International Civil Aviation Organization

Tenth Meeting of the Air Traffic Management Sub-Group (ATM/SG/10) of APANPIRG

Video Teleconference, 17 – 21 October 2022

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 Twelfth Meeting of the FANS Interoperability Team-Asia (FIT-Asia/12) and the Twenty-Seventh Meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/27) were held by video teleconference from 25 to 28 July 2022 and 22 to 25 August 2022 respectively.

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

1.3 Meeting documentation and the final report of the meeting are available on the FIT- Asia/ 12 and RASMAG/27 can be found at the following web-pages:

i. https://www.icao.int/APAC/Meetings/Pages/2022-FIT-Asia12.aspx

ii. https://www.icao.int/APAC/Meetings/Pages/2022-RASMAG27.aspx

2. DISCUSSION

FIT-Asia Meeting Outcomes

FIT-Asia Problem Reports

2.1 The lower number of data link problem reports (PR)s submitted in the last 12 months reflected the dramatic decrease in air traffic due to the impact of the COVID-19 pandemic (**Figure 1**).

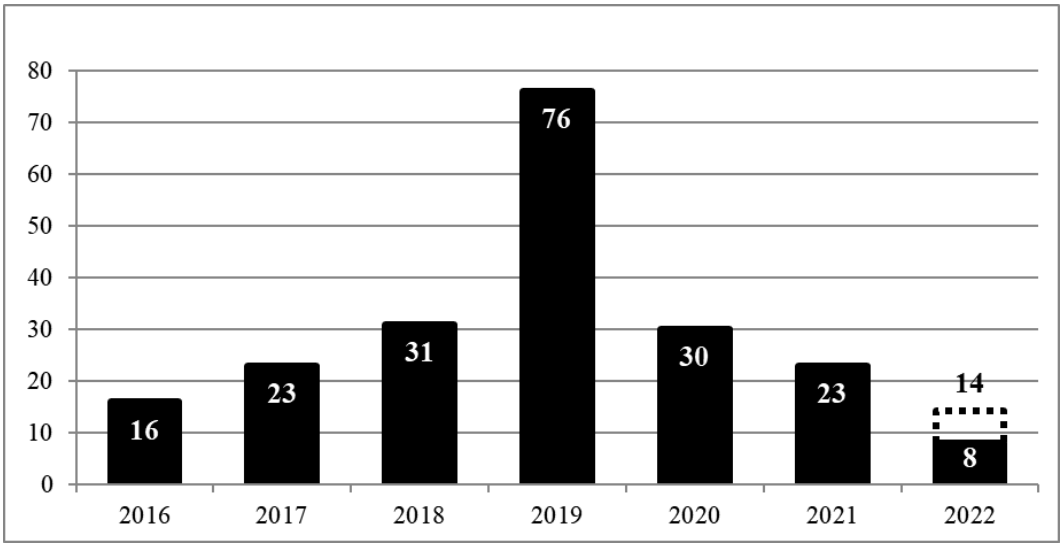

Figure 1: FIT-Asia PR Submissions per Year

2.2 The Central Reporting Agency (CRA) updated the status or progress of three old PRs that had occurred in the FIT-Asia States, and investigated nine significant new PRs and six less-significant new PRs.

PBCS Developments and Implementation

2.3 At FIT-Asia/11, New Zealand proposed that a FANS1/A CPDLC Latency Timer value of 300 seconds as was currently being trialled in the North Atlantic (NAT) Region be adopted in the APAC Region for oceanic airspace. The meeting was also informed that the 300 seconds latency timer value had been implemented under trial for several years in the NAT Region, and was formalized in the North Atlantic Operations and Airspace Manual.

2.4 FIT-Asia/12 had agreed to adopt the latency timer value of 300 seconds. The RASMAG/27 meeting subsequently agreed to the following Conclusion drafted by FIT-Asia/12:

Conclusion RASMAG/27-1: CPDLC Latency Monitor value

That, recognizing:

1. the need for aircraft to provide an appropriate indication when the age of the time stamp of a received CPDLC message exceeds a defined value (latency timer value), in accordance with ICAO Doc 9869 PBCS Manual safety requirement SR-15; 2. the need for a single, standardized global value.

The Asia-Pacific region adopts a latency timer value of 300 seconds for use in oceanic airspace.

Regional PBCS Implementation Update

2.5 The meeting was updated on the status of PBCS implementation among Asia/Pacific Administrations, as reported using the APAC regional Survey of the Status of Current and Planned Implementation of Performance-Based Horizontal Separation Minima form. The meeting was reminded of relevant Conclusions of the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG) and the RASMAG:

Conclusion APANPIRG/27-7: PBCS Operator Requirements

Conclusion RASMAG/22-3: Performance-Based Separation Implementation Survey

Conclusion APANPIRG/28-11: PBCS Operational Authorizations

Conclusion RASMAG/23-1: PBCS Compliance

2.6 A total of 19 APAC Administrations had responded to the survey prior to FIT-Asia/11. Only Australia, Indonesia, Singapore and Thailand provided their annual survey response for 2022. Following on from discussion of the survey form, ICAO provided further information on the need for an update of the Survey of the Status of Current and Planned Implementation of Performance-Based Separation Minima. ICAO further proposed that the annual submission date for both the survey form and the PBCS performance monitoring data (ANSP to FIT) be brought forward to 28 February each year.

2.7 The RASMAG/27 meeting agreed to the following Conclusion drafted by FIT-Asia/12:

Conclusion RASMAG/27-2: Updated Reporting of PBCS Implementation Status and Performance Monitoring Data:

That:

1. *the revised Survey of the Status of Current and Planned Implementation of Performance-Based Separation Minima at **Attachment C to RASMAG/27 report,** and the revised PBCS Action List for ANSPs at **Attachment D to RASMAG/27 report** be uploaded to the ICAO Asia/Pacific Regional Office website to replace the existing; and*
2. *States are urged to submit the following to the Asia/Pacific Regional Office by not later than 28 February each year:*
   a) *the completed Survey of the Status of Current and Planned Implementation of Performance-Based Separation Minima form; and*
   b) *PBCS performance data for inclusion in the aggregated regional PBCS performance data report, using the Data Link Performance Report Template – ANSP to FIT provided on the ICAO Asia/Pacific Regional Office website.*

   Note 1: Non-FIT-Asia States may submit their PBCS performance data through the relevant FIT.

   Note 2: This Conclusion supersedes Conclusions RASMAG/22-3, 23-1, 23-2, 23-3.

Asia/Pacific Region Combined PBCS Monitoring Report

2.8 The report highlighted consolidated performance data and issues associated with Automatic Dependent Surveillance – Contract (ADS-C) Actual Surveillance Performance (ASP) and Controller – Pilot Data Link Communications (CPDLC) Actual Communications Performance (ACP) for the region.

2.9 Overall ASP for the region had met the 95% criterion (**Table 1**).

ACTUAL SURVEILLANCE PERFORMANCE - FIR AGGREGATE (ALL MEDIA TYPES)						
Region	Asia-Pacific Region					
Performance Criteria	RSP180					
Time Period	2021 January-June			2021 July-December		
Colour key: Meets criteria / 99.0%-99.9% / Under criteria	Message Counts	Criteria		Message Counts	Criteria	
		95%	99.90%		95%	99.90%
FIR		% < = 90sec	% <= 180sec		% < = 90sec	% <= 180sec
PAZA	1196520	98.89%	99.70%	1217086	98.72%	99.62%
RJJJ	1514208	98.30%	99.64%	1781319	98.39%	99.62%
KZAK	3436520	98.94%	99.69%	4305637	98.56%	99.53%
NFFF	98541	98.89%	99.54%	109885	99.19%	99.69%
NTTT	23879	99.72%	99.88%	42068	99.77%	99.89%
NZZO	151438	99.04%	99.80%	145725	99.13%	99.83%
YBBB	392893	99.49%	99.84%	518548	99.66%	99.89%
YMMM	346329	99.01%	99.52%	383003	99.50%	99.80%
VCCF	256657	98.69%	99.71%	251687	98.89%	99.91%
VECF				315611	98.67%	99.56%
VOMF	126634	98.52%	99.43%	148693	98.59%	99.46%
WSJC	205191	99.19%	99.85%	251035	99.23%	99.85%
ZLLL	142990	98.80%	99.70%	208842	98.80%	99.60%
ZWWW	75034	98.90%	99.70%	101660	98.80%	99.60%
VVTS	177227	98.73%	99.80%	188140	98.85%	99.83%
VYYF	172414	98.89%	99.56%	166438	98.99%	99.63%
RPHI	221669	99.29%	99.83%	273277	99.25%	99.83%
WAAF	66829	99.31%	99.75%	84031	99.38%	99.79%

Table 1: Asia/Pacific Region ASP (RSP180)

2.10 Overall ACP for the region met the 95% criterion (**Table 2**). . While the volume of data count had slightly increased in 2021, the trend of regional performance in both the 95% and 99.9% criteria had generally improved.

ACTUAL COMMUNICATION PERFORMANCE - FIR AGGREGATE (ALL MEDIA TYPES)										
Region	Asia-Pacific Region									
Performance Criteria	RCP240									
Time Period	2021 January-June					2021 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%	95%	99.90%
FIR		% <= 180sec	% <= 210sec	% <= 120sec	% <= 150sec		% <= 180sec	% <= 210sec	% < = 120sec	% <=150sec
PAZA	74627	98.79%	99.27%	98.51%	98.96%	75692	98.88%	99.20%	98.76%	99.15%
RJJJ	30889	99.69%	99.83%	99.72%	99.79%	37089	99.70%	99.82%	99.71%	99.80%
KZAK	192490	99.28%	99.51%	99.51%	99.75%	236799	98.97%	99.29%	99.22%	99.52%
NFFF	2185	99,67%	99.72%	99.86%	99.81%	3148	99.68%	99.71%	99.84%	99.77%
NTTT	730	100.00%	100.00%	100.00%	100.00%	1329	99.69%	100.00%	99.77%	100.00%
NZZO	3431	99.76%	99.88%	99.88%	99.91%	3222	99.78%	99.87%	99.90%	99.93%
YBBB	11591	99.42%	99.33%	99.60%	99.57%	14683	99.62%	99.39%	99.77%	99.58%
YMMM	13777	99.32%	99.36%	99.47%	99.51%	14850	99.48%	99.50%	99.60%	99.66%
VCCF	8037	98.68%	99.70%	99.26%	99.91%	8360	98.27%	99.57%	99.21%	99.89%
VECF						22069	99.49%	99.67%	99.49%	99.67%
VOMF	34545	99.74%	99.85%	99.85%	99.89%	56992	99.72%	99.82%	99.84%	99.89%
WSJC	14786	99.19%	99.45%	99.30%	99.46%	23916	99.16%	99.49%	99.26%	99.47%
ZLLL	1582	97.97%	98.04%	98.98%	99.11%	1759	98.06%	98.29%	98.69%	98.80%
ZWWW	147	97.27%	97.95%	98.63%	98.63%	80	100.00%	100.00%	100.00%	100.00%
VVTS	43261	95.94%	96.45%	99.43%	99.72%	44881	95.70%	96.30%	99.59%	99.77%
VYYF	47863	98.45%	98.73%	98.76%	99.05%	48746	98.67%	98.99%	99.07%	99.33%
RPHI	6412	98.48%	98.67%	99.02%	99.24%	12973	98.75%	98.91%	99.24%	99.41%
WAAF	11281	98.78%	98.99%	99.76%	99.80%	13841	99.27%	99.40%	99.85%	99.88%

Table 2: Asia/Pacific Region ACP (RCP240)

<u>RASMAG/27 Meeting Outcomes</u>

APAC Consolidated Safety Report

2.11 The Monitoring Agency for the Asian Region (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 2**).

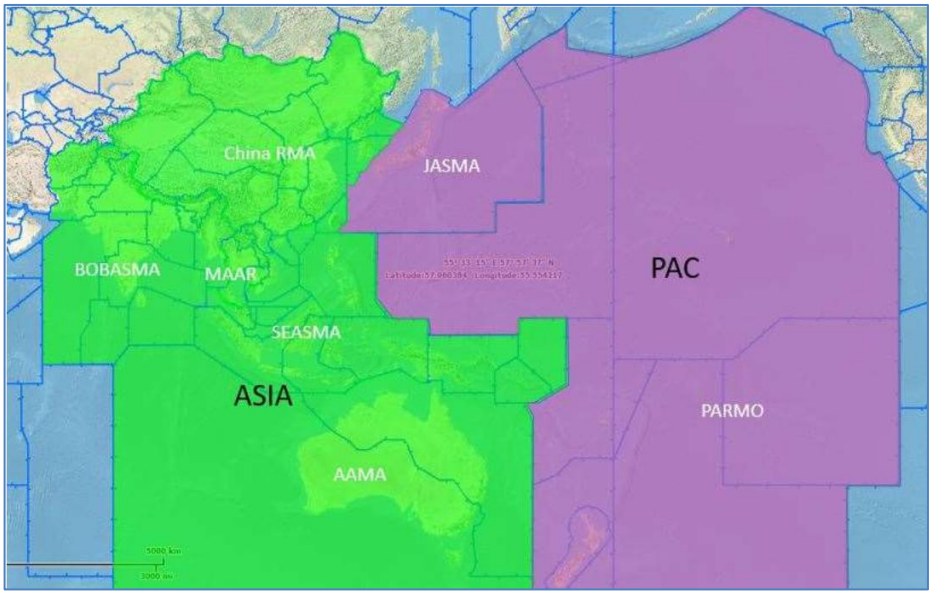

Figure 2: Asia and Pacific Safety Reporting Areas

Pacific Area Vertical Collision Risk

2.12 The estimated vertical collision risk for 2021 for the PAC area did not meet TLS (**Table 3**). The overall risk vertical risk had been increasing from 2016 to 2021 due to improvements in reporting culture.

Pacific Area – annual flying hours = 2,159,665			
Source of Risk	**Risk Estimation**	**TLS**	**Remarks**
Vertical Technical Risk	0.14×10^{-9}	2.5×10^{-9}	Below Technical TLS
Vertical Operational Risk	19.61×10^{-9}	-	-
2021 Vertical Overall Risk	19.74×10^{-9}	5.0×10^{-9}	Above TLS

Table 3: Pacific Area Vertical Collision Risk 2021

2.13 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, before resuming the upward trend in 2021. (**Table 4**)

Year	**Vertical Overall Risk Estimate (x 10^{-9} FAPFH)**	**Remark**
2021	19.74	Above TLS
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 4: Pacific Area Vertical Collision Risk Estimates 2016 – 2021

2.14 There was a total of 123 Large Height Deviations (LHDs) in the Pacific area in 2021 (increased from 91 in 2020), with total duration 508.40 minutes and 65 levels crossed. 16 of the occurrences were Category[1] A, B or C (13%), 80 were Category D, E or F (65%), six were Category G (5%), 11 were Category I (9%), and nine were Category J.

Pacific Area Horizontal Collision Risk

2.15 The estimated horizontal collision risk for 2021 for the PAC area met TLS in all longitudinal and lateral risk categories. (**Table 5**)

Pacific Area – annual flying hours = 939,628 hours			
2021 PAC Area	**Risk Estimation**	**Airspace**	**Remarks**
30NM Lateral Risk	1.74×10^{-9}	Pacific	Below TLS
50NM Lateral Risk	0.71×10^{-9}	Japan	Below TLS
30NM Longitudinal Risk	-	Pacific	Below TLS
30NM Longitudinal Risk	0.01×10^{-9}	Japan	Below TLS
50NM Longitudinal Risk	2.22×10^{-9}	Pacific	Below TLS
10MIN Longitudinal Risk	0.03×10^{-9}	Japan	Below TLS
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

Table 5: Pacific Area Horizontal Collision Risk 2020 – 2021

2.16 There was a total of 137 Large Lateral Deviations (LLDs) and Large Longitudinal Errors (LLEs) in the Pacific area in 2021 (increased from 109 in 2020), with a total duration of 664 minutes and total horizontal deviation of 597NM. 105 of the occurrences were Category E (77%), 11 were Category A or B (8%), 1 was Category G (< 1%) and 5 were Category H (4%).

[1] [1] Category A; Flight crew fails to climb or descent the aircraft as cleared;
Category B: Flight crew climbing or descending without ATC clearance;
Category C: Incorrect operation or interpretation of airborne equipment;
Category D: ATC system loop error;
Category E: Coordination errors in ATC-to-ATC transfer of control responsibility as a result of human factors issues;
Category F: ATC transfer of control coordination errors due to technical issues;
Category G: Aircraft contingency leading to sudden inability to maintain level;
Category H: Airborne equipment failure and unintentional or undetected level change;
Category I: Turbulence or other weather-related cause leading to unintentional or undetected change of flight level;
Category J: TCAS RA – flight crew correctly climb or descend following the RA;
Category K: TCAS RA – flight crew incorrectly climb or descend following the RA;
Category L: An aircraft being provided with RVSM separation is not approved;
Category M: Others.

Asia Area Vertical Collision Risk

2.17 The estimated vertical collision risk for 2021 for the Asia area met TLS. (**Table 6**). The overall risk continued to decline since 2017 due to various safety improvement initiatives.

Asia Area – annual flying hours = 5,404,154 hours			
Source of Risk	**Risk Estimation**	**TLS**	**Remarks**
Vertical Technical Risk	0.32×10^{-9}	2.5×10^{-9}	Below Technical TLS
Vertical Operational Risk	3.71×10^{-9}	-	-
2020 Vertical Overall Risk	**4.03×10^{-9}**	5.0×10^{-9}	**Below TLS**

Table 6: Asia Area Vertical Collision Risk 2021

2.18 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 7**). The 2021 vertical collision risk estimate was below TLS.

Year	**Vertical Overall Risk Estimate (x 10^{-9} FAPFH)**	**Remark**
2021	4.03	Below TLS
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 7: Asia Area Vertical Collision Risk Estimates 2016 - 2021

2.19 There was a total of 379 LHDs reported in the Asia area in 2021, with total duration 339 minutes and 115 levels crossed.

Asia Area Horizontal Safety Assessments

2.20 The estimated horizontal collision risk for 2021 for the Asia area met TLS in all longitudinal and lateral risk categories. (**Table 8**)

Asia Area – annual flying hours = 333,153 hours		
2021 Asia Area	**Risk Estimation**	**Remarks**
30NM Lateral Risk	0.0015×10^{-9}	Below TLS
50NM Longitudinal Risk	1.02×10^{-9}	Below TLS
2020 Asia Area	**Risk Estimation**	**Remarks**
30NM Lateral Risk	0.0004×10^{-9}	Below TLS
50NM Longitudinal Risk	0.85×10^{-9}	Below TLS
2019 Asia Area	**Risk Estimation**	**Remarks**
30NM Lateral Risk	0.0001×10^{-9}	Below TLS
50NM Longitudinal Risk	0.25×10^{-9}	Below TLS

Table 8: Asia Area Horizontal Collision Risk 2019 - 2021

2.21 There was one LLDs and LLEs reported in the Asia area in 2021, with a duration of 29 minutes.

Safety Reporting – Asia Area

2.22 **Table 9** shows the number of LHD, LLD and LLE reports for 2017 to 2021, and the number of reports per flying hours. Total estimated flying hours had decreased significantly due to the COVID-19 pandemic, from 15,677,369 in 2019 down to 7,234,881 in 2020 – an overall reduction of 54%. Flying hours in 2021 were marginally higher than 2020, at 7,604,927. The total number of reports approximately halved, from 1094 in 2019 down to 548 in 2020, but increased to 679 in 2021.

2.23 The number of reports per flying hours in 2021 significantly increased from 2020 in China, SEA, Indonesia, Japan, Republic of Korea/AKARA, leading to an overall reporting rate that was improved from the rate in 2020. Mongolia submitted one report in 2021. Data was not available for DPR Korea.

Airspace	# Reports					1 Report : Flying Hrs				
	2017	2018	2019	2020	2021	2017	2018	2019	2020	2021
DPRK	0	0	0	0	0	-	-	-	-	-
Mongolia	4	1	2	0	1	1: 37,771	1: 158,891	1: 82,138	-	1: 121,621
China	134	110	79	85	105	1: 18,248	1: 22,229	1: 31,119	1: 26,867	1: 15,477
ROK	5	12	34	5	70	1: 117,090	1: 28,365	1: 18,959	1: 25,965	1: 15,456
SEA	474	205	152	42	80	1: 6,548	1: 17,757	1: 22,275	1: 25,106	1: 13,528
Indonesia	34	23	37	18	47	1: 10,842	1: 53,603	1: 33,321	1: 17,346	1: 11,975
Japan	71	76	77	66	135	1: 21,510	1: 20,632	1: 20,762	1: 14,737	1: 11,167
SA/IO	935	681	439	152	41	1: 3,166	1: 3,783	1: 7,955	1: 7,907	1: 7,402
SW Pacific	51	53	101	46	176	1: 17,572	1: 17,817	1: 9,335	1: 6,954	1: 6,638
Pacific	42	43	173	134	24	1: 54,191	1: 45,064	1: 10,139	1: 6,404	1: 6,285
Total	**1,750**	**1,204**	**1,094**	**548**	**679**	**1: 8,180**	**1: 12,332**	**1: 14,330**	**1: 11,712**	**1: 11,200**

Table 9: Total LHD, LLD and LLE Reports, and Reports per Flying Hours, 2017 - 2021

LHD Hot Spots

2.24 **Table 10** summarizes current LHD Hot Spots, the FIRs involved, the year of identification, and status remarks. The meeting considered that all current hot spots should be retained due to the continuing reduced traffic resulting from the COVID-19 pandemic. This would be reviewed at RASMAG/28.

Hot Spot	Involved FIRs	Identified	Remarks
A1	Kolkata/Dhaka-Yangon	2015	Cat. E LHDs improved. Mitigations to be completed.
A2	Chennai – Yangon/Kuala Lumpur	2015	Cat. E LHDs slightly increasing
B	Incheon (AKARA Airspace)	2015	Cat. E LHDs improved. Mitigations to be completed.
D	Manila – all adjacent FIRs	2015	Cat. E LHDs increasing
F	Mogadishu – Mumbai	2015	Cat. E LHDs improved. Mitigations to be completed.
G	Sanaa/Muscat – Mumbai	2015	Cat. E LHDs improved. Mitigations to be completed.
J	Jakarta – Singapore/Kota Kinabalu	2018	Cat. E LHDs increasing.

M	Colombo – Melbourne	2019	Proposed to re-classify as non-hot spot. Mitigations to be completed.
N	Oakland USA – Hawaii CEP	2019	Cat. E LHDs increasing

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

2.25 The process of identifying, monitoring and removing LHD hot spots had been developed informally over several years, to focus RASMAG attention on areas that required special attention. MAAR, responding to RASMAG Task List Action Item 26/5, presented a draft process for identifying, monitoring and removing LHD hot spots which had been discussed at RASMAG-MAWG/9. The MAWG meeting had agreed that the process should be conducted as a trial in 2022 before finalizing. All monitoring agencies trialled the draft approach in their safety reports for RASMAG/27. The meeting noted that the trial hotspot identification process was subjective to some degree, but difficult to standardize. Monitoring agencies were welcome to propose ideas in this regard to the MAWG to fine tune the overall process. RASMAG supported continuation of this activity, with a view to its future formalization.

AKARA Corridor

2.26 JASMA provided an updates on the 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 3**), and remained the current status of the project.

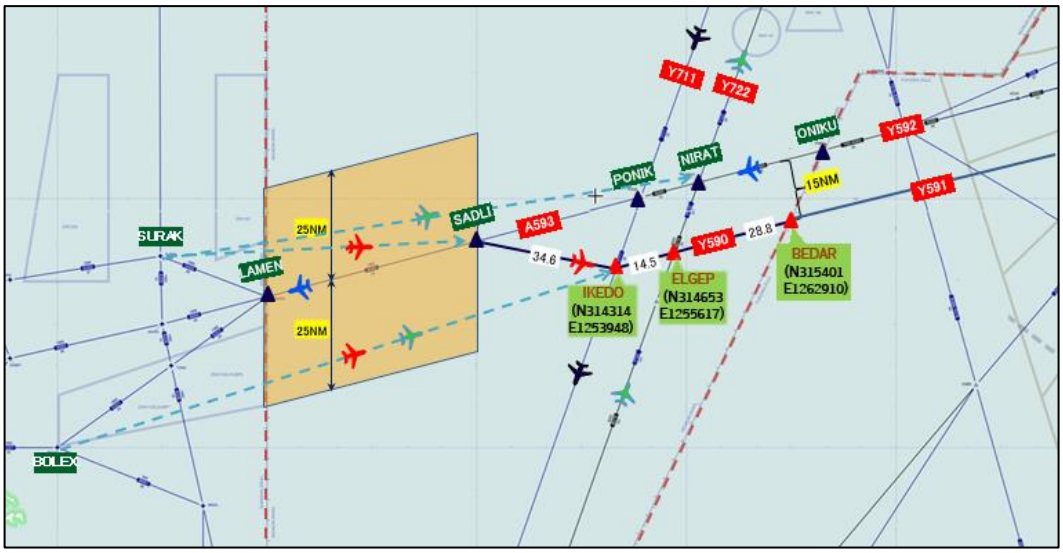

Figure 3: ATS route structure of AKARA-FUKUE Corridor in Phase 1

2.27 As reported to RASMAG/26, All Air Traffic Control (ATC) responsibility for ATS route A593 between ONIKU and SADLI had been handed over to Incheon Area Control Centre (ACC).

2.28 Japan and Republic of Korea had conducted bilateral discussion of the matter, and had agreed to an interim procedure to assign non-FLAS flight levels for requesting flights if the flight level was not already assigned to another aircraft.

2.29 Japan proposed that China and ROK should present and share information on the updated schedule for Phase 2 implementation and significant technical and operational issues at the ATM/SG/10 meeting. China replied that they welcomed open discussion with the related States to progress Phase 2 implementation (**Figure 4** shows the ATS route structure of Phase 2) at an appropriate time, within the Technical Working Group (TWG) framework.

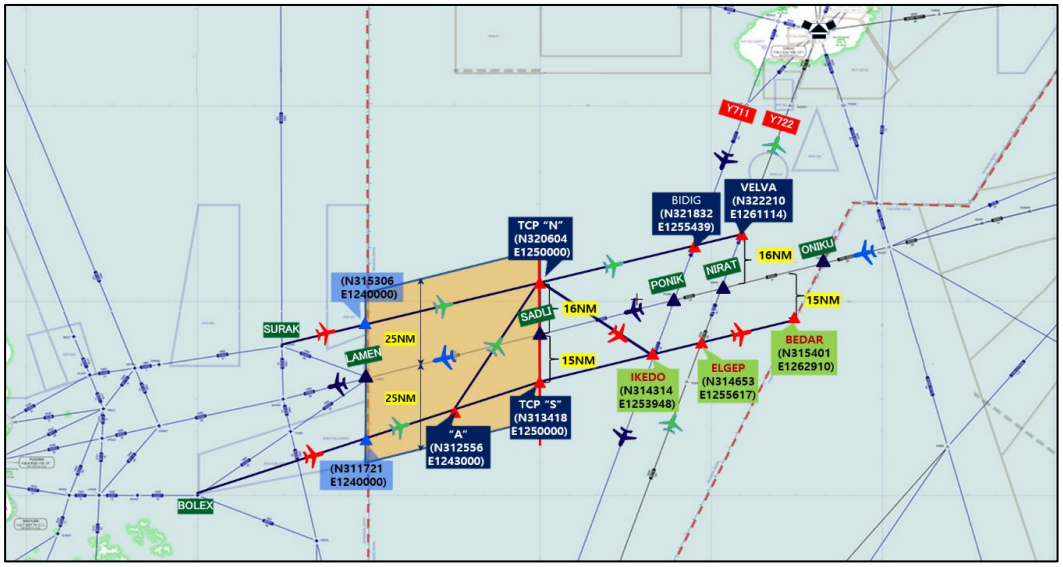

Figure 4: ATS route structure of AKARA-FUKUE Corridor Safety Improvement Plan Phase 2.

2.30 Republic of Korea informed the meeting that the coordination of a safety oversight scheme was being discussed with China in preparation for the route structure that would become more complicated in Phase 2.

2.31 Republic of Korea was studying more efficient FLAS operations regardless of implementation of Phase 2, for example the flexible use of FLAS based on traffic volume. Republic of Korea would discuss this with States concerned through bilateral or trilateral channels when a proposal was ready.

2.32 ICAO considered that implementation of Phase 2 of the project was a regional matter, and would normally be expected to be resolved by the States concerned. However, the meeting noted that the development of the airspace improvement plan had been the subject of a TWG coordinated by ICAO Headquarters. The ICAO Asia/Pacific Office would coordinate with ICAO Headquarters (TWG Secretariat) on the matter.

2021 Analyses for the Incheon FIR AKARA Corridor Interface with Shanghai/Fukuoka/Taibei FIRs

2.33 The Pacific Approvals Registry and Monitoring Organization (PARMO) provided an update on its analysis of the AKARA corridor airspace. The December 2021 Traffic Sample Data (TSD) received from Incheon FIR contained air traffic movements from the AKARA corridor after the route structure was changed. There were key collision risk model (CRM) parameters which were directly estimated from the TSD. The route structure change in the airspace affected specific CRM parameters.

2.34 The vertical operational risk estimate was zero for calendar year 2021. The 2021 vertical technical risk estimate of 0.21×10^{-9} fatal accidents per flight hour (fapfh) met the TLS for vertical technical risk (2.5×10^{-9} fapfh). The overall vertical risk estimate of 0.21×10^{-9} fapfh met the overall vertical TLS (5×10^{-9} fapfh), and was a 72 percent decrease from the 2020 estimate (**Figure 5**).

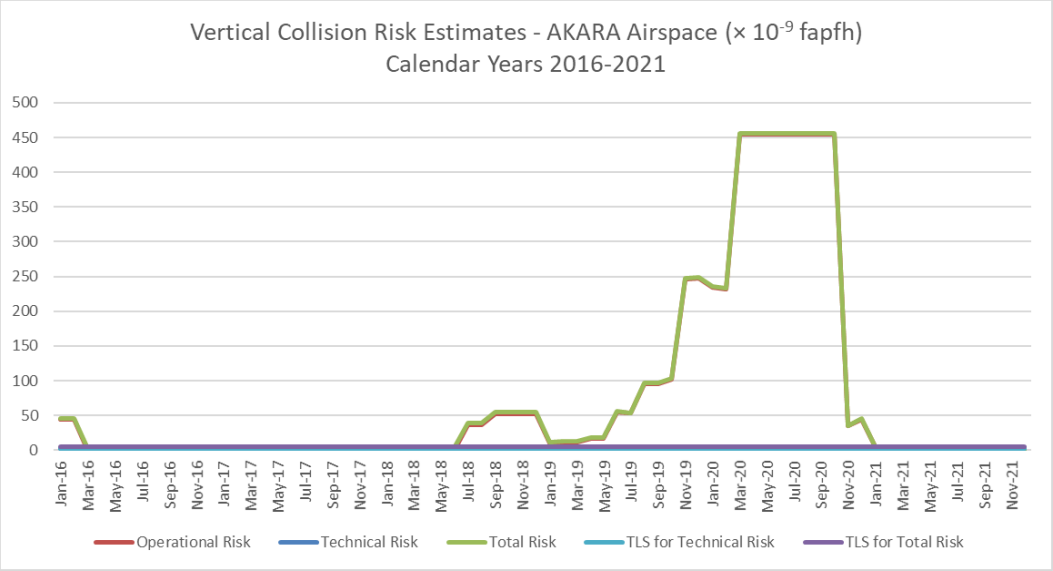

Figure 5. Twelve-month Rolling Vertical Collision Risk Estimates

2.35 While there had been a significant increase in traffic from 2020 to 2021, the December 2021 TSD indicated that traffic volume in the airspace remained more than 60% lower than December 2019.

RVSM Risk Assessment in the Brisbane, Honiara, Melbourne, Nauru, Port Moresby, Jakarta and Ujung Pandang FIRs – 1 January to 30 December 2021

2.36 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. The TLS of 5 x 10-9 had been met, at 1.73 x 10-9.

2.37 An assessment of safety reporting culture as proposed by the MAWG/7 meeting, measured against the reporting rate of occurrences per flight hour and grouped by attribution, indicated reports were consistently made by both pilots and ATC. LHDs with Pilot/Aircrew and ATC attribution were equally reported, indicating a positive reporting culture especially if ATC were comfortable reporting on their own errors as part of a 'just culture' framework.

2.38 AAMA also provided an airspace safety review of RVSM airspace risk in the Jakarta and Ujung Pandang Flight Information Regions (FIRs) for the period 1 January 2021 to 31 December 2021. The total risk estimate for the Jakarta and Ujung Pandang FIRs at 3.64 x 10^{-9}, met the TLS.

2.39 The high rate of reporting of occurrences with ATC attribution was an indication of a positive reporting culture, especially if ATC were comfortable reporting on their own errors as part of a 'Just Culture' framework.

MAAR Vertical Safety Report

2.40 MAAR provided the results of the airspace safety oversight for RVSM operations in South Asia/Indian Ocean Airspace (SAIO), Southeast Asia Airspace (SEA), and Mongolian Airspace during 2020.

South Asia Indian Ocean Airspace

2.41 The 2021 RVSM risk estimate for SAIO airspace indicated that the TLS had not been met at 5.62 x 10^{-9} (**Figure 6**).

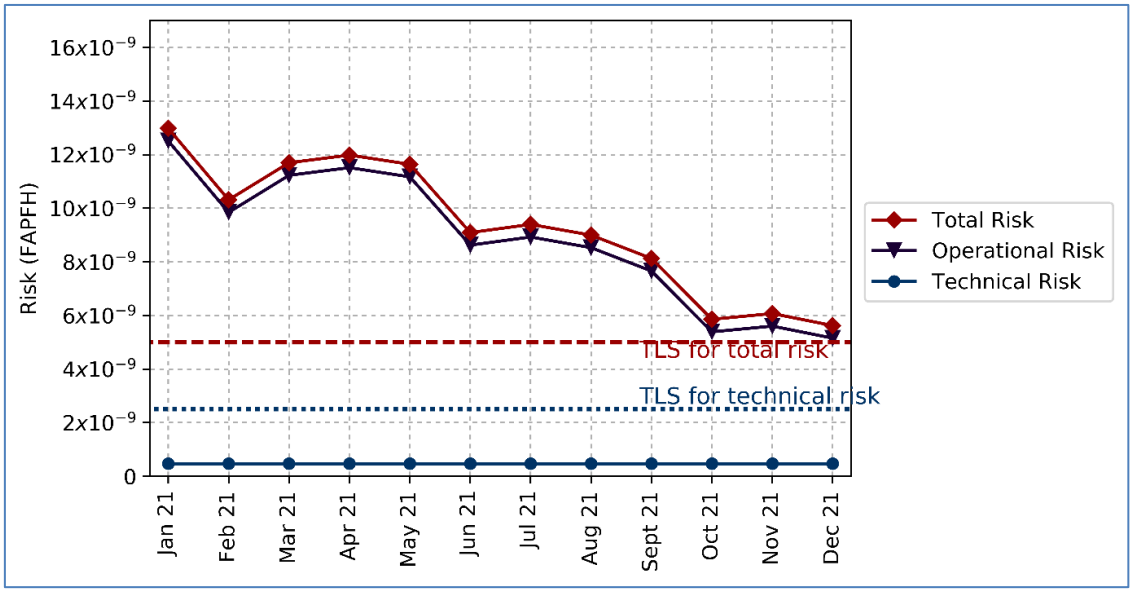

Figure 6: Trends of Risk Estimates for SA/IO Airspace.

2.42 As had been the case in previous years, the vast majority of the 134 LHD cases that had been reported were Category E events (123 or approx. 92%)

Southeast Asian Airspace

2.43 The 2021 RVSM risk estimate for SEA airspace indicated that the TLS for total risk had been met at 2.58 x 10-9 FAPFH. 69 of the 72 reported LHDs in SEA airspace (96%) were classified as Category E.

Mongolian Airspace

2.44 The 2021 RVSM risk estimate for Mongolian airspace indicated that the TLS for total risk had been met at 0.81 x 10-9 FAPFH. In 2021 there was one LHD reported in Mongolian airspace. The aircraft was detected before crossing the transfer of control point (from Irkutsk ACC), and therefore contributed zero operational risk.

Side Meeting – Hot Spot D

2.45 A RASMAG/27 side meeting was held after the close of plenary discussion on 23 August 2022, to provide the opportunity for ANSPs to discuss Hot Spot D (Manila FIR and Adjacent FIRs). A summary of discussion was provided in **Appendix E to the RASMAG/27 report**.

SEASMA Safety Report

2.46 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 2021. This assessment was based on RNP10 performance and concluded that the TLS established for lateral and longitudinal separation standards were satisfied at 0.017 x 10^{-9} and 0.375 x 10^{-9} respectively.

2.47 The number of LLEs had reduced from three in 2020 to zero in 2021 while the number of LLDs remained zero.

2.48 In response to a query on State reporting, SEASMA informed the meeting that there was no indication of non-reporting. Improved ATM automation systems, stabilized technology and better ATC awareness of hot spots were likely to have contributed to the reduced number of occurrences.

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 2021. The 50NM lateral and longitudinal risks remained below the Target Level of Safety (TLS) at 1.09397 x 10^{-9} and 1.07689 x 10^{-9}.

2.50 In December 2021, the average number of flights in the three Indian FIRs were 50% of the corresponding total in 2019, which is a slight increase from the 32% observed in December 2020. Thus, as in the previous year, a reduced collision risk was expected although not as low as in 2020. There was one Category E LLD and nil LLE reported in 2021.

Identified Airspace Risk Occurrences in Indian FIRs

2.51 India presented identified risk occurrences in the four Indian FIRs as reported by ATC during the period 1 January to 31 December 2021, together with various mitigation measures.

2.52 There was one LLD and no LLE reported in the BOBASIO airspace. However, there were 149 LHDs including 143 category E LHDs, of which 100 were filed by Indian ACCs/OCCs and another 43 by adjacent accepting ACCs/OCCs.

2.53 As part of its efforts to reduce the risks due to coordination errors and other near boundary ATS incidents India had planned to implement AIDC with all the neighbouring FIRs. AIDC Test/Trails were conducted during the past year with many of the neighbouring ATSUs.

PARMO Vertical and Horizontal Safety Monitoring Report

2.54 PARMO provided a vertical safety assessment for 2021 for the Pacific RVSM airspace and a portion of Northeast Asia RVSM airspace.

2.55 The 2021 RVSM risk estimate for Pacific airspace indicated that the TLS had not been met at 28.21 × 10^{-9} (**Figure 7**).

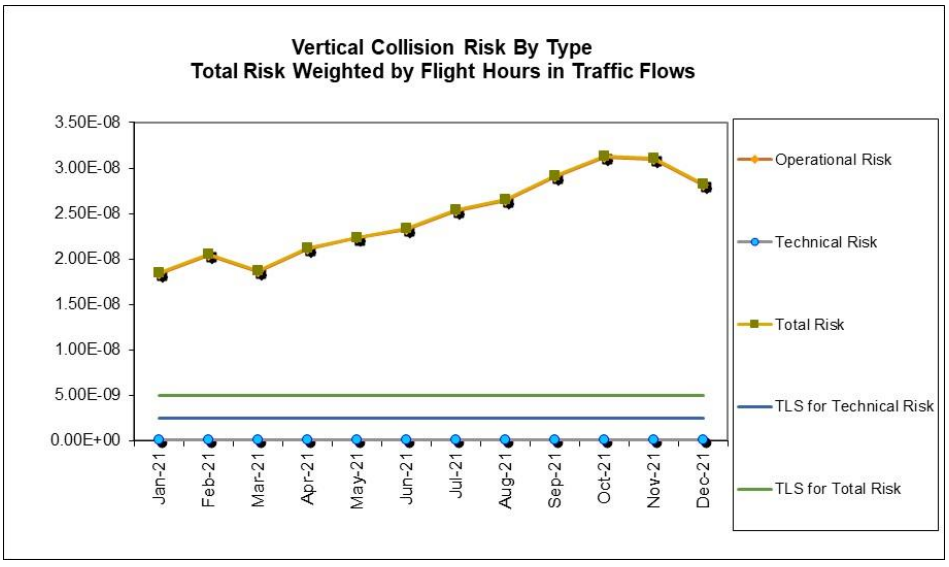

Figure 7: Pacific Airspace RVSM Risk Estimate Trends

2.56 The largest contributors to the vertical collision risk estimate were reported LHD category E occurrences involving Honolulu Control Facility (HCF) and Oakland Center. This specific set of reported LHDs account for 73 percent of the total risk estimate.

2.57 North East Asia airspace RVSM total risk estimate met TLS, at 0.04×10^{-9}. There were three LHDs (All were Category E LHDs) reported in North East Asia airspace in 2021.

PARMO Horizontal Safety Monitoring Report

2.58 PARMO submitted its horizontal safety monitoring report for 2021. The 30/50NM lateral, 30NM and 50NM longitudinal risks were all estimated to meet the TLS at 1.74×10^{-9}, 4.08×10^{-9} and 2.22×10^{-9} respectively. Of the 111 reported LLDs and LLEs, 100 (90%) were Category E, while six (5%) were as a result of Category A root causes (Flight crew deviates without ATC clearance in the horizontal dimension).

2.59 There were thirteen reported LLDs for calendar year 2021. This is a slight increase in the overall number of reported LLDs received by PARMO compared to calendar year 2020.

2.60 The high number of category E reported LLEs were due to reports for transfer errors between HCF and Oakland Oceanic FIR. There were 98 such reported category E LLEs in 2021.

LHD Material Package

2.61 MAAR presented consolidated LHD material as a package to capture the current situation of LHD reporting processes. The package included LHD frequently asked questions (FAQ), LHD taxonomy, LHD reporting form and LHD points of contact (POCs).

2.62 ICAO Doc 9574 RVSM Implementation Manual Chapter 5 specified that ATC authorities were responsible for reporting LHDs to the responsible RMA. The LHD Material Package should be useful to help States and ANSPs to better understand the LHD definition, criteria and reporting process. The LHD Material Package 2022 was provided in RASMAG/27 WP/24 Attachments 1 to 7.

Identification of Non-RVSM Approved Aircraft

2.1 **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
RASMAG/27	Nil	61	17	21	18	117

Table 11: Trend of Non-RVSM Airframes Observed

2.63 MAAR proposed, and the meeting agreed, to include Brunei Darussalam on the APANPIRG List of Deficiencies in the ATM and Airspace Safety fields for failure to verify RVSM approval status for two consecutive years. The meeting also agreed that Lao PDR and Mongolia, both of which failed to submit the 2021 annual RVSM approval snapshot, should be informed that failure to submit the snapshot in 2022 may result in a Deficiency being recorded in 2023.

Survey Outcome for Continuance of 'W' Check for APAC State Aircraft

2.64 The meeting was informed of the results of a survey conducted by ICAO Regional Office in response to ***Conclusion APANPIRG/32-6: RVSM Approvals Data and Filing of RVSM Indicator in Flight Plans of State Aircraft***. The survey, prepared by MAAR on behalf of APANPIRG and APAC RMAs had been circulated by ICAO State Letter on 03 March 2022.

2.65 Fifteen States responded to the Survey. The majority of responses indicated that respondent States:

1) had coordination processes in place to support discussions of RVSM and other airspace-safety-related issues with State aircraft operators;
2) had rules or procedures in place to ensure that State aircraft operators did not file the RVSM-approved 'W' indicator in filed flight plans for non-RVSM-approved aircraft; and
3) would you like Asia Pacific RMAs to continue to cross-check 'W' in State Aircraft's flight plans against RMAs' RVSM database and try to resolve the discrepancies.

2.66 MAAR informed the meeting that they would present this result to the upcoming RMACG/17 (Part II) meeting.

2.67 USA informed the meeting that a paper on State Aircraft RVSM status would be presented at the ICAO Assembly 41st Session in September/October 2022. The meeting was invited to take Assembly outcomes from the paper into consideration in future activities.

MAAR Rogue State Aircraft on the European Bulletin

2.68 The meeting was provided a list of rogue State aircraft (from States under MAAR responsibility) that were reported on the European Air Navigation Region Bulletin (version 17.7, updated July 15 2022). These aircraft were identified as RVSM non-approved aircraft operating within the European region by filing 'W' in their flight plan but did not have matching RVSM approval records in the global RVSM approval combined snapshot.

2.69 ICAO European Air Navigation Planning Group (EANPG) meetings had been exploring potential actions that States could take to address and minimize the number of aircraft on the bulletins, particularly those that had been listed for extended periods.

2.70 Germany had requested that the EUROCONTROL Integrated Initial Flight Plan Processing System (IFPS) reject flight plans for such aircraft planning to operate in RVSM designated airspace over Germany. A proposal to extend the scheme throughout the area covered by the IFPS would be submitted to EANPG.

2.71 **Table 12** summarizes the number of aircraft from States under the MAAR responsibility that are listed on the European bulletin.

State of Operator	**Operator Name**	**Number of Registrations**
India	Air Force of India	5
	Government of India	2
	India Total	**7**
Pakistan	Air Force of Pakistan	6
	Pakistan Army	1
	Pakistan Total	**7**
	Grand Total	**14**

Table 12: Number of Rogue Aircraft on the European Bulletin (States under MAAR responsibility)

2.72 India and Pakistan were urged to liaise with their State aircraft operators to explain the flight plan rejection mechanism and potential disruption to their flight operations. MAAR would assist in communications as much as possible.

2.73 India informed the meeting that the matter would be taken up with DGCA India. Pakistan had already approached the State aircraft operator on the matter.

2.74 ICAO noted the discussion of the matter of non-RVSM-approved State aircraft at ATM/SG/9 and APANPIRG/32 in 2021, which had resulted in Conclusion APANPIRG/32-6 not including key elements of the original drafted by RASMAG/26. States could also use the information to encourage more cooperative behaviour by their State aircraft operators.

APAC Consolidated LTHM Compliance Status

2.75 MAAR presented the overview of LTHM compliance status in the APAC Region, including assessments of five APAC RMAs – AAMA, China RMA, JASMA, MAAR and PARMO. The assessment, which was based on RVSM approval data as of at 30 June 2022, yielded a remaining monitoring burden in the APAC Region of 528 aircraft, which was a 25% increase since 2020.

2.76 Pakistan had the highest percentage of remaining monitoring burden at 73%. It was noted that 70% of Pakistan operators had contacted the MAAR for EGMU service, but could not receive the service due to the travel restrictions during the pandemic. The Chair commented that, as an alternative, States could encourage aircraft operators to retrofit ADS-B-Out capability where feasible, as it would provide a more efficient and more cost-effective solution for height monitoring in the long run.

2.77 **Table 13** lists the States having a remaining monitoring burden of 30% or more, which could be subject to an APANPIRG ATM and Airspace Safety Deficiency.

State	2020	2021
Vanuatu (AAMA)	0%	100%
Pakistan (MAAR)	61%	73%
Indonesia (AAMA)	41%	52%
Solomon Islands (AAMA)	50%	50%
Papua New Guinea (AAMA)	31%	46%
India (MAAR)	51%	46%
The Philippines (MAAR)	48%	45%
Nepal (MAAR)	46%	45%

Table 13: List of States having monitoring burden over 30% as of 30 June 2022

2.78 Regarding the States listed in Table 13, the meeting was informed that the EGMU service had remained unavailable in the past year. MAAR therefore proposed, and the meeting agreed, that consideration of States to include in the Deficiencies List should be delayed until RASMAG/28.

2.79 Information had been received indicating Afghanistan's remaining monitoring burden has dropped from 42% reported in RASMAG/26 to 14% this year. MAAR suggested that RASMAG propose APANPIRG consider removing Afghanistan from the List of Deficiencies. However, ICAO informed the meeting that the POC providing this information to MAAR was not the same person nominated by the current aeronautical administration in Afghanistan that was in regular contact with ICAO. It was proposed that the Deficiency should remain, but comments reflecting this be included in the Deficiency List when presented to APANPIRG/33.

JASMA Assessment of Non-PBCS Approved Aircraft

2.80 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 8** 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.

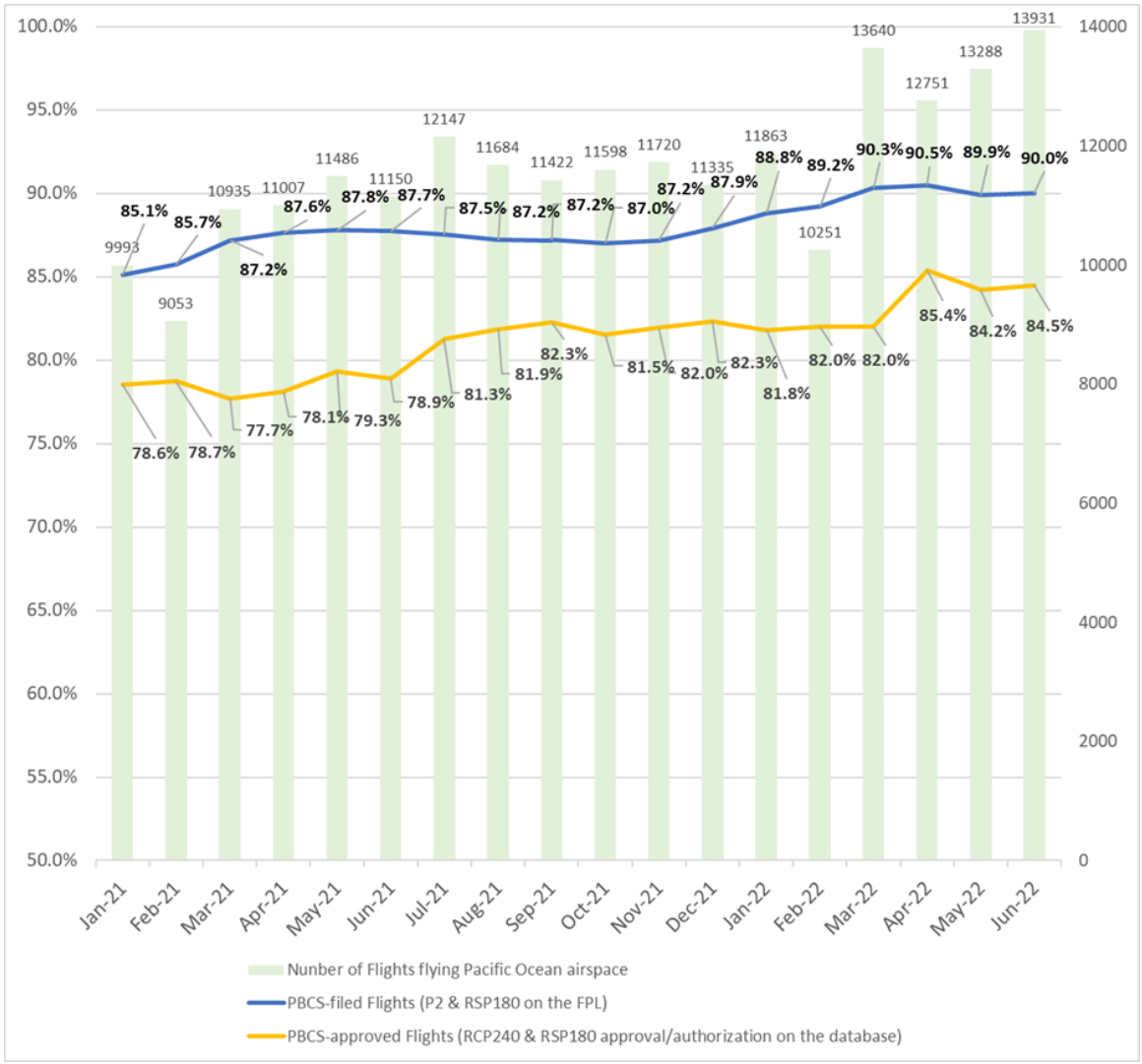

Figure 8: Aircraft filing PBCS indicators in flight plans versus PBCS-approved aircraft in the database – Fukuoka FIR

2.81 The percentage of PBCS-filed flights increased gradually from 85 to 88 percent in 2021, then reached 90 percent in the first half of 2022. The percentage of PBCS-approved flights had remained 5 to 9 percent lower than the percentage of PBCS-filed flights. There were approximately 30 flights per day and 900 per month that filed 'P2' and 'RSP180' in their flight plans but were not confirmed to be PBCS approved/authorized, according to the approvals database.

2.82 The meeting was informed that Japan and USA had a plan to implement 23NM lateral separation minimum and new ATS routes requiring RNP4 and PBCS for aircraft operating in the North Pacific Ocean Airspace. Aircraft filing 'P2' and 'RSP180' in their flight plans that were also identified as non-PBCS approved may not be approved to operate on the new ATS routes or in the related flight level stratum.

ANS Deficiencies List

2.83 The meeting reviewed the APANPIRG ATM and Airspace Safety Deficiency List and agreed to make the following recommendation to APANPIRG/33, as recorded in Appendix H to RASMAG/27 Report:

2.84 FIT-Asia/12 had proposed, and RASMAG/27 agreed, retention of the following data link-related ATM and Airspace Safety Deficiencies be recommended to APANPIRG/33:

a) Retention of the following data-link related deficiencies:

India: *Performance monitoring and analysis not reported for Mumbai FIRs.*

Maldives: *Problem reports not provided to CRA. Performance monitoring and analysis not reported to FIT.*

b) Retention of the following safety related data deficiency

Afghanistan: *non-provision of safety related data*

c) Addition of a new Deficiency:

Brunei Darussalam: non-provision of Safety-Related Data – Requirement of Paragraph 3.3.5.1 of Annex 11 (provision of data for monitoring the height keeping performance of aircraft)

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper;

b) note the trial hot spots identification process, and the retention of hot spots during the current period of significantly reduced traffic;

c) note the proposal to ICAO European Air Navigation Planning Group (EANPG) meetings for the rejection of RVSM non-approved aircraft listed in the European bulletins, particularly those that had been listed for extended periods;

d) note the **Conclusion RASMAG/27-1: CPDLC Latency Monitor value;**

e) note the **Conclusion RASMAG/27-2: Updated Reporting of PBCS Implementation Status and Performance Monitoring Data;**

f) note the retention of existing, and addition of new, ATM and Airspace Safety Deficiencies; and

g) discuss any relevant matters as appropriate.

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