



ICAO

International Civil Aviation Organization

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

Video Teleconference, 01 – 05 November 2021

Agenda Item 3: Performance Frameworks and Metrics

FIT-Asia and RASMAG Outcomes

(Presented by the Secretariat)

SUMMARY

This paper presents outcomes relevant to the ATM/SG from the Future Air Navigation Services (FANS) Interoperability Team – Asia (FIT-Asia) and the Regional Airspace Safety Monitoring Advisory Group (RASMAG).

1. INTRODUCTION

1.1 The Eleventh Meeting of the FANS Interoperability Team-Asia (FIT-Asia/11) was held by video teleconference from 23 to 26 August 2020.

1.2 The Twenty-Sixth Meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/26) was held by video teleconference from 20 to 23 September 2021.

1.3 RASMAG is a Sub-Group of APANPIRG, and the FIT-Asia reports to RASMAG.

1.4 A total of 119 participants were registered for RASMAG/26 from Australia, Bangladesh, Cambodia, China, Hong Kong China, Fiji, India, Indonesia, Japan, Malaysia, New Zealand, Pakistan, Philippines, Republic of Korea, Singapore, Somalia, Sri Lanka, Thailand, United States of America, Viet Nam, CANSO, IATA, IFALPA IFATCA and ICAO.

1.5 A total of 40 Working Papers (WPs), six Information Papers (IPs) and three flimsies were presented to the RASMAG/26 meeting. Meeting documentation and the final report of the meeting are available on the RASMAG/26 web-page:

<https://www.icao.int/APAC/Meetings/Pages/2021-RASMAG26.aspx>

2. DISCUSSION

FIT-Asia Meeting Outcomes

2.1 The lower number of data link Problem Reports (PRs) submitted to the Central Reporting Agency (CRA) in the 2020-2021 reporting period (27, compared with 66 in 2019-2020) reflected the decrease in air traffic due to the impact of the COVID-19 pandemic.

2.2 The FIT-Asia/11 meeting had discussed the need for adoption in the Asia/Pacific Region of a common Future Air Navigation Services 1/A (FANS1/A) Controller-Pilot Data Link Communications (CPDLC) Latency Timer value of 300 seconds, as was currently being successfully trialled in the North Atlantic (NAT) Region. The RASMAG/26 meeting agreed to **Conclusion RASMAG/26-1: FANS1/A CPDLC Latency Timer Value**, urging APAC States to implement a latency timer value of 300 seconds on a trial basis.

2.3 The meeting was informed that over a period of four years a total of 19 APAC Administrations had responded to the annual regional survey of the status of current and planned implementation of performance-based horizontal separation minima, which was supported by several APANPIRG and RASMAG conclusions. Only Australia, Indonesia and Singapore had responded in 2021.

2.4 A Proposal for Amendment (PfA) to ICAO Doc 7030 *Regional Supplementary Procedures* (SUPPS) had been drafted to support the inclusion of relevant FIRs administered by Indonesia, Philippines, Singapore and Sri Lanka in sections supporting the application of performance-based separation that required Performance-Based Communications and Surveillance (PBCS). On receipt of formal communications from all States requesting the change, the PfA process would commence.

2.5 Overall Automatic Dependent Surveillance – Contract (ADS-C) Actual Surveillance Performance (ASP) for the region had met the 95% criterion of the Required Surveillance Performance 180 (RSP180) specification, but fell marginally below the 99.9% criterion. While the volume of data counts had significantly reduced in 2020, the trend of regional performance in both the 95% and 99.9% criteria had generally improved.

2.6 Overall Controller-Pilot Data Link Communications (CPDLC) Actual Communications Performance (ACP) for the region met the 95% criterion (**Table 1**). ACP for most FIRs fell marginally below the 99.9% criterion, but several FIRs failed to meet it. In the first half of 2020 one FIR did not meet the 95% criterion for Actual Communications Technical Performance (ACTP) and two FIRs failed to meet the 99.9% criterion. In the second half of the year all reporting FIRs met the 95% criterion, but four did not meet the 99.9% criterion. Pilot Operator Response Time (PORT) performance requirements were not met by a number of aircraft operators.

ACTUAL COMMUNICATION PERFORMANCE - FIR AGGREGATE (ALL MEDIA TYPES)										
Region	Asia-Pacific Region									
Performance Criteria	RCP240									
Time Period	2020 January-June					2020 July - December				
Colour key Meets criteria 99.0%-99.9% Under criteria	Message Counts	ACP Criteria		ACTP Criteria		Message Counts	ACP Criteria		ACTP Criteria	
		95%	99.90%	95%	99.90%		95%	99.90%		
		% <= 180sec	% <= 210sec	% <= 120sec	% <= 150sec		% <= 180sec	% <= 210sec	% <= 120sec	% <= 150sec
FIR										
PAZA	70739	99.12%	99.33%	99.21%	99.50%	68090	99.06%	99.32%	99.24%	99.48%
RJJJ	34547	99.57%	99.78%	99.65%	99.75%	31739	99.60%	99.76%	99.63%	99.73%
KZAK	192062	99.31%	99.53%	99.65%	99.77%	142934	99.46%	99.64%	99.72%	99.84%
NFFF	3764	99.62%	99.81%	99.81%	99.89%					
NTTT	2939	99.49%	99.78%	99.71%	99.78%	1002	99.40%	99.70%	100.00%	100.00%
NZZO	7999	99.58%	99.73%	99.72%	99.74%	2803	99.82%	99.71%	99.89%	99.89%
YBBB	24042	99.25%	99.29%	99.46%	99.48%	11475	99.29%	99.29%	99.48%	99.48%
YMMM	29335	99.55%	99.48%	99.67%	99.66%	12820	99.38%	99.38%	99.53%	99.53%
RPHI	4665	97.59%	97.84%	98.91%	99.24%	9044	98.24%	98.24%	98.58%	98.82%
VCCF	24214	98.45%	99.53%	99.28%	99.78%	16601	98.37%	99.39%	99.17%	99.76%
VOMF	31266	99.77%	99.86%	99.84%	99.86%	31445	99.77%	99.85%	99.84%	99.86%
VVTS	26896	95.80%	96.31%	99.40%	99.65%	31859	96.26%	96.64%	99.48%	99.72%
WAAF	21900	98.20%	98.45%	99.70%	99.78%	11451	97.80%	98.12%	99.68%	99.75%
WMFC	9261	98.14%	98.71%	98.54%	99.11%	30246	97.67%	98.45%	97.42%	98.40%
WSJC	19113	98.94%	99.29%	98.87%	99.22%	14758	98.93%	99.20%	99.05%	99.29%
ZLLL	2447	97.99%	98.32%	98.40%	98.81%	1140	97.10%	97.28%	98.42%	98.68%
ZWWW	464	95.90%	96.76%	93.31%	96.98%	111	97.29%	98.19%	96.39%	96.39%

Table 1: Asia/Pacific Region ACP (RCP240)

RASMAG/26 Meeting Outcomes

AKARA Corridor

2.7 The Japan Airspace Safety Monitoring Agency (JASMA) provided an update on progress and proposals of the safety improvement plan for the AKARA – FUKUE Corridor. Phase 1 of the improvement plan had been implemented on 25 March 2021 (**Figure 1**).

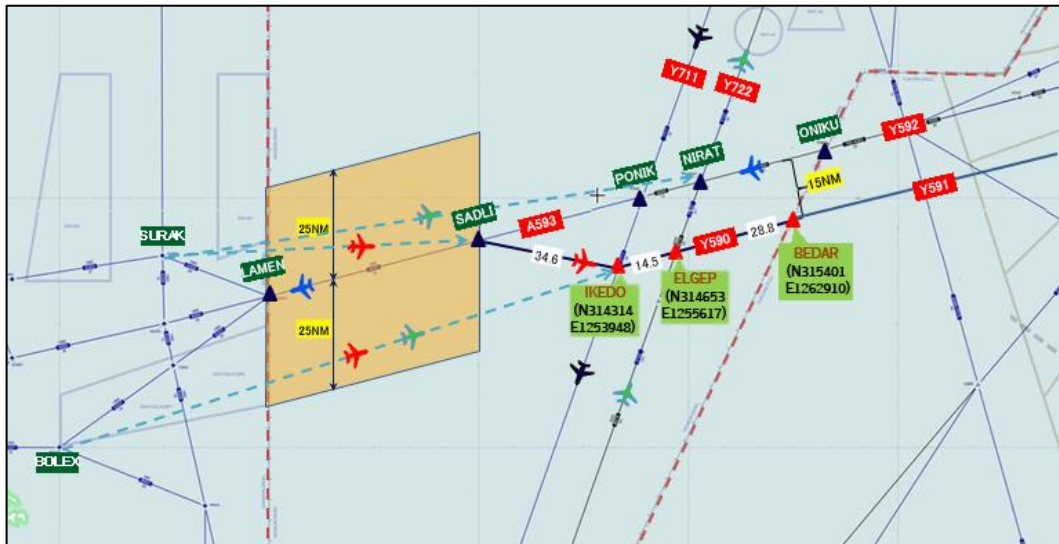


Figure 1: ATS route structure of Safety Improvement Plan Phase 1

2.8 All Air Traffic Control (ATC) responsibility for ATS route A593 between ONIKU and SADLI had been handed over to Incheon Area Control Centre (ACC). Due to the use of ATS Inter-Facility Data Communication (AIDC) there had been no Large Height Deviations (LHDs) at BEDAR and ONIKU reported to JASMA since 25 March to 31 August 2021.

2.9 As at August 2021 the transition from Phase 1 to Phase 2 of the improvement plan had been discussed between China and Republic of Korea, but the transition date had not yet been determined. **Figure 2** shows the ATS route structure of Phase 2.

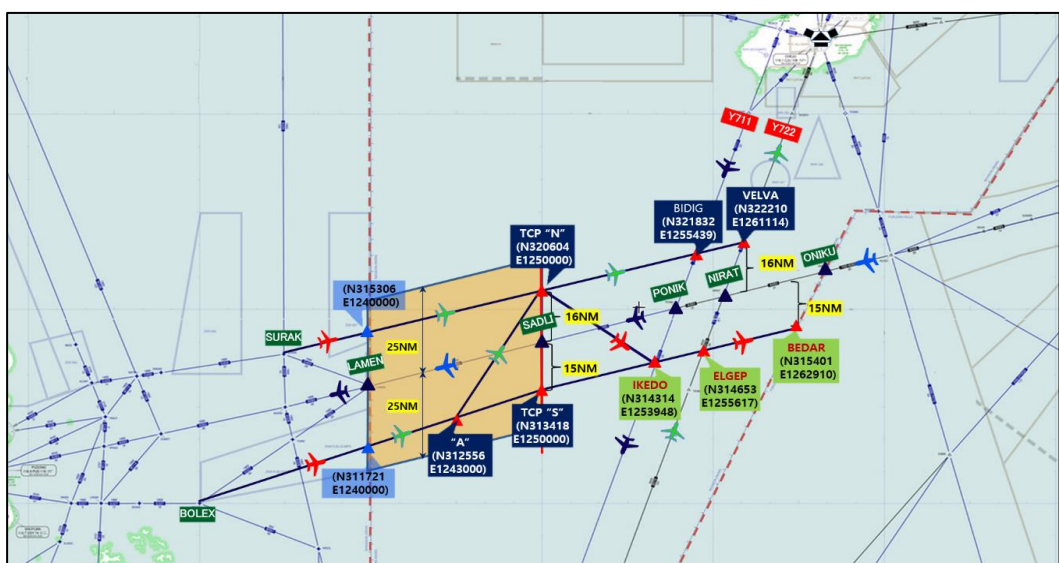


Figure 2: ATS route structure of Safety Improvement Plan Phase 2.

2.10 **Table 2** shows the result of a safety assessment in the AKARA – FUKUE corridor **airspace** conducted by JASMA and the Electronic Navigation Research Institute (ENRI), using fast-time simulation of traffic sample data (TSD) based on flight records between 0100 and 0700 UTC.

AKARA Airspace <i>(note: based on Dec 2019 traffic sample data)</i>				
Source of Risk	Same & Opposite Risk	Intersection Risk	Total Risk	Remarks
<i>Technical Risk (only A593 with FLAS)</i>	15.4×10^{-9}	0.16×10^{-9}	15.6×10^{-9}	<i>Past</i>
Technical Risk (Phase 1 with FLAS)	0.03×10^{-9}	0.23×10^{-9}	0.26×10^{-9}	Current
Technical Risk (Phase 1 without FLAS)	0.02×10^{-9}	0.20×10^{-9}	0.22×10^{-9}	
Technical Risk (Phase 2 with FLAS)	0.01×10^{-14}	0.17×10^{-9}	0.17×10^{-9}	
Technical Risk (Phase 2 without FLAS)	0.05×10^{-15}	0.12×10^{-9}	0.12×10^{-9}	Best future

Table 2: JASMA/ENRI result of safety assessment using fast-time simulation

2.11 Eliminating the Flight Level Allocation Scheme (FLAS) would contribute to decreasing technical risk estimates as aircraft would have more opportunity to cross other aircraft with more than 1,000ft vertical separation if the FLAS was eliminated.

2.12 JASMA had received a report of category D LHD (ATC system loop error) that occurred more than 100NM East of the AKARA corridor airspace in May 2021. Pilots misunderstood a heading instruction by Fukuoka ACC as a descending clearance to the FLAS altitude. According to the investigation by Fukuoka ACC, pilots flying the AKARA corridor airspace expected flight level change before entering the corridor. JASMA considered the pilots' expectation for altitude change due to FLAS could not be overlooked as a potential risk of LHD.

Note: the FLAS is also discussed under ATM/SG/9 Agenda Item 6, WP/25

2.13 The meeting was informed that China and Republic of Korea were currently negotiating on Phase 2 implementation, and more time was needed to reach agreement.

2.14 China, Japan and Republic of Korea, together with observers from other States and International Organizations, held a breakout session to discuss progress in the AKARA Corridor airspace. A summary of discussion was provided in **Appendix D to RASMAG/26 Report**.

2.15 Republic of Korea also provided information on the normalization progress of the AKARA – FUKUE Corridor. The meeting was reminded of the identification of the Corridor as one of the five LHD hot spot areas in the APAC Region at RASMAG/20 (Bangkok, Thailand, 26-29 May 2015). The Pacific Approvals Registry and Monitoring Organization (PARMO) RMA had conducted safety assessments for the Corridor every year since 2015 (**Table 3**).

Year	2015	2016	2017	2018	2019	2020
Overall vertical collision risk	46.2×10^{-9}	2.08×10^{-9}	1.75×10^{-9}	55.1×10^{-9}	247.0×10^{-9}	45.1×10^{-9}

Table 3: Vertical safety assessment of the AKARA - FUKUE Corridor

2.16 The 62% fall in traffic volume in the Corridor due to the coronavirus outbreak had led to the number of LHD reports falling from 29 in 2019 to 5 in 2020. However, the overall vertical collision risk continued to exceed the TLS due to the Corridor being highly susceptible to even a single deviation resulting in the airspace not meeting TLS.

2.17 PARMO provided an update of its analysis of AKARA corridor airspace using December 2020 TSD and reported LHD events in 2020. It was noted the analysis used traffic data and reported occurrences from calendar year 2020, before the normalization of the AKARA corridor on 25 March 2021.

2.18 The AKARA Corridor interface with Shanghai/Fukuoka/Taibei FIRs was identified by RASMAG/20 as **LHD Hot Spot B**. There were five reported LHDs in the AKARA airspace in 2020, which was a decrease from the 29 reported LHDs in calendar year 2019. The observed decrease was expected as the likely result of COVID-19-related reduction in air travel.

2.19 **Figure 3** maps the reported LHD locations and associated categories, including LHD reports of zero duration. Two Category D, Two Category E and one Category J LHDs were recorded.

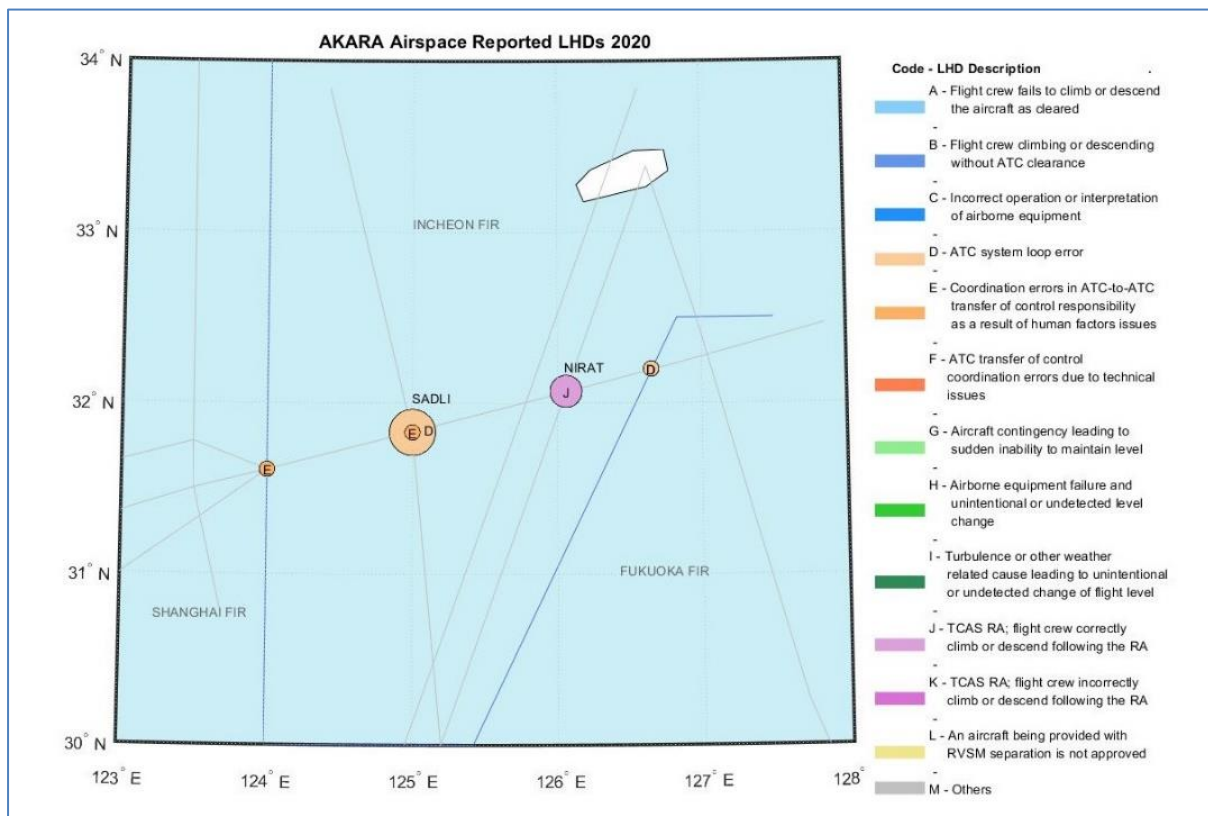


Figure 3: Locations of reported LHDs in AKARA Corridor airspace - 2020

2.20 The 2020 vertical collision risk estimate was lower than the estimate in 2019. This was also likely to have been due to the reduction in air travel due the pandemic. The 2020 vertical technical risk estimate of 0.72×10^{-9} fapfh met the TLS for vertical technical risk (2.5×10^{-9} fapfh). The overall vertical risk estimate of 45.1×10^{-9} fapfh exceeded the overall vertical TLS of 5×10^{-9} fapfh (**Figure 4**).

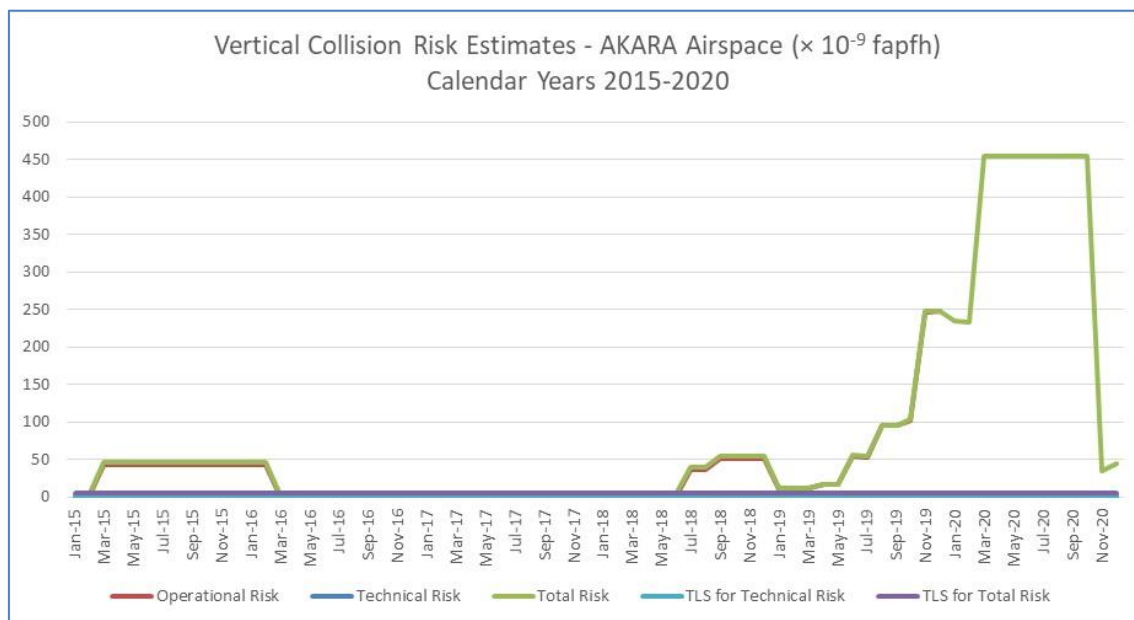


Figure 4: Twelve-month Rolling Vertical Collision Risk Estimates

2.21 Regarding **Hot Spot B**, the Chair reminded the meeting that usual RASMAG practice was to retain the identification of hot spots for 2 years following the achievement of collision risk below the TLS. ICAO proposed that any consideration of removal of hot spots should take into account the current major reduction in traffic and its effect on safety risk calculations. It would not be appropriate to remove hot spots under the prevailing circumstances only to find they had to be reimposed after traffic volumes returned to more normal levels.

RVSM Risk Assessment in the Brisbane, Honiara, Melbourne, Nauru, Port Moresby, Jakarta and Ujung Pandang FIRs – 1 January to 30 December 2020

2.22 The Australia Airspace Monitoring Agency (AAMA) provided an airspace safety review of RVSM airspace risk within the Brisbane, Honiara, Melbourne, Nauru and Port Moresby FIRs. Southwest Pacific - Australian Airspace The total vertical risk estimate of 0.017×10^{-9} met TLS.

2.23 In response to a query on the root causes of Category B LHDs, the meeting was informed of an analysis provided by AAMA to the Monitoring Agencies Working Group (MAWG/8 meeting). In that analysis three of the seven Category B occurrences that were assessed as non-zero duration involved incorrect aircraft changing levels without a clearance as a result of call sign confusion. AAMA stated that Australia’s ATC operations personnel were in favour of the Alphanumeric call sign initiative.

2.24 The total risk estimate for the Jakarta and Ujung Pandang FIRs was **0.181×10^{-9}** (met TLS) reflecting the significant decrease in flying hours and occupancy parameters. There were no non-zero duration reports for the Jakarta and Ujung Pandang FIRs in March, April, June, August, October and November 2020

China RMA Vertical Safety Report

2.25 The China RMA reported that the 2020 RVSM risk estimates for the Beijing, Guangzhou, Kunming, Lanzhou, Pyongyang, Sanya, Shanghai, Shenyang, Urumqi and Wuhan FIRs indicated that the TLS had not been met, at **7.107 x 10⁻⁹**.

2.26 The risk estimate had resulted from 85 reported LHDs, including 34 Category I (*Turbulence or other weather related cause*, 40%), nine Category A (*Flight crew failing to climb/descend the aircraft as cleared*, 11%) and 10 Category E (*Coordination errors in the ATC-to-ATC transfer of control responsibility as a result of human factors issues*, 12%). Four Category E events had been reported in 2019.

2.27 The 2020 RVSM risk estimate for the Pyongyang FIR indicated that the TLS had been met at **1.04 x 10⁻⁹**, as no LHD had been reported during 2020.

JASMA Vertical and Horizontal Safety Reports

2.28 The vertical safety assessment for the RVSM airspace in the Fukuoka FIR’s RVSM airspace for the period from January to December 2020 was presented by the Japan Airspace Safety Monitoring Agency (JASMA). The 2020 RVSM risk estimate for the Fukuoka FIR indicated that the TLS had not been met at **11.57 x 10⁻⁹** (Figure 5).

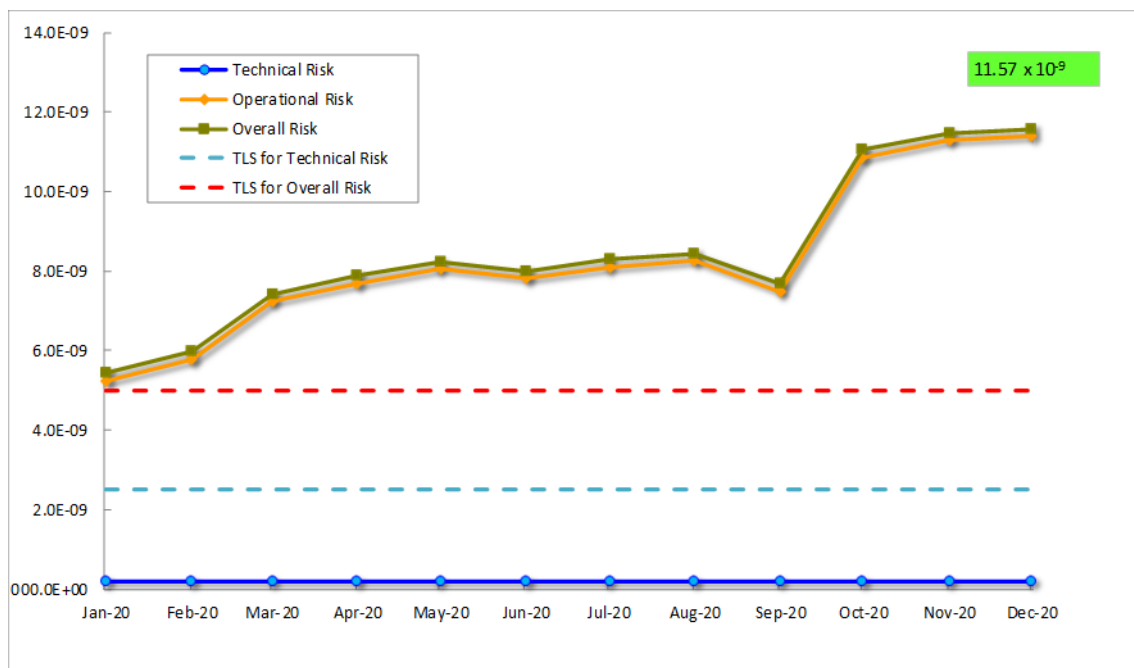


Figure 5: Japanese Airspace RVSM Risk Estimate Trends

2.29 A total of eight category E LHDs had occurred at **Hot Spot D**, the FIR boundary between Manila and Fukuoka FIRs. Seven had occurred on transfer from Manila ACC to Kobe ACC or Fukuoka ATMC, and the remaining one LHD had occurred on transfer from Kobe ACC to Manila ACC.

2.30 In response to JASMA’s invitation to the meeting, particularly IATA and IFALPA, to provide feedback on the increasing number of Category A LHDs, IFALPA agreed that decreasing opportunities for pilots to operate aircraft may have contributed. JASMA was also asked whether these events could be categorized by time of day, as fatigue may be a contributing factor due to some operators requiring pilots to fly longer than usual flight hours. JASMA agreed to provide IFALPA with further information, but noted it would take some time to prepare.

2.31 The horizontal separations based on Performance-Based Navigation (PBN) in the Fukuoka FIR met the TLS, with 50NM lateral achieving 0.65×10^{-9} and 30NM longitudinal estimated risk at 0.015×10^{-9} . The 10-minute time-based risk also met TLS at 0.25×10^{-9} .

JASMA Safety Reporting Culture

2.32 The meeting was provided information on the safety reporting culture in Japan including reporting procedures, systems and information flow. The information was provided in response to *Decision RASMAG/25-4: Safety Reporting Assessment*.

2.33 In wide-ranging discussion on safety reporting and safety culture, the meeting was informed that a safety culture survey may be conducted to measure the organization's safety behaviour. The meeting was also informed that RMAs/EMAs could try to assist by evaluating the reporting of occurrences at FIR boundaries. The meeting was further informed of CANSO guidance available on the following web-page:

<https://canso.org/publication/safety-culture-definition-and-enhancement-process/>

2.34 It was also noted that safety reporting and safety culture could be improved by easy-to-use online portals to make safety reporting easier for operational personnel, and through clear definition of what must be reported, and how it must be reported.

MAAR Vertical Safety Report

2.35 The Monitoring Agency for the Asian Region (MAAR) provided the results of the airspace safety oversight for RVSM operations in South Asia/Indian Ocean Airspace (SA/IO), Southeast Asia Airspace (SEA), and Mongolian Airspace during 2020.

2.36 The 2020 RVSM risk estimate for SAIO airspace indicated that the TLS had not been met at 15.67×10^{-9} (Figure 6).

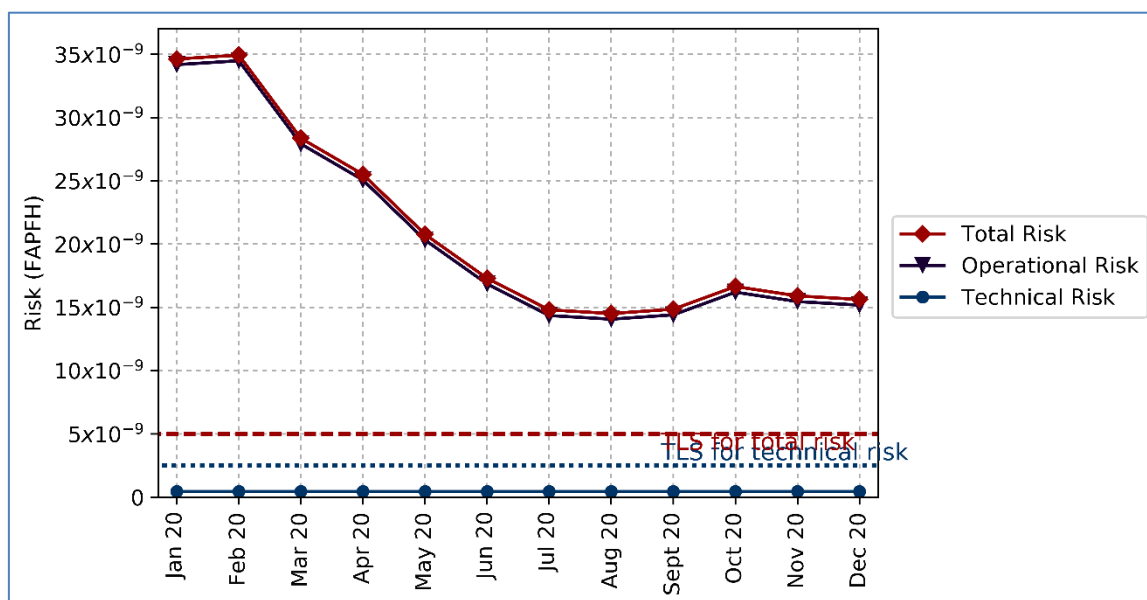


Figure 6: Trends of Risk Estimates for SA/IO Airspace.

2.37 As had been the case in previous years, the vast majority of the 152 LHD cases that had been reported were Category E events, with 138 (91%). The 65% reduction in numbers of LHDs from 434 in 2019 to 152 in 2020 reflected the 66% decrease in estimated annual flight hours.

2.38 **LHD Hot Spot G (Sanaa/Muscat – Mumbai)** and **LHD Hot Spot F (Mogadishu – Mumbai)** at the western boundary of Mumbai FIR remain as LHD hot spots since 2015. In 2020 the number of non-zero duration LHDs of these hot spots accounted for 62% of all non-zero-duration LHDs of the SA/IO airspace and the resultant operational risk of 11.17×10^{-9} FAPFH accounted for 74% of the total operational risk of the SA/IO airspace. It was strongly recommended that an engineering solution such as AIDC (hard barrier) be implemented with the Mumbai FIR to mitigate the risk. The meeting was informed that Mumbai ACC had conducted AIDC trials with Muscat ACC and Mogadishu ACC in March 2021. Space-based ADS-B had been implemented to enhance surveillance capability, particularly in oceanic airspace.

2.39 The number of LHDs at **LHD Hot Spot A1 (Kolkata/Dhaka - Yangon)** and **LHD Hot Spot A2 (Chennai - Kuala Lumpur)**, first identified as hot spots in 2015, had been decreasing from 275 in 2018 to 24 in 2020. All reported LHDs in 2020 had 0-min duration, resulting in the operational risk of 0 FAPFH. The reduction of operational risk to 0 FAPFH was related to safety enhancement initiatives including ADS-B data sharing between Kolkata and Yangon, and AIDC between Chennai and Kuala Lumpur, as well as the reduction in traffic volume.

2.40 **LHD Hot Spot I (Karachi – Kabul)** was de-identified from being an LHD hot spot by RASMAG/25. In 2020, Kabul ACC identified and reported more of their operational risk from LHD occurrences within their own airspace and at the boundaries with Lahore FIR and Karachi FIR, as depicted in **Figure 7**. The number of LHDs and operational risk at GADER and RANRU, most of which were Category E, increased in 2020. Poor communication and surveillance coverage did not allow Kabul ACC to detect and resolve the issues before an aircraft passed the transfer-of-control point. This issue would be closely monitored together with the dynamic situation over the Kabul airspace in 2021.

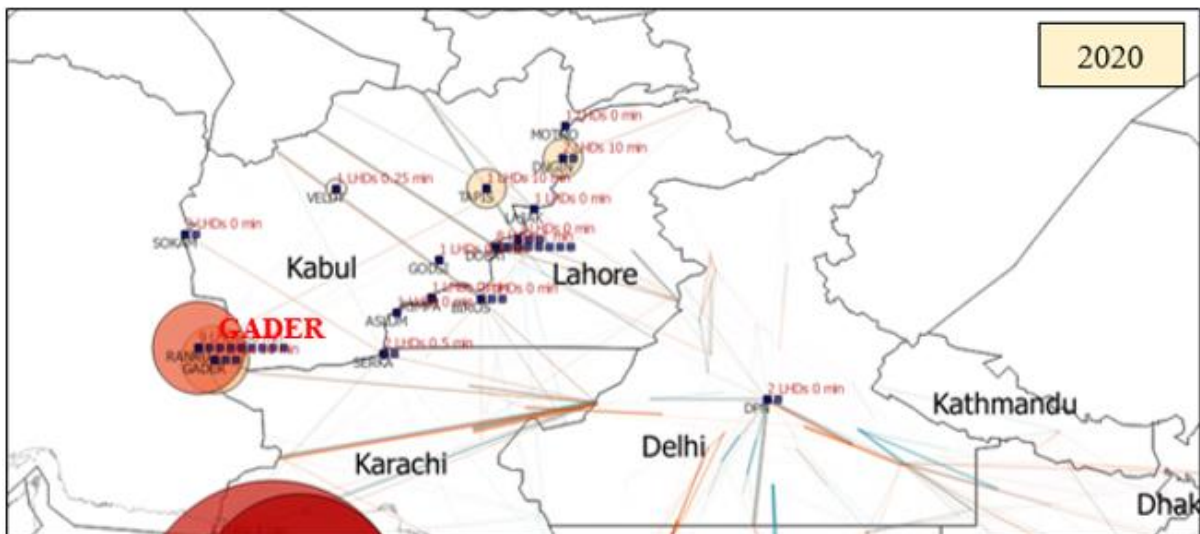


Figure 7: Kabul FIR LHDs

Southeast Asian Airspace

2.41 The 2020 RVSM risk estimate for SEA airspace indicated that the TLS for total risk had been met at 1.82×10^{-9} FAPFH.

2.42 27 of the 39 reported LHDs in SEA airspace (69%) were classified as Category E, which contributed to most of the operational risk (1.35×10^{-9} FAPFH).

2.43 Even though the situation of **LHD Hot Spot D (Manila and all adjacent FIRs)** seemed to be improving, the majority of the reported LHDs and the operational risk of the SEA airspace still remained along the boundaries of Manila FIR. A total of 24 LHDs at Manila FIR boundaries accounted for 62% of the number of LHDs in the SEA airspace. The resultant operational risk of 1.05×10^{-9} FAPFH accounted for 74% of the operational risk of the SEA airspace. Two out of three long duration LHDs occurred at Manila FIR boundaries.

2.44 Figure 8 illustrates the trend of LHDs being reported along Manila FIR boundaries together with the timeline of major safety improvement implementation by Manila ACC and the adjacent units. Since the transition to the new ATM centre in 2018, Manila ACC aimed to continually improve their communication and surveillance capabilities with ADS-C/CPDLC, AIDC and ADS-B technology.

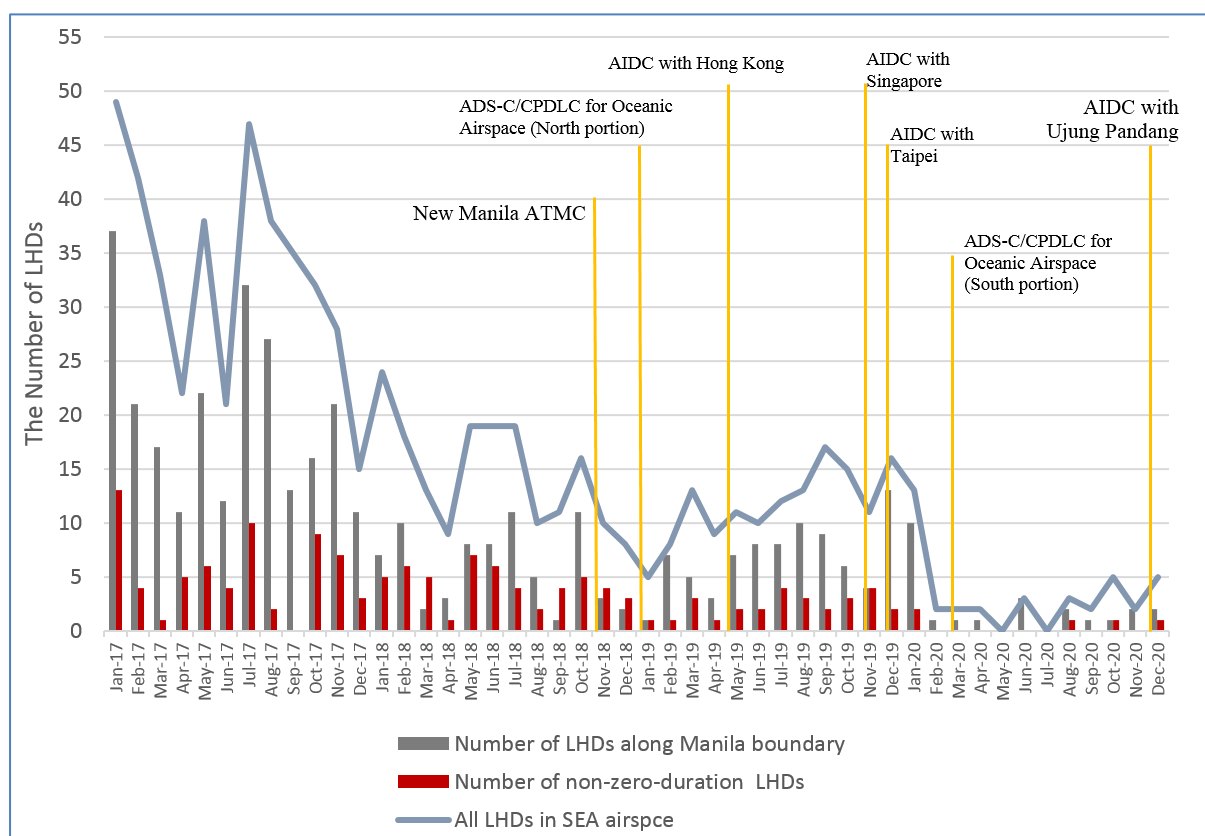


Figure 8: LHDs along Manila FIR Boundary 2017 to 2020

2.45 In 2019 Category F LHDs were an emerging issue at Manila boundaries where AIDC was implemented. There were a total of 9 Category F LHDs, and 7 out of 9 LHDs were due to AIDC failures. In 2020, the number of Category F LHDs slightly decreased from 9 to 6 LHDs. Those 6 LHDs were caused by the AIDC system failures and the unsuccessful transfer via AIDC. This issue should be followed up with relevant units and continuously monitored. ICAO noted that system alerts to ATC and robust procedures requiring voice coordination in the event of failure of AIDC message exchange were necessary for all AIDC implementations.

Mongolian Airspace

2.46 The 2019 RVSM risk estimate for Mongolian airspace indicated that the TLS had been met at 0.87×10^{-9} . No LHD was reported in 2020 within or at the boundary of Mongolian airspace.

SEASMA Safety Report

2.47 Singapore's South East Asia Safety Monitoring Agency (SEASMA) provided a horizontal safety assessment report for operations on ATS routes N892, L625, N884 and M767 within the South China Sea during 2020. This assessment was based on RNP10 performance and concluded that the TLS established for lateral and longitudinal separation standards were satisfied at **0.012 x 10⁻⁹** and **0.375 x 10⁻⁹** respectively.

2.48 There had been one Category D and two Category F LLE occurrences in 2020. The LLEs occurred at a FIR boundary, and were reported by both of the FIRs concerned. No LLDs were reported.

BOBASMA Horizontal Safety Monitoring Report

2.49 The Bay of Bengal Airspace Safety Monitoring Agency (BOBASMA) presented the horizontal safety assessment for the Bay of Bengal/Arabian Sea Indian Ocean airspace during the period January to December 2020. The 50NM lateral and longitudinal risks remained below the Target Level of Safety (TLS) at **0.637515 x 10⁻⁹** and **0.870503 x 10⁻⁹**.

2.50 It was noted that due to the COVID-19 pandemic had resulted in the average number of flights in the three Indian FIRs concerned (Chennai, Kolkata, Mumbai) in 2020 was 32% of the corresponding total in 2019, which had contributed to the substantial reduction in risk from the 2019 levels (**1.59 x 10⁻⁹** and **4.97 x 10⁻⁹**). No LLD or LLE were reported in 2020.

Identified Airspace Risk Occurrences in Indian FIRs

2.51 A total of 111 LHD reports were filed by ATC centres in the four Indian FIRs and those adjacent to them and sharing a common boundary, during the period 01 January to 31 December 2020. 107 of the reported LHDs were Category E. 81 of the LHD reports were filed by Indian ATC, and the rest were filed by external ATC centres. The total duration of the 111 LHD reports was 401 minutes.

2.52 While the huge reduction in the number of LHD reports (down from 381 in 2019) could be attributed to the COVID-19 related reduction in air traffic, the location and LHD duration of the occurrences in 2020 were clearly symptomatic of the continuing hot spots in the airspace of the four Indian FIRs. As part of its efforts to reduce risks due to coordination errors and other near-boundary ATS incidents India planned to implement AIDC with all of the neighbouring FIRs.

2.53 India's working paper on this topic would be shared with the Middle East (MID) Region RMA by the RASMAG Chair.

PARMO Vertical and Horizontal Safety Monitoring Reports

2.54 PARMO provided a vertical safety assessment for the Pacific RVSM airspace and a portion of the Incheon FIR during 2020.

2.55 The 2020 RVSM risk estimate for Pacific airspace indicated that the TLS had not been met at **22.04 x 10⁻⁹** (**Figure 9**).

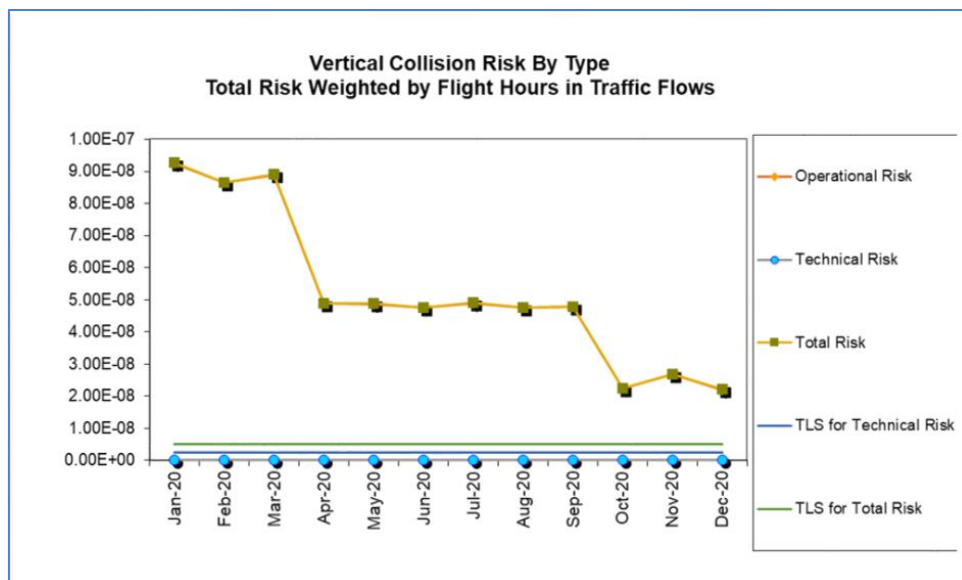


Figure 9: Pacific Airspace RVSM Risk Estimate Trends

2.56 Of the 51 LHDs, 27 were classified as Category E (53%, compared to 81% in 2019). There were also nine Category B *Flight crew climbing/descending without ATC clearance* errors LHDs (18%). The geographical location of reported Pacific LHDs is depicted in **Figure 10**.

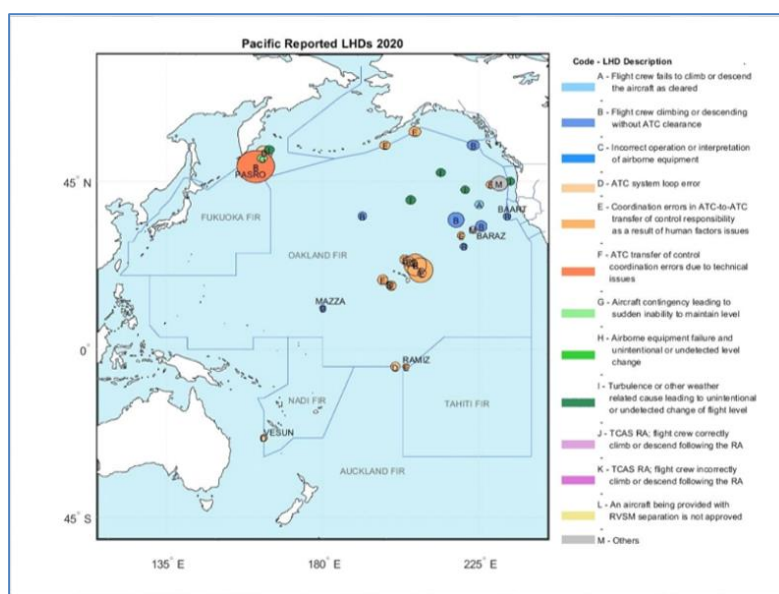


Figure 10: Location of Pacific LHDs, 2020

2.57 North East Asia airspace RVSM total risk estimate met TLS, at 0.23×10^{-9} .

PARMO Horizontal Safety Monitoring Report

2.58 PARMO submitted its horizontal safety monitoring report for 2020. The 30/50NM lateral, 30NM and 50NM longitudinal risks were both estimated to meet the TLS at 0.09×10^{-9} , 4.08×10^{-9} and 2.22×10^{-9} respectively. Of the 74 reported LLDs and LLEs, 65 (88%) were Category E, while six (8%) were as a result of Category A root causes (*Flight crew deviates without ATC clearance in the horizontal dimension*).

2.59 The significant decrease in the overall number of LLDs and LLEs received by PARMO in 2020 was likely due to the COVID-19 pandemic-related reduction in air travel.

Central East Pacific Traffic Flow Assessment for Calendar Year 2020

2.60 PARMO presented the 2020 vertical risk assessment for the Central East Pacific (CEP) traffic flow in Pacific airspace. This area was designated as Hot Spot N at RASMAG/24.

2.61 THE CEP traffic flow contained air traffic operations travelling in the east and west directions between mainland North America and Hawaii. **Figure 11** and **Table 4** show the location of the CEP route system structure and related statistics for observed air traffic during 2019 and 2020.

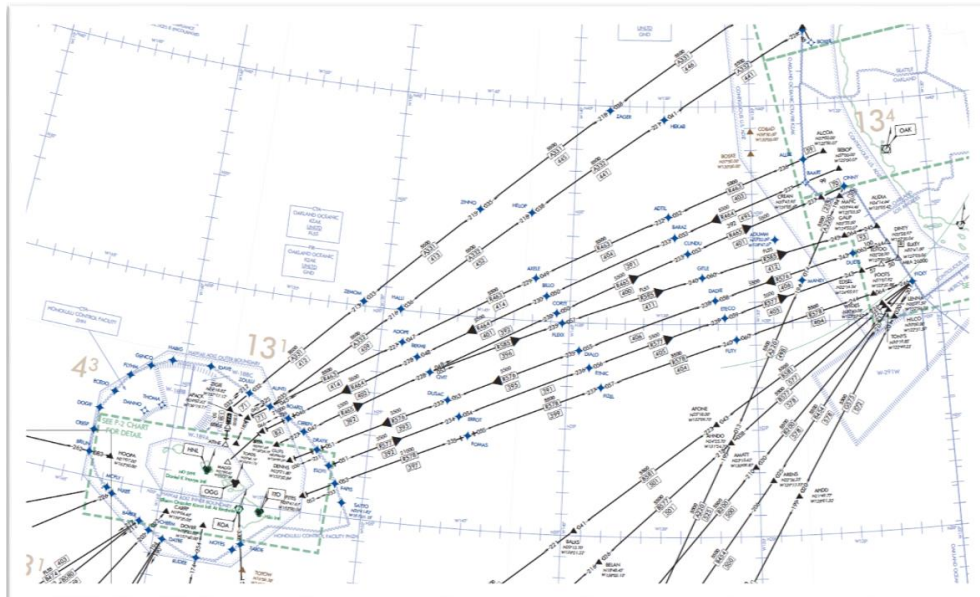


Figure 11: CEP route system

	2019	2020
Total flying hours	425,950	215,009
Number of Flights	115,543	63,661
Proportion Data Link Operations	69.1%	81.8%
Proportion HF (only) Operations	30.9%	18.2%
Proportion RNP4, RCP240, and RSP180 filing	31.4%	52.2%

Table 4: CEP Traffic Flow – 2019 vs 2020

2.62 From a total of 29 LHD occurrences, 21 were Category E and five were Category B. Total LHD duration was 97.1 minutes

2.63 The overall vertical risk for the CEP in 2020 was 17.35×10^{-9} fapfh, a value that exceeded the target level of safety (TLS). This represented a decrease from the risk reported in 2019 and 2018 for the CEP (59.9×10^{-9} and 99.1×10^{-9} fapfh respectively).

2.64 The meeting was informed of the establishment of a task force to further investigate these occurrences and determine remedial actions. Implementation of the En Route Automation Modernization (ERAM) system was planned by the end of 2025. In response to a query the meeting was informed there was currently no AIDC between the Honolulu Control Facility and Oakland Center.

APAC Consolidated Safety Report

2.65 MAAR presented a combined summary of the safety analysis results for the Asia/Pacific Region, on behalf of the Asia/Pacific RMAs and EMAs. The report was divided into the Pacific (PAC) area, and Asia area (**Figure 12**).

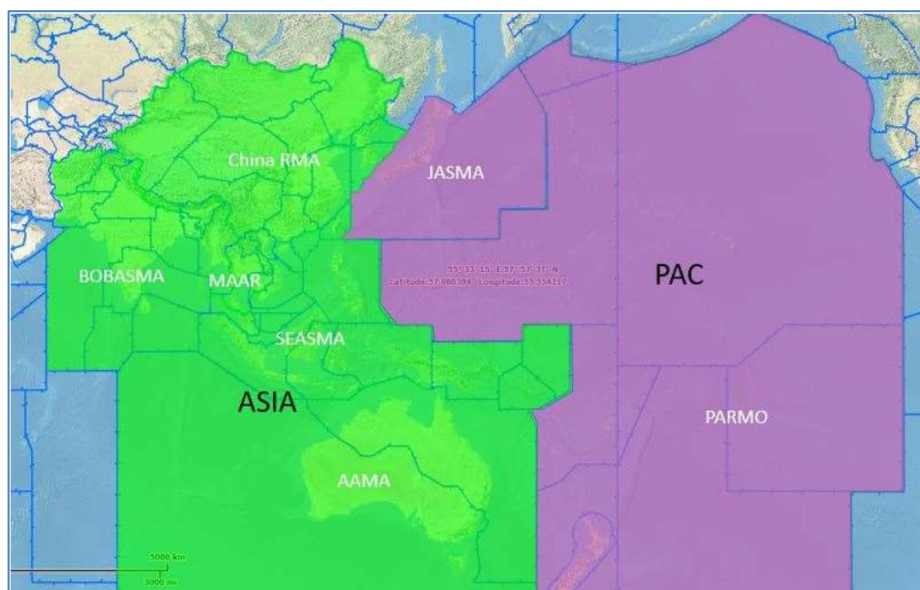


Figure 12: Asia and Pacific Safety Reporting Areas

2.66 The estimated vertical collision risk for 2020 for the PAC area did not meet TLS. (**Table 5**). The overall risk vertical risk had been increasing from 2016 to 2020 due to improvements in reporting culture.

Pacific Area – annual flying hours = 1,749,178 hours			
Source of Risk	Risk Estimation	TLS	Remarks
Vertical Technical Risk	0.14×10^{-9}	2.5×10^{-9}	Below Technical TLS
Vertical Operational Risk	16.57×10^{-9}	-	-
2020 Vertical Overall Risk	16.71×10^{-9}	5.0×10^{-9}	Above TLS

Table 5: Pacific Area Vertical Collision Risk 2020

2.67 The PAC vertical collision risk estimates had been above TLS and trending upwards each year from 2016 to 2019. In 2020 there was a significant fall in the risk estimate, reflecting the reduction in traffic volumes caused by the COVID-19 pandemic (**Table 6**)

Year	Vertical Overall Risk Estimate (x 10^{-9} FAPFH)	Remark
2020	16.71	Above TLS
2019	30.21	Above TLS
2018	19.40	Above TLS
2017	7.30	Above TLS
2016	5.01	Above TLS

Table 6: Pacific Area Vertical Collision Risk Estimates 2016 - 2020

2.68 There was a total of 91 LHDs in the Pacific area in 2020, with total duration 312.90 minutes and 82 levels crossed. 17 of the occurrences were Category A, B or C (19%), 48 were Category D, E or F (53%), and 16 were Category I (18%).

2.69 The estimated horizontal collision risk for 2020 for the PAC area met TLS in all longitudinal and lateral risk categories. The estimated risk for 10 minutes longitudinal separation in the Japan airspace improved from 20.10×10^{-9} in 2019 to 0.25×10^{-9} in 2020. (Table 7)

Pacific Area – annual flying hours = 939,628 hours			
2020 PAC Area	Risk Estimation	Airspace	Remarks
30NM Lateral Risk	0.09×10^{-9}	Pacific	Below TLS
50NM Lateral Risk	0.65×10^{-9}	Japan	Below TLS
30NM Longitudinal Risk	3.73×10^{-9}	Pacific and Japan	Below TLS
50NM Longitudinal Risk	2.22×10^{-9}	Pacific	Below TLS
10MIN Longitudinal Risk	0.25×10^{-9}	Japan	Below TLS
2019 PAC Area	Risk Estimation	Airspace	Remarks
30NM Lateral Risk	3.35×10^{-9}	Pacific	Below TLS
50NM Lateral Risk	1.45×10^{-9}	Japan	Below TLS
30NM Longitudinal Risk	4.10×10^{-9}	Pacific and Japan	Below TLS
50NM Longitudinal Risk	2.02×10^{-9}	Pacific	Below TLS
10MIN Longitudinal Risk	20.10×10^{-9}	Japan	Above TLS

Table 7: Pacific Area Horizontal Collision Risk 2019 - 2020

2.70 There was a total of 109 LLDs and LLEs in the Pacific area in 2020, with a total duration of 781 minutes and total horizontal deviation of 544NM. 70 of the occurrences were Category E (64%), 13 were Category A or B (12%), 10 were Category G (9%) and 14 were Category H (13%).

2.71 The estimated vertical collision risk for 2020 for the Asia area did not meet TLS. (Table 8). the overall risk continued to decline since 2017 due to various safety improvement initiatives, but remained above TLS.

Asia Area – annual flying hours = 5,404,154 hours			
Source of Risk	Risk Estimation	TLS	Remarks
Vertical Technical Risk	0.33×10^{-9}	2.5×10^{-9}	Below Technical TLS
Vertical Operational Risk	7.09×10^{-9}	-	-
2020 Vertical Overall Risk	7.42×10^{-9}	5.0×10^{-9}	Above TLS

Table 8: Asia Area Vertical Collision Risk 2020

2.72 The Asia vertical collision risk estimates had been above TLS each year from 2016 to 2019, and trending downwards since 2017. In 2020 there was a significant fall in the risk estimate, while still remaining above TLS, reflecting the reduction in traffic volumes caused by the COVID-19 pandemic (Table 9)

Year	Vertical Overall Risk Estimate (x 10^{-9} FAPFH)	Remark
2020	7.42	Above TLS
2019	12.88	Above TLS
2018	15.50	Above TLS
2017	27.30	Above TLS
2016	12.53	Above TLS

Table 9: Asia Area Vertical Collision Risk Estimates 2016 - 2020

2.73 There was a total of 340 LHDs reported in the Pacific area in 2020, with total duration 696 minutes and 26 levels crossed. 37 of the occurrences were Category A, B or C (11%), 225 were Category D, E or F (66%), and 36 were Category I (11%).

2.74 The estimated horizontal collision risk for 2020 for the Asia area met TLS in all longitudinal and lateral risk categories.

2.75 There was a total of three LLDs and LLEs reported in the Asia area in 2020, with a total duration of nine minutes and total horizontal deviation of 0NM. There was one Category D occurrence, and two Category F.

Hot Spots

2.76 **Table 10** summarizes current LHD Hot Spots, the FIRs involved, the year of identification, and status remarks.

Hot Spot	Involved FIRs	Identified	Remarks
A1	Kolkata/Chennai/Dhaka-Yangon	2015	Cat. E LHDs reducing
A2	Chennai – Kuala Lumpur	2015	Cat. E LHDs reducing
B	Incheon (AKARA Airspace)	2015	Cat. E LHDs
D	Manila – all adjacent FIRs	2015	Cat. E LHDs reducing Cat F LHDs emerging
F	Mogadishu – Mumbai	2015	Cat. E LHDs
G	Sanaa/Muscat – Mumbai	2015	Cat. E LHDs (Sanaa improved)
J	Jakarta – Singapore/Kota Kinabalu	2018	Cat. E LHDs, minor and reducing
M	Colombo – Melbourne	2019	Proposed to re-classify as non-hot spot
N	Oakland USA – Hawaii CEP	2019	Cat. E LHDs increasing

Table 10: LHD Hot Spots in the Asia/Pacific Region

2.77 MAAR informed the meeting that information on **Hot Spot G** had been sent to the MID Region RMA, which was experiencing difficulty in establishing liaison with Muscat. India informed the meeting that both Mumbai and Delhi were in contact with Muscat, and MAAR would be kept informed of outcomes.

2.78 In response to the proposal to remove **Hot Spot M**, ICAO proposed that the current significant decrease in traffic may not provide sufficient evidence of sufficiently reduced risk, and that this and all other hot spots should be retained and this hot spot re-classified as ‘reducing’ until such time as traffic increased. It was also noted that a significant number of the occurrences at this hot spot were the result of Indian Navy flights not complying with ATC instructions, and that an identified mitigation strategy was to establish contact with the Indian Navy to resolve the matter. This mitigation had not yet been achieved.

2.79 Republic of Korea requested that PARMO and ICAO take into consideration the removal of **Hot Spot B** due to the previous unique airspace arrangement having been rectified, a direct speech circuit having provided between Incheon and Shanghai ACCs, and the establishment of a new ATS route parallel to A593. Republic of Korea noted the JASMA/ENRI vertical collision technical risk calculation based on fast time simulation data which indicated technical risk had decreased after phase 1 implementation, and this was evidence of AKARA airspace improvement. The meeting noted however that in addition to the previously mentioned effect of the current reduction in overall traffic levels, Phase 2 of the AKARA Corridor airspace project, which involved a number of changes to the ATS route structure, was also yet to be completed. This hot spot should be reviewed again in 2022, after implementation of Phase 2 of the project.

Identification of Non-RVSM Approved Aircraft

2.80 **Table 11** lists the numbers of non-RVSM airframes reported annually by each RMA.

Report	AAMA	China RMA	JASMA	MAAR	PARMO	Total
RASMAG/20	8	45	15	234	26	328
RASMAG/21	5	6	15	106	11	143
RASMAG/22	7	40	11	163	25	246
RASMAG/23	5	20	9	43	38	115
RASMAG/24	5	4	17	34	1	61
RASMAG/25	2	24	6	26	9	67
RASMAG/26	10	19	21	19	3	72

Table 11: Trend of Non-RVSM Airframes Observed

2.81 The 10 airframes identified by AAMA included six from Australia, and one each from Greece, India, Papua New Guinea and United States. The airframe from India (IN320, Indian Navy, i.e. a State aircraft) and the airframe from Papua New Guinea (M2ZMY) had been operating in RVSM airspace without RVSM approval for 12 months or more.

2.82 The 19 Non-RVSM approved aircraft detected by China RMA included three from Australia, one from Hong Kong China, nine from Indonesia, three from Philippines, one from Republic of Korea and two from USA.

2.83 JASMA had identified a total of 21 airframes including one each from Canada, China, Indonesia and the Solomon Islands, two from Malaysia and 14 from USA. Almost all of the listed aircraft were identified only once in the period from January to June 2021. USA informed the meeting that they would follow up and report back to JASMA.

2.84 MAAR identified 19 aircraft that operated in RVSM airspace without valid RVSM approvals in the RMA's database, including one from Australia, 12 from India, four from Indonesia, and two from Malaysia.

2.85 The three non-RVSM aircraft detected by PARMO included one each from Greece, Netherlands (Aruba) and Solomon Islands.

RMAs' 'W' Verification of State Aircraft

2.86 The RASMAG Chair presented a paper addressing an action item from the RMACG/14 meeting, which asked all RMAs to request clarification from their respective PIRGs on responsibilities of the RMA regarding verification of the approval status of State aircraft (military and other government aircraft performing non-commercial, sovereign functions) and their relation to civil authorities.

2.87 APAC RMAs currently conducted monthly or annual audits of the use of the ‘W’ designator in flight plans, including the flight plans of State aircraft, against the global snapshot of all RMAs’ approval records. Aircraft that included ‘W’ in flight plans but did not have matching RVSM approval were generally called ‘rogue’ aircraft. The rogue aircraft that persistently remained on the list were mostly State aircraft. In order for the rogue State aircraft to be removed from the list either the State aircraft’s approval data had to be provided to the designated RMA, or the State aircraft operator had to stop using ‘W’ in item 10 of the ICAO flight plan.

2.88 Providing additional information to the meeting, MAAR compiled a list of rogue State aircraft that had been detected by APAC RMAs and reported in the past RASMAG meetings. In discussion the meeting noted that some States or their RMAs were not permitted to share RVSM approval data for State aircraft.

2.89 The meeting was invited to consider two options; drafting a Conclusion on the matter now for consideration by APANPIRG, or asking APAC RMAs to administer a short questionnaire to States’ POCs on the matter of RMA responsibility in this regard. After considerable discussion, the meeting agreed to do both.

2.90 The meeting noted that technical Conclusions could be finalized by RASMAG, but in this case there was also a ‘political’ dimension that warranted the matter be discussed at APANPIRG/32. Accordingly, the meeting agreed to the following Draft Conclusion:

Draft Conclusion RASMAG/26-3: RVSM Approvals Data and Filing of RVSM Indicator in Flight Plans of State Aircraft

That, States are urged to:

1. liaise with their State aircraft operators to:
 - a. share State aircraft RVSM approval data with the designated RMA where State aircraft RVSM approval processes are implemented;
 - b. confirm the RVSM approval status of State aircraft when queried by the RMA; and
 - c. not file ‘W’ in item 10 of the ICAO flight plan of aircraft that are not approved for RVSM; and
2. respond to a survey on RMA and State responsibility on the matter of RVSM approvals of State aircraft.

2.91 ATM/SG/9 is invited to endorse the Draft Conclusion.

JASMA Assessment of Non-PBCS Approved Aircraft

2.92 JASMA presented a list of operator-aircraft combinations operating within the Pacific Ocean airspace of the Fukuoka FIR with no registration of PBCS approval. **Figure 13** represents the number of aircraft operating in the airspace, the percentage that included PBCS indicators in their flight plans, and the percentage that were confirmed to be PBCS approved, for the period from April 2020 to June 2021.

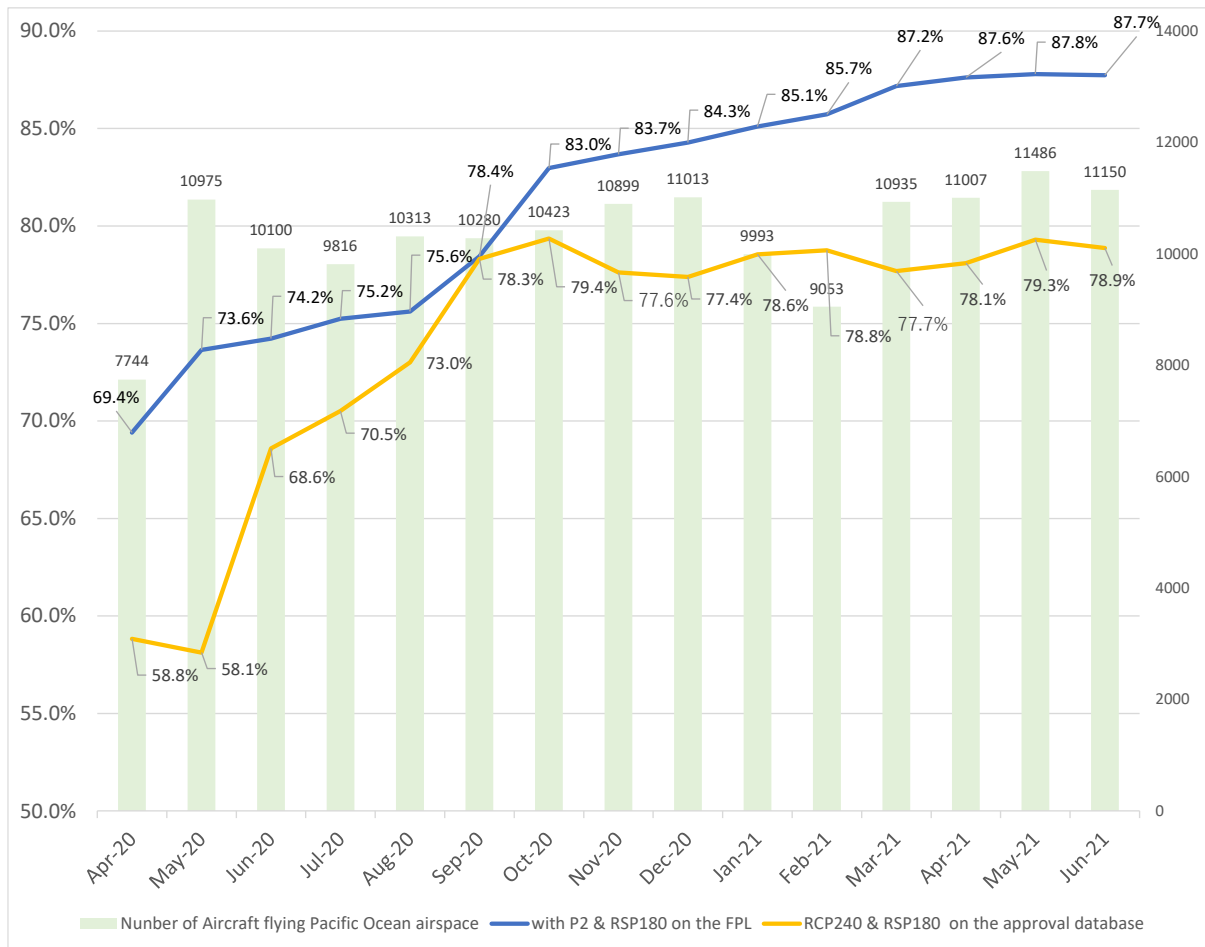


Figure 13: Aircraft filing PBCS indicators in flight plans versus PBCS-approved aircraft in the database – Fukuoka FIR

2.93 While the percentage of all flights in the Pacific Ocean airspace of the Fukuoka FIR that had filed PBCS indicators in flight plans increased to over 87% over the period, the percentage that were recorded in the database as PBCS-approved remained below 80%. Details were provided of the 203 airframes that had filed PBCS indicators but were not included in the PBCS approvals database.

ATM and Airspace Safety Deficiency List

2.94 The meeting reviewed the APANPIRG ATM and Airspace Safety Deficiency List and agreed to make the following recommendations to APANPIRG/32:

- deletion of the Deficiency for Fiji related to PRs not being provided to the Central Reporting Agency (CRA);
- deletion (provisional) of the Deficiency for Afghanistan related to non-provision of safety related data; and
- amendment of the Deficiency for India related to non-reporting of data link performance monitoring and analysis, to remove reference to Kolkata FIR.

2.95 Regarding the deletion of the Deficiency recorded against Afghanistan, ICAO informed the meeting there had been major disruption of Air Navigation Services (ANS) in Afghanistan, and the continued provision of safety data was not assured. MAAR informed the meeting that data had been received in 2020, and in 2021 each month up to August. The meeting agreed that if the provision of safety-related data did not continue in the next few months before APANPIRG/32 the Deficiency should be retained.

ICAO Aircraft Address Verification Using RVSM Approval Database

2.96 MAAR had started a trial process to verify ICAO aircraft address (24-bit address) and quality-check other parameters as a by-product. For height monitoring purposes the RVSM approval data contained ICAO aircraft addresses assigned to aircraft by State Civil Aviation Authorities.

2.97 Errors detected included mismatch of the aircraft address and the information in Item 18 of the flight plan, mismatched aircraft address due to incorrect address information in the RMA RVSM approval database, lag time in the provision of the combined snapshot when aircraft were transferred to a different State of Registry and assigned a new code, and mismatch of aircraft type designators between the flight plan and the RMA database.

2.98 MAAR had corrected information in its database, and coordinated with relevant RMAs and States to resolve issues. This verification process would continue as it would support future implementation of downlinked aircraft address for target identification in the APAC region.

2.99 ICAO informed the meeting that the ICAO Aircraft Address had a number of critical applications in Air Traffic Management systems. A paper on the MAAR activity in this regard should be submitted to the Surveillance Implementation Coordination Group (SURICG), which reported to the Communications, Navigation and Surveillance Sub-Group of APANPIRG (CNS SG).

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

- a) note the information contained in this paper;
- b) note the status of the AKARA – FUKUE Corridor Safety Improvement Plan, and the vertical safety risk estimates for the airspace;
- c) note the impact of the COVID-19 pandemic on safety risk analysis;
- d) note the failure of both the Asia and Pacific areas to meet vertical risk TLS;
- e) note and discuss LHD hot spots, and the retention of hot spots during the current period of significantly reduced traffic;
- f) note the increase in reported non-RVSM airframes operating within RVSM airspace;
- g) discuss and endorse **Draft Conclusion RASMAG/26-3: RVSM Approvals Data and Filing of RVSM Indicator in Flight Plans of State Aircraft;**
- h) discuss any other relevant matters as appropriate.

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