



**INTERNATIONAL CIVIL AVIATION ORGANIZATION
ASIA AND PACIFIC OFFICE**

**REPORT OF
TWENTY FOURTH MEETING OF THE
COMMUNICATIONS/NAVIGATION AND SURVEILLANCE SUB-GROUP
(CNS SG/24) OF APANPIRG**

(30 November - 4 December 2020)
Web-conference

The views expressed in this Report should be taken as those of the Sub-group and not of the Organization. This Report will be submitted to the APANPIRG/30 Meeting and any formal action taken will be published in due course as a Supplement to the Report of the APANPIRG Meeting.

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1. Introduction

1.1 The Twenty Fourth Meeting of the Communications, Navigation and Surveillance Sub-group (CNS SG/24) of Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG), was held from 30 November to 4 December 2020. The Meeting was conducted as an on-line meeting using Microsoft Teams.

2. Attendance

2.1 The meeting was attended by **176** participants from **26** States/Administrations (Afghanistan, Australia, Bangladesh, Bhutan, Brunei Darussalam, Cambodia, China, Hong Kong China, Macao China, Fiji, French Polynesia, India, Indonesia, Japan, Malaysia, Mongolia, Myanmar, Nepal, New Zealand, Pakistan, Philippines, Republic of Korea, Singapore, Thailand, USA, Viet Nam, and **5** International Organizations namely CANSO, EUROCONTROL, IATA, IFATCA and IFATSEA, plus **26** participants from industry partners. The list of participants is placed at **Attachment 1** to this Report.

3. Opening of the Meeting

3.1 Mr. Arun Mishra, ICAO Regional Director opened the meeting. In his opening remarks, he extended warm welcome to all participants in particular the former chairs of the Sub-group and chairpersons of contributory bodies to the sub-group and highlighted the significant achievements of CNS in 2020 and recent important developments relevant to CNS under the challenge of COVID-19 in the APAC Region.

3.2 Mr. Richard Wu, Chairman of CNS Sub-group of APANIRG thanked the ICAO APAC Regional Office for hosting this meeting, which is the first time using video conference, with meticulous preparation. He reviewed the achievements and tasks of the Sub-group since its last meeting. Mr. Wu expressed appreciation to members for their efforts in coping with the technology evolution and highlighted the unprecedented challenges imposed by the pandemic on the aviation industry, where a balance has to be struck and pragmatic priorities to be set in pursuing new initiatives related to CNS infrastructure and services in a harmonized manner, so as to cater for differences among States/Administrations in their pace of recovery in air transportation. On behalf of the CNS Sub-group, Mr. Wu expressed special thanks to Mr. Li Peng, the former Regional Officer CNS, who had served the ICAO APAC for more than 20 years and retired in July of 2020, to his great contribution to the APAC region. With the States/Administrations in supporting the CNS Sub-group's work through the contributory task forces and working groups, Mr. Wu was confident that the CNS Sub-group would continue to steer the way forward on the latest CNS development and new technologies for APAC Region to prepare for the recovery of air transportation.

4. Officers and Secretariat

4.1 The meeting was chaired by Mr. Richard Wu, the Chair of the CNS Sub-group. The Secretariat support was jointly provided by Mr. Yi Luo, Mrs. Soniya Nibhani, Regional Officers CNS of APAC-RO and Mr. V.K. Mishra, Regional Officer PBN of APAC-RSO, with the support of Ms. Bhabhinan Sirapongkosit, the Programme Assistant of the APAC-RO. The meeting was also supported by Regional Officers, ATM and MET of APAC-RO and Technical Officers in HQ.

5. Organization, Working Arrangement, Language and Documentation

5.1 The working language was English inclusive of all documentation and this Report. The Sub-group met as a single body to deal with all the agenda items.

5.2 A list of Working Papers, Information Papers, Presentations (**26** working papers and **24** information papers, **6** flimsies and **7** Presentations) considered by the Meeting is provided in **Attachment 2** to this Report.

6. Conclusions and Decisions - Definition

6.1 The Sub-groups of APANPIRG record their actions in the form of Draft Conclusions, Draft Decisions, Conclusions and Decisions with the following significance:

- 1) Draft Conclusions deal with matters, which, in accordance with the Sub-Group's Terms of Reference, require the attention of States or actions by ICAO in accordance with established procedures;
- 2) Draft Decisions relate solely to matters dealing with the internal working arrangements of APANPIRG and its contributory bodies;
- 3) Conclusions: Those Conclusions adopted by the Sub-group on behalf of APANPIRG on technical matters; and
- 4) Decisions relate solely to matters dealing with internal working arrangement of the Sub-group only.

Note: *in accordance with APANPIRG Procedural Handbook, Sub Groups are empowered to adopt Conclusions and Decisions on technical matters (especially those concerning guidance to States in the implementation of ICAO SARPs, GANP, RANP, and Seamless ANS Plan).*

Reference	Subject	Page
Draft Conclusion CNS SG/24/1	- Target Year of CRV Implementation in APAC Region	5
Draft Conclusion CNS SG/24/2 (<i>ACSICG/7/1</i>)	- Revised Regional Strategies on AMS and Datalink	8
Conclusion CNS SG/24/3 (<i>ACSICG/7/2 (ATFM/SG/10-3)</i>)	- Amendment of the AFTN/AMHS-based Interface Control Document (ICD) for ATFM	8
Conclusion CNS SG/24/4	- Publishing of the CRV Operations Manual	9
Decision CNS SG/24/5	- CRV Landing Page on the ICAO APAC Website	10
Decision CNS SG/24/6 (<i>SRWG/4/1</i>)	- Frequency requirements for VHF-COM systems and ILS, VOR, DME and GBAS/VDB facilities	20
Conclusion CNS SG/24/7 (<i>SRWG/4/2</i>)	- Simulation of VHF COM Frequency requirements for next 10 years	21
Conclusion CNS SG/24/8 (<i>SRWG/4/3</i>)	- Establishment a list of focal point responsible for the operation of Frequency Finder in States	21
Decision CNS SG/24/9 (<i>SRWG/4/4</i>)	- Revision of the Term of Reference of the SRWG	21
Conclusion CNS SG/24/10	- Flight Inspection Guidance Material (FIGM) for APAC Region	30
Conclusion CNS SG/24/11	- Protection of ILS Critical and Sensitive Areas in Three Dimensional	32
Decision CNS SG/24/12 (<i>SURICG/5/2</i>)	- Dissolution of SEA/BOB ADS-B WG	41
Draft Conclusion CNS SG/24/13 (<i>SURICG/5/3(DAPs WG/3/1)</i>)	- Mode S Forward Fit Equipage in APAC Region	42
Conclusion CNS SG/24/14 (<i>SURICG/5/4(DAPs WG/3/2)</i>)	- Mode S DAPs IGD 2.0	44
Conclusion CNS SG/24/15 (<i>SURICG/5/6</i>)	- Revised ADS-B Implementation and Operations Guidance Document (AIGD) Edition13	45
Decision CNS SG/24/16 (<i>SURICG/5/1</i>)	- Establishment of Study Group under SURICG on Sharing of Surveillance Data in SWIM	46
Draft Conclusion CNS SG/24/17	- Addressing Human Factor Issues of ATSEP	58

Agenda Item 1: Adoption of agenda

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

Agenda Item 2: Review outcomes of APANPIRG/RASG Chairpersons review, APANPIRG/30 meeting, 40th Session of ICAO Assembly, ATM Sub-group and other major meetings relevant to CNS Sub-group**Outcomes of A40 and APANPIRG/30 on CNS(WP/02)**

2.1 The meeting was informed that there was no outstanding issue on CNS in Assembly 40, however, some of the Assembly Resolutions were relevant to CNS area with reference to Resolutions adopted by the Assembly (Provisional Edition October 2019), as well as some paragraphs relevant to CNS incorporated in Technical Commission Report of 40th Assembly (Doc10137). The meeting also noted the latest update of Integrated Communications, Navigation, Surveillance and Spectrum Task Force (ICNSS-TF).

2.2 The meeting carried out a review of the actions taken by APANPIRG/30 on the four Conclusions formulated by the Twenty-third Meeting of the CNS Sub-group (CNS SG/23). The meeting also noted the follow-up actions taken on the 9 Conclusions and 4 Decision adopted by CNS SG/23 meeting. The meeting noted with satisfaction the actions taken and the progress achieved by States and the Secretariat. The status of the follow-up actions to the Conclusions/Decisions is provided in Attachment B and D, the outstanding Conclusions is provided in the Attachment C to WP/02.

Outcome of APANPIRG/RASG Chairpersons Review(IP/11)

2.3 The APANPIRG/30 and RASG-APAC/9 Midyear Review Meeting was held in conjunction with the Seventh Regional Coordination Meeting of PIRG and RASG via WebEx on 4 May. The meeting noted the progress made on the follow-up actions taken on the outcomes of APANPIRG/30 and RASG-APAC/9 meeting. The meeting also briefly reviewed the key outcomes/achievements of APANPIRG/30:

- a) monitoring and tracking implementation of Beijing Declaration;
- b) triennial major update of the Asia/Pacific Seamless ANS Plan to incorporate the 6th Edition of the GANP;
- c) Asia-Pacific ATM Performance Measurement Framework (new performance framework for monitoring ATM performance);
- d) Asia/Pacific Regional FIXM Extension for ATFM;
- e) States' and APANPIRG's actions to improve the process for State and APANPIRG to prioritise and resolve Air Navigation Deficiencies;
- f) Regional SWIM Implementation Philosophy & APAC SWIM Roadmap and SWIM Education video;
- g) successful trial of RPAS for flight inspection;
- h) APAC A-CDM Implementation Plan;
- i) implementation of IWXXM; and
- j) trial to combine the APANPIRG and RASG-APAC Plenary Meetings in 2020.

2.4 The meeting noted that the APAC is several years behind its commitments to implement the APAC Seamless ATM (now ANS) Plan. As a result of the COVID-19 pandemic, the meeting noted that progress was likely to be significantly affected, so the targets within the Seamless ANS Plan would probably not be met, and may need to be adjusted.

ATM/SG/8 and RASMAG/25 Outcomes (WP/03)

2.5 The CNS/SG/24 was briefed on the outcomes from the Eighth Meeting of the Air Traffic Management Sub-Group (ATM/SG/8) and the Twenty-Fifth Meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/25, 27 – 30 October 2020).

Seamless ANS

2.6 The ATM/SG/8 meeting recalled that the Asia/Pacific Region's primary means of Air Navigation Services (ANS) planning to support the ICAO Doc 9750 – Global Air Navigation Plan (GANP) was the Asia/Pacific Seamless ANS Plan. The Asia/Pacific Seamless ANS Plan had several important subsidiary plans, and now included a need to develop a National Air National Plan (NANP). The ten ANS priorities had been updated by APANPIRG/30 to 16 priorities. However, the Seamless reporting portal had not yet been updated to match the 6th Edition of GANP and Version 3.0 of the Asia/Pacific Seamless ANS Plan, meaning that data was now unfortunately out-of-date. APANPIRG Conclusion 30-6 had requested an updated portal. ICAO clarified that States/Administrations should withhold updates until the new Seamless Reporting Portal was ready.

USOAP

2.7 The meeting noted that the average ANS Effective Implementation (EI) of the APAC region was 68.52%, as at February 2020 (CNS 73.71%).

Service Delivery

2.8 Except for China, according to survey data, no State in Asia had been applying Air Traffic Control (ATC) separation standards based on the provisions of the Asia/Pacific Seamless ANS Plan and ICAO Document 4444 – PANS ATM. Therefore, the Asian Region had failed to deliver service levels new CNS systems were capable of. In particular, ICAO had noted that there were significant weaknesses in many Asian State's application of terminal separations, so this area had now been included in the survey. This inefficiency, and the failure to implement proper Air Traffic Flow Management (ATFM) where necessary, sequencing mechanisms such as Arrival Manager (AMAN) and efficient Standard Terminal Arrival Routes (STARs) and use of runways for departures between arrivals, had meant that many terminal airspace operations were operating well below potential capability.

ADS-B

2.9 India had provided the ATM/SG/8 with information on the positive development of Space-Based Automatic Dependent Surveillance-Broadcast (SB ADS-B) surveillance over the entire Indian oceanic airspace, commencing 1 January 2021. During Phase II, more efficient separation minima would be introduced to enhance airspace capacity, maintaining the same or improved level of safety with the application of Advanced Surveillance Enhanced Procedural Separation (ASEPS).

2.10 Singapore had presented its plan to establish ADS-B out exclusive airspace within the Singapore FIR in phases by January 2022, to fulfil the objectives of the Asia/Pacific Seamless ANS Plan with the aim of enhancing safety and optimising airspace use. ICAO noted a Doc. 7030 – Regional Supplementary Procedures amendment is required to contain a regional air navigation agreement for a mandate within that portion of international airspace over the 'high seas'. The ATM/SG/8 had also noted that there were a number of other States contemplating the use of ADS-B within international airspace, including SB ADS-B, so it would be better to have several States jointly submit a PfA. The Chair encouraged a Small Working Group of interested States to work on the PfA. ICAO APAC ATM Officer in charge would notify this initiative to the upcoming CNS/SG meetings for their information.

Mode S Conspicuity Code

2.11 Secondary Surveillance Radar (SSR) Code 1000 had been removed from the Regional Air Navigation Plan (RANP) table, and a specific regional requirement agreed that Mode A Code 1000 had been reserved for use as a Mode S conspicuity code in Part IV – *Air Traffic Management (ATM)*. The *Asia/Pacific Seamless ANS Plan* had also included a related performance expectation, noting that ATC units operating within controlled airspace wholly served by Mode S SSR Codes and/or ADS-B surveillance should implement the use of the standard non-discrete Mode A code 1000 for Mode S transponder equipped aircraft, to reduce the reliance on assignment of discrete Mode A SSR codes.

Implementation of RNP 4 on ATS Routes M767 and N884

2.12 Singapore and the Philippines presented on the joint development of RNP 4 route specification for ATS routes M767 and N884, in addition to the current RNP 10. The paper noted that RNP 4 enabled a reduction of longitudinal and lateral separation between suitably equipped aircraft to enhance airspace capacity and increase efficiency. There were plans to re-designate the two routes to RNP 2 in the future. ICAO thanked Singapore and the Philippines for the work to enhance capacity on these routes, especially for considering fleet equipage, recalling that it was important to start the transition process from RNP 4 where possible, and that there was a regionally-recognised equivalence of RNAV 2/RNP 1/GNSS if the fleet equipage for RNP 2 was not high enough.

ATM Security Requirements

2.13 ICAO had presented information on ANSP/ATM ICAO security requirements, and additional information relating to the establishment and dissemination of the 1st Edition of the *ICAO Cyber Security Action Plan* and ongoing developments in related guidance material and resources.

COVID-19 ATM Economics

2.14 IATA had stressed that the airline industry was in an extremely precarious financial position, so a whole-of-government response is required to recover from COVID-19. This must include government support for key system enablers like ANSPs in order to avoid unsustainable cost increases that airlines would be unable to absorb. Regarding Capital Projects (CAPEXs) or an Operational Initiatives (OPEXs), IATA also stated that a post-COVID-19 review of services required consideration of rationalisation of services or an assessment of graduated services to reflect the reality of the new operating environment. Most importantly, any change must ensure a tangible benefit to airspace users with safety improvements, and efficiency or fuel savings. The ATM/SG/8 meeting had agreed to the following Draft Conclusion, for APANPIRG/31's consideration:

Draft Conclusion ATM/SG/8-3: Review of National Air Navigation Plans (NANPs)

That, States should review their NANPs in accordance with a whole-of-government approach and the requirements of the Regional Air Navigation Plan to:

- (1) include airspace user consultation to determine post COVID-19 service provision levels and the related investment and expenditure required, including identifying temporary or permanent service provision modification to reduce operational costs; and*
- (2) seek government support for their Air Navigation Service Providers (ANSPs) during the post-COVID-19 recovery.*

CNS Systems Resilience and GNSS Interference (IP/10)

2.15 The Council, at the ninth meeting of its 220th Session on 22 June 2020, agreed with the proposal to bring to the attention of States the actions agreed by the 40th Session of the Assembly

(24 September - 4 October 2019) with regard to communications, navigation, and surveillance (CNS) systems resilience and mitigation of harmful interference to global navigation satellite system (GNSS).

2.16 A State Letter with Ref.: AN 7/5-20/89 and **Subject: Strengthening of communications, navigation, and surveillance (CNS) systems resilience and mitigation of interference to global navigation satellite system (GNSS)** was circulated to States on 28 August 2020, and proposed required action by States on the aforementioned issues.

2.17 The meeting noted the criticality of the issue and the importance of action by States to address it by making use of the ICAO guidance provided in Doc 9849, *Global Navigation Satellite System (GNSS) Manual*. **ACTION ITEM 24-1**

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.

Outcomes of ACSICG/7 including the outcomes of CRV OG/7(WP/04)

3.2 The Secretariat presented the outcomes of the Seventh Meeting of the Aeronautical Communication Services Implementation Coordination Group (ACSICG/7) which was held from 21 to 23 July 2020 using VTC. The ACSICG/7 meeting reviewed the outcomes of the 7th meetings of CRV Operations Group (CRV OG/7) and took following actions.

3.3 The meeting noted the updated ATN/AMHS and AIDC implementation status in the APAC Region provided in **Appendix A** to this Report.

Election of a co-chair of the ACSICG

3.4 Proposed by USA, seconded by Hong Kong China, Mr. Chonlawit Banphawattharak, Chief, Policy and Strategy Management Bureau of AEROTHAI was unanimously elected as co-chair of the ACSICG of APANPIRG.

Action taken on the Report of CRV OG/7 Meeting

3.5 The Seventh Meeting of the Common Aeronautical Virtual Private Network Operations Group of APANPIRG (CRV OG/7) was held in ICAO Asia and Pacific Office from 20 to 22 January 2020.

3.6 The meeting updated the information contained in the APAC CRV Implementation Table, and according to the latest updates in April 2020 from PCCWG, Russia, India and Mongolia were negotiating for the contract. Some States were waiting for internal approval (completed the contract negotiation): PNG, Indonesia, Malaysia, Nepal, China, Thailand, Bahrain. Bhutan has signed the order and CRV would be set up in second half 2020 with target date in June. Singapore and Republic of Korea have joined the CRV. *The meeting recognized the challenges and difficulties faced by States/Administrations under current pandemic situation and recommended to postpone the target year of regional implementation of CRV from 2020 to end of 2021. It was informed by the Secretariat that PCCWG also agreed to extended target year for regional CRV implementation from 2020 to 2021.*

3.7 Through **Flimsy/04** prepared by the Secretariat, the meeting recapped the Action Item DGCA/54/20 in 2017 putting up 2020 as the target date for CRV implementation for all ANSP to optimize cost benefit. The meeting then recalled the Beijing Declaration adopted by the first Asia/Pacific Ministerial Conference on Civil Aviation (APACMC) in 2018 that States/Administrations were requested to take necessary follow up actions in achieving implementation of PBN, Common Ground/Ground Telecommunication Network and enhanced surveillance capability including ADS-B in APAC Region by 2022.

3.8 With aforementioned, the meeting formulated a draft conclusion as following

Draft Conclusion CNS SG/24/1 - Target Year of CRV Implementation in APAC Region	
What: That, set and monitor 2021 as the target for CRV implementation for all ANSPs.	Expected impact: <input type="checkbox"/> Political / Global <input type="checkbox"/> Inter-regional <input checked="" type="checkbox"/> Economic <input type="checkbox"/> Environmental <input checked="" type="checkbox"/> Ops/Technical
Why: Considering the challenges and difficulties faced by States/Administrations under current pandemic situation and recommended to postpone the target year of regional implementation of CRV from 2020 to end of 2021 and further align with follow up actions on Common Ground/Ground Telecommunication Network stated in the Beijing Declaration.	Follow-up: <input checked="" type="checkbox"/> Required from States
When: 16-Dec-20	Status: To be adopted by PIRG
Who: <input checked="" type="checkbox"/> Sub groups <input checked="" type="checkbox"/> APAC States <input type="checkbox"/> ICAO APAC RO <input type="checkbox"/> ICAO HQ <input type="checkbox"/> Other:	

3.9 According to the latest updates in November 2020 from PCCWG, **eleven** States/Administrations have joined CRV and implemented operations: Australia, Bhutan, China, Hong Kong China, Fiji, Japan, New Zealand, Philippines, Republic of Korea, Singapore and USA. Additional **nine** States/Administration have plan to join CRV: France-New Caledonia and Polynesia, India, Indonesia, Malaysia, Nepal, PNG, Russia, Thailand. The Updated CRV Implementation Status Table is provided in **Appendix B** to this report.

Draft CRV Operations Manual

3.10 The meeting noted the discussions by CRV OG/7 on the draft CRV Operations Manual. The meeting recalled that the manual is based on ITIL 2011 Processes which would be used to govern the operations and performance of the CRV Network. The meeting considered that more work would be required to polish the draft operations manual. USA recommended that the co-chair from Fiji to lead a small ad hoc working group with CRV OG members from USA, Singapore and New Zealand to further improve the draft and get it ready for consideration by CNS SG through a joint working paper. Thailand also agreed to provide support to review the revised draft.

CRV for AMHS Centres of the Russian Federation Interacting of COM Centres in the APAC Region

3.11 Russian Federation provided updates on their plan and progress of joining CRV at number of centres (Moscow, Khabarovsk, Irkutsk) in Russia to interact with COM centres (Fukuoka, Beijing and Ulaanbaatar) in the APAC Region as well as COM centres in USA (Salk Lake City and Anchorage). In following up the outcome of COM Coordination Meeting in May 2019, Russian Federation is considering options to join CRV at those designated entry/exit points in Russia with entry/exit points in the APAC Region. It was informed that minimum three months would be required for Russian Federation to perform the tender process.

3.12 The meeting noted that CRV OG supported for Russian Federation to join CRV. China supported Russian Federation to join CRV as it would be more cost effective solution to replace the landline between Beijing and Khabarovsk which updated recently. Japan expressed no objection for Russian Federation to join CRV for use of the service to support circuits between Japan and Russia. In

following up the outcome of the meeting, the ICAO Secretariat sent a letter with reference of: T 8/2.10-AP-CNS0020/20 dated 20 February 2020 to Russian Federation.

MPLS/IP Based Inter-Regional Connection

3.13 The meeting agreed to a proposal to develop a high level concept on the interconnection of the CRV with other regional network such as REDDIG/MEVA/PENS. A number of States that connecting to the CRV are also required to connect to other regional networks. There are potential benefits with implementing interconnections between regional networks such as harmonization and efficiency in the connection for services like SWIM and reducing costs for States that connect to other regional networks. Some States had already expressed their interest in a connection to other regional networks such as New Zealand to REDDIG and Singapore to PENS. It's noted that USA has established service with REDDIG and MEVA and in the process to join PENS.

3.14 Noting these requirements, early discussions with these regional networks, the CRV OG and PCCWG will enhance the discussions with these regional networks at future opportunity to consider how the CRV can potentially be interconnected with other regional networks.

CRV and AFS Safety and Protection planning

3.15 In following up the outcome of CNS SG/23 meeting, the AFS Safety and Protection joint working group meeting scheduled for 21 to 23 April 2020 in Nevada, USA has been postponed without a firmed date. The meeting considered necessary and timely to address safety and security concerns as more and more AFS and other new applications being transferred to and exchanged over CRV. This meeting was also planning to discuss inter-network connection as indicated in paragraph 3.13 above.

Proposal to use CRV for Space based ADS-B

3.16 PNG and ICCAIA jointly made a presentation on use of CRV for delivery of surveillance data from spaced based ADS-B. PNG Air Services Limited (PNGASL) has contracted for the supply of space based ADS-B data from Aireon LLC and is intending to contract for a CRV connection in early 2020 for a number of applications including space based ADS-B. One prime purpose for using CRV is to reduce the need for point to point circuits and would result in lower data communications costs for ANSPs. Aireon and PNG ASL believe that delivery of space based ADS-B via CRV will achieve these objectives. Indonesia expressed support to PNG's proposal to use CRV for distribution of space based ADS-B data.

3.17 The meeting was informed that the space-based ADS-B is now fully operational. The service is being used by Canada and United Kingdom to separate aircraft in the Atlantic Ocean (using trial ASEPS procedures) and over continental Canadian airspace using 5 NM separation standards. In June 2019 Aireon was officially approved by the European Union Aviation Safety Agency (EASA) as an Air Navigation Service Provider (ANSP) Organization to provide Air Traffic Management (ATM)/Air Navigation Service (ANS) surveillance services, to support the separation of aircraft. This authorizes Aireon as the first-ever certified provider of aircraft surveillance-as-a-service.

3.18 The meeting noted that in following the agreed procedure, co-chair of CRV OG from Australia conducted survey with members of CRV OG regarding the service provider Aireon LLC's joining CRV. The co-chair from Fiji was requested to provide the result of the consultancy on the CRV portal.

SWIM Demonstration on CRV

3.19 The meeting noted that SWIM Demonstration on CRV to be hosted by Hong Kong China scheduled for March 2020 has been postponed without a definite date due to pandemic. Hong Kong China was requested to keep the Secretariat informed of the new date of the Demonstration once available.

CAAP-FAA AMHS/AIDC Planned Routing Changes

3.20 Considering the upcoming Air Traffic Services (ATS) Message Handling System (AMHS) service between Civil Aviation Authority of the Philippines (CAAP) and USA Federal Aviation Administration (FAA) will become operational in 1Q2021, the Philippines and USA proposed to make following routing changes:

- USA will route all “RP” traffic directly to the Philippines with existing route via Japan as alternate.
- The Philippines will route all “C”, “K”, “M”, “P”, “S” and “T” traffic directly to the US as primary and to Hong Kong China as an alternate.

3.21 USA and the Philippines will coordinate with AMC for these routing changes. The ICAO Regional AFTN/AMHS Routing Directory may also be updated to reflect the new traffic routes.

3.22 The meeting noted that the AMHS connection between FAA and CAAP would carry AIDC traffic after successful implementation of AMHS.

Report on the readiness status of AMHS to support IWXXM service by November 2020

3.23 The following ANSPs should be able to support IWXXM using their respective AMHS with FTBP capability: Australia; Bangladesh; Bhutan; Cambodia; China; Hong Kong, China; Macao, China; Fiji; India; Japan; Republic of Korea; Myanmar; Nepal; New Zealand; Pakistan; Philippines; Singapore; Sri Lanka; Thailand; and USA. Indonesia Jakarta already implemented AMHS with FBTP and supported IWXXM.

3.24 The meeting recommended that States with designated BBIS: Australia, China, Hong Kong, China, Fiji, India, Japan, Singapore, Thailand and USA should increase their respective connection bandwidth to greater than 64kbps if feasible and applicable.

APAC regional Strategies on AMS and Air-Ground Data Link

3.25 Based on a task given by the CNS SG/23 meeting in 2019, China took the lead and worked together with Australia, Japan and USA to review the regional AMS strategy adopted by APANPIRG in 2013 and the Datalink strategy adopted by APANPIRG in 2005. The draft on the revised strategies were distributed among members and discussed through a teleconference on 1 July 2020. As a result, the ad hoc group agreed to submit the proposed changes to the ACSICG/7 for consideration.

3.26 The meeting reviewed the draft on the revised strategies attached to WP presented by China, Australia, Japan and USA. The meeting further discussed some additional changes proposed by Singapore. As a result of discussion, the meeting endorsed the revised regional strategies and formulated a Draft Conclusion **ACSICG/7/1 - the Revised Regional Strategies on AMS and Datalink** for consideration by CNS SG.

3.27 The meeting expressed appreciation to China, Australia, Japan and USA for the development of the revised strategies and to Singapore for the comments on further improvement, and agreed to a proposal to forward the draft strategies agreed by the meeting to the FANS Interoperability Team Asia (FIT-Asia/10) for comments and endorsement at its next meeting scheduled for early August 2020 before its final adoption by CNS SG in December 2020. The meeting was reminded that the review by FIT-ASIA would be relevant to those wordings on PBCS and FANS based datalink. The FIT-Asia/10 meeting noted the draft strategies through a flimsy by the Secretariat.

3.28 With aforementioned, the meeting further reviewed the revised regional strategies and formulated the following Draft Conclusion for consideration by APANPIRG:

Draft Conclusion CNS SG/24/2(ACSICG/7/1) - the Revised Regional Strategies on AMS and Datalink	
What: That, the revised Aeronautical Mobile Service (AMS) Strategy for the Asia/Pacific Region provided in Appendix C and the revised Strategy for Implementation of the Air-Ground Data Link in the Asia/Pac Region provided in Appendix D to the Report be adopted.	Expected impact: <input type="checkbox"/> Political / Global <input type="checkbox"/> Inter-regional <input checked="" type="checkbox"/> Economic <input type="checkbox"/> Environmental <input checked="" type="checkbox"/> Ops/Technical
Why: Need to update the regional strategies on AMS and Datalink based on the latest developments	Follow-up: <input checked="" type="checkbox"/> Required from States
When: 16-Dec-20	Status: To be adopted by PIRG
Who: <input checked="" type="checkbox"/> Sub groups <input checked="" type="checkbox"/> APAC States <input type="checkbox"/> ICAO APAC RO <input type="checkbox"/> ICAO HQ <input type="checkbox"/> Other:	

Amendment to AFTN/AMHS-based ATFM Interface Control Document (ICD)

3.29 The Tenth Meeting of the Asia/Pacific ATFM Steering Group (ATFM/SG/10, Video Teleconference, 4 to 8 May 2020) proposed amendment to the AFTN/AMHS-based ATFM ICD which was endorsed by ACSICG and adopted by CNS SG/23 meeting in 2019.

3.30 Subsequent to the ATFM/SG/10 meeting, the Secretariat conducted a further editorial review of the ICD, in consultation with the ATFM/SG/10 Chair and the AMNAC Technical Sub-group. The document was the further amended to correct some errors and minor omissions.

3.31 In view of the foregoing, the meeting adopted the following Conclusion formulated by ATFM/SG/10 and then endorsed by ACSICG/7:

Conclusion CNS SG/24/3(ACSICG/7-2 (ATFM/SG/10-3)) - Amendment of the AFTN/AMHS-based Interface Control Document (ICD) for ATFM	
What: That, the AFTN/AMHS-based Interface Control Document for ATFM Version 2.0 provided in Appendix E to this Report be adopted and posted on the ICAO Asia/Pacific Regional Office website to supersede the existing version, for use by Asia/Pacific Administrations in implementing cross-border ATFM communications in accordance with the provisions of the Regional Framework for collaborative ATFM.	Expected impact: <input type="checkbox"/> Political / Global <input type="checkbox"/> Inter-regional <input type="checkbox"/> Economic <input type="checkbox"/> Environmental <input checked="" type="checkbox"/> Ops/Technical
Why: To align with message format provisions of Annex 10 Vol II, and to support implementation by States through amendment to specific provisions.	Follow-up: <input checked="" type="checkbox"/> Required from States
When: 4-Dec-20	Status: Adopted by Subgroup
Who: <input checked="" type="checkbox"/> Sub groups <input checked="" type="checkbox"/> APAC States <input type="checkbox"/> ICAO APAC RO <input type="checkbox"/> ICAO HQ <input checked="" type="checkbox"/> other: ACSICG/7	

Update on Space-based VHF Voice Communications Service

3.32 Singapore presented an update on Singapore's technical studies on the space-based VHF Voice Communication Service. The working paper recalled that the space-based VHF concept was first endorsed in 2018 by the ICAO APANPIRG and supported by ICAO Communications Panel (CP) and Frequency Spectrum Management Panel (FSMP). Singapore has since embarked on design studies with various communications vendors and satellites service providers. The paper further introduced the next steps of studies on space-based VHF radio communications concept.

3.33 The paper also highlighted the future work regarding frequency allocation. An amendment to the ITU Radio Regulations would be required in order to authorize the satellite reception and transmission of VHF radio relay communications to/from aircraft, succinctly expressed an authorization to the AMS(R)S would be required to permit this concept of communications. This requirement is identical to that which was needed at WRC-15 for the AMS(R)S allocation to space-based ADS-B in order to legally authorise the service in accordance with the ITU Radio Regulations.

3.34 Singapore encouraged States/Administrations to support the potential development of space-based VHF and invited interested States/Administrations to join Singapore in the space-based VHF technical studies and POC trials. Singapore also proposed a draft Conclusion to urge States/Administrations to actively participate in the relevant ICAO and ITU WP5B meetings to support the space-based VHF communications concept and the need to support for inclusions of this new service into the AMS(R)S spectrum allocation in the Radio Regulation.

3.35 Considering the initial ICAO positions for WRC-2023 is being developed by FSMP, ICAO member States will be requested to support ICAO position at regional and international forums of ITU, the meeting recommended Singapore to develop a working paper highlighting the detailed proceedings and expected supports from States for review and consideration by CNS SG.

Draft CRV Operations Manual (WP/24)

3.36 New Zealand presented update on the CRV Operations Manual after the Seventh meeting of the Aeronautical Communication Services Implementation Co-ordination group (ACSICG/7), as the outcome of the ACTION ITEM of the meeting (refer to paragraph 3.7).

3.37 Since then several ad hoc meetings have been held. The main focus has been on the Request Fulfillment Process and procedures as this provides the information and directions required to join, leave or make changes the CRV network. The work has involved clarifying how to find the information, the information required and who to notify when joining, leaving or requesting a change. This has required linking pages within the manual and to documents outside of the manual.

3.38 This has led to the need to have a CRV landing page on the ICAO APAC and MID regional websites. This landing page will provide an overview of CRV and who to contact. This informed the details on how to join CRV. An initial request will be send to the APAC CRV Portal Administrator requesting to join, leave or add a new connection to CRV. Upon receipt of the request, a registration form is provided and check the content is completed.

3.39 If completed, acknowledge the request with a link to the Common Package, the Operations Group Manual and the Implementation Plan and the CRV Portal. If not completed, request updated information. It will notify the CRV OG and PCCW and update the Registrations List. Part of the email back to the requestor will be an overview of the process they will go through and the stages relevant to the Operations Manual and the Common Package documentation. Once published the CRV OG will manage changes to the Operations Manual and other CRV related documentation through the Document Administration Process and Procedure which is detailed in the Operations Manual.

3.40 With the abovementioned, the meeting adopted the following Conclusion:

Conclusion CNS SG/24/4 - Publishing of the CRV Operations Manual	
What: That the CRV Operations Manual provided in Appendix F to this Report be adopted as first Edition for publishing and use.	Expected impact: <input type="checkbox"/> Political / Global <input type="checkbox"/> Inter-regional <input type="checkbox"/> Economic <input type="checkbox"/> Environmental <input checked="" type="checkbox"/> Ops/Technical

Why: Provides the information and directions required for CRV OG performance and CRV operations.	Follow-up: <input checked="" type="checkbox"/> Required from States
When: 4-Dec-20	Status: Adopted by Subgroup
Who: <input checked="" type="checkbox"/> Sub groups <input checked="" type="checkbox"/> APAC States <input checked="" type="checkbox"/> ICAO APAC RO <input type="checkbox"/> ICAO HQ <input type="checkbox"/> Other:	

3.41 The meeting also endorsed the following Decision:

Decision CNS SG/24/5 - CRV landing page on the ICAO APAC website	
What: That ICAO APAC Office is requested to create CRV landing page on ICAO APAC web page to providing information on CRV and guidance on how to join, leave or make changes.	Expected impact: <input type="checkbox"/> Political / Global <input type="checkbox"/> Inter-regional <input type="checkbox"/> Economic <input type="checkbox"/> Environmental <input checked="" type="checkbox"/> Ops/Technical
Why: Provides online access to the information and directions required for the Request Fulfilment Process and procedures to join, leave or make changes the CRV network	Follow-up: <input type="checkbox"/> Required from States
When: 4-Dec-20	Status: Adopted by Subgroup
Who: <input checked="" type="checkbox"/> Sub groups <input type="checkbox"/> APAC States <input checked="" type="checkbox"/> ICAO APAC RO <input type="checkbox"/> ICAO HQ <input type="checkbox"/> Other:	

3.42 The meeting appreciated contributions from Airways New Zealand to host web portal to hold updated CRV documentation, as well as Mr. Vaughan Hickford's continuous contribution in supporting regional CRV implementation issue and drafting this manual.

3.43 The meeting also noted the issues related to CRV operational support at a regional level, as more and more ANSPs, service providers and service consumers have been joining CRV, various services are being implemented over CRV. States/Administrations are encouraged to share their new ideas on this issue in future meetings. **ACTION ITEM 24-2**

Review of AMHS Readiness Status for Supporting IWXXM (WP/05)

3.44 The Twenty Eighth Meeting of the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG/28) in September 2017 through Conclusion APANPIRG/28/16: *Upgrade AMHS to support IWXXM traffic* urged all APAC States/Administrations to upgrade AMHS systems (AMHS server and User Agent) by November 2020 to either Extended AMHS or Basic ATS Message Handling Service plus File Transfer Body Parts sub-set of extended AMHS for Binary data exchange (FTBP) functional groups as defined in **Doc 9880 Part IIB section 3.4.1**.

3.45 Consequently, a number of States/Administrations shared the AMHS readiness and experience for supporting IWXXM Traffic at the ACSICG/7 from 21 to 23 July 2020. The APAC State Letter Ref.: T 8/3.5 & T 8/2.11– AP160/20 (CNS) was sent to States/Administration in August 2020 as a reminder to upgrade the AMHS with FTBP and deploy AMHS connect to achieve synchronized AMHS distribution mechanism to support MET information exchange using IWXXM in the APAC Region. The report of AMHS readiness from States/Administrations shown in the attachment of the working paper was reviewed by the meeting, and it was further updated by this SG meeting and provided in **Appendix G** to this Report.

Updates on APAC Implementation of IWXXM Exchange over AMHS (IP/21)

3.46 This paper presents the updates on the implementation of IWXXM exchange over AMHS in APAC Region based on the outcome of MET SG/24 meeting, and invites the meeting to request the States to urgently complete the implementation of AMHS to support IWXXM exchange.

3.47 The meeting noted that a majority of APAC States/Administrations had not yet reported full implementation of IWXXM format, in accordance with the standards in ICAO Annex 3, applicable from 5 November 2020. IWXXM exchange requires AMHS (with FTBP) and the use of unique AMHS addresses. The Regional OPMET Centres (ROCs) will be responsible for distribution of IWXXM formatted OPMET data in APAC. An online register of the status of IWXXM exchange capabilities in APAC Region will facilitate IWXXM exchange between capable ROCs.

3.48 ACSICG chair remarked no technical difficulties for communications system and informed the meeting that there was no new target date for ACSICG on AMHS supporting IWXXM traffic. The meeting requested the MET SG and CNS SG to enhance mutual coordination and sharing outcomes of related survey and seminar/workshop, and encouraged States/Administrations to expedite responding to the ICAO's survey as soon as possible before APANPIRG/31, and the contributory body of MET SG (Meteorological Information Exchange Working Group (MET/IE WG)) should work collaboratively with ACSICG for a way forward in APAC region. **ACTION ITEM 24-3**

Presentation of PCCW Network Based IWXXM Translation and Exchange Services (IP/23)

3.49 Fiji and PCCW Global limited described PCCW IWXXM Translation and Exchange Services. They proposed that it could serve as an alternative solution for member States to fulfil the exchange of IWXXM messages.

3.50 ICAO APAC CRV has been built leveraging PCCW Global's high-speed international IP network, with mission-critical connections running across a diversified infrastructure supporting multiple aviation-specific applications. PCCW Global has been developing the SWIM service on a private and scalable platform in partnering – FREQUENTIS. PCCW described that PCCW Network Based IWXXM Translation and Exchange Services is one of the modules on PCCW SWIM (IWXXM, FIXM and AIXM) which is hosted in the high availability private platform and fully controlled environment which connects to CRV network infrastructure. They claimed that the services complied with ICAO and WMO standards and are designed to support the acquisition, management, processing and dissemination of meteorological data related to aviation.

3.51 PCCW Global, the CRV provider, shown its keenness to develop value-added service on CRV. PCCW described Service Components composed of CRV connection, Translation and Aggregation Service, and Exchange Service. It was proposed that States/Administrations could build the platform in-house or procure it from manufacturer and setup in the State's premises. Alternatively States/Administrations can subscribe the network-based services and PCCW Global will handle the IWXXM exchange.

3.52 It was summarized that PCCW IWXXM Translation and Exchange services provide the flexibility and reliability to collect most of the current MET data from multiple designated sources and the processing functionality to validate, store and redistribute the data, along with the ability to display it on XML Browser via CRV private connection.

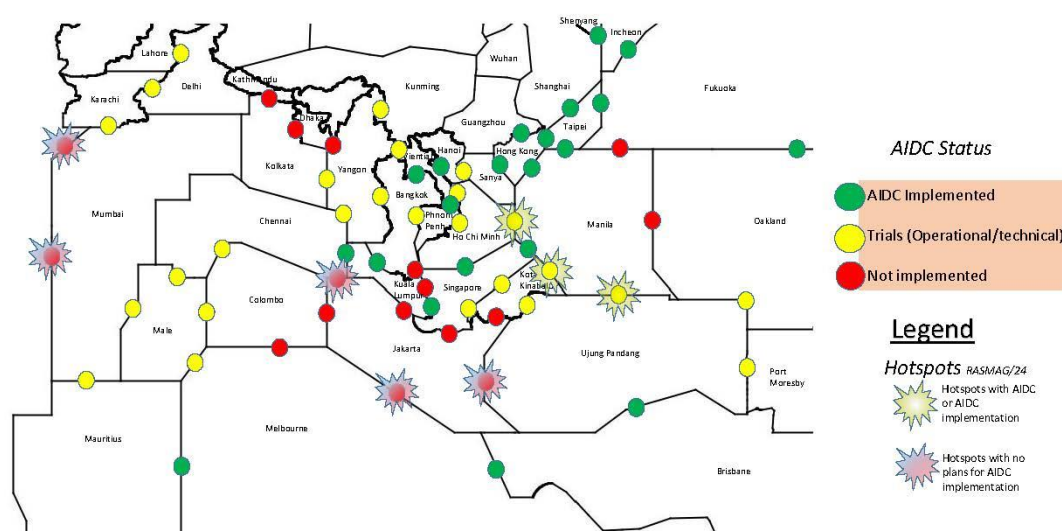
Report of the Sixth Meeting of the Asia Pacific AIDC Task Force (WP/06)

3.53 The Sixth meeting of the ATS Inter-facility Data Communication Task Force (APA TF/6) noted that AIDC implementation in South China Sea sub-region had been satisfactory while further efforts by States in the Bay of Bengal sub-region are required. The summary of the new AIDC connections implemented since the APA TF/5 meeting is listed below:

- Automatic handling over based on OLDI ICD between Shenyang ACC and Khabarovsk ACC implemented in October 2019 over a dedicated line;
- AIDC operational implementation between Kuala Lumpur ACC and Chennai OCC came into effect on 1 April 2020;
- Operational AIDC between Singapore ACC and Kuala Lumpur ATCC with limited messages set was implemented on 1 November 2019;
- Operational AIDC between Bangkok ACC and Kuala Lumpur ATCC with limited messages set was implemented on 14 March 2020;
- Operational AIDC between Bangkok ACC and Vientiane ACC with 5 messages set was implemented on 14 July 2020;
- AIDC service between Manila ACC and Hong Kong ACC implemented on 23 May 2019;
- AIDC service between Manila ACC and Singapore ACC implemented on 1 November 2019; and
- AIDC service between Manila ACC and Taipei ACC implemented on 5 December 2019.

3.54 The meeting noted that the new ATM Automation System in Bangkok was put into operation by Thailand on 12 February 2020. The meeting congratulated the Philippines and Thailand for successful implementation of a number of new AIDC connections with their counter parts using their new ATM system. The meeting encouraged States/Administrations concerned to continue work bilaterally to expedite implementation of those planned AIDC connections as priorities identified by APANPIRG.

3.55 The graphical map for quick and easy understanding of the regional AIDC implementation status initiated by CAA. Singapore and updated by the meeting is shown below.



APA AIDC Implementation Chart ver 2 (Jul 2020)

3.56 The meeting noted that the graphical presentation on the AIDC implementation is based on FIR/FIR bases from air traffic controller’s perspective. Noting the implementation status shown focused on Bay of Bengal and South China Sea sub-regions, the ACSICG recommended AIDC Task Force to develop additional chart to reflect the APAC regional AIDC implementation status. Singapore responded that only accurate input from States/Administrations could enable such development of a regional picture. Therefore, States/Administration were urged to update the required information in ATN/AMHS/AIDC implementation table and AIDC Task Force is recommended to take necessary following action.

Collected AIDC Implementation Issues

3.57 The latest AIDC issues were presented to APA TF/6 meeting by Indonesia with supports from India and Singapore. Totally 89 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/6 (2020)		
	Issues Reported	Closed	Open
a. Communication Link	9	3	6
b. ATM System	50	20	30
c. AIDC Message	17	15	2
d. Airspace Design/Procedures	8	4	4
e. Other	5	2	3
Total	89	44	45

3.58 The meeting encouraged States/Administrations to provide the identified issues with recommended solutions to Indonesia for consolidation into the issues form.

AIDC Webinar

3.59 Due to the significant achievements made by APA TF under such a difficult time, the key contributors of the task force were invited to make a webinar on AIDC to APAC region, titled *AIDC Implementation Benefits and Lessons Learnt*. The webinar was successfully conducted on 9 October

2020, which was moderated by Mr. Kwek Chin Lin from CAAS, the other three speakers were Mr. Anurag Sharma from AAI, Mr. Joe Chua from CAAS, and Mr. Arian Nurahman from DGCA Indonesia. The presentation used for this webinar is provided as **Appendix H** to this report.

3.60 The meeting appreciated the great contribution of the APA TF since its establishment including the guidance material and promotion on implementation. The meeting also agreed that the understanding on AIDC implementation may differ from the regional perspective and State's perspective, based on regional planning document or bilateral agreement between ATSUs. APA TF holds the view that the number of messages to be implemented in AIDC operation would be considered as far as practical. Regarding the AIDC/OLDI implementation between India and Oman, the meeting was informed that ATM automation system of Mumbai is capable to support AIDC and OLDI, inter-regional coordination between India and Oman may require escalation through ICAO APAC and MID Office.

Fourth Meeting of System Wide Information Management Task Force (WP/07)

3.61 The meeting reviewed the report of SWIMTF/4 meeting held from 3 to 6 November 2020 via VTC.

Election of Co-Chair of the Task Force

3.62 Ms. Jeri Groce, Chair of the SWIM Task Force briefly recalled the history and efforts of the task force, explained the benefits to enhance the leadership of the task force with regional view to better deal with the challenges and progress the implementation of SWIM, and opened the floor to participants for consideration and nomination. Dr. Amornrat Jirattigalachote, Strategic Planning Manager (Engineering), Policy and Strategy Management Bureau of AEROTHAI, was nominated by USA, seconded by Japan, Singapore, Hong Kong China and China, was elected as co-chair of the APAC SWIM Task Force of APANPIRG.

Review SWIM Task Force Programme and outstanding action items

3.63 The meeting reviewed the development of SWIM TF's work plan and the updating of Action List with highlight on the restructure of the task assignment and numbering. The meeting noted the information, considered the amendment as necessary, and therefore adopt the revised task structure through **Decision SWIM TF/4/1 - Revised SWIM TF Task Group**.

SWIM in ASEAN Demonstration Report

3.64 Thailand and Singapore presented the SWIM in ASEAN Demonstration Report to the meeting, which detailed the demonstration development, including the collection of operational requirements as well as the design, development, and test of SWIM infrastructure and information services. Observations recorded and lessons learnt during the whole course of the Demonstration were also provided.

An Approach for APAC Regional SWIM Implementation

3.65 Japan presented the research and practical results of previous Task 1.8 and the optional approaches of regional SWIM construction and implementations within transition period. The research work of this Task was carried out in coordination with the tasks of ASEAN SWIM Demonstration and SWIM Service and Application Validation. To overcome the limitations of CRV and avoid the unsupportable point-to-point connections between all stakeholders, the cooperation between CRV and SWIM service providers is required. As result of discussion, the meeting agreed to adopt an CRV-based interoperable architecture in which the CRV communication and SWIM communication are divided into different layers to assure the performance of CRV for conventional AFTN/AMHS applications and improve the flexibility required for regional SWIM implementation. It is required SWIM service providers to establish common agreements and creating a collaborative environment at the regional level to ensure information exchange between different systems.

3.66 The meeting further discussed the technical capabilities of SWIM TI required to achieve interoperability during the transition period, such as: 1) The SWIM TI will have two interfaces that enable the exchange of information with both CRV-based legacy systems and SWIM-enabled systems; 2) SWIM-enabled systems need to receive/send different AFTN/AMHS message types (MET, AIS, and ATS) from/to CRV-based legacy systems according to information domain requirements; 3) The SWIM TI is able to decouple CRV-based legacy and SWIM-enabled applications from external systems that implement different communication protocols.

SWIM Technical Overview Centered around CRV

3.67 PCCW Global, the CRV provider selected through ICAO TCB process, presented a system architecture of SWIM service. It is a managed SWIM solution which can be deployed with the preference of each member States and is proposed to run on CRV network as value-added service.

3.68 PCCW Global has been developing the SWIM service on a private and scalable platform in partnering with one of leading aviation vendors - FREQUENTIS. PCCW Global owned network infrastructure & hosting facilities combining with FREQUENTIS proven knowledge & experience in aviation industry would formulate an alternative solution for ANSPs to facilitate the SWIM initiatives. It provided an alternative approach for States to immediate access the available SWIM services.

3.69 PCCW SWIM infrastructure could be one of the global/commercial EMS nodes to deliver SWIM services or qualified third party services. The deployment options include on-premise deployment, network based as well as hybrid model. This enables flexibility to meet individual State requirement.

Extension Development of FIXM to Support National ATFM Operations and ATFM/A-CDM Integration in China

3.70 In order to implement data sharing among ATFM stakeholders, and facilitate a seamless and agile exchange of ATFM data, the development of FIXM has been started by ATMB of CAAC in 2019, based on FIXM APAC FLOW Extension version 1.0. Additional data attributes required to be exchanged among stakeholders involving in ATFM operations and to support the integration between ATFM and A-CDM were identified in FIXM ATMB ATFM Extension version 0.1.

SWIM Discovery Service (SDS): Introduction

3.71 United States (USA) and Republic of Korea (ROK) introduced the concept of a SWIM Discovery Service (SDS). The ability to search for and locate (discover) services offered by a growing number of independently developed and autonomously managed SWIM domains is highly important and is a precursor for achieving global information exchange. The Federal Aviation Administration (FAA) and Korea Airports Corporation (KAC) are collaborating in an effort to define and test an approach for enabling federated service discovery across geographical and organizational boundaries. In this approach, a “discovery service” is a core SWIM service that allows a user to search for and obtain service metadata from multiple sources in one consolidated result. Discovery services do not need a centralized discovery mechanism since they are self-advertising and also advertise each other. To formalize the approach, the FAA has produced an SDS Implementation Specification v.1.0.0 that establishes guidelines and techniques for developing a discovery service capable of interacting with other SDS-compliant discovery services. The paper described SDS interaction patterns and discussed the contents of the Implementation Specification, including SDS behavior model, information model, resource model, interface requirements, and security requirements. The meeting noted that the SDS approach is consistent with the federated registry architecture adopted at SWIM TF/3, and encouraged participants to collaborate on SDS development.

Security and Trust in the Context of SWIM Service Discovery

3.72 USA and ROK provided a discussion of Security and Trust in the Context of SWIM Service Discovery. The joint FAA and KAC effort to establish a SWIM Discovery Service (SDS) development and testing environment has identified the need to address issues of security and trust that might occur when multiple independently operated discovery services exchange information. The paper illustrated some of these issues using an example scenario (an end user wants to “find all operational flight services”) that requires intercommunication among three different discovery services. It went on to explain that FAA and KAC are investigating using a federated identity management solution approach to secure the communication and showed how this approach could answer questions raised in the scenario. The paper also provided an overview of the latest relevant security technologies, and it discussed the proposed APAC Mutual Trust Infrastructure being developed as part of the Security Management subtask (Task 5) and its relationship to issues of trust between discovery services. The meeting recommended that issues identified in the paper be addressed by the TF Governance task and TF Security Management task, and encouraged participants to collaborate further on this subject.

SWIM Service Category Taxonomy

3.73 USA presented a SWIM Service Category Taxonomy designed for the purpose of organizing SWIM services into classes or categories to make the services easier to find or manage. The paper defined taxonomies as hierarchical classification schemes and described this particular scheme as a 3-level hierarchy with a top level “SWIM Service” classified into two categories, “Information Service” (services that provide information products) and “Core Service” (services that provide support capabilities). Each category has subcategories; e.g., “Weather Service” is a subcategory of Information Service, and “Security Service” is a subcategory of Core Service. The virtue of this taxonomy is that it can be extended horizontally by adding more categories to any level of the hierarchy, or vertically by further dividing a particular category into more specialized subcategories; in this way it is able to meet future business needs. Rendering the taxonomy into machine language (see <https://semantics.aero/service-category>) also allows it to support applications for service discovery or governance processing. The paper concluded by suggesting that the taxonomy be adopted as a standard approach for classifying SWIM services.

Implementation Status of SWIM Discovery Service (SDS)

3.74 USA and ROK provided information on the Implementation Status of the joint FAA/KAC SWIM Discovery Service (SDS) effort. In October 2019, Federal Aviation Administration (FAA) SWIM and Korea Airports Corporation (KAC) began a collaborative effort to establish a virtual environment for conducting transparent and replicable development of discovery services for future deployment by APAC SWIM initiatives. The paper presented a list of FAA/KAC work items together with the current status of each item. Completed items include: a service registry for ROK SWIM, a SWIM Discovery Service (SDS) Specification v.1.0.0 (<https://discovery.swim.aero/sds/1.0.0/>), a Service Description Model for JSON (SDM-J) (<https://discovery.swim.aero/sdm-j/1.0.0/>), and several SDS operations implemented. Remaining items include carrying out bi-directional testing of SDS operations and formally reporting the result of the joint effort to SWIM APAC TF/4.

Collaboration in Sharing of Surveillance Data in SWIM

3.75 The paper presented the key considerations leading to a proposal of a Commercial-ANSP collaboration scheme in sharing and enriching surveillance coverage for the region to benefit the aviation community and accelerate the implementation of SWIM. With the concern of sensitivity of surveillance data, the ownership and accountability of correctness on surveillance data, contributing ANSPs need to consider what surveillance data to be shared and associated commitment to high availability, system redundancy and coverage of surveillance data to be shared. General availability to all ANSPs, contributing or not, to the shared surveillance data is recommended to realize benefits such as more rapid expansion of CRV community and the launch of SWIM services. Furthermore, the need for a Surveillance Central Data Processor (SCDP), being a critical infrastructure required for the sharing of data in SWIM is also explored and discussed in this paper.

3.76 Through the discussion of key consideration factors, this paper intends to elicit Members’ views and thoughts on the Commercial-ANSP collaboration scheme proposed in this paper

and the various consideration factors leading to the proposal. Also mentioned in this paper is the data sharing model at EUROCONTROL'S Network Manager, which could serve as a reference to move the potential scheme of surveillance data sharing in APAC. It is suggested that a study group led by Surveillance Implementation Coordination Group (SURICG) supported by experts in SWIM and CRV etc. and under the guidance of ICAO APAC to be set up to advise CNS Sub-group on the best approach for regional surveillance data sharing.

3.77 The meeting agreed to nominate Task Leads or members from Task 2, Task 5 and Task 6 to join the study group proposed by SURICG to further explore the initiative.

FF-ICE/R1 Service Validation and Implementation

3.78 This WP was presented via a joint demonstration led by Japan, China and Republic of Korea. To implement FF-ICE/R1 operation, not only SWIM Technical Infrastructure for sharing information between different systems but also information services for supporting operation between different ATM applications are required. The FF-ICE services are expected to be highly automated and are expected to be performed through computer-to-computer links within a SWIM environment. This demonstration validated the implementation of FF-ICE services and the process of related messages for FF-ICE/R1 operation through two scenarios by considering the FF-ICE/R1 capable ASPs and AUs (eASP and eAU). The demonstration shows that the SWIM-based FF-ICE operation is capable to provide related information in greater detail and allow the eAU and the eASP to share their expectations in an unambiguous manner via the exchange of trajectory information. Moreover, according to the scenario discussion and the test system development, some technical observations and recommendations are presented for improving regional SWIM and FF-ICE/R1 implementation.

SWIM in APAC Region: Where are we now and where are we going?

3.79 Japan recalled the main regional activities since the establishment of SWIM Task Force in 2017. Considering the important role and function of SWIM in Global Air Navigation Plan (Doc 9750) and the Global ATM Operation Concept (GATMOC), as well as the significant impact of COVID-19 on the aviation industry, it is essential to highlight more efficiency and a strengthened and shared strategy for implementing SWIM in the region with stakeholders.

3.80 The meeting agreed to develop an action item for next Task Leads meeting to revise the TOR and further consolidate the list of action items, with consideration on the impact of COVID-19, new provisions from GANP edition 6, APAC Seamless ANS Plan, and enhancement of the interaction with various contributory bodies under APANPIRG. ACTION ITEM 4-5. The meeting also proposed to consider to prepare another SWIM workshop for this region during the next Task Leads meeting.

Regional Coordination

3.81 IATA presented to the meeting about the SWIM related activities (and their interdependencies) in planning or development within other Working Groups (WGs) and Task Forces (TFs) at regional level since SWIM TF/3, for a broader coordination of SWIM activities in APAC (not solely MET) and improved awareness of the work of the SWIM Task Force.

3.82 The access to ICAO APAC SWIM reference and education material resided in ICAO Secure Portal, SWIM briefing videos and IATA SWIM training classroom course were also introduced:

- i. SWIM awareness / educational videos are available from both ICAO at <https://youtu.be/wXI9ep98Z8E> and IATA at <https://youtu.be/QplD6sP--gg>
- ii. two-day IATA SWIM Training classroom course and two-hour online SWIM introductory course, both of which participants can register for at <https://www.iata.org/en/training/>.

Breakout Session Summaries

3.83 During the planning period of SWIM TF/4, the chair, Task Leads and secretariat team conducted a number of online discussions, therefore agreed to set up a breakout session for SWIM TF/4 to facilitate the Task Leads and contributors to meet and update their assignment respectively with efficiency and effectiveness. Three online breakout meeting rooms were provided to accommodate tasks' discussion. The outcome of breakout session was reported by to the plenary by various Task Leads.

Update on APAC SWIM Implementation Materials

3.84 APAC Regional SWIM Implementation Guidance Document was proposed during SWIM TF/3 and the draft Table of Content of APAC SWIM Implementation Materials was adopted as Appendix B to the SWIM TF/3 final report. The Task Leads and the associated contributors were requested to prepare their consolidated input to the APAC SWIM Implementation Materials at SWIMTF/4 meeting based on their presentations and studies, therefore a draft of APAC SWIM Implementation Materials was expected as outcome of SWIMTF/4 meeting.

3.85 The outbreak of COVID-19 pandemic projected unprecedented impact on aviation industry and also changed the original plan and available resource of this task. Considering the significant change of task force programme after SWIM TF/3, and the progress of DOC 10039 Vol II, the meeting agreed to suspend ACTION ITEM SWIMTF/3/2 for some time and reactivate it upon further updates during the future Task Lead meetings or SWIM TF/5, and the meeting encouraged the participants and concerned parties to provide and share SWIM related video, training material and other useful information to SWIM TF and secretariat for future compilation.

Generation and Life Cycle Management of GUF I and Related Issues

3.86 China implemented the wide-area surveillance network function verification system which was fed with various data sources including AFS message system, satellite/ground-based ADS-B system, surveillance radar system, ACARS, etc. The system provides multi-category data services for airlines, airports, ATC units, administration, GADSS-related organizations and other data users. GUF I (Globally Unique Flight Identifier) is used in flight data management in the system, which is usually generated in the flight planning stage by the simulated ATM role and participate in the subsequent data exchange, and it is managed in the entire life cycle of a flight, so as to realize the persistent storage of FIXM format flight data in the system.

3.87 The paper briefed the GUF I's textual representation, encoding rules, and the accessing of various flight-related data, part of which is generated in real time, while others is generated after the flight. At each flight data access point, a GUF I management component is set up. Some identified issues to be addressed were also discussed in the paper, such as the method to exchange data between systems in different countries/regions, difficulty to uniformly generate GUF I on a global scale, and GUF I use to exchange flight data in the transition environment.

The Status of SWIM R&D in the Republic of Korea

3.88 The Republic of Korea has been conducting SWIM R&D following the ICAO Global Air Navigation Plan (GANP) and Korea's National ATM Reformation and Enhancement Plan (NARAE) since 2016. Korea Airports Corporation (KAC) is in charge of SWIM R&D and its purpose is to implement SWIM testbed and lay the foundation for the transition to a SWIM environment.

Report on SWIM in Australia

3.89 Australia summarised the activities and plans for the design and implementation of SWIM services in Australia for customers and stakeholders. SWIM architecture and planning activities have been carried out by Airservices Australia (ASA) and the Australian Bureau of the Meteorology

(BOM) over the past 18 months. A number of proposals for the APAC SWIM community were proposed.

New IWXXM design to better support SWIM

3.90 Hong Kong China, being one of the members of the Task Team on Aviation Data (TT-AvData) of World Meteorological Organization (WMO), presented the latest update on the development of a new IWXXM design being studied by WMO TT-AvData for future versions of IWXXM. The new IWXXM design would introduce "Weather Object" to better facilitate retrieval and consolidation of individual meteorological element through SWIM information services.

The Status of Shared Information Quality Management in China

3.91 The paper presented the exploration and practice of Civil Aviation Administration of China (CAAC) for establishing information quality management system based on SWIM concept. As the number of participants and information shared for operation coordination are increasing rapidly, it is necessary to clarify the accountabilities, standardize the procedures and enhance the platform functions for information quality management.

SWIM in ASEAN Demonstration Report (WP/23)

3.92 Singapore and Thailand presented the SWIM in ASEAN Demonstration Report. Detailed of the demonstration development, including the collection of operational requirements as well as the design, development, and test of SWIM infrastructure and information services were discussed.

3.93 SWIM in ASEAN Demonstration was successfully conducted on the 12 and 15 of November 2019, in Bangkok, Thailand and Singapore, respectively to demonstrate the principles of SWIM, show the potential operational benefits of SWIM and to demonstrate a model of SWIM implementation for ASEAN and Asia/Pacific Region. It got a wide participation of aviation stakeholders including CAAs, ANSPs, airport operators, airlines, and international organizations such as ICAO APAC, IATA.

3.94 The Report covers the details of the demonstration development, including operational scenario development, SWIM infrastructure, information services, and SWIM-enabled applications design, development, and test, and observations and lessons learnt. Various operational scenarios were conducted during the Demonstration. Global Enterprise Messaging Services (GEMS) was selected as the architecture to support the demonstration. To ensure that messages would be routed correctly and in the most efficient manner possible, AMQP version 1.0 was chosen to be the standard protocol for the Demonstration. It was concluded that the existing standardized information exchange models, namely AIXM, FIXM, and IWXXM could be utilized for the exchange of aeronautical information, flight information, and weather information, respectively. The specific version of information exchange models, i.e. AIXM version 5.1, FIXM version 4.1, and IWXXM version 2.0, were selected. It was found that to address the specific needs extensions to the core of the existing information exchange models are viable and effective solution. Additionally, mediation is a key to bring diverse stakeholders on board and to enable the early leveraging of seamless information sharing. Clearly defined operational use cases and processes are crucial to and prerequisite for SWIM development and implementation. Interconnected EMSs is a candidate model of SWIM implementation. SWIM ASEAN Demonstration Report is provided in **Appendix I** to this report.

3.95 The meeting congratulated Thailand and Singapore in leading this SWIM Demonstration, and highly recognized its contribution to the regional SWIM implementation. The meeting also encouraged SWIM TF to make better benefits from the cross cutting coordination with other contributory bodies of APANPIRG, in particular with CRV and ATFM, to further enhance the connection with infrastructure and the users. **ACTION ITEM 24-4.**

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/4 Report related to the aeronautical mobile communication and spectrum utilization.

Fourth Meeting of the Spectrum Review Working Group (SRWG/4) (WP/08)

4.2 The Fourth Meeting of the Spectrum Review Working Group (SRWG/4) was assisted by Mr. Robert Witzgen in voluntary way from Montreal, who's a former ICAO Officer, expert in frequency management and main developer of Frequency Finder software tool.

4.3 Due to resignation of Mr. Paul Dowsett of Airservices Australia from the Chair role after the third meeting, there was a need to elect a new chair to lead the group. Nominated by Hong Kong China and seconded by Singapore, Mr. Chainan Chaisompong, Air Traffic Engineering Manager from Aeronautical Radio of Thailand Ltd. (AEROTHAI) was elected as the new Chair of the SRWG.

Review of Regional Process

4.4 A secretariat paper addressed the need to explore the spectrum capacity to implement future requirements for VHF-COM systems as well as for NAV systems in the light of determining the need to reduce in particular the channel spacing in the VHF band 108 – 117.975 MHz for ILS Localizer and VOR to 50 kHz. The paper proposed to develop a frequency assignment plan that would include all requirements for VHF-COM and for NAV systems, including GBAS/VDB, for the period up to around 2030. Therefore, the meeting endorsed the following Decision:

Decision CNS SG/24/6(SRWG/4/1) - Frequency requirements for VHF-COM systems and ILS, VOR, DME and GBAS/VDB facilities	
What: That, the SRWG is tasked to develop a rolling frequency assignment plan for VHF-COM and ILS, VOR, DME and GBAS/VDB facilities to meet the operational requirements until [2030], subject to a regular review and updating by the SRWG.	Expected impact: <input type="checkbox"/> Political / Global <input type="checkbox"/> Inter-regional <input type="checkbox"/> Economic <input type="checkbox"/> Environmental <input checked="" type="checkbox"/> Ops/Technical
Why: To secure adequate spectrum for these facilities for the near future.	Follow-up: <input checked="" type="checkbox"/> Required from States
When: 4-Dec-20	Status: Adopted by Sub-group
Who: <input checked="" type="checkbox"/> Sub groups <input checked="" type="checkbox"/> APAC States <input checked="" type="checkbox"/> ICAO APAC RO <input type="checkbox"/> ICAO HQ <input type="checkbox"/> Other:	

Introduction of Signal Monitoring for ILSs Using Same Frequency But Different Identifiers at Both Ends of the Same Runway

4.5 China introduced the signal monitoring for ILSs which using same frequency but different identifiers at both ends of the same runway in China. In order to solve the problem of ILSs frequency strain in airports dense area, it is a common practice to assign the same frequency but different identifiers at both ends of the same runway. Such practice was implemented at Shanghai Pudong international airport and Beijing Daxing international airport. Since human factor or failure of interlock could lead navigation indication error and aircraft flight path loss, a monitoring method is necessary for protection of ILSs signal quality.

Review of Global COM List for the APAC Region

4.6 With the successful implementation of Frequency Finder, there was no more Frequency List No. 3 published by the ICAO Asia and Pacific Regional Office after the 29th Edition in January

2016, the up-to-date database in Frequency Finder (equivalent to Frequency List No. 3 in APAC region) is visible to all Frequency Finder users.

4.7 The maintenance and promulgation of Frequency List Nos. 1 and 2 are still being conducted by the Regional Office in a timely and periodic manner. It proposes to request States to update specific characteristics for NAV facilities in the Frequency List No. 2 as well as to secure that the information in the Frequency Lists is up-to-date.

4.8 After review of the regional Frequency List No. 3, through further discussion in the meeting, a decision was made as following:

Conclusion CNS SG/24/7(SRWG/4/2) – Simulation of VHF COM Frequency requirements for next 10 years	
What: To conduct a new round of simulation for VHF COM frequency assignment based on new operational requirements of States to 2030 as necessary.	Expected impact: <input type="checkbox"/> Political / Global <input type="checkbox"/> Inter-regional <input type="checkbox"/> Economic <input type="checkbox"/> Environmental <input checked="" type="checkbox"/> Ops/Technical
Why: To support regional strategy on the use of 8.33KHz channel spacing.	Follow-up: <input checked="" type="checkbox"/> Required from States
When: 4-Dec-20	Status: Adopted by Sub-group
Who: <input checked="" type="checkbox"/> Sub groups <input checked="" type="checkbox"/> APAC States <input checked="" type="checkbox"/> ICAO APAC RO <input type="checkbox"/> ICAO HQ <input type="checkbox"/> Other:	

4.9 Considering the important role of Frequency Finder played in the updating and maintenance of global database, relevant issues including user credential, software robustness, cyber security, etc. were addressed by the meeting. In order to fully benefit from the use of Frequency Finder for spectrum coordination, while effectively managing the relevant risks, the meeting urged ICAO to continue the robustness of the tool, endorsed the following Conclusion aimed at improving the administrative process.

Conclusion CNS SG/24/8(SRWG/4/3) – Establishment a list of focal point responsible for the operation of Frequency Finder in States	
What: That, States in APAC Region are requested to nominate a focal point responsible for operation of the Frequency Finder and coordination for frequencies assignments with ICAO APAC Regional Office in order to reduce operational error and improve quality management for the coordination process.	Expected impact: <input type="checkbox"/> Political / Global <input type="checkbox"/> Inter-regional <input type="checkbox"/> Economic <input type="checkbox"/> Environmental <input checked="" type="checkbox"/> Ops/Technical
Why: To reduce operational error in accessing the tool of Frequency Finder and improve the spectrum management quality by enhancing the administrative process.	Follow-up: <input checked="" type="checkbox"/> Required from States
When: 4-Dec-20	Status: Adopted by Sub-group

4.10 The meeting encouraged States/Administrations to share experience in using VHF COM function of Frequency Finder in various regional CNS events. The meeting also urged States to provide the Regional Office with information of all facilities that are in operation to improve the currency of Frequency lists.

Review of TOR and Action List

4.11 The secretariat presented the development and achievements made in APAC Region since SRWG/3, and the meeting reviewed the main outcomes from the previous meetings, with the experiences shared by States, discussed the possible future direction and tasks against the TOR and the Action List.

4.12 The most important function of this expert working group was to study the issue of the requirement of 8.33 kHz channel spacing, and it could be considered as completed by 2016 after SRWG/3. However, with the expected changes in air traffic, it has been agreed to conduct another round of simulation on VHF COM frequency assignment in APAC Region based on operational needs submitted by States, it has also been identified in spectrum capacity to accommodate GBAS/VDB and other emerging issues in optimizing the efficient and safe use of radio spectrum. The meeting discussed the aforementioned information and experiences from States, and agreed the following Decision:

Decision CNS SG/24/9 (SRWG/4/4) – Revision of the Term of Reference of the SRWG	
What: That, the revised Terms of Reference provided in Appendix J to the Report be adopted.	Expected impact: <input type="checkbox"/> Political / Global <input type="checkbox"/> Inter-regional <input type="checkbox"/> Economic <input type="checkbox"/> Environmental <input checked="" type="checkbox"/> Ops/Technical
Why: Need to refine the scope of related tasks and include the new members.	Follow-up: <input checked="" type="checkbox"/> Required from States
When: 4-Dec-20	Status: Adopted by Sub-group
Who: <input checked="" type="checkbox"/> Sub groups <input checked="" type="checkbox"/> APAC States <input checked="" type="checkbox"/> ICAO APAC RO <input type="checkbox"/> ICAO HQ <input type="checkbox"/> Other:	

4.13 The keynote for this revision is to conduct simulation on VHF COM frequency assignment and expand its scope of work to cover Navigation systems with highlight on GBAS implementation.

Annex 10 Volume V and VI on RPAS C2 Link

4.14 There were the proposals to amend Annex 10, Volume V and to add a new Volume VI to Annex 10 to include a dedicated to the SARPs on the “C2 Link Procedures” and the “C2 Link Systems”. On 23 August 2019, a State Letter with Ref.: AN 7/67.1.1-19/52 and **Subject: Proposals for the amendment of Annex 10, Volume V, new first edition of Volume VI and consequential amendments to Annexes 1 and 2 arising from the thirteenth meeting of the Remotely Piloted Aircraft Systems Panel (RPASP/13)** was issued for a 6-month consultation.

4.15 The proposed Volume VI, “Communication Systems and Procedures relating to Remotely Piloted Aircraft Systems C2 Link”, is constituted in two parts: Part I, dealing with procedural SARPs, organized similarly to Annex 10 Volume 2; and part II on Systems organized similarly to Annex 10 Volume 3. The State Letter, appended the IP/30 introduces generic and technology-neutral C2 Link SARPs, the first of the two planned C2 Link deliverables. It provides stakeholders, including regulators, manufacturers and operators, with a framework enabling them to plan for the introduction of the C2 Link.

1090 MHz Spectrum and 24-bit Aircraft Address Issues with UAS

4.16 It is noted that on 8 November 2019, ICAO issued a State Letter on the Subject: 1090 MHz spectrum issues and proper management of 24-bit aircraft addresses associated with unmanned aircraft operating exclusively at very low level, Ref.: SP 44/2 - 19/77. ICAO member States are urged

to note the ongoing ICAO initiatives to ensure the continued safe and reliable operation of aeronautical surveillance systems, and encouraging State to make use of the guidance material enclosed in the letter.

Report on the results of the International Telecommunication Union (ITU) World Radiocommunication Conference (2019) (WRC-19) (IP/08)

4.17 Radio frequency spectrum is a critical component of infrastructure that serves all aeronautical communications, navigation and surveillance/air traffic management (CNS/ATM) services and is protected as a safety-of-life function under the Radio Regulations. It is imperative that the global aviation community retains interference-free access to sufficient radio frequency spectrum in order to maintain safe implementation and operation of the CNS/ATM systems.

4.18 The ITU WRC serves as the preeminent event for negotiating long-term frequency spectrum rights. This paper summarizes the discussions and results from ITU WRC-19 (held 28 October to 22 November 2019 in Sharm el Sheikh, Egypt). In general, the conference results conformed to the ICAO Position. It is now essential to form an expeditious start of the ICAO preparatory activities for the next conference in 2023, as a very large effort will be required on the part of the Organization and its Member States to ensure that the ICAO Position is supported by the conference.

Draft ICAO Position for ITU WRC-23 (IP/09)

4.19 This paper reviewed the agenda for the ITU World Radiocommunication Conference 2023 (WRC-23), discussed points of aeronautical interest and provides the ICAO Position for these agenda items.

4.20 The goal of the ICAO Position is to ensure aeronautical access to appropriately protected spectrum for radiocommunication and radionavigation systems that support current and future safety-of-flight applications. In particular, it describes the safety considerations necessary to ensure adequate protection against harmful interference.

4.21 Support of the ICAO Position by ITU Member States is required to ensure that the position is supported at the WRC-23 and that aviation requirements are met. **ACTION ITEM 24-5**

4.22 The meeting briefly reviewed the draft ICAO Position for ITU WRC-23 and also reviewed the ICAO process to prepare Position and join the WRC preparations provided in **Flimsy/02**.

Space-based VHF Communications in 117.975-137 MHz Frequency Band (WP/26)

4.23 Singapore presented updates on the preliminary technical study findings of study of space-based VHF concept and the progress of space-based VHF discussions at ICAO and ITU meetings.

4.24 By space-based VHF, aircraft operating in remote continental regions and oceanic areas could communicate with ATC via VHF relayed through satellite(s). The paper provided illustration of the space-based VHF communication concept. Amendments to the ITU Radio Regulations (“RR”) are necessary as the space-based VHF will require the ITU to harmonise and allocate the VHF frequency spectrum for AMS(R)S between satellite and aircraft. The space-based VHF frequency allocation (under AI 10 of WRC-19) was formally accepted as an agenda item for WRC-23 Agenda Item 1.7. Works on space-based VHF spectrum and technology studies have started in ITU Working Party 5B (WP 5B), ITU Asia Pacific Telecommunity (APT) Preparatory Group (APG), ICAO Communications Panel, and ICAO FSMP.

4.25 Objectives and characteristics for the space-based VHF system under study along with Aircraft VHF receiver characteristics was discussed. The aircraft antenna pattern for space based VHF was presented. It was informed that the co-sinusoidal shape and consequential null at aircraft zenith has important implications on the performance of the satellite VHF link. It was said that a field strength of 30 microvolts per metre would be more relevant for the satellite case than the 75 microvolts per metre

reference. It is proposed to consider a maximum 1000 km (540 nm) range for Satellite-aircraft range for the reference link budget and to take reference ionospheric losses as a low level of 3 dB attenuation losses for medium latitude regions, a medium level of 5 dB attenuation losses for high latitude regions, and a high level of 10 dB attenuation losses for low latitude regions. A circularly-polarized receiving and transmitting antennas are assumed. Preliminary downlink link budget for satellite transmitter was presented.

4.26 CAAS and its industry partners will continue with the technical feasibility studies on the design of the satellite constellation, coverage optimisation and other technical parameters. France and Singapore commenced the frequency compatibility studies work and submitted an Input Document at the November 2020 ITU Working Party 5B (WP 5B) meeting to update on Agenda Item 1.7. In parallel, CAAS is also working closely with interested States and ICAO FSMP to develop methods to satisfy this agenda item, in the current WRC cycle leading up to WRC-23. FSMP is also drafting ICAO Positions for WRC-23, in addition to coordinating the frequency compatibility studies work required for WRC-23. The current draft ICAO Position for WRC-23 Agenda Item 1.7 was described. The ICAO DCIWG meeting in Oct 2020, approved the setup of a new project team sub-group to review existing ICAO Annex 10 SARPs, and recommend if amendments are required and relevant guidance materials to enable satellite-based VHF operations for AMS(R)S.

4.27 Chairman asked whether space-based VHF topic was discussed at ACSICG prior to this meeting. Singapore and ICAO Secretariat replied that similar papers were presented at SRWG and ACSICG, but WP26 contained more updates from the frequency compatibility studies that commenced in mid-2020 (after the SRWG and ACSICG meetings). The meeting further discussed about the business case and frequency congestion concerns of regional/global space-based VHF services. It is proposed that ACSICG to study whether there is a need to perform business case studies, considering that such studies are usually driven by industry. On frequency congestion concern, Singapore replied that ICAO Regional Office will allocate frequencies as per current practice.

4.28 Through **Flimsy/03**, Singapore further informed the meeting about the proposal on a draft conclusion to encourage States/Administrations in APAC Region to participate in the ICAO DCIWG space-based VHF sub-group to review ICAO Annex 10 SARPs for adoption of space-based VHF operations. The meeting considered further work needs to be done and agreed to recommend States/Administrations who are interested and capable to join the relevant study, and as present ICAO Position for WRC-23 already included space-based VHF agenda. The Secretariat was requested to coordinate with SRWG chair and ACSICG chair to clarify how to track and monitor this initiative, and form an ad hoc group, if necessary, to take the concerns from States on a regional level so as to make the study meaningful, and the outcome of this deliberation will be reported back to CNS SG/25 for consideration. **ACTION ITEM 24-6**

Agenda Item 5: Navigation

Seventh Meeting of Performance Based Navigation Implementation Coordination Group (PBNICG/7) (WP/09)

PBN Implementation Update

5.1 The Secretariat presented global PBN implementation status at international airports. The Secretariat informed that regarding key requirement of ICAO Assembly Resolution A37-11, which is the implementation of approach procedures with vertical guidance (APV) for all instrument runway ends by 2016, implementation of APV procedures were behind global achievement. However, implementation of PBN SID/STAR were above the global implementation status (see **Table 1**).

Table 1. ICAO Assembly Resolution A37-11 Implementation Status

Dec 2019	PBN Approach	APV		PBN SID	PBN STAR
		LNAV/VNAV	LPV		
Global (%)	74.8	56.5	34.1	47.8	43.9
Asia/Pacific (%)	62.6	43.5	0	70	67.8

Regional Transition Plan for RNP Chart Identification

5.2 The Secretariat informed the meeting that Asia/Pacific Regional Transition Plan for RNP APCH Chart Identification from RNAV to RNP as accepted by states in PBNICG/6 and endorsed by ATMSG/7 and CNS SG/23 was adopted by the thirtieth meeting of the Asia/Pacific Air navigation planning and implementation regional group (APANPIRG/30) Bangkok, Thailand, 4 to 6 November 2019. Proposed contingency measure for the Regional Transition Plan for RNP APCH Chart identification as discussed in APANPIRG/30 was also presented.

States' PBN Implementation Progress

5.3 China provided updated information on PBN implementation. China informed the meeting that 500 out of 532 instrument runway ends of 246 airports have PBN approach procedures. The meeting was also informed that China implemented 753 PBN routes. By now, Beijing/Capital, Beijing/Daxing, Shanghai/Pudong, Shanghai/Hongqiao and other major airports have implemented RNP APCH procedures. China has also implemented 33 RNP AR procedures including 11 at International airports and 22 at Domestic airports.

5.4 India provided information on ATS routes, SIDs/STARs and RNP APCH implementation in accordance with its PBN implementation plan. India has implemented RNP APCH procedures for 52 Runway ends so far. Out of these 23 RNP APCH are for international airports and 29 RNP APCH for domestic airports. As per the regional transition plan for chart identification from RNAV to RNP, India has completed and changed all the chart identification and all new charts are having Chart title RNP.

5.5 India informed the meeting on the progress & update on the development of SBAS (GAGAN) LPV procedures and that it is exploring the possibility of implementing LPV procedures. The secretariat asked about the clarification about GAGAN Mandate, to which India stated that it is for new aircraft to be registered in India after the cut-off date. The secretariat requested India to share the mandate on GAGAN and India agreed to share the same with meeting. The secretariat also requested India to share safety assessment of LPV procedure in the next GBAS/SBAS, to which India agreed.

5.6 The Republic of Korea (ROK) presented its PBN implementation status in approach, SID/STAR and ATS routes. The meeting was informed that the entire RNAV5 routes operated within the Incheon FIR were converted to the RNAV2. The meeting was informed that of 18 airports (civil / joint civil and military) in ROK, LNAV / VNAV approach procedures have been established at 29 out of 56 runway ends, while LNAV procedure has been established at 34 runway ends. The ROK has completed converting naming of 32 charts from RNAV (GNSS) RWY XX to RNP RWY XX as of 15 August 2019.

5.7 Maldives has published 22 RNP APCH procedures, 16 LNAV and 6 LNAV/VNAV. Eight more procedures will be published for the newly developed domestic airports. The meeting was informed that the process to change the identification of PBN instrument flight procedure approach charts from RNAV to RNP was completed in May 2019. Maldives has published 10 domestic routes based on the RNP 1 navigation specification, to connect the airports in the South. The secretariat raised the rationale for selecting RNP 1, which is designed for terminal airspace, Nav Specs for these routes

and Maldives should consider replacing RNP 1, with RNAV 2 or RNP 2 routes. Maldives stated that due to lateral spacing requirement, they have implemented this.

5.8 Myanmar provided information on the PBN implementation progress in Terminal, Approach and En-route in accordance with their PBN implementation plan. However, the implementation process has been delayed due to some constraints involving military airspaces. Vietnam enquired about frequency of validation flight of Baro-VNAV procedures, Myanmar responded that it is done before publication of the procedure. The secretariat clarified that the validation process as defined in ICAO Doc 9906 should be followed.

5.9 Nepal provided information on the latest progress of PBN implementation in Terminal, Approach and En-route in accordance with their PBN implementation plan. The meeting was informed that Feasibility study for RNP APCH (SBAS) will be done and regional cooperation will be sought for the planned implementation if such procedures are desirable. RNP AR Departures will be designed and implemented at TIA Kathmandu. The meeting was informed that the process to change the identification of PBN instrument flight procedure approach charts from RNAV to RNP was completed in March 2020.

5.10 Pakistan enquired about RNP AR departure criteria, to which Nepal responded that its being designed using criteria used by industry and some States. The secretariat clarified that presently there is no published criteria of RNP AR departure in ICAO documents.

5.11 Thailand provided PBN implementation status in approach, SIDs and STARs, and ATS route implementation. In addition, the meeting was informed the progress of RNP AR APCH procedure, the plan for GBAS installation at Phuket International Airport as 2024 and for Suvarnabhumi International Airport postponed. For En-route operations, new RNAV2 routes (L880, M633, N506, P629) between Bangkok and Phnom Penh FIR have been developed and became operational in October. In line with the Asia Pacific Seamless ANS Plan, RNAV2 specification is planned for all new ATS Routes, international and domestic.

5.12 Viet Nam provided the status information on RNP APCH, SIDs and STARs and ATS route development in accordance with their PBN implementation plan. The meeting was informed about the lesson learnt, such as Airlines not being approved for RNP APCH and coordination required with Military. The secretariat suggested that Flexible use of Airspace(FUA) could provide a solution to some of the issues related to Military coordination. In this regard ICAO Circular on Civil Military Cooperation in ATM, ICAO Circular 330 could be looked into.

CDO/CCO Implementation

5.13 China shared with the meeting implementation process for CDO/CCO, its benefits, and implementation status so far and planned implementation of CDO/CCO in China. It explained in detail about the technical research, Implementation Steps and Implementation results. It further elaborated that the guidance was derived from GANP, APAC Seamless Air Traffic Plan, CDO, CCO and PBN Manual to design the implementation strategy. It also described the benefits from CDO/CCO such as Safety Improvement, Green Environment, reduction in Cockpit workload, improvement in comfort for the passengers. So far CDO/CCO have been implemented at six international airports including Guangzhou Baiyun Intl. airport and Kunming Changshui Intl. airport and etc. CDO/CCO will be implemented in more airports in China in phases.

5.14 India discussed with the meeting implementation process for CDO/CCO implementation at Delhi, its benefits, and challenges in terms of Traffic Pattern, Airspace Constraint, Pilot sensitization, ATC training etc. It shared some of the pictures from the actual CDO/CCO conducted at Delhi Airports and explained in detail how it is being done at one of the busiest airport with several airspace constraints.

5.15 The Secretariat presented the list of action items agreed by the previous meetings. There were 07 actions left for discussion at the meeting. The meeting was informed of the progress of each action item and agreed to close 06 items after deliberations. Pakistan pointed out that there is inconsistency between the number of instrument runways available in Asia/Pac e-ANP Volume II and

data used by i-STARs for some States. After deliberations it was decided to add a new action item that “number of International Instrument Runway Ends to be included in iSTARs should be based on the latest information”.

5.16 The meeting noted the *Draft Conclusion PBNICG/7/1 - PBN Implementation Reporting in iSTARs* provided in the List of Action Items and agreed to keep it as an action item tasked to ICAO APAC RSO other than an APANPIRG conclusion.

Report of the First and the Second Meeting of Asia/Pacific GBAS/SBAS Implementation Task Force (GBAS/SBAS ITF/1 and ITF/2) (WP/12)

5.17 As per CNS SG/23 meeting Decision CNS SG/23/9 regarding establishment of the APAC GBAS/SBAS Implementation Task Force, the first Meeting (GBAS SBAS ITF/1) was held through VTC on 23-24 June 2020 in which 104 participants joined. The TOR of the Task Force as provided in Appendix J to the CNS SG/23 meeting report was discussed. Outcomes of the ICAO GBAS/SBAS Implementation Workshop in Seoul on 3-5 June 2019 were discussed in the GBAS/SBAS ITF/1. To better capture the issues and challenges faced in GBAS/SBAS implementations, an exercise was conducted amongst participants in GBAS/SBAS ITF/1.

5.18 To develop awareness among participants, as well as collecting needs from States for guidance or training, the Secretariat created an exercise; and all participants of the Task Force were split into four breakout groups. Each individual breakout group worked on an electronic wall for discussing participants’ ideas in that particular group and a rapporteur then presented the main outcomes in the debriefing session with all participants’ attendance. This exercise captured issues and challenges regarding GBAS/SBAS implementations in the States.

5.19 With reference to information captured in the exercise and explanations provided by the four rapporteurs, the Secretariat proposed to structure the wrap-up in the following way:

- a. Training of the operational people Stakeholders (syllabus or training package)
- b. Knowledge/ Experience sharing / platform in respect of systems and procedures
- c. Review of the outcomes published by ICAO Ionospheric Study Task Force in 2016
- d. Organize a workshop for airspace users / CONOPS / Fleet readiness
- e. ATC Interface / NOTAM
- f. Guidance Material on implementation / safety assessment
- g. Involvement of regulators in the overall implementation process

5.20 It was agreed that the Secretariat would propose the first list of actions of the Task Force.

5.21 The second Meeting of the ICAO APAC GBAS/SBAS Implementation Task Force (GBAS/SBAS ITF/2) was held through VTC on 9-10 September 2020 with attendance of 118 participants. Ten IPs prepared by States and industry were presented on GBAS/SBAS activities in the region.

5.22 The Secretariat received two nominations for chairperson of the Task Force: Mr. Susumu Saito from Japan and Mr. Wong, Tak Yuen George from Hong Kong China. After discussion within the Task Force, both nominated candidates were elected as Co-Chairs.

5.23 Australia presented the status of two currently functional GBAS Landing Systems at Sydney and Melbourne airports. There are more than 3000 GLS approaches conducted per fortnight at these two airports. Percentage of GLS equipped aircraft operating at Melbourne is 40% and that at Sydney is 29%. Australia and New Zealand have established a joint project to deliver a Satellite Based Augmentation System (SBAS) capability.

5.24 China presented that the Beidou (BDS) was one of the 4 core satellite constellations defined in Annex 10 and the validation of BDS was being discussed and promoted. BDS-3 constellation includes 24 MEOs, 3 IGSOs and 3 GEO3. The BDS will provide the worldwide service in 2020. The BD SBAS constellation and ground system will be completed in end 2020. The accuracy of BDSBAS SF Service satisfies the requirement of APV-I.

5.25 Hong Kong, China shared their strategy and experience in conducting a GBAS trial at the Hong Kong International Airport (HKIA), which aimed to assess the feasibility for GBAS implementation there and to identify potential impacts arising from local ionospheric effects as well as constraints induced by terrains/building structures around the HKIA.

5.26 The issue in VDB frequency assignment for GBAS was also raised by Hong Kong, China due to the VDB frequency using the same radio frequency band as other types of ground-based navigational systems, such as VHF Omni-directional Range (VOR) and Instrument Landing System (ILS), but with large (around 1MHz) channel space required from existing DVOR/ILS frequencies already in use. Hong Kong China drew States' attention to the need for the coordination with other State/Administration for the use of navigational facilities frequency, through collaboration with ICAO Spectrum Review Working Group (SRWG) and assistance from ICAO APAC Office, for the implementation of GBAS.

5.27 Japan presented that MSAS (Michibiki Satellite-based Augmentation Service) SBAS has completed satellites transition from MTSAT to QZSS in end March 2020. Various developments are being conducted to enhance the MSAS system, including MSAS LPV service expected to commence in 2023. JCAB updated the status of the CAT-I GBAS at Tokyo Haneda airport, for which a trial had been conducted since July 2020 to aim for formal operation commencement by the end of 1Q 2021. In addition, ENRI is conducting activities on GAST-D and GAST-E/F.

5.28 The Korea Augmentation Satellite System (KASS) will be completed by 2023 for the provision of the Safety of Life (SoL) service across the designated coverage. Republic of Korea pointed out the difficulty to find Geo payload to rent for transmission of the SBAS signal.

5.29 IATA presented that GBAS infrastructure and GLS procedures should be implemented as appropriate based on a positive business case and consultation with airlines. Regarding SBAS, due to issues associated with overlapping satellite footprints States should not support the use of SBAS to fly LNAV or LNAV/VNAV minima and should publish LPV minima for all approach procedures to be flown using SBAS. Additionally, all procedures with SBAS LPV minima should also include ABAS Baro-VNAV LNAV/VNAV minima.

5.30 Activities of ICAO Navigation Systems Panel (NSP) GBAS working group (GWG) Ionosphere Gradient Mitigation (IGM) ad hoc group were introduced. It is working on enhancing GBAS performance in the low latitude region that shares the common interest with this task force related to the review of APAC GBAS guidance on the ionosphere threat mitigation.

5.31 The United States provided an overview of their research, design approval, commissioning, and oversight of GBAS, with highlights on benefits and technical differences between GBAS and ILS. US deployment plan for GBAS meeting GAST C standards was also presented. Discussion also highlighted the need to develop and apply a site specific ionospheric threat model for assessing risk to GBAS performance.

5.32 The Action List of the task force proposed by the Secretariat was discussed. Description, relevance and priority of those action items were assessed by the meeting. Action owners were assigned with target date agreed in GBAS/SBAS ITF/2.

5.33 The Action List from GBAS/SBAS ITF/2 and the TOR of GBAS/SBAS were presented in CNS SG/24 Meeting and there was no comment raised on them.

Outcome of the Seminar on Flight Inspection and Procedure Validation (WP/13)

5.34 The Seminar on Flight Inspection and Procedure Validation (FIPV) was held in the ICAO APAC Regional Office, Bangkok, Thailand from 24 to 27 September 2019. It was conducted in accordance with the Special Implementation Project of ICAO for 2019.

5.35 The Seminar recognized the need and usefulness in organizing such a forum exchanging information on FIPV to enhance flight safety and regularity of air navigation. The outcome would facilitate States/Administrations in improving their capacity to conduct the critical FIPV activities in a more effective, efficient, safe and economical manner.

5.36 The need was emphasized to update the *Catalogue of Asia and Pacific Flight Inspection and Flight Validation Service Providers* more regularly to reflect the latest information that would benefit potential new customers seeking flight inspection/validation services within the Region or beyond.

5.37 The seminar noted the development of FIPV technology, computer simulation analysis techniques which have been used in the prediction and analysis of navigation signals that can be further used to analyse the accuracy of the signals when a new navigation station is commissioned, or an existing navigation station environment changes.

5.38 The need for development of guidance material on the regional best practices for undertaking flight inspection was identified, considering the typical need of States/Administrations without a national FIS provider and some recommended measures necessary for conducting flight inspection at night. The initial table of contents based on the flight inspection manual of Hong Kong-China is provided. The guidance material will be presented to CNS SG for adoption and then will be posted on the ICAO APAC Website. The volunteering member of the group: Hong Kong CAD, CAAS, New Zealand Airways, CAAC FIC, FCS and Aeroperl (Hong Kong CAD acts as lead).

5.39 Further guidance from ICAO is expected on the use of UAS (RPAS) as a viable/supplementary solution to carry out the flight inspection including cost/effectiveness analysis for introducing this emerging technology.

5.40 Member States/Administrations in a position to do so are encouraged to continue conducting more research and trials using emerging technologies and best practices and provide regular reports to CNS SG of APANPIRG:

- a) Assessment of UAS (RPAS) for Flight Inspection/Validation including the scenarios, advantages, limitations (such as FI range, UAV speed and payload, C3 etc.) and proposed processes and procedures for implementation;
- b) Improved flight inspection efficiencies and operational risks of flight inspection at night;
- c) Sharing PBN flight procedure validation methods and technologies, which can save cost, improve efficiencies, and facilitate PBN implementation; and
- d) PBN vulnerability to GNSS Interference, and the need for spectral assessment.

5.41 States in APAC Region are urged to update the information in the Flight Inspection Catalogue (Catalogue of Asia and Pacific Flight Inspection and Flight Validation Service Providers, 10th Edition, April 2018). The new editions of the Catalogue should be published on a regular basis. States were also encouraged to incorporate into the catalogue any capability for ADS-B and other information involving the use of new technologies.

5.42 States/Administrations capable to do so are encouraged to further study the application of computer simulation technology and ground testing technology before flight inspection of nav aids

in order to facilitate the set up and best performance state of the nav aids in order to improve the efficiency of flight inspection.

Flight Inspection Guidance Material (FIGM) for APAC Region (WP/18)

5.43 Hong Kong, China presented flight inspection guidance material for APAC region. In response to a recommendation from the “Seminar on Flight Inspection and Procedure Validation (FIPV)” held in the ICAO APAC Regional Office, Bangkok, Thailand from 24 to 27 September 2019, it is decided to complement existing SARPs to provide guidance on flight inspection and to serve as a reference for States/Administrations to develop their own specific practices and procedures. A first edition of the Flight Inspection Guidance Material (FIGM) is then developed with the experiences and knowledge contributed by volunteer APAC States / Administrations and industry partners and was presented to the meeting.

5.44 It includes recommendations of key activities and milestones in planning, execution, and delivery of a flight inspection. Useful materials, including sample flight inspection reports are also included for reference. The FIGM is not intended to and shall not replace the relevant flight inspection requirements stipulated in Annex 10 and Doc 8071. Therefore, in the event of any inconsistency or conflict between this document and Annex 10 and Doc 8071, Annex 10 and Doc 8071 shall take precedence.

5.45 There are four chapters in FIGM named Introduction, planning for flight inspection, conducting flight inspection, and reporting of flight inspection results. The FIGM introduces example flight inspection procedures for Instrument Landing System (ILS) including visual aids, Doppler Very High Frequency Omni-Directional Range (DVOR), Distance Measuring Equipment (DME), Primary Surveillance Radar and Secondary Surveillance Radar (PSR/SSR) and discusses about the arrangement for flight inspection at night and the emergency flight inspection. Reference was also made to the reference on the considerations of radio navigation aids flight inspection periodicity during COVID-19. Reference is also given on the example flight inspection system performance specifications and associated Test Accuracy Ratios (TAR) and the workflow on reporting of flight inspection results.

5.46 With aforementioned and further discussion on the material, the meeting formulated and adopted the following Conclusion:

Conclusion CNS SG/24/10 – Flight Inspection Guidance Material (FIGM) for APAC Region	
What: That, the first edition of the Flight Inspection Guidance Material (FIGM) provided in Appendix K to this Report be adopted.	Expected impact: <input type="checkbox"/> Political / Global <input type="checkbox"/> Inter-regional <input type="checkbox"/> Economic <input type="checkbox"/> Environmental <input checked="" type="checkbox"/> Ops/Technical
Why: To provide additional guidance on planning, execution and delivery of flight inspection for States/Administrations in APAC Region.	Follow-up: <input checked="" type="checkbox"/> Required from States
When: 4-Dec-20	Status: Adopted by Subgroup
Who: <input checked="" type="checkbox"/> Sub groups <input checked="" type="checkbox"/> APAC States <input checked="" type="checkbox"/> ICAO APAC RO <input type="checkbox"/> ICAO HQ <input type="checkbox"/> Other:	

5.47 The meeting appreciated Ms. Angel Kwan from Civil Aviation Department, Hong Kong, China, for her commitment to the action and leadership of the ad hoc group in developing the guidance material under such a difficult time.

RPAS-Based Flight Inspection Program Progress in China (IP/02)

5.48 China presented progress of RPAS based flight inspection status for the year 2020 along with previous trails and their outcomes. China completed first trial of RPAS based flight inspection technology in June 2019, which validated the feasibility and suitability both technically and operationally. Based on the result, hybrid VTOL fixed wing RPAS is the best selection. China described the technical aspects of their selection. China performed 10 more trials till October 2020 to evaluate the flight inspection capability: ILS, VOR/DME, NDB, ADS-B and preliminary GBAS testing in commercial airports as well as general aviation airports. They concluded that the RPAS-based flight inspection payload developed by the joint team in China can support most of the nav aids inspection in civil airport.

5.49 It was also discussed that the ability of the RPAS can limit actual inspection function, for example polarization was not evaluated during trials since the unmanned aircraft cannot incline to desired degree in flight for safety consideration. It was told that no COTS RPAS fulfill flight inspection requirements and listed additional features of special RPAS to be developed.

5.50 China has published the first technical Specification for the RPAS-based Flight Inspection System as CAAC Information Bulletin (IB-TM-2020-005) in September 2020. China will work further on to improve RPAS technology, performance, and standards establishments with taking into considerations of different ICAO Docs requirements.

Navigational Aids Check by Using Drone in Republic of Korea (IP/19)

5.51 Republic of Korea presented information about development and practical use of drone in Navigational Aids in Republic of Korea. The method of checking Navigational Aid on the ground has limitations in that it cannot check aerial signals above a certain altitude. The best way to check the aerial signal from the ground is to use a mast, or to check the signal on the roof of a nearby building or mountain. These checks cannot measure the radio signals of the aircraft approach course, and cannot check the overall bearing.

5.52 Korea Airports Corporation developed an ultra-compact and lightweight receiver that can be mounted in drone for check of Navigational Aids. The Korea Airports Corporation's Drone System for Navigational Aids check (DIVA) can accurately check the airborne radio signal of Navigational Aids such as ILS, VOR, and TACAN just in about 20-minutes flight. PAPI and ALS checks are under development. Compared to aircraft, drone is easy to control flight speed and can fly freely. It is possible to continuously check change in radio signal at specific point. Korea Airports Corporation built up Drone systems in each six divided regions nationwide. Guidelines on the operation procedure and safety management of drone around the airport and SOP for Drone System are prepared.

5.53 New infrastructure near airport can cause distortion of radio signals of Navigational Aids. The origin of radio wave obstacles can be identified by surveying the air wave environment using a drone. Thus, Republic of Korea is using drones for Non-disruptive operation of Navigational Aids. Republic of Korea has completed European CE certification for the receiver of Navigational Aids for drone. In addition, Republic of Korea is conducting technical consulting for drone check in Brazil and Colombia.

5.54 The meeting appreciated the update from China and Republic of Korea, and PBNICG was requested to pay more attention and enhance regional connection on the flight inspection or nav aids check activities with the use of RPAS and drones.

Protection of ILS Critical and Sensitive Areas in Three-Dimensional and ILS Facility Performance Category Requirements (WP/21)

5.55 Hong Kong, China shared their observations on a common scenario of potential impacts of departing aircraft on arriving aircraft under runway mixed-mode operation in many airports.

ICAO Annex 10 Volume I, Attachment C, highlighting the need for States to extend protection of the ILS Critical and Sensitive Areas (CA/SA) from two-dimensional (2D) context to volumes. Currently, Annex 10 Vol. I Attachment C concerning guidance in protection of ILS CA/SA focuses on protection in 2D instead of three-dimensional (3D).

5.56 Hong Kong, China shared with the meetings cases encountered in Hong Kong International Airport (HKIA) on Localizer (LOC) signal fluctuations, which occurred during single runway mixed-mode operation. The pilots of arriving aircraft reported LOC signal fluctuations at the time when departing aircraft on the same runway flew over the LOC antenna. The ILS CA/SA on ground was found clear without any intrusion.

5.57 The consultant (NAVCOM Consult) for Hong Kong Civil Aviation Department provided his expert advice to the meeting on the theory, analysis, and recommendations for 3D ILS CA/SA as promulgated in ICAO Annex 10. He highlighted that those reported observations at HKIA was not unique but were applicable and observed at other airports as well, especially those airports which often use single runway mixed-mode operation. The consultant explained various contributory factors to such observations, such as lateral symmetry of departing aircraft and its climb rate, size of departing aircraft, and distance of arriving aircraft to touchdown, etc. The consultant considered that while it was important to draw attention from States to 3D nature of ILS CA/SA and seek guidance from ICAO on how to establish such 3D ILS CA/SA and protect them, it would be beneficial for States to proactively formulate and implement mitigating measures on possible impacts, including promulgation of relevant information to ATC controllers and pilots keeping them aware via aeronautical publication such as AIP/AIC/NOTAM as appropriate, providing sufficient separation between departing and arriving aircraft, as well as giving pre-warnings/alerts to the pilots when the runway is under mixed-mode operation, and alerting avionics manufacturers to incorporate such considerations into the design of avionics, etc.

5.58 Hong Kong China also shared considerations of applying the ILS classification system for newly installed ILS. According to ICAO Annex 10 Vol. I, Amendment 92 applicable on 5 November 2020, in order to utilize the Facility Performance Category II and III, the level of integrity and continuity of service of the new ILS in accordance with the ILS classification system shall be at least level 3. For meeting the level 3 requirements, at least 3,200 hours of the new ILS operations would be needed. However, taking into consideration the need to assess the seasonal influence of the environment, one year is typically required for new ILS installations. This period may be reduced in case the operating environment is well controlled and there are other similar proven installations. However, no further details are elaborated in Annex 10 as to how to reduce the evaluation period. More guidance on how to reduce the evaluation period was requested.

5.59 Hong Kong China invited States to note the importance of protecting the ILS CA/SA in volumes and the minimum evaluation period for specific ILS facility performance category. ICAO was requested to provide more guidance for ANSPs to protect CA/SA in volumes and to achieve the required facility performance category for new ILS installations within the shortest evaluation period.

5.60 Australia echoed the observations and views expressed by Hong Kong China and its consultant concerning the ILS 3D CA/SA, and supported the recommendations. ICAO APAC will forward this WP/21 and its presentation file to secretary of the ICAO Navigation Systems Panel (NSP) for consideration by Conventional Nav aids and Testing Working Group (CNTWG). **ACTION ITEM 24-7**

5.61 In view of significance of this subject with impacts on flight safety, the meeting adopted the following Conclusion:

Conclusion CNS SG/24/11- Protection of ILS Critical and Sensitive Areas in Three Dimensional	
What: That, States to: a) take note of the importance in extending protection of ILS Critical and Sensitive Areas (CASA) from two dimensional	Expected impact: <input type="checkbox"/> Political / Global <input type="checkbox"/> Inter-regional

<p>to three dimensional as stated in ICAO Annex 10 (7th Edition, Amendment 92), Volume I, Attachment C, Paragraph 2.1.9.5;</p> <p>b) be aware that departing aircraft and/or manoeuvring helicopters/aircraft can cause disturbances to ILS signals received by arriving aircraft under single runway mixed mode operation;</p> <p>c) take measures to mitigate potential impacts caused by disturbances in ILS signals under single runway mixed mode operation;</p> <p>and ICAO to:</p> <p>d) provide guidance materials in establishing three dimensional ILS CASA and their protection.</p>	<p><input type="checkbox"/> Economic</p> <p><input type="checkbox"/> Environmental</p> <p><input checked="" type="checkbox"/> Ops/Technical</p>
<p>Why: In accordance with ICAO Annex 10 (7th Edition, Amendment 92), Volume I, paragraph 2.1.9.5 – “While critical and sensitive areas are evaluated in a two-dimensional (horizontal) context, protection should actually be extended to volumes, as departing aircraft and/or manoeuvring helicopters/aircraft can also cause disturbances to the ILS signals”. However, no detailed guidance was given as to how to establish the ILS CA/SA in three dimensional and how to protect them.</p>	<p>Follow-up: <input checked="" type="checkbox"/> Required from States</p>
<p>When: 4-Dec-20</p>	<p>Status: Adopted by Sub-group</p>
<p>Who: <input checked="" type="checkbox"/> Sub groups <input checked="" type="checkbox"/> APAC States <input type="checkbox"/> ICAO APAC RO <input checked="" type="checkbox"/> ICAO HQ <input type="checkbox"/> Other:</p>	

BDS SARPs Development and Validation Status in ICAO (IP/03)

5.62 China presented the status of BDS Open Service Standards and Recommended Practices (SARPs) development and validation work in ICAO, which is at the final stage of completion in ICAO Navigation System Panel (NSP).

5.63 China discussed that BDS has always been willing to serve civil aviation users. China proposed to ICAO to include BDS into ICAO SARPs at the 37th ICAO Assembly in 2010. ICAO agreed to start it in ICAO Council 192nd session. BDS has started Open Service SARPs development work in ICAO NSP since May 2012. ICAO NSP initiated the SARPs validation work for four core constellations including GPS, GLONASS, Galileo and BDS in April 2018.

5.64 GNSS SARPs except the generic sections for all the four cores constellations including BDS have been fully validated and translated into various ICAO languages. After NSP JWG/6 meeting in June 2020, the open requirements of BDS in GNSS generic sections pending for validation are the Radio Frequency Interference related ones. ICAO NSP/6 meeting held from November 2nd November to 13th November. China presented BDS RFI related working paper WP 25. All the open requirements on RFI for BDS in GNSS SARPs generic sections were closed.

5.65 This is an important milestone for BDS standardization work in ICAO and a good start and guidance for future BDS MOPS development. The next step for BDS SARPs review in ICAO is supposed to be the submission from NSP to ANC to review and the state letter process.

BDSBAS Status Update Report (IP/04)

5.66 China presented updates of BDSBAS, including the BDSBAS architecture, the GEO satellite status, the BDSBAS B1C ICD, the service testing results and the certification plan.

5.67 The BeiDou Navigation Satellite System (BDS) was formally commissioned on July 31st, 2020. BDSBAS will provide Single-Frequency (SF) and Dual-Frequency Multi-Constellation (DFMC) services, in accordance with the ICAO standards, in China and surrounding areas and achieve APV-I and CAT-I precision approach capabilities.

5.68 BDSBAS is comprised of space segment, ground segment and user segment. The BDSBAS space segment includes successfully launched 3 Geostationary Earth Orbit (GEO) satellites at 80°E, 110.5°E and 140°E with PRN codes 130, 143, and 144. The BDSBAS ground segment consists of 30 Monitoring Stations (MS), 2 Data Processing Centers (DPC), 1 Operation Control Center (OCC) and 3 Uplink Stations (US). The BDSBAS user segment refers to the SBAS terminals used in civil aviation, maritime and railway applications etc.

5.69 China explained the technical characteristics of three GEO satellites and informed that the interface control document (ICD) of BDSBAS B1C has been published by China Satellite Navigation Office in July 2020 and is available on BDS website. The paper also presented TEST RESULTS OF BDSBAS SF SERVICE. As per the results, both horizontal and vertical safety indexes are larger than 1, which means no appearance of the integrity risk during the test periods. It was estimated that BDSBAS SF service will broadcast SF test signals based on ICAO SARPs and BDSBAS B1C ICD by the end of 2020 and the certification process having three parts i.e. technical review, system test and initial operation. BDSBAS SF certification scheme will be carried out accordingly, and last for at least 3 years.

Status of GBAS Implementation in Japan (IP/13)

5.70 Japan presented the status of GBAS implementation as well as the research and development related to GBAS in Japan. There are several projects to implement GBAS in the APAC region. ICAO standards on the CAT-II/III GBAS (GAST-D) have been published. Japan have been working on implementing CAT-I GBAS in Japan including development of specifications, certification framework, ionospheric threat model, and other operation related frameworks. Japan has also been working on a CAT-I GBAS prototype, APAC common GBAS ionospheric threat model, validation of GAST-D standards, and evaluation of DFMC GBAS concepts. Japan discussed about first CAT-I GBAS implementation manufactured by NEC Corporation and currently in trial phase at Tokyo Haneda. Its ionospheric threat model is based on the APAC common GBAS ionospheric threat model with some modification based on the observation and analysis by ENRI. It has two ionosphere field monitor (IFM) stations and four reference stations. CAT-I GBAS approach procedures have been published as AIP supplement.

5.71 A GAST-D ground experimental prototype and an airborne experimental subsystem have been developed by ENRI and its results contributed to the standardization of GAST-D. Japan continues to support refining the GAST-D standards in the ICAO NSP. Additionally, DFMC GBAS study is being conducted by ENRI for evaluating concepts of DFMC GBAS. Japan will contribute to ICAO activities on DFMC GBAS standardization.

5.72 Japan is actively contributing to the APAC GBAS/SBAS Implementation Task Force (ITF). Japan would welcome the first face-to-face meeting of the task force, when the COVID-19 situation improves and restrictions on international travel are relaxed. Japan will continue to contribute to the ICAO NSP activities to enhance the GAST-D performance

GBAS VDB Frequency Compatibility for Tokyo Haneda (IP/14)

5.73 Japan presented the information on GBAS VDB frequency compatibility analysis for Tokyo Haneda. Japan has presented GBAS implementation at Tokyo Haneda by IP/13. The ICAO standards on the frequency compatibility between VHF radio navigation aids have been defined. It

helped to find an appropriate frequency to implement a GBAS. The VDB frequency compatibility with other VHF radio navigation aids near Tokyo Haneda is called “airport-to-airport compatibility” while compatibility with other systems in the same airport considering the geometry of the VHF facilities and runways is called “same-airport compatibility”.

5.74 Japan described high level summary of the steps for frequency compatibility analysis procedures in the paper. Japan also described summary of compatibility of the GBAS VDB at Tokyo Haneda with 3 VOR stations. Following the latest standards, the VDB frequency at Tokyo Haneda has been confirmed to be compatible with existing VOR stations. It was discussed that the ICAO Frequency Finder for the APAC region could not find an appropriate frequency for Tokyo Haneda (WP43, ICAO NSP Joint GSWG/SWG/VWG Meeting, Virtual, April 2020). It is because the frequency database included several VOR stations which have already been decommissioned. Therefore, it is important to keep the regional frequency database consistently up to date.

SBAS Status Update in Japan (IP/15)

5.75 Japan’s SBAS MSAS has started operation with MTSAT in Japan’s FIR on September 27th, 2007. A decision of MSAS LPV implementation was made on March 13, 2018. MSAS LPV using three GEOs (QZS3, 6 and 7) is expected to be operational in 2023. MTSAT-2 was broadcasting two PRN codes (129 and 137). During MSAS transition from MTSAT to QZS-3 (GEO) at the end of March 2020, PRN129 and PRN137 were transferred from MTSAT to QZS (GEO) satellites. QZSS seven satellites configuration is expected in 2023 with three GEOs broadcasting L1 SBAS signal. Additional PRN is necessary for three GEOs configuration in 2023 to perform a successful transition from the NPA service to the LPV service.

5.76 Using MSAS V2 by only QZS-3, MSAS LPV250 approach will be introduced step by step from 2021 as MSAS LPV250 trial operation in advance of MSAS LPV full-scale operation. This trial operation will be expected to boost the proficiency of Airline pilots maneuver and the motivation for introducing SBAS LPV receiver in Airline. Japan will start LPV operation at all airports to designed IFR approach, excluding 2 military control airports. L5 augmentation signals with PRN196 (QZS2: IGSO) for DFMC SBAS validation became available on September 23rd, 2017. In addition to the L1 SBAS signal, all QZSS satellites but QZS-1 have the capability of broadcasting DFMC SBAS messages through the L5S signal. Additional L5 augmentation signals are available with PRN197 and PRN200. PRN assignment for non-GEO SBAS satellites is still pending in DFMC SBAS SARPs development. The L1 SBAS ranging will not be provided at the start of the service with the QZSS GEO. Evaluation of ranging accuracy from the view point of GEO orbit and clock accuracy as well as the ranging signal quality may make it possible to provide the ranging function in far future. Same possibility will be evaluated for DFMC SBAS L5 signal not only for GEOs but also for IGSOs.

Agenda Item 6: Surveillance

5th Meeting of the Surveillance Implementation Coordination Group (WP/10)

6.1 The meeting noted the Proposal for Amendment (PfA) to the Regional Supplementary Procedure (SUPP Doc 7030) from SURICG/2 has been processed in accordance with established procedure, and the approved PfAs were circulated to States on 18 June 2020 through a State Letter with reference: T8/11.2 – AP130/20 (CNS), and this change will be incorporated in the new Six Edition of Doc 7030/6 as part of the restructuring process of Doc 7030.

Proposal for Amendment of Annex 10 regarding ACAS X

6.2 The secretariat informed the meeting about the ICAO State Letter, Ref.: AN 7/1.3.105-20/42, issued on 8 April 2020, with the Subject: Proposals for the amendment of Annex 10, Volume IV regarding airborne collision avoidance system X (ACAS X). States are encouraged to make their comments to reach Montréal by 8 October 2020.

PNG Deployment of Space Based ADS-B

6.3 After a successful Space based ADS-B trial using a VPN on the internet to deliver data, PNG has contracted for Space based ADS-B to serve the whole PNG FIR plus 50 miles. The system has been installed and data is now flowing, will bring improved safety and efficiency to the PNG FIR. Service acceptance testing will be performed by the ANSP, supported remotely by Aireon (due to COVID). It is expected to become operational later in 2020 and will operate in tandem with existing ADS-B and radar services.

6.4 The system will initially use dual MPLS lines to USA to receive the service, but PNG has joined CRV and expects to transition to a dual CRV solution in 2021. The CRV solution will use two Package C nodes, supported by 1 MPLS and one VSAT terminal. A CRV contract has been signed with PCCW to provide the CRV connections supporting AFTN/AMHS, Voice, AIDC, ADS-B ground station sharing and Space based ADS-B. Aireon was approved to connect to the CRV earlier in 2020 and can now deliver Space based ADS-B to other CRV customers potentially without additional communication links. PNG also anticipates sharing ADS-B ground station data with Australia and Indonesia via CRV.

FAA's Operational Evaluation of Space-based ADS-B in the Caribbean

6.5 FAA shared with the meeting about its Operational Evaluation of Space-Based ADS-B (SBA) trials in the Caribbean, including an overview of the SBA trials, data analysis summary, and identified installation and performance issues.

6.6 Review of the received SBA data has highlighted the following potential issues:

- 1) Lack of detection for single antenna installations (e.g., Bottom only)
- 2) Poor performance (e.g. low power) from diversity installations
- 3) Short periods of time with single satellite coverage.

6.7 In order to assess SBA performance in the trial airspace, the following update threshold requirements were identified:

- 1) 8 second 97%
- 2) 30 second 99.9%

6.8 The 8 second 97% requirement is necessary to meet the RTCA DO-318 requirement for use of SBA in radar airspace. The 30 second 99.9% requirement is used by the FAA to track aircraft that have entered into a coasting condition, and is an "operational suitability" threshold defined by FAA controllers.

6.9 ZMA controllers have used the test area in Miami Centre to determine the feasibility of using SBA data operationally to separate aircraft transiting through the SBA trial airspace. During this testing, ZMA determined the number of aircraft exhibiting detection issues exceeds the minimum acceptable level required to begin using SBA to provide separation services.

6.10 The FAA, in collaboration with Aireon, have identified the following as potential mechanisms to improve airspace performance:

- 1) Identify poor performing aircraft for remediation;
- 2) Aireon to modify their system to optimize coverage and improve probability of detection (Pd); and
- 3) FAA implement an exclusion list for poor performing aircraft

6.11 The FAA will continue to analyse data to identify improvements made from coordinated work with Aireon and relevant stakeholders. This analysis and coordinated work will assist in identifying the potential impact that each issue is having on aircraft detection. If necessary, the FAA

will also work with appropriate foreign counterparts to create an adequate Standard Operating Procedure (SOP) for handling aircraft with diversity antenna installations versus non-diversity installations.

6.12 During the discussion, the meeting was informed that the actual performance of SBA was dependent on many factors, including number of aircraft in the region (i.e., airspace density), 1090 MHz spectrum congestion, etc. The new software upgrade released by Aireon is focused on improving receiver performance and is applicable globally across their entire constellation.

Long-range Air Traffic Surveillance Display System for ATFM

6.13 Hong Kong China has developed an in-house system for displaying long-range air traffic surveillance tracks up to 4000km from the Hong Kong International Airport, which is approximately 5 hours of flying time beyond airspace boundary. The system is designed to enhance the situational awareness of flow managers on the air traffic and assist in flow control decision making. It is currently used by Air Traffic Flow Management (ATFM) Unit of Hong Kong China in assessing the overall impacts of certain flow restriction imposed by other airspaces.

6.14 The long-range air traffic surveillance display system is based on terrestrial ADS-B data service for monitoring air traffic from “departure to destination”. Space-based ADS-B data is planned to be integrated into the system to strengthen the coverage by early 2021. The Human Machine Interface (HMI) of the display system has been specially designed for flow managers with an aim to reduce display clutter caused by various elements and enhance HMI efficiency.

Proposed Solutions for Sharing of Surveillance Data

6.15 Following the Conclusion CNS SG/23/10 (SURICG/4/1) - *ADS-B and Flow Management*, there is a need to share surveillance data to provide surveillance from “departure to destination”.

6.16 Singapore proposed solutions for sharing of surveillance data using SWIM/CRV (other networks and datalink may work as well), viz. Distributed, Single Source or Hybrid solutions. The paper discussed the advantages and drawbacks of each solution which offers States the freedom to choose for the implementation which best suits them. The paper also discussed the solutions in detail requiring technical and governance issues to be ironed out. Through the *Draft Decision SURICG/5/1 - Establishment of a Study Group to Explore Solutions on Regional Surveillance Data Sharing*, the meeting proposed that a study group to be set up to explore the three solutions or other solutions that may be presented.

Additional System Area Codes (SAC) for Surveillance Systems in APAC and Update on Regional Supplement to ASTERIX ICD

6.17 With the development and expansion of surveillance facilities, there is a need to introduce additional System Area Codes (SAC) for surveillance systems in APAC. Subsequently, the Regional Supplement will have to be updated to cater the new introduction.

6.18 The secretariat informed the meeting through the working paper that Australia had requested ICAO APAC Regional Office for an additional SAC for its surveillance facilities. According to the Recommendation in paragraph 3.1.2 of the ICD, ICAO APAC Regional office has accepted the A4hex to be the additional SAC as proposed by Australia.

6.19 The acceptable code A4^{hex} is to be reflected into the next edition the Regional Supplement as in Table 1, and the System Identification Code (SIC) provided by Australia, Laos PDR and the Philippines, as well as the editorial updates on the binary representation of SAC of Brunei Darussalam are to be reflected into the next edition the Regional Supplement which is provided in **Appendix L** to this Report.

PCCWG Solution on Surveillance Data over SWIM/CRV

6.20 PCCW Global, the selected CRV service provider through ICAO TCB process, presented their capability to provide a hosted platform over SWIM/CRV for sharing of surveillance data.

6.21 The meeting discussed the draft decision proposed by Singapore to set up a multidisciplinary study group, to be led by SURICG, including experts from surveillance, SWIM and ATFM, etc. in APAC Region to further explore the solutions on surveillance data sharing, and agreed to take it as a SURICG ACTION ITEM at this stage, and invite interested member States / organization to join. Singapore will take the lead to prepare working papers for SWIM TF/4 and CNS SG/24 on behalf of SURICG, and Hong Kong China will support this initiative.

The ICAO Aircraft Address Monitoring in Japan

6.22 As an agreed action item by SURICG/4, Japan presented to the meeting on its experience on the ICAO Aircraft Address (Mode-S address) monitoring since 2007, which including monitoring activity, tool function, monitoring results and reporting paths. JCAB already took 6 correcting actions for Japanese civil aircraft and JSDF (Japan Self Defense Force) aircrafts in recent 4 years. The meeting thanked Japan for this sharing, and agreed to incorporate the main content of this paper into the AIGD.

Introduction to the Management and Application of 24-Bit Aircraft Addresses for Chinese Civil Aviation

6.23 CAAC issued "Regulation for Aircraft Address Management of Civil Aircraft " to make use of aircraft addresses efficiently and standardly for civil aviation in China. The 24-bit address has a greater advantage to identify aircraft than the traditional SSR code. With the implementation of the National ADS-B Construction Project and the application of the Mode S radars, it becomes possible to identify aircraft by 24-bit aircraft address in ATM automation system.

6.24 The Radio Regulatory Office of CAAC is authorized to perform unified address management responsibility. The 24-bit aircraft addresses should be assigned to the civil aircraft registered in China, the civil aviation ground surveillance systems installed in China, the surface-operating vehicles in civil airport, and research activities. The 24-bit aircraft addresses used by ground surveillance systems and surface-operating vehicles are valid for no more than 10 years, and the validity period of the 24-bit addresses for research activities is no more than 1 year.

6.25 The aircraft addresses in China are divided into 64 blocks by CAAC, each block has 4,096 addresses. At present, 20 blocks have been used, mainly by aircraft. 2 blocks have been assigned to the ground surveillance systems and surface-operating vehicles.

6.26 ADS-B data quality analysis in China revealed 2 main problems about the application of 24-bit aircraft addresses. One is the duplication of 24-bit aircraft addresses, the other one is that the 24-bit aircraft addresses in FPL are not standardized. These two problems impacted the accuracy of aircraft identification and may cause wrongly track coupling in the ATM automation system.

Implementation of New Surveillance System within Pyongyang FIR

6.27 This paper presented the information on the transition of surveillance system from SSR to ADS-B within Pyongyang FIR. The relevant information of new surveillance system implementation was issued by NOTAM early in February of this year and published the relevant AIRAC AIP AMDT effective from October 08, 2020 through the AIS. RAIM prediction NOTAM is planned in future and ADS-B data sharing with adjacent States is also proposed.

Latest Update on ADS-B OUT Mandate in Europe

6.28 Hong Kong China informed the meeting about the deferral of European ADS-B mandate from 7 June 2020 to 7 December 2020. The announcement by European Commission (EC) on 5 May 2020 also included new amendments allowing certain non-ADS-B operations.

Standards to Support Global Interoperability

6.29 As invited by the meeting, Mr. Christian Schleifer Heingärtner, the Secretary General of EUROCAE presented to the meeting on the role, function, process and available resources of this worldwide recognised industry standards-development organisation for aviation. The presentation also covered the domains of activities with highlights on surveillance related updates.

6.30 The meeting expressed its appreciation and gratitude to EUROCAE, encouraged States to nominate members to attend various technical WG meetings. EUROCAE suggested to focus on challenges and priorities to effectively balance the needs in different regional environments in making standards. As it is globally and publically open, EUROCAE encouraged SURICG members to make use of the online resources by subscribing the email service from EUROCAE webpage at www.eurocae.net to enhance the engagement with EUROCAE, and benefit from this open consultation process in the standards development, to gain visibility and have the possibility to provide comments on draft standards. The meeting highly recognized the value to explore more on better collaboration with EUROCAE during various meetings in APAC region.

Report of SEA/BOB ADS-B WG/15 Meeting

6.31 The Chairperson of SEA/BOB ADS-B WG/15 from CAA Singapore presented the Report of the Fifteenth Meeting of the South-East Asia/Bay of Bengal Sub-Regional ADS-B Implementation Working Group (SEA/BOB ADS-B WG/15), held in Singapore from 3 to 5 December 2019. The meeting noted updates of ADS-B projects and activities in the South East Asia and Bay of Bengal sub-regions presented in the meeting report.

6.32 The meeting reviewed and further updated the ADS-B implementation information consolidated by SEA/BOB ADS-B WG/15 and SURICG/5, and the Table of ADS-B Implementation Status in the APAC Region is provided in **Appendix M** to this Report. Currently 30 States/Administrations installed ADS-B ground stations, 12 States issued ADS-B mandate and 8 States used ADS-B for separation and others for awareness, gap filling and redundancy.

ADS-B Data Sharing between China/Myanmar & China/Laos PDR.

6.33 China provided updates on their surveillance data sharing plan with Myanmar and Laos PDR. Kunming FIR is provided with 56 ADS-B ground stations, 5 of which are able to provide coverage for the boundary areas between China/Myanmar and China/Laos PDR. A level-2 ADS-B Data Processing Center (ADC) has also been commissioned for collecting all ADS-B ground stations data within Kunming FIR, verifying and fusing the ADS-B data, and providing real and reliable ADS-B data output. The ADC could customize the output of each version of ASTERIX CAT021 (such as V0.26, V1.4, V2.1), and could define the output data for specific airspace for the data users. Currently the ADS-B data from ADC is used by Kunming's ATC automation system and fused with radar data for track calculation.

6.34 China proposed to conduct the sharing of ADS-B data with Myanmar and Laos PDR in the following steps for consideration:

- a) choose the existing ground transmission link for the ADS-B data sharing; or to promote the opening of the CRV link;

- b) consider the implementation of the transmission link according to the actual business promotion plan;
- c) conduct signal routing, testing and evaluation; and
- d) implement ADS-B data sharing and advance data-related applications.

Update on ADS-B Avionics Problem Reporting Database (APRD)

6.35 Hong Kong China updated the meeting on the latest status of ADS-B Avionic Problem Reporting Database (APRD) after its deployment in ICAO APAC web site in 2017. The APRD could contain useful information of generic ADS-B avionics performance problem commonly encountered in the Region as well as specific avionics issues that States/Administrations need to pay attention during the ADS-B Implementation. However, the usage of APRD by States/Administrations appears to be low since its deployment. States/Administrations were encouraged to make best use of the database to improve the quality of avionics equipage in ADS-B mandated airspace, report and share avionics issues. APRD direct link: <https://applications.icao.int/ADSB-APRD/login.aspx>

6.36 The States/Administrations, which have yet registered for APRD, to nominate point of contact to ICAO Regional Office for accessing the APRD. States/Administrations were also urged to report problems of ADS-B avionics and sharing of experience through the APRD.

Demonstration on spaced based ADS-B data and DCPC SATVOICE trials

6.37 The meeting appreciated a brief demonstration presented by Singapore on the ADS-B data derived from space- based ADS-B and the audio recording of HF, VHF and DCPC type of SATVOICE conversations between ATC controllers and pilots for voice quality comparison. An in-house developed processing server can filter the ADS-B data for the specified airspace for display or for onwards transmission to another user.

Achievement and future of SEA/BOB ADS-B WG

6.38 The meeting reviewed and discussed the paper jointly presented by Singapore, CANSO and the Secretariat. The meeting recalled that the SEA ADS-B WG was established by APANPIRG in 2007 through APANPIRG conclusion 18/38. In 2011, SEA ADS-B WG was renamed as SEA/BOB ADS WG. The meeting reviewed the achievements of the working group as listed below:

- a) Producing the cost sharing framework;
- b) Producing the draft data sharing agreement;
- c) Producing the templates for ADS-B mandates;
- d) Working out the sub-regional implementation plan;
- e) Harmonization of avionics requirement;
- f) Successful implementation of data sharing;
- g) Reduction of separation from Singapore to Hong Kong China; and
- h) Implementation of the ADS-B Avionics Problem Reporting Database;

6.39 The meeting discussed next step and the possible future work for the ADS-B WG including a number of new tasks identified in the proposed amendment to TOR. The meeting also discussed whether the SEA/BOB ADS WG should be closed and a new working group – regional ADS-B working group be established to deal with identified new subject/works. The meeting further considered an option to merge the work of the working group into work programme of SURICG. The meeting discussed benefits and cost of each option, but could not reach a consensus by all members of SEA/BOB ADS-B WG. As such a vote was proposed and conducted among members of SEA/BOB ADS-B WG. Finally, based on the outcomes of the vote, the meeting agreed to formulate a draft Decision on the dissolution of SEA/BOB ADS-B Working Group for CNS SG/24 consideration.

6.40 With aforementioned, this meeting adopted the following Decision:

Decision CNS SG/24/12 (SURICG/5/2) - Dissolution of SEA/BOB ADS-B WG	
<p>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 performed by SURICG,</p> <p>That, the SEA/BOB ADS-B WG be dissolved.</p>	<p>Expected impact:</p> <p><input type="checkbox"/> Political / Global</p> <p><input type="checkbox"/> Inter-regional</p> <p><input type="checkbox"/> Economic</p> <p><input type="checkbox"/> Environmental</p> <p><input checked="" type="checkbox"/> Ops/Technical</p>
<p>Why: The SEA/BOB ADS-B WG terms of reference have been completed and pending action items will be performed by SURICG.</p>	<p>Follow-up: <input type="checkbox"/> Required from States</p>
<p>When: 4-Dec-20</p>	<p>Status: Adopted by Sub-group</p>
<p>Who: <input checked="" type="checkbox"/> Sub groups <input type="checkbox"/> APAC States <input checked="" type="checkbox"/> ICAO APAC RO <input type="checkbox"/> ICAO HQ <input type="checkbox"/> APANPIRG <input checked="" type="checkbox"/> Other: SURICG</p>	

6.41 The meeting highly recognized the great achievements made by SEA/BOB ADS-B WG in past years, SURICG was requested to carefully design future meeting structure in four days to maintain the effectiveness in promoting ADS-B and implementing data sharing.

Report of DAPs WG/3

Utilization of Mode-S DAPs Data for Weather Forecast

6.42 As advanced ATM, like Trajectory Based Operation (TBO), requires high-accurate trajectory prediction. One of major factors of estimated flight time error in TBO is weather uncertainty. DAPs data are expected to be useful for improving numerical weather prediction because temporal and spatial intervals of DAPs data are very short. Japan conducted experiments for improving weather forecast accuracy by utilizing DAPs data extracted from BDS 5,0 and BDS 6,0, and the experimental results indicated that Mode S DAPs data have a potential to improve weather forecasts.

Guidance Material for Assignment of Interrogator Codes (IC) for MLAT and ADS-B

6.43 In the previous Mode S DAPs WG meetings, there were discussions on which II codes should be used by MLAT and ADS-B with interrogators. In practice, interrogators for MLAT are assigned II code = 0. While its logical for II code = 0 to be used for such equipment, some of the content in the Annex 10 Vol 4 and Doc 9924 seemed to either contradict or do not give clear indication.

For example: *Section 3.1.2.5.2.1.2.3 of Annex 10 Vol 4 states that II Code = 0 shall only be used for supplementary acquisition in conjunction with acquisition based on lockout override.*

6.44 While the ICAO provisions do provide some guidance on the use of II Codes = 0, it does not provide the reader with clear guidance whether interrogators installed with MLAT and ADS-B may use II Code = 0.

6.45 The ICAO Surveillance Panel (SP) Aeronautical Surveillance Working Group (ASWG) has been informed in Sep 2019 on the lack of guidance material relating to this issue. During the ASWG meeting, it was generally agreed that II=0 may be used for interrogators in both MLAT and ADS-B. It is expected that new text will be adopted by ASWG sometime this year.

II/SI Operations

6.46 In order for radars to use SI codes, the aircraft have to be SI capable. Although ICAO mandated that all aircraft transponders have to be SI capable by 1 January 2003, but not all are SI capable.

6.47 Non SI capable transponders will only be able to recognize the last 4 bits, hence will mistakenly lock out to other radars with different SI codes, but with the same last 4 bits. To work around the situation, parts of Europe employed a special mode of operation known as the II/SI Operation. Under this operations, the radar will only lock-out aircraft with SI capable transponder but will not lock out non-SI capable transponder.

Mode S Roadmap

6.48 MODE S DAPS WG/3 discussed the recommended the following roadmap for various Mode S DAPs related issues to be adopted by SURICG.

Mode S Mandates

6.49 Considering that a number of applications will require Mode S DAPs, and that it would be easier for new aircraft to be fitted with Mode S upon delivery rather than to retrofit at a later date. It is also noted that Enhanced Surveillance (EHS) can support more applications than Elementary Surveillance (ELS), States are strongly encouraged to mandate forward fit of Mode S of EHS by 1 Jan 2022. IATA expressed support to Mode S in general as well as forward-fit of EHS. As for retrofitting existing airframes equipped with Mode A/C with Mode S transponders, the proposed timeframe for 1 Jan 2022 was tight for airlines that had portions of their fleet with Mode A/C only. It was a challenging target date to meet in normal circumstances and with the impact of the COVID crisis on airline economics, it could become even more challenging. As such, the meeting agreed to defer retrofit of Mode S transponder to DAPs WG for further deliberation. IATA would also be invited to take part in discussion on Mode S roadmap/mandate in the coming meetings of DAPs WG.

6.50 Therefore, a Draft Conclusion is formulated for consideration of APANPIRG/31:

Draft Conclusion CNS SG/24/13 (SURICG/5/3(DAPS WG3/1)) - Mode S Forward Fit Equipage in APAC Region	
<p>What: Regarding fitment of Mode S equipage,</p> <p>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).</p>	<p>Expected impact:</p> <p><input type="checkbox"/> Political / Global</p> <p><input type="checkbox"/> Inter-regional</p> <p><input checked="" type="checkbox"/> Economic</p> <p><input type="checkbox"/> Environmental</p> <p><input checked="" type="checkbox"/> Ops/Technical</p>
<p>Why: 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.</p>	<p>Follow-up: <input checked="" type="checkbox"/> Required from States</p>
<p>When: 16-Dec-20</p>	<p>Status: To be adopted by PIRG</p>
<p>Who: <input checked="" type="checkbox"/> Sub groups <input checked="" type="checkbox"/> APAC States <input checked="" type="checkbox"/> ICAO APAC RO <input checked="" type="checkbox"/> APANPIRG <input type="checkbox"/> ICAO HQ</p> <p><input checked="" type="checkbox"/> Other: SURICG</p>	

Use of SI Codes

6.51 Parts of Asia Pacific may require the use of SI code due to high concentration of Mode S radars. Other parts may not. It is possible for certain regions in Asia Pacific to commence the use of SI codes first while the rest continue to uses the II code first. To overcome the issue with non SI-capable aircraft, the II/SI Code Operation may also be considered.

Radar Clustering

6.52 Very few States are practicing radar clustering. States with the competency and operational requirement may apply such technique.

Use of Conspicuity Code

6.53 Most Asia Pacific States still uses Mode A codes for flight plan coupling. In anticipation that Mode S codes would be used in future, it was agreed that the Mode A code of 1000 be reserved as the conspicuity code for Asia Pacific so as to match the European region. It is likely to take many years before all States can support this capability across APAC and EUR. The ATM systems must support the conspicuity code feature. In preparation on the use of the conspicuity code, States developing new automation systems are encouraged to include the conspicuity code capability into the system.

Weather Reporting Capability

6.54 Based on information provided by aircraft manufacturers, there is currently no service bulletins that will help upgrade aircraft with such weather reporting capability. There is also currently no plan to develop such upgrades. It is envisaged that weather reporting capability will be available in the next generation transponder. Instead of mandating weather reporting capability, it may be more practical to Mandate Enhanced Mode S and derive weather information using algorithms.

Datalink Map

6.55 Europe is experiencing very high usage of the 1090MHz frequency. In order to prevent States from over interrogating, Europe has a datalink map which restricts the registers that States can extract from. Europe even have rules stating that Mode S radars should not actively interrogate for Mode A and Flight ID unless there is a change. At this moment, the frequency congestion situation within Asia Pacific is not as severe as that in Europe. Hence it is not foreseen that such datalink map is required soon within APAC region.

6.56 The SURICG/5 meeting noted the effectiveness and achievements made by DAPs WG in last year, and recognized that the complex situation in publishing the regional roadmap on evolving Mode S technology, Mode S DAPs WG was then tasked to conduct more studies and further polish the roadmap, aiming to formulate a new version for consideration by SURICG/6 meeting in 2021.

Amendments to the Guidance Materials

6.57 The edition 1.0 of the Mode S DAPs IGD has been adopted in 2019 to provide guidance for States in the implementation and operational application. The Mode S DAPs WG made further improvements to the Mode S DAPs IGD. The main changes include adding introduction of Mode S DAPs data source, additional text for Mode S mandates, supplement benefits to ATC operation brought by Mode S DAPs, revise procedure of DAPs extraction, refine the regulations and procedures related to the use of ICAO 24-bit Aircraft Address/Aircraft Identification and add one specific example of Mode S DAPs application.

6.58 Accordingly, the meeting adopted the following Conclusion drafted by SURICG/5:

Conclusion CNS SG/24/14 (SURICG/5/4(DAPS WG3/2)) - Mode S DAPs IGD 2.0	
What: That, the <i>Mode S DAPs Implementation and Operation Guidance Document</i> Edition 2.0 provided in Appendix N to this Report be adopted.	Expected impact: <input type="checkbox"/> Political / Global <input type="checkbox"/> Inter-regional <input type="checkbox"/> Economic <input type="checkbox"/> Environmental <input checked="" type="checkbox"/> Ops/Technical

Why: Editorial correction and revision to reflect regional updates in implementation.	Follow-up: <input type="checkbox"/> Required from States
When: 4-Dec-20	Status: Adopted by Sub-group
Who: <input checked="" type="checkbox"/> Sub groups <input type="checkbox"/> APAC States <input type="checkbox"/> ICAO APAC RO <input type="checkbox"/> ICAO HQ <input type="checkbox"/> Other:	

Allocation of 24-Bit Aircraft Addresses

6.59 The Mode S DAPs WG was briefed on possible changes to the allocation of 24-bit aircraft addresses.

6.60 Blocks of 24-bit aircraft addresses are assigned to States by ICAO. Each block is defined by a fixed pattern of the first 4, 6, 9, 12 or 14 bits of the 24-bit address. Thus, blocks of different sizes (1,048,576, 262,144, 32,768, 4,096 and 1,024 consecutive addresses) are made available.

6.61 In the last decade, some States with 1,024 addresses have developed their air hub and does not have enough addresses. The SP-ASWG has tasked its Technical Sub-group (TSG) to investigate/identify options for additional allocation of 24-bit aircraft addresses to States who currently have a small number of addresses (such as 1024).

Review ADS-B Implementation and Operations Guidance Document (AIGD)

- 6.62 Proposed changes to AIGD are summarized as below:
- Updated the status of known ADS-B avionics problems in Attachment A of Appendix 2 “List of known ADS-B avionics problems”, including:
 - B787 NACv = 0 Issue
 - Updated Section 5.1.4.5.1 on ICAO Aircraft Address Monitoring
 - Added the following new sections:
 - Use of ADS-B for Airport Surface Movement (Section 9.3.6)
 - 1090 MHz Spectrum and 24-bit Aircraft Address Issue with Unmanned Aircraft Systems (UAS) (Section 9.3.7)
 - Measures for Enhancing the Security of ADS-B (Section 10.3)
 - Time Difference of Arrival (TDOA) Based Position Verification Method (Section 10.3.1)

6.63 The meeting agreed to adopt the following Conclusion formulated by SURICG/5:

Conclusion CNS SG/24/15 (SURICG/5/6) - 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 this Report, which consolidated all change proposals during SURICG/5, be adopted as Version 13.	Expected impact: <input type="checkbox"/> Political / Global <input type="checkbox"/> Inter-regional <input type="checkbox"/> Economic <input type="checkbox"/> Environmental <input checked="" type="checkbox"/> Ops/Technical
Why: Updates and editorial correction	Follow-up: <input type="checkbox"/> Required from States
When: 4 Dec 2020	Status: Adopted by Sub-group
Who: <input checked="" type="checkbox"/> CNS Sub group <input type="checkbox"/> APAC States <input checked="" type="checkbox"/> ICAO APAC RO <input type="checkbox"/> ICAO HQ	

SSR Reception Malfunction Caused by UAV Video Transmitter

6.64 The UAV video transmitter device is using 1,080MHz to 1,200MHz, which overlapped the frequencies of SSR and DME, and may have a significant impact on SSR and DME.

Collaboration in Sharing of Surveillance Data in SWIM (WP/22)

6.65 Hong Kong China and Singapore presented some key considerations leading to a proposal of a Commercial-ANSP collaboration scheme in sharing and enriching surveillance coverage for the region to benefit the aviation community and accelerate the implementation of SWIM.

6.66 SWIM data is to be carried over CRV. At CRV OG/5, Hong Kong China presented a working paper on the three infrastructure models, namely Distributed model, Centralized model, and Hybrid model as potential implementation of SWIM infrastructure in the region. It was proposed that similar to other SWIM services, the sharing of surveillance data could be implemented in any of the three infrastructure models. It was proposed to use ADS-B data as the prime candidate for sharing because of lesser concern on data sensitivity, data ownership, data accuracy and data accountability on the part of contributing ANSPs. However, there are commitments from contributing ANSPs in terms of efforts and cost. It was said that it is desirable for the shared surveillance data service to be available to all parties who can access the regional SWIM to quicken implementation of SWIM.

6.67 The paper proposed an infrastructure named Surveillance Central Data Processor (SCDP) for sharing surveillance data. It considered two business models, namely (i) “ANSPs as SCDP operators”; and (ii) “Commercial Concern(s) as SCDP Operator with ANSPs’ Collaboration”. The paper suggested that the business case for an ANSP(s) to play the SCDP role might not be strong. However, in the second model, with a commercial concern(s) as SCDP operator and the assumption of subscription-based charges, the issues of commitment to resources, accountability and upfront costs could be shifted to the commercial provider while a shorter lead time to service availability is to be expected. Furthermore, the potential collaboration scheme by way of strategic locations of an ANSP’s receiver sites together with a commercial concern’s data source would provide a much wider coverage map in the region and an additional layer of data source redundancy.

6.68 It is suggested to establish a Study Group under Surveillance Implementation Coordination Group (SURICG) and supported by subject matter experts in SWIM, CRV and ATFM etc. and under the guidance of ICAO APAC to advise CNS Sub-group on the best approach for regional surveillance data sharing. This proposal was also presented to SWIM TF/4 as WP/13 and resulted into an action item 4-4. The meeting was invited to consider the Commercial-ANSP collaboration scheme and the various consideration factors leading to this potential scheme. It is requested to consider the potential developments in surveillance data, particularly ADS-B data as SWIM services carried over CRV and support the establishment of the Study Group to recommend solutions on regional surveillance data sharing to provide surveillance from “departure to destination”.

6.69 The meeting noted the Draft Decision SURICG/5/1 as well as the relevant outcome from SWIM TF/4, and an ad hoc group led by Hong Kong China had prepared a draft TOR for the proposed Study Group for further consideration by CNS Sub-group. The meeting discussed the draft TOR through **Flimsy/06**, and deferred to the Study Group to fine-tune its TOR and decided its time schedule and deliverables for updating to SURICG. It was agreed that SURICG will be held after SWIM TF, so that the progress made by the Study Group would be shared with SWIM TF before reporting to SURICG. The meeting adopted the following Decision:

Decision CNS SG/24/16 (SURICG/5/1) - Establishment of Study Group under SURICG on Sharing of Surveillance Data in SWIM	
What: Noting the operational needs of this region to enhance surveillance data sharing and new technologies available,	Expected impact: <input type="checkbox"/> Political / Global <input type="checkbox"/> Inter-regional <input type="checkbox"/> Economic

That, the Study Group under SURICG on Sharing of Surveillance Data in SWIM (SurSG) with TOR provided in Appendix P to the Report, comprising subject matter experts in relevant areas including surveillance and SWIM to be set up to study and recommend solutions on surveillance data sharing to provide surveillance from “departure to destination”, be established.		<input type="checkbox"/> Environmental <input checked="" type="checkbox"/> Ops/Technical
Why: To enhance surveillance coverage, enhance surveillance data availability by providing additional layers of surveillance services, and support implementation of advanced Air Traffic Management (ATM) tools such as Air Traffic Flow Management (ATFM).	Follow-up:	<input checked="" type="checkbox"/> Required from States
When: 4-Dec-20	Status:	Adopted by Sub-group
Who:	<input checked="" type="checkbox"/> Sub Groups <input checked="" type="checkbox"/> APAC States <input type="checkbox"/> ICAO APAC RO <input type="checkbox"/> ICAO HQ <input checked="" type="checkbox"/> Other: SURICG	

Air Traffic Control Surveillance Activities in India (IP/05)

6.70 India is continuously upgrading and augmenting the current surveillance capabilities. Indian airspace is covered by redundant surveillance coverage including 16 nos. of ASR/MSSR, 02 nos. of ARSR/MSSR, 12 independent MSSR, 04 ADS-C/CPDLC links, 21 ADS-B Ground receivers, and 11 Nos. of ASMGCS.

6.71 India has entered a service contract with service provider of space-based ADS-B for Chennai and Mumbai. India has entered into agreement or planning to share ADS-B data with neighboring countries such as Myanmar, Malaysia, and Indonesia. 36 Nos of ADS B ground receivers have been planned. These will enhance redundancy for surveillance in existing Radar airspace and extend surveillance coverage to low density airports and certain oceanic airspace including facilitate extension of surveillance coverage for low altitude. ADS-B based surveillance approach centers have been established for 07 Non-Radar airports i.e. Calicut, Tiruchirappalli, Patna, Agartala, Bhubaneshwar, Coimbatore, and Jaipur. ADS-B based Surveillance services has been established for ‘Terminal and En-route’ operations at 04 airports i.e. Ahmedabad, Cochin, Guwahati, and Trivandrum. Work is in progress for 05 more such airports i.e. at Amritsar, Mangalore, Lucknow, Varanasi, and Mumbai. ADS-B Based Surveillance for En-route operations have been done at Dibrugarh, Jaisalmer, Nagpur, Port Blair, and Vijayawada.

6.72 The Director General of Civil Aviation (DGCA), India has issued ADS-B Avionic mandate from 01.01.2020 onwards. All aircrafts flying over Indian continental airspace at or above FL-290, are to be equipped with on-board ADS-B equipment. Also, 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 is going on.

Japan’s Effort to A-SMGCS: Data-Driven and Simulation-Based Research Activities on Airport Surface Traffic Flow (IP/16)

6.73 Growth in traffic volume in busy airports induces surface traffic congestion, which degrade operational efficiency and results in uncertain taxiing times. It is necessary that efficiency measures should be devised. In Japan, ENRI (Electronic Navigation Research Institute) is supporting the administrative activities on airport surface management by problem identification, development of airport surface traffic simulator (GRACE), and simulation studies on efficiency improvement. ENRI use Aircraft position data at every second by SMR, MLAT etc., parking gate assignment records, and ATC process records and input them to GRACE to compare the actual and simulated traffic situations precisely.

6.74 ENRI is studying surface traffic management methods to regulate departures' traffic volume and to stabilize taxiing times, based on surface traffic simulations. ENRI studies show that the uncertainty of the taxiing time of departure flight could be reduced by leveling the waiting time at the runway end. It is expected that ENRI's studies and airport surface traffic simulator "GRACE" should contribute to DMAN and SMAN operation, which are key enabler for one of the most important factors in A-SMGCS "Routing". ENRI will continue further studying for efficiency improvement on airport surface traffic flow.

Lockout Override Operation to Avoid IC(II) Code Collision (IP/20)

6.75 Republic of Korea presented information about the Mode-S radar configuration to avoid IC code collision with adjacent radars and the performance evaluation result. Acquiring ICAO 24-bit address by Mode-S radar is the first step to detect new target. Incheon airport has two Mode-S radar and one SSR radar. Shinbul#B radar (II:2 code) has Mode-S IC code collision allegedly against the unknown Chinese Mode-S radar at the Shandong peninsula airspace. Republic of Korea explained the technical details about the problem.

6.76 The significant implication about the Mode-S IC collision is that the detection results are different between inbound and outbound flights in the IC collision region. Shinbul#B Radar cannot newly acquire the aircraft address of AAR542 by using II:2 because AAR542 already locked out by the unknown II:2 Radar. Shinbul#B Radar does not have a lockout list for AAR542.

6.77 For countermeasure to avoid Mode-S IC collision, they proposed two ways. First is to change MIP (Mode interlace pattern) to add classic Mode-A, Mode-C and second is the use of lockout override with probability of 1/2. Pros and cons of both methods were described. It is discussed that to overcome IC collision, adding classic Mode A, C interrogation slot in the MIP configuration could be one solution with some disadvantages. It is informed that Incheon airport is testing "Lockout Override with PR 1/2". Current test result show that still there is no reason not to use Lockout override in the IC collision condition. No side-effect of lockout override configuration is observed. As the result, lockout override of probability 1/2 could be a good solution for the radar having the problem to acquire the new aircraft address in the Mode-S IC code collision region.

6.78 Republic of Korea was requested to bring this paper for further deliberation on DAPs WG/4 meeting. The Secretariat informed the meeting about the regional established practice on II code coordination through **Flimsy/05**, as well as the need for IC code inter-regional coordination, and urged States/Administration to provide the required information to ICAO Regional Office for updating the APAC II code list. **ACTION ITEM 24-8**

Agenda Item 7: Automation

Outcome of Seminar on Air Traffic Management Automation System and First Meeting of Air Traffic Management Automation System Task Force (WP/11)

7.1 The Seminar on Air Traffic Management Automation System and the First Meeting of the Asia/Pacific Air Traffic Management Automation System Task Force (ATMAS TF/1) were held from 27 to 30 October 2020. The seminar was conducted in two sessions, the Session 1 focused on Experience Sharing from CAA/ANSPs, while the session 2 focused on New Technology and Approach from Industry, it provided a platform for participants to exchange experience and keep abreast of the latest knowledge on the subject of air traffic management automation.

7.2 Ms. Xie Yu Lan, Deputy Director General of North China Regional Air Traffic Management Bureau of CAAC, and Mr. Kwek Chin Lin, Chief ATC Specialist (Systems Development) from Civil Aviation Authority of Singapore, who were both unanimously elected as the co-chairs of the ATMAS TF.

Global and regional ATM Automation System updates

- 7.3 The meeting recalled AN Conf./12 recommendations:
Recommendation 1/11 – Automation roadmap

That ICAO:

a) develop a global roadmap for the evolution of ground air traffic management automation systems in line with aviation system block upgrade implementation; and

b) develop performance-based system requirements for air traffic management automation systems so that:

1) where necessary these systems are interoperable across States and regions; and

2) the function and operation of these systems will result in consistent and predictable air traffic management system performance across States and regions.

- 7.4 The meeting also noted the Action Item 54/13 of 54th DGCA Conference on ATM system:

Noting the need for a risk-based approach throughout system development, testing/acceptance, system and operations transition, handling of teething issues of its safety-critical ATM system with good lessons learned, the Conference supported the initiative of States towards formation of an international Users' Group for ATM system to share operational and technical experience, and map out the future system development roadmap, which could be beneficial for the APAC Region in respect of development of the global roadmap and performance-based requirements of the ATM system.

- 7.5 The meeting noted the editorial change on air traffic automation system between the ICAO GANP (DOC 9750) edition 5 (published in 2016) and the GANP edition 6 as a portal at: <https://www4.icao.int/ganpportal/>. The meeting also noted the ICAO provisions relevant to automation, which may be used as basic reference for future work, including Annex 2, 4, 10, 11, 15, 19, PANS ATM/OPS (Doc 4444, Doc 8168), GANP Suite (Doc 9750, Doc 9854, Doc 9882, Doc 9883), Doc 7030, Doc 9985, etc., as well as APAC regional requirements mainly resided in APAC Air Navigation Plan and APAC Seamless ANS Plan.

- 7.6 Japan and China expressed appreciation of the Secretariat's effort on this paper and emphasized the importance of harmonization in implementing. Hong Kong China expressed its concerns on the absence of automation system roadmap in GANP edition 6, and the Philippines advised the meeting about one paragraph in GANP edition 6 to explain its Relationship with other Documents, could be a response on ICAO roadmap, and quoted as following:

The Global Air Traffic Management Operational Concept (GATMOC, Doc 9854) presents a vision for a common operational concept of an integrated, sustainable, harmonized and globally interoperable air traffic management (ATM) system. The operational concept is independent of technology and is a statement of the envisaged "what". The timely development of a sustainable aviation system based on the GATMOC requires a collaborative, synchronized and maintained planning tool such as the GANP. Hence, the vision, performance ambitions and conceptual roadmap embedded in the GANP refer directly to the GATMOC. The GATMOC's companion manuals, which include, inter alia, the Manual on Air Traffic Management System Requirements (Doc 9882) and the Manual on Global Performance of the Air Navigation System (Doc 9883), will continue to evolve and provide the sound conceptual basis and focus for an integrated, sustainable, harmonized and globally interoperable air navigation system.

ATM Automation System implementation in Indonesia

7.7 Indonesia has 14 ATM systems consisting of 12 for main system and 2 for backup system, deployed to provide ATC surveillance in 12 terminal and approach, also area control services (Jakarta ACC and Ujung Pandang ACC) . Indonesia adopted an phased approach to implement ATM automation system, covering System Plan and Design (meet the requirements of the airspace structure and services), System Installation and Commissioning (with reference to the instruction contained in documentation of each system), Systems Operations Management and Maintenance Practices (with respect to the SOP, site specific changes and technical personnel ratings). There are three phases for the Operational Transition: Dry Shadow Phase, Wet Shadow Phase and Cut Over. Contingency Plan was also introduced for Transition Period, Operational period while considering various system configuration and the scope of the failure.

Challenges in Implementation of ATM Automation System

7.8 The implementation of ATM Automation system is a complex task in terms of Time, Money & acceptance of ATM Automation system by the user. With the successful commissioning for a new ATM Automation system at Delhi International Airport and Delhi ACC recently, India shared the challenges faced during the implementation in different phases of project, as well as suggestions to address the challenges. (refer to para 7.38)

Software Management and Technical Support in ATM Automation System

7.9 China has more than 90 sets of ATM Automation System and established the software management and technical support system. It covers all system construction and operation stages, including many actives, such as system requirements analysis, system fault management, software release, test and evaluation, parameter configuration management. It is essential to the safe and regular operation of the system in the whole life cycle.

Radar Access Risks and Solutions to ACC ATM Automation System

7.10 Although more and more radars access enhances the multiple coverage of the airway and reduces the blind zone of coverage, it also brings certain risks to the ATM automation system, which are mainly reflected in the following aspects:

- a) The problem of the radar transmission link.
- b) The problem caused by the radar's north/sector report lost.
- c) Target instability due to environmental factors at the location of the radar.
- d) The speed jump and vector line swing caused by the edge coverage of the radar, and the problematic radar.

7.11 The paper proposed four solutions:

- a) all the radars equipped with GPS.
- b) to integrated cut radar function on the ATM AS.
- c) to fine-tune the radar parameters on the ATM AS.
- d) radar access gradually enables SIC/SAC recognition on the ATM AS.

Different ATM Automation System Implementation in India

7.12 India has installed multiple ATM automation systems of various capabilities across the Indian airports to utilize the large network of surveillance sensors. Since each of the ATM automation system was installed in different stages, the Air Navigation Service Provider (ANSP), Airports authority of India (AAI) operates a combination of Automation systems from various vendors having different capabilities and with varied experiences. India shared the common features and differences between various Automation System architecture installed.

Application of Flight Data Exchange in ATM Automation System

7.13 In order to adapt to the rapid development of civil aviation in China and improve the safety assurance level of the Air Traffic Management Automation System (ATM AS), the Civil Aviation Administration of China (CAAC) issued the industry standard "Civil Aviation Air Traffic Control Automation System" (MH/T 4029). The third part: Flight Data Exchange (MH/T 4029.3), which defines the protocol, message type and data format for the flight data exchange between the ATM AS and related systems, the standard is mainly used for the ATM AS planning, design, construction, testing and operational use.

Application of Flight Plan Centralized Processing System in ATM Automation System

7.14 Flight plan centralized processing system (FCPS) is a set of intelligent control system independently developed by ATMB, which is responsible for processing National flight plans and telegrams. It was officially put into operation in September 2017. With the construction of National Flight Plan Processing Center, the unified processing of flight plans of 237 airports in China has been completed. The rudiment and new business mode of unified management of national flight plans have been preliminarily established.

Initial Application of CRACP in Flow Management System

7.15 In 2014, to respond to the rapidly increasing demand for traffic in Northeast Asia, China, Japan and the Republic of Korea established a sub-regional ATFM group, "Northeast-Asia Regional ATFM Harmonization Group (NARAHG)". CRACP is a cross-border traffic management solution in Northeast Asia proposed by China at the third NARAHG Conference based on the seamless air traffic control concept of TBO, FF-ICE and ICAO.

7.16 CRACP (Cross-Border ATFM Collaborative Platform) can realize the data docking between China, Japan and ROK air traffic management units using their respective systems to achieve full situational awareness of cross-border flights from 2 hours before EOBT to the transfer point, and implement more accurate and more limited traffic on this basis Management measures. Thereby reducing the length of traditional interval restrictions and the number of affected flights, and improving the quality of operations.

ATFM-ACDM Integration

7.17 India presented a case study of the actual integration of Airport Collaborative Decision Making (ACDM) and Air Traffic Flow Management (ATFM). ATFM-ACDM integration is a process to achieve data exchange between these two systems without the need for any manual intervention.

Challenges in Implementation of DMAN

7.18 Singapore shared her experience in the implementation of Departure Manager (DMAN). Singapore introduced A-CDM in Oct 2016 at Singapore Changi Airport. A-CDM and DMAN are closely inter-linked and have high dependencies on one another. DMAN is a key system to support the implementation of A-CDM, and it uses the information shared through A-CDM to work effectively. DMAN requires the TOBT inputs from airlines or ground handling agents to calculate TTOT and TSAT. The importance of accurate TTOT was emphasized. The interdependencies between A-CDM and DMAN is highlighted. The success of DMAN implementation does not solely depend on the system itself. It is much more complex than Arrival Manager (AMAN) implementation, where automation alone can probably achieve the desired results. For DMAN to work, it requires a reasonable level of TOBT accuracy, and this can only be achieved if stakeholders act in the spirit of collaboration and commit to adhering to the agreed A-CDM processes and procedures.

7.19 Singapore also shared her plans to integrate the DMAN system with AMAN, and later with an SMAN which will result in greater automation. TTOT calculation will take into consideration of the arrival and thus impact the TSAT. With the systems integrated, this process is done automatically with information sharing. When the SMAN is integrated, a dynamic taxi time can be derived using

ground sensors to determine speed and controllers' set taxi route to re-compute the taxi distance, thereby providing a real time adjustment of taxi duration time.

Preparation of Tailored MET-ATM Implementation in Indonesia

7.20 ATM-MET Integration system shows graphical information of meteorological forecasts in the air space, i.e. Flight Information Regions (FIRs), Upper Control Areas (UTAs), Flight Service Sectors (FSSs), Control Areas (CTAs) and Terminal Control Areas (TMAs) of Indonesian region. Impact-based weather information for the ground area is displayed according to aerodrome forecast and warnings, as well as for the holding area surround the airport. Forecast information in Holding Area consists of forecast information of some parameters which include temperature, wind direction and speed, and forecast of Cumulonimbus development in 6 hours ahead. Categorization of impact-based is determined according to the weather condition which will affect the reduction of capacity both of the airport and the air space managed by air navigation service provider. The categorization has been made based on mutual-understanding between meteorological service providers and ANSPs in each airport.

Implementation of Enhanced Wake Turbulence Separation and Approach Spacing Tool in Hong Kong China

7.21 Hong Kong, China has conducted a safety case study for the implementation of ICAO "enhanced Wake Turbulence Separation" (eWTS) at Hong Kong International Airport (HKIA). The study involved a 12-month wake study and analysis on the real-time data collection, generation and dissipation rates of wake vortices of different aircraft types in the local Hong Kong environment. The wake vortex data was analyzed by international experts, and a safety case was prepared to demonstrate with evidence that the safety assurance arguments supported the implementation of eWTS in HKIA operations, and that the wake encounter risk for each aircraft pair under eWTS would remain with the current acceptable safety risk level.

7.22 Based on the study of historical traffic data at HKIA, it is anticipated that the overall arrival spacing on final approach would be reduced safely under the application of eWTS. Additional arrival slots would be generated by Arrival Manager (AMAN) dynamically according to actual traffic mix. As a result, an increase in runway capacity is anticipated through the implementation of the eWTS scheme.

Application of AMAN Technology in Busy Terminal Area

7.23 Shanghai and Beijing's AMAN system adopted the integrated AMAN system, and introduced the characteristics of the integrated AMAN system and the interaction with the ATM automation system.

Application of DAPs Data in ATM Automation System

7.24 In recent years, China has promoted the application of Mode S radar in ATM automation system in three stages. In the first stage, Mode S elementary surveillance data has been applied in ATM automation system. DAPs data with specific application scenarios are currently underway in the second stage, and the rest will be further studied in the third stage. At present, China is in the second stage and this paper concludes the specific application, benefits and problems of DAPs data in ATM automation system.

Application of DAPs in ATM Automation System in Singapore

7.25 Singapore shared their experience in the introduction of DAP. The ATM automation system in Singapore was upgraded in 2018 to display DAPS on the aircraft label for the following:

- ACAS Resolution Advisory notification (BDS code 3,0)
- MCP/FCU Selected Altitude (part of Selected Vertical Intention, BDS code 4,0)
- Indicated Airspeed (part of Heading and Speed report, BDS code 6,0)

- Mach Number (part of Heading and Speed report, BDS code 6,0)
 - Magnetic Heading (part of Heading and Speed report, BDS code 6,0)
- *The last 3 items are only displayed in the extended label when invoked by the controller.

7.26 Singapore highlighted the issues (and resolution) and challenges in the implementation such as erroneous 24-bit address and MCP/FCU mismatch showing incorrect values.

7.27 Since the introduction of the MCP/FCU Selected Altitude mismatch alert, multiple potential level bust had been prevented as the MCP/FCU Selected Altitude mismatch alerts provided controllers an additional layer of defence. Besides the display of information obtained from DAPs, the ATM automation system in Singapore was also enhanced to incorporate the information in its processing of existing safety nets which results in lesser false alerts.

Application of MTCD Functions in ATM Automation System

7.28 CAAC ATMB has deployed Medium Term Conflict Detection (MTCD) function in Beijing and Shanghai ATM Automation System. It is widely commended by controllers, mainly being ascribable to call their attention to keeping aircrafts separation in a certain time advance rather than in a closely short time, and is helpful for airspace safety especially in heavy traffic. China presented to the meeting on the concept of MTCD and the differences between MTCD and STCA, as well as the tuning experience and operational use of MTCD in ATM Automation System.

Progressive Implementation of Safety Net Functions in Hong Kong China

7.29 Hong Kong, China has adopted a progressive approach in the implementation of applicable safety net functions in the ATM Automation System, so as to minimize the risks involved in transition to the ATM Automation System, and to best suit the operational needs of air traffic control officers (ATCOs). Following this approach, three safety net functions, namely Short Term Conflict Alert (STCA), Special Use Airspace Intrusion Warning (SUAIW) and Cleared Level Adherence Monitoring (CLAM) have been successfully implemented since the full commissioning of the ATM Automation System in November 2016.

7.30 Another three safety net functions, namely Approach Path Monitoring (APM), Departure Path Monitoring (DPM) and Similar Callsign Advisory (SCA) have been successfully implemented in 2019. All the safety net functions have been operating satisfactorily. To assess effectiveness of the implemented safety net functions, post implementation review with ATC operations were conducted to obtain feedbacks from front-line ATCOs to identify if there was a need to fine-tune the system parameters. Riding on the experience gained, Hong Kong, China would continue to adopt the progressive approach to implement other applicable safety net functions.

Cyber Security Control for ATM Automation System

7.31 With the implementation of data exchange between ATM automation system and other external systems, the operational environment of ATM automation system has been changed. Considering the system boundary is constantly expanding, the cyber security of ATM automation system becomes a key issue which is supposed to pay special attention on.

7.32 Considering the operation of ATM automation system, it is recommended to give priority to P(protection) and D(detection) to set up technical mechanisms control for ATM automation system. It is suggested to optimize system network structure, deploy security equipment and related configuration strategies at the boundary, and improve the system capability to prevent and detect external threats. An optimized network structure of ATM AS and five measures were proposed for reference, and three suggestions were also provided as follow-up actions.

A Proactive and Systematic Approach in Protecting Digitised Air Traffic Services Against Cyber Threats in Hong Kong China

7.33 Hong Kong, China provided information about its proactive and systematic approach in protecting digitised Air Traffic Services (ATS) against cyber threats in Hong Kong. Hong Kong, China fully supported the ICAO's initiative on aviation cyber security management against cyber threats, and had taken proactive measures in a systematic manner to address an increasing challenge on cyber security for ATS systems.

7.34 The meeting was informed of the key elements of the provisions of the measures implemented by Hong Kong, China, covering aspects on policy, administration, procedures, drills, systems/technologies, as well as physical security. States are encouraged to strengthen their cyber security management to protect the increasingly digitised ATS against cyber threats.

Recommended Functions and Performances of ATM Automation System

7.35 The development of a guidance material of implementation of ATM automation system is one of the key deliverables of ATM automation system task force (ATMAS/TF) as per the Terms of Reference. This working paper was jointly prepared by China, Hong Kong China and Singapore to explore the Recommended Functions and Performances of ATM Automation System (RFAP of ATM AS) and proposed a draft as edition 0.0 for future formulation and development by the task force, as the guidance material for systems planning, design, testing and implementation of ATM automation system in the Asia and Pacific Regions.

7.36 China took the lead in preparing the initial draft of the RFAP of ATM AS, explained to the meeting about the main points of the edition 0.0 through a presentation. The meeting appreciated the excellent job done by China, Hong Kong China and Singapore, and agreed to use the edition 0.0 as the basis for future work of a specialized ad hoc group of volunteered experts from member States/Administrations. The meeting supported China to lead this ad hoc group, and consolidated a list of focal point of this ad hoc group to facilitate the various tasks shared by group members, which include China, Hong Kong China, India, Indonesia, Japan, Malaysia, Myanmar, Nepal, Philippines, Singapore, Thailand and Vietnam. The Rapporteur of this ad hoc group is Ms. Cao Su Su from China.

7.37 In the chat box, Japan commented for meeting adjustment regarding to ATMAS TF/1. Web conferencing has a convenient aspect because it does not require securing a place, but on the other hand, it is necessary to be careful about overlapping meeting times. Exactly ATMAS TF/1 overlapped with IWXXM Webinar. It may be a very difficult adjustment, but ICAO would consider it for future meeting settings.

Challenges in Implementation of ATM Automation System (IP/06)

7.38 India shared the challenges faced during implementation of ATM Automation System in different phases of project and suggestions to address the challenges. India has successfully commissioned a new ATM Automation system at Delhi International Airport and Delhi ACC. The various issues faced, and lessons learnt during the execution of this project into pre and post contract phases were explained. As per the discussion during pre-contract phase, purchaser should have clarity for system Architecture. Quality assurance level requirement needs to be well defined like Quality of Test in accordance with ISO-9001-20XX specifications or DO-278A/ED-109A assurance level or Valid CMMI Level xx as per requirement. Estimate of the project should consider latest version of Hardware & peripheral equipment along with the level of Operational Maintenance support. Timeline of project shall be framed in a realistic manner. The supplied software shall be thoroughly tested by the QA team at site in real environment. Selection of a successful supplier can be based on Quality cum Cost Based Selection (QCBS) criterion.

7.39 During post contract phase, a dedicated Project Monitoring group (PMG) drawn from all the concerned stakeholders should create. System Evaluation, HMI customization & prototype testing shall be performed before starting System evaluation. Database Creation Phase shall be

completed in time before starting testing Phase. Training to ATSEPS and ATCOs should be provided before Factory Acceptance test as well as after installation of the System. System Testing, Quality Assurance Audit, Site Acceptance Test, System Reliability & Stability Test (SRST), System Anomalies resolution & Transitional phase are required to be monitored on continuous basis which results in timely acceptance of the system.

Lessons Learned from New ATM Automation System Implementation (IP/12)

7.40 Thailand initiated the Thailand Modernization CNS/ATM System (TMCS) project to replace previously aging CNS/ATM systems along with ATM automation support system. Transition to use new system completed in Q1 2020. Thailand presented summary of lessons learned from implementation of new ATM Automation System.

7.41 Thailand categorized lesson learned into several categories. It includes addition of importance of collaborative process from ATM automation system users into terms of reference (TOR), support from vendors for safety case in terms of reference development and setup structured data set management team. They advised to define clear external interfaces, good planning of Operations Room and Support Facilities, modified procurement process, relationship management between ANSP and ANS regulators, and vendor relationship management. Important of various factors and considerations in ATM system transition planning in shadowing, ghosting, and post cutover phases are proposed. Thailand highlighted importance of communication strategies during transition phase, project management office setup along with requirements to be fulfilled by them during transition phase in case of large scale system. Additionally, procedures on using and maintaining new ATM automation system along with availability of a Contingency / Training ATM automation support system were detailed. Thailand encouraged sufficient time and manpower for ATSEPs training.

7.42 The meeting appreciated the efforts and achievements of ATMAS TF during its first meeting, congratulated the successful ATM automation system implementation of India and Thailand, and thanked the experience sharing.

7.43 As ATMAS TF/1 was conducted in concurrently with other regional meeting and webinar, the meeting noted the Japanese suggestion on avoiding overlapped meeting planning in 2021.

Agenda Item 8: Review and updates

China Civil Aviation Ground-Ground Communication network Status (IP/07)

8.1 China presented the information of China civil aviation ground-ground communication network, including network scale, network topology, application technology and services accessing.

8.2 China has constructed a new ground-ground communication network named China Civil Aviation Communication Network (CCACN) to replace the previous network that was based on ATM technology. The new communication network covers the whole civil aviation involving about 762 nodes. CCACN is composed of transmission network, service carrying network, cyber security system and comprehensive management system. The bandwidth of backbone is 622M-155M. The service carrying network is divided into IP carrying network and TDM carrying network. The transmission network is built by SDH and DWDM equipment, and MSTP technology is used to provide private circuit for IP and TDM networks. TDM network based on datalink layer tunnel technology, which is accesses aeronautical service, including AFTN, VHF, Radar and ADS-B.

8.3 CCACN has been designed as a three-tier network architecture model which contains a common core layer, a convergence layer and an access layer. Important nodes have installed dual devices, two power supply modules for guarantee node reliability. CCACN is a historic milestone for the development of China's civil aviation communication network. Since the operation of the CCACN in November 2019, the service by ATM network have been gradually migrated to CCACN. By the end of September 2020, the services migration has been basically completed.

8.4 CCACN will not affect or make change communication mode with neighboring States. China joined the CRV Network in October 2020 and had already completed the implementation on 26 October 2020. The CCACN will setup interface for connecting the CRV for more selection in international communication in the future.

The Long-Term Vision for the Future Air Traffic Systems of Japan (CARATS) (IP/17)

8.5 Japan presented the information about status update of the long-term vision for the future air traffic systems of Japan, namely "CARATS: Collaborative Actions for Renovation of Air Traffic Systems".

8.6 ICAO GANP indicates comprehensive direction for the globally harmonized air navigation systems with safe, effective, and efficient air traffic and various measures as ASBUs and Technology Roadmaps. JAPAN established CARATS in 2010, which describes goals aimed at for 2025 such as improvement of safety, growth in global air traffic demand, improvement of user-friendliness, improvement of operational efficiency, etc. along with eight directions of renovation to achieve the goals, with a core of the "Trajectory Based Operations (TBO)".

8.7 CARATS is consistent with the ASBU Methodology. The main measures in CARATS are improved efficiency in ATC operations of take-offs, landings and surface using AMAN, DMAN, SMAN coordination, A-CDM, reduced wake turbulence separation minima, etc.; enhancement of ATC capacity by Continental Controller Pilot Data Link Communication; and realization of TBO utilized FF-ICE/SWIM. Japan has made decisions to implement Operational Improvements such as ATS operation by utilizing aircraft derived data CAP, utilization of wind information for ATS and enablers such as Information management infrastructure- FF-ICE filing service, utilization of aircraft derived data -enhanced DAPs data element. FF-ICE is the key to ATC digitalization, which has huge impact for relevant stakeholders. Japan has decided to introduce FF-ICE step by step. ATS operation by utilizing aircraft derived data is utilized DAPS for improving situational awareness for ATC.

Update of ADS-B & AIDC Implementation in Indonesia (IP/22)

8.8 In accordance with the Conclusion APANPIRG/30/15 – *Revised Surveillance for APAC Region*, member States are encouraged to maximize the use of ADS-B on major air routes and in terminal areas. Indonesia continue to undertake the ADS-B implementation program in order to harmonize the air navigation services among FIRs and enhances safety in the region. Indonesia has carried out several stages of ADS-B implementation and has implemented ADS-B mandate (Tier-1) for all transport category aircraft at all level in particular airspace, since 23 April 2020. Area of ADS-B implementation are class A airspace between FL245 – FL600, class B, C, D, and E airspace between Ground to FL245, at 9 control zones and terminals. the population of ADS-B equipped aircraft increase to 87% from all transport category aircraft from 85% initially. Additionally, new ADS-B ground stations are deployed to cover the eastern part of Indonesia and the Indonesian FIR boundary.

8.9 Indonesia also shared AIDC implementation status in Indonesia, especially Ujung Pandang ACC, until end of Q2-2020, until end of Q2-2020 as follows:

- with Brisbane ACC: **Implemented**
- with Manila: **Operational Trial**, target implementation in December 2020
- with Port Moresby ACC: **Success Testing**, target implementation in January 2021
- with Kota Kinabalu ACC: **Success Testing**, target implementation in 1Q-2021
- with Oakland ARTCC: **Success Testing**, target implementation in 1Q-2021
- with Jakarta ACC: **Planned**, target implementation in 2023.

8.10 Recently, Ujung Pandang ACC and Manila ACC have signed and agreed to implement AIDC, and will be **effective on 3 December 2020**. Ujung Pandang ACC and **Port Moresby ACC** have

also been conducting the operational since **8th October 2020**, and planned to implement in January 2021.

Reinforcement of CNS Capability around Fukue-Akara Corridor Area in Incheon FIR (IP/24)

8.11 ATMO (Air Traffic Management Office) of the Republic of Korea (ROK) has been made an endeavor to build up safe air traffic environment with an efficient air traffic control system by operating two ACCs, which divide Incheon Flight Information Region (FIR) into East & West sections. The Fukue-AKARA Corridor is recognized as one of the most traffic volume areas in the Asia-Pacific region in conjunction with the region's identification as LHD Hot Spot at the 20th Meeting of the APAC Regional Airspace Safety Monitoring Advisory Group (RASMAG/20).

8.12 For the need for coordination between States concerned in order to identify optimum solutions to address safety and efficiency issues, the Technical Working Group (TWG) was formed with technical experts designated by States Concerned. The paper described the Republic of Korea's (ROK) endeavor to reinforce CNS system around the Corridor area in support of addressing safety and efficiency issues in the said area. It includes new Installation of U/VHF Equipment, installation of DSC between Shanghai ACC and Incheon ACC, new installation of Radar (ARSR/SSR) on highland of Mt. Halla, installation of primary and secondary surveillance radar (SSR), and ADS-B establishment and implementation.

8.13 Republic of Korea insisted that while the current pandemic has temporarily reduced the air traffic volume, safety concern may resurge at any time with the expected increase of traffic in the future. As such, ATMO would do the best performance in preparation for resilience of air traffic volume when COVID-19 passed.

Updates on CNS Collaboration between ICAO Regional Office and EUROCONTROL (SP/02)

8.14 EUROCONTROL presented briefly about its history, structure, and current role, in particular the European Network Manager (including traffic flow management) and as an international Air Traffic Control center. The presentation highlighted the iCNS Unit activities including Datalink Performance Monitoring- DPM, Navigation systems Monitoring Ground + GNSS- NAVM, Surveillance Interrogators, Surveillance Avionics, ACAS and Altimetry Monitoring Service- SI3AM. The presentation covered 1030MHz-1090MHz status Monitoring, Altimetry Monitoring, Spectrum and Radio Frequencies monitoring, Datalink Implementation Support, COM – IP, COM - ATS Messaging Management and their associated tools. Various tools were also introduced, such as DEMETER and AUGUR, SUR Code Allocation Tool, SUR Services Tools, and NAV PBN tools. The participants were invited to visit EUROCONTROL website to get a network-wide view of European CNS infrastructure.

8.15 The meeting appreciated the valuable information sharing by EUROCONTROL, and discussed about potential cooperation between EUROCONTROL and Asia pacific region. EUROCONTROL tools were mainly developed for use at European level, however, they may be tailored to meet other national and regional needs. The meeting requested ICAO APAC Office to further identify the services, information and tools provided by EUROCONTROL that may benefit this region, further cooperate on specific topics with the APANPIRG contributory bodies reporting through CNS SG, and the member States were encouraged to individually contact EUROCONTROL for various services.

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

Action of Communication Status Improvement Between China and Pakistan and Suggestion on Removal of the Relevant CNS Deficiency (WP/16)

9.1 China presented a brief summary of China and Pakistan's activities in order to resolve communication deficiency and suggests removing relevant content from the current APANPIRG deficiency CNS list.

9.2 The ATS direct speech circuit and COM/SUR problems between China and Pakistan were identified on the RASMAG/19 meeting in May 2014. In order to resolve this problem, China and Pakistan planned to enhance the scope and the quality of communication, and expanded the scope of ATS surveillance as further improvement and remedial action.

9.3 In China and Pakistan COM Coordination Meeting organized by ICAO APAC Office, Beijing, China from 7 to 9 May 2015, China had submitted a proposal named SOLUTIONS FOR COMMUNICATIONS BETWEEN CHINA AND PAKISTAN. Both states agreed to upgrade the communication circuit by setting up new satellite stations at Lahore and Urumqi and establishing satellite link between them.

9.4 The Afghanistan, China and Pakistan COM Coordination Meeting organized by ICAO APAC Office was held in Regional Sub-Office, Beijing, China from 24 to 25 July 2019. Based on the Large Height Deviation Events reported to China RMA (WP/05), the LHDs concerning Urumqi ACC interface with Lahore ACC was reducing year by year since 2015. According to the suggestion of China, Hot Spot E (Lahore-Urumqi) had been removed at the RASMAG/25 and there is improvement in bilateral communication and surveillance. China suggested that this deficiency be removed.

Review Status of CNS Deficiencies (WP/19)

9.5 The meeting was informed about the Conclusion APANPIRG/30/19 urging States concerned to establish action plan with defined target dates for resolution of deficiencies, update the status on the action taken and update contact details of a focal point to coordinate actions to resolve the deficiencies.

9.6 The meeting reviewed the definition of deficiencies as per the APANPIRG Procedural Handbook, and noted the State Letter Ref. : T 8/2.10 - AP041/20 (CNS), dated on 2 March 2020, which was a Reminder for implementation of Common aeronautical VPN (CRV) in APAC Region by 2020, and CRV OG might recommend to establish an Air Navigation Deficiency Report beginning 2021 for those States/Administrations that have not implemented CRV.

9.7 The meeting was advised that reported interference caused by frequency implemented by States without coordination and registration through Regional Office, it may be considered as discrepancy to the regional planning requirements, and be further identified as deficiency upon harmful impact report on international operations.

9.8 The meeting noted the information provided in WP/16, highlighted the improvement in bilateral communication and surveillance between China and Pakistan, and the Hot Spot E (Lahore-Urumqi) had been removed at the RASMAG/25, therefore, the meeting agreed the removal of this deficiency in "Reporting Form on Air Navigation Deficiencies in the CNS Fields" from APANPIRG Air Navigation Deficiency list.

9.9 The meeting did not identify any additional deficiencies in the CNS fields. The updated list of CNS related deficiencies is provided in **Appendix Q** to this Report.

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

10.1 The CNS SG fully recognized the importance of Human Factors and ATSEP training in support of ANS operations, and encouraged States/Administrations to share relevant information at its annual sub-group and any other appropriate meetings.

Review Outcomes of Small Working Group Study on Human Factor Issues of ATSEP (WP/25)

10.2 IFATSEA initiated the study with the objectives to study the human factor issues of ATSEP on their working environment, to identify the significant factors that add stress and fatigue and affect their safety job performance, to understand the stress and fatigue levels of ATSEP and for resolving potential risks to ANS, to identify the significant counter measures, and to identify the means for improving the safety culture and professional engagement. IFATSEA had already elaborated the factors that cause the human factor issues to the ATSEP in the paper CNS SG/23-WP/19.

10.3 In this paper, IFATSEA submitted the report of the study. It was concluded that the human performance management maturity levels of ANSPs with respect to ATSEP were in the very early stages and there were scopes for improvements. The “Learning from the bottom” approach was adopted for the study. The Literature research, personal interaction, Open-ended online survey, grouping of the factors, Closed-ended online survey and data processing and validation of countermeasures assumed in the early stages of the study.

10.4 ICAO’s Human factors training manual was taken as a fundamental reference and SHELL model and REASON’s model were taken for presenting the study to all participants. PEAR model and DIRTY DOZEN models were referred for further analysis of the inputs received. Based on the outcomes, final consolidated counter measures and significant factors were listed as recommendations in the Chapter 10 of the study report. Most important measures that ANSP need to take on priority are listed in the conclusion chapter.

10.5 IFATSEA proposed to make a detailed human factor regional guidance material for the self-evaluation by states with respect to ATSEP job profile and working environment. This regional guidance material should enable the states to bench mark themselves and attain higher level of maturity in assuring the human performance. Though there are several manuals and guidance materials available, IFATSEA, APAC would like to prepare a human factor training material for ATSEP, for the benefit of the regional ATSEP and ANSPs. The detailed study report was given in the **Appendix R** to this Report.

10.6 The meeting appreciated the effort led by IFATSEA, and recognized the values of recommendations from the study report, and supported the further scope of work proposed by IFATSEA and then formulated the following conclusion for APANPIRG consideration:

Draft Conclusion CNS SG/24/17 - Addressing Human Factor Issues of ATSEP	
What: That, a) the States are encouraged to make reference and implement the recommendations made out of the IFATSEA study report <i>Factors adding stress and fatigue to ATSEP</i> provided in Appendix R to the Report for proactive measures; b) States are also encouraged to join the small working group for finding the left-out gaps and in preparing the regional ATSEP human factor guidance material.	Expected impact: <input type="checkbox"/> Political / Global <input type="checkbox"/> Inter-regional <input checked="" type="checkbox"/> Economic <input type="checkbox"/> Environmental <input checked="" type="checkbox"/> Ops/Technical
Why: to continuously improve the human performance management in practice to better support CNS/ATM system operations.	Follow-up: <input checked="" type="checkbox"/> Required from States
When: 16-Dec-20	Status: Draft to be adopted by PIRG
Who: <input checked="" type="checkbox"/> Sub groups <input checked="" type="checkbox"/> APAC States <input type="checkbox"/> CAO APAC RO <input type="checkbox"/> CAO HQ <input type="checkbox"/> Other:	

Agenda Item 11: Cybersecurity of CNS/ATM systems**ICAO Trust Framework Update (SP/01)**

11.1 Mr. Michael Goodfellow (TO/GIS) from Air Navigation Bureau, ICAO Headquarters, presented updates about the ICAO trust framework, which formally started after following AN Conf./13 Recommendation 5.4/1. ICAO presented its vision for the global trust framework, highlighting the risk of diverging efforts and the need for converging strategies for all aviation ecosystem stakeholders that build on existing foundations.

11.2 ICAO shared a short history and definition of ICAO Trust framework along with the update of the third meeting Trust Framework Study Group (TFSG). TFSG's work included reviewing a concept of operations for an international aviation trust framework, developing use cases for the international aviation trust framework, and developing requirements and guidance for identity management. TFSG/03 also covered requirements and procedures for technical and organizational trust, defining performance-based requirements for exchange and storage of information, an IPv6 address schema & allocation and management policy, supporting ICAO in negotiating with Internet governing bodies for a dedicated block of IPv6 addresses for current and future aviation needs, and working with the IETF to identify the necessary protocols to allow logical isolation of aviation data communications from the public internet. TFSG also provides coordination with ANC Panels and internet bodies such as ICANN.

11.3 ICAO shared information about the Enterprise Security Harmonization Proof of Concepts (ESHPOC) with EUROCONTROL and FAA for Validating Trust Framework technical documents and implementation strategies using SWIM Test cases.

11.4 The meeting was also informed about the *Aviation Cybersecurity Strategy* published in October 2019 and the 1st Edition of the *ICAO Cyber Security Action Plan (CyAP)* at following webpage: <https://www.icao.int/cybersecurity/Pages/default.aspx>

Outcome of APAC Cybersafety and Resilience Workshop with Tabletop Exercise (WP/14)

11.5 The ICAO Asia Pacific Cyber Safety and Resilience Workshop with Tabletop Exercise (APAC CSR TTX) was facilitated by Ms. Olga de Frutos Martin (TO/AN) and Mr. Michael Goodfellow (TO/GIS) from the Air Navigation Bureau, ICAO Headquarters. The objective of the Cyber Safety and Resilience Workshop was to empower CAAs and ANSPs with measures to mitigate the exploitation of critical information systems, develop awareness on cyber issues affecting aviation, and foster a cyber-safety culture that promotes a resilient and secure cyberspace. Particular focus was placed on the development and promotion of a common understanding of cyber threats, vulnerabilities and resultant risks across the aviation ecosystem. The workshop was also expected to identify gaps in State policies and operations and identify and promote regional mechanisms for information sharing on emerging threats and incident response.

11.6 During the Tabletop Exercise with three scenarios, the facilitators provided the participants an opportunity to simulate a cyber-event affecting international, regional and domestic operations. The scenarios focused on systems, which form an integral part of flight operations. By using a predefined scenario and introducing new challenges throughout the exercise, participants became aware of what coordination efforts would be required at a management level to successfully navigate a cyber-event.

11.7 A number of presentations were made preceding the TTX including Future of global ANS, the regional perspective and activities, Setting the cyber scene for the workshop, ICAO Trust Framework and Workshop summary and wrap-up.

11.8 Air navigation and airport infrastructure and information systems are exposed to a multitude of threat sources, including organized crime, motivated activists or so called ‘hacktivists’, Insider threats and; accidental or inadvertent system damage due to employee or contractor misuse. Each of these threats is able to cause a large and wide-spread disturbance to the order of air and ground operations.

11.9 Discussions on the 3 Scenarios covered a lot of topics, and various recommendations were proposed, including general recommendations on cyber safety/risk, oversight needs, training needs, organizational needs, coordination mechanisms and other needs, as well as additional TTX observations summary.

11.10 The workshop was informed of a global trust framework promoted by ICAO. including its concept, latest development, recommendation by AN Conf/13 which has been approved by the Council, public key infrastructure; service and seamless operating resilient federated digital network. The work of TRON, Digital Identify and GRAIN working groups, under the global trust framework study group (TFSG), was presented.

11.11 The meeting appreciated the presentation on TFSG update and the outcome of APAC CSR TTX, and then quickly went through the APAC CSR TTX outcome report, discussed relevant issues regarding ICAO provisions on cybersecurity and the implementation, and noted CNS systems were facing a wide cybersecurity threat surface.

11.12 The meeting was informed that the TFSG updates were able to be provided to APAC States through regional officer. The ICAO guidance materials related to aeronautical communications system security were developed in coordination with the ICAO Communications Panel, and generic security related guidance from other ICAO publications also covered cyber issues, although some of them published a couple of years ago.

11.13 CANSO provided a publication to the meeting, *the CANSO Standard of Excellence in Cybersecurity*, which brings together best practices, knowledge and experience from various industry stakeholders to enable air navigation service providers (ANSP) to assess and improve their cybersecurity performance, as well as their suppliers. This document is available at: <https://canso.org/publication/canso-standard-of-excellence-in-cybersecurity/>

11.14 The meeting also recalled the regional efforts on cybersecurity issues in the past years, considering the nature of complexity and the need for inter section coordination within the APAC RO and with HQ and in relation to the Cybersecurity Action Plan and promoting similar drills in future, ICAO APAC is requested to plan a webinar on cybersecurity for the region in 2021.**ACTION ITEM 24-9.**

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, as the response to APANPIRG’s call on enhancing engagement with industry, various industry partners were invited to share and update the latest progress in relevant areas.

ANSP International Connectivity and Cybersecurity (SP/03)

12.2 Nokia presented a brief about its various aviation solutions in the domain of ATC, airlines, and airports along with latest research being carried out on ANSP International Connectivity and Cybersecurity. The presentation highlighted the need of High Performance Networking for ANSPs which requires G/G Network Upgrade without changing the current applications. Nokia presented its

expertise on industries standards compliances and their proposed solutions for ANSP international connectivity based on migration from TDM/E1 to international IP network without disturbing ANSP E1 application. Nokia emphasized its focus on secure, efficient and lower cost of ownership for the Aviation community and introduced about its research project Future All Aviation CNS Technology (FACT). Lastly, Nokia discussed about Cyber Security Governance in Aviation and proposed ANSP Cyber Asset Model.

Application of New Technologies in ATC HMI Design (SP/04)

12.3 Thales discussed about its HMI 2025 research project based on technologies voice recognition, eye tracking, touch screens, and data mining. The objectives are to automate the controller's tasks and to ease controller's work on complex HMIs by providing voice commands and reducing complexity of HMI. Thales discussed importance of eye tracking with supplement AI and Machine Learning in research project to automate the controller's workflow. This project is also looking for answers if the concepts of personal touch devices can be applied in an ATC context and possibility of Hands-Off without physical actions. In order to fulfil these objectives, Thales is working on data mining including data gathering and data analysis. The topic gained a lot of interest among states and various questions were answered.

IT VCS for ATM (SP/05)

12.4 Frequentis presented advancement of current voice communication system as IT VCS. Frequentis presented their current innovative projects under voice communication system and their progress in this area. They discussed how voice communication system and virtual centers interact each other. Frequentis discussed challenges faced by ANSP in current VCS and proposed their ATM masterplan targets using virtual centers while providing operational flexibility along with safety and reliability. The advantages of IT VCS system are its management like other IT systems along with high availability, security, and voice quality. It was said that SESAR also support this approach. Architecture for voice communication IT system was presented and its flexibility and redundancy were described. Concern of cyber security with IT system were discussed and Frequentis described their security features embedded into IT VCS system. Lastly, Frequentis presented various benefits of IT VCS system and encouraged states to see their systems.

Digital Transformation - The Airport and Beyond (SP/06)

12.5 Searidge presented its new technologies on digital transformation of airports in the form of digital ATC tower or Remote tower. Searidge started with its brief history, shareholders, key business locations, and key business areas. Searidge presented traditional ATC tower to digital ATC tower need, advantages, key enablers, and business cases along with different location, where it has been implemented. Lastly, it discussed about some use cases about LHR Heathrow Digital Tower, Paris Orly Digital Tower, and Singapore Smart Tower by describing their business case, proposed solutions, and operational application.

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

ANS Planning and Provision – A New Normal? (WP/15)

13.1 CANSO presented the potential impact of Covid-19 on ANSPs in the planning and provision of air navigation services. ANSPs are losing revenue with the drastic downturn in air traffic but they must maintain airspace availability for the aircraft such as cargo, repatriation, and humanitarian flights.

13.2 CANSO hosted a webinar entitled 'New Normal', where it presented a survey conducted by Egis and the views of the panellists. The results of survey and views are presented in the paper.

13.3 As per the survey, strategic priorities of the surveyed ANSPs before the pandemic and after the pandemic have been changed. Before pandemic out of 10 strategic priorities, top priorities were technological leadership, automation of services and increasing revenue. Cutting costs was at number 5 and service scalability was at number 8. After pandemic, the top priorities are cost cutting followed by a tie between increasing revenue and automation of services with closely followed by technological leadership and service scalability.

13.4 The paper also highlighted to use current reduced traffic demand as an opportunity to focus on implementing strategic changes, to review what are the really important investments, how to use better harmonized efforts, and ensure that benefits are optimized across the region. There are also opportunities to review current airspace restrictions and ways to improve service provision to minimize operational delays and inefficient routings along with greater collaboration and partnerships.

13.5 The meeting appreciated CANSO's sharing and reminded States to keep an eye in future while dealing with the cost-cutting due to COVID-19. The Egis report is available through the following link: <https://en.calameo.com/read/0040249107c41ca06fa30?page=1>

CNS Related Work/Projects Impacted by COVID-19 (WP/17)

13.6 India presented the impact of COVID-19 pandemic on CNS related work and projects of Airports Authority of India along with discussion of various measures undertaken to limit such impact.

13.7 For projects under planning stage, delay in formulation/finalization of operational & technical requirement of CNS/ATM Systems has been addressed by conducting regular Web Conference meetings and coordination through electronic means. For projects under Tender stage, time delay in Tender invitation evaluation and award of contract is mitigated by mandatory to work on e-office. For projects where Installation & Commissioning was in progress and where Manpower is required to be deployed from Overseas to complete the installation, AAI coordinated with vendors to depute their Installation team as soon as International flight operations get started while for in house projects, various ILS, DVOR/DME replacement projects have been completed. India has invoked "Force Majeure" clause to all projects and other supply contracts to avoid any financial burden on the vendors.

13.8 During COVID19 Lockdown period since 22/03/2020 in India, Airports Authority of India, Flight inspection Unit carried out the flight inspection of radio navigational and ground aids installed at Airports in India with proper methodology and permission from MOCA (Ministry of Civil Aviation) and DGCA (India Regulator), with effect from. 22/03/2020 up to 31st August 2020, Flight inspection of 37 ILS, 11 DVOR, 15 DME and 74 ground Visual Aids(PAPI) were carried out.

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

13.9 Most of the ICAO ASIA/PAC meeting schedules of 2020 were postponed and some had to be cancelled. As the report of progress and some action requirements need effective communication and efficient cooperation between Regional Office and member States, the COVID pandemic caused a great challenge to ICAO ASIA/PAC to achieve and accomplish all work programme.

13.10 For the consequence, the use of online meeting platforms for virtual meetings found some observations:

- 1) Number of participants increased significantly compare to face-to-face meeting.
- 2) Webinars were widely recognized.
- 3) Time Zone impacted meeting arrangement and effectiveness.
- 4) Difficulty for hands-on demonstration.
- 5) Postponement of required update.
- 6) Limitations on networking and coordination.
- 7) Workload of the Secretariat increased.

13.11 Quick Reference Guides (QRGs) were developed by ICAO, with the support of relevant subject matter experts, to provide guidance of a particular subject area in addressing COVID-19 related risks to the continuity of business and operations that were under consideration by a State for alleviations, while ensuring that the safety risks introduced by any changes from alleviations were also addressed.

13.12 The ICAO Asia and Pacific (APAC) Director-General of Civil Aviation (DGCA) Information Sharing web-conference, 31 March 2020, on the subject of “COVID-19”, decided to form a task force/group to assist the DGCAs in coordinating their approach to the management of civil aviation through, and out of, the current extraordinary circumstances resulting from the COVID-19 pandemic. Consequently, the ICAO APAC COVID-19 Contingency and Recovery Planning Group (ACCRPG) was established.

13.13 The meeting appreciated the Secretariat’s effort on this paper and recommended ICAO APAC Office to think and plan for meetings in hybrid mode by implementing IT technology with the meeting facilities, to allow more participants from States to access ICAO regional events. The meeting was informed that the newly refurbished conference hall in ICAO APAC Regional Office would be able to support hybrid mode meeting in near future.

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

Introduction of the Network Performance Assessment Center (IP/18)

14.1 Japan presented information about recently established (April 2020) Network Performance Assessment Center (NPAC) in Japan, which was established to monitor, analyse and assess the service level of each CNS system to assure if it meets the required performance specification for PBO (Performance Based operation).

14.2 Japan has been promoting to implement PBO, which requires the highly accurate position information and robust ATC communications and hence robust CNS systems. The NPAC has started GNSS performance monitoring and assessments including GPS augmentation systems (SBAS and GBAS) for improved RAIM prediction information service.

14.3 The NPAC will start Surveillance system performance assessments in late this year. Japan described the system operations of NPAC. In addition to performance assessments, NPAC operates ATC datalink exchange system and SBAS. DLCS (Data Link Center Sortation equipment) processes all the datalink communications messages such as ADS, CPLDC, DCL and ATIS throughout Japan and delivers them via DSPs. MSG (MSAS Signal Generating equipment) connected to QZSS (Quasi Zenith Satellite System) to broadcast SBAS signal to the aircraft flying in Fukuoka FIR.

14.4 The meeting enquired about the potential for NPAC to support other States to make assessment on various systems through commercial contract, NPAC suggested that interested parties contact JCAB via e-mail or appropriate way, in addition, GNSS related assessment reports were prepared to publish on it's website.

Briefing on the Technical Cooperation Bureau (SP/07)

14.5 ICAO secretariat presented briefing about the Technical Cooperation Bureau. ICAO reminds the mission of the Technical Cooperation Bureau (TCB) to support States in implementing international civil aviation SARPs and policies. It shared brief history about TCB along with average number of projects implemented per year, average number of experts recruited per year and average Member States that have been benefited from TCB Services each year. TCB listed the fields in which it provides solutions to the civil aviation industry through customized programmes. TCB described its capabilities in projects & implementation, procurement of goods & services, experts & personnel, and training & fellowships. TCB coordinates with ICAO Technical Bureaus to develop packages that address current and future SARPs implementation needs. TCB presented data for project implementation in APAC region in the year 2018 along with percentage of TCB Projects per ICAO Strategic Objective in APAC. TCB discussed various on-going projects by the types in APAC in the year 2020 and benefits of regional projects for CNS/ATM. Lastly, TCB presented ICAO training portfolio having 250+ Courses and described different TCB services as an added value for APAC states.

The tentative CNS meeting Dates in 2021

14.6 The meeting noted the current status of CNS meeting planning contained in **Flimsy/01**, and agreed the meetings planned for the 1st half of 2021 would be conducted in VTC. Considering the uncertainty of the pandemic, the CNS SG/25 would be scheduled for the second half of 2021, and the meetings planned for 2021 were listed below. The specific meeting dates will be confirmed by the coordination of the Secretariat and the chairs of relevant contributory bodies:

No.	Meeting Name	Tentative Date
1	CRV OG/8	May/June
2	GBAS/SBAS ITF/3	March/April
3	DAPs WG/4	First half of March, 2021 TBC
4	APA TF/6	2nd half of 2021
5	PBNICG/8	June/July
6	APAC Aeronautical Fixed Service Safety and Protection Planning Working Group meeting (AFSSP WG 2020), Postponed	AFSSP WG 2021, to be discussed by ACSICG/8
7	SWIM TF/5	after May, TBD by next TL meeting
8	SURICG/6	after SWIM TF/5
9	ACSICG/8	2 nd half of 2021
10	SRWG/5	2 nd half of March, 2021
11	ATMAS TF/2	2 nd half of 2021
12	Frequency Finder workshop, 5 days	2 nd half of 2021
13	CNS SG/25	2 nd half of 2021

Note of appreciation

14.7 On behalf of the Group, Mr. Richard Wu, Chairperson of CNS Sub-group expressed thankfulness to ICAO Secretariats for their excellent support in ensuring smooth running of the CNS SG/24 meeting within the tight timeframe, all participants from member States/Administrations, ICAO APAC Regional Office, international organizations including IATA, CANSO, IFATCA, IFATSEA, EUROCONTROL, PCCW Global (ICAO CRV service provider), and sponsoring organizations including Nokia, Thales, Frequentis, Searidge, Saab and Chinney Alliance Engineering for their significant contributions and active participation in making the meeting a successful and fruitful one. Mr Wu gave a brief summary on the achievements by the CNS Sub-group in this meeting while highlighting the key issues discussed and addressed. He believed that with the strong dedication and unfailing support from all, the CNS Sub-group would upkeep our good work and momentum to ride on the storm and continue taking a significant role in shaping the future direction of CNS development for this region.
