International Civil Aviation Organization

Twelfth Meeting of the South China Sea Traffic Flow Review Group (SCSTFRG/12)

Bangkok, Thailand, 11 – 12 November 2024

Agenda Item 2: Review of the Current and Planned CNS/ATM Capabilities and Identifying Associated Reduced Horizontal Separation

THE OUTCOMES OF THE RELEVANT MEETINGS

(Presented by Secretariat)

SUMMARY

This paper presents a summary list of outcomes from An-Conf/14, ATM/SG/12, and FIT-Asia/14, RASMAG/29 relevant to the meeting.

1. INTRODUCTION

1.1 The 14th ICAO Air Navigation Conference (AN-Conf/14), held from August 26 to September 6, focused on advancing air navigation with an emphasis on efficiency, modernization, and safety. Key outcomes included frameworks for implementing initiatives like longitudinal separation and Free Route Airspace (FRA) in the near term. Delegates also addressed phasing out legacy systems in favor of advanced planning mechanisms, targeting a global transition by 2034. These initiatives aim to improve air traffic flow, reduce environmental impacts, and enhance operational efficiency.

1.2 The Twelfth Meeting of the Air Traffic Management Sub-Group (ATM/SG/12) of the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG) was held from 23 to 27 September 2024 at the Kotiate Wing of the ICAO Asia and Pacific Regional Office, Bangkok, Thailand.

1.3 The Fourteenth Meeting of the FANS Interoperability Team-Asia (FIT-Asia/14) and the Twenty-ninth Meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/29) were held in Bangkok, Thailand, from 16 to 19 July 2024 and 19 to 22 August 2024 respectively.

2. DISCUSSION

AN-CONF/14 Outcomes

2.1 The conference concluded with high-level recommendations in air navigation and safety, which will be submitted to the Council for approval and, where appropriate, for endorsement by the 42nd Assembly in 2025.

2.2 In reviewing AN-Conf/14-WP/75, Revision No. 1 presented by International Air Transport Association (IATA) and International Business Aviation Council (IBAC), supported by the

International Federation of Air Traffic Controllers' Associations (IFATCA), the Committee noted that airspace disruptions have increased in recent years with airlines continuing to face challenges impacting efficient operations around airspace that are no longer available for civil aviation, sometimes for extended periods.

2.3 As a result of the discussion, the Committee agreed on the following recommendation:

Recommendation 1.1/2: Resilience of the air navigation system

That States:

a) implement airspace optimisation initiatives covered by ICAO provisions, such as air traffic flow management, flexible use of airspace and civil-military cooperation;

b) share advance information related to anticipated disruptions; and

that ICAO:

c) together with States and industry, develop global guidance on air traffic management contingency management, including the recovery phase, as well as regional frameworks, to support the implementation of Annex 11 – Air Traffic Services.

2.4 The Committee reviewed AN-Conf/14-WP/10, presented by ICAO, regarding the proposed Project 30/10. This initiative aims to improve the operational efficiency of the global air navigation system by implementing longitudinal separations of 55.5 km (30 NM) or less in oceanic and remote airspace, and 19 km (10 NM) or less elsewhere.

2.5 As a result of the discussion, the Committee approved the following recommendations:

Recommendation 3.1/1: Project 30/10 – Optimised implementation of longitudinal separation minima

That States:

a) within the processes of the planning and implementation regional groups, actively collaborate with neighbouring States to implement Project 30/10 – implementation of longitudinal separations of 55.5 km (30 NM) or less in oceanic and remote airspace, and 19 km (10 NM) or less elsewhere;

that ICAO:

b) through the planning and implementation regional groups, develop regional action plans for the implementation of Project 30/10;

c) support inter-regional collaboration for a harmonized implementation of Project 30/10; and

d) consider other minimum service level procedures, via a framework, for implementation in oceanic and remote airspace.

2.6 In reviewing AN-Conf/14-WP/60, AN-Conf/14-WP/48 and AN-Conf/14-WP/70, the Committee noted the benefits of trajectory-based operations (TBO) in improving the predictability of aircraft movement and flight efficiency, as well as in increasing utilisation of available capacity and operator flexibility. While acknowledging that there would be varying degrees of readiness to

implement TBO in different States and regions, the Committee stressed the importance of a well prepared and coordinated implementation of TBO to accrue more substantial and immediate benefits.

2.7 As a result of the discussion, the Committee approved the following recommendations:

Recommendation 3.1/3: Enabling successful deployment of trajectory-based operations

That States:

a) and regions expedite the implementation of TBO enablers that are considered mature and relevant;

b) support ICAO in expediting its work programme on TBO and its enablers, including the development of a plan and timeline for their implementations;

that ICAO:

c) develop and maintain an ICAO work programme addressing the full scope of TBO;

d) develop ICAO provisions and guidance for automated air-ground trajectory synchronization; and

e) investigate the need for the evolution of service priority policy in support of TBO implementation.

2.8 The Committee, in recognising that expansion of free route airspace (FRA) initiatives across airspace boundaries should increase operational efficiency and contribute to reduced fuel consumption, agreed that the question of whether additional ICAO provisions and guidance material were necessary to facilitate harmonised FRA implementation should be referred to the appropriate expert group(s) for further consideration.

2.9 As a result of the discussion, the Committee approved the following recommendations:

Recommendation 3.1/4: Free route airspace

That States:

a) actively collaborate with neighbouring States to implement FRA;

that ICAO:

b) consider the need for provisions and guidance material to support harmonized implementation of FRA, including implementation across airspace boundaries and regions.

2.10 The Committee reviewed several working papers, including AN-Conf/14-WP/11, which outlined progress in developing global provisions for implementing flight and flow – information for a collaborative environment (FF-ICE) services and proposed 2034 as the target date to cease FPL2012 operations. To support this, the importance of an inclusive, coordinated approach at national and regional levels was emphasised, along with collaboration among States and guidance from ICAO.

2.11 As a result of the discussion, the Committee approved the following recommendations:

Recommendation 3.2/2: Transition to flight and flow – information for a collaborative

environment services and cessation of ICAO 2012 flight plan by 2034

That States:

a) in support of the 2034 global cessation of the ICAO 2012 flight plan, commence the development of a national plan to transition FF-ICE services along with industry stakeholders;

b) include plans for the implementation of both minimum and optional FF-ICE services in the national air navigation plans;

c) share experience and resources for the implementation of FF-ICE services;

d) and planning and implementation regional groups, consider establishing regional focus groups for coordinating the planning and implementation of FF-ICE services and providing necessary support throughout the transition period;

e) support and contribute to the work of their respective planning and implementation regional group and their sub-groups to develop a regional plan to transition to FF-ICE services on the basis of the 2034 global cessation of the ICAO 2012 flight plan.

that ICAO:

f) amend relevant ICAO provisions and guidance material to enable the 2034 global cessation of the ICAO flight plan and associated air traffic services messages;

g) through planning and implementation regional groups, provide guidance and support for the development of regional plans to transition to FF-ICE to enable the 2034 global cessation of the ICAO 2012 flight plan;

h) support inter-regional collaboration for a harmonized implementation of and transition to FF-ICE services;

i) monitor and support the progress of FF-ICE services implementation and transition plan developments of States; and

j) conduct a periodic assessment and report on the readiness of the global air traffic management community for the 2034 global cessation of the ICAO 2012 flight plan.

2.12 The relevant Conference papers, reference documents and Draft Reports of the **AN CONF/14** are available at: https://www.icao.int/Meetings/anconf14/Pages/Draft-Reports.aspx.

ATM SG/12 Outcomes

Updating the Asia/Pacific Seamless ANS Plan (WP/04)

2.13 The Meeting reviewed Seamless ANS Plan V3.5. Following meeting discussion, the Secretariat had prepared Seamless ANS Plan V3.6 for review by 08 October 2024

2.14 The meeting adopted the following Draft Conclusion in order to update the Seamless ANS Plan, for APANPIRG/35's consideration.

Draft Conclusion ATM/SG/12-1: Asia/Pacific Seamless ANS Plan

That, given the urgency and priority of Air Navigation Service (ANS) planning and modernization, and the lack of progress in implementing the Aviation System Block Upgrade (ASBU) Block 0, Asia/Pacific States are urged to review Version 4.0 of the Asia/Pacific Seamless ANS Plan.

Regional Air Navigation Plan Update (WP/10)

2.15 ICAO presented an update on the progress of incorporating coordinate data for Asia/Pacific FIRs and Search and Rescue Regions (SRRs) in the Regional Air Navigation Plan (ANP) Volume I. States should note that Doc 9673 did not provide a legal description of the FIRs in the first place, it was very important for States to understand that this process of checking, alignment and validation is crucial if they would like a formal basis for their FIRs.

Regional Supplementary Procedures Doc 7030 Update (WP/13)

2.16 The Secretariat informed the meeting that when New Zealand, jointly with several States, submitted a PfA to SUPPS for implementing ADS-B ITP and ADS-C CDP, ICAO Headquarters deemed parts of these proposals unnecessary. At the Tenth Meeting of the ATM Sub-Group of APANPIRG in October 2022, New Zealand sought clarification on separation minima requiring a supporting SUPPS procedure. Their Draft Conclusion was agreed upon and referred to ICAO for technical review.

Conclusion APANPIRG/33/5: Provide clear direction on Doc 7030 Regional SUPPs publication requirements

That, ICAO provides clear direction on which separation minima require Doc 7030 Regional SUPPS publication to provide consistency in the information published in the different regions.

Rationalization of Navigation Infrastructure (WP/15)

2.17 Civil aviation had a high dependence on GNSS for communications, navigation and surveillance (CNS). The rising prevalence of GNSS RFI, spoofing and jamming posed a significant risk to aircraft safety and operational efficiency. According to IATA's analysis of data from over 370,000 flights, many current GNSS aircraft receivers would take 30 minutes to recover from RFI, and others required a ground maintenance reset to regain normal functionality.

2.18 IATA proposed that States and ANSPs consider current and future risks associated with GNSS RFI when developing and reviewing plans for decommissioning conventional navigation aids, as well as re-evaluate existing ground-based navigation aids (GBNA) and establish a minimum operating network (MON) of GBNA that could guarantee continued flight safety in the event that GNSS was unreliable or unavailable. This involved retaining some essential GBNA beyond 2030 and actively collaborating with airspace users to establish regional MONs that could mitigate GNSS RFI risks.

2.19 The Chair acknowledged the significance of GNSS interference and its major impact on ATS and airspace users. As a result, it was advised that States/Administrations develop standard operating procedures for air traffic controllers to manage GNSS interference, as well as reporting processes for airspace users to the relevant ATS.

Towards Harmonised Realisation of the ICAO Global Trajectory based Operations (TBO) Concept in the Asia and Pacific Regions (WP/17)

2.20 The paper provided an update on the APAC TBO Pathfinder Project, which was initiated by the Asia Pacific Air Navigation Service Provider (ANSP) Committee (AAC). The project's goal was to harmonise implementation planning for the ICAO global TBO concept in the APAC region. It aimed to accelerate the development and deployment of key TBO components like SWIM and FF-ICE/R1. Additionally, the project sought to advance future releases of FF-ICE and the Connected Aircraft concept through discovery methods such as tabletop exercises, laboratory demonstrations, and trials.

2.21 A summary of the work done by the three out of four workgroups (WGs):

WG1: Focused on effective communication with TBO stakeholders to modernise air navigation in the APAC region. They developed a draft education framework covering the TBO concept, benefits, implementation requirements, stakeholder discussions, the airline's perspective, and lessons from past trials.

WG2: Identified operational values for the APAC region in preparation for the FF-ICE/R1 lab demonstration in June 2025. They worked on operational scenarios, discussed tiered participation levels, and shared examples of SWIM connectivity and FF-ICE/R1 service implementation.

WG3: Discussed metrics for evaluating TBO benefits, agreeing to use and customise GANP KPIs. They decided to analyse historical data to identify inefficiencies and explore data sharing for end-to-end trajectory analysis, starting with a small sample from recent months.

2.22 In the APAC region, varying readiness levels were anticipated, with a key focus on managing air traffic in a mixed-mode environment. States and regions prioritised accelerating the planning and implementation of mature TBO technical enablers while ICAO continued work on harmonising these implementations at both regional and global levels.

2.23 Moreover, numerous participants underscored the critical need for a comprehensive regional roadmap for TBO. They strongly advocated for its integration into the 2026 update of the Seamless ANS Plan, emphasising that such a roadmap is essential for ensuring cohesive and efficient implementation across the region.

Cross-Border Direct Routing Operations (DRO) between Indonesia and Singapore (WP/18)

2.24 The paper detailed the joint efforts of Indonesia and Singapore in implementing cross border DRO based on the Free Route Operations (FRTO) concept. The goal was to improve flight efficiency and allow airspace users to choose preferred routes, marking an initial move towards TBO.

2.25 The development of FRTO was essential for achieving flexible trajectories in the ICAO ASBU. FRTO allowed airspace users to plan their own routes instead of following fixed ATS networks. With FF-ICE/R1 services starting in November 2024 and regional SWIM implementation expected by 2030, it was timely for APAC States/Administrations to consider FRTO to benefit from future ATM digitalisation and transformation.

2.26 Indonesia and Singapore collaborated on cross-border DRO on ATS route G579, conducting an operational trial from 21 March to 04 September 2024, which showed a 30% utilisation rate. Following the trial, the cross-border DRO was jointly implemented on 05 September 2024. Both States planned to enhance engagement with operators and explore further cross-border DRO opportunities.

2.27 The cross-border DRO between Indonesia and Singapore was a key step in improving

regional air traffic management. This initiative, along with multilateral projects like the Southeast Asia Oceania Free Route Airspace, aims to enhance safety and efficiency. Active collaboration could help the Asia/Pacific region to achieve the ICAO's vision of TBO and support the goal of net-zero carbon emissions by 2050.

2.28 The Chair advocated for enhanced collaboration with neighbouring FIRs. He emphasised the importance of learning from successful cross-border initiatives, particularly citing the cooperation between Indonesia and Singapore. This example served as a powerful reminder of the benefits that could be achieved through effective partnership and coordination across borders.

Updates on ATM Activities in Vietnam (IP/14)

2.29 This information paper presented an overview of recent developments in the field ATM in

2.30 Viet Nam including areas of modernisation of ATM systems, infrastructure development, airspace, ATS routes and flight procedure optimisation, human resource development, cooperation on ATFM and revision of ATC Letter of Agreements (LOAs), cooperation on ATFM and operational trial with Level 3 nodes, revision of ATC LOAs and separation standards, AIM and Viet Nam's preliminary USOAP audit results.

Progress Update on Capacity Optimisation of Air Routes L642 and M771 (WP/25)

2.31 This paper presented the progress update on the enhancement of longitudinal spacing on ATS routes L642 and M771 to follow up on one of the action items agreed as Priority Area 2 in the region.

2.32 An operational trial was conducted between all concerned States and Administrations to adopt 20 NM minimum longitudinal spacing for L642 and M771 between 0200 and 1200 UTC on daily basis for aircraft pair cruising at or above FL290; equipped with serviceable ADS-B; and with constant or increasing longitudinal spacing.

2.33 During the trial period, aircraft without serviceable ADS-B shall cruise at FL280 or below unless prior approval was sought from the receiving ATCC/ACC.

2.34 ICAO APAC Regional Sub-Office queried on the expected trial period. Hong Kong China claimed that the trial would continue until further notice since large scale weather deviation in South China Sea often prohibit the operation with reduced longitudinal separation. China agreed with Hong Kong China's view and encouraged neighbouring FIRs work together to make more progress.Singapore expressed that they would share the experience in dealing weather deviation with Viet Nam in the upcoming SCSTFRG meeting.

Optimisation of ATS Routes A461, M501 and A583 (WP/26)

2.35 This paper presented the outcome of enhancing the minimum longitudinal spacing on ATS routes A461, M501 and A583 between the Philippines and Hong Kong China. 30 NM minimum longitudinal spacing would be implemented in three phases.

2.36 Phase 1 and Phase 2 implementation was completed in February 2023. 30 NM minimum longitudinal spacing was applicable to traffic pair on ATS routes A461 and M501with RNP 4 capability at FL290 or above under constant or increasing longitudinal spacing. Smooth implementation, increased capacity and enhanced efficiency were noted.

2.37 In Phase 3 implementation, 30 NM minimum longitudinal spacing would be applicable to traffic pair on ATS route A583 with RNP 4 capability, CPDLC and ADS-C equipage at FL290 or above

under constant or increasing longitudinal spacing.

Optimisation and Enhancement of Air Traffic Management over the Bay of Bengal Area (IP/05)

2.38 The meeting was informed of Malaysia's implementation of default 50 NM longitudinal separation in the Bay of Bengal area and the additional flight level allocation scheme (FLAS) of flight level (FL) 360 for ATS routes L510, N571, P574 and P628. In collaboration with India, this initiative significantly enhanced flight capacity over the Bay of Bengal area and optimised air traffic management efficiency in the Kuala Lumpur FIR. The conference concluded with high-level recommendations in air navigation and safety, which will be submitted to the Council for approval and, where appropriate, for endorsement by the 42nd Assembly in 2025.

2.39 The relevant Conference papers, reference documents and Draft Reports of the **ATM SG/12** are available at: https://www.icao.int/APAC/Meetings/Pages/2024-ATM-SG-12.aspx.

FIT-Asia meeting Outcomes

2.40 The FIT-Asia meeting was reminded that APANPIRG/34 agreed the following Conclusion proposed by RASMAG/28 - Conclusion APANPIRG/34/8: Formal Service Arrangements with CRA.

2.41 The United States informed the meeting that the Federal Aviation Administration (FAA) contract for Informal Pacific ATC Coordinating Group (IPACG), Informal South Pacific Air Traffic Services Coordinating Group (ISPACG), and North Atlantic (NAT) would be expanded to include FIT-Asia States without formal service arrangements with a Central Reporting Agency (CRA). The ICAO Secretariat stated that they would reach out to each State to assess the suitability of the United States' proposed arrangement.

2.42 FIT-Asia meeting agreed to the revised colour key codes in the following files on the ICAO APAC eDocuments webpage shown below and RASMAG agreed to the following Conclusion, drafted by FIT-Asia/14.

Conclusion RASMAG/29-1: Revised colour key codes for Asia/Pacific PBCS reporting templates

That, the following PBCS reporting templates and example were revised to correctly reflect the criteria colour key code for yellow acceptable performance and be uploaded to the Asia/Pacific Regional Office to replace the existing ones.

1. Data Link Performance Report Template – ANSP to FIT (RASMAG/29 Appendix C);

2. EXAMPLE - Data Link Performance Report Template – ANSP to FIT (RASMAG/29 Appendix D); and

3. Aggregated Regional Data Link Performance Report Template - FIT to RASMAG (RASMAG/29 Appendix E)

2.43 The relevant Conference papers, reference documents and Draft Reports of the **FIT-Asia/14** are available at: https://www.icao.int/APAC/Meetings/Pages/2024-FIT-Asia-14.aspx.

RASMAG/29 Meeting Outcomes

2.44 The Monitoring Agency for the Asian Region (MAAR) presented a combined summary of the safety analysis results for the APAC region, on behalf of the Asia/Pacific RMAs and EMAs.

2.45 The estimated vertical collision risk for 2023 for the Asia area met TLS (**Table 1**). The overall risk continued to decline since 2017 due to various safety improvement initiatives and was below the TLS. There was a total of 824 LHDs reported in the Asia area in 2023 (increased compared to 518 in 2022), with total duration 414.45 minutes and 237 levels crossed.

Table 1: Asia Area Vertical Collision Risk 2023

Asia Area – annual flying hours = 10,153,474 hours (38% increase from 2022)			
Source of Risk	**Risk Estimation**	**TLS**	**Remarks**
Vertical Technical Risk	0.56×10^{-9}	2.5×10^{-9}	Below Technical TLS
Vertical Operational Risk	2.84×10^{-9}	-	-
2023 Vertical Overall Risk	**3.40×10^{-9}**	5.0×10^{-9}	**Below TLS**

2.46 The estimated horizontal collision risk for 2023 for the Asia area met TLS in all longitudinal and lateral risk categories (**Table 2**). There were ten LLDs and LLEs reported in the Asia area in 2023, with the total horizontal deviation of 136 NM.

Table 2: Asia Area Horizontal Collision Risk 2023

	Asia Area – annual flying hours = 503,528 hours (51% increase from 2021)		
2023 Asia Area	**Risk Estimation**	**Airspace**	**Remarks**
Total Lateral Risk	**1.517×10^{-9}**	ASIA	Below TLS
Total Longitudinal Risk	**4.444×10^{-9}**	ASIA	Below TLS
2022 Asia Area	**Risk Estimation**	**Airspace**	**Remarks**
30NM Lateral Risk	0.068×10^{-9}	SEA	Below TLS
50NM Longitudinal Risk	0.096×10^{-9}	SEA	Below TLS
30NM Lateral Risk	0.786×10^{-9}	SEA	Below TLS
50NM Longitudinal Risk	0.475×10^{-9}	SEA and SA/IO	Below TLS

2.47 **Table 3** summarised current LHD Hot Spots, the FIRs involved, the year of identification, and status remarks.

Table 3: LHD Hot Spots in the Asia/Pacific Region

Hot Spot	**Involved FIRs**	**Identified**	**Remarks**
D1	Fukuoka/Manila	2015	Cat. E LHDs reducing. Risk slightly increasing.
D2	Manila/Taibei	2015	Removed from the Hot Spot list in 2024 (RASMAG/29).
D3	Hong Kong/Manila	2015	Removed from the Hot Spot list in 2024 (RASMAG/29).
D4	Manila/Sanya	2015	Removed from the Hot Spot list in 2024 (RASMAG/29).
D5	Ho Chi Minh/Manila	2015	Cat. E LHDs reducing. Risk slightly increasing.

Hot Spot	Involved FIRs	Identified	Remarks
D6	Manila/Singapore	2015	Removed from the Hot Spot list in 2024 (RASMAG/29).
D7	Kota Kinabalu-Manila	2015	Cat. E LHDs and risk slightly increasing.
D8	Manila-Ujung Pandang	2015	Cat. E & F LHDs and risk increasing.

2.48 The Chair asked the relevant States to provide an analysis/update in relation to Hot Spot J (Jakarta/Kota Kinabalu/Singapore) for the meeting of RASMAG/30 in 2025 or to the responsible RMAs before the meeting.

Hot Spot Analysis

2.49 The updated mitigation measures for Hot Spot M (Colombo/Melbourne) were presented to the meeting for consideration and together with decreasing number of LHDs, enabled RASMAG to agree to the removal as a hot spot. They included:

a) Re-sectorisation in Colombo oceanic airspace since 2020; and

b) Awareness and training on topic of non-RVSM approved Indian military aircraft were also provided to ATCOs in both Colombo and Melbourne OCCs.

South Asia Indian Ocean Airspace

2.50 The 2023 RVSM risk estimate for SA/IO airspace indicated that the TLS had met at **4.05 x 10^{-9}** fapfh. 248 of the 254 reported LHDs in SEA airspace were classified as Category E in 2023.

2.51 In the analysis of hot spots, the following were proposed:

a) Hot Spot G (Mumbai-Muscat and Mumbai-Sanaa) should remain on the hot spot list and continue to be monitored until further safety improvement initiatives or prevention measures, such as AIDC, are completed and demonstrate their effectiveness;

b) Hot Spot F (Mogadishu-Mumbai) and A1(Kolkata-Yangon and Chennai-Yangon FIR boundaries) should remain on the hot spot list and be monitored until further safety improvement initiatives (specifically AIDC) are implemented even though the number of LHDs and the associated risks are currently below the hot spot criteria; and

c) Hot Spot A2 (the boundary between Chennai FIR and Kuala Lumpur FIR) which was proposed as a potential non-hot spot in the RASMAG/28 meeting held in August 2023, continued to not satisfy any criteria in 2023. Hence, Hot Spot A2 was proposed for removal from the hot spot list.

Southeast Asia Airspace

2.52 The 2023 RVSM risk estimate for Southeast Asia (SEA) airspace indicated that the TLS for total risk had been met at **2.91x 10^{-9}** fapfh, 85 of the 95 reported LHDs in SEA airspace were classified as Category E.

2.53 RASMAG MAWG/11 agreed that hot spot could be subdivided into smaller interfaces between FIR boundaries or ATS sectors, if applicable. Therefore, Hot Spot D was subdivided into nine (9) shown in **Figure 1**.

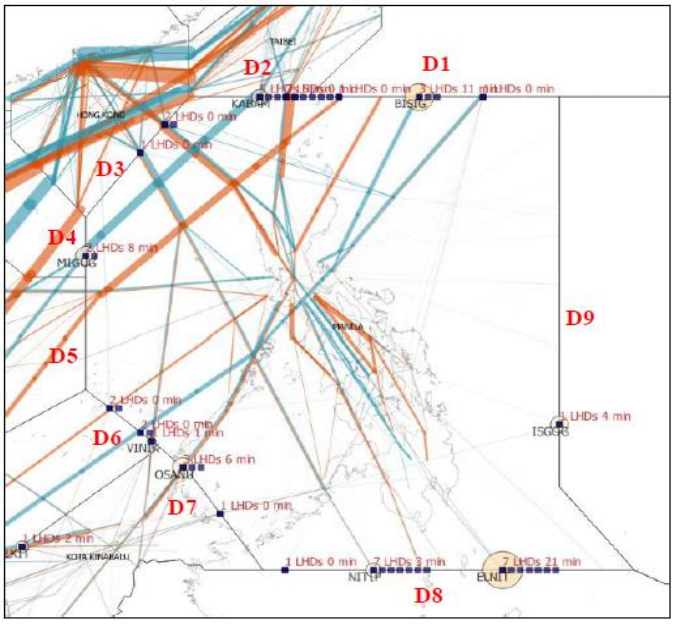


Figure 1: The Subdivision of Hot Spot D

Asia - Summary of LHDs 1

Attributions	Category Code	Description	Number of Occurrences	Duration (minutes)	Number of Levels Crossed
Aircrew/ Pilot	A	Flight crew failing to climb/descend the aircraft as cleared	25	15.00	19
	B	Flight crew climbing/descending without ATC Clearance	12	12.75	12
	C	Incorrect operation or interpretation of airborne equipment	19	26.00	1
ATC	D	ATC system loop error	25	26.00	6
	E	Coordination errors in the ATC-to-ATC transfer of control responsibility as a result of human factors issues	519	304	106
	F	Coordination errors in the ATC-to-ATC transfer of control responsibility as a result of equipment outage or technical issues	21	21.00	0.00
Aircraft/ Avionics/ Contingencies	G	Aircraft contingency event leading to sudden inability to maintain assigned flight level	1	1.00	1
	H	Airborne equipment failure leading to unintentional or undetected change of flight level A - 29	6	0.00	6

Asia - Summary of LHDs 2

Attributions	Category Code	Description	Number of Occurrences	Duration (minutes)	Number of Levels Crossed
Weather/ Turbulence	I	Turbulence or other weather related causes leading to unintentional or undetected change of flight level	82	0.20	62
TCAS	J	TCAS resolution advisory, flight crew correctly climb or descend following the resolution advisory	19	1.50	19
	K	TCAS resolution advisory, flight crew incorrectly climb or descend following the resolution advisory	0	0.00	0
Other	L	An aircraft being provided with RVSM separation is not RVSM approved	0	0.00	0
	M	Other	95	7.00	5
		Total	824	414.45	237

Asia : LHD Hot Spot O
(Bangkok/Ho Chi Minh/Kuala Lumpur/Singapore)

Nature of Occurrences : Coordination errors as a result of human factors issues (Category E).

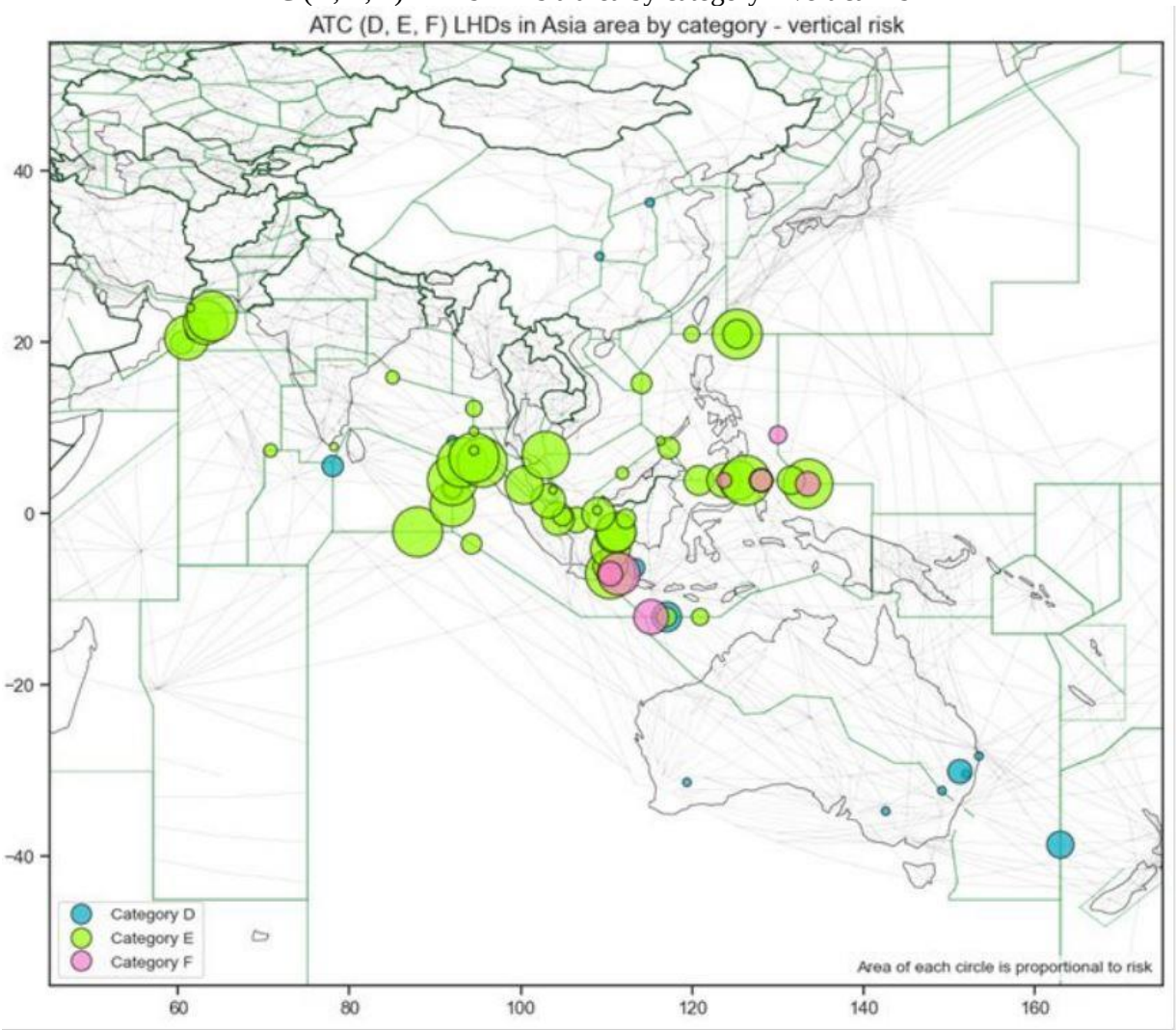
Contributing Factors : The route structure and ATC procedures of handling crossing traffic over this area can be complex due to the different Transfer of Control and Communication Points and the involvement of multiple ATS units.

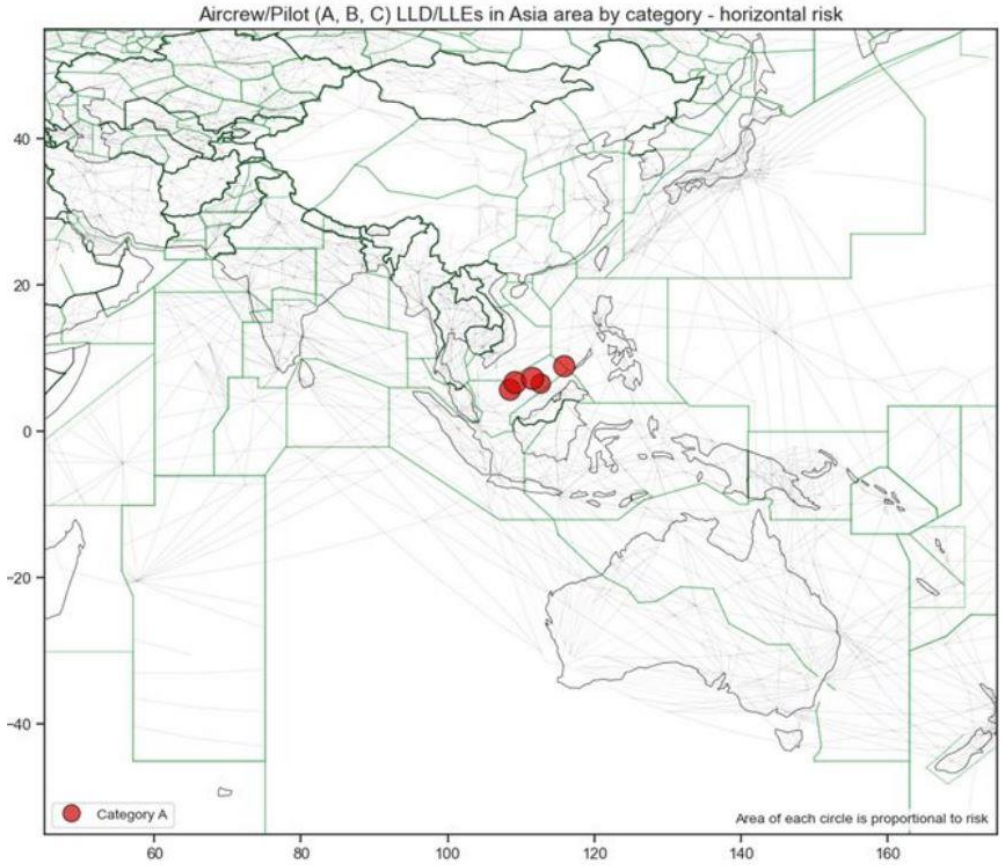
Trend : The operational risk and the number of LHDs slightly decreased in 2023. However, the proportion of operational risk, at 28%, remains high compared to the total operational risk in SEA airspace.

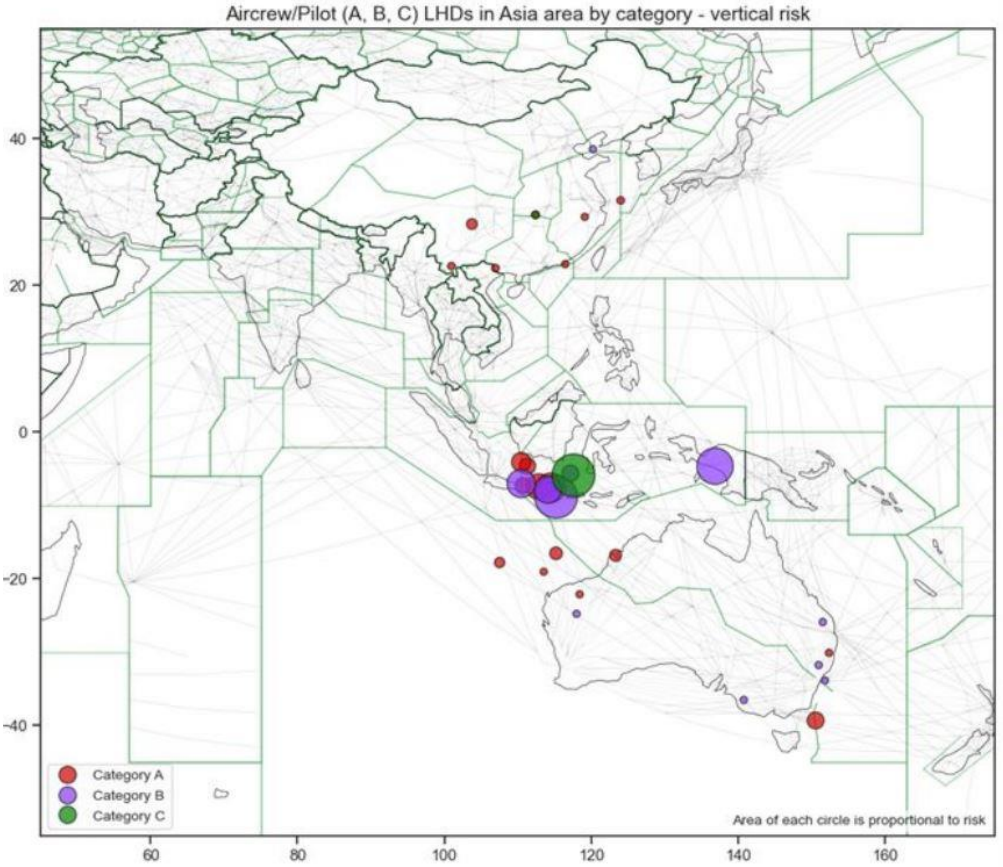
Result from the identifying hot spots process : This area satisfied the hot spot criteria in terms of the operational risk in 2022 and 2023. Therefore, **Hot Spot O remains on the hot spot list**.

Boundary	The Number of LHDs		
	2021	2022	2023
Hot Spot O	5	7	5
Boundary	**The Operational Risk (FAPFH)**		
	2021	**2022**	**2023**
Hot Spot O	0.14×10^{-9}	0.58×10^{-9}	0.51×10^{-9}

ATC (D, E, F) LHDs in Asia area by category – vertical risk




Aircrew/Pilot (A, B, C) LLD/LLEs in Asia area by category - horizontal risk
40
20
0
-20
-40
60
80
100
120
140
160
Category A
Area of each circle is proportional to risk


Aircrew/Pilot (A, B, C) LHDs in Asia area by category - vertical risk
40
20
0
-20
-40
60
80
100
120
140
160
Category A
Category B
Category C
Area of each circle is proportional to risk

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper; and

b) discuss any relevant matters as appropriate.

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