REPORT OF

THE ELEVENTH MEETING OF THE SURVEILLANCE IMPLEMENTATION COORDINATION GROUP (SURICG/11)

Bangkok, Thailand
25-27 March 2026

The views expressed in this Report should be taken as those of SURICG/11 Meeting and not of the Organization.

Approved by the Meeting
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HISTORY OF THE MEETING

REPORT ON AGENDA ITEMS

LIST OF APPENDICES

LIST OF ATTACHMENTS

1. Introduction

1.1 The Eleventh Meeting of the Surveillance Implementation Coordination Group (SURICG/11) was held at the ICAO APAC Regional Office, Bangkok, Thailand, from 25 – 27 March 2026.

2. Attendance

2.1 The Meeting was attended by **58** participants from **18** Member States/Administrations and 1 International Organizations, namely Bhutan, Cambodia, China, Hong Kong China, Macao China, Fiji, Indonesia, Japan, Lao People's Democratic Republic, Malaysia, Maldives, New Zealand, Pakistan, Singapore, Sri Lanka, Thailand, United States, Viet Nam, and ICAO. The List of participants is provided in **Attachment 1**.

3. Opening of the Meeting

3.1 The Meeting was opened by Mr. Ho Wee Sin. He welcomed participants, tracing the group's evolution from the 2003 ADS-B Task Force to the current SURICG. He highlighted key achievements, including ADS-B data sharing and Mode S implementation guidance, as well as the successful conclusion of the Surveillance Study Group (SURSG). He emphasized the integration of surveillance data into regional SWIM and urged Member States to actively implement these initiatives to enhance regional cooperation.

3.2 Mr. Zhang De, Regional Officer CNS, also welcomed all delegates and shared key agenda item details with the Meeting.

4. Officers and Secretariat

4.1 Mr. Ho Wee Sin, Deputy Director (Air Traffic Management), Civil Aviation Authority of Singapore, and Mr. Chanyut Phrukkumwong, Expert, Senior Director Level, AeroThai, co-chaired the Meeting.

4.2 Mr. Zhang De, Regional Officer CNS, acted as the Secretary of the Meeting with the support of Ms. Xu Jian, Associate Programme Officer (CNS) Implementation and Ms. Varapan Meefuengsart, the Programme Assistant from ICAO Asia and Pacific Regional Office.

5. Organization, working arrangements and language

5.1 The Meeting met as a single body for the Meeting. The working language for the Meeting was English, including all documentation and this report. The Meeting considered **Ten (10)** Working Papers and **Eleven (11)** Information Papers under its Thirteen (13) Agenda Items. The list of Papers is provided in **Attachment 2**.

6. Draft Conclusions, Draft Decisions and Decisions of SURICG – Definition

6.1 SURICG recorded its actions in the form of Draft Conclusions, Draft Decisions and Decisions within the following definitions:

> **Draft Conclusions** deal with matters that, according to APANPIRG's terms of reference, require the attention of States or action by the ICAO in accordance with established procedures;

Draft Decisions deal with the matters of concern only to APANPIRG and its contributory bodies; and

Decisions of SURICG that relate solely to matters dealing with the internal working arrangements of SURICG.

7. List of Conclusions/Decisions from SURICG/11

	Reference Number		Title of (Draft) Conclusions/Decisions
1.	Draft Conclusion SURICG11/01 (SURSG/5/01)	-	Guidance Materials for the sharing of surveillance data in SWIM
2.	Draft Decision SURICG11/02 (SURSG/5/02)	-	Proposing dissolution of SURSG
3.	Draft Conclusion SURICG/11/03	-	Decommissioning of the Asia Pacific ADS-B Avionics Problem Reporting Database.

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Agenda Item 1: Adoption of Agenda

1.1 The provisional agenda provided in WP/01 was adopted by the Meeting as the agenda items for the Meeting.

Agenda Item 2: Election of Co-Chair

2.1 Proposed by Singapore and seconded by Hong Kong China and United States, Mr. Chanyut Phrukkumwong, Expert, Senior Director Level, AeroThai, Thailand, was elected as Co-Chair of the Surveillance Implementation Coordination Group.

2.2 Mr. Chanyut Phrukkumwong thanked the Meeting for giving him the trust to serve as a Co-Chair of SURICG.

Agenda Item 3: Review of outcomes of relevant meetings on Surveillance

Review of Relevant Meetings - Sec (WP/02)

3.1 The paper summarised relevant information and updates with a highlight on the reviewed outcomes of SURICG/10, ATMAS TF/6, and relevant discussions of other meetings of CNS SG/29 and APANPIRG/36.

3.2 CNS SG/29 Meeting adopted **five (5)** conclusions and **six (6)** decisions. In addition, based on the outcome of discussions on various agenda items, the CNS SG/29 Meeting developed **three (3)** Draft Conclusions and **one (1)** draft Decision for consideration by the APANPIRG/36, which were adopted by the APANPIRG/36 Meeting. The Meeting noted the Conclusions/Decisions adopted by the CNS SG/29 and the APANPIRG/36 and discussed the follow-up.

Impact of Potential Removal of Unused Protocols in ICAO Annex 10 Vol 4 – Singapore (WP/10)

3.3 The Meeting was informed of an upcoming plan to remove unused Mode S Protocols in the ICAO Annex 10 Vol IV and seeks feedback from the Meeting on any undesirable impact.

3.4 It was noted that the ICAO Annex 10 Vol IV contains the full suite of Mode S services, of which several are either not implemented or seldom used. The Surveillance Panel therefore initiated an investigation to study the requirements and impact of removing the material relating to the unused protocol. States were encouraged to review and highlight if they are using any of the protocols that could be removed from the ICAO Annex 10 Vol IV.

3.5 As no concern was raised during the meeting, the Meeting encouraged States to further review after the meeting whether any of these protocols are currently used in their systems and provide feedback before August 2026 to Co-Chairs and the Secretariat, if there could be any operational or technical impact. **ACTION ITEM 11-1**

Agenda Item 4: Review Progress of SURSG

Outcome of SURSG/5 - Sec (WP/03)

4.1 This paper summarized the main points of the report of the Fifth Meeting of the Surveillance Study Group (SURSG/5), which was held from 23 – 24 March 2026 in the ICAO APAC Regional Office, Bangkok, Thailand.

4.2 The paper discussed the contents and Draft Conclusion/Decisions proposed by SURSG/5 for endorsement of SURICG/11. The SURSG/5 Meeting report, working papers, information papers, and other resources can be accessed by the following link:
https://www.icao.int/APAC/meetingdocs?fid=33630

4.3 It was recalled by SWIM TF/10 that SURSG was working on the task of reviewing, identifying and providing expert views and recommendations to address major issues raised to the SURSG in the technical, operational or regulatory aspects of surveillance data sharing to facilitate the implementation of surveillance from "departure to destination" in APAC and surveillance information exchange format should be part of this task. SWIM TF/10 requested that the ICAO Secretariat coordinate with SURICG and SURSG to obtain the required information.

4.4 ICAO Secretariat coordinated with the SURSG chair for this matter, and it was further discussed in the SWIM TF Task Leads meeting on 17 November 2025. SURSG chair informed that ASTERIX and/or JSON are proposed as the data exchange models for surveillance data sharing in the region. However, for the data exchange model to be used globally, it was suggested that it should be handled separately by a global body.

4.5 Given that the global body for surveillance matters in aviation is the Surveillance Panel (SP), the Meeting deliberated on the recommendation requesting the SP to discuss the topic and advise on the message format for global surveillance data exchange. It was shared by participating SP members that ASTERIX is managed by Eurocontrol, not by the SP. Therefore, SP may not endorse the global surveillance data exchange format.

4.6 The SWIM TF Co-chair informed that, under the current ICAO SWIM provisions, surveillance information is mentioned at various places. However, to date, no studies have been conducted, unlike those for flight information (FIXM), metrological information (IWXXM) and aeronautical information (AIXM). She provided examples of studies conducted in the APAC region evaluating the suitability of using FIXM for the exchange of surveillance information over SWIM.

4.7 The SWIM TF Co-chair added that, while conducting studies for the APAC Regional FIXM version 4.1 and version 4.2 extensions, an attempt was made to add surveillance data into these FIXM extensions. However, it was concluded that, due to the high update rate of surveillance data and the resulting significant bandwidth requirements, FIXM may not be an appropriate information model for sharing surveillance data in SWIM environment.

4.8 The SWIM TF Co-chair also shared an example of a governance framework for FIXM. It was noted that for FIXM, the Change Control Board (CCB) is responsible for FIXM management and is not an ICAO group. However, there is a relationship between ATM Requirements and the Performance Panel (ATMRPP) and the FIXM CCB, whereby ATMRPP provides inputs and requirements to the FIXM CCB, and the FIXM CCB develops the FIXM schema accordingly. It was suggested that SP may wish to consider adopting a similar governance framework.

4.9 SURSG recommended SURICG consideration for requesting SP to discuss the global surveillance data exchange format. Singapore suggested that an information paper be presented at the upcoming SP meeting on this topic, including various considerations shared by the SWIM TF Co-chair.

4.10 The SURICG/11 Meeting deliberated on this matter and agreed that, while ASTERIX and JSON were recommended for use in the APAC region, no global recommendation would be proposed. Instead, the Surveillance Panel would be informed of regional developments through an information paper for their consideration and feedback.

4.11 The SURSG/5 Meeting was informed that by Decision 36/11, APANPIRG/36 in November 2025, adopted the First Version of the Business Functionality for APAC Common SWIM

Information Services. It was recalled that at SWIM TF/10 in May 2025, it was noted that the level of detail differed across different information domains (e.g. aeronautical information, flight information, surveillance data, meteorological information, etc.), potentially caused by different levels of understanding as to what detail is needed by SWIM TF to facilitate the development of SWIM information services within the APAC region. In response to this, the Task 6 team of SWIM TF was developing the guidance material.

4.12 The SURSG/5 Meeting noted SWIM TF welcomes suggested improvements to the usability/clarity/structure of the information in the list of APAC Common SWIM Information Services. Two potential changes have already been identified by SWIM TF for consideration for future updates:

(i) Introduction of "applicability" (e.g. "region-wide" in order to achieve the anticipated benefits, vs. "as needed" to meet local needs), and
(ii) Addition of desired implementation timeframe (e.g. immediate (before 2030), medium-term (2030-2035), and long-term (beyond 2035)).

4.13 SWIM TF also recommended APANPIRG Subsidiary Groups consider the review of the Common APAC SWIM Information Services document as a standing meeting agenda item for future meetings and subsequent update to SWIM TF, as both SWIM and the associated required Information Services continue to evolve regionally and globally.

4.14 The SURSG/5 Meeting reviewed the draft Guidance Material for Business Functionality of APAC Common SWIM Information Services, and no changes were proposed. The guidance material was provided in **Appendix A** to this report.

4.15 For the request to consider the review of the APAC Common SWIM Information Services document as a standing meeting agenda item for future meetings and subsequent update to SWIM TF, as both SWIM and the associated required Information Services continue to evolve regionally and globally, the Meeting agreed that if SURSG is dissolved by the SURICG/11 Meeting, the list of APAC Common SWIM Surveillance Information Services document will be part of the agenda items of SURICG and the list will be updated by the SURICG meeting in the future.

4.16 The SURSG/5 Meeting was presented the updates on the work of the ICAO APAC SWIM Task Force (SWIM TF) on Information Services to finalize APAC Common SWIM Information Services for addressing the operational needs in APAC and requests inputs from SURSG to modify APAC Common SWIM Surveillance Information Services.

4.17 The SURSG/5 Meeting deliberated in length on the initial set of APAC Common SWIM Surveillance Information Services and provided inputs and comments. The revised APAC Common SWIM Surveillance Information Services agreed by the Meeting was provided in **Appendix B** using "Track Changes".

4.18 The SURICG/11 Meeting reviewed the revised list of APAC Common SWIM Surveillance Information Services, and further discussed whether the term "FPL" should be replaced with "flight information", as well as how to better reflect both surveillance data and flight plan information in the "Type of Information" field for the Surveillance Data with Flight Plan Information Sharing Service. Thailand volunteered to lead a study on the terminology of "FPL", with participation from Singapore, while China volunteered to study the inclusion of a footnote in the "Type of Information" field. Both tasks will report back to the next SURICG meeting. **ACTION ITEM 11-2/11-3**

4.19 The SURSG/5 Meeting recommended that Guidance Material for the sharing of surveillance data in SWIM should be added as a reference document for APAC Common SWIM Surveillance Information Services to support service implementers. As Task 6 of SWIM TF is working on adding relevant references to all services listed in APAC Common SWIM Information Services, it

was suggested that this information be shared with Task 6 of SWIM TF. ICAO Secretariat will share this information with the Task 6 Task Leads.

4.20 The SURSG/5 Meeting reviewed and finalized the Guidance Materials for the sharing of surveillance data in SWIM; the finalized Guidance Material was provided in **Appendix C** to this report, and the following draft Conclusion was endorsed by SURICG/11 Meeting for CNS SG/30 adoption.

<table>
<tr><td colspan="3">Draft Conclusion SURICG/11/01 (SURSG/5/01) – Guidance Materials for the sharing of surveillance data in SWIM</td></tr>
<tr><td colspan="2">What: The Guidance Materials for the sharing of surveillance data in SWIM be adopted.</td><td>Expected impact:
☐ Political / Global
☐ Inter-regional
☐ Economic
☐ Environmental
☒ Ops/Technical</td></tr>
<tr><td>Why: To assist APAC States/Administrations in their SWIM development and implementation on the sharing of surveillance data, the finalized version of the Guidance Materials for the sharing of surveillance data in SWIM is ready for adoption.</td><td colspan="2">Follow-up: ☐Required from States</td></tr>
<tr><td>When: 24-Mar-26</td><td colspan="2">Status: Draft to be adopted by Subgroup</td></tr>
<tr><td colspan="3">Who: ☒Sub groups ☐APAC States ☐ICAO APAC RO ☐ICAO HQ ☒Other: SURICG</td></tr>
</table>

4.21 The Meeting was informed that, as SWIM development in the region is ongoing, it was anticipated that future updates on the Guidance Material would be necessary, especially on any further required details of the surveillance information services. SURSG proposed that SURICG assume this responsibility and respond appropriately when the relevant standard(s) mature.

4.22 The Meeting reviewed the Work Plan of SURSG in view of the progress and development following SURSG/1 to SURSG/4. As all the tasks under the ToR allocated to SURSG were completed, SURSG was proposed to be dissolved. The Meeting discussed and adopted the following draft Decision for CNS SG/30 adoption:

<table>
<tr><td colspan="3">Draft Decision SURICG/11/02 (SURSG/5/02) – Proposing dissolution of SURSG</td></tr>
<tr><td colspan="2">What: SURSG completed all the allocated tasks under the ToR and is proposed to be dissolved.</td><td>Expected impact:
☐ Political / Global
☐ Inter-regional
☐ Economic
☐ Environmental
☒ Ops/Technical</td></tr>
<tr><td>Why: SURSG completed all the allocated tasks under the ToR.</td><td colspan="2">Follow-up: ☐Required from States</td></tr>
<tr><td>When: 24-Mar-26</td><td colspan="2">Status: Draft to be adopted by Subgroup</td></tr>
<tr><td colspan="3">Who: ☒Sub groups ☐APAC States ☐ICAO APAC RO ☐ICAO HQ ☒Other: SURICG</td></tr>
</table>

4.23 The SURSG/5 Meeting reviewed and updated the action item list. The pending action items will be incorporated into the Action Item List of SURICG.

Agenda Item 5: Review of regional requirements for Surveillance in the e-ANP, Seamless ANS Plan and the reported implementation Status

a) Outcome for survey on APAC Surveillance and DCPC Coverage

Outcomes for Survey on APAC Surveillance and DCPC Coverage – Hong Kong China (WP/04)

5.1 The need to enhance the surveillance and Direct Controller and Pilot Communication (DCPC) VHF coverage where gaps exist in APAC Region along some of the busy air traffic routes at boundaries between FIRs has been identified during APANPIRG/29 in 2018. As such, the coverage charts were regularly generated for inclusion in APAC Seamless ANS Plan. The ICAO APAC Regional Office launched a survey in early 2022 to update information concerning existing/planned coverage and reported the outcome from the Survey in CNS SG/26. Another round of updates to reflect the latest coverage was conducted per State Letter T 8/5.4: AP099/25 (CNS) issued in July 2025. With great assistance from Hong Kong China and Thailand, coverage charts on DCPC VHF and ATS Surveillance have been produced with highlights of changes discussed in the Meeting.

5.2 The Meeting noted as of March 2026, there were 14 States/Administrations provided their updated coverages, and all plottable data provided has been applied to the update of coverage maps.

5.3 The updated charts were provided in Fig.1 and Fig.2 below.

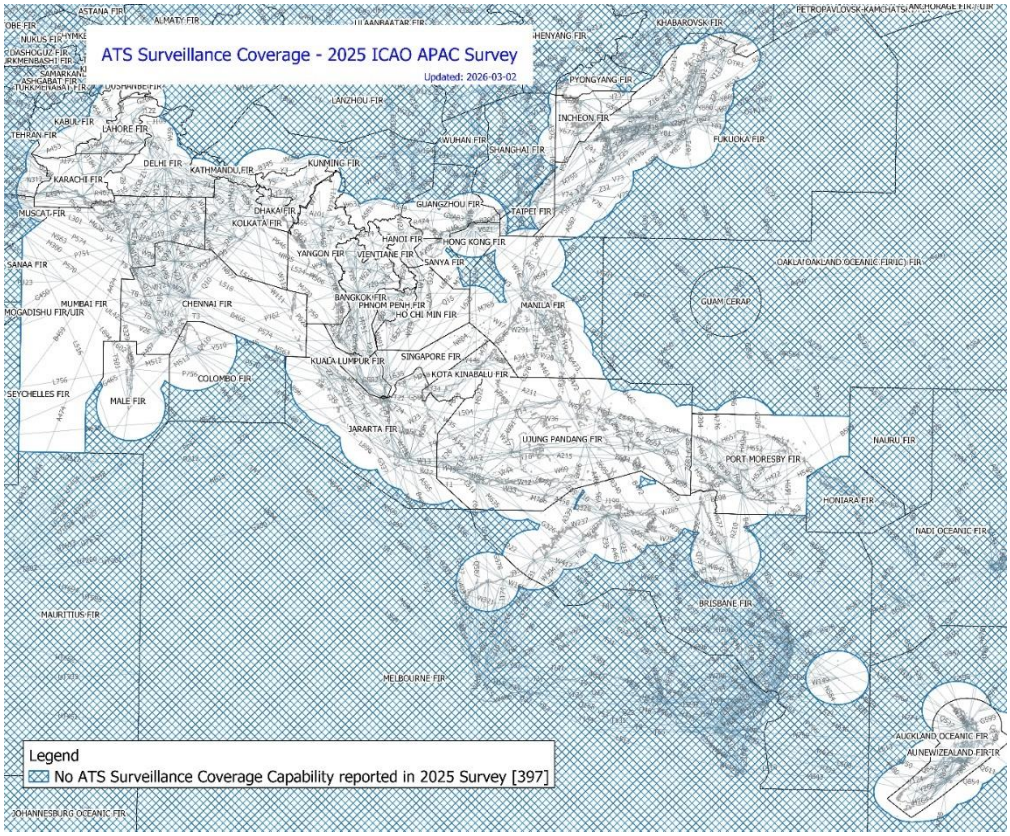


Figure 1: Updated ATS Surveillance Coverage

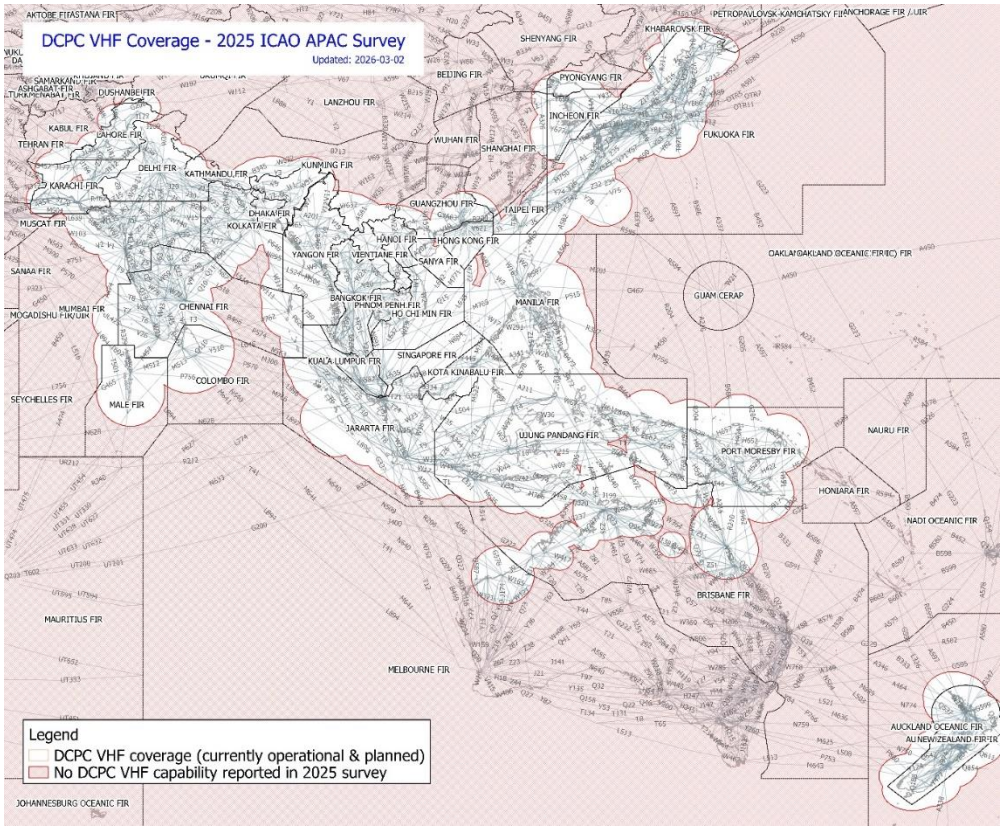


Figure 2: Updated DCPC VHF Coverage

5.4 During plotting of the coverage map, it is observed that data could be incorrect, causing the change in coverage area, including the following causes:

- Previously planned base stations were no longer in plan nor implemented. Some may be relocated, while others could be changed in plan. Many of the planned stations were not updated from some States during this survey
- Typo in lat-longs
  e.g. xx° N mistyped as xx° S, or xxx° E mistyped as xxx° W
- Mixing up of lat-long formats e.g. xx° yy' zz" (degree-minute-second) with xx.yyzz° which are not equal.

5.5 States/Administrations were encouraged to work with appropriate parties and/or other States/Administrations to derive plans in addressing the coverage gaps identified in the coverage charts. It was proposed that the updated coverage charts of the ATS surveillance and DCPC VHF coverage to be reviewed by States via CNS Sub-group and incorporated into the next update of the Asia Pacific Seamless ANS Plan.

5.6 The Secretariat expressed its appreciation to Hong Kong China and Thailand for their significant contributions and strong support to this work. States that have not yet provided input to the survey were encouraged by the Meeting to actively contribute in future updates, as broader participation will help ensure that the results more accurately reflect the overall situation in the APAC region.

b) Review Table CNS II-APAC-3 in APAC e-ANP Volume II

Review Regional Surveillance Requirements - Sec (WP/05)

5.7 The paper reviewed regional surveillance requirements specified in Table CNS II-APAC-3 in APAC e-ANP Volume II, presented the updated Table CNS II-APAC-3 SURVEILLANCE

of ANP Volume II after issued the state letter Ref.: AN 2/1 – AP092/25 (CNS) on 8 July 2025.

5.8 The Meeting reviewed the consolidated table by the Secretariat with reference to the Revised Surveillance Strategy of APAC, which will be incorporated into e-ANP Volume II Table CNS II-APAC-3 SURVEILLANCE.

5.9 It was emphasized that, in case of updates of any information required, States/Administrations should submit the updates to ICAO APAC Regional Office via PfA Process. States/Administrations were urged to verify and update the TABLE CNS II-APAC-3-SURVEILLANCE following the PfA process.

5.10 The Secretariat informed that it would validate and compile State responses following the CNS SG/30 meeting in July 2026. Member States were requested to submit or forward any missing responses to ensure the surveillance tables are accurately updated to avoid redundant cycles next year.

Agenda Item 6: Review implementation and coordination activities and sub-regional implementation plans

a) Progress on ADS-B planning and implementation – Bay of Bengal
b) Progress on ADS-B planning and implementation – South East Asia.

6.1 Two breakout sessions were conducted for *ADS-B planning and implementation – Bay of Bengal ad-hoc group* and *ADS-B planning and implementation – South East Asia Ad-hoc group*. The following members joined two Ad-hoc groups:

SN	ADS-B planning and implementation– Bay of Bengal Ad-hoc group	ADS-B planning and implementation– South East Asia Ad-hoc group
1.	Bhutan	China
2.	China	Hong Kong China
3.	Indonesia	Indonesia
4.	Malaysia	Lao PDR
5.	Maldives	Malaysia
6.	Sri Lanka	Singapore (Lead)
7.	Thailand (Lead)	Thailand
8.		Vietnam
9.	**Observers**	**Observers**
	Japan	Macao China, Japan, United States

6.2 During breakout sessions, various members shared updates on different projects with the group leads. The group leads prepared the final report and updated the ADS-B Data Sharing Implementation Status table. The Meeting reviewed the reports on the Sub-regional ADS-B implementation plan/projects presented by BOB and SEA Ad Hoc working groups, which were led by Thailand and Singapore, respectively. The reports updated by BOB and SEA Ad Hoc groups are provided in **Appendix D and E,** which could serve as a basis for further development of the sub-regional implementation plans and follow-up actions for coordination by States/Administrations.

c) Updates by other States

6.3 There were no papers under this sub-item.

d) Discuss progress on data-sharing projects among States

6.4 The Meeting reviewed the updated table on ADS-B Data Sharing Implementation Status, in which states and administrations provided updates during the ad-hoc working group sessions. The updated table is provided in **Appendix F** of this Report.

Agenda Item 7: Report on surveillance ground system and avionics performance monitoring and improvement in compliance

Future of the Asia Pacific ADS-B Avionics Problem Reporting Database - Singapore (WP/06)

7.1 This paper sought the views of the Meeting whether the Asia Pacific ADS-B Avionics Problem Reporting Database should continue to be maintained.

7.2 It recalled that the Asia Pacific region began ADS-B operations on a wide scale in 2013, with the APRD initiated in 2014 and a fully functional system launched in 2017. CNS SG/21 urged States to make full use of the APRD for reporting ADS-B avionics problems, sharing experiences, and following up actions through the APRD webpage.

7.3 It was recognized that the Asia Pacific APRD played a positive role during the early phase of ADS-B implementation in the region. However, following the introduction and increasing use of the FAA NSAL and the ADS-B Issues database maintained by the ICAO Surveillance Panel, the utilization of the APAC APRD declined significantly.

7.4 In view of the existence of a more actively maintained and globally referenced ADS-B Issues database under the ICAO Surveillance Panel (SP), the continued maintenance of a separate APAC ADS-B avionics problem reporting database may no longer be necessary. Instead, the ICAO surveillance community can make use of just one single database.

7.5 Therefore, it was suggested that the Asia Pacific ADS-B avionics problem reporting database be decommissioned and the ICAO surveillance community in Asia Pacific will refer to the database maintained by the Surveillance Panel. When there are issues identified in the Asia Pacific region, these can be brought to the attention of the Surveillance Panel and included in the Surveillance Panel's database.

7.6 With the abovementioned, the following draft Conclusion was endorsed by the Meeting.

<table>
<tr><td colspan="3">Draft Conclusion SURICG/11/03 - Decommissioning of the Asia Pacific ADS-B Avionics Problem Reporting Database</td></tr>
<tr><td colspan="2">What: The APAC ADS-B Avionics Problem Report Database (APRD), maintained by ICAO APAC Regional Office, be decommissioned, and that the Surveillance community in APAC refer to the Surveillance Panel's ADS-B Issue database as the primary mechanism for reporting and tracking ADS-B avionics-related issues.</td><td>Expected impact:
☐ Political / Global
☐ Inter-regional
☐ Economic
☐ Environmental
☒ Ops/Technical</td></tr>
<tr><td>Why: The APAC ADS-B APRD and the ADS-B Issues database maintained by the ICAO Surveillance Panel serve a similar purpose. The use of APRD has been very limited in recent years. In contrast, the Surveillance Panel's ADS-B Issues database is more actively used and maintained at the global level.</td><td colspan="2">Follow-up: ☐Required from States</td></tr>
</table>

When: 27-Mar-26	Status: Draft to be adopted by Subgroup
Who: ☐Sub groups ☐APAC States ☐ICAO APAC RO ☐ICAO HQ ☒Other: SURICG	

7.7 The Meeting further noted that the SP database primarily serves as a repository of ADS-B issues and related papers, rather than a comprehensive list of affected aircraft, and is relatively simple in structure. Concerns were raised regarding limited awareness and usage of the database among some States, as well as the need to ensure that both commercial and general aviation-related issues are adequately captured. Members highlighted the importance of actively submitting identified issues to ensure completeness of the database.

7.8 The Meeting discussed access to the SP portal and database, noting that access can be granted to APAC States upon request through subscription.

7.9 The Meeting further discussed whether ICAO Regional Office would establish an implementation monitoring mechanism for avionics performance following the amendment and publication of Annex 10 provisions. It was emphasized that States are responsible for implementing the relevant requirements. Where difficulties arise, ICAO Regional Office may provide coordination and support, as appropriate.

Status Update on the ADS-B Performance Monitor Under Development at ENRI – Japan (IP/02)

7.10 Japan introduced a status update on the ADS-B performance monitor under development at ENRI. It was informed that the Electronic Navigation Research Institute (ENRI) created an algorithm for appropriately analyzing ADS-B messages, and in 2025 it has developed a performance monitor to evaluate ADS-B performance based on this algorithm. This monitor can be used to assess the current ADS-B situation in Japanese airspace and to identify erroneous aircraft that do not meet surveillance requirements.

7.11 The Meeting noted the extended functionality of the developed software for evaluating ADS-B performance. The initial development has been completed, and additional functionalities will be implemented if necessary. Future work includes enabling real-time processing capabilities in the software.

7.12 The Meeting encourages Japan to continue sharing progress and operational experience with the group, as such tools could be beneficial for supporting surveillance performance monitoring in the region.

ADS-B Equipage and Quality Performance Observed in Thailand – Thailand (IP/07)

7.13 This paper provided a brief update from SURICG/10 of observed NIC/NACp values to assess the performance quality of aircraft using ADS-B in Thailand, along with ADS-B equipage status in Thailand. Thailand informed that since September 2024, seven ADS-B ground stations have been installed and integrated into the Air Traffic Management Automation System (ATMAS) in Thailand to enhance the efficiency, flexibility, and coverage of ATS surveillance within the Bangkok Area Control Center and selected Approach Control Centers. To address concerns regarding ADS-B performance within the Bangkok FIR, the Aeronautical Radio of Thailand, AEROTHAI (Thailand's ANSP), has initiated a monitoring program to assess ADS-B quality indicators at each ADS-B station.

7.14 This paper focused on ADS-B reports (ASTERIX CAT021) collected over a one-year period in 2025 of seven ADS-B receivers, with site monitor reports excluded. ADS-B messages

encompassed positional performance indices (NIC and NACp) whose values were analyzed, but the information concerning avionics installation issues (SDA, SIL, NACv) was not used to evaluate the performance of aircraft. Thailand presented statistical results for all collected ADS-B data that indicated that the ADS-B position quality met/not meet the requirements of 14 CFR 91.227. Thailand also presented the coverage of 12 SSRs and 7 ADS-B systems within the Bangkok FIR, along with displaying the intersection coverage of SSRs and ADS-B, which were used to evaluate the number of ADS-B-equipped aircraft within the FIR.

7.15 The Meeting noted that a small percentage of aircraft did not meet performance criteria (NIC/NACp), indicating potential avionics issues. It was noted that further investigation is required to identify affected aircraft. The Meeting encouraged more detailed analysis, including methodology, and suggested engaging stakeholders to determine appropriate follow-up actions.

Update on Challenges Finding the Cause of Non-Compliant ADS-B Data and GPS Interference – New Zealand (IP/08)

7.16 New Zealand presented a brief update on the challenges of finding the cause of non-compliant ADS-B data in New Zealand. New Zealand informed that in 2025, Airways presented a paper that identified several issues in finding the cause of non-compliant ADS-B data and resolving these issues. This paper provides an update on the progress to resolve those issues, and identifies any further issues found from late July 2025 until mid-Jan 2026.

7.17 New Zealand informed that ADS-B transponder type "Y" is being detected outputting NACp, NIC, and NACv ZERO with a SIL of THREE, which is non-compliant ADS-B data under NZCAA rule 91 and cannot be used for Surveillance Separation. It was added that when the non-compliant ADS-B data occurred, an ADS-B alert was generated to controllers – either a yellow starfish RPS for targets in ADSB-only airspace or a Degraded ADSB Data (DAD) alert for aircraft in airspace covered by both ADSB and either MLAT or MSSR. New Zealand shared more detailed statistics of non-compliant ADS-B data.

7.18 It was reported that a new issue began to be seen at Auckland (NZAA) airport with some ground vehicle ADS-B emitters (Squids) in late July 2025. On Oct 17, 2025, the OEM advised they had identified a problem affecting the GPS positioning performance of the Squid, which is observed as a reduced number of visible satellites or intermittent loss of position. On Nov 5, 2025, the Squid OEM advised their software department had developed and prepared a solution. The solution was purchased by Airways and rolled out across the affected vehicles, resolving the issue.

7.19 It was also reported that as the New Zealand summer holiday season approached more reports of a loss of GPS data were received from the same commercial airspace user in the vicinity of NZAA taxiways A7 to A9, with interference now being seen on the taxi, take off roll, and touchdown phase. It was determined later that the vehicle's company was using a GPS tracker to ensure they were always aware of the position and speed of its vehicles. The company was asked to disconnect the GPS tracker from any vehicles operating at NZAA, and since this action was taken, the issue has stabilized. While the MBIE analysis pointed to the GPS tracker as the issue, it has yet to be positively proven as the actual source of interference. It is not unheard of for vehicle operators to jam GPS tracking to mitigate company monitoring. It was suggested States should consider the potential of such activity when encountering interference events. It was added that both AIAL and Airways continue to monitor the situation to ensure no further issues are detected. Contact is also being made with the GPS tracker manufacturer to see what testing they have done around impact to aviation GPS systems.

7.20 New Zealand summarized the detection of ADS-B issues such as GPS interference or jamming is often easy to detect, but difficult to determine/resolve, Airways has found that there remains reluctance by some OEMs to acknowledge issues with their equipment and to work speedily to resolve these issues, Government level organizations can struggle to effectively support the resolution of such

specific technical issues as they are often more tailored to support a wider public need. This can hinder the quick resolution of such issues in the safety critical aviation environment and lead to restrictions in operational procedure and efficiency.

Agenda Item 8: Update on surveillance activities and explore potential cooperation opportunity

a) States/Administrations

II-SI Code Implementation and Evaluation in Japan – Japan (IP/03)

8.1 This paper provided the II-SI code implementation and evaluation in Japan. It was informed that JCAB currently operates 21 en-route radars. To achieve double coverage with SSRs, JCAB planned to assign individual codes to all SSRs using a combination of II and SI codes and to conduct Mode S operations throughout the entire area under radar coverage.

8.2 It was noted that Mode S SSRs and Mode A/C SSRs are mixed because II codes cannot be assigned to all SSRs in Japan currently. Japan began manufacturing new SSRs compatible with the II-SI code in 2024 and initiated replacement in 2025 to upgrade three SSR sites—Hakone, Mikawa, and Kumejima—to II-SI-compatible SSRs.

8.3 Before SI-code deployment, validation tests are planned from 2026 to Q3 2027 to assess basic SI code function, overlaps between II-code and SI-code SSRs (Hakone and ENRI), and overlaps among SI-code SSRs (ASC and Hakone), ensuring equivalent aircraft capture and confirming lockout behavior. The results of II-SI operational validation tests will be shared as appropriate.

8.4 The Meeting noted that JCAB needs to coordinate II-SI code assignments with neighboring states. It has shared contact information and the latest status of en-route SSRs with them since last year and will continue to do so for future II-SI code allocations. Japan's latest II code assignments have been registered in the Frequency Finder, and Japan will ensure that the information registered there is continually updated to prevent any II code conflicts.

Surveillance Activities in Singapore – Singapore (IP/04)

8.5 This paper provided a summary of surveillance activities in Singapore, including radars, A-SMGCS, ADS-B, ADS-C/CPDLC and DAPS. This paper also shared the equipage requirements for ADS-B out exclusive airspace and airport surface, and ADS-B equipage, which was monitored over the past few years.

8.6 The Meeting noted that the Civil Aviation Authority of Singapore (CAAS) has two terminal radars and one long-range Radar. Each of the radars comprised primary and secondary antennae. All three radars are Mode S radars. Currently, all three radars are using II codes. CAAS is planning to replace the long-range Radar and one of the terminal radars by 2029/2030. CAAS will take the opportunity of the replacement to migrate from II to SI codes for these two radars.

8.7 Singapore also shared details of A-SMGCS, ADS-B, ADS-C, CPDLC, and Mode S Downlinked Aircraft Parameters (DAPS).

8.8 Singapore informed that with the implementation of ADS-B services along selected ATS routes in the Singapore FIR, reduced longitudinal separation is applied in conjunction with Direct Controller Pilot Communication (DCPC)/VHF capabilities. In addition, as Changi Airport is using the surface MLAT system, aircraft operating at Changi Airport must be equipped with Mode S transponders. The Meeting noted that in Singapore, DO-260B aircraft continued to increase as old aircraft with DO-260 or DO-260A were being replaced with new aircraft equipped with DO-260 B.

8.9 The Meeting discussed the implementation status of Singapore's A-SMGCS Level 4 System. Singapore shared that the "follow-the-green" operations is currently under night time trial with the aim to operationalise in a year. Once the night trial is successfully completed, it will be followed by the day trials to address the day time lighting and operational challenges.

Update on Surveillance Status in China – China (IP/05)

8.10 This paper updated the status of surveillance sensors as of the end of 2025 in China, as well as the construction of sensors in 2025, including the progress of the Surveillance Radar, ADS-B, SMR, MLAT, and WAM. The Meeting noted that the Guangzhou WAM System is deployed with remote stations at the airport and surrounding areas to enable real-time reception and processing of signals from aerial targets in the approach airspace, meeting surveillance requirements such as target positioning and tracking. Construction of the system began in 2025. In early 2026, the system successfully completed its flight inspection, and all parameters were verified to comply with industry standards. The system is scheduled to become fully operational in 2027.

8.11 The Meeting inquired about plans to introduce space-based surveillance solutions. China responded that, given its comprehensive ground-based surveillance coverage, there are currently no clear plans to introduce space-based solutions in its surveillance system.

A Method for Azimuth and Range Monitoring and Calibration of Secondary Surveillance Radar System – China (IP/06)

8.12 During the operation of a Secondary Surveillance Radar (SSR), parameter drift deviating from the initial calibration values and cumulative increase of measurement errors may occur due to equipment aging, environmental changes and other factors. To ensure the measurement accuracy and operational reliability of SSR, CAAC has researched and formulated the Technical Guidance Material for Azimuth and Range Monitoring and Calibration of Secondary Surveillance Radar Systems in the Civil Aviation ATM System.

8.13 This paper introduced the method for radar azimuth and range monitoring in detail, including Monitoring Methods and Calibration Methods.

8.14 The Meeting discussed the potential inclusion of this method in the Mode S IGD document. China indicated that the method is still not sufficiently mature, and expressed its willingness to continue further study and provide updates at future meetings before considering its inclusion as guidance in the IGD. **ACTION ITEM 11-4**

Update on New Zealand Surveillance Status – New Zealand (IP/09)

8.15 New Zealand provided an update on the surveillance activities in New Zealand in 2026. It was reported that from Dec 31st, 2022, New Zealand's surveillance structure has been based on ADS-B as the primary surveillance source with twenty-seven terrestrial sites providing full coverage of controlled airspace. 4 MSSRs (1 new / 3 old), and an MLAT system, provide contingency cooperative surveillance back-up, and 2 PSRs (1 new / 1 old) provide a non-cooperative service where required. ADS-B, as New Zealand's primary surveillance source, is mandated in all controlled airspace within the NZZC FIR. Twenty-seven terrestrial sites provide country-wide coverage of controlled airspace and a significant amount of uncontrolled airspace. It was added that the high uptake of ADS-B In is seen as significant in improving safety, especially for VFR GA traffic.

8.16 The Meeting was informed that there are 3 MSSRs and 1 PSR, which are all 30-plus years old and at the end of their operational life. The purchase of spares to keep these systems running remains extremely difficult. A decision on either replacing or removing the MSSRs is yet to be made. In addition, the Wide Area Multilateration (WAM) system, used for approach and en route in the lower

South Island, and the Multilateration (MLAT) system used for surface movements at Auckland, are both 16 years old and nearing the end of their lives. Replacement systems are being considered. An ATS Surveillance OPS concept document has been developed, and consultation is ongoing with Airlines and Aerodrome operators to identify the preferred option.

8.17 It was noted that New Zealand regulatory requirements require ADS-B surveillance to be backed up by a non-GNSS contingency surveillance system covering the main trunk Jet routes between Auckland (NZAA) - Christchurch (NZCH) - Wellington (NZWN) - Auckland. Additionally, consideration should be given to the use of PSR for airports that have what is termed "dense complex airspace" (i.e., airspace with over 100,000 RPT movements a year). Three new combined MSSR/PSR3D systems at NZCH, NZAA, and NZWN are being installed to cover the regulatory requirements, with the first of the 3 installed in NZCH in late 2023 becoming operational in November 2025.

8.18 For the remaining two contingency sites, the old SSR/PSR at Wellington (Hawkins Hill) has been removed and a new MSSR/PSR3D installed, the radar is currently undergoing optimization testing prior to final acceptance testing occurring, the SSR at Auckland (Ruaotewhenua) was withdrawn from service in Feb 2025 and a new MSSR/PSR3D installed, the Auckland radar is about to commence SAT testing prior to optimization and final acceptance testing.

8.19 It was added that the Other Projects related to surveillance include New Zealand's continued work with Australia on the introduction of a Satellite-based augmentation system (SBAS) called the Southern Positioning Augmentation Network (SouthPan). This fully certified "Safety of Life system" is programmed to go-live in 2028 south of 20 degrees South. Coverage north of 20 degrees South is limited to LNAV-only due to ionospheric activity.

Use of ADS-B Only Data for Surface Situational Awareness to Reduce the Risk of Runway Incursions and Provide a More Efficient ATC Service- New Zealand (IP/10)

8.20 This paper looked at Airways of ADS-B data only to provide Surface Situational Awareness for use within the Air Traffic Management Automation System (ATMAS), achieving a safe, viable economic solution where the use of an "Advanced Surface Movement Guidance and Control System" (A-SMGCS) is not justified.

8.21 It was noted that the introduction of ADS-B as New Zealand's primary surveillance system on Dec 31, 2022, allowed Airways to provide a similar ground surveillance service at other International or Domestic airports within the New Zealand NZZC FIR, but using ADS-B data only. ADS-B-based ground surveillance provides an effective surface situational awareness at airports without the cost and complexity of employing more expensive surveillance systems, or A-SMGCS.

8.22 New Zealand shared their learnings from regulatory guidance, regulatory support, safety case, cost, ATMAS modification, training, and regulatory sign-off.

8.23 New Zealand concluded that the use of ADS-B-only surveillance data has proven in New Zealand to be a cost-effective and simple way of providing a Surface Situational Awareness service equivalent to that of a Level 1 A-SMGCS surveillance system. Depending on airport needs and the accompanying business/safety assessments, the capability shown in New Zealand indicates that a current ATMAS can be updated locally to fulfill A-SMGCS guidance Levels 1–4 without the need for additional support systems. International documentation on airport vehicle equipment and regulatory standards is lacking and should be reviewed.

8.24 The Meeting discussed the use of ADS-B for surface surveillance, noting that unique 24-bit addresses are assigned to operational vehicles and that ADS-B is used as the primary surveillance source in some cases, with supporting alerting mechanisms for non-compliant targets.

8.25 It was also noted that challenges remain, including data accuracy considerations, reliance on transponder performance, and the absence of clear international standards for vehicle equipage. The Meeting highlighted a regulatory gap regarding ADS-B requirements for vehicles, and noted that this issue may warrant further consideration at the global level.

Implementation of ADS-B TIER 1 Operations below FL290 within the Surveillance Airspace of Colombo FIR- Sri Lanka (IP/11)

8.26 Sri Lanka provided an update on the implementation of ADS-B Tier 1 operations below FL290 within the surveillance airspace of Colombo FIR. Since 2020, ADS-B technology has been used for surveillance separation between FL290 and FL460 in Colombo FIR. Sri Lanka informed it is now advancing to the next phase, extending ADS-B Tier 1 operations to lower altitudes (below FL290), in line with ICAO's "Best Equipped, Best Served" approach.

8.27 Sri Lanka shared details on the current status, including regulatory guidance, background, the ATMAS environment, trial operations, safety assessments, and training. It was noted that the ADS-B system has established a solid foundation for the progressive extension. The ATM systems can process and display ADS-B aircraft data. Trial operations are underway and are expected to be completed by March 2026. Safety assessments and training protocols are being prepared.

8.28 The Meeting noted ADS-B in Sri Lanka is now intended to be used, not simply as supplementary data, but rather as a cost-effective full redundancy for the Radar and as a primary means of surveillance for Tier 1 operations below FL290, by extending its current use above FL290.

b) Updates from ICAO Surveillance Panel, Standards Making Organization

Surveillance Panel Update – ICAO Surveillance Panel (WP/07)

8.29 This paper provided an overview of the recent and upcoming activities of the ICAO Surveillance Panel (SP). It was informed that the work programme and activities of the ICAO Surveillance Panel (SP) are divided into two Working Groups: the Aeronautical Surveillance Working Group (SP-ASWG) and the Airborne Surveillance Working Group (SP-AIRBWG).

8.30 The Meeting noted that in response to the ICAO job card SP.008.03 "Ensure the performance of surveillance systems", task 5 "Develop measurable technical performance specifications for surveillance systems and update information on ADS-B versions 1 and 2 as well as WAM definitions included in Cir 326", the SP created a Performance-Based Surveillance Sub-Group (PBSSG). The PBSSG is charged with developing new guidance material containing performance-based surveillance requirements, including updated materials that would replace ICAO Cir 326, which is now outdated. In September 2023, at the Fifth Meeting of the SP, a major revision of this draft Manual was provided to SP by PBSSG for review and comment. The PBSSG continued to work to finalize the draft Manual. A discussion was held at the recent SP-ASWG held in Montreal from 9 – 12 March 2026 where the Surveillance Performance Requirements Manual (formerly known as RSUR) was presented and agreed to. Subsequently, this manual was presented and adopted as part of the 6th Meeting of the SP held on 13 March 2026. The document will now undergo ICAO processes to address and resolve (if necessary) any issues with other panels, be assigned a document number, and proceed to publication.

8.31 It was informed that since the last SURICG meeting, each of the Surveillance Panel's Working Groups has held two meetings. The Twentieth Meeting of the Airborne Surveillance Working Group (AIRBWG) and the Twenty-second Meeting of the Aeronautical Surveillance Working Group (ASWG) were held as consecutive hybrid meetings in Nairobi, Kenya. AIRBWG/20 was held from 12 to 14 November 2025; ASWG/22 was held from 17 to 21 November 2025. The Twenty-first Meeting of the Airborne Surveillance Working Group (AIRBWG) and the Twenty-third Meeting of the Aeronautical Surveillance Working Group (ASWG) were held as consecutive meetings in Montreal at

ICAO Headquarters. AIRBWG/21 was held from 4 to 6 March 2026; ASWG/23 was held from 9 to 13 March 2026.

8.32 In addition, during the 6th Meeting of the SP, Mr. Stuart McKay was elected as Chairperson of the Surveillance Panel and Mr. Alejandro "Alex" Rodriguez was elected as Vice-chair of the Surveillance Panel). The 6th meeting brought forward the final revisions to several change proposals and proposed amendments to ICAO Standards and Recommended Practices (SARPs) to further clarify or complement what was previously approved under the 5th Meeting of the Surveillance Panel.

8.33 The SP Working Group timeline for the next Panel meeting was shared with the Meeting.

8.34 The Meeting inquired about the expected timeline for publication of the Surveillance Performance Requirements Manual. It was noted that, while efforts are being made to expedite the process, the timeline remains subject to ICAO procedures, and no specific date could be confirmed.

8.35 The Meeting also inquired about the consideration of non-cooperative sensors for separation under PBSSG. It was noted that, although the topic has been discussed, it is outside the scope of the current edition of the manual, which focuses on updates such as reduced separation minima (e.g. 3 NM en-route and 5 NM terminal).

c) Aircraft Manufacturers and Avionics Suppliers

8.36 There is no paper under this sub-Agenda Item.

Agenda Item 9: New and Innovative Technologies in Surveillance

9.1 The Meeting noted that no papers had been submitted under Agenda Item 9 on new and innovative surveillance technologies since its introduction. The Co-Chair indicated plans to engage industry, including vendors and relevant ICAO panels, to provide inputs and presentations on emerging technologies for future meetings. States were encouraged to submit papers and share developments. The United States expressed interest in presenting national initiatives and new surveillance applications at the next meeting. **ACTION ITEM 11-5**

Agenda Item 10: Review MODE S DAPs Implementation and Operations Guidance Document

10.1 There is no paper under this Agenda Item.

Agenda Item 11: Review ADS-B Implementation and Operations Guidance Document (AIGD)

11.1 There is no paper under this Agenda Item.

Agenda Item 12: Review of the Terms of Reference (ToR) and the Action Items

Review ToR and Action Items – Sec (WP/08)

12.1 SURICG/8 endorsed a revised version of the ToR of SURICG and further adopted in CNS SG/27 through Decision CNS SG/27/12 - Revised ToR of Surveillance Implementation Coordination Group to reflect the change due to the dissolution of Mode S and DAPs. The SURCIG/11 Meeting reviewed the ToR and considered that there was no need to modify it. The consolidated action items of SURICG, including action items transferred from SURSG to SURICG, were reviewed and

updated at the Meeting. The updated action items of SURICG are provided in **Appendix G** of this report.

Agenda Item 13: Next Meetings & Any Other Business

Update on SSR module of Frequency Finder Tool– Sec (WP/09)

13.1 This paper presented the latest work, enhancements and functionalities brought to the Frequency Finder tool to assist ICAO Regional Offices and States to manage and coordinate aeronautical frequency assignments as well as SSR Mode S II/SI codes.

13.2 The Meeting was informed that an IT audit was conducted to implement security improvements to the FF Server (frequency.icao.int). As a result, the central database became inaccessible from outside until the FF Server upgrades were completed. After the upgrade, the main download and export/import module scripts were updated to align with the latest server enhancements. Regarding SSR RT versions, after completing work on the VHF-COM module, two standalone NAV and SSR modules will be provided to States. It was recommended to continue using the current module versions offline, and for NAV and SSR assignment requests, to continue contacting the Regional officer.

13.3 The Meeting noted that with the rise of new CNS technologies, such as space-based VHF, and the increasing complexity of frequency planning, the FF application requires a significant upgrade to meet modern demands. The modernization project comprises four phases: VHF-communication systems module, Navigation systems module, Surveillance module, and improvements to Frequency Finder, along with common modernizations across all phases, including cyber resilience, enhanced data presentation, real-time visualization, and platform transition.

13.4 The Meeting discussed the status of the Frequency Finder tool, noting that it is undergoing system upgrades, with some modules already available online while others remain offline. It was noted that the tool continues to be used by States for frequency coordination, as well as II/SI code coordination in the APAC region, and members were encouraged to utilize the tool extensively, discuss any pertinent matters, and provide feedback. It was also noted that the user manual of FF tools is available on the ICAO FSMP public webpage.

Date and Venue for the Next Meeting

13.5 The Meeting considered that the next SURICG meeting would be held for 3 days, tentatively planned for ***31 March – 2 April 2027***. Any States/Administrations interested in hosting the Meeting may contact the ICAO APAC Office at least 4 months before the Meeting. The exact dates and venue will be communicated to the Member States in due course.

Closing of the Meeting

13.6 On behalf of the Group, Mr. Chanyut Phrukkumwong, Expert, Senior Director Level, AeroThai, Co-Chair of SURICG, expressed thankfulness to the ICAO APAC Regional Office, Co-Chair, and all participants from Member States/Administrations for their significant contributions in making the meeting a successful and fruitful one.

13.7 The ICAO Secretariat also conveyed its sincere appreciation to the Co-Chairs and all participants for their strong technical engagement and continued cooperation.

ICAO CAPACITY & EFFICIENCY

Guidance Material for Business Functionality of APAC Common SWIM Information Services

Developed by: SWIM Task Force (Task 6)

Purpose

- This Guidance Material has been developed to assist relevant APANPIRG Subsidiary Groups (e.g. MET/IE, SURICG, AAITF, FF-ICE Ad Hoc Group, ATFM SG) in specifying the relevant information associated with the high-level definition of planned APAC Common SWIM Information Services
  - Version 1 of the APAC Common SWIM Information Services has recently been published on the ICAO APAC eDocs site as per Decision APANPIRG/36/11:

    https://www.icao.int/sites/default/files/APAC/Documents/edocs/CNS/APAC-Common-SWIM-Information-Services.pdf
  - The purpose of list of APAC Common SWIM Information Services (including associated priorities) is to provide States/Administrations with **guidance on anticipated services** to **support their planning and implementation** of SWIM
    - Listed Information Services are expected to be at different levels of maturity, i.e. are not expected to be fully matured prior to being added to the list as an indicative roadmap for the Information Service
    - It is not intended to be overly prescriptive
      - This information will be captured in the Information Service Definitions (ISD)

Version Maintenance

- The latest published version of the Common APAC SWIM Information Services is available on the ICAO APAC eDocs site (CNS section)
- Between published versions, SWIM TF maintains an updated working version of Information Services to capture inputs from the APANPIRG Subsidiary Groups as they occur
  - APANPIRG Subsidiary Groups are recommended to regularly review/update the APAC Common SWIM Information Services document each time they meet, and to provide updates to SWIM TF as necessary to maintain the currency of the list relevant to their information domain (e.g. Aeronautical Information, Flight information, Meteorological information)
  - Between published versions, SWIM TF will update the working list at SWIM TF meetings based on inputs from Subsidiary Groups
    - The latest working version will be available following finalisation of each SWIM TF Report

Categories

- The Categories associated with the Business Functionality of APAC Common SWIM Information Services are:
  - Business Functionality of the information service
  - Brief description of the service
  - Type of information to be exchanged
  - Information exchange model / Message type
  - Message exchange pattern
  - Priority
- Guidance on each Category is provided in the following slides

Business functionality of the information service

Business functionality of the information service	Brief description of the service	Type of information to be exchanged	Information exchange model / Message type	Message exchange pattern	Priority (1) / (2) / (3)

- **What the Information Service is called**
  - **Wherever possible**, this should **align with Information Services that are being implemented globally,** defining APAC regional variations only where needed
    - e.g. FF-ICE filing service
  - It may be prudent (even advisable) to define **different information services** where the **same information** is provided in the payload, but which may serve a **different business need** (i.e. be utilised by different consumers of the information services at a different rate or have a different Quality of Service)
    - E.g. An information service providing surveillance data to support the provision of aircraft separation could be expected to be defined separately to an information service providing surveillance data to support ATFM purposes, as the business usage differs between the two information services

Brief description of the service (1)

Business functionality of the information service	Brief description of the service	Type of information to be exchanged	Information exchange model / Message type	Message exchange pattern	Priority (1) / (2) / (3)

- **Plain text description of the information service**
  - Includes **Intended usage** of the information service
    - Includes indication (where relevant) of the intended service consumers and/or associated business need
  - Includes **Identification of** (and link to) the **latest reference document** (where one exists)
    - Provides insight/clarity on how the intended information service is aligning with global or regional concepts/implementations
      - E.g. For FF-ICE filing service, **ICAO Doc 9965 (Manual on FF-ICE)**
      - E.g. for Surveillance data only sharing service, **Guidance Materials for the sharing of surveillance data in SWIM** developed by SURSG
    - As maturity increases over time, the document reference will change
      - **Goal** is to reference the relevant Information Service Description (ISD) once developed

Brief description of the service (2)

Business functionality of the information service	Brief description of the service	Type of information to be exchanged	Information exchange model / Message type	Message exchange pattern	Priority (1) / (2) / (3)

- **Plain text description of the information service**
  - The description of the information service should include proposed timeframe for implementation
    - Note: proposed implementation timing may be moved to a separate column in a future update of the table
  - The description of the information service should ***not*** include:
    - Proposed timeframe for implementation (this is proposed to be captured in a future update to the table)
    - Reference to the Information Exchange Model (e.g. FIXM)
    - Information to be exchanged (captured in the “information to be exchanged” column)

Type of information to be exchanged

Business functionality of the information service	Brief description of the service	Type of information to be exchanged	Information exchange model / Message type	Message exchange pattern	Priority (1) / (2) / (3)

- **The information that will be exchanged as part of the information service**
  - Describes the information in general terms only (rather than individual data elements)
    - E.g. Surveillance data with DAPs, Basic flight plan information (without trajectory), etc.
  - The ISD (once developed) will specify all mandatory and optional fields
    - Subsidiary groups may need to separately develop this additional granularity if the information service has not already been defined elsewhere
  - Timeframes for transitioning information types should not be included

Information exchange model / message type

Business functionality of the information service	Brief description of the service	Type of information to be exchanged	Information exchange model / Message type	Message exchange pattern	Priority (1) / (2) / (3)

- **The information exchange model (or message type) employed by the payload of the information service**
  - Identifies standard Exchange Models (FIXM, IWXXM, AIXM)
    - E.g. (FIXM, IWXXM, AIXM)
  - Where the content within the payload comes from another message type or data format, this can be identified
    - E.g. Surveillance data: JSON or RAW (derived from ASTERIX Cat 21)
  - Version / associated extensions of the Exchange Model is not required
  - If not yet known or confirmed, “TBD” is acceptable

Message exchange pattern (1)

Business functionality of the information service	Brief description of the service	Type of information to be exchanged	Information exchange model / Message type	Message exchange pattern	Priority (1) / (2) / (3)

- **The type of information that will be exchanged as part of the information service**
  - **At least one of**:
    - Request/Reply (**Req/Rep**), **including type if known** (see additional information on following slides)
      - Synchronous Request/Reply (**Sync R/R**)
      - Asynchronous Request/Reply (**Async R/R**)
    - Fire and Forget (**One-way**)
    - Publish/Subscribe (**Pub/Sub**)
  - If multiple MEPs are possible, identify which are mandatory or optional
    - E.g. Pub/Sub and Sync R/R
    - E.g. Req/Rep (mand), Req/Rep (opt), etc.
  - **"TBD" to be used where MEP is not yet known**

Fire and Forget vs. Publish / Subscribe

Business functionality of the information service	Brief description of the service	Type of information to be exchanged	Information exchange model / Message type	Message exchange pattern	Priority (1) / (2) / (3)

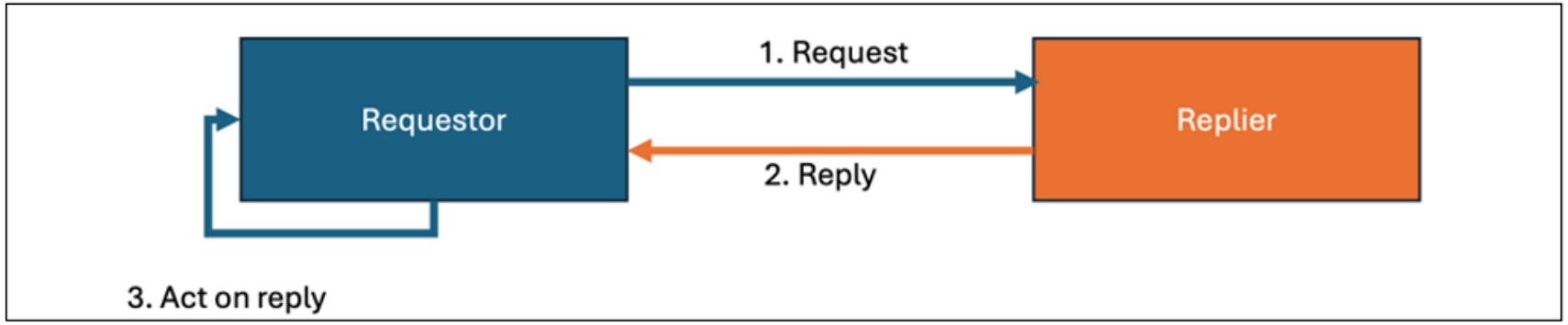
From the ICAO Manual on the SWIM Implementation (Doc 10203):

- For the **One-way ("Fire and Forget") MEP**, *the consumer initiates a message to an information service without expecting any response from the information service. This MEP is particularly useful at the lower application layer, where immediate message responses are not required*;
- For the **Publish/Subscribe MEP**, *the consumer initiates a subscription request to an information service. The subscription may be capable of providing details (such as through a filtering parameter) on the information being subscribed*
- The P/S MEP can be either a 'push' or a 'pull' mechanism:
  - For the 'push' mechanism, this requires that the consumer can receive messages at any time, and is not restricted from completing other operations while waiting for the Information Service to respond
  - For the 'pull' mechanism, this requires the Information Service to keep necessary updates available to the consumer, and that the consumer sends requests to the information service to receive the updates

Synchronous Request-Reply

Business functionality of the information service	Brief description of the service	Type of information to be exchanged	Information exchange model / Message type	Message exchange pattern	Priority (1) / (2) / (3)

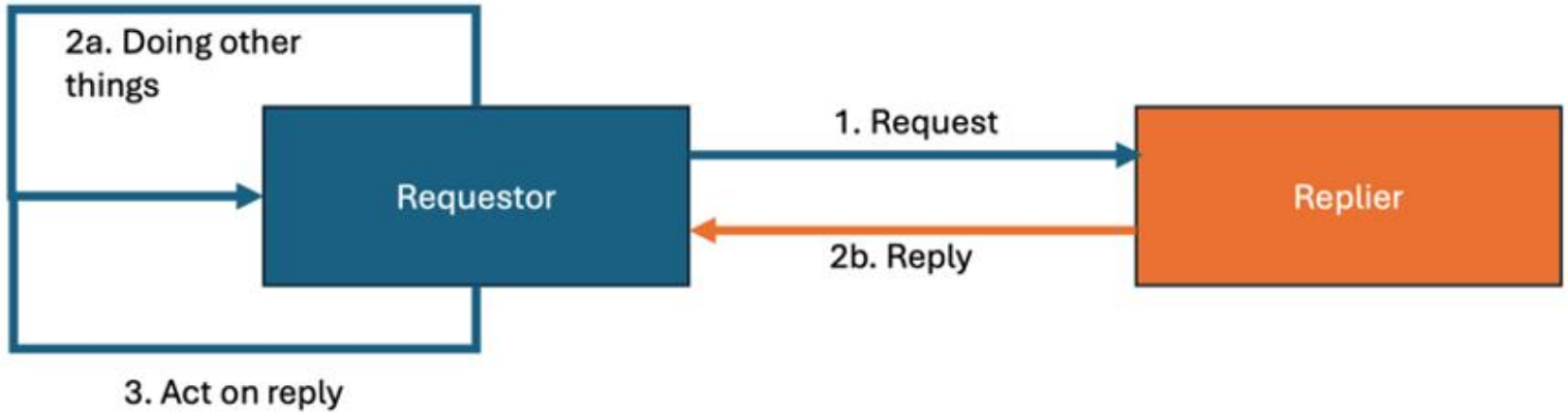
In Doc. 10203, **synchronous** R/R MEP is defined as – *The consumer initiates a request to an information service; the service processes the request and generates a reply to the consumer. The consumer waits for the information service to provide a response. During this waiting period, the consumer cannot send or receive any other requests or responses. This pattern is specifically applicable to information services that can quickly execute and respond to consumer requests*



Asynchronous Request-Reply

Business functionality of the information service	Brief description of the service	Type of information to be exchanged	Information exchange model / Message type	Message exchange pattern	Priority (1) / (2) / (3)

In Doc. 10203, **asynchronous** R/R MEP is defined as – *The consumer initiates a request to an information service; the service processes the request and generates a reply to the consumer. However, the consumer is not restricted from performing other operations while waiting for the information service's response. This MEP requires that the consumer be able to receive messages at any time and correlate them with prior requests*



Synchronous vs. Asynchronous Request-Reply

Business functionality of the information service	Brief description of the service	Type of information to be exchanged	Information exchange model / Message type	Message exchange pattern	Priority (1) / (2) / (3)

Index	Synchronous	Asynchronous
Time Coupling	Both requester and replier are available at the same time.	Requester sends a request and continues its process; replier can send the response later when available.
Space Coupling	Requester needs to know the exact service endpoint (protocol, address, API).	Requester sends to a known endpoint, but response may arrive via callback, polling, or correlation ID; looser coupling in response handling.
Reliability Handling	Retries and error handling happen at requestor side.	Retries and correlation of delayed responses must be managed at the requester side (e.g., matching reply with original request).
Use Cases	• Low latency expected • Both parties are available • Immediate response interaction	• Replier may not be immediate • Deferred or background processing acceptable
Typical Scenarios	• User Authentication • User Interface Interactions • Database Read and Immediate Write	• Order processing with delayed confirmation • Flight plan filing with later validation • Weather data request with queued response • Batch data processing

- Additional guidance can be found in "**Draft Guidance Material REQ REP MEP in Asia**" provided as **Appendix C** to the Working Paper

- If in doubt:
  - Specify Req/Rep only
  - Leave as TBD

Priority (1) / (2) / (3)

Business functionality of the information service	Brief description of the service	Type of information to be exchanged	Information exchange model / Message type	Message exchange pattern	Priority (1) / (2) / (3)

- **Either 1, 2 or 3 as determined by:**
  - Priority (1): Recommended for region-wide implementation for region-wide benefits
  - Priority (2): Recommended for implementation as much as practicable
  - Priority (3): Additional information services without common regional requirements and not included as a part of common regional information services

- *Note: It has been proposed to separate applicability (region-wide vs. as needed by a subset of States) and desired timeframe into separate columns, however any change to table columns will be formally communicated to Subsidiary Groups separately*

Example update

Note: this is not an actual update, it has been provided to indicate *potential* updates to FF-ICE Common APAC SWIM Information Services content that would align with this Guidance Material

Example – FF-ICE Information Services - Current

Business functionality of the information service	Brief description of the service	Type of information to be exchanged	Information exchange model / Message type	Message exchange pattern	Priority (1) / (2) / (3)
APAC Common SWIM Flight Information Services					
GUFI service	GUFI (Globally Unique Flight Identifier) generation and provision	GUFI	FIXM	Req/Reply	1
FF-ICE filing service	Provides a means to submit, update or cancel flight plans through a SWIM-based interface using FIXM.	Flight plan for registration, update or cancellation	FIXM	Req/Reply Pub/Sub	1
FF-ICE publication service	Provides harmonised sharing of flight plan information in a global standard supporting common situation awareness.	Flight information for publication	FIXM	Pub/Sub	2
FF-ICE trial service	Allows operators to test the effect of a potential change in a flight plan prior to committing to the change.	Proposed changes in a flight plan	FIXM	Req/Reply	2
FF-ICE flight data request service	Allows an operator to request the current status of a flight plan, or an ANSP can request an operator to submit the latest version of their flight plan.	Current status of a flight plan, a copy of flight plan or supplementary plan	FIXM	Req/Reply	1
FF-ICE notification service	Provides notification of a change in flight state, such as Departure (DEP) and Arrival (ARR) Air Traffic Service (ATS) messages.	ARR, DEP messages	FIXM	Req/Reply Pub/Sub	1
FF-ICE planning service	Allows operators to submit preliminary flight plans for early Air Traffic Flow Management (ATFM) planning and to obtain feedback regarding restrictions/constraints affecting the flight.	Preliminary flight plan for early ATFM planning	FIXM	Req/Reply Pub/Sub	2

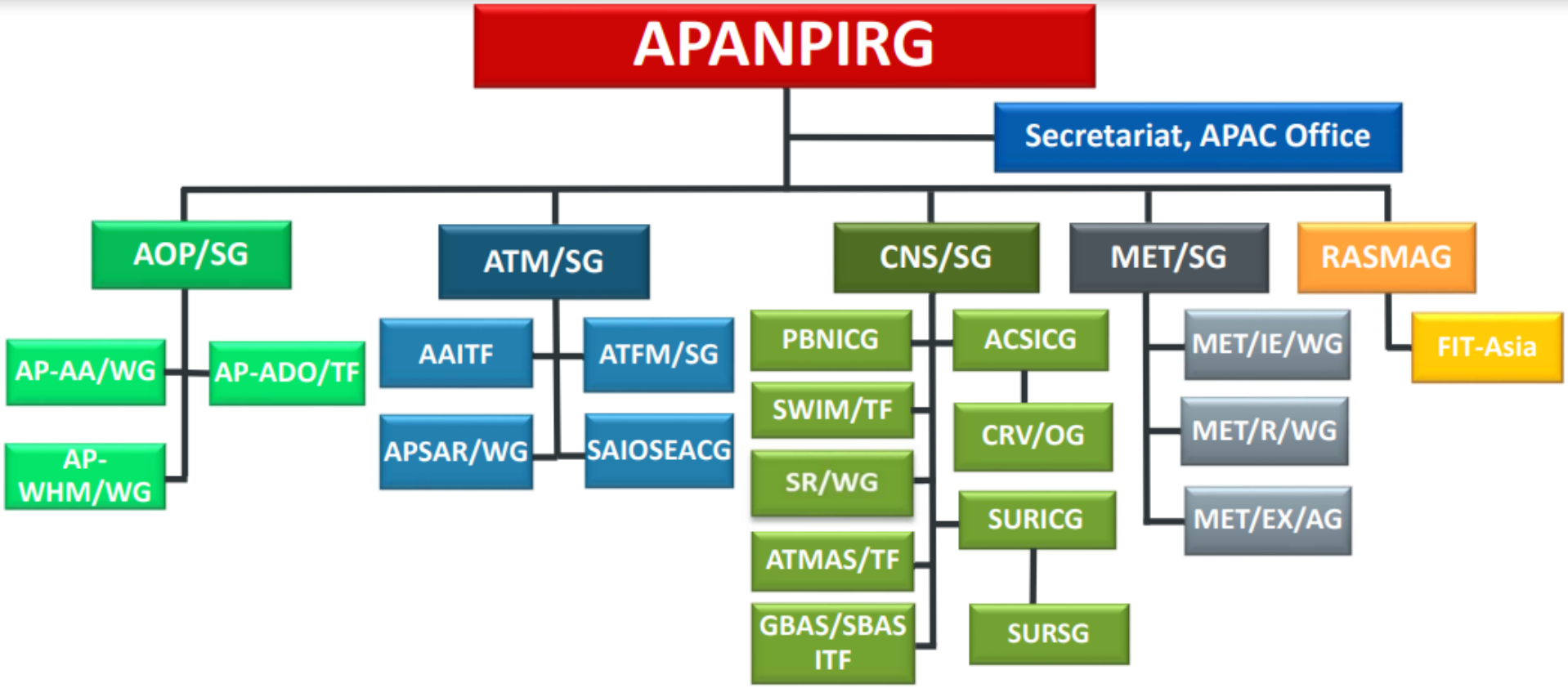
Example – FF-ICE Information Services – *Potential* updates

Business functionality of the information service	Brief description of the service	Type of information to be exchanged	Information exchange model / Message type	Message exchange pattern	Priority (1) / (2) / (3)
FF-ICE filing service	Provides a means for Airspace Users to submit, update or cancel flight plans ~~through a SWIM based interface using FIXM.~~ Reference: ICAO Doc 9965 (Manual on FF-ICE) Target Implementation timeframe 2034	Full ~~F~~flight plan with trajectory~~for registration, update or cancellation~~	FIXM	~~Req/Reply~~ Async R/R and Pub/Sub	1
FF-ICE publication service	Provides ~~harmonised sharing of~~ flight plan information in a ~~global~~ standard format supporting common situation awareness. Reference: ICAO Doc 9965 (Manual on FF-ICE)	~~Flight information for publication~~Full Flight Plan with trajectory (latest agreed)	FIXM	Pub/Sub	2
FF-ICE trial service	Allows operators to test the effect of a potential change in a flight plan prior to committing to the change. Reference: ICAO Doc 9965 (Manual on FF-ICE)	Proposed changes in a flight plan	FIXM	~~Req/Reply~~ Sync R/R and Async R/R	2
FF-ICE flight data request service	Allows an operator to request the current status of a flight plan, or an ANSP can request an operator to submit the latest version of their flight plan. Reference: ICAO Doc 9965 (Manual on FF-ICE) Target Implementation timeframe 2034	Current status of a flight plan, ~~or~~a copy of full flight plan, or supplementary plan	FIXM	~~Req/Reply~~ Sync R/R and Async R/R	1
FF-ICE notification service	Provides notification of a change in flight state, such as Departure (DEP) and Arrival (ARR) Air Traffic Service (ATS) messages. Reference: ICAO Doc 9965 (Manual on FF-ICE)	~~ARR, DEP messages~~Movement information (e.g. ARR, DEP)	FIXM	~~Req/Reply~~ Pub/Sub and Sync R/R and Async R/R	1
FF-ICE planning service	Allows operators to submit preliminary flight plans for early Air Traffic Flow Management (ATFM) planning and to obtain feedback regarding restrictions/constraints affecting the flight. Reference: ICAO Doc 9965 (Manual on FF-ICE)	Preliminary full flight plan with trajectory ~~for early ATFM planning~~	FIXM	~~Req/Reply~~ Async R/R and Pub/Sub	2

Further Improvements?

- **SWIM TF is open to improving usability/clarity of information within the table of APAC Common SWIM Information Services prior to publishing the next version**
  - E.g. it is proposed to replace “Priority” column with:
    - Applicability: region-wide (to achieve anticipated benefits) vs. as needed (to meet local needs), and
    - Desired implementation timeframe (e.g. immediate (before 2030), medium (2030-2035), longer term)
  - Subsidiary Groups are invited to provide any other suggestions to improve the table prior to SWIM TF/11 to enable any changes to be effected at the same time
    - Thank you in advance for any recommendations!

Reference



AOP/SG	-	Aerodrome Operations and Planning Sub Group
AP-AA/WG	-	APAC Aerodrome Assistance Working Group
AP-ADO/TF	-	APAC Aerodrome Design and Operations Task Force
AP-WHM/WG	-	APAC Wildlife Hazard Management Working Group

ATM/SG	-	ATM Sub Group
AAITF	-	AIS - AIM Implementation Task Force
APSAR/WG	-	APAC Search and Rescue Working Group
ATFM/SG	-	ATFM Steering Group
SAIOSEACG	-	South Asia Indian Ocean and South East Asia ATM Coordination Group

CNS/SG	-	CNS Sub Group
PBNICG	-	PBN Implementation Coordination Group
SWIM/TF	-	System-Wide Information Management Task Force
SR/WG	-	Spectrum Review Working Group
ATMAS/TF	-	ATM Automation System Task Force
GBAS/SBAS ITF	-	GBAS/SBAS Implementation Task Force
ACSICG	-	Aeronautical Communication Services Implementation Coordination Group
• CRV/OG	-	Common Regional Virtual Private Network (VPN) Operations Group
SURICG	-	Surveillance Implementation Coordination Group
• SURSG	-	Surveillance Study Group

MET/SG	-	Meteorology Sub Group
MET/IE/WG	-	Meteorological Information Exchange Working Group
MET/R/WG	-	Meteorological Requirements Working Group
MET/EX/AG	-	Meteorological Exercises Advisory Group

RASMAG	-	Regional Airspace Safety Monitoring Advisory Group
• FIT-ASIA	-	FANS Interoperability Team-Asia

Business Functionality of APAC Common SWIM Information Services
(Updated by ~~XXXX~~SURICG/11)

Draft Second Version (xx 2026)

Purpose.– This list of APAC Common SWIM Information Services, including associated priorities, provides States/Administrations with guidance on anticipated services to support their planning and implementation of SWIM.

Notes.– Priority of Recommended Services in Initial APAC Common SWIM Information Service (IS) ((1)/(2)/(3)):

- Priority (1): Recommended for region-wide implementation for region-wide benefits
- Priority (2): Recommended for implementation as much as practicable
- Priority (3): Additional information services without common regional requirements and not included as a part of common regional information services

Business functionality of the information service	Brief description of the service	Type of information to be exchanged	Information exchange model / Message type	Message exchange pattern	Priority (1) / (2) / (3)
APAC Common SWIM Aeronautical Information Services					
Airspace management service	Exchanges of airspace status information between ASM Support System and Air Traffic Control (ATC) System. The sharing of airspace availability and airspace structure in real-time will contribute to a more efficient execution of the flight as information impacting the trajectory will be exchanged.	Availability or activation/deactivation or temporarily change of airspace, restricted area, danger area, search and rescue regions	AIXM	Pub/Sub or Req Reply	2
Airspace feature service	Provides the characteristics of the three-dimensional airspace, described as horizontal projection with vertical limits, and their relevance to air traffic.	FIR/UIR boundaries, waypoints, enroute ATS routes, SIDs and STARs, navaids, procedures, and other airspace not limited to restricted area, prohibited area, danger area, search and rescue regions	AIXM	Pub/Sub or Req Reply	2

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Commented [A1]: If proposing updates to the table, please identify the group proposing the changes - e.g. SUR SG)

Business functionality of the information service	Brief description of the service	Type of information to be exchanged	Information exchange model / Message type	Message exchange pattern	Priority (1) / (2) / (3)
		(Remarks – Other data published in the AIP may be included)			
Aerodrome feature service	Provides current and/or planned airport layout features, such as aerodrome mapping data, runway, taxiway, passenger facilities.	Runways, movement areas, aerodrome services, navaids, instrument landing systems, Aerodrome location, communication facilities (frequencies)	AIXM	Pub/Sub or Req Reply	2
Runway Condition Report service	Provides runway surface conditions and contaminants (least to most slippery) that are directly correlated to aircraft take-off and landing performance.	Global Reporting Format (GRF) for runway surface conditions	AIXM	Pub/Sub or Req/Reply	2
Digital NOTAM distribution service	Provides aeronautical information in accordance with the Digital NOTAM Specification, such as runway closure.	Digital NOTAM (e.g. Special activity airspace (SAA) NOTAMs, or other types of NOTAMs)	AIXM	Pub/Sub or Req Reply	2
ATIS distribution service	Provides continuous and automated broadcast of recorded aeronautical information in airport and terminal areas.	Current weather conditions, runway in use, available approaches, and other data relevant to arriving and departing aircraft, specific ATC procedures, and any airport construction activity that could affect taxi planning	TBD	Pub/Sub	3
Search and rescue service	Allows Rescue Coordination Centres (RCCs) to exchange information with neighbouring RCCs and ATS units for coordination during SAR operations.	Search and rescue regions, Registered aircraft operator details and contacts, ICAO Autonomous Distress Tracking (ADT) data, Location of Aircraft in Distress Repository (LADR) data, ICAO OPS CTRL database contact information, SAR Unit (SRU) location and capability data	TBD	Pub/Sub	3

Business functionality of the information service	Brief description of the service	Type of information to be exchanged	Information exchange model / Message type	Message exchange pattern	Priority (1) / (2) / (3)
APAC Common SWIM Flight Information Services					
GUFI service	GUFI (Globally Unique Flight Identifier) generation and provision	GUFI	FIXM	Req/Reply	1
FF-ICE filing service	Provides a means to submit, update or cancel flight plans through a SWIM-based interface using FIXM.	Flight plan for registration, update or cancellation	FIXM	Req/Reply Pub/Sub	1
FF-ICE publication service	Provides harmonised sharing of flight plan information in a global standard supporting common situation awareness.	Flight information for publication	FIXM	Pub/Sub	2
FF-ICE trial service	Allows operators to test the effect of a potential change in a flight plan prior to committing to the change.	Proposed changes in a flight plan	FIXM	Req/Reply	2
FF-ICE flight data request service	Allows an operator to request the current status of a flight plan, or an ANSP can request an operator to submit the latest version of their flight plan.	Current status of a flight plan, a copy of flight plan or supplementary plan	FIXM	Req/Reply	1
FF-ICE notification service	Provides notification of a change in flight state, such as Departure (DEP) and Arrival (ARR) Air Traffic Service (ATS) messages.	ARR, DEP messages	FIXM	Req/Reply Pub/Sub	1
FF-ICE planning service	Allows operators to submit preliminary flight plans for early Air Traffic Flow Management (ATFM) planning and to obtain feedback regarding restrictions/constraints affecting the flight.	Preliminary flight plan for early ATFM planning	FIXM	Req/Reply Pub/Sub	2

Business functionality of the information service	Brief description of the service	Type of information to be exchanged	Information exchange model / Message type	Message exchange pattern	Priority (1) / (2) / (3)
ADP Distribution Service	Supports publication and distribution of ATFM Daily Plan (ADP), based on information included in the APAC ADP Exchange Procedure[1]. The published ADP is designed to inform for stakeholders on upcoming demand/capacity constraints and possible ATFM measures.	Refer to ADP template	FLXM[2]?	Pub/Sub	1
Flight-Specific ATFM Measure Service	Supports notification of information related to "flight-specific" ATFM measures, i.e. measures whose control mechanisms apply to a single flight. An example is the Ground Delay Program (GDP), whose control mechanism is a Calculated Take-Off Time (CTOT), or an ATFM measure for airborne flight, whose control mechanism is a Calculated Time Over (CTO). Recipients of this information should take actions to comply with the ATFM measure contained herein.	CTOT, CTO, CLDT, and fields currently included in APAC AFTN/AMHS-Based ICD for ATFM[3]	FIXM	Req/Reply Pub/Sub	1
Flow-Specific ATFM Measure Service	Supports notification of information related to "flow-specific" ATFM measures, i.e. measures whose control mechanisms apply to a "group of flights" on a particular traffic flow. An example is the Minutes-in-Trail (MINIT) requirement applied on an eastbound traffic using A1 from VT*, VV* to RK*.	Spacing parameters for MINIT, MIT; Departure intervals for MDI; Alternate routes for Re-Routing; Flight level allocation for Level Capping	TBD	Pub/Sub	2 or 3

[1] The ADP template included herein is not updated. The new ADP template had been agreed by the AMNAC group and included into the AMNAC COP v6.1, Appendix D, and was proposed to the ATFM/SG/15 (Apr-May 2025). The meeting agreed that the Secretariat will update the ADP Exchange Procedure to include the new template, which has already been supplied by AMNAC core team post-meeting.

[2] FLXM: Flow Information Exchange Model

[3] Based on the conclusion from ATFM/SG/15, an amendment to this ICD will be proposed in which a more structured use of REGUL and REGCAUSE fields will be introduced. This proposal is expected to be tabled at the upcoming CNS/SG meeting.

Business functionality of the information service	Brief description of the service	Type of information to be exchanged	Information exchange model / Message type	Message exchange pattern	Priority (1) / (2) / (3)
	Recipients of this information should take actions to comply with the ATFM measure contained herein.[4]				
ATFM/A-CDM Integration Service	Supports exchanges of flight-specific ATFM measure information and A-CDM milestone parameters among stakeholders, including arrival/departure ATFM units, airspace users, and airport operators, to integrate A-CDM process with ATFM operations.	ATFM measure information: CTOT A-CDM departure planning information: TOBT, TTOT, TSAT	FIXM	Req/Reply Pub/Sub	1
APAC Common SWIM Meteorological Information Services					
FOR AERODROME					
METAR/SPECI service	Provides of IWXXM-formatted METAR/SPECI product specified in ICAO Annex 3.	Provision of the existing Annex 3 product via an information service	IWXXM	Pub/Sub Req/Reply	1
TAF service	Provides of IWXXM-formatted TAF product specified in ICAO Annex 3.		IWXXM	Pub/Sub Req/Reply	1
Aerodrome Meteorological Observation Information Service	Provides continuous observations of weather parameters at an aerodrome. Advanced meteorological SWIM (MET-SWIM) service being developed by MET Panel.	To be introduced as recommended practice in Annex 3 (Amd 84) in Nov 2030 tentatively (Note: Level of standardisation needs to be considered, as different aerodrome information services may be required for different use cases.)	IWXXM	Pub/Sub or Req/Reply	2*
Aerodrome Meteorological Forecast Information Service	Provides information of the expected meteorological conditions, including probability, at an airport during a specified period. Advanced meteorological SWIM (MET-SWIM) service being developed by MET Panel.		IWXXM	Pub/Sub or Req/Reply	2*
FOR ENROUTE					
SIGMET service	Provides IWXXM-formatted SIGMET product specified in ICAO Annex 3.	SIGMETs for thunderstorm, tropical cyclone, turbulence, icing, mountain wave, duststorm,	IWXXM	Pub/Sub Req/Reply	1

[4] Common operating procedure for this group of ATFM measures (e.g., MINIT, MIT, MDI, Re-Route, Level Capping) has not been developed for the APAC region yet, and should be developed before finalizing the information service to support the operations.

* Will become Priority (1) when it is introduced as recommended practice in Annex 3 tentatively in Nov 2030

Business functionality of the information service	Brief description of the service	Type of information to be exchanged	Information exchange model / Message type	Message exchange pattern	Priority (1) / (2) / (3)
		sandstorm, volcanic ash and radioactive cloud			
AIRMET service	Provides IWXXM-formatted AIRMET product specified in ICAO Annex 3.	Provision of the existing Annex 3 product via an information service	IWXXM	Pub/Sub Req/Reply	2
Tropical Cyclone Advisory service	Provides IWXXM-formatted Tropical Cyclone Advisory product specified in ICAO Annex 3. (Designated provider: States with Tropical Cyclone Advisory Centre)		IWXXM	Pub/Sub Req/Reply	1
Volcanic Ash Advisory service	Provides IWXXM-formatted Volcanic Ash Advisory product specified in ICAO Annex 3. (Designated provider: States with Volcanic Ash Advisory Centre)		IWXXM	Pub/Sub Req/Reply	1
Space Weather Advisory service	Provides IWXXM-formatted Space Weather Advisory product specified in ICAO Annex 3. (Designated provider: States with Space Weather Advisory Centre)		IWXXM	Pub/Sub Req/Reply	1
Volcano Observatory Notice for Aviation (VONA) service	Provides of IWXXM-formatted VONA specified in ICAO Annex 3. Provision of VONA is a recommended practice in Annex 3 (Amd 82). (Designated provider: States with a designated State Volcano Observatory)		IWXXM	Pub/Sub Req/Reply	2
Quantitative volcanic ash concentration information (QVA) service	Provides detailed information of significant volcanic ash in the atmosphere, including probabilities of ash concentration thresholds over space and time. Advanced meteorological SWIM (MET-SWIM) service being developed by MET Panel. (Designated provider: States with Volcanic Ash Advisory Centre (VAAC))	QVA gridded forecasts including probabilities, and IWXXM QVA objects. A recommended practice for significant ash clouds in Annex 3 (Amd 82) for VAACs in a position to do so from Nov 2025, and for all VAACs from Nov 2026.	Gridded data (e.g. NetCDF), IWXXM	Pub/Sub Req/Reply	2[#]

[#] Will become Priority (1) from Nov 2026

Business functionality of the information service	Brief description of the service	Type of information to be exchanged	Information exchange model / Message type	Message exchange pattern	Priority (1) / (2) / (3)
WAFC (World Area Forecast Centres) gridded forecast service	Provides global gridded weather forecasts. (Designated provider: WAFCs (UK and US))	Global gridded forecasts of CB, icing, turbulence, upper winds, upper-air temperatures and humidity, flight level and temperature of tropopause, and direction, speed and flight level of maximum wind	Gridded data in GRIB2	Pub/Sub Req/Reply	1
WAFC significant weather (SIGWX) forecast service	Provides global WAFC SIGWX data sets with coverage expressed in polygons. (Designated provider: WAFCs (UK and US))	Significant weather forecast such as tropical cyclone, turbulence, icing, etc.	IWXXM	Pub/Sub ~~or~~ Req/Reply	1
Special Air Report (ARS) service	Provides reports of special observations made by aircraft when they encounter special weather phenomena, such as moderate/severe turbulence or icing. (Note: Currently there is no plan to implement this information service at MET Panel)	Special aircraft observations of weather phenomena as specified in Annex 3, including turbulence, icing, mountain wave, thunderstorms, duststorm, sandstorm, volcanic cloud, volcanic activity / eruption	TBD	Pub/Sub or Req/Reply	2
MET derived from Mode S DAPs service	Provides upper air winds and temperatures derived from Mode S Downlinked Aircraft Parameters (DAPs) (e.g. true airspeed, ground speed, magnetic heading, true track angle) and facilitates exchange of derived winds and temperatures among MET service providers.	Upper air winds and temperatures derived from Mode S DAPS	TBD	Pub/Sub or Req/Reply	3
Satellite image service	Provides satellite observational information.	Satellite derived MET information (e.g. significant convection)	Gridded format (e.g. NetCDF) and image format	Req/Reply	2
Weather radar image service	Provides two- or three-dimensional radar observational information.	Weather radar reflectivity to visualise the intensity of convection	Gridded format (e.g. NetCDF) and image format	Req/Reply	2

Business functionality of the information service	Brief description of the service	Type of information to be exchanged	Information exchange model / Message type	Message exchange pattern	Priority (1) / (2) / (3)
APAC Common SWIM Surveillance Information Services					
Surveillance data only sharing service	Provides surveillance data of aircraft.	latitude, longitude, flight level, ground speed (optional), magnetic heading (optional), target identification, target address, mode 3/A code (optional), date, time of message reception for position, quality indicators, SAC, SIC	ASTERIX Cat 21 (payload in JSON or RAW format)	Pub/Sub	1
Surveillance data with flight plan information sharing service	Provides surveillance data of aircraft with flight plan information.	globally unique flight identifier, aircraft identification, departure aerodrome, destination aerodrome, aircraft type (optional), wake turbulence category (optional), latitude, longitude, flight level, ground speed (optional), magnetic heading (optional), target identification, target address, mode 3/A code (optional), date, time of message reception for position, quality indicators, SAC, SIC	ASTERIX Cat 21+FPL (payload in JSON ~~or RAW~~ format) Or ASTERIX Cat 21+FPL (FPL contained in message header and Cat 21 payload in RAW format)	Pub/Sub	2

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Appendix C to the Report

Guidance Materials for the sharing of surveillance data in SWIM

Jan 2026

Study Group Under SURICG On Sharing of Surveillance Data In SWIM (SURSG)

Table of Contents

1. Introduction

1.1. Background

1.1.1. Surveillance Study Group (SURSG)

The establishment of the SURSG and its Terms of Reference (TOR) was endorsed by the CNS SG/24 on 4 December 2020 under the ***"Decision CNS SG/24/16 (SURICG/5/1) - Establishment of Study Group under SURICG on Sharing of Surveillance Data in SWIM"***. Based on the TOR, the objectives of the Study Group are to:

1) Study, provide expert views and recommendations:
   a) to achieve harmonized sharing of surveillance data in SWIM in the Asia and Pacific Regions (APAC) according to the Surveillance Strategy adopted by APANPIRG and in support of ICAO's GANP and ASBU initiatives; and
   b) on the possible models of sharing surveillance data in SWIM in the SWIM environment, in consideration of the SWIM technical infrastructure, SWIM information service, Common aeRonautical Virtual Private Network (CRV) infrastructure and any applicable governance, and technical requirements.

2) Review, identify and provide expert views and recommendations to address major issues, raised to the SURSG by ICAO APAC, in the technical, operational or regulatory aspects of surveillance data sharing to facilitate the implementation of surveillance from "departure to destination" in APAC.

1.1.2. SURSG Study Report

With members' support, inputs, and efforts from task leads, all tasks in the feasibility study stage were completed in Feb 2022 with a Concept of Operations (CONOPS) and a Study Report been published in ICAO portal (SURICG/6-IP17 and Appendix E in CNS SG/26-WP13) which formed the basis for shaping the performance requirements and service categorization of surveillance data sharing in the region. One of the recommendations and moving forward from the Study Report was the proposal for the establishment of a Surveillance Sharing in SWIM Trial Implementation Group (S3TIG) to oversee a trial with the following main responsibility and objectives:

1) Coordinating with the SWIM Task Force, CRV OG to reflect SWIM development in the trial
2) Leading and coordinating with interested states/administrations, and stakeholders (commercial and non-commercial) to conduct the trial:
   a) to demonstrate as far as practicable the general, technical and administrative aspects of surveillance sharing in SWIM in the Study Report; and
   b) to serve as a reference model for future surveillance sharing implementation in SWIM.

1.1.3. S3TIG and Joint Event

S3TIG was then established in December 2022 to support and promote the trial implementation of surveillance data sharing based on SWIM. With the endorsement of SURSG/3, SWIM TF/7, and SURICG/8, the SWIM Demonstration over CRV and surveillance data sharing in the SWIM trial were

successfully conducted as a Joint Event by S3TIG in Hong Kong, China, from 28 to 29 May 2024. The report of the joint event can be found in the ICAO portal (SWIM TF/10-WP/05).

1.1.4. Guidance Materials

Guidance materials (i.e. this document) for the sharing and access of surveillance data is one of the deliverables under SURSG. Upon successful completion of the Joint Event, States/Administrations including Hong Kong China, Singapore, and the USA have volunteered and contributed to producing this document.

1.2. Purpose of the Document

This document provides guidance for system planning, design, and implementation of SWIM platforms in the APAC region for surveillance data sharing, with the purpose of ensuring continuous and coherent development of the SWIM platforms for surveillance data sharing that is harmonized and interoperable within the region.

2. Summary of Major Considerations from the Study Report and their Outcomes from the Joint Event

2.1. Implementation Model

2.1.1. Starting small and simple

To align with the philosophy and roadmap for the implementation of SWIM in APAC, the same incremental approach (i.e. starting small and simple) has been leveraged for surveillance data sharing in the Joint Event. With a focus on operations selected (i.e. ATFM, FF-ICE, and MET) to benefit from surveillance data sharing, the infrastructure and associated information service have been identified and implemented. Where the first implementation of surveillance data sharing of ADS-B data proved feasible and beneficial.

2.1.2. SWIM over CRV

CRV has been endorsed as the carrier of SWIM data at CRV OG/5 and SWIM TF/3 meetings. S3TIG considered that the option to use the operational CRV for the Joint Event was not preferred considering the potential bandwidth impact and cyber security risks, even if remote, on the operational CRV, which is the network carrying safety critical operation data.

Instead, PCCWG established a pseudo-CRV network for the Joint Event. The pseudo-CRV operated exactly like the operational CRV, utilizing a dedicated and segregated CRV network with the same hardware setup. Similar to the operational CRV, dedicated network interface devices were installed at the site for each participant participating with an EMS.

For participants without an EMS, PCCWG provided SIM cards for mobile connection through its Console Connect platform. This platform allows users to access the simulated SWIM environment in the Joint Event to publish/subscribe data services and interact with the HMI of the SWIM services provided by PCCWG. The network infrastructure used in the Joint Event is illustrated in Figure 1 below.

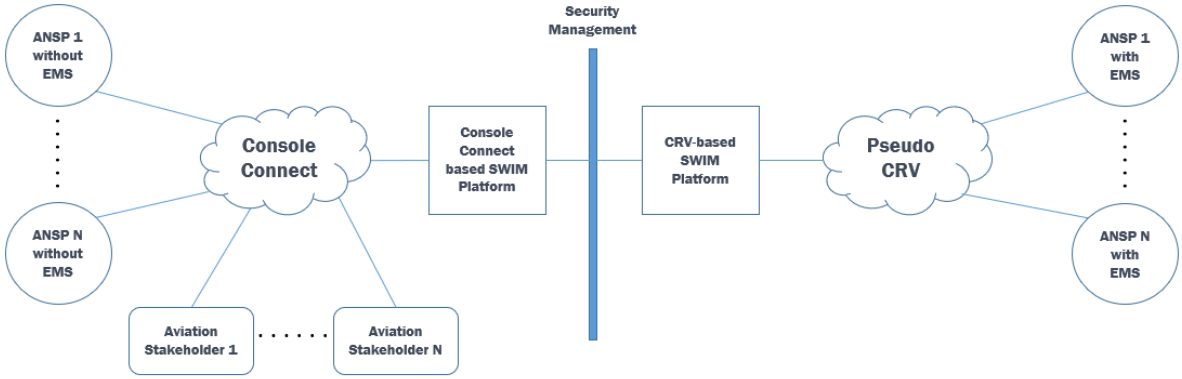


Figure 1 – Network Infrastructure for the Joint Event

The outcome of the Joint Event confirmed that the proposed implementation of surveillance data sharing using a SWIM platform, as depicted in Figure 1 above, with a combination of CRV-based SWIM platform and third-party/commercial interest providing the internet-based SWIM platform (i.e. Console Connect in the case of the Joint Event) for different kinds of stakeholders is feasible.

Moreover, stakeholders who are currently outside the CRV network's coverage can subscribe to the surveillance data sharing service (whether it is within the CRV network or not) through Console Connect (left side of the diagram), using various connection means. With proper security management, the Console Connect-based SWIM platform will be able to communicate with the CRV network and allow surveillance data exchange between the two platforms.

It should be noted that the 2Mbps bandwidth tentatively offered for each State/administration in the pseudo-CRV was not sufficient to carry surveillance data sharing with a 1s data rate. Section 4 of this document provides more detailed bandwidth considerations for surveillance data sharing.

2.2. Infrastructure Model

2.2.1. SWIM Technical Infrastructure

The hybrid infrastructure model as proposed by the Study Report, comprising private EMSes owned by States/Administrations and public/commercial EMSes was adopted in the Joint Event. While setting up the EMS architecture for the Joint Event, the SWIM Implementation Pioneer Group (SIPG) noted that a GRE tunnel would have to be established between each communication pair under the CRV provision. This approach would put restrictions on the future SWIM implementation as lots of GRE tunnels have to be constructed for any-to-any connections. To mitigate the impact of such restriction, a 2-tier hierarchical architecture was proposed by SWIM TF and was adopted for the Joint Event. In the hierarchical architecture, participants were divided into sub-communities and one representative from each sub-community would act as the gateway for message exchange among all sub-communities (“the Gateway EMS”). Participants under each sub-community with EMS provision would act as the EMS provider (“the Edge EMS”) for their local downstream users. This approach could effectively reduce the number of GRE tunnels required. For participants without EMS, PCCWG would act as the 3rd party EMS provider to provide network-based EMS services for them. Figure 2 below shows a schematic diagram of such EMS architecture.

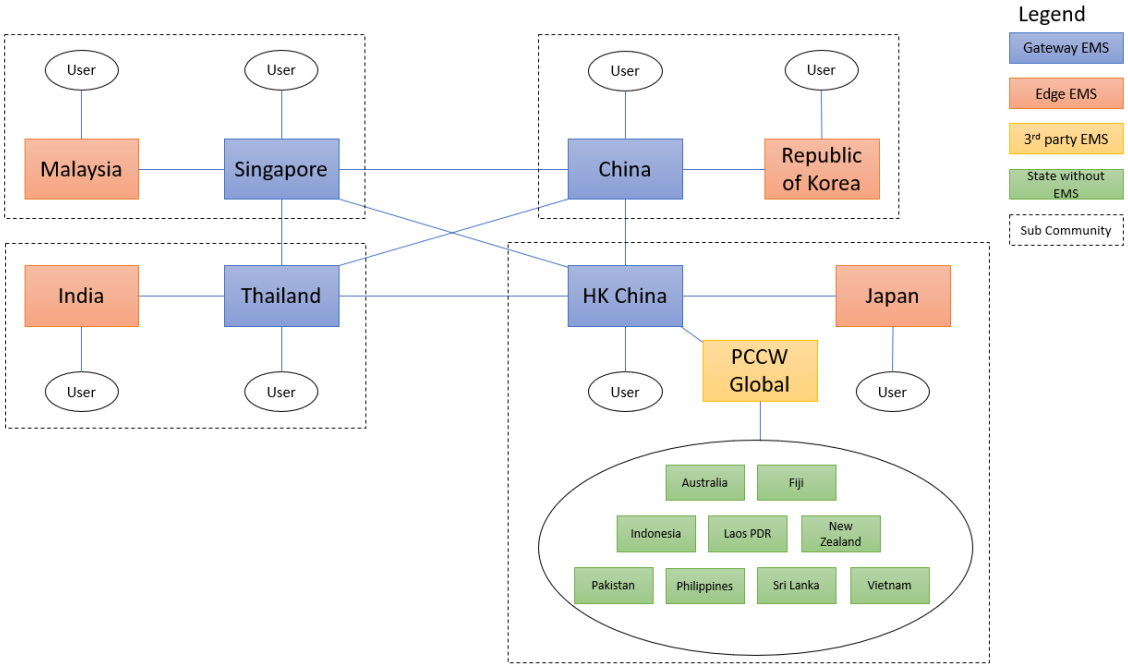


Figure 2 – EMS Infrastructure for the Joint Event

Some participants had expressed doubts about whether the hierarchical architecture is the appropriate architecture for the APAC region. There were several observations with this architecture identified during the preparation of the Joint Event, such as specific configuration required for different brands of EMS, potential message loop back if source and recipient checking was not implemented properly, combining byte message and text message into a single queue, single point of failure of the current architecture, etc.

It should be highlighted that the development of the SWIM technical infrastructure for APAC region is still ongoing. States/Administrations should refer to the latest development status as published by SIPG from time to time.

2.2.2. Surveillance Central Data Processor (SCDP)

Surveillance data sharing can be supported by direct interfacing between data contributor and data consumer. If any 3rd party wishing to provide a centralized surveillance data-sharing service may do so by way of an SCDP, which filters and collates surveillance data feeds from data contributors and outputs user-selectable data streams as a SWIM service. Figure 3 below shows a conceptual model of SCDP. While the SCDP functions were not tested in the Joint Event as such functions cannot be delivered by the SCDP service provider on time, it should be noted that the SCDP concept could bring benefit on bandwidth saving, especially for non-contributing EMS that only interested data will be transmitted from the SCDP, rather than receiving all surveillance data from all the contributing EMSes.

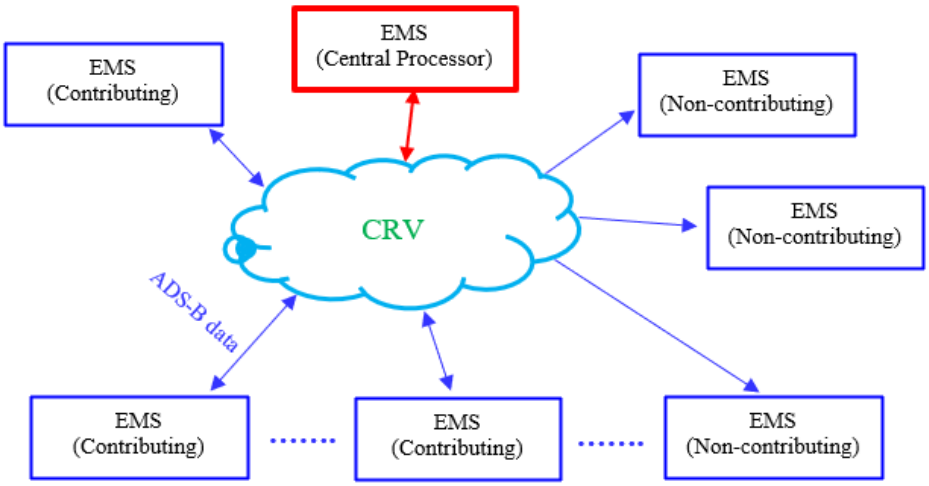


Figure 3 – Conceptual Model of SCDP

2.3. Business Model

The following are the major recommendations from the Study Report on the business model. For details, please refer to the Study Report as referred to in Section 1.1.2.

2.3.1. CONOPS

It is envisaged that States/Administrations will have varying needs for the shared surveillance data. Based on the nature of ATS applications, the service levels of shared surveillance data may be roughly classified into two types as below:

1) Level 1 Data Services for supporting ATS applications which make use of the shared surveillance data for aircraft separation.
2) Level 2 Data Services for supporting ATS applications which do not use shared surveillance data for aircraft separation (e.g. Air Traffic Flow Management (ATFM), situation awareness at FIR boundaries, etc.)

It should be highlighted that the APAC Common SWIM Information Services for surveillance data sharing in the region is not specified to support the provision of aircraft separation (i.e. Level 1 Data Services).

The Level 2 Data Services is suitable for:

a. FIR coordination.
b. Air situation awareness at FIR boundaries.
c. Flight tracking.
d. Strategic planning and analysis.

and is **not suitable** for:

a. Separation assurance.
b. Controller tactical operations.
c. Surveillance-based conflict resolution.

2.3.2. Format of Data

ASTERIX CAT 21 Edition 2.1 is recommended for the initial implementation, as most of the States/Administrations can support without additional data conversion efforts. The SCDP would be able to provide data conversion services between different ASTERIX CAT 21 editions, to support legacy systems if required. Accordingly, S3TIG proposed the data structure for surveillance data sharing. Such data structure could serve as a reference model for future surveillance-sharing implementation in SWIM. Two message payloads (i.e. ASTERIX and JSON) were tested in the Joint Event. The finalized data structure can be found in Section 6.2 - Annex 2.

2.3.3. Integrity of ADS-B Data

The data contributors should not modify the content of the surveillance data except for the following purposes:

1) ASTERIX Edition upgrading or downgrading;
2) Format conversion to meet the agreed data format for sharing;
3) SAC/SIC amendment; and
4) Fusion of data from multiple sensors, such as removal of duplicated ADS-B position reports. Position report extrapolation shall not be shared.

The time stamp of the surveillance data report shall be based on a reliable time source with timeliness performance as mentioned in Section 5.4, without any modification by the data contributors.

2.3.4. Report Filtering

Screening out special or non-civilian flights (e.g. State aircraft) is allowed with the filters being agreed upon prior to implementation. The filtering mechanism shall be detailed in the data services provided. For ADS-B data, the data contributors shall not perform any data filtering based on ADS-B quality indicators or blacklist. All the ADS-B data shall be shared with users as far as possible. Considering that States/Administrations will be making the assessment of data usability, and that lower NUC/NIC can still support lower-level operations, all data should be sent without filtering based on NUC/NIC.

2.3.5. Serviceability

Two data services, namely Level 1 (use for aircraft separation) and Level 2 (not use for aircraft separation) Data Services, were recommended to support the operation needs on surveillance data sharing in the region. These two data services are equivalent to Category 1 (support aircraft separation) and Category 3 (support enhanced flight operation) under "*Baseline ADS-B Service Performance Parameters*" of ICAO'S *ADS-B Implementation and Operations Guidance Document Edition 15.0 – September 2022"* with details as below.

Service Parameters	Level 1[1]	Level 2[2]
System Availability	Total Service Availability > 99.9%	Total Service Availability > 90%
System Reliability	Total Service MTBF > 50,000 hours	Total Service MTBF> 200 hours
Aircraft Updates	0.5 second < Interval < 10 seconds	0.5 second < Interval < 60 seconds
Data Latency	95%: < 2 seconds	95%: < 60 seconds

2.3.6. Data Coverage

Data contributor to share ADS-B data from stations that are near the FIR boundaries (useful to cover surveillance gaps) to support Level 1 data service and/or ADS-B stations that are near airports for international flights (useful for ATFM) to support Level 2 data service is recommended to be the minimum for a data contributor. Other choices to share ADS-B data from (i) all its ADS-B stations; (ii) one of its ADS-B stations; and (iii) all its international flights could be considered if such a use case is available.

2.4. Participation Model

2.4.1. Data Contributors

Due to the varying degrees of SWIM implementation status of States/Administrations, data contributors should offer flexibility to allow surveillance data sharing to the data consumers either by direct interfacing or by centralized SCDP services provided by a 3rd party.

Direct interfacing between data contributor and data consumer can be established regardless of whether an SCDP exists. However, an SCDP is expected to greatly accelerate the implementation of surveillance data sharing and popularize its utilization in accordance with the "starting small and simple" philosophy. SWIM-enabled States/Administrations can choose this collaboration model for an initial trial with a "local SCDP" and then populate the SCDP services through further collaboration in a later stage by expanding their capabilities or by way of 3rd-party SCDP centralized services.

Surveillance data sharing services (Level 1 and Level 2), if offered via SCDP, require the collaboration between States/Administrations (as data contributors) and the SCDP service provider for the data provision mechanism, including data format, data update rate, etc., to ensure the SCDP can deliver the ultimate surveillance data sharing services, meeting the service parameters mentioned in Section 2.3.5.

Data charging schemes or incentives provided to States/Administrations who are data contributors to the SCDP should be explored to encourage data contribution to the SCDP.

[1] Level 1 standards are for supporting ATS applications which make use of the shared surveillance data for aircraft separation. It should be highlighted that the service parameters mentioned in the table have been referenced from AIGD for 5NM separation, and may differ from any specific performance requirements specified in EUROCONTROL-SPEC-147 (EUROCONTROL Specification for ATM Surveillance System Performance (Volume 2 Appendices))

[2] Level 2 standards are for supporting ATS applications which do not use shared surveillance data for aircraft separation (e.g. Air Traffic Flow Management (ATFM), situation awareness at FIR boundaries, etc.)

With the presence of SCDP, States/Administrations without SWIM infrastructure can also contribute their data by legacy means and in legacy data formats (if this is the case) to the SCDP, which will then take care of data conversion and onward data surveillance sharing service for dissemination.

2.4.2. Data Consumers

States/Administrations, based on their own SWIM implementation status, can choose between direct interfacing with the data contributor or using the surveillance data sharing service provided by SCDP. States with SWIM infrastructure may participate in the initial trial by directly interfacing with data contributors. Data consumers without SWIM infrastructure can subscribe to the surveillance data sharing services from the SCDP to benefit from shared surveillance data.

Data will be shared among all the participating users in the spirit of sharing and benefiting the aviation community.

2.4.3. Data Governance

It should be highlighted that the development of the SWIM data governance for APAC region is still ongoing. States/Administrations should refer to the latest development status as published by SIPG from time to time.

2.5. Implementation Roadmap and Timeframe

2.5.1. Development of CONOPS

Singapore, Hong Kong, China, Thailand, and Vietnam have developed a proposed concept of operations (CONOPS) for surveillance data sharing in SWIM (SURICG/6-IP/17). A comprehensive discussion has been included, ranging from practical models for collaboration and operation to business models, considering available platform(s) and other technical considerations.

2.5.2. Preparation of guidance material and multilateral agreement

With reference to the models and recommendations advised in the Study Report, guidance material, specified system requirements, performance requirements, operation and maintenance practice, and so forth, should be developed to facilitate and harmonize the implementation of surveillance data sharing. The guidance material should also provide guidance for the design, testing, and commissioning of the system for surveillance data sharing to ensure coherent system development.

A multilateral agreement may involve a lengthy negotiation process, depending on the size of the participant group and agendas. Despite the considerable time it may take, a multilateral agreement is considered a more suitable option over a bilateral agreement to attain non-discrimination data sharing with transparent, fair, and equitable treatment.

2.5.3. Implementation of infrastructure – SWIM, CRV and EMS

SWIM over CRV is the default means to share surveillance data. The hybrid infrastructure model is considered the most suitable one with maximum efficiency and minimal geopolitical concerns. The States/Administrations are suggested to evaluate and determine which options to be adopted, based on their own context. The infrastructure should be implemented according to the

requirements set out with considerations of latency, throughput, network security, system reliability, and cost effectiveness.

2.5.4. Implementation of information service

It is envisaged that information services developed based on the functional and performance requirements, such as message format and data filtering, will be properly tested and validated locally or with the adjacent regions to ensure a reliable system for surveillance data sharing.

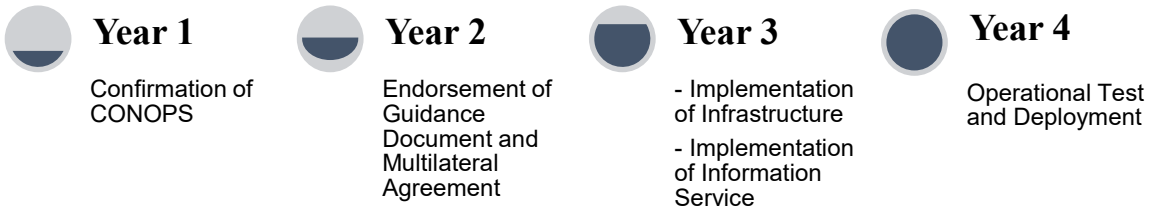
2.5.5. Operational test, validation user acceptance, and operation deployment

Upon the completion of the implementation of infrastructure and information service, the overall functions of sharing surveillance data could be verified through operational tests and user acceptance tests. State/Administration's involvement in this stage is important to identify system deficiencies or interface issues, if any, for further investigation and improvement before putting into operation.

After comprehensive testing and review, the system would be ready to deploy for operation. Regular meetings across the States/Administrations should be held with an operations group to review performance and examine any issues found. A collaborative review process and cooperative system fine-tuning will be crucial for the continuous improvement and further development of surveillance data sharing.

2.5.6. Timeframe

The implementation timeline chronologically arranges the tasks identified in the implementation roadmap proposed in Sections 2.5.1 to 2.5.5. The timeline may differ to some extent depending on the actual deployment model and approach, and also for the level of services to be delivered (e.g. quicker deployment for Level 2 Data Services than Level 1 Data Services). The implementation of the SWIM platform is a key contributing factor to the timeline of surveillance data sharing.



3. Surveillance Information Service Security

The security of the Surveillance Information Service in the SWIM platform is critical to ensuring the integrity, confidentiality, and availability of surveillance data. While the overall SWIM-related information security would be based on the guidance documents developed by the Trust Framework Panel (TFP), this document will focus on industrial best practices for securing surveillance information services and their interfaces.

3.1. General Security Principles

1) **Authentication and Authorization**: Verify the identity of all entities accessing the SWIM services and enforce strict role-based access control (RBAC).
2) **Confidentiality**: All surveillance data exchanged between systems must be encrypted to prevent unauthorized access.
3) **Integrity**: Mechanisms must be in place to detect and prevent any unauthorized alterations to surveillance data.
4) **Availability**: Ensure that the SWIM platform and its services remain operational and resistant to denial-of-service (DoS) attacks.

3.2. Security for External Interfaces

The external interface of the SWIM platform would be over CRV or the internet. This interface is vulnerable to external cyber threats and requires robust protection mechanisms, such as:

1) Data Encryption
   a) Use TLS for encrypting data exchanged over the external interface.
   b) Ensure that all endpoints support secure transport protocols.

2) Authentication
   a) Implement mutual TLS (mTLS) to authenticate both the SWIM platform and external entities.
   b) Use digital certificates issued by a trusted Certificate Authority (CA) for secure communications.

3) Access Control
   a) Apply firewall rules to restrict access to the SWIM platform to only authorized IP addresses or ranges.
   b) Use Application Layer Gateways (ALG) or dedicated API gateways to filter and validate incoming and outgoing messages.

4) Monitoring and Intrusion Detection
   a) Deploy an Intrusion Detection System (IDS) or Intrusion Prevention System (IPS) to monitor traffic between the SWIM platform and external entities.
   b) Log all access attempts and regularly audit logs for suspicious activity.

5) Message Validation
   a) Validate incoming messages for conformance to the expected format (e.g. ASTERIX CAT 21 or SWIM-based messages).
   b) Reject malformed or unexpected messages to prevent injection attacks or malformed data propagation.

6) Rate Limiting and DoS Protection
   a) Apply rate limiting to prevent excessive requests from external entities.

b) Use traffic filtering and scrubbing solutions to mitigate DoS or Distributed Denial of Service (DDoS) attacks.

3.3.Security for Internal Interfaces

The SWIM platform's internal interface would be connected to the data conversion engine and the internal ADS-B system. While the internal network is more protected, it still requires robust security to prevent insider threats or breaches.

1) **Network Segmentation**
   a) Separate the SWIM platform, data conversion engine, and internal ADS-B system into distinct network zones.
   b) Use firewalls to enforce strict segmentation and limit communication to only necessary connections.
2) **Encryption**
   a) Secure internal communications using IPSec or TLS to prevent interception or tampering of data.
3) **Data Validation and Filtering**
   a) Validate and sanitize all messages exchanged between the data conversion engine and the SWIM platform.
   b) Ensure that no unauthorized or malformed data is passed through the internal interface.
4) **Authentication**
   a) Use secure tokens or certificate-based authentication for all communications between internal systems.
   b) Implement two-factor authentication (2FA) for administrative access to internal components.
5) **Access Control**
   a) Enforce strict access control policies for internal systems. Only authorized personnel and systems should have access to the SWIM platform and the data conversion engine.
6) **Audit and Logging**
   a) Maintain detailed logs of all interactions between the SWIM platform, data conversion engine, and internal ADS-B system.
   b) Implement real-time monitoring to identify unauthorized access or unusual activity.

3.4.Security for Data Conversion Process

The data conversion engine, which converts legacy ASTERIX format data to SWIM-based messages, must be secured to ensure reliable and accurate data transformation.

1) **Input Validation:**
   a) Validate and sanitize all data received from the internal ADS-B system before processing.
   b) Ensure that only ASTERIX CAT 21 messages are accepted for conversion.
2) **Controlled Data Transformation:**
   a) Perform data conversion within a sandboxed environment to mitigate the risk of malicious payloads affecting the SWIM platform.
3) **Error Handling and Exceptions:**

a) Implement robust error handling to prevent corrupted or incomplete data from being transmitted to the SWIM platform.

4) **Data Integrity Checks:**
   a) Use hashing algorithms (e.g. SHA-256) to verify the integrity of data before and after conversion.

3.5.Security Governance and Compliance

1) **Compliance with Standards:**
   a) Ensure compliance with ICAO guidelines, such as the Global Air Navigation Plan (GANP) and Aviation System Block Upgrade (ASBU) framework.
   b) Follow guidance documents developed by the TFP.
2) **Regular Security Assessments:**
   a) Conduct periodic vulnerability assessments and penetration testing for both internal and external interfaces.
   b) Review and update security policies regularly to address emerging threats.
3) **Incident Response Plan:**
   a) Develop and maintain an incident response plan to quickly detect, respond to, and recover from security incidents.
   b) Conduct regular drills and simulations to ensure readiness.
4) **Training and Awareness:**
   a) Provide cybersecurity training to all personnel involved in the operation and management of the SWIM platform.
   b) Promote awareness of phishing, social engineering, and other common threats.

4. Infrastructure and Bandwidth Considerations

4.1. Infrastructure Considerations

The ANSP's infrastructure to support surveillance data sharing over SWIM should include at least the following components and interconnections among them.

1) Internal ADS-B system;
2) An interfacing module with flight plan system (for supporting surveillance data with flight plan information)
3) A data conversion engine/services to convert legacy ASTERIX format data to SWIM-based surveillance messages, which would most likely be a new system to be implemented, as existing automation systems typically incorporate surveillance data processing which create surveillance tracks no longer representative of the original data source (i.e. existing automation system outputs will not meet the requirement to supply the unprocessed ADS-B data).
4) An EMS to publish the SWIM based surveillance messages

Schematic diagrams showing the possible infrastructures are depicted below, with option 1 to be owned by ANSP and option 2 be cooperated with 3rd party service provider.

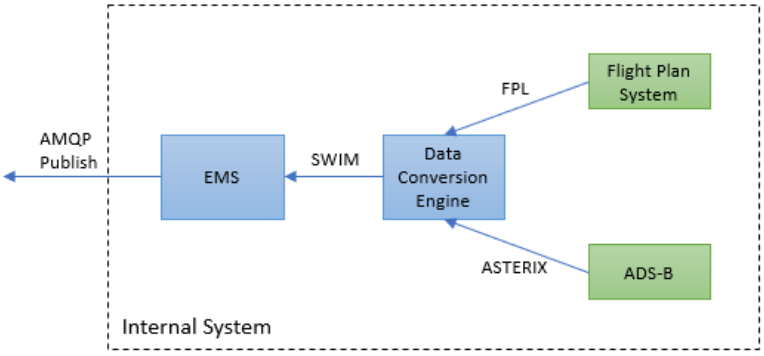


Figure 4 – Possible infrastructure (option 1)

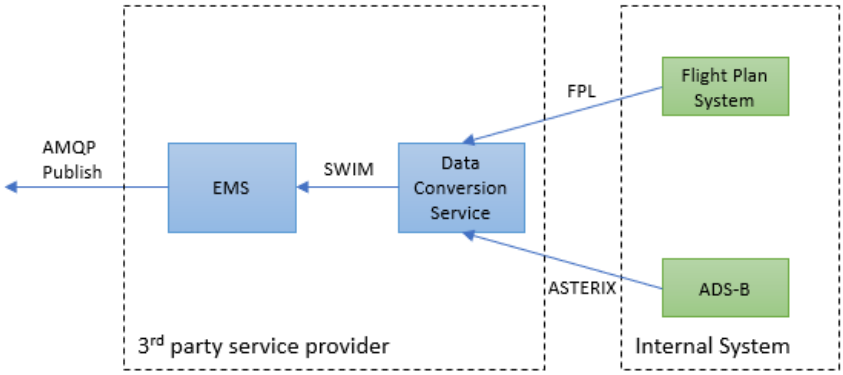


Figure 5 – Possible infrastructure (option 2)

The comparison between the two options are similar to other provision of SWIM services and could be considered by ANSP according to its situation. Some consideration factors are listed below.

1) On-premise vs Cloud-based SWIM infrastructure;
2) Self-development vs service-subscribed services;
3) Self-maintenance vs service-subscribed maintenance;
4) One-time cost vs recurrent cost; and
5) Level of data ownership and data sensitivity.

4.2. Bandwidth Considerations

In planning for the transmission of surveillance data over SWIM, it is essential to consider the bandwidth implications associated with the selected data format, message frequency, and operational requirements. Ensuing paragraphs provides considerations into the bandwidth calculation based on the Joint Event for surveillance data sharing over SWIM as presented in the WP05 in SURSG/4, 28 – 31 May 2024.

a) Transmission Overhead
Analysis of packet captures has revealed that Advanced Message Queuing Protocol (AMQP) messages incur an approximate 8% overhead relative to the size of the original message content (header and body).

b) Message Size
Statistical data from the Joint Event highlights that AMQP messages containing both ADS-B surveillance data and Flight Plan information can vary in size depending on the number of data fields and format used. Notably:
- Messages in JSON format that carry 32 data fields have an average size of **1.1K bytes** per message.
- Including the **8%** transmission overhead, the effective size per message increases to approximately **1.2K bytes**.

This represents the upper bound of message size observed and is suggested to be used as a reference for capacity planning.

c) Peak Bandwidth Estimation Example
In the case of Hong Kong, China, during peak traffic periods, the ADS-B system detects and processes data for approximately 300 aircraft targets per second within its area of responsibility. Assuming each target is associated with a message of 1.2 KB, the estimated bandwidth consumption is as follows:
- 300 messages per second × 1.2K bytes = 360K bytes per second
- This equates to approximately **2.88 Mbps**

This estimation provides a useful reference point for States/Administrations when planning their bandwidth provision in similar operational environments.

d) Suggested Calculation for Required Bandwidth

[maximum number of targets per second] x 1.2K bytes x 8 bps

5. Performance Requirements

5.1. Overview

This section defines the minimum performance requirements for sharing surveillance data in a SWIM-compliant environment. The framework assumes a fixed surveillance data refresh rate of between every 4 to 30 seconds and aims to support **Level 2 Data Services only** (align with the APAC Common SWIM Information Services) including strategic ATM operations such as situational awareness at FIR boundaries, planning, and safety monitoring—not tactical control. Emphasis is placed on the integrity, timeliness, and efficient distribution of surveillance data between contributing systems and consumers.

5.2. Surveillance Refresh Cycle and Data Management

5.2.1 Surveillance Refresh Rate

1. All surveillance data (track-level or processed target reports) shall be refreshed between every 4 and 30 seconds (0.25 and 0.03 Hz).
2. This interval defines the **data validity window** for each update; messages older than this window must be **discarded** and **replaced with the most current message**.
3. EMS and EMS Central Processing units must synchronize their output to this cycle and align time stamps using a standard (e.g., UTC-based ISO 8601).

5.2.2 Surveillance Central Data Processing (SCDP) Interface

1. The SCDP must act as the **authoritative node** aggregating surveillance feeds from contributing **EMS or EMS Central Processing nodes**.
2. All contributing EMS nodes must:
    a. Push updates to the SCDP in harmony with the surveillance update rate, between every 4 to 30 seconds.
    b. Include metadata indicating the source system, timestamp, and message sequence.
    c. Implement logic to **replace stale messages** and ensure that only the most current data is available for downstream dissemination.
    d. SCDP shall enforce **version control** and prevent duplication or delivery of outdated data.

5.3. Message Distribution Architecture

5.3.1 Push Message Model

1. **Definition**: Data is delivered continuously from the publisher (e.g., SCDP) to subscribed consumers without solicitation.
2. **Performance Characteristics**:
    a. Suitable for systems needing continuous streams (e.g., ground situation displays, traffic flow tools).
    b. Requires **high bandwidth**, especially during peak operational hours.
    c. Messages must be prioritized and queued efficiently to avoid congestion.
    d. Tolerable one-way distribution time: **≤ 1 second end-to-end**, including **200–400 ms over CRV**, depending on available bandwidth.

5.3.2 Pull Message Model

1. **Definition**: Consumers request specific data sets from the SCDP or an intermediary data service.
2. **Performance Characteristics**:
    a. Pull requests must be **governed and filtered**: consumers may only access messages that are:
    b. Related to their airspace of responsibility.
    c. Within their operational context or authorization.
    d. Response times to pull queries should not exceed **2 seconds**, including message retrieval and filtering.
    e. Pull services must implement **access control**, **query scope limits**, and **load-balancing mechanisms** to preserve the system.

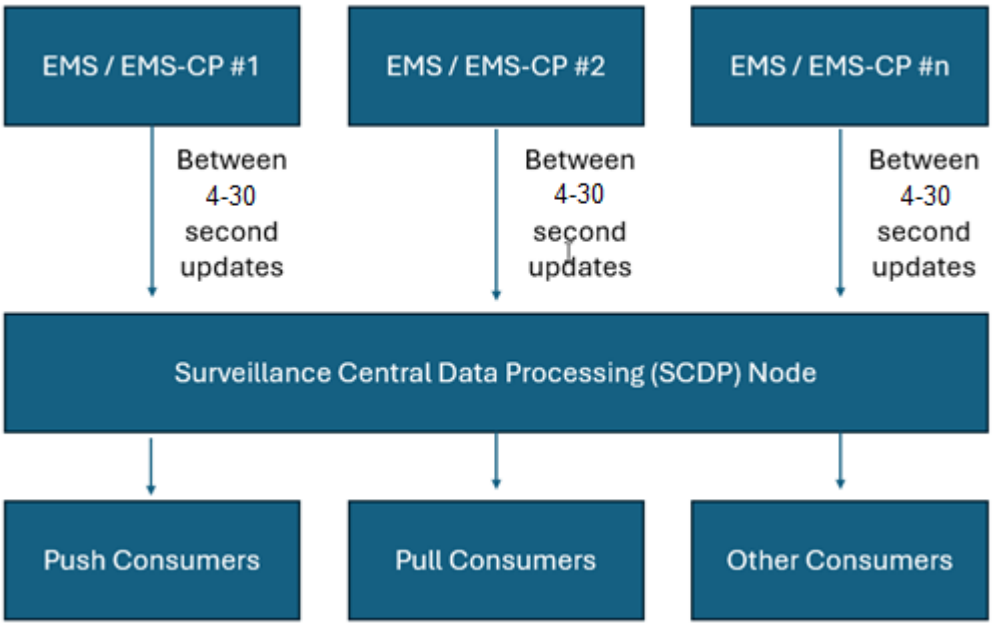
5.4. Key Performance Parameters

Parameter	Requirement
Update Rate	Between every **4 and 30 seconds** from all contributing EMSs to SCDP.
Latency	End-to-end delivery from EMS to consumer: **≤ 1 second** (nominal).
CRV Distribution Time	**200–400 ms**, subject to bandwidth; tolerance for up to 600 ms in constrained conditions.
Data Integrity	All messages must include verification (e.g., checksum, digital signature). Invalid or corrupted data shall be rejected.
Availability	99.9% availability (max 8.76 hours downtime per year).
Continuity	Surveillance data source shared via SWIM to maintain message delivery such that, for each individual source, no more than one consecutive expected message is missed within any rolling 24-hour period.
Timeliness	All surveillance data must be time-stamped to UTC with an accuracy of ±1 second.
Bandwidth Efficiency	Push models must implement flow control. Pull models must restrict volume by request scope and role-based access.
Scalability	Systems must scale to support a growing number of consumers (e.g., FIRs, ATFM units, adjacent ANSPs) without degradation in latency.

5.5. Quality Assurance and Monitoring

1. SWIM surveillance data services must implement continuous **performance monitoring** at key nodes (EMS, SCDP, CRV interface, consumer).
2. **Alerts** must be generated for:
    a. Missed updates.
    b. Latency exceeding defined thresholds.
    c. CRV congestion or message drops.
3. Logs must retain metadata for **audit and post-event analysis** for at least 30 days.

5.6.SWIM Surveillance Data Sharing Architecture



5.7. Key Components and Data Flow

1. **EMS / EMS-CP Nodes**:
    a. **Function**: Collect raw surveillance data (e.g., radar, ADS-B).
    b. **Data Transmission**: Send processed surveillance messages to the SCDP every 4 to 30 seconds.
    c. **Time Synchronization**: Ensure all messages are time-stamped using UTC (e.g., ISO 8601 format).
2. **Surveillance Central Data Processing (SCDP)**:
    a. **Function**: Aggregate, validate, and manage surveillance data from multiple EMS/EMS-CP sources.
    b. **Data Management**:
        i. Discard outdated messages beyond the 4-to-30-second refresh cycle.
        ii. Replace old messages with new ones to maintain data currency.
    c. **Data Distribution**:
        i. **Push Model**: Broadcast data to subscribed consumers.
        ii. **Pull Model**: Respond to specific data requests from consumers.
3. **Push Consumers**:
    a. **Examples**: Air Traffic Flow Management systems, situational awareness displays.
    b. **Data Reception**: Receive continuous data streams.

   c. **Bandwidth Consideration**: High bandwidth usage, especially during peak operational hours.
4. **Pull Consumers**:
   a. **Examples**: Analytical tools, post-event analysis systems.
   b. **Data Access**: Request specific data subsets based on criteria (e.g., geographic area, time frame).
   c. **Access Control**: Governed to ensure consumers receive only relevant and authorized data.
5. **CRV (Common Regional Virtual) Network**:
   a. **Function**: Facilitate data transmission between EMS/EMS-CP nodes and the SCDP.
   b. **Performance**:
      i. Typical distribution time: 200–400 milliseconds.
      ii. Potential for increased latency if bandwidth is constrained.
6. **Performance Parameters Summary**
   a. **Surveillance Refresh Rate**: Between every 4 and 30 seconds.
   b. **Message Validity**: Messages older than 4-to-30 seconds are discarded and replaced.
7. **Push Model**:
   a. **Bandwidth**: High during peak hours.
   b. **Latency**: Target end-to-end delivery within 1 second.
8. **Pull Model**:
   a. **Access Control**: Consumers receive only data pertinent to their role and authorization.
   b. **Latency**: Response time should not exceed 2 seconds.
9. **CRV Network**:
   a. **Distribution Time**: 200–400 milliseconds under optimal conditions; may increase with bandwidth limitations.

6. Annexes

6.1. Annex 1 – Message Headers for the Joint Event

Header Name	Values	Descriptions	Mandatory / Optional	Data Type
APAC_SOURCE	VH_HKCAD	Hongkong ASP (Contibutor & Consumer)	Mandatory	String
	RJ_JCAB	Japan ASP (Contibutor & Consumer)		
	WM_CAAM	Malaysia ASP (Contibutor & Consumer)		
	RK_KAC	ROK ASP (Contibutor & Consumer)		
	WS_CAAS	Singapore ASP (Contibutor & Consumer)		
	VT_AEROTHAI	Thailand ASP (Contibutor & Consumer)		
	VA_AAI	India (Contributor & Consumer)		
	RJ_JAL	Japan Airlines		
	VH_PCCW	PCCW		
APAC_RECIPIENT_LIST	ZB_ATMB	China ASP (Observer)	Mandatory	String
	VH_HKCAD	Hongkong ASP (Contibutor & Consumer)		
	RJ_JCAB	Japan ASP (Contibutor & Consumer)		
	WM_CAAM	Malaysia ASP (Contibutor & Consumer)		
	RK_KAC	ROK ASP (Contibutor & Consumer)		
	WS_CAAS	Singapore ASP (Contibutor & Consumer)		
	VT_AEROTHAI	Thailand ASP (Contibutor & Consumer)		
	VA_AAI	India (Contributor & Consumer)		
	WI_CAI	Indonesia ASP (Observer)		

Header Name	Values	Descriptions	Mandatory / Optional	Data Type
	VL_LPDR	Laos ASP (Observer)		
	NZ_AIRWAYS	NZ ASP (Observer)		
	OP_CAAPK	Pakistan ASP (Observer)		
	RP_CAAP	Philippines ASP (Observer)		
	YM_ASA	Australia (Consumer)		
	NF_FIJI	Fiji (Consumer)		
	RJ_JAL	Japan Airlines		
	VH_PCCW	PCCW		
APAC_CATEGORY	FIXM	All FIXM Messages	Mandatory	String
	AIXM	All AIXM Messages		
	IWXXM	All IWXXM Messages		
	ASTERIX	Surveillance Messages		
	GEOJSON	Meteorological Report Messages		
	JSON	Surveillance Messages in JSON Format		
APAC_CATEGORY_VERSION	FIXM_4_1	FIXM v4.1.0	Mandatory	String
	FIXM_4_1_APAC	FIXM v4.1.0 APAC Extension		
	FIXM_4_2	FIXM v4.2.0		
	FIXM_4_2_FF_ICE	FIXM v4.2.0 (for FF-ICE R1 and R2)		
	FIXM_4_2_APAC	FIXM v4.2.0 APAC Extension		
	AIXM_5_1	AIXM v5.1		
	IWXXM_2_0	IWXXM v2.0		

Header Name	Values	Descriptions		Mandatory / Optional	Data Type
	IWXXM_3_0	IWXXM v3.0			
	ASTERIX _CAT021	ASTERIX ADS-B Data Category			
	GEOJSON_4	GEOJSON v4.0			
	JSON_1	JSON v1.0			
APAC_MESSAGE_TYPE	**Values**	**Descriptions**	**Format**		
	PRELIMINARY_FLIGHT_PLAN	Preliminary Flight Plan	FIXM_FF-ICE R1	Mandatory	String
	FILED_FLIGHT_PLAN	Filed Flight Plan	FIXM_FF-ICE R1		
	SUBMISSION_RESPONSE	Submission Response	FIXM_FF-ICE R1		
	FILING_STATUS	Filing Status	FIXM_FF-ICE R1		
	PLANNING_STATUS	Planning Status	FIXM_FF-ICE R1		
	FLIGHT_PLAN_UPDATE	Flight Plan Update	FIXM_FF-ICE R1		
	FLIGHT_ARRIVAL	Arrival	FIXM_FF-ICE R1		
	FLIGHT_DEPARTURE	Departure	FIXM_FF-ICE R1		
	FLIGHT_CANCELLATION	Flight Plan Cancel	FIXM_FF-ICE R1		
	TRIAL_REQUEST	Trial Request	FIXM_FF-ICE R1		
	TRIAL_RESPONSE	Trial Response	FIXM_FF-ICE R1		
	FLIGHT_DATA_REQUEST	Flight Data Request	FIXM_FF-ICE R1		
	FLIGHT_DATA_RESPONSE	Flight Data Response	FIXM_FF-ICE R1		
	TRACK_RAW	Track Raw Data	ASTERIX Binary Data		
	TRACK_JSON	Track JSON Message	ASTERIX JSON Data		
	TRACK	Track Message	FIXM APAC Extension		
	CTOT	Calculated Take Of Time	FIXM APAC Extension		
	NOTAM	Notices to Airmen	AIXM		
	SAA	Special Activity Airspace	AIXM		

Header Name	Values	Descriptions		Mandatory / Optional	Data Type
	METAR	Aviation Routine Weather Report	IWXXM		
	SPECI	Special weather report	IWXXM		
	TAF	Terminal Area Forecast	IWXXM		
	SIGMET	Significant Meteorological information	IWXXM		
	AIRMET	Meteorological Information	IWXXM		
	VAA	Volcanic Ash Advisory	IWXXM		
DEP_AIRPORT	4 Letter ICAO Code	Departure Airport (used for flight identification)		Optional	String
ARR_AIRPORT	4 Letter ICAO Code	Arrival Airport (used for flight identification)		Optional	String
AIRLINE	Use ICAO Airline	Name of Airline		Optional	String
ACID	FIXM-defined format for ACID	Aircraft Identification (Mandatory for Tracks and Flight Plans)		Conditional Mandatory	String
GUFI	GUFI from message	Globally Unique Flight Identifier		Optional	String
EOBT	EOBT from message	Estimated off-block time (used for flight identification)		Optional	String
FFICE_PHASE	PRELIM	Preliminary phase of FF-ICE		Optional	String
	FILED	Filed phase of FF-ICE (Filed Flight Plan has been sent)		Optional	String
APAC_TIMESTAMP	epoch time	Timestamp of the message out or in the system. The time is to be appended to this field whenever the message is posted into a message queue. This field is delimited with commas E.g. JAL_OUT:1675213637251, JCAB_IN: 1675213638200 Comma delimited string of 64-bit signed integer representing the number milliseconds since Jan 1, 1970 00:00:00.000 UTC		Mandatory	String

6.2.Annex 2 – Data Structure of Surveillance Data for the Joint Event

6.2.1. JSON Structures for Surveillance Data with Flight Plan Information

Data fields below are based on ASTERIX CAT 21 version 2.1 specifications.

Field Name	Type	CAT21 Data Item Reference	Compulsory	Values	Descriptions
GUFI	String	N/A	No	0248982c-4384-49f4-bdb3-7956bd553383	Globally Unique Flight Identifier (obtained from FF_ICE services)
ACID	String	N/A	Yes	TLM912	Aircraft Identification
ADEP	String	N/A	Yes	VTBS	Departure Aerodrome
ADES	String	N/A	Yes	ZGGG	Destination Aerodrome
ARCTYPE	String	N/A	No	A339	Aircraft Type
WKTRC	String	N/A	No	H	Wake Turbulence Category
LAT	Number	I021/130 or I021/131	Yes	18.6701799113899	Latitude (Degree) Use I021/131. If I021/131 does not exist, use I021/130
LONG	Number	I021/130 or I021/131	Yes	103.180853652939	Longitude (Degree) Use I021/131. If I021/131 does not exist, use I021/130
FL	Number	I021/145	Yes	310	Flight Level
GS	Number	I021/160	No	498	Ground Speed (Knot) Use I021/160 x 3600 because I021/160 provides Ground Speed in NM/s
HEADING	Number, Null	I021/152 or I021/160	No	34.2773437344	Heading (Degree) Use I021/152 If I021/152 does not exist, use I021/160 null, if both not exist.

Field Name	Type	CAT21 Data Item Reference	Compulsory	Values	Descriptions
ARCADDR	String	I021/080	Yes	883031	Aircraft Address (ICAO 24-bit Mode S address)
SSRCODE	String	I021/070	No	5035	Mode 3A Code
DT	String	I021/071 or I021/073 or I021/075	Yes	2022-09-13T15:41:3	Date and Time (Date from server date and Time from packet) Use I021/073 If I021/073 does not exist, use I021/075 If I021/075 does not exist, use I021/071 I021/071, I021/073 and I021/075 are time only value. Publishers have to add date themselves.
QITYPE	String	I021/210	Yes	NUCp or NIC	NUCp = Navigational Uncertainty Category for Position NIC = Navigational Integrity Category
QI	Integer	I021/090	Yes	6	Range is 0-11 for NIC and 0-9 for NUCp
SAC	Integer	I021/010	Yes	78	Data Source Identification (SAC)
SIC	Integer	I021/010	Yes	29	Data Source Identification (SIC)

6.2.2. JSON Structures for Surveillance Data only

Data fields below are based on ASTERIX CAT 21 version 2.1 specifications.

Field Name	Type	CAT21 Data Item Reference	Compulsory	Values	Descriptions
ACID	String	I021/170	Yes	TLM912	Target Identification in 8 characters, as reported by the target.
LAT	Number	I021/130 or I021/131	Yes	18.6701799113899	Latitude (Degree) Use I021/131. If I021/131 does not exist, use I021/130

Field Name	Type	CAT21 Data Item Reference	Compulsory	Values	Descriptions
LONG	Number	I021/130 or I021/131	Yes	103.180853652939	Longitude (Degree) Use I021/131. If I021/131 does not exist, use I021/130
FL	Number	I021/145	Yes	310	Flight Level
GS	Number, Null	I021/160	No	498	Ground Speed (Knot) Use I021/160 x 3600 because I021/160 provides Ground Speed in NM/s
HEADING	Number	I021/152 or I021/160	No	34.2773437344	Heading (Degree) Use I021/152 If I021/152 does not exist, use I021/160 null, if both not exist.
ARCADDR	String	I021/080	Yes	883031	Aircraft Address (ICAO 24-bit Mode S address)
SSRCODE	String	I021/070	No	5035	Mode 3A Code
DT	String	I021/071 or I021/073 or I021/075	Yes	2022-09-13T15:41:3	Date and Time (Date from server date and Time from packet) Use I021/073 If I021/073 does not exist, use I021/075 If I021/075 does not exist, use I021/071 I021/071, I021/073 and I021/075 are time only value. Publishers have to add date themselves.
QITYPE	String	I021/210	Yes	NUCp or NIC	NUCp = Navigational Uncertainty Category for Position NIC = Navigational Integrity Category
QI	Integer	I021/090	Yes	6	Range is 0-11 for NIC and 0-9 for NUCp
SAC	Integer	I021/010	Yes	78	Data Source Identification (SAC)
SIC	Integer	I021/010	Yes	29	Data Source Identification (SIC)

6.2.3. Message Header for Surveillance Data with Flight Plan Information

Header Name	Values	Descriptions
APAC_SOURCE	RJ_JCAB	Name of message publisher
APAC_RECIPIENT_LIST	RJ_JAL,VT_AEROTHAI	Name list of recipients (comma delimited)
APAC_CATEGORY	ASTERIX	Name of information exchange model (ASTERIX)
APAC_CATEGORY_VERSION	ASTERIX _CAT021	Version of information exchange model (Data Category of ASTERIX)
APAC_MESSAGE_TYPE	TRACK_RAW or TRACK_JSON	Message type of information exchange model • TRACK_RAW for binary data • TRACK_JSON for JSON data
DEP_AIRPORT	RJAA	Departure Airport
ARR_AIRPORT	VTBS	Arrival Airport
AIRLINE	JAL	Name of Airline
ACID	JAL707X	Aircraft Identification
GUFI	0248982c-4384-49f4-bdb3-7956bd553383	Globally Unique Flight Identifier
EOBT	2023-02-01T03:00:00Z	Estimated Off-Block Time
APAC_TIMESTAMP	JCAB_OUT:1675213637251	Timestamp of the message out or in the system

6.2.4. Message Header for Surveillance Data Only

Header Name	Values	Descriptions
APAC_SOURCE	RJ_JCAB	Name of message publisher
APAC_RECIPIENT_LIST	RJ_JAL,VT_AEROTHAI	Name list of recipients (comma delimited)
APAC_CATEGORY	ASTERIX	Name of information exchange model (ASTERIX)
APAC_CATEGORY_VERSION	ASTERIX _CAT021	Version of information exchange model (Data Category of ASTERIX)
APAC_MESSAGE_TYPE	TRACK_RAW or TRACK_JSON	Message type of information exchange model • TRACK_RAW for binary data • TRACK_JSON for JSON data
ACID	JAL707X	Aircraft Identification
APAC_TIMESTAMP	JCAB_OUT:1675213637251	Timestamp of the message out or in the system

7. Acronyms and Abbreviations

2FA	Two Factor Authentication
ADS-B	Automatic Dependent Surveillance - Broadcast
ALG	Application Layer Gateways
AMQP	Advanced Message Queuing Protocol
ANSP	Air Navigation Service Provider
APAC	Asia Pacific
APANPIRG	Asia/Pacific Air Navigation Planning and Implementation Regional Group
API	Application programming interface
ASBU	Aviation System Block Upgrade
ASTERIX	All Purpose Structured EUROCONTROL Surveillance Information Exchange
ATFM	Air Traffic Flow Management
ATM	Air Traffic Management
bps	Bits per second
CA	Certificate Authority
CONOPS	Concept of Operations
CNS SG	Communications, Navigation and Surveillance Sub-group
CRV	Common aeRonautical Virtual Private Network
CRV OG	Common aeRonautical Virtual Private Network Operations Group
DoS	Denial of Service
DDoS	Distributed Denial of Service
EMS	Enterprise messaging system
FF-ICE	Flight and Flow Information for a Collaborative Environment
FIR	Flight Information Region
GANP	Global Air Navigation Plan
GRE	Generic Routing Encapsulation
HMI	Human Machine Interface
ICAO	International Civil Aviation Organization
IDS	Intrusion Detection System
IPSec	Internet Protocol Security

JSON	JavaScript Object Notation
MET	Aeronautical Meteorological Services
MTBF	Mean Time Between Failure
NIC	Navigation Integrity Category
NUC	Navigation Accuracy Category
PCCWG	PCCW Global
RBAC	Role-based Access Control
S3TIG	Surveillance Sharing in SWIM Trial Implementation Group
SAC	System Area Code
SCDP	Surveillance Central Data Processor
SHA	Secure Hash Algorithm
SIC	System Identification Code
SIM	Subscriber Identity Module
SIPG	SWIM Implementation Pioneer Group
SURICG	Surveillance Implementation Coordination Group
SURSG	Surveillance Study Group
SWIM	System Wide Information Management
SWIM TF	System Wide Information Management Task Force
TFP	Trust Framework Panel
TLS	Transport Layer Security
TOR	Terms of Reference

REPORT FROM BAY OF BENGAL AD HOC WORKING GROUP

25 March to 27 March2026

States Presented:

Bangladesh (not present)
Bhutan
China
India (not present)
Indonesia
Malaysia
Maldives
Nepal (not present)
Pakistan (not present)
Sri Lanka
Thailand

Observer:
Japan

Participants met to update the status of implementation of ADS-B in their states and possible Data sharing between the neighbouring States.

Implementation Updates

1. Bangladesh (Not present, no update provided in 2024 - ~~and~~ 2026)
Not Present

We are trying to modernize our systems through the implementation of ATM project. At first it was in PPP & now it is on G2G with France. This was under the process of government approval. Government approval is granted, and 5 ADS-B receivers will have been installed at detailed below,

Cox's Bazar, Barisal, Saidpur, Dhaka and Sylhet, there is another one for Extended Economic Zone at new area in the Bay of Bengal which is 200NM at south of the country.

2. Bhutan (~~no~~ update in 2026 ~~provided in 2024 and 2026~~)
~~Not Present~~

~~Bhutan cannot join previous SEA/BOB ADS-B meeting as we do have plan to implement ADS-B, but now we are targeting to complete ADS-B feasibility study by mid of 2019 and now it is extended up to mid of 2020.We found out that feasibility study (Coverage and ground station location) is necessary as Bhutan is surrounded by mountain terrain.~~

~~As per the result of feasibility study we are going to implement installation of ground station.~~

~~Bhutan do not have any national policy or regulation about data sharing, so we will be sharing data with any neighbouring countries/states as per the regional norms and conditions.~~

7 ADS-B ground stations started in 2022 covering entire air space of Bhutan. Currently with trial operation in progress, Bhutan use ADS-B for situational awareness.

Bhutan is planning to issue mandatory carriage of ADS-B out equipment and targeted to operation in 2029.
Bhutan is willing to be sharing data with neighbouring states.

3. China (~~status same~~updates in 202~~5~~6)
China has been continuously promoting to push forward the application of ADS-B technology. China provided update on the installation and related activities regarding ADS-B surveillance system as follows:

- 5 UAT ADS-B stations are used for flight training of CAFUC. The upgrade to 1090ES ADS-B stations project has already started in 2017, and the project is finished by 2022;
- 4 ADS-B station in operational in Sanya FIR since 2008;
- Chengdu - Lhasa route with 7 ADS-B stations;
- 9 ADS-B stations deployed on the routes H15 and Z1 by the end of 2015;
- 19 ADS-B station at the small airport; and
- 308 ADS-B stations nationwide have already finished in operation ~~stallation and~~ ~~SAT by~~ at the end of 2018. And there are 2 level-1 data processing centres working in main-standby mode for redundancy, 8 level-2 data processing centres to concentrate data from data stations within its area of responsibility, as well as 36 data stations to collect received data from GSs. All the installation and SAT of GSs, level-2 data processing centres and level-1 data processing centres have already complete. The trial operation has started from October 10, 2019 and the ADS-B mandate had also been published on October 1, 2019, which is effective from October 10.2019.
- With the development of surveillance facilities in China, there are 349 ADS-B stations at the end of 2025.

4. Indonesia (~~update~~ status same ~~in~~in 2025)

Indonesia earlier informed that ADS-B ground station at Aceh is already operational and updated to comply with DO-260B (ver 2) and expressed willingness to share data with India (It was earlier decided to have Port Blair-Aceh data sharing, but for better coverage and usability it was suggested in the meeting to have data sharing of upcoming Campbell Bay ADS-B - Aceh when India is ready).

Indonesia now will share the data with Campbell Bay ADS-B – Aceh only.
Indonesia is proposing to share ADS-B data using CRV Network.
Campbell Bay ADS-B is installed.

Letter of Agreement between Indonesia and India regarding ADS-B data sharing is on progress
Letter of agreement is agreed by Indonesia and India, yet to be signed.

5. Malaysia (updates in 202~~5~~6**)**

~~Malaysia has completed the installation of the two new ADS-B ground station in Langkawi and Genting and were now fully integrated into the new ATM system. Both stations are compliant with DO-260B with output data handling function as plot and tracks (ASTERIX CAT21 ver. 0.23, ver. 0.26 and ver. 2.1.)~~
Malaysia in the process to upgrade~~update~~ ADS-B sensors in Kuala Terengganu and to install 8 new ADS-B sensors and target implementations in 2029. Malaysia is also in process of implementing Space-based ADS-B services to support traffic monitoring over Bay of Bengal with operational readiness target by Q4/2026.

Malaysia is venturing to share ADS-B data with Indonesia, India and Thailand. Data sharing from India (Port Blair or Campbell Bay ADS-B GS), or from Indonesia (Aceh ADS-B GS-) or from Thailand will close the surveillance gap within the KL FIR.

~~The ADS-B data (from Genting and Langkawi) processed through ADS-B central processing system is now integrated into new ATC Systems and is now ready for data sharing. Malaysia is reviewing the sample agreement proposed by India and Indonesia and will revert as soon as possible.~~

6. Maldives (update~~s~~ in 202~~65~~**)**

Maldives started using ADS-B to enhance ATS surveillance capability in Male FIR on 7th February 2016.

With 4 ground stations (2 autonomous stations at Male; 2 unduplicated ground stations: 1 at an island in the North and the other in the South), the ADS-B provides coverage up to 90% of Male FIR above FL290.

~~ADS-B serves as the backup for Male radar and is in use for vectoring and 5NM separation commensurate with Radars~~

As part of the effort towards full implementation of ADS-B, from March 2017 aircraft imported for commercial air transport in the Maldives are required to be equipped with ADS-B Out, as published in AIP ENR 1.6-3.

~~The full implementation, which require carriage of ADS-B Out, was implemented for the year 2021~~

~~Maldives is making efforts to complete the airworthiness approval for all locally registered aircraft, already equipped with ADS-B.~~

~~Maldives is in the process of installing five additional ADS-B Ground Station in 2024, to improve the coverage at low flight levels.~~

Five new ADS-B ground stations were installed in 2024. These stations extend the existing infrastructure and significantly improve surveillance in areas with dense seaplane operations, especially in VFR corridors. ~~Integration of these new ground stations into the ATM system is underway and is expected to be completed by the third quarter of 2025.~~ Although the project was originally scheduled for 2025, several operational requirements emerge during the planning phase. The new requirements were incorporated into the upgrade, resulting in a delay, and are expected to be completed by the end of 2026. With this implementation, the Maldives will look into the possibilities of sharing ADS-B data with neighboring FIRs.

The carriage of ADS-B Out equipment is not yet mandatory within the Maldives FIR. SSR remains as the primary surveillance method.

The complete implementation of ADS-B, which includes mandatory carriage requirements, is targeted for 2027.

7. Myanmar (no update provided in 2024 ~~and~~ 202~~65~~)
Not Present

The 5 ADS-B ground stations have been installed in Myanmar. Among them, Sittwe and Co Co Island ground stations are installed in 2014 and they are DO260 compliant, and Yangon, Mandalay and Myeik airports ground stations are DO260B compliant and installation was finished in 2016.

All ADS-B data are fused with MSSR data target in the Top Sky ATC Automation system (Thales) in 2016, and using as MSSR backup and surveillance monitoring in Yangon ACC.

In addition, Myanmar have planned to install new ADS-B Station in the First quarter of 2020 at Lashio Airport located in north-eastern part of Myanmar closed to the China-Myanmar border near the LINSO transfer point on A599 ATS route. After the installation finished, the ADS-B data sharing process can be proceeded between Myanmar and China *after March, 2020*.

For the communication links between Yangon and Beijing, it can use the existing 2M E1 IPLC link which is now using for AFTN messaging and (AIDC Testing) Voice, and also can be used the existing Yangon-Beijing VSAT link as backup.

Myanmar also willing to participate the special coordination meetings to promote relevant works in terms of the surveillance data sharing among the countries to enhance the safety and surveillance capability in the sub-region.

Lashio installation will be completed by First quarter of 2020.
Redundant Communication link via Land line / CRV / V-SAT is proposed under discussion.

8. India (Not present, no update till 2026~~5~~)

ADS-B Usage and Mandate in India:

India has installed 36 ADS-B ground receivers to enhance redundancy in existing Radar airspace and also to extend Surveillance coverage in low density airports and in certain oceanic airspace. It will also facilitate extension of Surveillance coverage for low altitude (below existing Radar coverage) leading to more efficient use of airspace. ADS-B data is being used for Terminal as well as Enroute Surveillance operations.

Out of 36 ADS-B ground receivers presently ~~30~~ 34 receivers have already been operationalized and efforts are on to operationalize remaining ~~6~~ 2 ADS-B ground receivers soon. Further, India has entered into a contract with M/s Aireon in July 2019 to receive ADS-B data for Oceanic regions of Indian FIR to ensure seamless Surveillance coverage across its oceanic airspace, Space Base ADS-B system has been successfully integrated with Data fusion systems of Mumbai, Chennai, Kolkata and Guwahati and presently being used for situational awareness only.

In order to promote ADS-B usage in India, the Director General of Civil Aviation (DGCA) India has issued ADS-B avionics mandate w.e.f. 01st January 2020, all aircrafts flying over Indian continental airspace at or above FL290, are to be equipped with on-board ADS-B equipment.

9. Sri Lanka (update in 2026~~5~~**)**

Sri Lanka has installed 5, ADS-B stations and data received by the stations have been integrated and available for sharing. The ADS-B coverage is approximately 3350NM from Piduruthalagala, the highest mountain situated in central Sri Lanka. Sri Lanka is willing to share this data with ~~India and Maldives~~ neighbouring FIRs. ~~India is requested to provide a soft copy of draft agreement for sharing of ADS-B data with Sri Lanka so as to enable Sri Lanka to look into the terms and conditions of draft agreement~~.

10. Thailand (update in 2026**)**

Thailand provided update on the installation and related activities regarding ADS-B and other related surveillance system as follows:

ADS-B Ground Infrastructure and ATC System Readiness or Implementation Plan

- ~~4 ADS-B ground stations (DO260B and lower compliant) have been installed at Doi Inthanon (Chiangmai), Hatyai Airport (VTSS), Samui Airport (VTSM) and Ubon Ratchathani Airport (VTUU). Moreover, 3 SSRs at Surat Thani Airport (VTSB), Ubon Ratchatani Airport (VTUU), and Phuket Airport (VTSP) have been upgraded with ADS-B capability. In total, 7 ADS-B stations are under approval process and is expected for air traffic services by the end of 2024.~~
- Thailand has installed 7 ADS-B stations and integrated into ATM system,which has been fully operational since 5 September 2024.
- Thailand is currently in the procurement process for a new SSR system with ground based ADS-B, to be installed at Hua Hin airport (VTPH), and is expected to be operational within the ATM system by early 2027.
- Thailand is in the process of investigating the use of Space-based ADS-B.

Data sharing

- ATS surveillance data sharing with adjacent FIRs was approved in principle in October 2018.

- User requirements, particularly ATS routes to be served, and communication link test plan are discussed in 2018.

11. Nepal (Not present, no update in 2026**)**

Nepal has also completed installation of 4 ADS-B GS at Mt. Phulchowki (Kathmandu), Nepalgunj, Bhairahawa and Dhangadhi Airports and have been integrated with MSDPS.
They are in test operation.

12. **Pakistan (Not present, no update in 2026~~5~~)**

Pakistan has installed a network of nine (9) redundant ADS-B ground stations to enhance its surveillance coverage in areas traditionally underserved by radar, known as grey areas or cones of silence.

Pakistan has phase wise deployed a network of multivendor ADS-B ground stations to enhance surveillance coverage within its airspace. Out of 09 (nine) stations 06 (six) are collocated with MSSR Mode S, however remaining 03 (three) ground stations are deployed independently to enhance surveillance coverage and performance in Grey Areas of Radar Coverage.

In the first phase installation, deployment, and Site Acceptance activities for Islamabad, Rojhan, Pasni and Lakpass were completed in 2019. The remaining 05 sites of Lahore, Karachi, Dalbandin, Zhob and Laramtop were deployed and commissioned in 2023.

The system meets Tier 1 service capabilities as defined in APANPIRG/18, ensuring baseline ADS-B service performance parameters are met. Dalbandin, Zhob, Laramtop, Lahore and Karachi ADS-B ground stations are version 2 i.e. DO-260B compliant. And output target reports in data protocol formats Asterix CAT 21 v2.4, CAT 23 v1.2, CAT25 v1.1 and CAT 247 v1.2.

Islamabad, Lakpass, Rojhan and Pasni ADS-B ground stations are version 2 i.e. DO- 260B compliant. And output target reports in data protocol formats Asterix CAT 21 v1.8, CAT 23 v1.2 and CAT 247 v1.2.

ADS-B Data Sharing

Project 1 - ADS-B Data Sharing between China, Laos and Myanmar (same as 2025)

Phase 1 *China and Laos sharing ADS-B data from following:*
Kunming ADS-B data processing Centre (china), which can customize the output of ADS-B data in version, specific area and height range depend on Laos's requirement.

Route to be affected B465.

China and Myanmar sharing ADS-B data from the following sites:

Lashio (Myanmar) Not yet installed – Target to be installed by March 2020.Route to be affected A599

China and Myanmar sharing ADS-B data from the following:

Kunming ADS-B Data Processing Centre (China), which can customize the output of ADS-B data in version、specific area and height range depend on Myanmar's requirement.

Operational Status
N/A

Expected benefits

- Enhanced air navigation safety at FIRs boundary.
- Promoting air traffic control work efficiency.

Project 2 - ADS-B Data Sharing between India and Indonesia (same as 2025)

Phase 1

Aceh – Indonesia
Camp Bell Bay – India

Route to be affected B466, P574 and N563

Operational Status
ADS-B data from Campbell Bay (India) is proposed to be integrated with Jakarta (Indonesia) ATC centre. Similarly, data from Banda-Aceh (Indonesia) ADS-B is proposed to be integrated with Chennai

(India) ATC centre. Draft Letter of Agreement (LOA) has been shared with Indonesia and necessary Government approval is awaited for implementation of data sharing.

Benefits

Enhanced safety by reduction in occurrences of LHDs and LLDs in BOB region.

Project 3 - ADS-B Data Sharing between India and Malaysia

Phase 1

Port Blair/Campbell Bay - Langkawi ~~(2023)~~
Route to be affected N571, P628, L510, P627, L645 and P574

Operational Status

ADS-B data from Campbell Bay (India) is proposed to be integrated with Kuala Lumpur (Malaysia) ATC centre. Similarly, data from Langkawi (Malaysia) ADS-B is proposed to be integrated with Chennai (India) ATC centre. ~~Draft Letter of Agreement (LOA) has been shared with Malaysia and necessary Government approval is awaited for implementation of data sharing. India and Malaysia are exchanging comments on the Draft LOA.~~
Malaysia and India will have further discussion to establish the new Letter of Agreement (LOA) and data sharing policy upon the issuance of updated guideline from both states.

Expected benefits

Enhanced safety by reduction in occurrences of LHDs and LLDs in BOB region.

Project 4 - ADS-B Data Sharing between India and Myanmar (~~updates till 2025~~ no updates in 2026)

Phase 1

The ADS-B data sharing between Kolkata and Yangon FIR was an initiative taken by India and Myanmar to enhance safety and reduce LHDs along Kolkata-Yangon FIR boundary.

In 6 May 2015, Myanmar and India have signed the MOU agreement for ADS-B data sharing between the two countries.

As per the data sharing agreement, ADS-B data sharing test between Agartala(India) and Sittwe (Myanmar) and Port Blair(India) and Coco Island(Myanmar) has been accomplished between technical teams since June 2018. Kolkata has integrated the ADS-B feed from Sittwe and Co Co Island in its Automation system. Presently the data is given in the back up automation system at Kolkata for test purpose and ADS B equipped aircrafts are tracked from as far as 250 nm west of Bangkok.

But for Myanmar side, India's data is just received to Yangon ACC technical management room and need to discuss with ATM Manufacturer (Thales) of Surveillance Display System to integrate India's ADS-B data to existing Surveillance Display System for operational use in Yangon ACC. Because the multicast address and port from India's ADS-B data are different with existing setup.

The communication link used for ADSB data transfer between Yangon and Kolkata is the existing E1 IPLC link which is used for DSC phone between the two ATS units.

Route to be affected A201, A599, B465, G463, L507, P646, P762, G472, L524, M770 and L759

Operational Status

Operationalized for situational awareness. India-Myanmar data sharing has been completed successfully through under sea cable between Mumbai (India) and Yangoon (Myanmar). Data from Sittwe (Myanmar) and Coco Island (Myanmar) has been successfully integrated with Kolkata Automation system, and there were no reported instability issue. Similarly, data from Agartala (India) and Port Blair (India) has been provided to Yangoon ATC centre.

Expected benefits

Enhanced safety by reduction in occurrences of LHDs and LLDs in BOB region.

Project 5 - ADS-B Data Sharing between Indonesia and Malaysia (updates till 2026~~5~~)

Phase 1

Langkawi - Aceh (TBD)
Route to be affected B466, N571, P628, L510, P627, L645 and P574.

ADS-B data from Aceh (Indonesia) is proposed to be integrated with Kuala Lumpur (Malaysia) ATC centre. Similarly, data from Langkawi (Malaysia) ADS-B is proposed to be integrated with Jakarta (Indonesia) ATC centre. ~~Draft Letter of Agreement (LOA) has been shared with Indonesia and Malaysia and necessary Government approval is awaited for implementation of data sharing.~~

Malaysia and Indonesia is planning to use CRV for the data sharing link.
CAT21 Ver 0.26 format to be used for data sharing.

Operational Status

New ATM Automation system in Kuala Lumpur has been completed and ready for data sharing.
The status of CRV readiness is yet to be discussed to support the project.

Expected benefits

Enhanced safety at FIR boundary

Project 6 - ADS-B Data Sharing between Malaysia and Thailand (updates till 2026~~5~~)

Phase 1

Langkawi - Phuket

General discussion about possibility to share ADS-B data for route N571, P628, L510, P627, L645 and P574. Malaysia and Thailand to continue discussion to exchange views of the possible ADS-B data sharing.

Operational Status

~~Currently on hold until further discussion~~
~~Malaysia has initiated technical discussion with Thailand on ADS-B Data Sharing for Phuket, Hatyai, Langkawi and Kuala Terengganu sensors as the initiative to reduce the surveillance GAP at the BOB area within both FIRs.~~
Malaysia and Thailand have conducted technical discussions on sharing ADS-B data from Phuket, Hat Yai, Langkawi, and Kuala Terengganu. This initiative aims to reduce surveillance gaps in the Bay of Bengal (BOB) within the FIRs of both countries.

Thailand has received ADS-B sample data from the Langkawi station in Malaysia and is currently testing compatibility with the ATM system.

Expected benefits

- Enhanced visibility of surveillance targets in Bay of Bengal.
- Enhanced situational awareness at FIR boundary.

Project 7 - ADS-B Data Sharing between India and Sri Lanka (~~no update provided in 2018 - 2022)~~ (updates till 2026~~5~~)

Phase 1

In view of integration of Space Based ADS-B data, India's requirement of ADS-B data from Sri Lanka is supplemented, by the data from Aireon. Hence there is no further follow up from India on the data sharing. However, in case Sri Lanka desires to have ADS-B data from India, project may be approached, afresh by Sri Lanka.

If any other neighbouring countries are interested. Sri Lanka can resume the project with neighbouring countries.

Operational Status
~~Feasibility studies are being conducted by Sri Lanka~~
This feasibility study is postponed.

Expected benefits

Enhanced safety at FIR boundary

General remark for all the above projects: As agreed at previous ADS-B Task Force, WG and SURICG meetings, sharing of ADS-B data should include sharing of VHF radio facilities/services, where possible

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REPORT FROM SOUTHEAST ASIA SUBGROUP

Bangkok, Thailand, *25 to 27 March 2026*

States Present
China
Hong Kong, China
Indonesia
Lao PDR
Malaysia
~~The Philippines~~
Singapore
Thailand
Viet Nam

Observer
Japan
Macao, China
USA

Previously Identified Projects

The South East Asia Group provided an update on the near-term implementation of the following projects that were identified in previous meetings.

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

Phase 1a
Indonesia and Australia sharing ADS-B data from the following sites:

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

Data Sharing Agreement signed in Nov 2010.
~~;~~
Communications links between Australia and Indonesia were upgraded from VSAT to terrestrial links in Mar 2016. The service quality was improved.

Benefits
Data used for air situational awareness and safety nets.
Enhanced Safety at FIR boundary.
Operational service commenced by Australia in 2010.
Indonesia has been using the data for Tier 2 services since Sep 2014

Phase 1b
Indonesia and Australia plan to share ADS-B data from the following additional sites:

- Timika (Indonesia) (Installed) - Commenced data sharing
- Kupang (Indonesia) (Installed) - Commenced data sharing

- Christmas Island (Australia) (Not yet installed)
- Browse Basin oil rig (Australia) (installed in 2018 and not yet operational)

Based on previous data as Australia was not present.

Data Sharing Agreement signed on 18 Jun 2014.

Sharing agreement extended from 2023 to 2026.

Project 2 – ADS-B Data Sharing In Southeast Asia

Phase 1
Under the near term implementation plan, the parties have commenced ADS-B data sharing from the following sites:

- Singapore (Singapore provide data to Indonesia)
- Natuna (Indonesia provide data to Singapore)
- Matak (Indonesia provide data to Singapore)
- Con Son (Viet Nam provide data to Singapore)
- Sanya FIR (China provide fused data from four ADS-B stations to Hong Kong China)

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

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

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

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

DCPC services agreement between China and Hong Kong China signed in 2005.
ADS-B Data sharing agreement between China and Hong Kong China signed in 2013.

Operational Status
Singapore agreed on separation minima with Viet Nam and have commenced on ADS-B operations since Dec 2013. Singapore commenced with 40nm separation and subsequently reduced to 30nm separation between Singapore and Ho Chi Minh FIR. Further reduction to 20nm longitudinal separation was implemented on 10 Nov 2016.

All 4 administrations (China, Hong Kong China, Singapore and Viet Nam) agreed that operational approval is not required.

Initial Benefits

The above sharing/collaboration arrangements will benefit L642, M771, N891, M753, N892 and L644. Enhanced safety and reduced separation have been achieved. Mandate was effective in Singapore FIR

from Dec 2013. China published the mandate in Oct 2019. Mandate for domestic fleet was effective on 10 Oct 2019. Mandate for international fleet will effective on 31 Dec 2020. Hong Kong China's ADS-B mandate was effective from Dec 2016 for aircraft at FL290 and above.

Phase 2
The Philippines has installed ADS-B station at Manila ATM Centre and Bataraza. It is planning to install other ADS-B stations within Manila FIR.

Singapore and the Philippines signed an MOU in Oct 2015 to make available ADS-B data and VHF facilities at Bataraza, Palawan for Singapore. The project was completed in Aug 2017. The ADS-B of Bataraza is yet to be integrated into Manila ATM Centre and it will be done after the hardware is upgraded.

The Philippines indicated that there is a surveillance gap at Northwestern part of Manila FIR and is studying acquisition of space-based ADS-B data to cover the surveillance gap.

China's four ADS-B ground stations deployed in Sanya FIR may be able to cover parts of the surveillance gap. China is prepared to share its ADS-B data, via its ADS-B data processor, with neighbouring states.

Brunei signed an MOU with Singapore in April 2019 where Brunei shared ADS-B data with Singapore and provide the VHF facilities for Singapore ATC use. Data sharing commenced 1 September 2021.

Singapore and Viet Nam signed an agreement in Jul 2016 to make available ADS-B data and VHF facilities at Ca Mau for Singapore. The facilities were commissioned in Nov 2018.

Operational Status
ADS-B mandate for Singapore FIR for FL290 and above is effective since 27 November 2025.

Phase 3
Vietnam has ADS-B coverage at the Southern part of L625, N892, N884, M767 and M772 and Vietnam is willing to share the ADS-B data with the Philippines and Singapore. The discussion between Singapore and Vietnam is in progress.

The Philippines is studying the use of space-based ADS-B to cover its surveillance gaps.

Malaysia has ~~In addition to sharing~~ ADS-B ~~data from its ADS-B~~ stations in ~~in Terengganu, Malaysia~~ Terengganu, ~~is also willing to share the ADS-B data from its ADS-B stations in~~ Kuching~~g, Bintulu,~~ and Kota Kinabalu ~~and Sandakan~~. Currently, Malaysia is reviewing their data sharing policy. Once this is finalised, Malaysia will re-initiate the discussion. ~~The data from these four stations are also useful to Indonesia and will be shared under Project 3.~~ Singapore is still willing to share data from its Singapore ADS-B station with Malaysia.

Malaysia and Singapore will initiate discussions on data sharing from the following sites:

- Terengganu (Malaysia) - Installed
- ~~Bintulu (Malaysia) - Installed~~
- Kota Kinabalu (Malaysia) – Installed
- Kuching (Malaysia) – Installed
- ~~Sandakan (Malaysia) - Installed~~
- Singapore (Singapore) - Installed

Initial benefits

Enhanced Safety at FIR boundary and coverage redundancy

Project 3 – ADS-B data sharing between Indonesia and Malaysia

Indonesia and Malaysia are willing to share the ADS-B data from the following sites:

- Pontianak (Indonesia) – Installed
- Tarakan (Indonesia) - Installed
- ~~Bintulu (Malaysia) – Installed~~
- Kota Kinabalu (Malaysia) – Installed
- Kuching (Malaysia) – Installed
- ~~Sandakan (Malaysia) - Installed~~

Malaysia is reviewing their data sharing policy. Once this is finalised, Malaysia will re-initiate the discussion ~~Malaysia and~~with Indonesia. ~~are reviewing the collaboration agreement.~~

Initial benefits
Enhanced Safety at FIR boundary and coverage redundancy

Project 4 – ADS-B data sharing between Cambodia, Thailand and Viet Nam

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

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

Based on previous data as Cambodia is not present.

Viet Nam completed installing 11 new ADS-B stations in the HCM FIR in 2023. Viet Nam is willing to share data with Cambodia and Thailand.

Thailand has 4 ADS-B ground stations (DO260B and lower compliant) installed at Doi Inthanon (Chiangmai), Hatyai Airport (VTSS), Samui Airport (VTSM) and Ubon Ratchathani Airport (VTUU). Moreover, 3 SSRs at Surat Thani Airport (VTSB), Ubon Ratchathani Airport (VTUU), and Phuket Airport (VTSP) have been upgraded with ADS-B capability. In total, 7 ADS-B stations implemented and operational since 5 September 2024.

Thailand updated that they are in the process of procuring new Mode S SSR system with ground-based ADS-B capability to be installed at Hua Hin Airport (VTPH). This is expected to be operational in ATM System by early 2027.

Initial benefits
For redundancy

Project 5 – ADS-B data sharing between Indonesia and the Philippines

Indonesia and the Philippines initiated discussion in 2019 on data sharing:

- Melonguane (Indonesia) (installed)
- General Santos (The Philippines) (Under procurement)

Based on previous data as The Philippines is not present in the meeting.

Initial benefits
Situational awareness

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

Data Sharing between Australia and Papua New Guinea -

- Thursday Island (Australia) (installed)
- Gove (Australia) (installed)
- Kintore (Australia) Not yet installed – Target to be installed by 2027
- Burns Peak – Port Moresby (PNG) (installed)
- Mt Robinson (PNG) (to be installed by 2018) or Mt Nauwein (to be installed by 2018)

The above data sharing proposal will be re-evaluated due to implementation of space-based ADS-B in Papua New Guinea

Based on previous data as Australia and Papua New Guinea were not present in the meeting.

Data Sharing between Indonesia and Papua New Guinea

- Mt Nauwein (PNG) (to be installed by 2018) ~~– Phase 1~~
- Merauke (Indonesia) (installed) ~~– Phase 1~~
- ~~Jayapura (Indonesia) (installed) – Phase 2~~
-

Based on previous data as Papua New Guinea were not present in the meeting.

New ATM system installed in PNG.
The parties have yet to sign the agreement.

The above data sharing proposal will be re-evaluated due to implementation of space-based ADS-B in Papua New Guinea.

Project 7 – Lao PDR

Data Sharing between Lao PDR and Thailand

Lao PDR is willing to share the ADS-B data from the following site:

- Savannakhet (installed in 2017)

Lao PDR expressed desire to obtain data from Thailand to cover surveillance gaps.

ADS-B sample data has been exchanged between Ubon Ratchathani, Thailand and Savannakhet, Lao PDR. They are in the process of compatibility testing with the ATM Systems.

~~Lao PDR expressed desire to obtain data from Thailand to cover surveillance gaps.~~

There will be further discussion between Lao PDR and Thailand after the technical study.

General remark for all the above projects: As agreed at previous APAC ADS-B Task Force, WG and SURICG meetings, sharing of ADS-B data should include sharing of VHF radio facilities/services, where possible

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ADS-B Data Sharing Implementation Status in the Asia/Pacific Region

Related States/Administrations	ATS Route Served	Initiation Year	Agreement Date	Target Data Sharing Year	Implementation Status	Remarks/Challenges
Australia - Indonesia	Phase 1a L511, R592, G578, B349, M735, G326, A587, M768, A461, R340, B472, B473, G459	2010	2010	2010	Completed	SEA Report: Project 1
	Phase 1b M774, A458, J199, M766, G326, A587, L895, A585	2014	2014	TBD	Ongoing	Browse Basin oil rig (Australia) awaiting acceptance testing
Australia - Papua New Guinea	TBDN				Ongoing	SEA Report: Project 6 (to be re-evaluated due to the implementation of space-based ADS-B in Papua New Guinea)
Brunei - Singapore	M758, M768, M767	2015	2019	2021	Completed	SEA Report: Project 2 Data sharing start Sep 2021
China – Hong Kong, China	Project 1 M771, L642	2010	2013	2013	Completed	
	Project 2 M771, L642, A1	2017		2018	Completed	Supplementary data sharing of Route A1
China - Lao PDR	A581, B465 B218	2019		TBD	Ongoing	BOB Report: Project 1
China - Myanmar	A599	2019		TBD	Ongoing	BOB Report: Project 1
India - Indonesia	B466, P574, N563	2018		20265	Ongoing	BOB Report: Project 2 ADS-B data from Campbell Bay (India) is proposed to be integrated with Jakarta (Indonesia) ATC centre. Similarly, data from Banda-Aceh (Indonesia) ADS-B is proposed to be

Related States/Administrations	ATS Route Served	Initiation Year	Agreement Date	Target Data Sharing Year	Implementation Status	Remarks/Challenges
						integrated with Chennai (India) ATC centre. Draft Letter of Agreement (LOA) has been shared with Indonesia and necessary Government approval is awaited for implementation of data sharing.
India - Malaysia	N571, P628, L510, P627, L645, P574	2017		TBD~~2025~~	Ongoing	BOB Report: Project 3 ~~ADS-B data from Campbell Bay (India) is proposed to be integrated with Kuala Lumpur (Malaysia) ATC centre. Similarly, data from Langkawi (Malaysia) ADS-B is proposed to be integrated with Chennai (India) ATC centre. Draft Letter of Agreement (LOA) has been shared with Malaysia and necessary Government approval is awaited for implementation of data sharing. India and Malaysia are exchanging comments on the Draft LOA.~~
India - Myanmar	A201, A599, B465, G463, L507, P646, P762, G472, L524, M770, L759	2015	05/06/2015	2018	Completed	BOB Report: Project 4 Myanmar side: Discussion with ATM manufacturer for operational use at ACC is needed. Indian side completed.
Indonesia - Papua New Guinea	R204, A215, B462, B456	2018		TBD	Ongoing	SEA Report: Project 6 (to be re-evaluated due to the implementation of space-based ADS-B in Papua New Guinea)
Indonesia - Malaysia	B466, N571, P628, L510, P627, L645 and P574	2017		TBD	Ongoing	BOB Report: Project 5

Related States/Administrations	ATS Route Served	Initiation Year	Agreement Date	Target Data Sharing Year	Implementation Status	Remarks/Challenges
Indonesia-Malaysia	**Project 3** R455, M772, B648, R223, M522, M768 and A211	2023		TBD	Ongoing	SEA Report: Project 3 To be reviewed after Malaysia completes the data sharing policy
Indonesia - Philippines	A461, R590, B472	2018		TBD	Ongoing	SEA Report: Project 5
Indonesia - Singapore	M646, M758, M761, -N875	2010		2013	Completed	SEA Report: Project 2
Malaysia - Singapore	Phase 3~~Project 1~~ M758, M768, L649,	2017		TBD	Ongoing	SEA Report: Project 2
	~~Project~~ Phase ~~2~~3 M904, M765, N875, N891	2018		TBD	Ongoing	SEA Report: Project 2
Malaysia - Thailand	N571, P628, L510, P627, L645, P574	2018		TBD	Ongoing	BOB Report: Project 6
Myanmar - India	Project 1: Effect on Myanmar A201, A599, B465 Effect India: G463, L507, P646, N895	2018	2015	TBD	Ongoing	Data communication between Myanmar and India is stable with two links. Different Multiaircraft Address from India ADS-B Data
	Project 2: L301, M770	2019	2016	2020/2021	On trial	-
Philippines - Singapore	N884, M522, M754, M767, M772, L649	2018		2018	Completed	SEA Report: Project 2
Singapore - Vietnam	**Project 1** N892, N891, M771, M753, M758, L642, L644	2007		2013	Completed	SEA Report: Project 2

Related States/Administrations	ATS Route Served	Initiation Year	Agreement Date	Target Data Sharing Year	Implementation Status	Remarks/Challenges
	Project 2 N892, N891, M771, M753, M758, M904, L642, L644	2014	2016	2018	Completed	SEA Report: Project 2
Lao PDR – Thailand	A202, A1	2025	TBD	TBD	Ongoing	SEA Report: Project 7

SN	Reference	Who	What	Due date	Status	Completed on	Result	Comment
35	D-3	Co-chairs and hosting States	Harmonization with air space users (in SURICG2)		close	Propose to close	The "Harmonization with airspace user" came from the objective of the dissolved Mode S DAPS WG, where the harmonization came from the ToR endorsed in SURICG/2. Since this is an ongoing item and has been re-merged back into the ToR of SURICG, I believe the item has already incorporated in the work of SURICG thus could be suggested for removal from the list.	Invite avionics manufacturers and airlines to share experience, where possible.
36	D-10	Co-chairs, ICAO	Reservation of II codes 14 and 15 for Research, Test and Military Purposes (DAPs WG/5)		close	Propose to close	COMPLETED New stategy adopted.	To decide when significant number of radars migrated from II to Surveillance Identifier (SI) codes. ICAO APAC will make a conscious effort to avoid allocating II 14 and 15 (and the matching SI codes) to new radars unless due to capacity issue.
37	D-11	China	Update IGD with the discussion outcome on IC planning and coordination (DAPs WG/6)	Target in 2025	close	Expected paper/IGD from China	The Edition 6.0 of the Mode S IGD was submitted last year. The main amendments to this version were the addition of some achievements from DAPs/6, such as the general strategy on the assignment of and migration to SI code that has been adopted during the 34th APANPIRG meeting. And there was also a change in the strategy to migrate from II codes to SI code in SURICG/9. The meeting finally decided to delay the update of the Mode S IGD to this year. This year only these related contents will be updated. I think there is no need for a paper to introduce the revised document. And the revised document will be submitted to you as soon as possible. Thank you	Revised IGD was presented in SURICG10
38	D-12	ICAO	Workshop on the use of Mode S and DAPs and Assignment of /migration to II/SI codes (DAPs WG/6)	Target in 2027	Open		Plan with FF SUR module	
39	9-1	Member States, ICAO Secretariat	Continue monitoring GNSS vulnerability issue and consider revising the regional surveillance strategy when necessary		Open		GNSS is a global issue. Continue to coordinate with HQ for global guidance.	
40	9-2	ICAO Secretariat	Incorporate updates from States during SURICG/9 into e-ANP Volume II Table CNS II-APAC-3 SURVEILLANCE through the PfA process.		close		replaced by action item from SURICG10	
41	9-3	Member States	Incorporate individual statistics and trend analysis on equipage similar to IP/20 of SURICG/9 for future meetings to see any need for another initiative on new equipage mandate in future.		close			
42	10-1	SURSG	SURSG will review final list of APAC Common SWIM Surveillance Information Services was prepared by the SURICG/10 meeting and provide further updates, if any, to publish in the next version of APAC Common SWIM Surveillance Information Services.		close		reviewed by SURSG/5	
43	10-2	ICAO Secretariat	During the discussion of the next meeting date of SURSG, it was stated that the next Meeting will be planned before the SURICG/11 Meeting in 2026		close		SURSG/5 is scheduled for 23–24 March 2026, and SURICG/11 is scheduled for 25–27 March 2026.	
44	10-3	USA	8.17 The Meeting noted that a Performance-Based Surveillance Sub-Group (PBSSG) is discussing using a cooperating surveillance system for separation, not for non-cooperative systems. However, the proposal to add non-cooperative sensors can be shared with the group by Alex from the USA during next week's Meeting from 28 – 30 April 2025		close		Alex prepared WP/07 for SURICG/11 on the relevant updates under Surveillance Panel	

SN	Reference	Who	What	Due date	Status	Completed on	Result	Comment
45	SG-1	SURICG, ICAO Secretariat	SURSG recommended SURICG consideration for requesting SP to discuss the global surveillance data exchange format	SURICG/11	close			
46	SG-2	Singapore	Singapore suggested that an information paper be presented at the upcoming SP meeting on this topic, including various considerations shared by the SWIM TF Co-chair	SURICG/12	Open			
47	SG-3	SURICG, ICAO Secretariat	For the request to consider the review of the APAC Common SWIM Information Services document as a standing meeting agenda item for future meetings and subsequent update to SWIM TF, as both SWIM and the associated required Information Services continue to evolve regionally and globally, the Meeting agreed that if SURSG is dissolved by the SURICG/11 Meeting, the list of APAC Common SWIM Surveillance Information Services document will be part of the agenda items of SURICG and the list will be updated by the SURICG meeting in the future	SURICG/12	Open			
48	SG-4	ICAO Secretariat	The Meeting deliberated in length on the initial set of APAC Common SWIM Surveillance Information Services and provided inputs and comments. The revised APAC Common SWIM Surveillance Information Services agreed by the meeting is provided in Appendix B using “Track Changes” and will be proposed to the SURICG/11 and SWIM TF/11 for further discussion	SURICG/11	close			
49	SG-5	ICAO Secretariat	The Meeting recommended that Guidance Material for the sharing of surveillance data in SWIM should be added as a reference document for APAC Common SWIM Surveillance Information Services to support service implementers. As Task 6 of SWIM TF is working on adding relevant references to all services listed in APAC Common SWIM Information Services, it was suggested that this information be shared with Task 6 of SWIM TF. ICAO Secretariat will share this information with the Task 6 Task Leads	SURICG/12	Open			
50	SG-6	SURICG, ICAO Secretariat	The Meeting was informed that, as SWIM development in the region is ongoing, it was anticipated that future updates on the Guidance Material would be necessary, especially on any further required details of the surveillance information services. SURSG proposed that SURICG assume this responsibility and respond appropriately when the relevant standard(s) mature. The Meeting agreed to the proposal and requested that the ICAO Secretariat share this recommendation from SURSG for SURICG consideration	SURICG/12	Open			

SN	Reference	Who	What	Due date	Status	Completed on	Result	Comment
51	11-1	Member States	Regarding the impact of potential removal of unused protocols in ICAO Annex 10 Vol 4, the meeting encouraged States to further review after the meeting whether any of these protocols are currently used in their systems and provide feedback before August 2026 to Co-chairs and the Secretariat, if there could be any operational or technical impact.	Aug 2026	Open			
52	11-2	Thailand, Singapore	Thailand volunteered to lead a study on the terminology of “FPL” in the revised list of APAC Common SWIM Surveillance Information Services, with participation from Singapore	SURICG/12	Open			
53	11-3	China	China volunteered to study the inclusion of a footnote to better reflect both surveillance data and flight plan information in the “Type of Information” field	SURICG/12	Open			
54	11-4	China	China indicated that the method for radar azimuth and range monitoring is still not sufficiently mature, and expressed its willingness to continue further study and provide updates at future meetings before considering its inclusion as guidance in the IGD.	SURICG/12	Open			
55	11-5	Member States	The Co-Chair indicated plans to engage industry, including vendors and relevant ICAO panels, to provide inputs and presentations on emerging technologies for future meetings. States were encouraged to submit papers and share developments. The United States expressed interest in presenting national initiatives and new surveillance applications at the next meeting.	SURICG/12	Open			

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LIST OF WORKING/INFORMATION PAPERS

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		WORKING PAPERS	
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WP/02	3	Review of Outcomes of Relevant Meetings	Secretariat
WP/03	4	Review of Outcomes of SURSG/5	Secretariat
WP/04	5	Outcomes for Survey on APAC Surveillance and DCPC Coverage	Hong Kong China
WP/05	5	Review Regional Surveillance Requirements	Secretariat
WP/06	7	Future of ADS-B APRD	Singapore
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WP/08	12	Review ToR and Action Items	Secretariat
WP/09	13	Update on SSR module of Frequency Finder Tool	Secretariat
WP/10	3	Impact of Potential Removal of Unused Protocols in ICAO Annex 10 Vol 4	Singapore
		INFORMATION PAPERS	
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IP/02	7	Status Update on the ADS-B Performance Monitor Under Development at ENRI	Japan
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IP/08	7	Update on Challenges Finding the Cause of Non-Compliant ADS-B Data and GPS Interference	New Zealand
IP/09	8	Update on New Zealand Surveillance Status	New Zealand

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IP/10	8	Use of ADS-B Only Data for Surface Situational Awareness to Reduce the Risk of Runway Incursions and Provide a More Efficient ATC Service	New Zealand
IP/11	8	Implementation of ADS-B TIER 1 Operations below FL290 within the Surveillance Airspace of Colombo FIR	Sri Lanka

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