International Civil Aviation Organization

The Twenty-Ninth Meeting of the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG/29)

Bangkok, Thailand, 03 – 05 September 2018

Agenda Item 3: Performance Framework for Regional Air Navigation Planning and Implementation

3.3 RASMAG

RASMAG/23 OUTCOMES

(Presented by the Secretariat)

SUMMARY

This paper presents outcomes relevant to the APANPIRG from the Twenty-Third Meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/23).

1. INTRODUCTION

1.1 The Seventh Meeting of the Future Air Navigation Services (FANS) Interoperability Team – Asia (FIT-Asia/7) was held in Bangkok, Thailand, from 11 – 13 December 2017. FIT-Asia/8 was also held in Bangkok, from 26 to 29 June 2018.

1.2 The Twenty-Third Meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/23) was held from 02 – 05 July 2018 at Bangkok, Thailand. A total of 58 participants attended RASMAG/23 from Australia, Bangladesh, Cambodia, China, Hong Kong China, Fiji, India, Indonesia, Japan, Malaysia, Nepal, New Zealand, Philippines, Republic of Korea (ROK), Singapore, Sri Lanka, Thailand, United States, Viet Nam, IATA, IFALPA and ICAO. A total of 33 Working Papers (WPs), five Information Papers (IPs) and three flimsies were presented to RASMAG/23.

2. DISCUSSION

FIT-Asia 7 Outcomes

2.1 The FIT-Asia/7 meeting was an extra meeting requested by APANPIRG/28. The meeting's agenda differed significantly from the usual as it was focused on the matter of Performance-Based Communications and Surveillance (PBCS) implementation in the Asia/Pacific Region. Discussion centred around six global issues that should be resolved prior to PBCS implementation:

- lack of State readiness to issue operational authorizations for PBCS;
- lack of Required Communications Performance (RCP)/Required Surveillance Performance (RSP) Statements of Compliance (SOC) for some aircraft;
- a need for an alternative to the requirement for commercial contracts between operators and Communication Service Providers (CSPs);
- agreements on the roles of Regional Monitoring Agencies (RMAs) regarding PBCS;
- lack of global standardized requirement for PBCS data collection/monitoring; and
- lack of readiness of all ANSPs to receive, process, transfer and use PBCS flight plan codes.

2.2 The meeting considered the outcomes of APANPIRG/28, which had agreed that the APANPIRG Chair and Vice Chair be empowered to consider, and if necessary change, the current transition arrangements for the implementation of PBCS provisions by APAC ANSPs in the event that FIT-Asia recommended such action The FIT-Asia/7 meeting agreed that the currently agreed latest implementation date of 29 March 2018 should not be deferred. The APANPIRG Chair and Vice-Chair endorsed the revised Asia/Pacific PBCS Transition Strategy (**Attachment A)** and it was posted to the ICAO Asia/Pacific eDocuments webpage.

2.3 Noting that the requirement for PBCS policies and objectives supporting safety oversight of aircraft operator and aircraft system PBCS operations applied to all States of Registry, the following survey results were highlighted a lack of:

1. readiness to implement by 29 March 2018, including two Administrations that did not plan implementation at all;
2. commitment to undertake activities to ensure aircraft operator readiness by 29 March 2018, including three Administrations that had no plan to conduct these activities at all;
3. readiness ready to implement PBCS monitoring, analysis and reporting, including five Administrations that did not plan implementation at all; and
4. any intention to submit the necessary Proposals for Amendment to Regional Supplementary Procedures.

PBCS Developments and Implementation

2.4 Japan informed the meeting that the ratio of PBCS-approved aircraft was initially approximately 17%, and had increased to approximately 40% at the current time (**Figure 1**). The rate of UNABLE responses to altitude change requests had increased by approximately 10% since PBCS implementation (**Figure 2**).

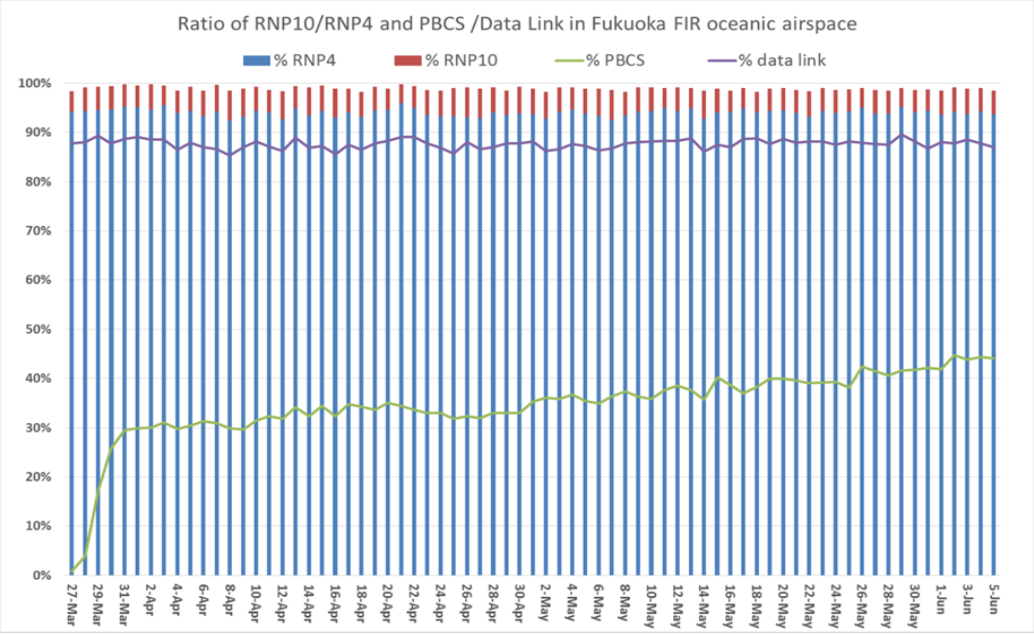

Figure 1: Ratio of RNP10/RNP4 and PBCS/Data Link in Fukuoka FIR oceanic airspace

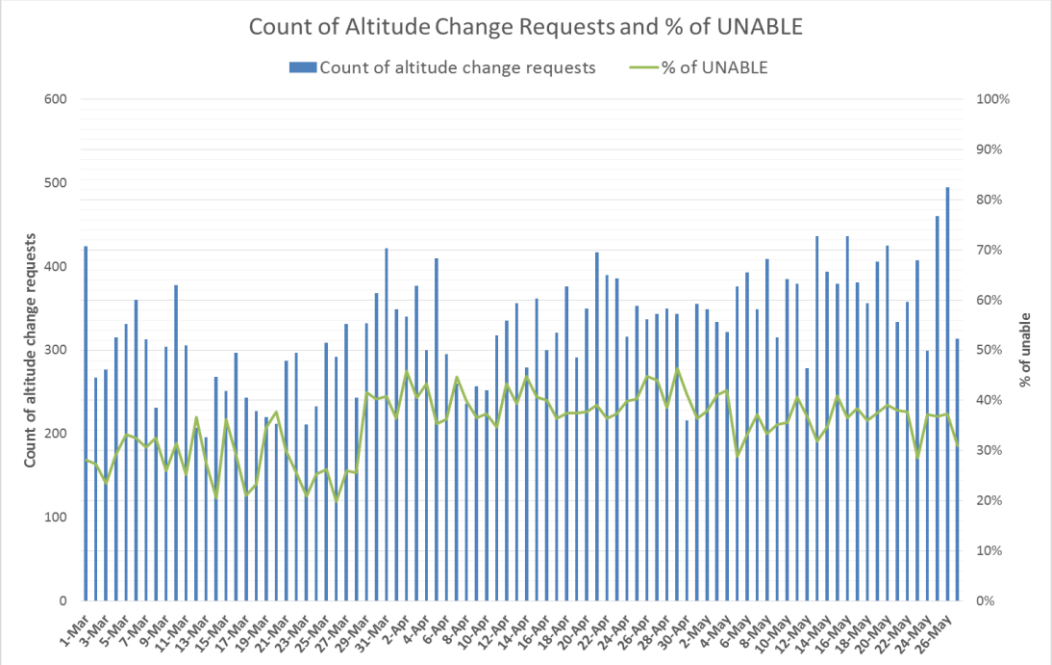

Figure 2: Transition of altitude change requests and ratio of UNABLE responses

2.5 Japanese air traffic controllers had not reported a significant workload increase or observed an operational impact of PBCS implementation.

2.6 Regarding the Auckland Oceanic FIR, 56% of Automatic Dependent Surveillance – Contract (ADS-C) reports received during May 2018 were from PBCS qualified aircraft. This was expected to increase to around 63% in the near future. During the first two months of PBCS operations, mixed PBCS – non-PBCS operations had not created any significant ATC workload issues.

PBCS Post-Implementation Review

2.7 IATA presented a brief PBCS post-implementation review, noting the very low compliance rate. The main issues identified were the lack of regulatory processes to enable PBCS-capable aircraft to file RSP180 and RCP240 indicators in flight plans, and the non-availability of aircraft manufacturer technical solutions for a number of aircraft types.

2.8 Despite two APANPIRG Conclusions urging States to take action and to report implementation status it was unclear why many aircraft could not file PBCS indicators in flight plans. This would mean a 'mixed-mode' environment in PBCS airspace that could require considerable effort from ATC to minimize the impact on operations.

Summary of Current <u>Reported</u> PBCS Status

2.9 The following Asia/Pacific States had reported implementing PBCS operations in their Flight Information Regions (FIR)s, and were completing, in full or in part, the regulatory processes supporting aircraft operator readiness for PBCS:

- **PBCS FIRs**: China, Fiji, Indonesia, Japan, New Zealand, Singapore, USA.
- **Aircraft Operator Readiness**: China, Japan, New Zealand, Singapore, USA.

2.10 The FIT/-Asia/8 meeting drafted the following Conclusion, which was subsequently agreed by RASMAG/23:

Conclusion RASMAG/23-1: PBCS Compliance		
What: That, ICAO reminds all Asia/Pacific Administrations of Conclusions RASMAG/22-3, and APANPIRG 27/7 and 28/11, and requests they urgently complete the annual Survey on Performance-Based Separation Implementation, due by April 30 each year, particularly with respect to Survey items D1 and D2.		Expected impact: ☐ Political / Global ☐ Inter-regional ☐ Economic ☐ Environmental ☒ Ops/Technical
Why: To remind regulators of the need to take urgent action in accordance with APANPIRG Conclusions 27/7 and 28/11, and RASMAG 22/3; if they had not already done so.	Follow-up: ☒Required from States	
When: 5-Jul-18	Status: Adopted by Subgroup	
Who: ☒Sub groups ☒APAC States ☒ICAO APAC RO ☐ICAO HQ ☐Other:		

2.11 **Table 1** lists the FIRs where Doc. 7030 (*Regional Supplementary Procedures*, *SUPPs*) enabled the application of performance-based separations that required PBCS in high seas airspace.

FIRs	50 NM Lateral RNAV 10 (RNP 10)	50 Longitudinal RNAV 10 with PBCS	23 NM Lateral RNP 4 or RNP 2 with PBCS	30 NM Longitudinal RNP 4 or RNP 2 with PBCS
Anchorage, Oakland Oceanic	✓	✓	✓	✓
Auckland Oceanic, New Zealand	✓	✓	✓	✓
Brisbane, Melbourne	✓	✓	✓	✓
Fukuoka	✓	✓	✓	✓
Hong Kong	✓	✓		
Ho Chi Minh	✓	✓		
Honiara	✓	✓	✓	✓
Kuala Lumpur	✓	✓		
Nadi	✓	✓	✓	✓
Nauru	✓	✓	✓	✓
Port Moresby	✓	✓	✓	✓
Sanya	✓	✓		
Singapore	✓	✓		
Tahiti	✓	✓	✓	✓

Table 1: Doc. 7030-supported Performance Based Separations by FIR

2.12 The meeting noted that several Asia/Pacific States may have implemented, or planned to implement, performance-based separations in airspace over the high seas without the necessary support in SUPPS. States were requested to notify the ICAO Asia/Pacific Regional Office in this regard, to facilitate a coordinated PfA that would avoid piecemeal amendments to SUPPS.

2.13 Boeing was planning to demonstrate compliance on data link systems that had not been demonstrated to date (B474-400 with legacy Flight Management Computer, and B777 AIMS1 models). A summary of next steps for configurations that failed to demonstrate compliance was provided, together with an overall compliance status for all models.

CRA Arrangements, Problem Reporting and Performance Analysis Reporting

2.14 The meeting noted that, while the reporting of performance data to the FIT had improved, there was little reporting of the actions taken by States to determine the causes of performance not meeting the criteria, or of actions taken to rectify performance deficiencies. States were requested to ensure that all cases of significant failure to meet the performance criteria were acted upon, and that the results of analysis of contributing factors and the rectification action taken by the State were reported to the FIT.

Actions – Operator Performance Issues

2.15 Where monthly performance analyses, or analysis of information provided by ATC, operators themselves or other sources, identified deficiencies in the data link performance of a particular operator, or operators, States should report the issue to the Central Reporting Agency (CRA) for analysis. Further reporting to the RMA and/or Regulator should follow, as appropriate.

2.16 It was noted that apparent operator issues may also be related to communications network issues such as transitions between satellite and VHF communications, therefore requiring full analysis before reporting to RMA and/or regulator.

Aggregated Regional Data

2.17 The meeting recommended that aggregated regional data link performance data should be made available. The responsibility for compiling the data and reporting it to the FIT should be assigned on a rotational basis. FIT/-Asia/8 drafted the following Conclusion, which was subsequently agreed by RASMAG/23:

<table>
<tr><td colspan="3">Conclusion RASMAG/23-2: PBCS Action List for ANSPs</td></tr>
<tr><td colspan="2">What: That, the PBCS Action List for Air Navigation Service Providers (ANSPs) provided at Appendix C to the Report be uploaded to the ICAO Asia/Pacific website to provide guidance in the steps for analysis and reporting of PBCS performance problems.</td><td>Expected impact:
☐ Political / Global
☐ Inter-regional
☐ Economic
☐ Environmental
☒ Ops/Technical</td></tr>
<tr><td>Why: To provide guidance to ANSPs in the steps to follow for the detection, analysis and reporting of data link performance, degraded performance and problems.</td><td colspan="2">Follow-up: ☒Required from States</td></tr>
<tr><td>When: 5-Jul-18</td><td colspan="2">Status: Adopted by Subgroup</td></tr>
<tr><td colspan="3">Who: ☒Sub groups ☒APAC States ☒ICAO APAC RO ☐ICAO HQ ☐Other:</td></tr>
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Regional PBCS Monitoring Templates

2.18 New Zealand had presented the format of PBCS monitoring templates agreed at the April 2018 Informal South Pacific Coordinating Group (ISPACG) FIT meeting. These templates standardized reporting of observed RCP240 and RSP180 performance by ISPACG ANSP to the ISPACG FIT. The paper also proposed monitoring templates for use by regional groups such as ISPACG and FIT/Asia when reporting FANS1/A data link performance to their appropriate coordinating group and RASMAG.

2.19 As several FIT-Asia States had only recently commenced data link performance analysis, it was proposed that FIT-Asia supported a phased implementation of the new templates.

2.20 FIT/-Asia/8 drafted the following Conclusion, which was subsequently agreed by RASMAG/23:

<table>
<tr><td colspan="3">Conclusion RASMAG/23-3: Data Link Performance Analysis Reporting Templates</td></tr>
<tr><td colspan="2">What: That, recognizing the need to make data link performance information available to States, Regional Monitoring Agencies, and aircraft operators in multiple ICAO Regions, and the consequent need to standardize the presentation format of information:
1. The Data Link Performance Analysis Reporting Templates provided in Appendix D to the Report be uploaded to the ICAO Asia/Pacific website, together with examples of completed reports, for use in reporting to FIT-Asia;
2. FIT-Asia States that have yet to commence providing data link performance reports to the FIT do so using the new templates exclusively; and
3. States that currently provide data link performance reports to FIT-Asia commence using the new templates at the earliest opportunity, and in any event by not later than FIT-Asia/10 in 2020.</td><td>Expected impact:
☐ Political / Global
☐ Inter-regional
☐ Economic
☐ Environmental
☒ Ops/Technical</td></tr>
<tr><td>Why: To standardize the presentation of data link performance data to FIT, RMA, RASMAG and States.</td><td colspan="2">Follow-up: ☒Required from States</td></tr>
<tr><td>When: 5-Jul-18</td><td colspan="2">Status: Adopted by Subgroup</td></tr>
<tr><td colspan="3">Who: ☒Sub groups ☒APAC States ☒ICAO APAC RO ☐ICAO HQ ☐Other:</td></tr>
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PBCS Approvals Database

2.21 A template for ANSP reporting of non-compliance was considered by the meeting. The meeting noted that Annex 6 – *Operation of Aircraft* specified the Standards relating to PBCS with which the operator and State must comply, but did not require the issuance of approvals for PBCS by the State to the aircraft operator. While the Reduced Vertical Separation Minimum (RVSM) approvals database would provide a useful resource to facilitate communication with the State of Operator/Registry, there did not appear to be a need for either a separate or an expanded RVSM approvals database.

2.22 The Monitoring Agency for the Asia Region (MAAR) explained that the sole purpose of collecting RVSM or PBCS authorization/approval information was so that RVSM, RSP and RCP designators in the flight plans could be checked against the information obtained from the State CAA. However, it was also noted that the risk environment of RVSM operations was significantly different from that of horizontal separation supported by PBCS. Moreover, airspace in which PBCS applied was not exclusionary (in other words, it was mixed PBCS and non-PBCS), unlike RVSM.

2.23 The meeting agreed that the template for ANSP reporting PBCS performance below the criteria would be useful for standardizing the information provided to RMAs and States.

2.24 FIT/-Asia/8 drafted the following Conclusion, which was subsequently agreed by RASMAG/23:

Conclusion RASMAG/23-4: PBCS Non-Compliance Report Form Template	
What: That, recognizing the need for Air Navigation Service Providers (ANSPs) to report data link performance of aircraft and/or aircraft operators' fleets to the RMA for follow-up action by the State of Registry, and the consequent need to standardize the information provided and the format of its presentation, the PBCS Non-Compliance Report Form at **Appendix E to the Report**, together with an example of a completed report form, be uploaded to the ICAO Asia/Pacific website for use by ANSPs in reporting non-compliant data link performance to RMAs.	Expected impact: ☐ Political / Global ☐ Inter-regional ☐ Economic ☐ Environmental ☒ Ops/Technical
Why: To provide States with a standard reporting template for reporting aircraft/operator PBCS performance problems to the RMA.	Follow-up: ☒Required from States
When: 5-Jul-18	Status: Adopted by Subgroup
Who: ☒Sub groups ☒APAC States ☒ICAO APAC RO ☐ICAO HQ ☐Other:	

RASMAG/23 Outcomes

Vertical Safety Assessment

2.25 **Figure 3** is a summary of Asia/Pacific Reduced Vertical Separation Minimum (RVSM) Target Level of Safety (TLS) compliance reported to RASMAG/23.

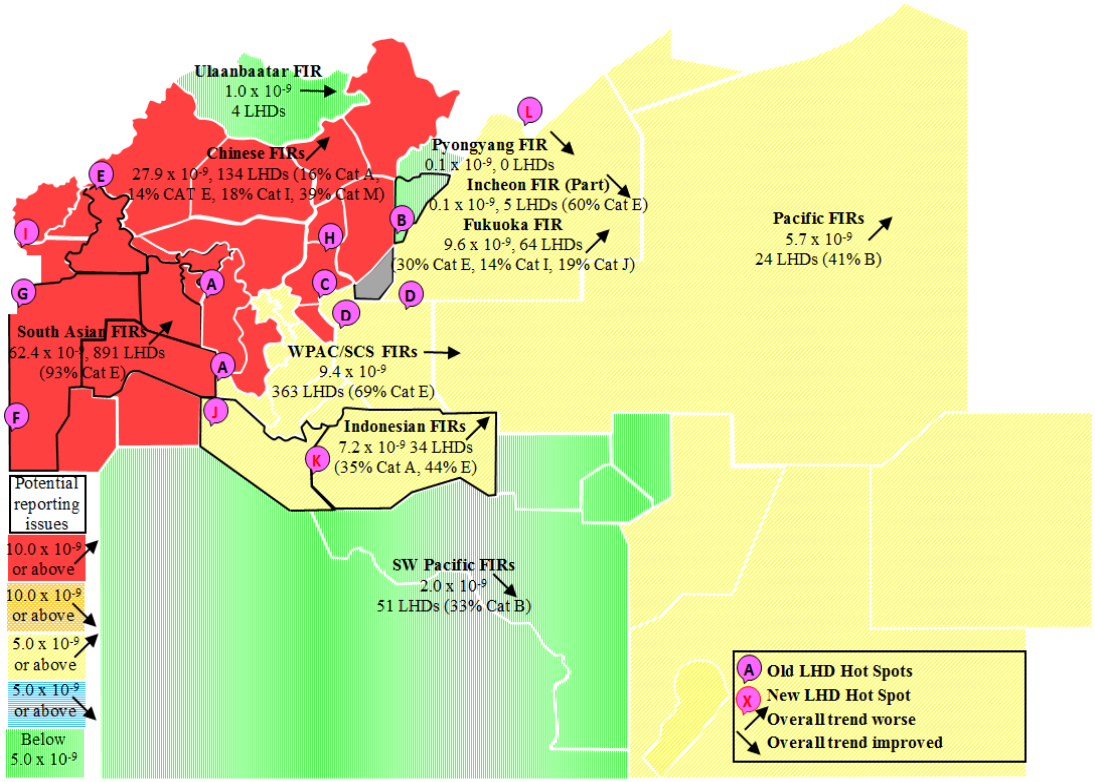

Figure 3: Asia/Pacific RVSM TLS compliance reported to RASMAG/23

2.26 **Table 2** provided a comparison of Asia/Pacific RVSM risk as a measure against the TLS by grouped FIRs, according to the RMA responsibilities for airspace. Over the past five years (2013 – 2017), the performance of Asia/Pacific in compliance with the TLS for RVSM had been poor overall, averaging 34% when measured by the grouped FIRs.

	RASMAG19	RASMAG20	RASMAG21	RASMAG22	RASMAG23
FIRs	16%	53%	32%	51%	16% (8 FIRs)

Table 2: Comparison of Regional RVSM TLS Achievement

South Asian/Indian Ocean Airspace

2.27 In summary, the estimated vertical risk for the South Asia/Indian Ocean area had increased substantially from **27.8 x 10^{-9}** to **62.4 x 10^{-9}** (**Figure 4**), or more than an order of magnitude higher than the TLS. Negative transfer cases accounted for 45% of occurrences but 63% of the risk. Urgent work was being undertaken by all the States concerned to implement improved Air Traffic Services (ATS) surveillance and communications, including ATS Interfacility Datalink Communications (AIDC), and enhanced operational procedures to reduce this risk.

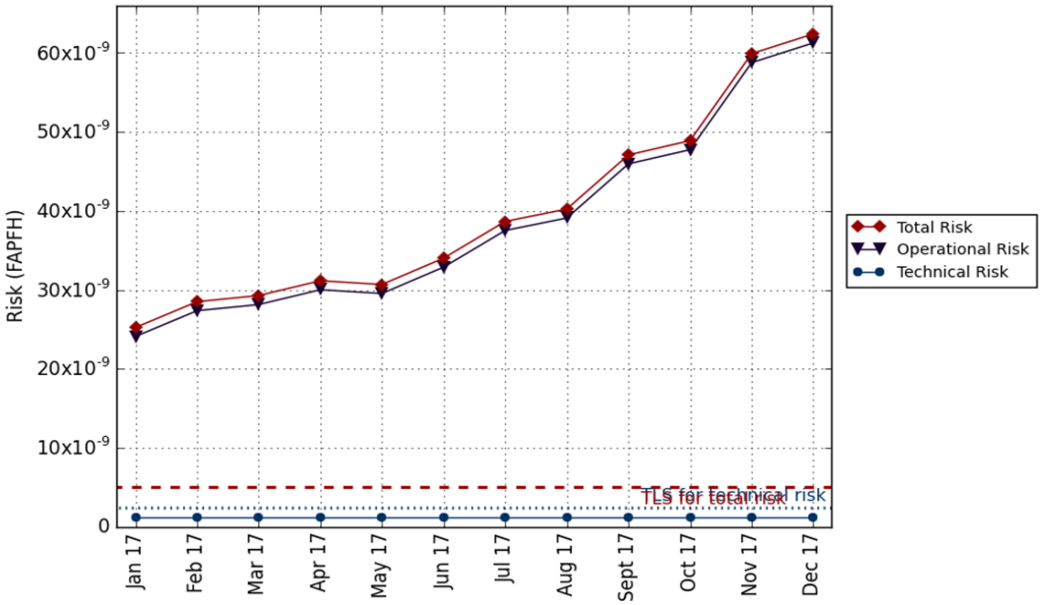

Figure 4: South Asia/Indian Ocean Airspace RVSM Risk Estimate Trends

Southeast Asia

2.28 The Western Pacific/South China Sea (WPAC/SCS) area overall risk estimation was unchanged from 2016 to 2017 (**9.4 x 10^{-9}**, **Figure 5**).

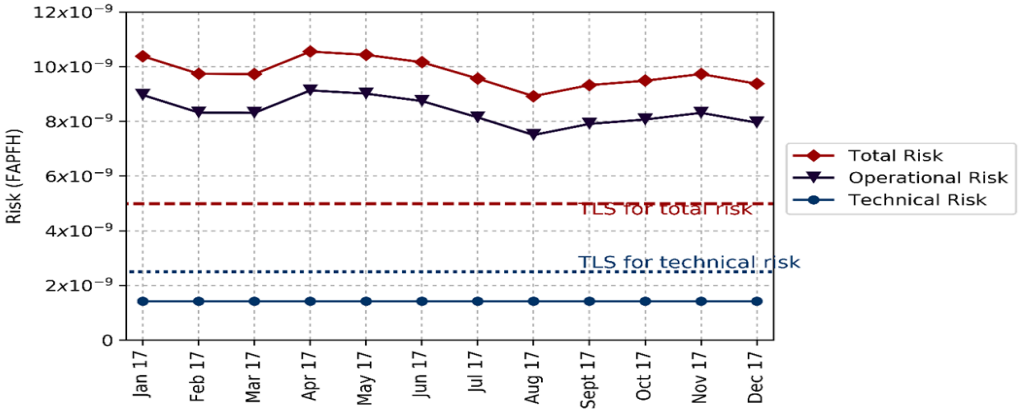

Figure 5: WPAC/SCS Airspace RVSM Risk Estimate Trends

2.29 Hot Spot D – the Manila FIR interface with the Ujung Pandang, Singapore, Ho Chi Minh, Sanya, Hong Kong and Fukuoka FIRs remained problematic, although a reduction of Large Height Deviations (LHDs) was noted from 96 in 2016 to 62 in 2017. The implementation of AIDC had been previously urged as a high priority, but was not yet fully operational. Therefore, operational measures such as the reduction of workload within the Manila ACC through initiatives such as improved ATC sectorisation was a continuing priority.

2.30 The Philippines described the extensive ATC modernisation programme that was due to be implemented mainly during the second half of 2018. IFALPA asked about specific timelines for implementation. The Philippines stated that they were currently in a shadowing phase and planned to cutover in August 2018 if the system provider could fix all the blocking issues.

2.31 RASMAG/23 also noted the workload [and therefore safety] issues with the continued requirement to transition to a non-standard Flight Level Orientation Scheme (FLOS) in the South China Sea (SCS). ICAO noted that the SCS Traffic Flow Review Group (SCSTFRG) managed this task, and requested China, Hong Kong China and Viet Nam to resolve this issue as soon as possible.

East Asia

2.32 The Incheon FIR AKARA Corridor interface with Shanghai/Fukuoka/Taibei FIRs had been identified by RASMAG/20 as an LHD Hot Spot (**Hot Spot B**) with the Pacific Approvals Registry and Monitoring Organization (PARMO), China RMA, Japan Airspace Safety Monitoring Agency (JASMA), and MAAR as the assigned RMAs. Fukuoka ACC provided (ATS on ATS route A593 for traffic east of point SADLI and Shanghai ACC for traffic west of point SADLI. A Flight Level Allocation Scheme (FLAS) was in place, with three crossing routes – Y711 and Y722/B576 (**Figure 6**).

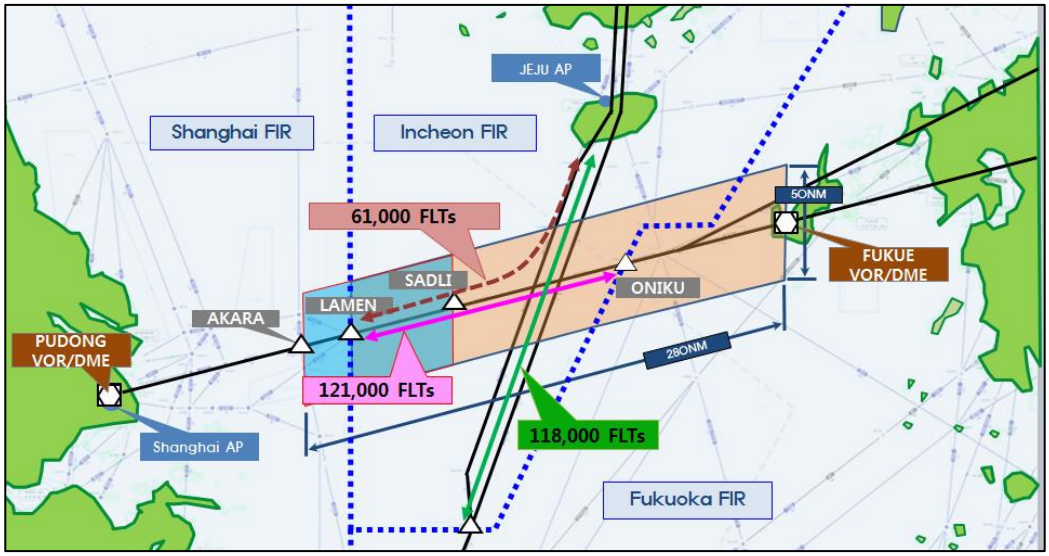

Figure 6: AKARA Corridor Overview

2.33 Although there had been no reported LHDs within the AKARA Corridor during 2017, some ANSPs providing services within this airspace had previously been noted by RASMAG as under-reporting (there had been three LHDs reported in both 2015 and 2016). The 2017 safety assessment for AKARA noted that a single deviation of only 9.25 seconds in a year would be enough to fail the TLS, due to the AKARA arrangements being non-compliant with ICAO Standards.

2.34 The ROK provided operational information on the AKARA Corridor. A review had been conducted on the current situation during January 2018. A safety assessment of the airspace had been initiated regarding an ATC sector for the AKARA Corridor, and how to normalize the system in accordance with ICAO Standards and regional expectations.

2.35 IATA thanked PARMO and ROK for providing the information on operations within the AKARA Corridor, which had a significant effect on safety and efficiency. IATA continued to be concerned about the abnormal arrangements, particularly if there was an emergency descent or a deviation required. Recognising that the arrangement was set up due to the lack of infrastructure 35 years ago, IATA noted that this was not the case today.

2.36 Moreover, IATA stated that while the airlines supported short-term mitigation actions, the focus must remain on normalising the airspace, with one ATC unit providing the services within one airspace (the meeting noted that the ATM/SG should discuss this). In response to a suggestion to use Strategic Lateral Offset Procedure (SLOP), ICAO recalled that SLOP was one of the operational mitigations that had been previously recommended by RASMAG, but this was complex airspace.

2.37 The Fukuoka FIR's vertical safety estimate indicated an increased risk from 9.2 x 10^{-9} in 2016 to **9.6 x 10^{-9}** in 2017, although much of this risk originated from the Manila FIR (**Figure 7**). Of significance were the continued incidence of turbulence-related Category I LHDs south and southwest of Japan (9) (*note: RASMAG/21 had suggested an emphasis on special meteorological forecasting in that area was required so that appropriate avoidance action might be taken*).

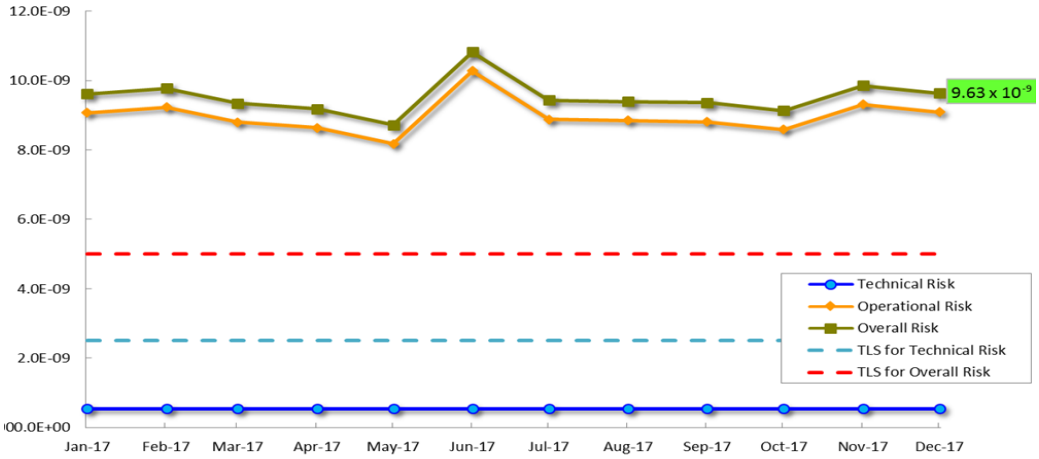

Figure 7: Fukuoka FIR RVSM Risk Estimate Trends (2017)

2.38 Chinese FIRs had experienced a major increase in estimated risk, from 4.7 x 10^{-9} in 2016 to **28.0 x 10^{-9}** in 2017 (**Figure 8**). The main change was a large increase in Category M ('Other') LHDs from 13 to 52, and the number of LHDs overall increased from 117 to 134. However, RASMAG had previously noted that China RMA had embarked on a major education programme in China's ACCs, which was inevitably providing an improved reporting environment, and thus more safety reports.

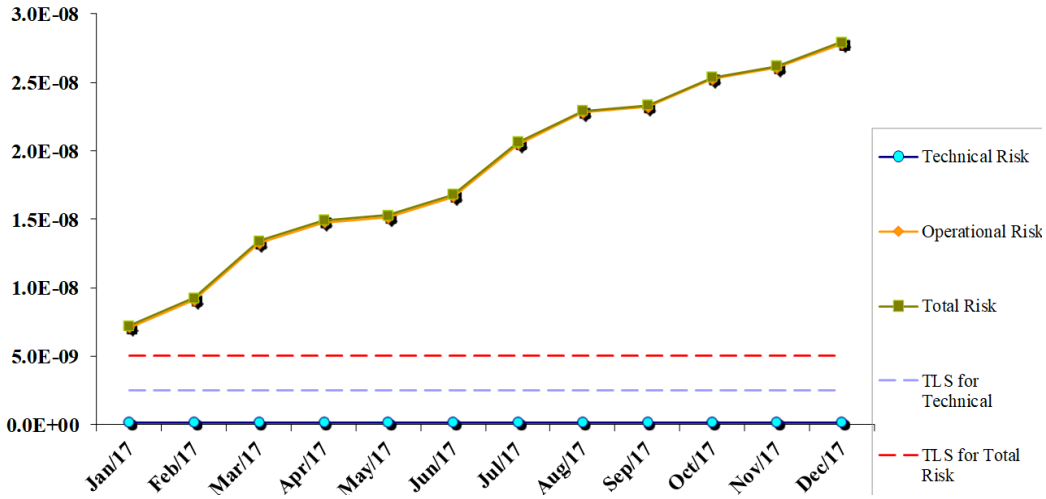

Figure 8: Chinese FIRs RVSM Risk Estimate Trends (2017)

2.39 Regarding **Hot Spot E** on the Urumqi/Lahore FIR interface, China was continuing to work with Pakistan to improve the surveillance and communication situation, and the number of LHDs had reduced from 21 in 2014 to 6 in 2017.

2.40 The number of LHDs at **Hot Spot C** (Hong Kong FIR – Guangzhou/Sanya FIRs interface) and at **Hot Spot H** on the Guangzhou/Wuhan FIR interface had reduced, indicating the use of positive operational measures by China.

Pacific

2.41 The Central and South Pacific areas marginally did not achieve the TLS, with an increasing trend to **5.7 x 10^{-9}**. There had been almost no change in the number of LHDs since 2016, but a cluster of Category B events in the Central East Pacific (CEP) area had contributed to the increased risk. In addition, the South Pacific – East Asian traffic flow LHDs accounted for 76 minutes of time spent at incorrect flight level, which is more than 28% of the time spent at incorrect flight levels for Pacific airspace in 2017.

2.42 According to the Australian Airspace Monitoring Agency (AAMA), the Southwest Pacific (including Australian airspace) achieved TLS in 2017 at **2.0 x 10^{-9}**, with an improving trend.

2.43 **Table 3** provides a summary of the Hot Spots.

Hot Spot	Involved FIRs	RMAs/Date	Remarks
A1	Kolkata/Dhaka – Yangon;	MAAR/2015	LHDs reducing, AIDC
A2	Chennai – Kuala Lumpur	MAAR/2015	Chennai – Kuala Lumpur
B	Incheon	PARMO/2015	AKARA Corridor
C	Hong Kong – Guangzhou/Sanya	C-RMA/2015	LHDs reducing
D	Manila – all adjacent FIRs	MAAR/2015	LHDs reducing
E	Lahore – Urumqi	C-RMA/2015	LHDs reducing
F	Mogadishu – Mumbai	MAAR/2015	LHDs reducing
G	Sana'a/Muscat – Mumbai	MAAR/2015	LHDs increasing (Cat E)
H	Guangzhou – Wuhan	C-RMA/2015	LHDs reducing
I	Karachi – Kabul	MAAR/2018	Major, Category E LHDs
J	Jakarta – Singapore	AAMA/2018	Minor, Category E LHDs
K	Jakarta – Ujung Pandang	AAMA/2018	Minor, Category E LHDs
L	Fukuoka – Khabarovsk	JASMA/2018	Minor, Category E LHDs

Table 3: Comparison Summary of LHD Hot Spots

RASMAG Safety Bulletins

2.44 The RASMAG Chair presented drafts of the first RASMAG Safety Bulletins as discussed by RASMAG/22, for consideration by the meeting. IATA congratulated the MAAR as this built on the work of RASMAG to take initiatives intended to fix safety issues. IATA noted that the draft Bulletins needed further refinement, and could include regional information like hot spots.

2.45 New Zealand suggested that States could also help to promote the Bulletins, in cooperation with their own safety promotion programmes under Annex 19. IFALPA agreed to distribute the pilot-orientated bulletin. ICAO stated that the promotion of future Bulletins could include promulgation on the ICAO Asia/Pacific website and distribution via State Letter.

2.46 RASMAG/23 agreed to the following Conclusion:

Conclusion RASMAG/23-5: RASMAG Safety Bulletins		
What: That, recognizing the value of safety promotion activities by RASMAG, Safety Bulletins developed by relevant International Organizations and concerned States as endorsed by RASMAG would be posted on the ICAO Asia/Pacific website and circulated by State Letter, in addition to informal circulation by Regional Monitoring Agencies (RMAs).		Expected impact: ☐ Political / Global ☐ Inter-regional ☐ Economic ☐ Environmental ☒ Ops/Technical
Why: To provide stakeholders with an improved understanding of safety issues and initiatives identified by RASMAG	Follow-up: ☒Required from States	
When: 5-Jul-18	Status: Adopted by Subgroup	
Who: ☒Sub groups ☒APAC States ☒ICAO APAC RO ☐ICAO HQ ☐Other:		

LHD Analysis by States

2.47 As RASMAG had emphasised the importance of States being involved in solving LHD problems through analysis and action taken to reduce risk in *Decision RASMAG/22-11*, MAAR had made an effort to develop forms to guide States in that process and gather LHD analysis. These were *Form A – LHD Analysis* and *Form B – LHD Preventive/Mitigation Measures*. ICAO expressed appreciation to MAAR for this work, as it encouraged States to take a systematic approach that focussed on preventive (systems) approach, rather than just taking short-term corrective action measures that normally involved individuals.

Non-RVSM Approved Aircraft

2.48 The highest number of aircraft from Asia/Pacific States that were observed for a significant length of time by the RMAs were from India (16, MAAR), USA (15, NAARMO) and Australia (8, AAMA). The meeting noted that the dramatic reduction of non-RVSM airframes detected could be attributed to the effort of all RMAs, and Conclusion APANPIRG/28/12 *Management of Non-RVSM Aircraft*.

2.49 A survey of Asia/Pacific States had been conducted by ICAO on the management of non-RVSM aircraft, related to Conclusion APANPIRG/28/12. A total of 14 Administrations responded to the survey, although it was only applicable for 13 (Macau, China did not operate RVSM airspace). The general results are as follows:

- **Q1 Policies** *Does your State/Administration have <u>policies</u> in place to exclude aircraft known to be Non-RVSM from the RVSM stratum (FL290 – FL410), except State aircraft or when non-RVSM aircraft are specifically approved by Air Traffic Control*? – 85% responded in the affirmative, which was a pleasing result. States that had not done so already were urged to comply with the APANPIRG Conclusion.
- **Q2 Legislation** *Does your State/Administration have <u>legislation</u> in place to exclude aircraft known to be Non-RVSM from the RVSM stratum (FL290 – FL410), except State aircraft or when non-RVSM aircraft are specifically approved by Air Traffic Control*? – 62% answered 'yes', which was also a good result, considering the difficulty in some States of enacting legislation in a timely manner.

- **Q3 Procedures** *Does your State/Administration have procedures for Air Navigation Service Providers (ANSPs) in place to exclude aircraft known to be Non-RVSM from the RVSM stratum (FL290 – FL410), except State aircraft or when non-RVSM aircraft are specifically approved by Air Traffic Control*? – 100% of applicable States.

RMA Monitoring Burden

2.50 All RMAs except the MAAR and PARMO had been either reducing their monitoring burden or the burden was relatively stable, with the overall Asia/Pacific burden reducing by 44.1% from 2014 (428 to 295). The MAAR burden now constituted approximately 57% of the Asia/Pacific's total, so the States it served needed to take increased action to ensure aircraft were monitored in accordance with Annex 6 requirements.

2.51 **Table 4** indicated States that had relatively high remaining monitoring burdens over 30%, which are marked in red:

State	2016%	Requirement	Burden	2017%
Pakistan (MAAR)	**68%**	42	29	**69%**
Bangladesh (MAAR)	**61%**	17	7	**44%**
Indonesia (AAMA)	**56%**	111	47	**42%**
Afghanistan (MAAR)	**-**	8	3	**38%**
Malaysia (MAAR)	**44%**	48	18	**38%**
Myanmar (MAAR)	**30%**	11	4	**36%**
Philippines (MAAR)	**35%**	53	16	**30%**
Nepal (MAAR)	**40%**	5	0	0%

Table 4: Comparison of State Monitoring Burden

2.52 ICAO recommended that States failing to meet monitoring obligations with a burden of 30% or more airframes should be considered an APANPIRG Deficiency, which was agreed by the meeting. This may assist the MAAR, which had all but one of these States as part of its responsibility.

Horizontal Safety Report

2.53 The following Asia/Pacific En-Route Monitoring Agency (EMAs) reported horizontal risk assessments as follows, which all met the TLS of 5.0 x 10^{-9} (**Table 5**):

ATC Separation	EMA	2016 Estimated Risk	2017 Estimated Risk
50NM Lateral	BOBASMA	2.67 x 10^{-9}	2.21 x 10^{-9}
	JASMA	0.03 x 10^{-9}	0.04 x 10^{-9}
	PARMO	-	0.57 x 10^{-9}
	SEASMA	1.99 x 10^{-9}	0.37 x 10^{-9}
30NM Lateral	PARMO	2.70 x 10^{-9}	1.08 x 10^{-9}
50NM Longitudinal	BOBASMA	4.45 x 10^{-9}	4.30 x 10^{-9}
	PARMO	2.22 x 10^{-9}	2.22 x 10^{-9}
	SEASMA	0.38 x 10^{-9}	0.38 x 10^{-9}
30NM Longitudinal	BOBASMA	0.25 x 10^{-9}	0.02 x 10^{-9}
	JASMA	0.002 x 10^{-9}	0.004 x 10^{-9}
	PARMO	4.08 x 10^{-9}	4.08 x 10^{-9}

Table 5: Comparison of Horizontal Risk Assessments

2.54 In addition, JASMA's assessment of the 10-minute longitudinal standard without Mach Number Technique, which had reduced to be within TLS at **0.95 x 10^{-9}**.

Safety Reporting

2.55 An analysis by RASMAG/23 of estimated flight hours and the number of reported LHDs suggested that the Asia/Pacific had a range of reporting cultures, although the ratio of LHDs/flight hours could not be viewed as a direct indicator in isolation, as some operating environments were more complex and others more prone to air safety incidents.

2.56 South Asia (South Asia and Indian Ocean) airspace was an example of the latter, which had an increase in the number of LHD reports; yet there was still a significant lack of LHDs reported, especially within the Delhi FIR.

2.57 The number of reported LHDs within the Incheon FIR (excluding AKARA) had reduced from 19 in 2015 to six in 2016, and only five in 2017, resulting in an implausibly high ratio of one incident for every 117,090 hours (even higher than the 2016 result of 1: 93,291 hours). Therefore, RASMAG noted that the ROK should continue to take actions to improve its reporting culture, which had been previously noted as being less than optimal since RASMAG/18 (when no LHDs had been reported).

2.58 The meeting noted that it was appropriate to remind States, even those which had taken significant positive steps to improve reporting, and especially those such as India, ROK and Indonesia where safety reporting issues had been noted for some years, to continually monitor their reporting culture and systems to optimise reporting. Experience from developed nations had shown that educating operational personnel was not enough to achieve the open reporting objective of the 'aviation culture', as described in the Asia/Pacific Seamless ATM Plan.

RASMAG Effectiveness

2.59 RASMAG/23 noted that over the last decade, safety reporting had increased markedly in several parts of the Asia/Pacific due to RASMAG's efforts through the RMAs, which had resulted in a more correct safety picture emerging. The most dramatic increase had occurred in the South Asia/Indian Ocean airspace (**Figure 9**). RASMAG recognised that since 2012 (when safety reporting was first raised by ICAO), important safety mitigation actions had been implemented as a result.

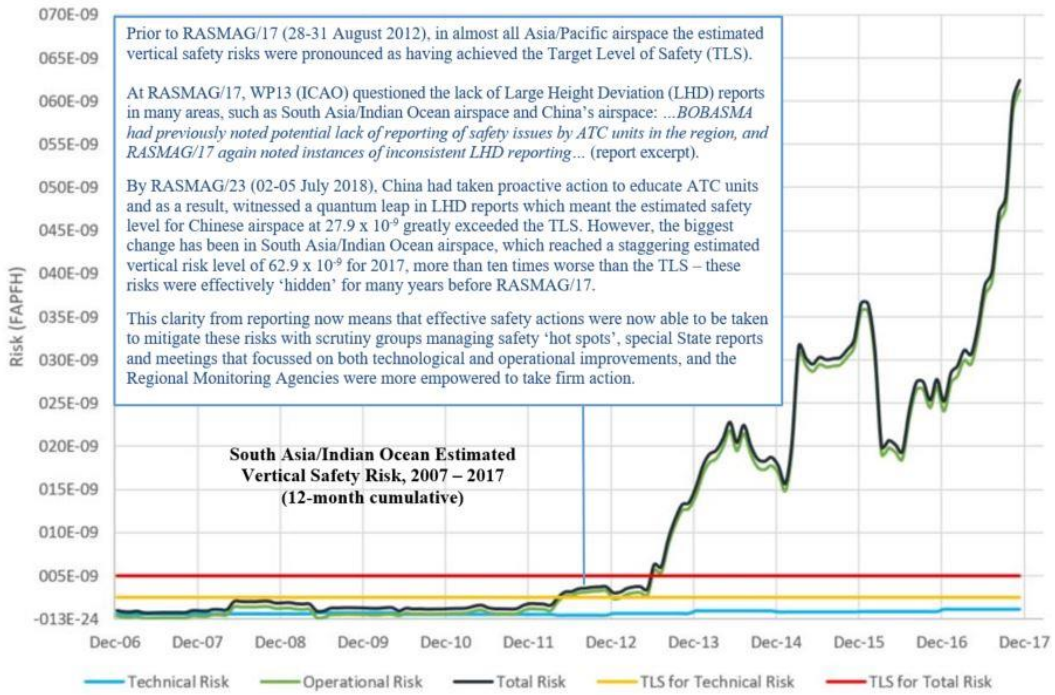

Figure 9: South Asia/Indian Ocean Estimated Vertical Safety Risk (2007 – 2017)

RASMAG ANS Deficiencies

2.60 The meeting reviewed the RASMAG-related APANPIRG Deficiencies detailed in WP32, with consideration of *Conclusion APANPIRG21/ 53 −Elimination of ATM Air Navigation Deficiencies*. As a result of discussion by the meeting, the amendments highlighted in the List of Deficiencies were forwarded to the ATM/SG/6 for consideration, and are now proposed to APANPIRG/29 (note: the consolidated ANS Deficiencies Table was part of the ATM/SG/6 paper).

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper;

b) note the Asia/Pacific PBCS Transition Strategy;

c) note the Asia/Pacific lack of readiness for PBCS, particularly with respect to regulatory activities supporting aircraft operator readiness;

d) note the availability of the Global PBCS Charter;

e) note and discuss the FIT-Asia position that there is no need for a PBCS Approvals database, or expansion of the RVSM database for the purpose of monitoring PBCS approvals;

f) note the PBCS-related and RASMAG Safety Bulletin Conclusions:

g) discuss the elevated vertical safety risks in South, Southeast and East Asia;

h) discuss aspects of normalizing the AKARA Corridor's airspace (Noting that this would be further discussed during the ATM/SG/6 paper);

i) note the reduction in reported non-RVSM airframes operating within RVSM airspace;

j) discuss the safety reporting issues identified by RASMAG as appropriate; and

k) discuss any other relevant matters as appropriate.

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PERFORMANCE-BASED COMMUNICATION AND SURVEILLANCE (PBCS) IMPLEMENTATION STRATEGY FOR THE ASIA/PACIFIC (APAC) REGIONS

Considering that:

1. The ICAO Provisions for PBCS including new Standards and Recommended Practices (SARPS) and related guidance material are applicable from 10 November 2016;

2. State policies and procedures enabling aircraft operators to file Required Communication Performance (RCP) and Required Surveillance Performance (RSP) designators in flight plans are not likely to be promulgated and implemented by the applicable date;

3. Some Asia/Pacific Region States providing Required Navigation Performance (RNP)-based horizontal separation minima requiring the use of Controller-Pilot Data Link Communications (CPDLC) and Automatic Dependent Surveillance – Contract (ADS-C) are not likely to be ready to implement separation minima based on PBCS designators in flight plans by the applicable date;

4. Some States outside the APAC Regions may require the filing of PBCS designators in flight plans for the provision of 50 NM and 30 NM longitudinal and 23 NM (formerly 30 NM) lateral separation minima on or soon after the applicability date of the PBCS provisions;

5. Area Navigation (RNAV) and Required Navigation Performance (RNP)-based 50 NM and 30NM longitudinal 30NM lateral separation minima are currently being applied in some APAC Region FIRs, normally between a relatively small proportion of eligible aircraft pairs;

6. RNAV and RNP-based horizontal separation minima should already be supported by data link performance monitoring in accordance with Annex 11 requirements;

7. RASMAG has noted that horizontal PBN separation standards (30NM and 50NM) have consistently met Target Level of Safety for many years; ~~and~~

8. ATM automation systems should, as a minimum, currently be configured to accept without processing PBCS indicators in received flight plans[i] ~~.~~;

9. The availability of Operational Authorizations guidance material and the Global PBCS Charter developed by the Operational Data Link Working Group (OPDLWG) of the ICAO Communications Panel, adopted by several States, aircraft operators and other organizations, supported by the Regional Data Link policy outcomes of the Seventh Meeting of the FANS Interoperability Team – Asia (FIT-Asia/7, Bangkok, Thailand, 11 to 13 December 2017) and to be referenced in the next version of Doc 9869 – *PBCS Manual*;

10. The availability in ICAO Doc 4444 *Procedures for Air Navigation Services – Air Traffic Management* (PANS-ATM) of some alternative RNP-based separation minima that do not require specification of RCP or RSP and may be used as suitable transitional arrangements for States yet to implement PBCS:

The APAC Regional PBCS Implementation Strategy is as follows:

1. States are urged to take appropriate measures to develop, establish, implement and promulgate, through advisory circular or other relevant State instruments, necessary policies and procedures to enable operators conducting flights in airspace where separations are dependent on Performance-Based Communication and Surveillance (PBCS) to start using required communication performance (RCP) / required surveillance performance (RSP) indicators in the flight plan as soon as possible[ii].

   This should take into account:

   a. time for the operator to comply with the States' policies; and

   b. the need for the State to distribute data from PBCS monitoring programs, as necessary.

   Note: Applicable to ALL States having on their Register any aircraft or aircraft operator that will be separated by performance-based separations requiring PBCS in the area of responsibility of any State.

2. No Asia/Pacific State will implement PBCS-exclusionary airspace. ANSPs will manage the mixed mode environment (PBCS-authorized versus non-authorized aircraft) to ensure, as far as possible, there are no restrictions on flight operations applied to those aircraft that are awaiting State authorization or Statements of Compliance for PBCS.

~~2~~3 Until 29 March 2018 the ~~The~~ application of ~~existing and planned~~ RNAV and RNP-based 50 NM and 30NM longitudinal and 30NM lateral separation minima that existed before 10 November 2016 should continue, subject to the conditions that:

   a. PBCS monitoring is in place; and

   b. The capability to apply performance ~~Performance~~-based horizontal separation using PBCS designators in flight plans is implemented as soon as practically possible;

~~3~~4 Common implementation dates are applied by States using PBCS indicators to establish performance-based separation in adjacent airspace, supported by joint submission of Proposals for Amendment (PfA) to ICAO Doc 7030 – Regional Supplementary Procedures; and

~~4~~5 States that apply or plan to apply 30 NM and/or 50 NM longitudinal separation minima and/or 30 NM or 23 NM lateral separation ~~minimum~~ minima are urged to implement the ATM system capability to process and use ICAO PBCS flight plan indicators to determine aircraft eligibility for performance-based horizontal separation by **not later than 29 March 2018**; ~~and~~

6 States that apply or plan to apply performance-based separation minima requiring PBCS, aircraft operators and communication service providers (CSPs) are urged to sign up to the Global PBCS Charter, available on the FANS-CRA website at www.fans-cra.com.

~~5~~7 States applying performance-based horizontal separation minima~~, whether RNAV/RNP or PBCS based,~~ should report their implementation status to the FANS-Interoperability Team – Asia (FIT-Asia) at least once annually, and upon any change of implementation status[iii]~~.~~; and

8 States applying performance-based horizontal separation minima that do not expect to be prepared to implement PBCS by 29 March 2018 may consider the interim use of the separation minima specified in ICAO Doc 4444 – *Procedures for Air Navigation Services – Air Traffic Management* (PANS-ATM) paragraphs 5.4.1.2.1.6(a) 5.4.1.2.1.7 and 5.4.2.6.3 subject to an appropriate safety assessment.

Note: the 50NM longitudinal separation minimum in paragraph 5.4.2.6.3 does not require the use of ADS-C, but does require direct controller pilot communications (DCPC) and distance reports at frequent intervals.

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[i] As described in the *Asia/Pacific Guidance Material for the Implementation of Amendment 1 to the 15th Edition of the Procedures for Air Navigation Services – Air Traffic Management (PANS-ATM, Doc 4444).*

[ii] Guidance for Operational Authorizations will be available from 1 January 2018 on the ICAO public website dedicated PBCS page at www.icao.int/airnavigation/pbcs.

[iii] Reporting form to be developed and distributed by the FIT-Asia Secretary.