

7.15 Based on the proposal by APA TF/7, which was reviewed by ACSICG/8, ATMAS TF/2 and CNS SG/25, the CNS SG/25 adopted the **Decision CNS SG/25/16** *(ATMAS TF/2/1 (APA TF/7/1)) - Dissolution of APA TF*. The ATMAS TF/2 meeting reviewed and updated the Action Item list for ATMAS TF, and also reviewed the Action Items arising from APA Task Force and agreed to consolidate APA TF work in ATMAS TF/3.

7.16 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** *Revised ATMAS TF Terms of Reference* which is provided in *Appendix P of the CNS SG/25 report*.

Future Plan for ATM Automation System Implementation in India (IP/25)

7.17 India presented in CNS SG/25 their future plan for ATM Automation system implementation in India.

Implementation of the Weather Data Converter for a Legacy Automation System as an Interfacing to TDWR (IP/26)

7.18 Republic of Korea (ROK) presented in CNS SG/25 their implementation of weather data converter for a legacy automation system as an interfacing to TDWR (Terminal Doppler Weather Radar) and benefit of it.

Approach Spacing Tool – Concept and Feature Overview (Presentation/02)

7.19 Thales introduced in CNS SG/25 their integrated Approach Spacing Tool (AST).

Agenda Item 8: Review and updates

Review of Regional CNS Requirements in ICAO APAC e-ANP, Seamless ANS Plan and Updates on National Air Navigation Plan (NANP) (WP/15)

8.1 The ICAO Secretariat presented in CNS SG/25 the Regional CNS requirements specified in the three Volumes of ICAO APAC e-ANP, Seamless ANS Plan (Version 3.0, November 2019) and 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. The Member States/Administrations were requested to provide updates in a timely manner for CNS requirements defined in section 2.1 of the paper.

8.2 CNS SG/25 was informed that the e-ANP Volume I Part II Table **AOP I-1 International Aerodromes Required In The Asia/Pacific Regions** and e-ANP Volume II Part II Table **AOP II-1 Requirements and Capacity Assessment in International Aerodromes in The Asia And Pacific Regions** have been updated in 2021. The Member States/Administrations were requested to review and submit the updates to ICAO APAC Regional Office for the updates on various facilities listed in **e-ANP Vol II Part III Table CNS II-APAC 2** for **new international aerodromes added in 2021** by filling the PfA template specified in section 2.4 and send it to ICAO APAC Regional Office. **ACTION ITEM 25-3**

8.3 Member States/Administrations were also invited to review **all CNS facilities listed and CNS requirements specified** in the e-ANP to verify that the information provided for their States/Administration is up-to-date and correct. Lastly, the Member States/Administrations should take into consideration to update e-ANP CNS relevant section when commissioning or decommissioning CNS systems in a timely manner and should inform to ICAO to add/delete new/obsolete CNS facilities.

8.4 In response to a question, 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. Therefore, CNS delegates from Member States were requested to inform the ICAO Secretariat about CNS related amendments in e-ANP relevant section by following procedure mentioned in the working paper. In addition, the Chair of CNS SG invited the ICAO Secretariat to carry out the same review on e-ANP volumes in ATM aspects. **ACTION ITEM 25-4**

Updates on Beijing Declaration Implementation Related to CNS (WP/16)

8.5 The ICAO Secretariat shared in CNS SG/25 about current status of the Minister's commitment for implementation of technology (CNS) components under **Air Navigation Services** mentioned in Beijing Declaration, which is to be implemented by 2022.

Updates on ICAO Annex 10 VI RPAS C2 Link (WP/28)

8.6 The ICAO Secretariat presented in CNS SG/25 on the information about approval of Annex 10, Volume VI dedicated to the SARPs on the "C2 Link Procedures" and the "C2 Link Systems" and Amendment 90 to the ICAO SARPs, Annex 10- Aeronautical Telecommunications, Volume V - *Aeronautical Radio Frequency Spectrum Utilization* arise from the recommendations developed by the RPASP/13. The corresponding State Letter was provided in Appendices to the paper. The first edition of Volume VI becomes effective on 12 July 2021 and it will be applicable from 26 November 2026.

Seamless ANS Plan and Monitoring Update (WP/31)

8.7 CNS SG/25 reviewed the status of the *Asia/Pacific Seamless Air Navigation Services (ANS) Plan* reporting, and the implementation progress of air navigation improvements in the Asia/Pacific Region. Given the importance of Air Navigation Services planning on a higher-level whole-of-government approach through an effective National Air Navigation Plan, it is proposed that ATM/SG/9 to 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.

8.8 In response to a query, the ICAO Secretariat clarified that in line with other subsidiary plan, the ICAO Secretariat will request NANP reporting in designated format by Member States, if proposed draft conclusion would be adopted by ATM/SG/9.

The Long-Term Vision for the Future Air Traffic Systems of Japan (CARATS) (IP/22)

8.9 The paper presented the status of Collaborative Actions for Renovation of Air Traffic Systems (CARATS), the long-term vision for the future air traffic systems of Japan.

Agenda Item 9: Review status of CNS deficiencies (APANPIRG Deficiency List)

Review Status of CNS Deficiencies (WP/17)

9.1 CNS SG/25 reviewed the list of Air Navigation Deficiencies in the CNS field which was reviewed in APANPIRG/31. The only outstanding issue was related to unreliability of AFS communication between Afghanistan and Pakistan. The current List of Air Navigation Deficiencies in the CNS field was reviewed in CNS SG/25 and endorsed as *Appendix Q to the CNS SG/25 meeting report*, and to be further reviewed in APANPIRG/32.

9.2 Pakistan raised a few challenges they were facing, including lack of contact point of Afghanistan, challenges in restoring VSAT link, and waiting for pairwise CRV implementation with Afghanistan. The ICAO Secretariat informed they would update Pakistan with the latest contact point of Afghanistan in due course, and invited the meeting, particularly BBIS States including Thailand and India to implement CRV as soon as possible to provide convenient connections to BIS States.

Agenda Item 10: Human Factors and Air Traffic Safety Electronics Personnel (ATSEPs) related training

Review Outcomes of Small Working Group Study on Human Factor Issues of ATSEP (WP/18)

10.1 CNS SG/25 reviewed the summariy on the outcomes of the various Ad-hoc group (*comprised of Eight (8) States/Administrations namely China, Hong Kong China, India, Indonesia, Japan, Republic of Korea, Singapore, and Thailand*) meetings held from its establishment in April 2021 in response to APANPIRG Conclusion C 31/15 for finding the left-out gaps and for preparing the regional ATSEP human factor guidance material. The task completed and the summary of task to be completed were provided in Appendices**.** The planned tasks are to be completed by June 2022 as per the current timeline, and if done so without any hindrance or exceptional unavoidable situation, the ad-hoc group would present and submit the draft Regional ATSEP guidance material to CNS SG/26.

Agenda Item 11: Cybersecurity of CNS/ATM systems

Outcomes of ICAO Asia Pacific Regional Cybersecurity Webinar (WP/19)

11.1 The paper presented in CNS SG/25 on the outcomes of ICAO Asia Pacific Regional Cybersecurity Webinar held on 14 June 2021 via VTC in response to ACTION ITEM 24-9 of CNS SG/24. The Webinar was attended by 317 participants from 26 States/Administrations, 6 International Organizations and 2 Technology/Solutions providers (Nokia and Thales) who sponsored the event. Total ten (10) presentations were delivered by Experts from different parts of the world under different domains related to cybersecurity. During the Webinar, Questions and Answers (Q & A) sessions were held at end of each presentation through the Pigeonhole tool. Throughout the Webinar, a total of 69 questions were asked and *more than 100 feedbacks* for the Webinar were provided by participants with 100% positive responses.

11.2 It was commented in CNS SG/25 that CANSO has been active on the cybersecurity topic for ANSPs. The meeting invited and CANSO expressed their continued commitment to share more experience and the latest development, such as their cybersecurity guidance publications, in future ICAO APAC meetings.

Implications of Cybersecurity and Associated Requirements for CRV Operations (WP/32)

11.3 USA addressed the implications for existing services and the CRV resulting from the Cybersecurity Webinar (WP/19 refers) and future support of SWIM and other proposed services for the Region. The meeting was requested to review the various challenges in addressing cybersecurity and SWIM. Mr. Hoang Tran, Co-Chair of ACSICG, commented that there are some issues, which are not be assigned to any groups in ICAO APAC, for example, who would be responsible for the DNS and cybersecurity. He suggested that formation of independent bodies be recommended to APANPIRG to look into cybersecurity across various domains from-end-to-end. Mr. Kelepi Dainaki, Co-chair of CRV OG (Pacific), informed that the cybersecurity requirements for CRV are under discussion in CRV OG.

11.4 The meeting noted that certain basic cybersecurity building blocks e.g. IPv6 dedicated address blocks and DNS service for APAC Region have yet been addressed. The ICAO Secretariat informed the meeting that initial coordination with other ICAO Regional Offices on regional network cybersecurity requirements has been initiated. The Chair of CNS SG invited ICAO APAC Regional Office to follow up with ICAO Headquarter on the issue. **ACTION ITEM 25-5**

Cybersecurity in Air Navigation Activities (WP/33)

11.5 The paper provided CNS SG/25 the information of cyber threat, one relevant and emergent challenge that must be taken into account as an integral part of air navigation activities, as well as a summary about experience and activities development by ICAO NACC Regional Office to address and support Caribbean States in their air navigation cybersecurity approach.

Cybersecurity in ATM System of Systems Approach - Patch Management (Presentation/03)

11.6 Thales presented in CNS SG/25 on Cybersecurity in ATM System of Systems approach focused on patch management.

Information Security Requirements for Exchange of Information over IP (Presentation/04)

11.7 The presentation introduced in CNS SG/25 on 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. The meeting requested ICAO to consider organising another webinar on this subject on how Information Security Requirements for Exchange of Information over IP can be implemented by Member States in a pragmatic manner. **ACTION ITEM 25-6**

Agenda Item 12: Discuss and share experience and application of new technologies, including big data analysis, artificial intelligence, Digital-Tower counter UAS detection and identification system, UTM, etc.

12.1 Under this agenda item, in response to APANPIRG's call on enhancing engagement with the industry, CNS SG invited various industry partners to share and update the latest progress in relevant areas.

UAS-Based PAPI Inspection Technology in China (WP/24)

12.2 China informed CNS SG/25 that the Unmanned Aerial System (UAS) application research team in China has been developing a leading and practical PAPI flight inspection technology and explained the prototype of the UAS-Based PAPI Flight Inspection System. 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. The meeting noted the application of UAS technology in China and would welcome further sharing of the progress in CNS SG/26 meeting.

Trial Inspection on CNS Outstations by Drone to Enhance Maintenance Work in Hong Kong China (WP/25)

12.3 The paper provided information to CNS SG/25 about a trial conducted by Hong Kong China to explore potential applications and benefits of using the drone to support maintenance work for CNS facilities at remote outstations. It was informed that Hong Kong China will further explore other potential use cases of drone to enhance the overall robustness and efficiency in CNS maintenance work and encouraged States/Administrations to consider cost effective and proven technologies to enhance CNS maintenance work. The meeting noted that application of Artificial Intelligence and BIM for drone-based inspection would be major development areas in the future.

Development of an Integrated Safeguarding Surface to Uphold Flight Safety While Facilitating Infrastructure/Building Developments in Hong Kong China (WP/27)

12.4 Hong Kong China shared the successful 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.

Standard Establishment of Data Link for UAS-Based Flight Inspection in China (IP/15)

12.5 China informed that the joint research and developing team in China is drafting a minimum operational performance standard (MOPS) for special-purpose air-ground data link used in UAS-based flight inspection missions. The being drafted standard focuses on establishing featured

requirements for the data link designed for UAS-based flight inspection scenario. The meeting noted that in China the frequency used for datalinks would depend on local governmental regulations.

Implementation of A-SMGCS Level IV Operation in Beijing Daxing International Airport (IP/16)

12.6 China informed that the Daxing A-SMGCS system was put into operation in September 2019, which can meet the level IV operation standard in DOC 9830 and provide surveillance, alert, routing, and guidance functions for ground targets in airport and added that the A-SMGCS level IV operation function will be promoted in other airports in China. Regarding a question on how to resolve the situation for false targets triggering the automatic routing function, China explained that with the multilateration system deployed, the effect of false targets to routings has barely happened.

Standard Establishment of UAS-based Flight Inspection System in China (Flimsy/03)

12.7 CAAC shared in CNS SG/25 that they 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 meeting was invited to provide feedback on the technical specification attached to this flimsy.

Uniting the Things That Fly - How to Integrate ATM and UTM for a Safer APAC Sky (Presentation/01)

12.8 Frequentis presented in CNS SG/25 on their products on integrating ATM and UTM for APAC.

Application of Knowledge Graph in Air Traffic Management (Presentation/05)

12.9 The China State Key Laboratory of ATM System and Technology shared in CNS SG/25 the applications of knowledge graph in air traffic management.

Agenda Item 13: CNS related work/projects impacted by COVID-19

Impact of COVID-19 to CNS Works in 2021 (WP/20)

13.1 The ICAO Secretariat summarised the impact of COVID-19 on CNS works in 2021. The ICAO Secretariat 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). 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.

Agenda Item 14: Dates of next meeting and any other business

CNS Points of Contact (WP/21)

14.1 The ICAO Secretariat informed the CNS SG/25 that the need for points of contact from States/Administrations who would respond in a timely, effective, and efficient manner was important in addressing CNS-related operational deficiencies notified to the Regional Office. Member States/Administrations were invited to review and update their existing nominated CNS Points of Contact to the APAC Regional Office, and each State/Administration was requested to provide points

of contact of CNS contingency planning and administrative support for effective and efficient coordination in CNS aspect.

CNS Meeting Planning for 2022 (Flimsy/01)

14.2 The ICAO Secretariat prepared a tentative meeting plan for 2022 based on assumption of possibilities of Face-to-Face (F2F) meeting from Q2 of 2022. Meeting noted that ICAO Secretariat will conduct future F2F meeting with additional option for Member States to join the meeting by VTC as much as practical, which is termed as Hybrid Mode (HM) meeting. The tentative meeting plan for 2022 is as follows:

No.	Meeting Name	Tentative Dates	Mode
1	CRV OG/9	25-27 January	VTC
2	SRWG/6	01-03 March	VTC
3	SURSG/2	15-17 March	VTC
4	DAPS WG/5	23-25 March	VTC
5	PBNICG/9	March	VTC
6	ACSICG/9	19-21 April	HM
7	SWIM TF/6	17-20 May	HM
8	SURICG/7	24-27 May	HM
9	SBAS/GBAS, ITF/4	May	HM
10	ATMAS TF /3	14-17 June	HM
11	CNS SG/26	04-08 July	HM
12	Frequency Finder Workshop	Q4	F2F

14.3 The ICAO Secretariat will inform Member States about the exact dates, mode and venue of the meeting while issuing invitation letters in due course.

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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	ATN tests were conducted. BIS Router and Backbone BIS Router and AMHS implemented. CRV operational since May 2019. AMHS over CRV with: Singapore, New Zealand, Fiji and USA AMHS over leased line with: South Africa 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) Extended AMHS with FTBP in support of IWXXM exchange in operation since Nov. 2020.	Frequentis Comsoft	AFTN/AMHS based AIDC Implemented between Brisbane and Melbourne. For neighbouring ANSP of Brisbane, AIDC implemented with Auckland, Nadi, Oakland, Port Moresby, Ujung Pandang For neighbouring ANSP of Melbourne, AIDC implemented with Johannesburg and Mauritius.		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. IOT and POT with Mumbai completed on 27th June 2017. IOT and POT with Thailand completed on 2nd May 2017. TMC signing with both countries signed.	AEROTHAI'S AMHS System	Currently not applicable. If required in the future, will decide after CRV implementation.		
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;	IN-HOUSE (Aero-Info Technologies Co., Ltd)

				With Thailand is completed POT, after sign the TMC circuit and was put into operation in Q12020	
	AMHS/ATN technical tests with Macau completed in 2009. Plan for ATN/AMHS implementation with Macao China is TBD.		AIDC between Dalian and Incheon implemented in Nov. 2016;		
	ATN/AMHS circuit with ROK has been put into operation since June 2011.			AMHS/ATN technical tests with Macau completed in 2009. Plan for ATN/AMHS implementation with Macao China in 2019.	
	ATN/AMHS tests with India has been put into operation since 2016.			ATN/AMHS circuit with ROK has been put into operation since June 2011.	
			AIDC between Sanya and Hong Kong China put into operational use since February 2007. (duplicate)		
	ATN and AMHS IOT with Mongolia is completed in May 2018. Plan for commissioning after POT completion in 2021			ATN/AMHS tests with India has been put into operation since 2016.	
	Connection tests with Nepal is TBD.		AIDC between Shanghai/Guangzhou and Tapei China put in to operational use since 2013.	ATN and AMHS IOT with Mongolia is completed in May 2018. Plan for commissioning after POT completion in 2021	
	AMHS testing with Japan was completed in March 2021.It will put into operation after TMC is signed.			Connection tests with Nepal is TBD.	
	AMHS testing with Russia in 2021.		AIDC between Dalian and Incheon put into operational use since October 2016.	with the Beijing - Japan AMHS link was put into operation in 2020.	
				AMHS testing with Russia in 2021	
			AIDC between Guangzhou and Hong Kong China put into operational use since May 2018.		
			OLDI between Shenyang and Khabarovsk put into operational use since Oct.2019.		

			AIDC between Kunming and Vientiane put into pre-operational trails since January 2021. AIDC technical test between Beijing ACC and Ulaanbaatar ACC conducted since 2018. Kunming/Yangon under test and progress since May 2017 AIDC technical test between Sanya ACC and Hanoi ACC conducted since 2019.		
HONG KONG, CHINA	**Manila / Philippines** CRV/AMHS circuit was put into operation in May 2019. **Beijing / China** CRV/AMHS circuit was put into operation in April 2021 Macao / China ATN/AMHS circuit was put into operation in December 2009. Wait for Macao to join CRV. **Bangkok / Thailand** ATN/AMHS circuit was put into operation use in 2014. Wait for Thailand to join CRV. **Fukuoka / Japan** CRV/AMHS circuit was put into operation in September 2020. **HoChiMinh / Vietnam** Currently on AFTN. Simple AMHS IOT was conducted in Dec 2019. Wait for Vietnam to join CRV. **Taibei** CRV/AMHS circuit was put into operation in June 2020.	COMSOFT	AFTN-based AIDC with Sanya put into operational use in Feb 2007. AIDC with Taibei put into operational use in Nov 2012. AIDC with Guangzhou put into operational use in May 2018. AIDC with Manila put in operational use in May 2019.	Raytheon ATM system Support AIDC ICD Version 3 commissioned in November 2016.	Already support exchange of IWXXM messages based on FTBP. Support of IHE is planned since November 2020.
MACAO, CHINA	ATN/AMHS interoperability test with Beijing commenced in March 2009. ATN/AMHS circuit with Hong Kong put into operational use in end Dec 2009.	COMSOFT	[Not applicable for using AIDC, looking into the possible application between TWR and ACC/APP]		

	Upgrade of ATN/AMHS to support IPS and IWXXM planned with tentative target date of Q3 2021.				
COOK ISLANDS					
DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA	The ATN BIS Router and AMHS planned for in 2011.		With neighboring ACCs to be implemented		
FIJI ISLANDS	ATN BBIS IPS router and AMHS implemented over CRV for connection to USA in April, 2019 with Australia planned for June, 2019. . For connections with sub-regional centers: For New Caledonia using AMHS since 2017; For connection with Kiribati using UA/AMHS implemented in 2015.	COMSOFT	AFTN based AIDC implemented between Nadi/ Brisbane, Auckland and Oakland.	- Support and implemented AIDC messaging: ABI, EST, CPL, CDN, ACP, TOC, AOC with all three centers - AIDC ICD version 2.0 implemented with Auckland and Oakland. - AIDC ICD Version 1.0 implemented with Brisbane	B2B connection between Nadi AMHS and Brisbane AMHS planned for Q3, 2021 as backup for CRV.
FRANCE (French Polynesia Tahiti)	Planned for implementation of AMHS in 2022 (T1). Using IP with New Zealand since 2017.		Implementation of AIDC (based on Version 3) with adjacent centers (Oakland and Auckland) since 2009.	THALES EUROCAT for AIDC	Alternate routing for backup between Tahiti and Christchurch via Tahiti/New Caledonia IP link
INDIA	Dual stack ATN/IP router and AMHS implemented at Mumbai in 2011. Operational AMHS connections with Bangkok, Dhaka, Singapore, Kathmandu, Karachi implemented. With Beijing implemented in 2016; With Colombo implemented in May2017; With Bhutan implemented in July 2017; (IOT/POT) between Mumbai – Muscat is scheduled with mutual agreement between India & Oman between 0600-0900 UTC from 21.06.2021 onwards.	COMSOFT	Initially-15-May-2017, AIDC implemented between Chennai and Kuala Lumpur with ABI and EST messages. India is currently using APAC AIDC ICD version 3. **A. Implementation within India:** Testing & trials: I. At Delhi with: Ahmedabad, Varanasi, Nagpur	Mumbai: Raytheon Auto track-III Chennai- Raytheon Auto track-III + Delhi: INDRA Aircon Kolkata: INDRA Aircon Bengaluru: SELEX Hyderabad: SELEX Ahmedabad: INDRA Aircon 2100	INDIA

	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.		II. At Chennai with: Mumbai, Kolkata, Trivandrum, Mangalore, Trichy, Hyderabad, Bengaluru III. At Kolkata with: Chennai, Nagpur, Varanasi, Guwahati IV. At Mumbai with: Chennai, Ahmedabad, Nagpur Operational: Chennai- Mumbai; Delhi-Nagpur; Delhi-Ahmedabad, Functional: Delhi-Varanasi, LOA to be signed shortly. **B: Implementation with Neighboring States:** The status on AIDC implementation with following ATSUs of neighboring FIRs is as under: I. **Chennai & Kuala Lumpur** (Malaysia) – ABI, EST successful. CDN is done with voice confirmation. TOC/AOC is implemented w.e.f. 1st Jan 2021. LOA signed on 26th May 2021 effective from 1st June 2021. II. **Chennai & Male (Maldives)** –Trails have been successful. LOA in process. Safety Assessment conducted on 9th April 2021 for implementation III. **Chennai & Colombo** (Sri Lanka) - Colombo in process to address the syntax errors in ABI. Thereafter, trails will be conducted. LOA in progress.	Nagpur: INDRA Aircon 2100 Varanasi: INDRA Aircon 2100 Guwahati: INDRA Aircon 2100 Trivandurm: INDRA Aircon 2100 Mangalore: INDRA Aircon 2100 Trichy: INDRA Aircon 2100 All these systems follow APAC AIDC ICD Ver 3.0 of 2007	

			IV. **Chennai & Yangon** (Myanmar) – 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 V. **Mumbai & Male (Maldives)** – Safety Assessment conducted on 9th April 2021 for implementation. Final LOA to be signed shortly. **VI. Mumbai & Mogadishu** - Successful trials conducted in March 2021. Minor adaptation system issues with Mogadishu automation system identified. Resolution awaited from Mogadishu. **VII Mumbai & Muscat** - Successful trials conducted in March 2021. System issues with Muscat's automation system identified. Resolution awaited from Muscat ATCAS vendor **VIII. Ahmedabad & Karachi (Pakistan)** – Automatic message exchange (e.g. ABI, EST) happens for most of the East bound flights between Karachi & 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 & Karachi and Ahmedabad in second and third phase respectively. **IX. Delhi & Lahore (Pakistan)**- 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.		

			X. Kolkata & Yangon (Myanmar) – 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. **C. Under Planning** I. To conduct operational trials between Kolkata-Dhaka, Mumbai-Karachi (Pakistan), Chennai-Jakarta and Varanasi-Kathmandu subject to readiness from the concerned states. D. Seychelles and Sana ATSU do not have a compatible ATM Automation system in place for AIDC coordination with Mumbai ATSU E. Delhi – Karachi: AIDC between Delhi & Karachi will not be required due to re-structuring of FIRs		
INDONESIA	ATN BIS Router and AMHS with Singapore implemented since February 2018; AMHS Trial (IOT) with Brisbane pending for CRV implementation.	IDS	AIDC implementation in Ujung Pandang ACC conducted as follows: 1) Ujung Pandang ACC –Brisbane ACC: Implemented since July 2017. 2) Ujung Pandang ACC – Manila ACC: Implemented since 4Q 2020; 3) Ujung Pandang ACC – Kota Kinabalu ACC: - Successfully tested and target date for operational trial in 4Q2020;	Thales TopSky in Makassar able to support ICD version 3 since December 2015.	For CRV, target of contract in 3Q2021 and implementation in 4Q2021.

			- Target date for implementation 4Q2021. 4) Ujung Pandang ACC – Oakland ARTCC: - Successfully tested and target date for implementation in 4Q2021. 5) Ujung Pandang ACC – Port Moresby ACC: - Successfully tested on 7 July 2020; - Target date for operational trial in 3Q2020. - Target date for implementation 2Q2021. 6) Ujung Pandang ACC – Jakarta ACC; - Target date for operational trial in 3Q2021. - Target date for implementation 4Q2021; AIDC implementation in Jakarta ACC will be carried out with the following priorities: 1) Jakarta – Ujung Pandang (4Q2021); 2) Jakarta – Chennai (2Q2022); 3) Jakarta – Melbourne (3Q2022); 4) Jakarta – Colombo (4Q2022); 5) Jakarta – Singapore (2Q2023); 6) Jakarta - Kuala Lumpur (3Q2023); 7) Jakarta – Kota Kinabalu (4Q2023).		Priority is in accordance with Hot Spot identified by RASMAG/23
JAPAN	ATN BBIS router and AMHS installed at **USA** in 2000. Connection tests with USA in 2000 - 2004 and put into operational use in 2005.	NEC	AIDC implemented between Fukuoka ATMC and Oakland ARTCC in 1998.		Japan and USA conducting testing AIDC over AMHS and cutover date is 5 May 2017.

	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. Hong-Kong AMHS/FTBP over CRV was put into operation in September 2020. **Singapore** AMHS/FTBP over CRV was put into operation in December 2020. **Beijing/China** AMHS/FTBP over CRV test was all completed in March 2021. It will put into operation after TMC is signed **Taipei** Plan for AMHS/FTBP over CRV IOT in July 2021 POT in 1Q 2022 Incheon/Korea Plan for AMHS/FTBP over CRV IOT in 4Q 2021		AIDC implemented between Fukuoka ATMC and Anchorage ARTCC in 2005. AIDC implemented between Tokyo ACC/Fukuoka ACC and Incheon ACC in 2010. Implemented between Fukuoka and Incheon since June 2009. AIDC implemented between Fukuoka ACC/Naha ACC and Taibei ACC implemented. AIDC between Fukuoka ACC and Shanghai ACC under negotiation.		
KIRIBATI	Connection with Nadi using UA/AMHS implemented in 2015.				

LAO PDR	- ATN BIS Router and AMHS Implemented with Bangkok and Phnom Penh. - AFTN used with Hanoi and Kunming. - For Yangon we have no direct link the connection is used via Bangkok.	THALES	- Vientiane ACC AIDC used for coordination between Bangkok and Phnom Penh ACCs since 2020. - Operation trials are on going with Kunming, Hanoi and Yangon ACCs.	THALES which is able to support ICD Version 2	
MALAYSIA	ATN BIS Router completed 2007. AMHS for Malaysia – Singapore implemented in March 2020. AMHS for Malaysia – Thailand implemented in Dec 2019.	FREQUENTIS	**Kuala Lumpur ACC and Bangkok ACC** AIDC technical test between Kuala Lumpur ACC and Bangkok ACC conducted since November 2016 (ABI/EST/ACP/LAM/LRM/CDN/REJ/TOC /AOC). The operational trial commenced in August 2019 (EST/ACP/LAM/ LRM). The operational implementation commenced on 14th March 2020 (EST/ ACP/LAM/LRM). **Kuala Lumpur ACC and Chennai OCC** AIDC technical test between Kuala Lumpur ACC and Chennai OCC conducted since 31st 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 1st April 2020 (ABI/EST/ ACP/LAM/LRM/CDN/REJ/MAC). The operational trial for TOC/AOC started on 1st July until 1st August 2020.	SELEX which is able to support ICD Version 3.	

			The operational implementation for TOC/AOC commenced on 1st January 2021. The updated LOA signed on 26th May 2021. **Kuala Lumpur ACC and Singapore ACC** 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 1st November 2019 (EST/ ACP/LAM/LRM). **Kuala Lumpur ACC and Ho Chi Minh ACC** AIDC technical test between Kuala Lumpur ACC and Ho Chi Minh ACC To Be Discussed (TBD). **Kuala Lumpur ACC and Jakarta ACC** AIDC technical test between Kuala Lumpur ACC and Jakarta ACC TBD. **Kota Kinabalu ACC and Manila ACC** AIDC Technical Test 1 between Kota Kinabalu ACC and Manila ACC started on 21 – 22nd May 2019 (ABI / EST / ACP / LAM / LRM / TOC / AOC / MAC). Technical Test 2 was conducted on 21 – 22nd 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 **Kota Kinabalu ACC and Ujung Pandang ACC** AIDC Technical Test 1 between Kota Kinabalu ACC and Ujung Pandang ACC started on 7 – 8th August 2019 (ABI / EST / ACP / CDN / LAM / LRM / REJ / MAC).		

			Technical Test 2 was conducted on 23 – 24th October 2019 (ABI / EST / ACP / LAM / LRM / TOC / AOC / MAC). Technical Test 3 was conducted on 11th March 2020 (EST / ACP / LAM / LRM). Upcoming AIDC Technical Test between Kota Kinabalu ACC and Ujung Pandang ACC to be conducted in Q32021 **Kota Kinabalu ACC and Jakarta ACC** AIDC Technical Test between Kota Kinabalu ACC with Jakarta ACC is to be discussed. **Kota Kinabalu ACC and Singapore ACC** AIDC Technical Test between Kota Kinabalu ACC and Singapore ACC started on 22nd September 2015 (ABI / EST / ACP / CDN / LAM / LRM / REJ / MAC). AIDC Technical Test 1 was conducted on 18 – 19th November 2019 (ABI / EST / ACP / CDN / LAM / LRM / REJ / MAC). Technical Test 2 was conducted on 16th January 2020 (EST / ACP / LAM / LRM). AIDC Operational Trial started since 16th November 2020 and to be extended until 30th June 2021. Agreement on Operational Implementation has been materialized on 3rd June 2021. Operational Implementation is agreed to be conducted on 1st July 2021 (EST / ACP / LAM / LRM) **Kuching ACC and Singapore ACC** 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 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)		

			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. **Kuching ACC and Jakarta ACC** AIDC between Kuching ACC and Jakarta ACC TBD.		
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. 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. Also will look for the possibility of implementing the CRV network to use with AMHS and AIDC during the same phase.		Connection established with all the adjacent ATSUs. Interoperability tests successfully completed in 2017. 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. Ready to sign LOA with Melbourne and is expected during the 2nd quarter of 2019. Trials with Colombo had few issues, which Colombo is working to resolve it on their end with the automation system supplier.	SELEX which is able to support ICD Version 3.	

			Connections between all 5 ATSUs are turned ON in the ATS automation system to conduct pre-notified operational trials.		
MARSHALL ISLANDS					
MICRONESIA (EDERATED STATES OF)					
Chuuk					
Kosrae					
Pohnpei					
Yap					
MONGOLIA	AMHS/AFTN gateway implemented 2012. ATNBIS router implemented in 2014. ATN and AMHS IOT with China was completed in May 2018. Plan for commissioning after POT completion in 2019.	COMSOFT	ATM automation system supports both AIDC and OLDI. Coordinating with Russia on OLDI connection in target date 2016. Coordinating with China on AIDC connection between Beijing/Ulaanbaatar technical trials in progress. Planned date of testing in 2019.	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. AMHS implementation is planned for after successful implementation of CRV this year. AMHS implementation planned for 2020.	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. AIDC implementation with Indonesia to happen after CRV implementation this year.	New ATM System from Thales (TopSky-ATC) implemented and operational now supports AIDC V3.	
PHILIPPINES	ATN/AMHS Boundary Intermediate System was installed at the new Manila CNS/ATM Center; • Site Acceptance, Oct. 2015 • Commissioned & operational, March 2018 AMHS implementation over CRV with;	**Frequentis - Comsoft**	AIDC implementation status/update over AMHS with the following FIR's; **HONG KONG** – Implemented, May 2019	THALES which is able to support ICD Version 2.	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; **-HONG KONG**

	• **HONG KONG** - May 2019 • **TAIPEI** - Sept. 2019 • **SINGAPORE** - Dec. 2020 • **OAKLAND** - April 2021		**SINGAPORE** – Implemented, December 2020 **TAIPEI** – Implemented, December 2019 **UJUNG PANDANG** – Implemented, December 2020 via **BBIS** **HO CHI MINH** - Awaiting OPS trial. Technical Test conducted on June 15-16, 2021. **KOTA KINABALU** – Next progress AIDC test to be scheduled, target 3Q2021 **OAKLAND** – 1st test to be scheduled, target 3Q2021		**-TAIPEI** **-SINGAPORE** **-OAKLAND**
REPUBLIC OF KOREA	Plan to upgrade AMHS support IWXXM from 2023 over CRV Frequentice 1) AMHS/CRV IOT with China and Japan in 4Q of 2021 2) AMHS/CRV POT with China and Japan in 4Q 2022 3) Cutover to AMHS/CRV with Chi na and Japan in Q1 2023 after POT 4) Implementation of AMHS/CRV with Japan Q1 2023	FREQUENTIS	AIDC implemented between ACC and Fukuoka ATMC in 2010 AIDC between Incheon and Dalian implemented in Nov. 2016.	Rockheed Martin System	
SINGAPORE	AMHS implemented with:	FREQUENTIS	1) Operational with Ho Chi Minh implemented Jul 2014.	THALES supports ICD Version 3 since December 2018	

	1) AMHS circuit with India put into operational use in Mar 2011. 2) AMHS circuit with UK put into operational use in Mar 2012. 3) AMHS circuit with Thailand put into operational use in Dec 2014. 4) AMHS circuit with Australia put into operational use in Oct 2016. 5) AMHS circuit with Indonesia put into operational use in Feb 2018. 6) AMHS circuit with Malaysia put into operational in Mar 2020. 7) AMHS circuit with Japan put into operational in Dec 2020. 8) AMHS circuit with Philippines put into operational in Dec 2020. Inter-Operability Test (IOT) with Vietnam started in 2019. IOT with Sri Lanka, Bahrain and Brunei to be confirmed.	COMSOFT	2) Kuala Lumpur operational trial started since Sep 2018 and is implemented Nov 2019. 3) Implemented with Kuching ATCC in Feb 2021. 4) Operational trial ongoing with Kota Kinabalu ATCC since Nov 2020 and implementation date on 1st July 2021. 5) Manila operational trial started in Feb 2019. Implementation Nov 2019. 6) Technical trials with Jakarta ACC will be initiated once the Jakarta ACC ATMS renewal is completed.		
SRI LANKA	ATN BIS Router Planned for 2013. IP based AMHS implemented by Oct. 2017. - Mumbai tested May 2017 operational planned for Q4 2017;	IDS	Trials with Male planned for in 3Q2019.	INTELCAN which is able to support ICD Version 3.	

	- Singapore testing in Q4 2017 operational for 2018; - Male testing and operational date TBD.		Trial with Chennai on-going. Plan for implementation in 2018 and with Melbourne plan for 1Q2018.		
THAILAND	BBIS/BIS Routers already implemented. Connection with Bangladesh, Bhutan, Cambodia, China, India, Lao PDR, Myanmar, Singapore, Hong Kong China, and Malaysia implemented. Bangkok -Viet Nam Circuit IOT Test: Done POT Test: Planned for end of 3Q2021 Bangkok - Rome Circuit IOT Test: Planned for 3Q2021 Connection with SITA (SITA AMHS Gateway inter-connections) implemented. POT Test: Planned for end of 4Q2021	AEROTHAI's AMHS System	The implementation with Lao PDR has done since 14th July 2020 Cambodia has done on 22nd feb 2021 In addition, it is planned to implement AIDC with Myanmar.	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	- Australia - Fiji - New Zealand - Japan - Philippines	IN-HOUSE	- Fiji, Japan, New Zealand - Tahiti (via New Zealand), - Papua New Guinea via Australia (Direct planned for 2021)	IN-HOUSE which is able to support APAC and NAT ICDs currently Version 2.	

	- Papua New Guinea (2021) - Indonesia (2022) - Russia (Planned)		- Philippines (2021) - Indonesia via Australia (Direct planned for 2022) - Russian Federation (pending joining CRV)		
VANUATU					
VIET NAM	AMHS (basic) implemented from 4Q/2018. Plan AMHS extended from Q4 2022 IOT with Singapore from 10/2019 to 8/2020 IOT with Hong Kong 12/2019 IOT with Thailand 6/2020, POT 8/2020.	IN-HOUSE	Operational between Ho Chi Minh and Singapore since July 2014. Operational trial for additional messages sets on-goning. Technical testing between Ho Chi Minh with Philippines on going Technical testing with Cambodia already done; Technical testing between Hanoi and Vientiane, Lao. PDR. already done with Malaysia TBC For operation trial TBC. Operation trial between Ho Chi Minh and Hanoi ongoing.	Support ICD Version 1.0 with THALES at Ho Chi Minh ATM system. Support ICD Version 3.0 with Selex at Hanoi ATM System.	
Wallis and Futuna (FRANCE)	AMHS implementation planned for end of 2017			COMSOFT	

CRV IMPLEMENTATION TABLE

State/ Administration	Intended date for CRV cut-over	Applications targeted	Migration scheme	Prerequisites/ dependencies
Australia	Contract in May2018 and service readiness in 3Q 2018	AFTN, ADS-B, AMHS, Voice With: **Australia** February,2019(AMHS/AIDC), March,2019(Voice) **Fiji** March,2019 (AMHS June 2019/AIDC, Voice completed April) **New Zealand,** February, 2019 (AMHS June 2019, AFTN May 2019/AIDC), March, 2019 (Voice April 2019 completed) **Indonesia** 4Q2019 (TBC) (AMHS/AIDC, Voice, ADS-B); **PNG** 4Q2019(TBC), (AMHS/AIDC, Voice) **Singapore** 2Q2019 TBC (AMHS/AIDC, Voice); **South Africa TBC** 3Q2019 TBC (AMHS/AIDC, Voice); **Japan** would be end of 2019.	staged approach	Termination of current COM contract
Bhutan	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
Cambodia	As early as convenient, dependent on neighboring countries			Internal decision making
China	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	
DemocraticPeople's Republic of Korea	Contract in 3Q2018 and service readiness in 4Q2018	AFTN and VoIP		
Hong Kong, China	Contract signed on 6 April 2018. Connection was installed successfully in June 2018.	**With Manila** CRV-Voice put into operation in August 2018 CRV-AMHS put into operation in May 2019 **With Taibei** CRV-AMHS put into operation in May 2020 **With Fukuoka** CRV-AMHS put into operation in September 2020 **With Beijing** 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
		Bangkok and Hochiminh Subject to their readiness		
Macao, China	Service readiness in Q4 2021	To be confirmed	Staged approach	Migration from X.25 to IPS
Fiji	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
France (New Caledonia and French Polynesia)	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 *Wallis and Futuna: no dedicated connection to CRV*
India	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
Indonesia	Contract in 3Q2021 and service readiness in 4Q2021.	AFTN, AMHS, ADS-B and voice		CBA completed
Japan	Contract signed in Nov.2017 and service readiness in1Q 2018for 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 in1Q2021	staged approach	
Malaysia	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.
Myanmar	Contract will be signed 4Q2020.	AFTN/AMHS, AIDC, ADS-B and voice	staged approach	One of counterparts join in
Nepal	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
New Zealand	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.
Philippines	Contract signed in March 2018 and service readiness in 2Q2018	Completed: with **HONG KONG** AIDC - 2Q2019; AMHS - 2Q2019; Voice - 3Q2018. with **TAIPEI** AIDC 4Q2019; AMHS 3Q2019; Voice 1Q 2019. with **SINGAPORE** AIDC – 4Q2019; AMHS –4Q2020; Voice – 1Q2020. with **USA** 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 **INDONESIA** AIDC – 4Q2020.		
Republic of Korea	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	
Singapore	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	**Singapore**
Sri Lanka	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
Thailand	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	
United States	Contract in January 2018	1) AMHS with Australia Fiji Japan Philippines New Zealand Papua New Guinea (2021) Indonesia (2022) 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) 3) VoIP with Fiji Japan Philippines New Zealand Papua New Guinea (direct planned 2021) Indonesia (2022) Russia (when join CRV)	Staged approach	

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

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AMHS Readiness Report for Supporting IWXXM Traffic

No.	States/Administration	Name of State (Administration)/name of BBIS/BIS location where AMHS is installed:	AFTN/AMHS transition date/schedule	Readiness Status of AMHS for supporting File Transfer Body Part (FTBP), the Interpersonal Message (IPM) Heading Extension (IHE) to support for exchanging IWXXM reports of a maximum size of 4MB and FTBP of maximum 2MB:	Capacity status of the operational AFS links to support the exchange of the required meteorological information in both IWXXM GML form and TAC form:
1	Australia	Airservices - Brisbane	Completed. AMHS exchange in place with USA, Fiji, New Zealand, Singapore and South Africa. AFTN still in place with Indonesia and PNG, migration to AMHS based on pending readiness both partners Several Pacific island nations connecting via FCO CADAS ATS Terminal, currently over AFTN. Airservices plans to migrate to AMHS P3 CADAS but will need to provide user training. All domestic users and data originators still on AFTN, no desire by external partners to migrate to AMHS, awaiting SWIM instead.	Full compliance and support since Nov 2020	Airservices has contracted a 2.0Mbps bandwidth using CRV Package C+ for Voice & AMHS services. Bandwidth on the leased line with South Africa / Johannesburg is also 2Mbps.
2	China	Beijing	AMHS deployed in 2008 which was upgraded to support ATN/IPS in 2013 and upgraded to support exchanging IWXXM in 2020.	support	CRV bandwidth is 3M. Minimally 64kbps for each AMHS connection..
3	Hong Kong China	Hong Kong China	December 2009	Support	2MB for CRV and 64kbps for IPLCs
4	Fiji	Fiji Airport/Air Traffic Management Centre	Completed. In June 2019, Fiji completed the transition of ATN BBIS to IPS for the AMHS service from Nadi to Salt Lake, USA & Brisbane, Australia over the CRV network. The local end User still operates on AFTN terminal and is converted to AMHS over the AFTN/AMHS Gateway.	The Comsoft AMHS System supports File Transfer Body Part (FTBP). Our system has the capability of exchanging IWXXM reports of a maximum size of 4MB and FTBP of maximum.	Nadi has contracted a 1.0Mbps bandwidth using CRV Package C+ for Voice & AMHS services. The total bandwidth usage for voice and data is 768K from the total 1.0Mbps. The bandwidth for AMHS is 64Kbps each to Brisbane & Salt Lake Center. It is noted in the ACSICG/7 WP04 presented by USA that 64Kbps is the minimum recommended required bandwidth for AMHS to exchange FTBP for IWXXM.
5	India	AAI/Mumbai Airport	AMHS is in operation since 2011. India is in the process of tendering for replacement of existing AMHS system . The Tender action stands delayed due to COVID pandemic.	Presently India is not able to exchange the required 4 MB messages and 2 MB FTBP attachments.	Indian Meteorological Department is in the process of upgradation of HPC & DB to support IWXXM.

No.	States/Administration	Name of State (Administration)/name of BBIS/BIS location where AMHS is installed:	AFTN/AMHS transition date/schedule	Readiness Status of AMHS for supporting File Transfer Body Part (FTBP), the Interpersonal Message (IPM) Heading Extension (IHE) to support for exchanging IWXXM reports of a maximum size of 4MB and FTBP of maximum 2MB:	Capacity status of the operational AFS links to support the exchange of the required meteorological information in both IWXXM GML form and TAC form:
6	Japan	Japan/Fukuoka	ATN BBIS router and AMHS installed at 2000. Connection tests with USA 2000 - 2004 and put into operational use in 2005 and over CRV in February 2019. Put into AMHS operation with Hong- Kong and Singapore in 2021. AMHS implementation with China in 2021 , Korea and Taipei in 2022.	Already support exchange of IWXXM messages based on FTBP in August 2015. It is possible to send , receive and transfer up to 2GB for the contents such as FTBP,IPM and IHE in AMHS,and the size of IWXXM suported system by Japan Meteorological Agency is 2MB	AFS links over CRV is a Package A, Bandwidth 2M.
7	Macao China	Macao China	Q4/2009	Q3/2021	To be determined
8	Philippines	Philippines/ATMC Manila	Completed March 2018	Can support IHE and FTBP maximum 1MB (tested with Taipei on 13-May-20)	1MB Philippines has contracted 2Mbps bandwidth using CRV package “A” voice and data services.
9	Republic of Korea	Gimpo international airport	ATN/AMHS with China put into operational use in June, 2011. AMHS implementation with China and Japan over CRV will be in 4Q, 2022.	AMHS implementation for supporting FTBP and IHE will be in 4Q, 2022.	AFS links over CRV is a Package A, Bandwidth 2M.
10	Singapore	Singapore	March 2011	Yes	2MB for CRV and minimally 64kbps for IPLCs
11	Thailand	Thailand	BBIS/BIS Routers already implemented. AMHS has been implemented since July 2011. Connection with Bangladesh, Bhutan, Cambodia, China, India, Lao PDR, Myanmar, Singapore, Hong Kong China, and Malaysia implemented. Connection with SITA (SITA AMHS Gateway inter-connections) implemented. **Bangkok - Vietnam Circuit** IOT Test : Done POT Test: Planned for end of 3Q2021 **Bangkok - Rome Circuit** IOT Test: Planned for 3Q2021 POT Test: Planned for 4Q2021	Completed, the IWXXM exchange has been implemented since November 2020.	The capacity of links readied to support in both form.

No.	States/Administration	Name of State (Administration)/name of BBIS/BIS location where AMHS is installed:	AFTN/AMHS transition date/schedule	Readiness Status of AMHS for supporting File Transfer Body Part (FTBP), the Interpersonal Message (IPM) Heading Extension (IHE) to support for exchanging IWXXM reports of a maximum size of 4MB and FTBP of maximum 2MB:	Capacity status of the operational AFS links to support the exchange of the required meteorological information in both IWXXM GML form and TAC form:
12	USA	Federal Aviation Administration	Q4, 2020	Yes. FAA AMHS has FTBP capability. National Weather Service (NWS) projected to implement IWXXM by Q3, 2021	Yes. 2MB bandwidth over CRV

Roadmap for Mode S DAPs Implementation in APAC Region

(Agreed by Mode S DAPs WG/4 and SURICG/6)

1. INTRODUCTION

1.1 The Terms of Reference for the Mode S DAPs Working Group includes the formulation of a roadmap for DAPs Application.

1.2 An initial version of the roadmap was generated at Mode S DAPs WG/3 for adopted by SURICG/6.

1.3 The topics considered in the roadmap were:

a) Mode S mandate;
b) Use of II and SI mixed Codes;
c) Radar Clustering;
d) Use of conspicuity codes;
e) Weather reporting capability; and
f) Datalink Map.

1.4 However, due to the evolving and complex nature of Mode S related technology, only the roadmap of *Mode S mandate* was adopted after some amendment.

1.5 Based on current practices around the world and taking into account the situation in Asia Pacific, the Mode S DAPs WG/4 formulated the revised version of roadmap for the Asia Pacific Region.

2. SUMMARY

The revised roadmap is summarised as follows:

S/N	Issue	Proposed Roadmap	Reasons
1	Mode S Mandate	**Conclusion APANPIRG/31/14 (CNS SG/24/13 (SURICG/5/3(DAPs WG3/1))) - Mode S Forward Fit Equipage in APAC Region** That, States/Administrations in APAC Region be strongly encouraged to mandate that registered aircraft with a maximum certified take-off mass exceeding 5 700 kg or having a maximum cruising true airspeed capability greater than 250 knots, with a date of manufacture on or after 1 January 2022 be equipped with Mode S avionics compliant with Enhanced Surveillance (EHS).	Considering that a number of DAPs applications will require EHS and that it's easy for new aircraft to be equipped with EHS. Retrofitting existing airframes with EHS will need further deliberation under challenging pandemic situation.
2	Use of II and SI mixed Codes	**Proposed Draft Conclusion** States with Mode S radar capable of performing II/SI mode operations are urged to transit from II code to II and	Due to higher density of radars, some states are facing a shortage of IC codes, which has to be solved by transiting from II to II and SI mixed code. It is noted that

		SI mixed code, so as to ease the shortage of II codes. States planning to perform the transition shall coordinate with ICAO APAC to obtain the SI codes.	radars using II and SI codes can co-exist, hence there is no need for a big bang approach. However, States still have to coordinate with ICAO APAC on the allocation of SI codes. Due to some aircraft still not SI code ready, only radars with II/SI mode should be allowed to use SI
3	Radar Clustering	No proposed roadmap at the moment. But States with the competency and operational requirement may consider applying such technique.	Due to complexity and cost, only Germany and the Netherlands have implemented such techniques. It is unclear whether the benefits outweigh the cost.
4	Use of conspicuity codes	Mode A = 1000 has already being assigned as the conspicuity code.	It is foreseen that the region will need the automation systems to be able to support the conspicuity code feature before Mode S address can be used in lieu of Mode A address for selected flights. There may be a need to coordinate the efforts with ATMAS TF in the region.
5	Weather reporting capability	Not practical to mandate weather reporting capability in Mode S, as there are no ready solutions to enable such capability for current transponders (i.e. versions 0, 1, and 2). States requiring such capability should consider other means to generate weather information (such as using algorithm to derive weather information).	While weather data is one of the Mode S DAPs, only very few (<1%) aircraft has this capability. The industry does not have software patches to enable this weather feature, hence there is no point having a mandate for weather capability. Instead, some States researched algorithms to derive weather information. It is foreseen that the weather reporting capability will be available in version 3 transponders
6	Datalink Map	No proposed roadmap at the moment. States are instead urged to adopt the various SARPs and guidance material relating to reduction of frequency congestion.	It is difficult to implement and enforce datalink map with no certainty of success. It is more practical to adopt the SARPs and guidance materials relating to the reduction of frequency congestion.
7	Monitoring of 1030 and 1090 MHz usage	States with capability are urged to perform RF measurement on 1030 and 1090 MHz usage. Guidance material is proposed.	It is necessary to ensure that the RF occupancy is kept at healthy levels.

Note: The roadmap may be revisited as and when necessary. It is foreseen that for the items without roadmap, they may be reviewed in 2 to 3 year time.

ADS-B IMPLEMENTATION STATUS IN THE APAC REGION

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

State/ Administration	ADS-B Ground Infrastructure and ATC System readiness or Implementation plan	Date of issue/ effectiveness date of equipage mandate	Mandated Airspace and/or ATS-routes	Intended separation criteria to be applied	Remarks
BANGLADESH	Bangladesh has a plan to install four ADS-B ground stations to be installed at Dhaka, Cox's Bazar, Saidpur and Barisal Airports by 2019. ADS-B data will be integrated with new ATM system at Dhaka. 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.				Bangladesh is willing to share ADS-B data with neighbouring States to enhance the safety and surveillance capability in the sub-region.
BHUTAN	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.			
BRUNEI DARUSSALAM	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. Memorandum of Understanding (MOU) on ADS-B data sharing				

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.				
CAMBODIA	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.				
CHINA	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. 308 ADS-B stations nationwide have already finished the final acceptance activities. 4 ADS-B stations operational in Sanya FIR since 2008. Chengdu-Jiuzhai and Chendu - Lhasa route with 9 ADS-B stations.	The operation of national ADS-B Service is implementing in step -by-step way. Phase I: from October 10, 2019 ➢ ADS-B control services will be provided in APP where radar control services are not available; ➢ ADS-B control services will be implemented in control area above 8400m (inclusive) where Radar control services are not available; ➢ 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. Phase II: from December 31, 2020	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
	9 ADS-B stations deployed on the routes H15 and Z1 by the end of 2015. 19 ADS-B stations at the small airport.	➢ ADS-B control services will be provided in APP and ACC where radar control services are not available; ➢ 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 ➢ ADS-B equipment will be used at the tower of transport airports to display flight movements.			
HONG KONG CHINA	A larger-scale A-SMGCS covering the whole Hong Kong International Airport put into operational use in April 2009. Data collection/ analysis on aircraft ADS-B equipage in Hong Kong airspace conducted on quarterly basis since 2004. ADS-B trial using a dedicated ADS-B system completed in 2007. ADS-B out operations over PBN routes L642 and M771 at or above FL 290 within HK FIR	AIP supplement issued on 29 Aug 2014 with 8 Dec 2016 as effective date.	HKFIR at or above FL290	5NM surveillance separation	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.

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
	was effective in December 2013 and within HK FIR at or above FL 290 has been effective since December 2016. ADS-B ground station infrastructure completed in 2013. 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.				
MACAO, CHINA	Mode S MSSR coverage available for monitoring purposes.				Airspace – ATZ only
DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA	ADS-B has been used as back-up surveillance of SSR since 2008.				
FIJI ISLANDS	ADS- B /multilateration ground stations installed. Situations awareness service provided in 2013.	ADS-B mandate commencing from 31st December 2013	Mandate for domestic registered aircraft.		

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

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
	processing ADS-B data.				
INDONESIA	All 30 ADS-B ground station have been met with DO260B in November 2019; 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. The ADS-B ground stations has been integrated to 9 ATC systems and 3 others will follow after being upgraded.		Starting on 23rd 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.	Using 5 NM separation standard.	ADS-B data sharing had been conducted by Indonesia with Australia and Singapore. LOA of collaboration in ADS-B data sharing has been achieved with India. LOA of collaboration in ADS-B data sharing are under reviewing by Malaysia, Philippines and PNG.

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
JAPAN	Multilateration Systems for surface monitoring have been implemented at eight airports PRM (WAM) has been implemented at Narita Airport and Haneda Airport. En-route WAM system have manufactured for four areas and will be put into operation in FY2021 Plan to evaluate accuracy of ADS-B information under RAD condition.				
KIRIBATI					
LAO PDR.	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. 3 additional ADS-B ground stations (DO-260B compliant) will be completed the installation at existing MSSR sites (Xiengkhouang, Savannakhet and Champasack)				

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
	by 2016 to Q1 of 2017 to enhance the full ADS-B coverage of Lao FIR.				
MALAYSIA	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. Kota Kinabalu FIR: Four (4) new ADS-B will be installed in Kuching, Bintulu, Kota Kinabalu and Sandakan, to be completed in Dec 2021. Implementation Plan: Phase 1: ADS-B services on specific ATS routes and Flight Levels within Kuala Lumpur FIR, target date Mar 2021. Phase 2: ADS-B as secondary means of surveillance within the	AIC Issued on September 2017. AIP Supp on 16 Jan 2020.	Phase 1: On ATS routes N571, P628, L510, P627, L645 and P574 at FL 290 to FL 410 within Kuala Lumpur FIR Phase 2: En-route airspace	ICAO approved surveillance separation.	

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

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
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	**a) The ADS-B Implementation Update** - 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. - 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. **b) The ADS-B data sharing update between neighbouring States** - Myanmar and India signed the MOU agreement for ADS-B	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.

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
	data sharing on 6th May 2015. ADS-B data sharing test between Agartala (India) - Sittwe (Myanmar), and Port Blair (India) - 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. - Myanmar have planned to install new ADS-B Station in the 2nd 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.				

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
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	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 MLAT and ADSB data from the NZAA MLAT system to support surface movements control at NZAA	Current: ADSB mandate FL245 and above in the NZZC FIR from DEC 31, 2018, active **Proposed:** ADSB mandate for all controlled airspace from DEC 31, 2022, promulgated by NZCAA (Delayed from 2021 by 1 year due to COVID) **Current:** 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 specifies the	Current: All controlled airspace within the NZZC FIR FL245 and above. **Proposed:** All controlled airspace within the NZZC FIR	5NM surveillance separation in enroute controlled airspace, and 3NM surveillance separation in Terminal approach controlled (Class C) airspace.	Currently situational awareness surveillance targets are displayed for ADS-B targets from which the data supplied does not meet the requirements for surveillance separation.

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
	ADSB data at 6 domestic aerodromes to provide ADSB APT surface movements control 34 ADSB-B Ground stations for Enroute, Terminal and ADSB APT services	minimum Technical Standing Orders (TSO) or transponder GNSS receiver models for position input into ADS-B			
PAKISTAN	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.				
PAPUA NEW GUINEA	Initially 7 ADS-B sites to be deployed across PNG to provide seamless coverage above FL285. 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. Additional 7 sites to be rolled-out in the 2018/19 timeframe. Site location will be dependent on infrastructure, security and	An ADS-B mandate is on CASA PNG roadmap, however legislation yet to be developed. The Australian mandates will largely drive equipage for overflights (e.g. East-Asia to Australia/South Pacific). Expectation is that PNGASL (the ANSP) will lead development of ADS-B mandate framework. Initial steps may include mandate above F245 – but will depend on performance of Phase 1 ADS-B deployment.	None	**Air Traffic Control** <u>Approach/ Arrivals</u> 2018 – 5NM 2019 – 3NM (approach) <u>Upper Airspace (>FL245)</u> 2017/18 – Situational awareness. 2018/19 – 5NM	

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

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
	Mt. Majic Mactan, and General Santos "Tambler" Airport.				
REPUBLIC OF KOREA	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.	
SINGAPORE	The airport MLAT system was installed in 2007 and "far-range" ADS-B sensor was installed in 2009. ATC system has been processing ADS-B data since 2013.	AIC was issued on 28 December 2010/effective from 12 Dec.2013. ADS-B OUT equipment requirement for all aircraft operating on selected ATS routes within the WSSS FIR from 27 January 2022. ADS-B OUT equipment requirement for all aircraft operating within the WSSS FIR from 26 January 2023. AIP updated in May 2018 to reflect the ADS-B equipment certified as meeting: a. EASA - (AMC 20-24), or b. EASA CS-ACNS (Subpart D - Surveillance - SUR), or c. FAA - Advisory Circular No: 20-165A (or later versions), or	At and above FL290, affecting the following ATS routes L642, L644, M753, M771, N891 & N892 At and above FL290, affecting the following ATS routes L517, L625, L649, M758, M767, M768, M772 & N884.	40nm implemented on ATS routes L644 and N891. 20nm implemented on ATS routes L642, M771, M753 and N892.	Safety case was completed end of November. 2013.

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
		d. The equipment configuration standards in Appendix XI of Civil Aviation Order 20.18 of CASA.			
SRI LANKA	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.
THAILAND	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	

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
	The new ATM automation system was successfully implemented in Q1 2020. It can The ATS surveillance data sharing with the adjacent FIRs was approved in principle in October 2018.				
TONGA	Trial planned for 2017				
UNITED STATES	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.	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.	Class A, B, and C airspace, plus Class E airspace above 10,000 ft MSL. See 14 CFR 91.225 for details.	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: - 3nm - 2.5nm - independent parallel approach operations down to 3600 ft centreline separation - dependent	The U.S. has implemented integrated WAM/ADS-B in the following terminal areas: Charlotte LAX Implementation of integrated WAM/ADS-B is being considered for additional U.S. terminal areas.

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
				parallel approach operations down to 2500 ft centreline separation (currently 1.0 nm diagonal distance).	
VANUATU					
VIET NAM	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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List of Conclusion/Decisions adopted by CNS SG/25

<table>
<tr><td colspan="3">Conclusion CNS SG/25/01 (ACSICG/08/01(CRV/08/01)) – CRV Implementation Plan amendment (Version 2.1)</td></tr>
<tr><td colspan="2">What: That, the CRV Implementation Plan be amended to include the following new text in paragraph 2.4.2 – IP Addressing

iii. In the development of the IPv4 plan, a flexible margin has been designated to allow future growth or change. Through draft Conclusion CRV OG/8/01, using 10.46.0.1 to 10.46.255.254, each third party Service Provider (e.g. AIREON LLC providing Automatic Dependent Surveillance - Broadcast data over CRV) is assigned 254, 510, 764 or 1022 usable Network addresses (depending on Service Providers' technical requirements); and</td><td>Expected impact:
☐ Political / Global
☐ Inter-regional
☐ Economic
☐ Environmental
☒ Ops/Technical</td></tr>
<tr><td>Why: To allocate IP addresses to third party service providers for the delivery of services over CRV</td><td colspan="2">Follow-up: ☐Required from States</td></tr>
<tr><td>When: 22-Oct-21</td><td colspan="2">Status: Adopted by Subgroup</td></tr>
<tr><td colspan="3">Who: ☒Sub groups ☐APAC States ☐ICAO APAC RO ☐ICAO HQ ☒Other: ACSICG</td></tr>
</table>

<table>
<tr><td colspan="3">Conclusion CNS SG/25/03 (SWIM TF/5/01) – Asia/Pacific SWIM Implementation Plan and Status Survey</td></tr>
<tr><td colspan="2">What: To conduct a survey on SWIM implementation plan and status of Asia/Pacific Member States.</td><td>Expected impact:
☐ Political / Global
☐ Inter-regional
☐ Economic
☐ Environmental
☒ Ops/Technical</td></tr>
<tr><td>Why: To establish a baseline understanding of SWIM implementation plan and status within the Asia/Pacific region so as to aid the development of the regional SWIM implementation roadmap.</td><td colspan="2">Follow-up: ☒Required from States</td></tr>
<tr><td>When: 22-Oct-21</td><td colspan="2">Status: Adopted by Subgroup</td></tr>
<tr><td colspan="3">Who: ☒Sub groups ☒APAC States ☐ICAO APAC RO ☐ICAO HQ ☒Other: SWIM TF</td></tr>
</table>

Decision CNS SG/25/04 (*SWIMTF/05/02)* – Revised SWIM TF Terms of Reference	
What: That, the revised SWIM TF Terms of Reference (ToR) as shown in **Appendix F** to the report be adopted.	Expected impact: ☐ Political / Global ☐ Inter-regional ☐ Economic ☐ Environmental ☒ Ops/Technical
Why: To align with the progress made since the establishment of SWIM TF, the update of ICAO global and regional air navigation plans, and the revised task groups under SWIM TF adopted at SWIM TF/4.	Follow-up: ☐Required from States
When: 22-Oct-21	Status: Adopted by Subgroup
Who: ☒Sub groups ☐APAC States ☐ICAO APAC RO ☐ICAO HQ ☒Other: SWIM TF	

Conclusion CNS SG/25/05 – The Catalogue of Asia and Pacific Flight Inspection and Flight Validation Service Providers	
What: That, *The Catalogue of Asia and Pacific Flight Inspection and Flight Validation Service Providers* (Eleventh Edition) in the **Appendix G** to the report is adopted and be published on the ICAO Regional Office website.	Expected impact: ☐ Political / Global ☐ Inter-regional ☐ Economic ☐ Environmental ☒ Ops/Technical
Why: The information in *The Catalogue of Asia and Pacific Flight Inspection and Flight Validation Service Providers Tenth Edition, April 2018)* need to be updated as per the recommendation of CNS SG/24	Follow-up: ☐Required from States
When: 22-Oct-21	Status: Adopted by Sub-group
Who: ☒CNS Sub-group ☐APAC States ☒ICAO APAC RO ☐ICAO HQ ☐Other:	

Conclusion CNS/SG/25/06 - Update of Flight Inspection Guidance Material (FIGM) for APAC Region	
What: That, the Edition 2.0 of the Flight Inspection Guidance Material (FIGM) provided in **Appendix H** to the Report be adopted.	Expected impact: ☐ Political / Global ☐ Inter-regional ☐ Economic ☐ Environmental ☒ Ops/Technical
Why: The FIGM is subject to regular review and update, in the light of on-going development of flight inspection standards and recommended practices.	Follow-up: ☐Required from States
When: 22-Oct-21	Status:Adopted by Subgroup
Who: ☒Sub groups ☐APAC States ☒ICAO APAC RO ☐ICAO HQ ☐Other:	

Conclusion CNS SG/25/10 *(SURICG/6/4) (DAPs WG/4/6)* - Mode S DAPs IGD 3.0		
What: That, the *Mode S DAPs Implementation and Operation Guidance Document* Edition 3.0 provided in **Appendix J** to the report be adopted.		Expected impact: ☐ Political / Global ☐ Inter-regional ☐ Economic ☐ Environmental ☒ Ops/Technical
Why: Editorial correction and revision to reflect regional updates in implementation.	Follow-up: ☒Required from States	
When: 22-Oct-2021	Status: Adopted by Sub-Group	
Who: ☒Sub groups ☒APAC States ☐ICAO APAC RO ☐ICAO HQ ☒Other: SURICG		

<table>
<tr><td colspan="3">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)</td></tr>
<tr><td colspan="2">What: ICAO APAC Regional Office to:
a) update EUROCONTROL with the latest SAC allocation within Asia Pacific; and

b) coordinate the allocation of SAC within Asia Pacific and not the SIC.</td><td>Expected impact:
☐ Political / Global
☐ Inter-regional
☐ Economic
☐ Environmental
☒ Ops/Technical</td></tr>
<tr><td colspan="2">Why:
a) EUROCONTROL published the SAC for all the regions except Asia Pacific. It is believed that the publication will be beneficial to the developers of future message protocol and surveillance related applications.

b) SIC is managed by State and there is little value for ICAO APAC to manage the SIC. Considering the workload to manage the SIC and the negligible benefits, it is proposed that ICAO APAC not to manage SIC.</td><td>Follow-up:
☐Required from States</td></tr>
<tr><td>When: 22-Oct-2021</td><td colspan="2">Status: Adopted by Sub-Group</td></tr>
<tr><td colspan="3">Who: ☒Sub groups ☐APAC States ☒ICAO APAC RO ☐ICAO HQ ☒Other: SURICG</td></tr>
</table>

<table>
<tr><td colspan="3">Decision CNS SG/25/12 (SURICG/6/6): Revised ToR of Surveillance Study Group (SURSG)</td></tr>
<tr><td colspan="2">That, the Revised Terms of Reference of the Surveillance Study Group (SURSG) provided in Appendix L to the report be adopted.</td><td>Expected impact:
☐ Political /Global
☐ Inter-regional
☐ Economic
☐ Environmental
☒ Ops/Technical</td></tr>
<tr><td>Why: The SURSG/1 meeting reviewed the ToR and made amendments on adding chair role and function, frequency of the meeting of SURSG and the mode of the various task lead meetings for effective progress update, decision making, work assignments as they arise and the need to update the list of contributing States as necessary.</td><td colspan="2">Follow-up: ☐Required from States</td></tr>
<tr><td>When: 22-Oct-2021</td><td colspan="2">Status: Adopted by Sub-Group</td></tr>
<tr><td colspan="3">Who:☒Sub groups ☐ APAC States ☐ICAO APAC RO ☐ICAO HQ ☐APANPIRG ☒ Other: SURICG</td></tr>
</table>

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	
What: To urge States/Administrations to proactively follow up with air operators to address discrepancies of ICAO Aircraft Address and Target Identification between ADS-B / MLAT / Mode S data and flight plan.	Expected impact: ☐ Political / Global ☐ Inter-regional ☐ Economic ☐ Environmental ☒ Ops/Technical
Why: Such discrepancies will cause safety implications in ATC operation and induce additional workload to controllers and supporting staff in handling the cases.	Follow-up: ☒Required from States
When: 22-Oct-2021	Status: Adopted by Sub-group
Who: ☒Sub groups ☒APAC States ☐ICAO APAC RO ☐ICAO HQ ☒Other: SURICG	

Decision CNS SG/25/14 (SURICG/6/8): Revised ToR of Surveillance Implementation Coordination Group (SURICG)	
That, the Revised Terms of Reference of the Surveillance Implementation Coordination Group (SURICG) provided in **Appendix N** to the report be adopted.	Expected impact: ☐ Political /Global ☐ Inter-regional ☐ Economic ☐ Environmental ☒ Ops/Technical
Why: The ToR from dissolved SEA/BOB ADS-B WG was reviewed and necessary updates were identified.	Follow-up: ☐Required from States
When: 22-Oct-2021	Status: Adopted by Sub-Group
Who:☒Sub groups ☐ APAC States ☐ICAO APAC RO ☐ICAO HQ ☐APANPIRG ☒ Other: SURICG	

Conclusion CNS SG/25/15 (SURICG/6/9) - Revised ADS-B Implementation and Operations Guidance Document (AIGD)	
What: That, the revised ADS-B Implementation and Operations Guidance Document (AIGD) provided in **Appendix O** to the report, which consolidated all change proposals during SURICG/6, is adopted as Version 14.	Expected impact: ☐ Political / Global ☐ Inter-regional ☐ Economic ☐ Environmental ☒ Ops/Technical
Why: Updates from SURICG/6	Follow-up: ☐Required from States
When: 22-Oct-2021	Status: Adopted by Subgroup
Who: ☒CNS Sub group ☐APAC States ☒ICAO APAC RO ☐ICAO HQ ☒ Other: SURICG	

Decision CNS SG/25/16 (ATMAS TF/2/1 (APA TF/7/1)) - Dissolution of APA TF	
What: Noting that 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. That, the APA TF be dissolved.	Expected impact: ☐ Political / Global ☐ Inter-regional ☐ Economic ☐ Environmental ☒ Ops/Technical
Why: The APA TF Terms of Reference have been completed and pending action items will be undertaken by ATMAS TF.	Follow-up: ☐Required from States
When: 22-Oct-2021	Status: Adopted by Sub-Group
Who: ☒Sub groups ☐APAC States ☒ICAO APAC RO ☐ICAO HQ ☒Other: ATMAS TF	

Decision CNS SG/25/17 (ATMAS TF/2/2) – Revised ATMAS TF Terms of Reference	
What: That, the revised ATMAS TF Terms of Reference (ToR) as shown in **Appendix P** of the Report be adopted.	Expected impact: ☐ Political / Global ☐ Inter-regional ☐ Economic ☐ Environmental ☒ Ops/Technical
Why: After dissolution of the APA TF, the ongoing APAC regional AIDC work will be conducted by ATMAS TF.	Follow-up: ☐ Required from States
When: 22-Oct-21	Status: Adopted by Sub-Group
Who: ☒Sub groups ☐APAC States ☐ICAO APAC RO ☐ICAO HQ ☒Other: ATMAS TF	

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List of Draft Conclusion/Decisions adopted by CNS SG/25

<table>
<tr><td colspan="3">Draft Conclusion CNS SG/25/02 (ACSICG/08/02 (CRV/08/02)) - Implementation of CRV for small Pacific Island and small ANSP in the region using CRV Solution, PCCWG SLA Package D.</td></tr>
<tr><td colspan="2">What: That, the CRV OG should consider the following to assist small Pacific Islands & small ANSP in APAC in the implementation of CRV:
a) Small Pacific Island and small ANSP in the region to consider using CRV SLA package D as the CRV solutions to implement CRV for the exchange of voice & AMHS services
b) With target date to implement CRV by the end of 2021 by APANPIRG Conclusion C 31/12, it is recommended that the CRV OG to work closely with the small Pacific Islands, small ANSP in the region and PCCWG on a cost effective CRV solution to implement CRV.</td><td>Expected impact:
☐ Political / Global
☐ Inter-regional
☒ Economic
☐ Environmental
☒ Ops/Technical</td></tr>
<tr><td>Why: To facilitate the implementation of CRV for the small Pacific Island & small ANSP in the region</td><td colspan="2">Follow-up: ☒Required from States</td></tr>
<tr><td>When: 22-Oct-21</td><td colspan="2">Status: Draft to be adopted by PIRG</td></tr>
<tr><td colspan="3">Who: ☒Sub groups ☒APAC States ☐ICAO APAC RO ☐ICAO HQ ☒Other: ACSICG</td></tr>
</table>

<table>
<tr><td colspan="2">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</td></tr>
<tr><td>What: That,

With the need to extend the Use of Surveillance Identifier (SI) in Interrogator Code (IC) on top of Interrogator Identifier (II), the relevant APANPIRG Conclusions are updated as follows:

Coordination Process for SSR Mode S Interrogator Code (IC)
(formerly Conclusion 19/40)

a) in view of the increasing density of SSR interrogator installations in the region, and that States have varying readiness to extend from Interrogator Identifier (II) to both Interrogator Identifier and Surveillance Identifiers (SI) codes, there will be a period whereby both II and SI will be used.

b) while implementing SSR Mode S, States should take into account following issues while assigning IC for these installations:
• for planning the implementation of SSR Mode S interrogators, administrations should ensure that the interrogators with overlapping coverage are not operating with the same IC.
• where, the coverage of the interrogator extends beyond the boundaries of the State, The IC should be worked out in coordination with the ICAO Asia and Pacific Office and the neighbouring States concerned, and</td><td>Expected impact:
☐ Political / Global
☒ Inter-regional
☐ Economic
☐ Environmental
☒ Ops/Technical</td></tr>
</table>

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<tr><td colspan="2">

- administrations should inform the ICAO Asia and Pacific Office about the assigned IC for these installations.

Coordination Requirements for SSR Mode S Interrogator Codes (IC) (formerly **Conclusion 20/56***)*

States be advised to provide the following information on SSR Mode S Interrogator Code to the ICAO Asia/Pacific Office for coordination and registration.

a) Name of country/territory and location of facility;
b) Antenna Coordinates (Latitude and Longitude);
c) Elevation of antenna above the Mean Sea Level (MSL) in meters;
d) Maximum Coverage of SSR Mode S Interrogator in nautical mile;
e) II Code (1 to 15) or SI Code (1 to 63); and
f) Remarks (special configuration such as radar clustering, lockout override, II/SI mode capability)

Planning Criteria for SSR Mode S Interrogator Code (IC) Assignment (formerly **Conclusion 20/57***)*

The planning criteria for SSR Mode S IC coordination and assignment as provided in Appendix J of Doc 9924 (Third Edition, 2020) be adopted for use in the Asia/Pacific Region.

</td><td></td></tr>
<tr><td colspan="2">

Why: Due to higher density of radars, some States are facing a shortage of II codes. It has to be solved by transiting from II to SI code. It is noted that state may use a mixture of II and SI codes before complete migration to SI code.

The assignment of interrogator codes (IC), where necessary in areas of overlapping coverage, across international boundaries of flight information regions, shall be the subject of regional air navigation agreements.

States still have to coordinate with ICAO APAC Regional Office on the allocation of II codes and SI codes.

</td><td>Follow-up:
☒Required from States</td></tr>
<tr><td>When: 02-Dec-2021</td><td colspan="2">Status: Draft to be adopted by PIRG</td></tr>
<tr><td colspan="3">Who: ☒Sub groups ☒APAC States ☒ICAO APAC RO ☐ICAO HQ ☒Other: SURICG</td></tr>
</table>

*Note: This draft conclusion will supersede **APANPIRG Conclusions 19/40, 20/56 and 20/57** once adopted.*

Draft Conclusion CNS SG/25/08 *(SURICG/6/2) (DAPs WG/4/4)* - Transition from II code to II and SI mixed code	
What: 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.	Expected impact: ☐ Political / Global ☐ Inter-regional ☒ Economic ☐ Environmental ☒ Ops/Technical
Why: Due to higher density of radars, some States are facing a shortage of IC codes, which has to be solved by transiting from II to II and SI mixed code. It is noted that radars using II and SI codes can co-exist, hence there is no need for a big bang approach. However, States still have to coordinate with ICAO APAC Regional Office on the allocation of SI codes.	Follow-up: ☒Required from States
When: 02-Dec-2021	Status: Draft to be adopted by PIRG
Who: ☒Sub groups ☒APAC States ☒ICAO APAC RO ☐ICAO HQ ☒Other: SURICG	

Draft Conclusion CNS SG/25/09 *(SURICG/6/3) (DAPs WG/4/5)* - The APAC Regional Roadmap for Mode S Implementation	
What: That, the APAC Regional Roadmap for Mode S Implementation provided in **Appendix I** to the CNS SG/25 meeting report be adopted.	Expected impact: ☐ Political / Global ☐ Inter-regional ☒ Economic ☐ Environmental ☒ Ops/Technical
Why: The revised Roadmap defined the scope and rational steps for the implementation of Mode S in APAC region.	Follow-up: ☒Required from States
When: 02-Dec-2021	Status: Draft To be adopted by PIRG
Who: ☒Sub groups ☒APAC States ☒ICAO APAC RO ☐ICAO HQ ☒Other: SURICG	

ACTION ITMES OF CNS SG/25					
Action Item	**Subject**	**Status / Target Date**	**Action Party**	**Status**	**Remarks / follow-up**
25-1	SWIM TF to consider modifications proposed by Australia in Flimsy/02 in coming task lead meetings and SWIM TF/6 and to present revised ToR, if any as the outcomes of discussion, in CNS SG/26	CNS SG26	SWIM TF, ICAO Secretariat	Open	
25-2	The ICAO Secretariat will prepare a working paper to present in RASG-APAC/11 as an outcome of CNS SG/25 discussion for considering 5G potential interference with radio altimeter as a potential hazard.	RASG-APAC/11	ICAO Secretariat	Open	
25-3	The Member States/Administrations were requested to review and submit the updates to ICAO APAC Regional Office for the updates on various facilities listed in e-ANP Vol II Part III Table CNS II-APAC 2 for new international aerodromes added in 2021 by filling the PfA template specified in section 2.4 and send it to ICAO APAC Regional Office	CNS SG/26	Member States, ICAO Secretariat	Open	
25-4	The Chair of CNS SG invited the ICAO Secretariat to carry out the same review on e-ANP volumes in ATM aspects.	CNS SG/26	ICAO Secretariat	Open	
25-5	The Chair of CNS SG invited ICAO APAC Regional Office to follow up with ICAO Headquarter on regional network cybersecurity issue	CNS SG/26	ICAO Secretariat	Open	

25-6	The meeting requested ICAO to consider organizing another webinar on this subject on how Information Security Requirements for Exchange of Information over IP can be implemented by Member States in a pragmatic manner	CNS SG/26	ICAO Secretariat	Open	