INTERNATIONAL CIVIL AVIATION ORGANIZATION

TWENTY SEVENTH MEETING OF THE ASIA/PACIFIC AIR NAVIGATION PLANNING AND IMPLEMENTATION REGIONAL GROUP (APANPIRG/27)

Bangkok, Thailand, 5 to 8 September 2016

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

3.3 RASMAG

RASMAG/21 MEETING OUTCOMES

(Presented by the Secretariat)

SUMMARY

This paper presents a summary of the outcomes from the Twenty-First Meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/21, 14-17 June 2016, Bangkok, Thailand).

1. INTRODUCTION

1.1 A total of 46 participants attended RASMAG/21 from Australia, Bangladesh, China, Democratic People's Republic of Korea (DPRK) India, Indonesia, Japan, Malaysia, New Zealand, Philippines, Singapore, Thailand, the United States, IATA, IFALPA and ICAO.

1.2 A total of 36 Working Papers (WPs), and seven Information Papers (IPs) were presented to RASMAG/21.

2. DISCUSSION

FIT-Asia5 Meeting Outcomes

2.1 RASMAG/21 noted that an updated list of APANPIRG Deficiencies, including proposals for new or amended APANPIRG Deficiencies proposed by FIT-Asia5 (RASMAG21/WP03) related to Sri Lanka and Viet Nam, and a further proposal for a new Deficiency for India related to lack of safety data to the Regional Monitoring Agency (RMA) for Reduced Vertical Separation Minimum (RVSM) operations under Annex 6, would be forwarded to APANPIRG/27 for its consideration (**Attachment A**, ATMSG/4/WP44 also refers).

2.2 The Operational Data Link Seminar and Fifth Meeting of the Future Air Navigation Services (FANS) Interoperability Team – Asia (FIT-Asia/5) took place at Bangkok, 02 to 06 May 2016. Eight FIT-Asia administrations were known to be providing Automatic Dependent Surveillance – Contract (ADS-C)/Controller-Pilot Data Link Communications (CPDLC) services. Only 3 of these administrations had submitted problem reports to a recognized Central Reporting Agency (CRA).

2.3 Only three FIT-Asia administrations that provided operational ADS-C/CPDLC services submitted performance analyses to FIT-Asia/5. APANPIRG Air Navigation Service (ANS) Deficiencies were currently in place against eight FIT-Asia States for failure to comply with the requirements of Annex 11 paragraph 2.27.5.

2.4 Of the four data link ground systems operational in India, it was possible to extract data only from the Chennai system. CPDLC Actual Communications Performance (ACP) and ADS-C Downlink Latency for High Frequency (HF) both fell well below target levels of performance.

2.5 In noting the outcomes of the operational data link seminar and the 2016 Annex 11 amendment, the FIT-Asia meeting also noted the recommendation that a Regional Performance-based Communications and Surveillance (PBCS) Transition Strategy should be based on the third of three options proposed, i.e. to continue with the current operational implementation of performance-based separation minima under certain conditions, and recommended that the matter be referred to the ATM Sub-Group of APANPIRG (ATM/SG) for further consideration after RASMAG endorsement.

2.6 The FIT-Asia/5 meeting requested that, due to the timing of the APANPIRG/27 meeting being only two months before the applicability of the new RCP/RSP provisions, ICAO Asia/Pacific Regional Office circulate a State letter highlighting the outcomes from FIT-Asia/5 and the Draft Conclusions that would be proposed to APANPIRG/27. Accordingly, State Letter AP064/16 (ATM) was distributed to States on 03 June 2016.

2.7 The meeting discussed the possible future requirement for safety monitoring of data link performance reports under PBCS, and whether this may potentially be included in an expanded role for En-route Monitoring Agencies (EMAs). Noting the PBCS requirements supporting several horizontal separation minima either currently or planned to be implemented in the Asia/Pacific Region, RASMAG agreed to expand the role of Asia/Pacific Region EMAs to incorporate the provisions of APANPIRG Conclusion 24/25, and to also conduct safety monitoring of the new PBCS provisions.

2.8 IATA emphasised that the Asia/Pacific needed to conform with the agreed PBCS implementation strategy (**Attachment B**) as the North Atlantic was implementing in 2018 and it was likely that after that date Asia/Pacific aircraft that did not conform would be unable to access the North Atlantic PBCS airspace. It was noted that the North Atlantic implementation has been moved to align with the Asia/Pacific's (29 March 2018). The emphasis was on State regulators to create the required approval processes for PBCS.

2.9 RASMAG recognised that horizontal separation standards (30NM and 50NM) had been demonstrated to easily meet the TLS for some years, and as a result option 3 (status quo) was agreed with the addition of extra text recognising this fact. The meeting agreed to a proposal from the Chair that the RASMAG Monitoring Agencies Working Group (MAWG) should discuss the assignment of PBCS oversight for each FIR to an established Asia/Pacific EMA.

2.10 RASMAG/21 endorsed the following Draft Conclusions, and agreed that they should be referred to ATM/SG for further consideration:

Draft Conclusion RASMAG21-A: PBCS Operator Requirements	
That, States are urged to take appropriate measures to develop, establish, implement and promulgate, through advisory circular or other relevant State instrument, 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. This should take into account: a) time for the operator to comply with the States' policies; and	Expected impact: ☐ Political / Global ☒ Inter-regional ☒ Economic ☐ Environmental ☒ Ops/Technical

b) the need for the State to distribute data from PBCS monitoring programs, as necessary.	
Why: To ensure aircraft operators are prepared for implementation of performance-based separations by States in Asia/Pacific and other Regions implementing the new PBCS provisions.	
When: 10-Nov-16	Status: Draft to be adopted by PIRG
Who: ☒Sub groups ☒APAC States ☐ICAO APAC RO ☐ICAO HQ ☐Other:	

Draft Conclusion RASMAG21-B: State Implementation of ICAO Provisions for PBCS	
That, States that apply or plan to apply 30 NM and/or 50 NM longitudinal separation minima and/or 23 NM lateral separation minimum are urged to implement the ATM system capability to process and use ICAO PBCS flight plan indicators to determine aircraft eligibility for performance-based separation by not later than 29 March 2018; and Common implementation dates are applied by States using RCP/RSP 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.	Expected impact: ☐ Political / Global ☒ Inter-regional ☒ Economic ☐ Environmental ☒ Ops/Technical
Why: Recognizing that many States will not be ready to fully implement the new PBCS provisions on the applicability date of 10 November 2016.	
When: As soon as possible, but not later than 29-Mar-18	Status: Draft to be adopted by PIRG
Who: ☒Sub groups ☒APAC States ☐ICAO APAC RO ☐ICAO HQ ☐Other:	

Draft Conclusion RASMAG21-C: Asia/Pacific Region PBCS Transition Strategy	
That, the Asia/Pacific Region PBCS Transition Strategy at **Attachment RASMAG/21/WP3/Attachment B** be endorsed, and posted on the Asia/Pacific Regional Office website.	Expected impact: ☐ Political / Global ☒ Inter-regional ☒ Economic ☐ Environmental ☒ Ops/Technical
Why: Recognizing that many States will not be ready to fully implement the new PBCS provisions on the applicability date of 10 November 2016.	
When: As soon as possible, but not later than 29-Mar-18	Status: Draft to be adopted by PIRG
Who: ☒Sub groups ☒APAC States ☐ICAO APAC RO ☐ICAO HQ ☐Other:	

Note: the Draft Conclusions are not numbered so as to differentiate them from the other RASMAG-specific Conclusions.

RASMAG/MAWG/3 Report (WP04)

2.11 Topics discussed by the Third RASMAG/Monitoring Agencies Working Group (MAWG/3) meeting held in Canberra in November 2015 included:

a) the new Manual on Monitoring the Application of Performance-Based Horizontal Separation Minima (PBHSM, Doc. 10063);

b) China Regional Monitoring Agency's (RMA's) progress on use of ADS-B for height monitoring by the end of 2015;

c) concerns regarding States not responding effectively to RMA requests for Reduced Vertical Separation Minimum (RVSM) approvals confirmation, which may trigger RASMAG to highlight the issue and recommend an APANPIRG Deficiency if the matter was not resolved;

d) whether the ADS-B Height Monitoring System (AHMS) system needed to check the ADS-B operational approval status of aircraft before using the data for Altimetry System Error (ASE) estimate, which resulted in the following Draft Conclusion agreed by RASMAG/21 for APANPIRG's consideration:

Draft Conclusion RASMAG/21-1: Use of Available ADS-B Data for Aircraft Height Monitoring	
That, ADS-B data obtained by a Regional Monitoring Agency (RMA) for use in aircraft height-keeping monitoring by means of an ADS-B Height Monitoring System (AHMS), can be sourced from aircraft not subject to an ADS-B related operational approval.	Expected impact: ☐ Political / Global ☐ Inter-regional ☐ Economic ☐ Environmental ☒ Ops/Technical
Why: Approval for ADS-B is included in the overall operational approval and was no different to operating with radar; and APANPIRG Conclusion 26/41 stated that an operational approval was not required for the operational use of ADS-B OUT by ATC.	
When: 8-Sep-16	Status: Draft to be adopted by PIRG
Who: ☐Sub groups ☒APAC States ☒ICAO APAC RO ☒ICAO HQ ☒Other: ROs	

e) the provision by States of approvals data for specific PBN types if available, to the relevant EMA, which resulted in the following Draft Conclusion agreed by RASMAG/21 for APANPIRG's consideration:

Draft Conclusion RASMAG/21-2: Provision of PBN Approval Data by States	
That, when requested by an En-route Monitoring Agency (EMA) Asia/Pacific States should provide PBN approval data where that data is available.	Expected impact: ☐ Political / Global ☐ Inter-regional ☐ Economic ☐ Environmental ☒ Ops/Technical
Why: RASMAG/MAWG/2 and RASMAG/21 considered there may be future problems if States no longer provided approvals data for specific Performance-based Navigation (PBN) types, as data was needed to ensure valid data capture.	
When: 8-Sep-16	Status: Draft to be adopted by PIRG
Who: ☐Sub groups ☒APAC States ☒ICAO APAC RO ☐ICAO HQ ☐Other:	

LHD Material Package 2016

2.12 Thailand presented consolidated LHD material as a package to promote an understanding of LHD reporting. This package included LHD Frequently Asked Questions (FAQ), LHD taxonomy, LHD reporting form, cross-boundary LHD reporting flow, and LHD point of contacts (POC).

2.13 RASMAG considered the material as being suitable as guidance material for the Asia Pacific Region, and agreed all RMAs would post relevant items on their websites. In order to strengthen the use of the guidance material and support RMAs, RASMAG agreed to the following Draft Conclusion for APANPIRG's consideration:

<table>
<tr><td colspan="4">Draft Conclusion RASMAG/21-3: Large Height Deviation Guidance Material</td></tr>
<tr><td colspan="3">That, Asia/Pacific States should utilise the Large Height Deviation (LHD) Guidance Material on LHD taxonomy, reporting form(s), cross-boundary LHD reporting flow, and LHD Point of Contacts (POC) posted on Asia/Pacific Regional Monitoring Agency (RMA) websites.</td><td>Expected impact:
☐ Political / Global
☐ Inter-regional
☐ Economic
☐ Environmental
☒ Ops/Technical</td></tr>
<tr><td>Why:</td><td colspan="3">To harmonise the LHD handling procedures used by States in order to assist RMAs.</td></tr>
<tr><td>When:</td><td>8-Sep-16</td><td>Status:</td><td>Draft to be adopted by PIRG</td></tr>
<tr><td>Who:</td><td colspan="3">☐Sub groups ☒APAC States ☒ICAO APAC RO ☐ICAO HQ ☐Other:</td></tr>
</table>

AAMA Safety Report

2.14 Australia presented the results of RVSM safety assessments undertaken by the Australian Airspace Monitoring Agency (AAMA) for the twelve month period ending 31 December 2015.

2.15 The report showed that for the Australian (Brisbane, Melbourne), Nauru, Papua New Guinea (Port Moresby) and Solomon Islands (Honiara) Flight Information Regions (FIRs), the Target Level of Safety (TLS) was marginally not met with a risk assessment of **5.22×10^{-9}** (TLS, 5.0×10^{-9}).

2.16 Regarding Indonesian airspace, the TLS was reportedly met for the period (**1.10×10^{-9}**). However, AAMA noted that (WP30 later refers):

> *The reporting of LHDs to the AAMA by Indonesia was problematic over the twelve-month period, with significant delays being experienced in reports reaching the AAMA. Additionally, the AAMA observed what appeared to have been a reduction in reporting compared to previous years which could not be explained. As a result, the AAMA was unable to effectively validate monthly assessments with any confidence. This situation has been the subject of direct coordination between the AAMA and the Indonesian authorities and the reporting culture seems to have improved, during 2016 particularly since the introduction of AirNav Indonesia's new reporting application.*

China RMA Safety Report

2.17 The estimates of technical and total risks for the airspace of Chinese FIRs met the TLS, with an overall risk estimate of **3.27 x 10^{-9}**. Category E (ATC transfer of control coordination errors due to human factors) and M ('Other Causes') were the main contributors to risk.

2.18 The estimate by China RMA of the overall vertical collision risk for the Pyongyang FIR was **834.10 x 10^{-9}** fatal accidents per flight hour. This was several orders of magnitude above the TLS. However the extremely low traffic densities within this airspace meant that the result was not as significant as other airspace in East Asia. RASMAG/21 congratulated China and the DPRK for their work in enhancing safety reporting and furthermore, and for China RMA's extensive analysis and scrutiny group effort to help drive down safety incidents.

JASMA Vertical Safety Report (WP07)

2.19 Japan presented the results of the airspace safety assessment of the Fukuoka FIR by the JASMA. The report showed that the Fukuoka FIR did not meet the TLS, with the assessed risk calculated as **22.11 x 10^{-9}**. There were two main contributors to this steep increase in estimated risk:

a) Category E Large Height Deviations (LHDs), mainly on the FIR boundary with the Manila FIR; and

b) Category I (Turbulence or other weather related cause) LHDs, which occurred primarily in a localised area southwest of Japan, RASMAG21/WP30 refers).

2.20 **Figure 1** presents collision risk estimate trends during 2015.

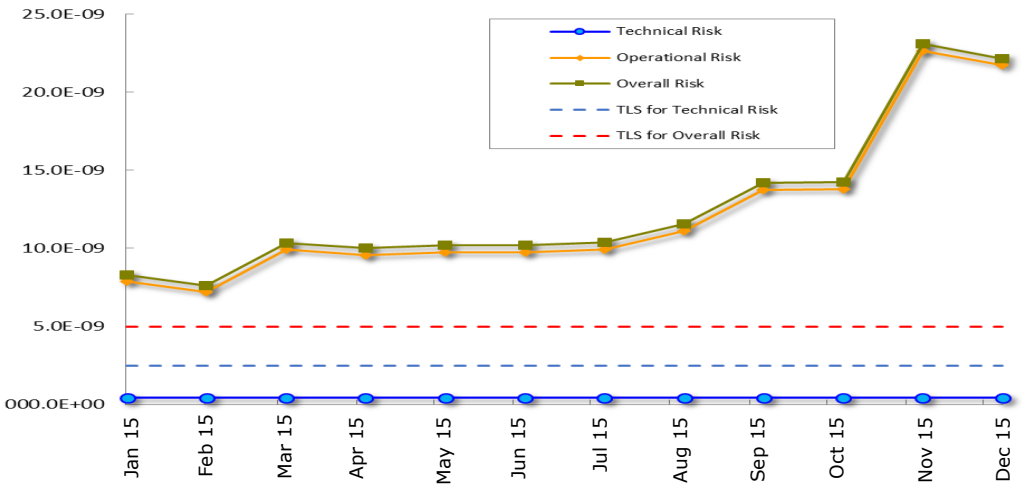

Figure 1: Fukuoka FIR RVSM Risk Estimate Trends

2.21 The RASMAG/21 meeting discussed aspects of the Category I reports identified in the JASMA report and specifically noted the location of these in the AKARA area, noting that RVSM should be suspended during periods of known severe turbulence. This has significant impact on this area given the implementation of the Flight Level Allocation Scheme (FLAS) by the three different ATS units controlling that airspace.

MAAR Vertical Safety Report

2.22 MAAR provided the airspace safety oversight results for the RVSM operation in the Bay of Bengal (BOB), Western Pacific/South China Sea (WPAC/SCS), and Mongolian airspace for 2015. **Figure 2** presents collision risk estimate trends during 2015.

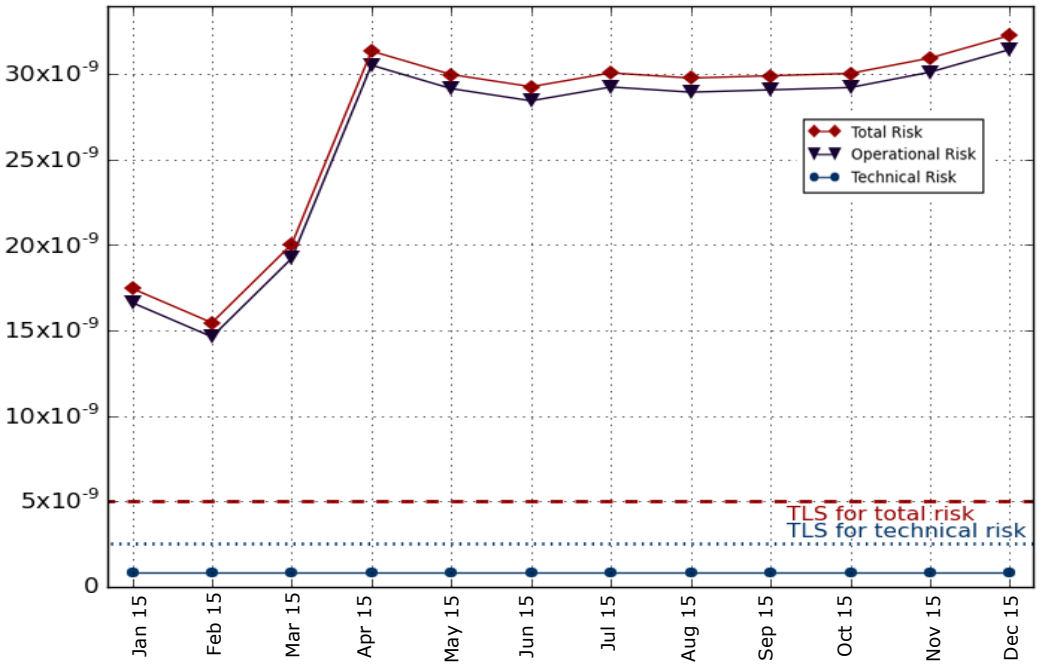

Figure 2: BOB Airspace RVSM Risk Estimate Trends

2.23 The BOB RVSM airspace overall risk was estimated to be **32.27 x 10^{-9}**, which did not meet the TLS by a substantial margin. The Transfer of Control (TOC) points between the Kolkata FIR and Dhaka/Yangon FIRs and the Chennai and Kuala Lumpur/Jakarta FIRs remained the most prominent hot spots in the Asia/Pacific Region, with ATC Category E errors accounting for more than 96% of reported LHDs in the BOB. India was in agreement with ICAO that Air Traffic Service Inter-facility Datalink Communications (AIDC) implementation cannot be construed as the only solution for mitigation of LHD hotspots and that States need to look into other possible mitigation measures as well.

2.24 A new hot spot emerged during 2015 along the western boundary of the Mumbai FIR, which interfaced with the Mogadishu, Sana'a, and Muscat FIRs. The surge in long duration LHDs in March and April 2015 coincided with the temporary closure of Sana'a FIR and redirected contingency traffic through the Mogadishu FIR.

2.25 The meeting noted that the spike in risk in March and April 2015 appeared temporary as the calculated monthly risk values for the remainder of the year were below the TLS. MAAR informed the meeting that two long duration LHDs were reported in the first quarter of 2016 even with the reopening of Sana'a FIR.

2.26 ICAO noted that Mogadishu had limited capacity, which was understood to be a procedural ATC system with constrained communications capability, but that neighboring Area Control Centres (ACCs) in Kenya (which used to service Mogadishu airspace) and the Seychelles were implementing AIDC and modern ATM systems. Therefore, if the hot spot remained, it was possible that RASMAG would recommend consideration of a delegation of upper airspace management to more capable ACCs in future, to reduce the unacceptable risk within the Asia/Pacific Region.

2.27 RASMAG/21 was informed that MIDRMA had notified Muscat ACC of the situation; however MAAR had not received any further information regarding the issues affecting Muscat. ICAO noted this, and would follow up with the ICAO MID Office.

2.28 The WPAC/SCS RVSM airspace total risk was estimated to be **5.73 x 10^{-9}**, which did not achieve the TLS. **Figure 3** presents collision risk estimate trends during 2015.

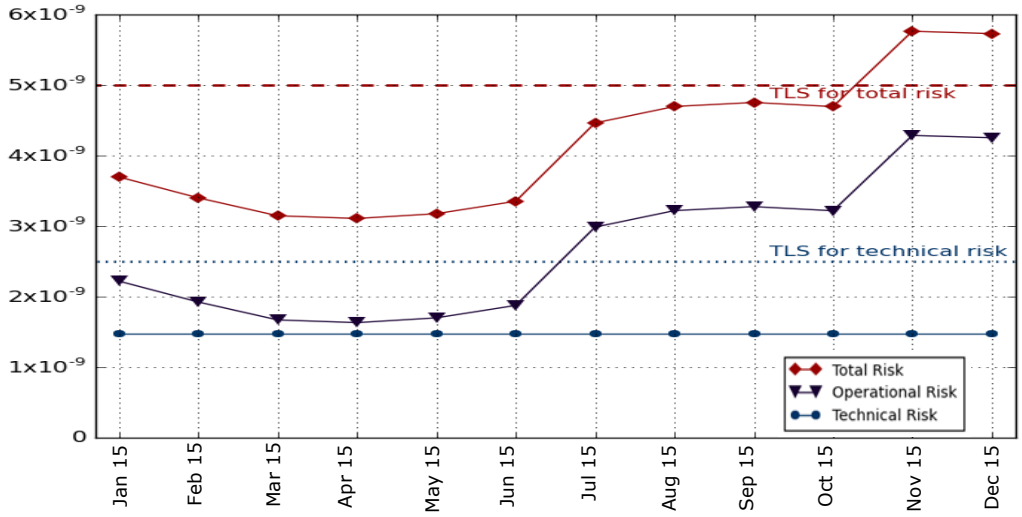

Figure 3: WPAC/SCS Airspace RVSM Risk Estimate Trends

2.29 The main hot spot for the SCS remains the interfaces around Manila FIR boundary, although most LHDs in this hot spot had zero duration since the area had good communication and surveillance coverage. A few LHDs had a short duration at the areas where there are holes in ATS surveillance coverage such as at the Manila – Hong Kong and Manila – Ho Chi Minh interfaces.

2.30 The overall risk in the region exceeded the TLS due one loss of separation occurrence of long duration within the Bangkok FIR in July 2015 which was caused by ATC human error, and a number of high risk LHDs reported in August and November.

2.31 The theoretical ATS surveillance coverage provided an opportunity to further reduce LHD duration and risk by sharing ATS surveillance data between Malaysia, Viet Nam and the Philippines. The theoretical Automatic Dependent Surveillance-Broadcast (ADS-B) coverage appeared to cover many of the LHD Transfer Of Control waypoints and there was extra surveillance capability planned with future ADS-B sites in the Philippines (Palawan, Pangasinan and Zambales).

2.32 The meeting discussed issues related to the Manila FIR interfaces and that resolution of these hot spot areas needed priority. The Philippines informed the meeting that technical interoperability issues of the ATM system with the adjacent ACC's were encountered. Resolution of the problems took a significant amount of time due to more stringent testing performed by the vendor taking into consideration the current operational requirements of Manila.

2.33 Technical tests with Singapore were expected to commence on July 4, 2016 using the operational platform after the successful tests. RASMAG requested an update on the technical implementation of AIDC and the operational mitigations to risk be made available by the Philippines to the ATM/SG and the MAAR. The meeting noted the possibility of delegating the western portion of the Manila FIR to a State able to provide the services. It was noted that the AIDC schedule for implementation provided by Manila was in the 2016-2017 timeframe (RASMAG/21/WP09 Appendix B), but the question remained what the State was doing to resolve the ATC procedural systemic issues in the meantime.

2.34 IATA asked the meeting to consider a more systematic approach of managing safety hot spots. The meeting discussed the problems of States not responding to monitoring agency enquiries, and the difficulty of establishing corrective action plans for safety issues from the agencies identified.

2.35 The Mongolian RVSM airspace total risk was estimated to be **0.98 x 10^{-9}**, which met the TLS. The improvement in performance was understood to be due to a concerted effort by China and Mongolia to enhance their ATC systems and procedures in this area.

PARMO Vertical Safety Report

2.36 The Pacific Approvals Registry and Monitoring Organization (PARMO) presented a safety assessment of RVSM for the Pacific and the Republic of Korea's (ROK) airspace for 2014. The Pacific airspace total risk was estimated to be **4.30 x 10^{-9}**, which met the TLS.

2.37 The Incheon FIR RVSM total risk was estimated to be **6.43 x 10^{-9}**, which did not meet the TLS (**Figure 4**). This result was primarily due to the increased number of event reports received by PARMO and the associated time spent at incorrect flight level. In 2014 there was a total of two minutes spent at incorrect level, while in 2015 the number had increased to over 11 minutes spent at the incorrect level. A detailed airspace analysis for the Incheon FIR AKARA Corridor Interface with Shanghai/Fukuoka/Taibei FIRs was provided in RASMAG21/WP12.

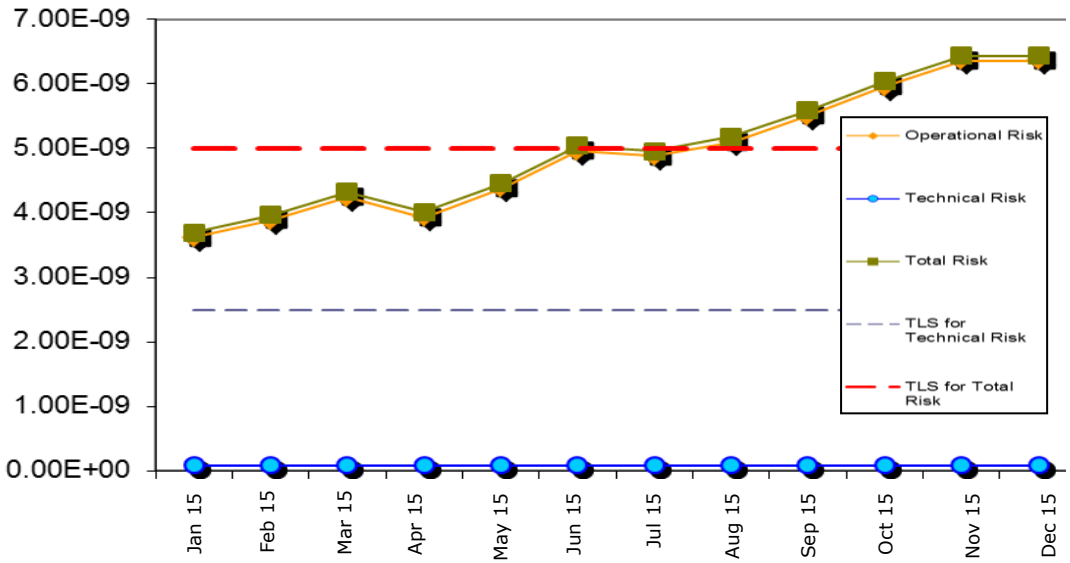

Figure 4: ROK Airspace RVSM Risk Estimate Trends

Latest Monitoring Results from the Setouchi HMU

2.38 Japan presented a summary of the latest results from the Setouchi height monitoring unit (HMU) for the period between 16 March 2015 and 15 March 2016.

2.39 **Figure 5** illustrated the trend for each aircraft monitoring group, with B747-100 showing a mean ASE of -70.8ft.

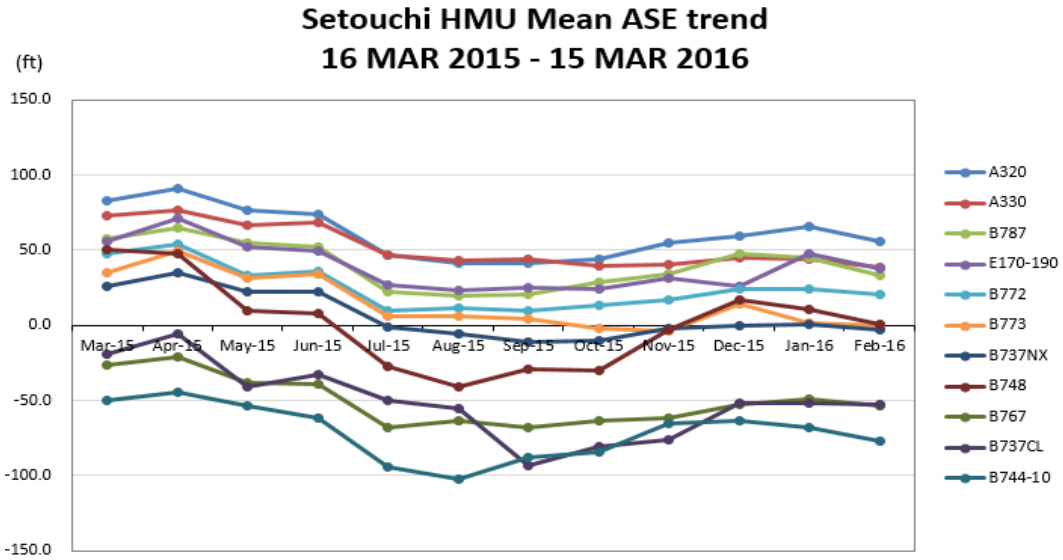

Figure 5: Monthly Mean ASE Trend of each Monitoring Group

2.40 The meeting noted the apparent deteriorating performance of the B744-10 aircraft group. The United States advised that this matter was being actively discussed with the manufacturer.

Regional Safety Monitoring Assessment

LHD Reporting

2.41 **Table 1** provides a comparison of the estimated flight hours for airspace analysed by an RMA, divided by the reported LHDs at RASMAG/20 and RASMAG/21, in order to assess reporting.

Airspace	**RASMAG 20 LHDs**	**RASMAG 21 LHDs**	**RASMAG 21 Estimated Flight Hours**	**RASMAG 20 Reporting Ratio**	**RASMAG 21 Reporting Ratio**
Mongolia	18	*2	116,664	1: 6,042	1:58,332
Indonesia	39	13	343,100	1: 19,522	1:26,392
Japan	34	51	1,101,469	1: 32,396	1:21,597
China	103	120	2,285,269	1:20,628	1:19,043
SW Pacific	69	72	821,496	1:11,528	1:11,410
WPAC/SCS	144	166	1,769,352	1: 10,498	1:10,659
ROK	3	19	178,800	1:164,120	1:9,410
India/BOB	224	380	2,326,493	1: 9,423	1:6,122
DPRK	0	2	3,387	0	1:1,693
Total	634	825	8,946,030	1:14,214	1:10,844
Pacific	37	42	1,670,790	1:45,125	1:39,780

Table 1: Comparison of Estimated Flight Hours and Reported LHDs (NC = no change)

*MAAR indicates that there was only one report at position NIXAL

2.42 The RASMAG/21 analysis shows major improvements in reporting for Chinese, DPRK, Japanese and ROK airspace, which is probably the result of State and RMA intervention. The States and RMAs should be encouraged for this effort, which is producing a clearer picture of risk.

2.43 Australian/SW Pacific airspace has demonstrated a consistent result over several years, indicating a mature reporting culture in the ratio band of 1:10,000 – 1:12,000. Therefore a ratio at or below this band in high density airspace is assumed to represent a good reporting culture (but it may also be due to a large number of incidents that indicate major safety problems). A ratio 50% or more above this band (1:18,000+) in high density airspace may indicate a lack of safety reporting. Therefore there is probably further improvement possible regarding Chinese and Japanese airspace.

2.44 Australian airspace analysis revealed about 77% of LHDs were within the Brisbane and Melbourne FIR boundaries, while China's data improved from 2014 to indicate about 40% of LHDs to be 'internal'. While the Australian, Chinese, Indian and Indonesian FIRs all have different operating characteristics, it is noticeable that within the Indian and Indonesian FIRs there were very few LHDs being reported. Less than 3% of LHD reports were made within the boundary of Indian FIRs. This was acknowledged as being statistically not possible by the Indian expert at RASMAG/20, and may be an indication of substantial under-reporting.

2.45 On the other hand, approximately 85% of boundary reports that were made by adjacent States appeared to have been not reported by Indonesia. The Indonesian reporting ratio had deteriorated substantially from 1:19,522 to 1:26,392. This was more than double that which might be expected in a mature reporting culture within higher density airspace.

2.46 Moreover, the proportion of missing boundary reports indicated that the number of unreported events could be as much as six times more than those that were reported, underlining the lack of confidence by AAMA in Indonesia's reporting at times during the year. Recalling that both India and Indonesia were noted by RASMAG/20 as having problems with reporting, RASMAG/21 discussed efforts to encourage an increase in safety reporting in these States.

2.47 Regarding Mongolian airspace, MAAR indicated that there was only one report at position NIXAL on the boundary with China, whereas the China RMA reported a second LHD at position INTIK which was apparently not reported to MAAR. The Mongolian reporting ratio was the most difficult to explain. While improved ATC surveillance and procedures partially account for the dramatic reduction in reported LHDs from 18 to only two, the ratio was still much worse than what might be expected, even accounting for a medium density airspace. Therefore some action should be taken by MAAR to discuss this with Mongolia, to assess if there were any systemic reporting issues.

2.48 Despite the enhanced reporting from the Incheon FIR, China RMA reported four LHDs on the boundary with the Shanghai FIR at position AGAVO, which did not appear in the Incheon FIR analysis. Moreover, there were three LHDs reported by JASMA (two by China RMA) at position SALDI, which was within the Incheon FIR along the 'AKARA Corridor', also not reported by Incheon.

2.49 In the same AKARA corridor near position ONIKU another four LHDs were reported by JASMA, several of them caused by severe turbulence. Therefore it is probable that the operation of a Flight Level Orientation Scheme (FLAS) with three different ATC units providing services within the same airspace had the potential for very high risk levels if vertical separation could not be assured.

2.50 MAAR commented that the RMA had not received non-NIL LHD reports from both Bangladesh and Pakistan as they might expect; whereas they had received some reports on the boundary of the Dhaka and Karachi/Lahore FIRs from neighbouring States. RASMAG noted the lack of safety reporting from both Bangladesh (which had a current APANPIRG Deficiency for lack of safety reports) and Pakistan.

2.51 ICAO presented an overview of safety assessment results from a regional perspective. **Figure 6** is the RASMAG/21 regional RVSM Target Level of Safety (TLS) compliance:

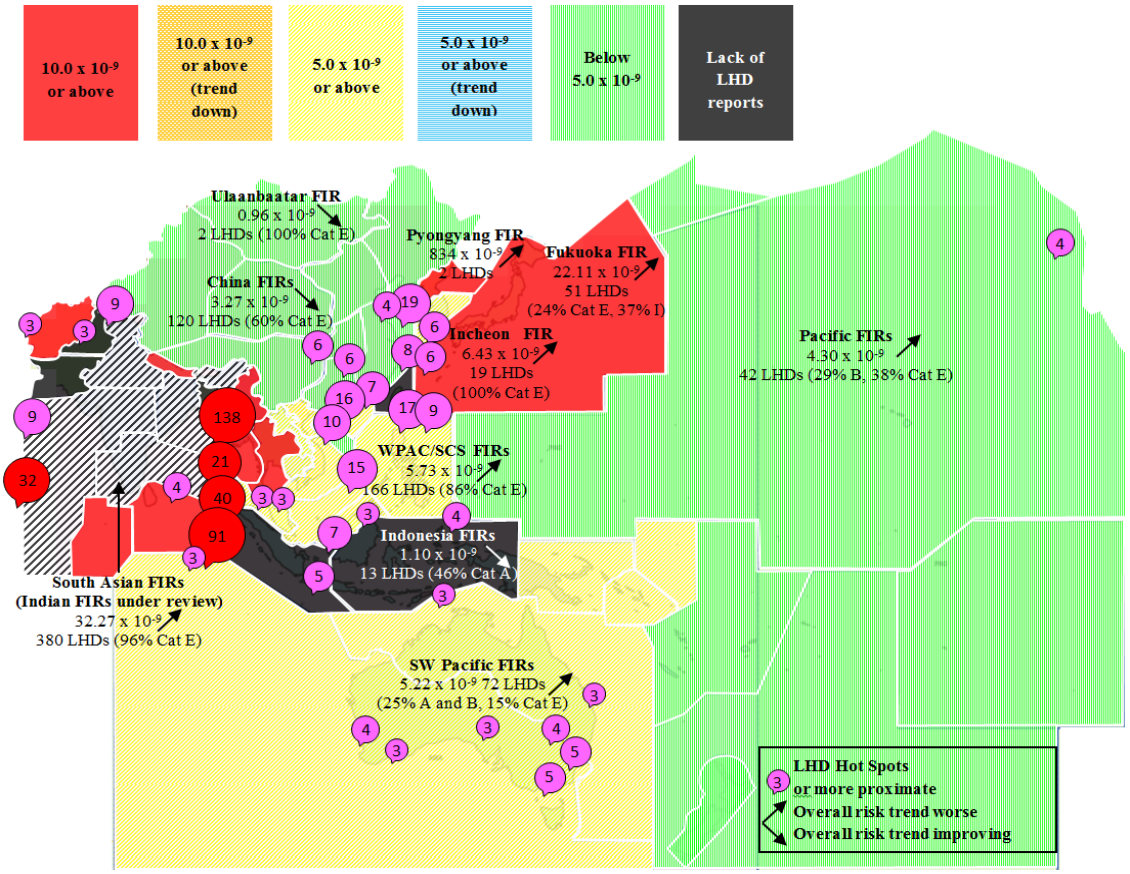

Figure 6: 2015 Asia/Pacific TLS compliance reported to RASMAG/21

Note: the regional picture has been developed from 2015 data and may not reflect the current risk picture in 2016. The data should be considered in conjunction with the analysis in paragraph 2.51.

2.52 **Figure 6** indicated the following sub-regional regional RVSM trends.

- **South Asia**: The South Asian FIRs exhibited the highest risk area in the Asia/Pacific, with troubling estimated risk levels more than six times the TLS, and major hot spots between the Indian FIRs and Bangladesh, Myanmar, Malaysian and Indonesian FIRs. These hot spots had been previously identified in RASMAG/20, and had increased in risk since then, despite plans for operational improvement. India has reportedly commenced plans for the installation of Automatic Dependent Surveillance (ADS-B) and Very High Frequency (VHF) communications in the Great Nicobar Islands but this would not solve the systemic issues evident in the interface between India and Bangladesh/Myanmar airspace in the northern Bay of Bengal (BOB) area. RASMAG needs to highlight this problem to the Director Generals of the States concerned to ensure the highest priority is given to urgent improvements in both system capability and human performance.

  Note: APANPRG Conclusion 26/28 Asia/Pacific LHD Hot Spot Action Plans refers – BOBASIO (Bay of Bengal Arabian Sea Indian Ocean) in agreement with MAAR has been identified as the scrutiny group leader for the Kolkata/Chennai FIRs interface with Yangon/Kuala Lumpur.

The major hot spot on the western boundary of the Indian FIRs and the African FIRs (and to a lesser extend with the Muscat FIR) can be partly explained by the temporary closure of the Sana'a FIR and contingency routes during 2015. However, Large Height Deviation (LHDs) continues to be reported in this area, suggesting the need for closer collaboration between India and the concerned African States, including risk mitigation measures such as the implementation of AIDC.

- **Southeast Asia**: The Southeast Asian area has also not met the TLS, with a slow degradation in compliance that can largely be attributed to the poor performance of the Manila FIR, with numerous category E LHDs. The Philippines has had an improvement plan to modernize their Air Traffic Control (ATC) system for some years but this has not yet yielded any improvement in performance. RASMAG needs to highlight this problem to the Director General of the Philippines to ensure the highest priority is given to urgent changes within the Manila FIR.

  Note: APANPRG Conclusion 26/28 Asia/Pacific LHD Hot Spot Action Plans refers – MAAR has been identified as the scrutiny group leader for the Manila FIR interface with Fukuoka/Hong Kong China/ Singapore/Ujung Pandang FIRs.

- **East Asia**: Chinese airspace had shown marked improvement to meet the TLS, even with a large increase in LHD reports. It was evident that a concerted effort had been made by China to systematically mitigate identified hot spot risks. Notwithstanding this, there were several significant hot spots still evident – in the interface with the Lahore FIR (Pakistan), Fukuoka FIR (Japan), and Manila FIR (Philippines).

  China RMA has again identified hot spot areas between mainland China and Hong Kong, China's airspace that were also evident in 2014.

  Note: APANPRG Conclusion 26/28 Asia/Pacific LHD Hot Spot Action Plans refers – China RMA has been identified as the scrutiny group leader for the Hong Kong FIR interface with Guangzhou/Sanya FIRs, and the Urumqi FIR interface with Lahore FIR.

  Japanese airspace had also been adversely affected by the poor performance of the Manila FIR so this has contributed to the TLS not being met within the Fukuoka FIR. However some 35% of LHDs were caused by turbulence in a localised area southwest of Japan, which suggested a greater emphasis on special meteorological forecasting in that area was required so that avoidance action may be taken, or a temporary reversion to 2,000ft separation made if appropriate.

  Mongolian airspace met the TLS. However there was an absence of LHD reports that would typically be expected at a higher level in this airspace.

  The Pyongyang FIR did not meet the TLS, although the number of LHDs was only two. It should be noted that these were the first LHD reports from this FIR for years, which indicates the successful coordination work being conducted with China.

  The Incheon FIR did not meet the TLS, due to a number of reported LHDs between the Shanghai FIR and the Incheon FIR. Notably, analysis of seven LHDs reported by China and Japan indicated a severe safety risk in the AKARA corridor.

  Note: APANPRG Conclusion 26/28 Asia/Pacific LHD Hot Spot Action Plans refers – PARMO has been identified as a scrutiny group leader for Incheon FIR AKARA Corridor interface with Shanghai/Fukuoka/Taibei FIRs.

- **Southwest Pacific**: Southwest Pacific FIRs did not meet the TLS by a very small margin. Category A and B flight crew errors were the predominant causes of LHDs, which had no specific pattern that could be identified by AAMA. A small number of Category L and M occurrences of high duration were the prime factor in driving the risk above the TLS in July 2015.
- **Pacific**: Pacific airspace met the TLS, although the trend was slowly deteriorating.

2.53 **Table 2** provides a comparison of Asia/Pacific RVSM risk as a measure against the TLS. There had been significant degradation in the region's performance meeting the TLS. The dramatic reduction in Asia/Pacific FIR TLS performance can be largely explained by increased reporting, which is showing the 'hot spot' problem areas that had been previously unidentified.

	RASMAG18	**RASMAG19**	**RASMAG20**	**RASMAG21**
RMA 'sub-regions'	89%	22%	67%	33%
FIRs	90%	16%	53%	32%

Table 2: Comparison of Sub-Regional and Regional RVSM TLS Performance

Non-RVSM Approved Aircraft

2.54 **Table 3** compared the number of non-RVSM approved airframes incorrectly flight planning as if RVSM-approved reported by each RMA:

Report	**AAMA**	**China RMA**	**JASMA**	**MAAR**	**PARMO**
RASMAG/18	98	43	47	118	15
RASMAG/19	90	33	40	130	19
RASMAG/20	8	45	15	234	26
RASMAG/21	5	6	15	106	11

Table 3: Trend of Non-RVSM approved airframes Observed by Asia/Pacific RMAs

2.55 Aircraft from Asia/Pacific States that were observed for a significant length of time by the RMAs were as follows:

- China RMA: Republic of Korea registered aircraft HL8049, HL8050 (both Jeju Air) and HL8056 (T'way Air);
- JASMA: Republic of Korea registered aircraft HL8049, HL8050 and HL8056;
- MAAR: Indian registered aircraft totalled 60, of which 26 had expired approvals and 34 had no proof of RVSM approval, and the Australian registered aircraft VHFIX which was confirmed as being non-RVSM approved; and
- PARMO: Australian registered aircraft VHFPO.

2.56 Overall, the trend for observed non-RVSM approved aircraft was rapidly dropping, with a 56.4% reduction in observed non-compliant airframes from 2014 to 2015. This suggests that the proactive work of State authorities, RMAs and APANPIRG *Conclusion 24/26 Repetitive Non-RVSM Approved Aircraft Operating as RVSM Approved Flights* were having a positive effect. RASMAG would recall that *Conclusion 24/26* urged Asia/Pacific States, except where a specific non-RVSM operation is authorized – to deny entry to operate within RVSM airspace for aircraft that have been confirmed as non-RVSM approved over a significant length of time, or by intensive checking, and was in accordance with Annex 6:

> *7.2.8 All States that are responsible for airspace where RVSM has been implemented, or that have issued RVSM approvals to operators within their State, shall establish provisions and procedures which ensure that appropriate action will be taken in respect of aircraft and operators found to be operating in RVSM airspace without a valid RVSM approval.*

2.57 Notwithstanding the positive downward trend, the large number of Indian registered aircraft found to have no RVSM approval may indicate systemic issues. In 2014 India was observed to have 73 aircraft registrations found operating without proof of RVSM approval, so this appeared to be a long-term problem. Therefore, RASMAG/21 agreed that India should be reminded by State Letter of the need to meet the requirements of Annex 6 (paragraph 7.2.8) and APANPIRG Conclusion 23/16 (Safety Monitoring Data Provision).

2.58 MAAR noted that invalidity of RVSM approval due to States giving expiration dates in the RVSM approvals had become an issue in the 'W' compliance check process. This was because the required coordination workload was very high compared to approvals without expiration, and therefore, some States did not commit to updating the renewed approvals before they expired.

2.59 To reduce the number of unnecessary rogue aircraft reporting workload, RASMAG agreed to the following Draft Conclusion for APANPIRG's consideration:

<table>
<tr><td colspan="3">Draft Conclusion RASMAG/21-4: Reduced Vertical Separation Minimum (RVSM) Approval Expiry</td></tr>
<tr><td colspan="2">That, Asia/Pacific States should:

a) in case they intend to allow RVSM approvals to expire, review their RVSM approvals data sharing procedures to take into account their ability to update RVSM approvals to Regional Monitoring Agencies (RMAs) before they expire; and

b) in case they do <u>not</u> allow RVSM approvals to expire, notify the RMA to remove all existing expiration dates (if any), and ensure that any future withdrawals of RVSM approvals are sent to the RMA.</td><td>Expected impact:
☐ Political / Global
☐ Inter-regional
☐ Economic
☐ Environmental
☒ Ops/Technical</td></tr>
<tr><td colspan="3">Why: To assist reduce unnecessary workload for the RMAs and increase efficiency in managing non-RVSM approved airframes.</td></tr>
<tr><td>When: 8-Sep-16</td><td colspan="2">Status: Draft to be adopted by PIRG</td></tr>
<tr><td colspan="3">Who: ☐Sub groups ☒APAC States ☒ICAO APAC RO ☐ICAO HQ ☐Other:</td></tr>
</table>

<u>RMA Monitoring Burden</u>

2.60 **Table 4** compares the outstanding monitoring burden reported by each RMA:

Report	AAMA	China RMA	JASMA	MAAR	PARMO
RASMAG/19	79	87	16	200	37
RASMAG/20	113	105	14	176	20
RASMAG/21	85	72	14	172	20

Table 4: Outstanding Monitoring Burden of Asia/Pacific RMAs

2.61 **Table 5** indicates that all RMAs have been either reducing their monitoring burden or the burden is at the same level as 2015, with the overall Asia/Pacific burden reducing by 15.2% (428 to 363). The MAAR burden still constitutes approximately 47.4% of the Asia/Pacific's total, so it is clear that the States it serves need to take increased action to ensure aircraft are monitored in accordance with Annex 6 requirements.

2.62 **Table 5** indicates the States that had relatively high remaining monitoring burdens:

State	2014%	Requirement	Burden	2015%
Solomon Is. (AAMA)	0%	1	1	**100%**
Tonga (PARMO)	0%	1	1	**100%**
Bhutan (MAAR)	75%	4	3	**75%**
Bangladesh (MAAR)	68%	20	13	**65%**
Pakistan (MAAR)	66%	42	27	**64%**
DPRK (China RMA)	89%	10	6	**60%**
Indonesia (AAMA)	61%	119	57	**48%**
Myanmar (MAAR)	0%	11	5	**46%**
Malaysia (MAAR)	39%	39	17	**44%**
Thailand (MAAR)*	41%	108	46	**43%**
Philippines (MAAR)	48%	49	15	**31%**

Table 5: Comparison of State Monitoring Burden

2.63 RASMAG/21 agreed that the need to comply with the requirements of Annex 6 (paragraph 7.2.7), in respect of a monitoring burden would be highlighted to the following States in **Table 5** at APANPIRG/27 and the DGCA/53 meetings:

- Bangladesh;
- Bhutan;
- DPRK;
- Indonesia;
- Malaysia;
- Pakistan;
- Thailand; and
- The Philippines.

2.64 Myanmar, the Solomon Islands and Tonga were not considered deficient in 2016 due to their small fleet size and the fact that this the burden had only occurred since 2015 (i.e.: it was not necessarily indicating a systemic problem). However all States with a systemic problem in this area would be recommended for an APANPIRG Deficiency in 2017 if the situation did not improve.

2.65 Although the Philippines had improved its burden since 2014 (from 48% to 31%), the percentage remained high for a nation with significant aviation activity.

2.66 In addition, India and Thailand should be urged to provide the required data to the MAAR as these States did not provide 2015 RVSM Approval Data. India also did not provide 2014 RVSM Approval Data, so RASMAG/21 agreed to recommend an APANPIRG Deficiency (**Appendix A**) for India in terms of Annex 6 (paragraph 7.2.6) and the following APANPIRG Conclusions:

- 19/15 (*Enhanced communications between States and RVSM RMAs*);
- 23/15 (*Long-Term Non- RVSM Approved Aircraft*); and
- 23/16 (*Safety Monitoring Data Provision*).

2.67 Airports Authority of India (AAI) reassured the meeting that they would take up the issue with the DGCA India to clarify the status of RVSM aircraft from India.

2.68 MAAR also brought to the meeting's attention that about 51 operators with remaining monitoring burden had never had their entire fleet height monitored since they were first introduced (**Attachment C**).

2.69 RASMAG/21 discussed whether there were enough GMUs to progress height-monitoring for these aircraft, most of them being International General Aviation (IGA) operators. The meeting agreed that, despite the plethora of guidance material available for States regarding the requirements for monitoring, it would be appropriate to remind regulators of the State responsibilities prescribed under Annex 6 in this regard, and agreed to the following Draft Conclusion to be considered by APANPIRG/27:

<table>
<tr><td colspan="4">Draft Conclusion RASMAG/21-5: Reduced Vertical Separation Minimum (RVSM) Monitoring of Small Fleets</td></tr>
<tr><td colspan="3">That, Asia/Pacific States should have processes to ensure that single aircraft operators or operators with small fleets are appropriately monitored in terms of Annex 6 requirements, including:

a) the provision of guidance material so operators are aware of their responsibilities; and

b) regulatory procedures being in place to ensure a State meets its obligation under Annex 6 that RVSM approved aircraft are monitored systematically.</td><td>Expected impact:
☐ Political / Global
☐ Inter-regional
☐ Economic
☐ Environmental
☒ Ops/Technical</td></tr>
<tr><td>Why:</td><td colspan="3">To increase Annex 6 monitoring compliance levels within the Asia/Pacific.</td></tr>
<tr><td>When:</td><td>8-Sep-16</td><td>Status:</td><td>Draft to be adopted by PIRG</td></tr>
<tr><td>Who:</td><td colspan="3">☐Sub groups ☒APAC States ☒ICAO APAC RO ☐ICAO HQ ☐Other:</td></tr>
</table>

Regional Horizontal TLS Compliance

2.70 The Asia/Pacific En-Route Monitoring Agency (EMAs) reported horizontal risk assessments that all met the TLS of 5.0 x 10^{-9} (**Table 6**). The AAMA also provided risk assessments that met the TLS for both longitudinal and lateral implementations of 50 NM and 30 NM minima. These specific risk estimates are not included in **Table 6** as a result of the three distinct airspace sampling methodologies used by the AAMA.

Separation Standard	EMA	Estimated Risk
50NM Lateral Risk	BOBASMA	1.70 x 10^{-9}
	JASMA	0.49 x 10^{-9}
	SEASMA	0.66 x 10^{-9}
30NM Lateral Risk	PARMO	0.51 x 10^{-9}
50NM Longitudinal Risk	BOBASMA	3.97 x 10^{-9}
	PARMO	2.32 x 10^{-9}
	SEASMA	0.38 x 10^{-9}
30NM Longitudinal Risk	BOBASMA	0.14 x 10^{-9}
	JASMA	0.04 x 10^{-9}
	PARMO	3.74 x 10^{-9}

Table 6: Comparison of Horizontal Risk Assessments

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper;

b) endorse the new or amended APANPIRG Deficiencies proposed by FIT-Asia5 related to Sri Lanka and Viet Nam, and a further proposal for a new Deficiency for India related to lack of Annex 6 safety data to the RMA (Attachment A);

c) note that only three of eight administrations had submitted datalink problem reports to a recognized CRA;

d) note that the following Draft Conclusions on PBCS were transferred to the ATM/SG for its consideration (paragraph 2.10):

i) Draft Conclusion RASMAG21-A: PBCS Operator Requirements;

ii) Draft Conclusion RASMAG21-B: State Implementation of ICAO Provisions for PBCS; and

iii) Draft Conclusion RASMAG21-C: Asia/Pacific Region PBCS Transition Strategy;

e) discuss and agree to the following Draft Conclusions on safety monitoring:

i) Draft Conclusion RASMAG/21-1: Use of Available ADS-B Data for Aircraft Height Monitoring (paragraph 2.11);

ii) Draft Conclusion RASMAG/21-2: Provision of PBN Approval Data by States (paragraph 2.11);

iii) Draft Conclusion RASMAG/21-3: Large Height Deviation Guidance Material (paragraph 2.13);

iv) Draft Conclusion RASMAG/21-4: Reduced Vertical Separation Minimum (RVSM) Approval Expiry (paragraph 2.57); and

v) Draft Conclusion RASMAG/21-5: Reduced Vertical Separation Minimum (RVSM) Monitoring of Small Fleets (paragraph 2.67);

f) discuss the major safety issues in the following airspace, and the urgent corrective action being taken by relevant parties:

i) BOB airspace (**32.27×10^{-9}**), especially at the interface between Indian FIRs and Bangladesh, Myanmar, Malaysian and Indonesian FIRs;

ii) Japanese airspace (**22.11×10^{-9}**), caused mainly by the interface with the Manila FIR; and

iii) ROK airspace (**6.43×10^{-9}**), especially the AKARA Corridor, which had the potential for very high risk levels

g) note the enhanced safety reporting by China and the DPRK, while India and Indonesia were identified as having safety reporting issues;

h) note the trend of non-RVSM approved aircraft within the RVSM stratum was rapidly dropping, with a 56.4% reduction in observed non-compliant airframes 2014 to 2015;

i) urge the States that had relatively high remaining monitoring burdens to improve their capabilities and systems (Bangladesh, Bhutan, DPRK, Indonesia, Malaysia, Pakistan, Thailand and The Philippines); and

j) discuss any other relevant matters as appropriate.

— — — — — — — —

ATM/AIM/SAR Deficiencies List (Updated 16 June 2016)

Identification		Deficiencies			Corrective Action			
Requirements	**States/ facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date for completion**	**Priority for action****
WGS-84								
Requirements of Paragraph 3.7.1 of Annex 15	Afghanistan	WGS-84 - Not implemented	24/6/2014			Afghanistan	TBD	A
	Bangladesh	WGS-84 - Not implemented	24/6/2014			Bangladesh	TBD	A
	Bhutan	WGS-84 - Not implemented	2/7/1999	Data conversion completed, but not published		Bhutan	TBD	A
	Brunei Darussalam	WGS-84 - Not implemented	24/6/2014			Brunei Darussalam	TBD	A
	Cook Islands	WGS-84 - Not implemented	24/6/2014			Cook Islands	TBD	A
	Kiribati	WGS-84 - Not implemented				Kiribati	TBD	A
	Marshall Islands	WGS-84 - Not implemented	24/6/2014			Marshall Islands	TBD	A
	Micronesia	WGS-84 - Not implemented	24/6/2014			Micronesia	TBD	A

Identification		Deficiencies			Corrective Action			
Requirements	**States/ facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date for completion**	**Priority for action****
	Nauru	WGS-84 - Not implemented		Conferring with consultant		Nauru	TBD	A
	Pakistan	WGS-84 - Not implemented	24/6/2014			Pakistan	TBD	A
	Palau	WGS-84 - Not implemented	24/6/2014			Palau	TBD	A
	Philippines	WGS-84 - Not implemented	24/6/2014			Philippines	TBD	A
	Samoa	WGS-84 - Not implemented	24/6/2014			Samoa	TBD	A
	Thailand	WGS-84 - Not implemented	24/6/2014			Thailand	TBD	A
	Vanuatu	WGS-84 - Implemented at main airports	2/7/1999			Vanuatu	1999	A
Airspace Classification								
Requirements of Paragraph 2.6 of Annex 11	China	Airspace Classification - Not implemented	7/7/99		Difference to Annex 11 is published in AIP, China.	China	APANPIRG/19 updated, implementation planned by end 2010.	A

Identification		Deficiencies			Corrective Action			
Requirements	**States/ facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date for completion**	**Priority for action****
	Kiribati	Airspace Classification - Not implemented	7/7/99			Kiribati	TBD	A
	Nauru	Airspace Classification - Not implemented	7/7/99			Nauru	TBD	A
	Papua New Guinea	Airspace Classification - Not implemented	7/7/99			Papua New Guinea	Project in place	A
	Solomon Islands	Airspace Classification - Not implemented	7/7/99			Solomon Islands	TBD	A
<u>AIP Format</u>								
Requirements of Chapter 4 of Annex 15	Cook Islands	AIP Format - Not implemented	7/7/99			Cook Islands	ATM/AIS/SAR/G/16 (June 2006) updated - AIP COOK ISLANDS in new format in progress with assistance of New Zealand	A

Identification		Deficiencies			Corrective Action			
Requirements	**States/ facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date for completion**	**Priority for action****
	Kiribati	AIP Format - Not implemented	7/7/99			Kiribati	ATM/AIS/SAR/SG/ 18 (June 2009) was advised AIP in draft stage	A
	Nauru	AIP Format - Not implemented	7/7/99			Nauru	ATM/AIS/SAR/SG/ 18 (June 2008) was advised work soon to start	A
	Papua New Guinea	AIP Format - Not implemented	7/7/99			Papua New Guinea	TBA	A
AIS Quality Management System								
Requirements of Paragraph 3.2.1 of Annex 15 Quality Management System - Not implemented	Afghanistan	AIS Quality Management System - Not implemented	24/6/2014			Afghanistan	TBD	A
	Bangladesh	AIS Quality Management System - Not implemented	24/6/2014			Bangladesh	TBD	A
	Bhutan	AIS Quality Management System - Not implemented	24/6/2014			Bhutan	TBD	A
	Brunei	AIS Quality Management	24/6/2014			Brunei	TBD	A

Identification		Deficiencies			Corrective Action			
Requirements	**States/ facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date for completion**	**Priority for action****
	Darussalam	System - Not implemented				Darussalam		
	Cambodia	AIS Quality Management System - Not implemented	24/6/2014			Cambodia	TBD	A
	Cook Islands	AIS Quality Management System - Not implemented	24/6/2014			Cook Islands	TBD	A
	DPR Korea	AIS Quality Management System - Not implemented	24/6/2014			DPR Korea	TBD	A
	Indonesia	AIS Quality Management System - Not implemented	24/6/2014			Indonesia	TBD	A
	Kiribati	AIS Quality Management System - Not implemented	24/6/2014			Kiribati	TBD	A

Identification		Deficiencies			Corrective Action			
Requirements	**States/ facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date for completion**	**Priority for action****
	Lao PDR	AIS Quality Management System - Not implemented	24/6/2014			Lao PDR	TBD	A
	Maldives	AIS Quality Management System - Not implemented	24/6/2014			Maldives	TBD	A
	Marshall Islands	AIS Quality Management System - Not implemented	24/6/2014			Marshall Islands	TBD	A
	Micronesia	AIS Quality Management System - Not implemented	24/6/2014			Micronesia	TBD	A
	Nauru	AIS Quality Management System - Not implemented	24/6/2014			Nauru	TBD	A
	Nepal	AIS Quality Management System - Not	24/6/2014			Nepal	TBD	A

Identification		Deficiencies			Corrective Action			
Requirements	**States/ facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date for completion**	**Priority for action****
		implemented						
	Pakistan	AIS Quality Management System - Not implemented	24/6/2014			Pakistan	TBD	A
	Palau	AIS Quality Management System - Not implemented	24/6/2014			Palau	TBD	A
	Papua New Guinea	AIS Quality Management System - Not implemented	24/6/2014			Papua New Guinea	TBD	A
	Philippines	AIS Quality Management System - Not implemented	24/6/2014			Philippines	TBD	A
	Samoa	AIS Quality Management System - Not implemented	24/6/2014			Samoa	TBD	A
	Solomon Islands	AIS Quality Management System - Not	24/6/2014			Solomon Islands	TBD	A

Identification		Deficiencies			Corrective Action			
Requirements	**States/ facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date for completion**	**Priority for action****
		implemented						
	Thailand	AIS Quality Management System - Not implemented	24/6/2014			Thailand	TBD	A
	Timor Leste	AIS Quality Management System - Not implemented	24/6/2014			Timor Leste	TBD	A
	Vanuatu	AIS Quality Management System - Not implemented	24/6/2014			Vanuatu	TBD	A
	Viet Nam	AIS Quality Management System - Not implemented	24/6/2014			Viet Nam	TBD	A

Identification		Deficiencies			Corrective Action			
Requirements	**States/ facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date for completion**	**Priority for action****
SAR capability								
Requirements of Annex 12	Afghanistan	SAR Capability Matrix	6/07/2015	SAR Capability (no data)		Afghanistan	2016	U
	Bhutan	SAR Capability Matrix	6/07/2015	SAR Capability (no data)		Bhutan	2016	U
	Cambodia	SAR Capability Matrix	6/07/2015	SAR Capability (14 of 20)		Cambodia	2016	U
	Cook Islands	SAR Capability Matrix	6/07/2015	SAR Capability (19 of 20)		Cook Islands	2016	U
	Cook Islands	Annex 12 requirements not implemented. No agreements with adjacent States.	31/1/95		Cook Islands - implement Annex 12 requirements and co-ordinate LOA with adjacent States ICAO - assist to develop SAR capability and to co-ordinate with adjacent States	Cook Islands	2009. SAR agreement with New Zealand completed 2007.	U
	DPR Korea	SAR Capability Matrix	6/07/2015		SAR Capability (15 of 20 elements non-compliant)	DPR Korea	2016	U

Identification		Deficiencies			Corrective Action			
Requirements	**States/ facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date for completion**	**Priority for action****
	Fiji	SAR Capability Matrix	6/07/2015		SAR Capability (13 of 20 elements non-compliant)	Fiji	2016	U
	Kiribati	SAR Capability Matrix	6/07/2015		SAR Capability (no data)	Kiribati	2016	U
	Lao PDR	SAR Capability Matrix	6/07/2015		SAR Capability (10 of 20 elements non-compliant)	Lao PDR	2016	U
	Macau, China	SAR Capability Matrix	6/07/2015		SAR Capability (10 of 20 elements non-compliant)	Macau, China	2016	U
	Maldives	SAR Capability Matrix	6/07/2015		SAR Capability (9 of 20 elements non-compliant)	Maldives	2016	U

Identification		Deficiencies			Corrective Action			
Requirements	**States/ facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date for completion**	**Priority for action****
	Maldives	Annex 12 requirements not implemented. No agreements with adjacent States.	24/4/97	SAR services and facilities provided (details to be confirmed). SAR agreements with neighbouring States under development	Maldives - implement Annex 12 requirements and co-ordinate LOA with adjacent States ICAO - assist to develop SAR capability and to co-ordinate with adjacent States	Maldives	2009	U
	Marshall Islands	SAR Capability Matrix	6/07/2015		SAR Capability (no data elements non-compliant)	Marshall Islands	2016	U
	Micronesia	SAR Capability Matrix	6/07/2015		SAR Capability (20 of 20 elements non-compliant)	Micronesia	2016	U
	Myanmar	SAR Capability Matrix	6/07/2015		SAR Capability (17 of 20 elements non-compliant)	Myanmar	2016	U
	Nauru	SAR Capability Matrix	6/07/2015		SAR Capability (no data elements non-compliant)	Nauru	2016	U
	Nepal	SAR Capability Matrix	6/07/2015		SAR Capability (12 of 20 elements non-compliant)	Nepal	2016	U
	New Caledonia	SAR Capability Matrix	6/07/2015		SAR Capability (8 of 20 elements non-compliant)	New Caledonia	2016	U

Identification		Deficiencies			Corrective Action			
Requirements	**States/ facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date for completion**	**Priority for action****
	Palau	SAR Capability Matrix	6/07/2015		SAR Capability (no data)	Palau	2016	U
	Papua New Guinea	SAR Capability Matrix	6/07/2015		SAR Capability (11 of 20 elements non-compliant)	Papua New Guinea	2016	U
	Philippines	SAR Capability Matrix	6/07/2015		SAR Capability (12 of 20 elements non-compliant)	Philippines	2016	U
	Samoa	SAR Capability Matrix	6/07/2015		SAR Capability (no data elements non-compliant)	Samoa	2016	U
	Solomon Islands	SAR Capability Matrix	6/07/2015		SAR Capability (no data)	Solomon Islands	2016	U
	Timor Leste	SAR Capability Matrix	6/07/2015		SAR Capability (no data)	Timor Leste	2016	U
	Tonga	SAR Capability Matrix	6/07/2015		SAR Capability (18 of 20 elements non-compliant)	Tonga	2016	U
	Vanuatu	SAR Capability Matrix	6/07/2015		SAR Capability (no data)	Vanuatu	2016	U

Identification		Deficiencies			Corrective Action			
Requirements	**States/ facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date for completion**	**Priority for action****
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)	India	Annex 11 requirement not implemented.		Established by RASMAG/20- failure to provide RVSM approvals summary data	Lack of	India		U
Requirement of Paragraph 3.3.5.1 of Annex 11 (provision of data for monitoring the height-keeping performance of aircraft)	Philippines	Annex 11 requirement not implemented.		Established by RASMAG/20- failure to provide RVSM approvals summary data		Philippines		U
Failure to provide RVSM Approval Data to the RMA	India	Annex 6 paragraph 7.2.6	RASMAG/ 20 and 21	Established by RASMAG/21 - Relevant APANPIRG Conclusions: *19/15 (Enhanced communications between States and RVSM RMAs)*; *23/15 (Long-Term Non-RVSM Approved Aircraft)*; and *23/16 (Safety Monitoring Data Provision).*		India		U

Identification		Deficiencies			Corrective Action			
Requirements	**States/ facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date for completion**	**Priority for action****
Data Link Performance Monitoring and Analysis								
Requirements of Paragraph 2.27.5 of Annex 11 not met.	China	Post-implementation monitoring not implemented	29/5/2015	Problem Reports not provided to CRA		China	TBD	A
	Indonesia	Post-implementation monitoring not implemented	29/5/2015	Problem Reports not provided to CRA. Performance monitoring and analysis not reported to FIT.		Indonesia	TBD	A
	Malaysia	Post-implementation monitoring not implemented	29/5/2015	Problem Reports not provided to CRA. Performance monitoring and analysis not reported to FIT.		Malaysia	TBD	A

Identification		Deficiencies			Corrective Action			
Requirements	**States/ facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date for completion**	**Priority for action****
	Myanmar	Post-implementation monitoring not implemented	29/5/2015	Problem Reports not provided to CRA. Performance monitoring and analysis not reported to FIT.		Myanmar	TBD	A
	Maldives	Post-implementation monitoring not implemented	29/5/2015	Problem Reports not provided to CRA. Performance monitoring and analysis not reported to FIT.		Maldives	TBD	A
	Sri Lanka	Post-implementation monitoring not implemented	29/5/2015	~~Not registered with competent CRA.~~ Problem Reports not provided to CRA. Performance monitoring and analysis not reported to FIT.	Agreed by FIT-Asia/5, endorsed by RASMAG/21	Sri Lanka	TBD	A

Identification		Deficiencies			Corrective Action			
Requirements	**States/ facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date for completion**	**Priority for action****
	Viet Nam	Post-implementation monitoring not implemented	29/5/2015	Problem Reports not provided to CRA. Performance monitoring and analysis not reported to FIT.	Agreed by FIT-Asia/5, endorsed by RASMAG/21	Viet Nam	TBD	A

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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. Aircraft operators are not likely to be ready to file Required Communication Performance (RCP) and Required Surveillance Performance (RSP) designators in flight plans[i];

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;

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 have 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[ii].

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.

   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.

2. The application of existing and planned RNAV and RNP-based 50 NM and 30NM longitudinal and 30NM lateral separation minima should continue, subject to the conditions that:

   a. PBCS monitoring is in place; and

   b. Performance-based horizontal separation using PBCS designators in flight plans is implemented as soon as practically possible;

3. 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. 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 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

5. 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].

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[i] RCP and RSP designators in the flight plan complement existing Required Navigation Performance (RNP) designators

[ii] 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).*

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

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Attachment C: List of Operators and Aircraft Monitoring Group Never Height-Monitored

State Name"	Operator	MMR Group	Fleet Size	Total Outstanding Burden
Bangladesh	**NOVOAIR**	E135-145	3	2
	SKY CAPITAL AIRLINES LIMITED	B732	1	1
	UNITED AIRWAYS BANGLADESH	A310-PW	2	2
		MD80	5	2
	ZAINUL HAQUE SIKDER WOMENS MEDICAL COLLEGE & HOSPITAL (PVT) LTD. (DBA): R & R AVIATION	H25B-800	1	1
Bangladesh Total				**8**
Bhutan	**BHUTAN AIRLINE**	A320	2	2
Bhutan Total				**2**
China (Hong Kong)	**GOVERNMENT OF THE HKSAR**	CL605	2	2
China (Hong Kong) Total				**2**
India	**AIRCAR AIRLINES PRIVATE LIMITED**	P180	1	1
	KINGFISHER AIRLINES LTD.	A320	2	2
	PINNACLE AIR PVT LTD.	P180	1	1
	RELIANCE TRANSPORT & TRAVELS PVT. LTD.	E135-145	1	1
	SPICE JET LTD.	B737C	2	2
India Total				**7**
Malaysia	**BERJAYA AIR SDN. BHD.**	BD100	1	1
	DEPARTMENT OF CIVIL AVIATION MALAYSIA	LJ60	2	2
	GADING SARI AVIATION SERVICES SDN BHD	B737CL	2	2
	GENERAL AVIATION	B737CL	1	1
	HORNBILL SKYWAYS SDN. BHD.	CL605	1	1
	NEPTUNE AIR	B737CL	1	1
	RAYA AIRWAYS	B752	1	1
Malaysia Total				**9**

State Name"	Operator	MMR Group	Fleet Size	Total Outstanding Burden
Myanmar	**AIR MANDALAY**	E135-145	2	2
	FMI AIR	CARJ	3	2
Myanmar Total				**4**
Nepal	**HIMALAYA AIRLINES**	A320	1	1
Nepal Total				**1**
Pakistan	**AIR INDUS**	B737CL	3	2
	K K AVIATION PVT LIMITED	HA4T	1	1
	LUCKY AIR PRIVATE LIMITED	LJ60	1	1
	PAK ARAB FERTILIZERS LTD. MULTAN	C25B	1	1
	PAKISTAN AIRLINES	A320	11	2
		B747CL	1	1
	PAKISTAN AVIATORS & AVIATION	BE20	1	1
		G150	1	1
		GALX	1	1
	SHAHEEN INTERNATIONAL	B737CL	9	2
	VIP FLIGHT GOVERNMENT OF BALOCHISTAN	LJ45	1	1
	VIP SINDH	LJ45	1	1
	VISION AIR INTERNATIONAL PRIVATE LIMITED	B732	1	1
		B737CL	1	1
Pakistan Total				**17**
Singapore	**SINGAPORE AIRLINES LTD.**	A350	2	2
Singapore Total				**2**
Taiwan	**AVANTI AVIATION CORP.**	GALX	1	1
	EXECUTIVE AVIATION TAIWAN CORP	B737NX	1	1
	WIN AIR BUSINESS JET	GLF6	1	1
Taiwan Total				**3**
Thailand	**ANUTIN CHARNVEERAKUL**	TBM	1	1

State Name"	Operator	MMR Group	Fleet Size	Total Outstanding Burden
	BUSINESS AIR CENTRE	B767	1	1
	CITY AIRWAYS COMPANY LIMITED	B737NX	1	1
	KANNITHI AVIATION COMPANY LIMITED	PRM1	1	1
	KING POWER INTERNATIONAL COMPANY LIMITED	F2TH	1	1
		G280	1	1
	K-MILE AIR CO. LTD	B737CL	1	1
	ORIENT THAI AIRLINE	B744-5	1	1
		B747CL	2	2
	P.C. AIR COMPANY LIMITED	A310-GE	1	1
	SABAIDEE AIRWAYS	B737CL	4	2
		B737NX	2	2
	SIAM AIRNET COMPANY LIMITED	C750	1	1
	SUNNY AIRWAYS	B767	1	1
	THAI AIRWAYS INTERNATIONAL LTD.	A306	3	2
		A310-PW	1	1
	THAI EXPRESS AIR COMPANY LIMITED	B737CL	1	1
	THAI FLYING SERVICE	C650	1	1
	THAI VIETJET AIR	A320	1	1
	VIP JETS LIMITED	C510	1	1
Thailand Total				**24**
Grand Total				**79**