



ICAO

International Civil Aviation Organization

The Third Meeting of the South Asia, Indian Ocean and Southeast Asia ATM Coordination Group (SAIOSEACG/3)

Bangkok, Thailand, 16 – 19 April 2024

Agenda Item 3: Review of Current Operations and Problem Areas

APPLICATION OF ATC SEPARATION MINIMUMS

(Presented by Secretariat)

SUMMARY

This paper presents information on the Seamless ATM survey conducted to determine which Air Traffic Control (ATC) separation minimums were being applied within the Asia/Pacific Region.

1. INTRODUCTION

1.1 In an endeavour to track the effectiveness of the Seamless Air Navigation Services (ANS) element implementation related to the use of tactical (ATC surveillance-based and datalink-supported) ATC separation minimums, the ICAO Regional Office issued State Letters since 2017 subsequently supported by *Conclusion ATM/SG 6-1: ATC Separations Standards Survey*, *Conclusion ATM/SG/10-1: Revised Reporting Date for ATM Regional Plans' Implementation Status Monitoring and Conclusion ATM/SG/11-2 Revised Annual APAC Regional Survey of ATC Separation Standard*.

1.2 The survey requested respondents to advise the minimum horizontal separation minimums authorized for use by controllers within Category R (remote en-route airspace with Air Traffic Services (ATS) HF or CPDLC communications and outside the coverage of ground-based surveillance coverage), Category T (terminal operations serviced by direct ATS communications and surveillance) and Category S (serviced (or potentially serviced) en-route airspace – by direct (not dependent on a Communication Service Provider (CSP)) ATS communications and surveillance and the minimum horizontal spacing authorized by Air Traffic Services Letter of Agreement (ATS LOA) or other instruments on each of your Flight Information Region (FIR) inbound transfer of Control (TOC) points. Surveying the TOC points' spacing parameter is a step forward in helping to identify the 'bottleneck' FIR Boundary TOC points in the region. In addition, it was asked whether your Administration applied a Flight Level Allocation Scheme within its FIR(s) [no closer than 50NM to the FIR boundary]. The survey is found at the ICAO APAC webpage, APAC eDocuments>>ATM>>Seamless ANS Plan.

1.3 The specific parts from the *Asia/Pacific Seamless ANS Plan* being referred to in the survey were:

7.34 All ATC units should authorise the use of the horizontal separation minima stated in ICAO Doc 4444 (PANS ATM), or as close to the separation minima as practicable, taking into account such factors as:

the automation of the ATM system, including automated hand-off between sectors;

a) *the capability of the ATC communications system;*

b) *the performance of the ATS surveillance system, including data-sharing or overlapping coverage at TOC points; and*

- c) *ensuring the competency of air traffic controllers to apply the full tactical capability of ATS surveillance systems.*

Note 1: the delivery of ATC services should be based primarily on the CNS/ATM capability. When using Annex 10 compliant ATS surveillance, 5NM (enroute) or 3NM (terminal) surveillance-based separations should be authorised within ATC sectors. At the TOC points in such environments, 5-10NM should be authorised with auto hand-off and surveillance data-sharing or overlapping coverage at the TOC point, and 5-20NM without auto hand-off, as determined by an appropriate safety assessment.

Note 2: the efficacy, continuity and availability of ATM services should be supported by adherence with regional planning and guidance material regarding ATM automation and ATM contingency systems (regarding ATM contingency operations, refer to the Regional ATM Contingency Plan).

7.35 *Priority for FLAS level allocations should be given to higher density ATS routes over lower density ATS routes. FLAS should comply with Annex 2, Appendix 3a unless part of an OTS. FLAS other than OTS should only be utilised for safety and efficiency reasons within:*

- a) Category R airspace with the agreement of all ANSPs that provide services:

- *within the airspace concerned; and*
- *within adjacent airspace which is affected by the FLAS; or*

Category S airspace with the agreement of all ANSPs that provide services:

- *where crossing track conflicts occur within 50NM of the FIRB; and*
- *ATS surveillance coverage does not overlap the FIRB concerned, or ATS surveillance data is not exchanged between the ATC units concerned.*

2. DISCUSSION

Survey

2.1 The survey questions circulated were expected to provide greater clarity on the separation minimums used in the region. Q1 surveyed Remote, Surveillance and Terminal airspace separations within the airspace of APAC Administrations, Q2 captured the separation minimums for only inbound flights at FIR TOC points and Q3 covered FLAS.

2.2 The latest responses from Asia/Pacific Administrations to the latest survey are provided in **Attachment A** and **Attachment B**. The data in **Attachment A** shows the responses from Q1 & Q3 of the survey, the green text indicates compliance with the *Asia/Pacific Seamless ANS Plan's* expectations, while red text represents non-compliance. Whereas **Attachment B** shows all reported inbound TOC points from Q2 and its compliance to the Seamless ANS Plan.

2.3 As of 29 March 2024, the responses to the latest survey has decreased from 25 to 15 (compared to last reporting period). **Table 1** presents the list of submission by States from 2018 to 2024. Some States/Administrations did not submit any data since 2017 to date.

State/Administration	2018	2019	2020	2021	2022	2023	2024
Afghanistan	Yes						
Australia	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bangladesh					Yes	Yes	

Bhutan		Yes					
Brunei Darussalam							
Cambodia	Yes	Yes	Yes		Yes	Yes	Yes
China		Yes				Yes	
Cook Islands						Yes	
DPR Korea						Yes	
Fiji	Yes	Yes			Yes	Yes	Yes
French Polynesia	Yes	Yes					
Hong Kong, China	Yes	Yes	Yes	Yes	Yes	Yes	Yes
India	Yes	Yes			Yes	Yes	Yes
Indonesia	Yes	Yes	Yes		Yes	Yes	Yes
Japan	Yes	Yes	Yes		Yes	Yes	
Kiribati							
Lao PDR	Yes	Yes					
Macao, China			Yes	Yes	Yes	Yes	
Malaysia		Yes		Yes	Yes	Yes	Yes
Maldives		Yes		Yes	Yes		
Marshall Islands							
Micronesia							
Mongolia		Yes			Yes	Yes	Yes
Myanmar		Yes			Yes	Yes	
Nauru							
Nepal				Yes	Yes	Yes	
New Caledonia							
New Zealand	Yes	Yes				Yes	Yes
Pakistan	Yes	Yes		Yes	Yes	Yes	Yes
Palau							
Papua New Guinea	Yes	Yes	Yes				
Philippines	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Republic of Korea	Yes	Yes	Yes	Yes	Yes	Yes	
Samoa							
Singapore	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Solomon Islands							
Sri Lanka	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Thailand	Yes	Yes	Yes	Yes	Yes	Yes	
Timor Leste							
Tonga		Yes					
Tuvalu							
USA	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vanuatu							
Viet Nam		Yes	Yes	Yes	Yes	Yes	Yes

Table 1: Responses for ATC separation survey, 2018 - 2024

Analysis

2.4 The analysis of Q1 of the survey are presented separately for the three categories of airspace namely Category R, Category S and Category T in **Figure 1, Figure 2 and Figure 3** respectively. The figures provide an indication, as at 29 March 2024, of the efficiency of ATC spacing

between aircraft at the same level as it is theoretically being applied within FIRs and inbound at FIR TOC Points respectively. The criteria used the analysis of Q1 are as follows:

- Category R - Acceptable standard: ≤ 50 NM
- Category S - Acceptable standard: 5 NM
- Category T - Acceptable standard: 5 NM

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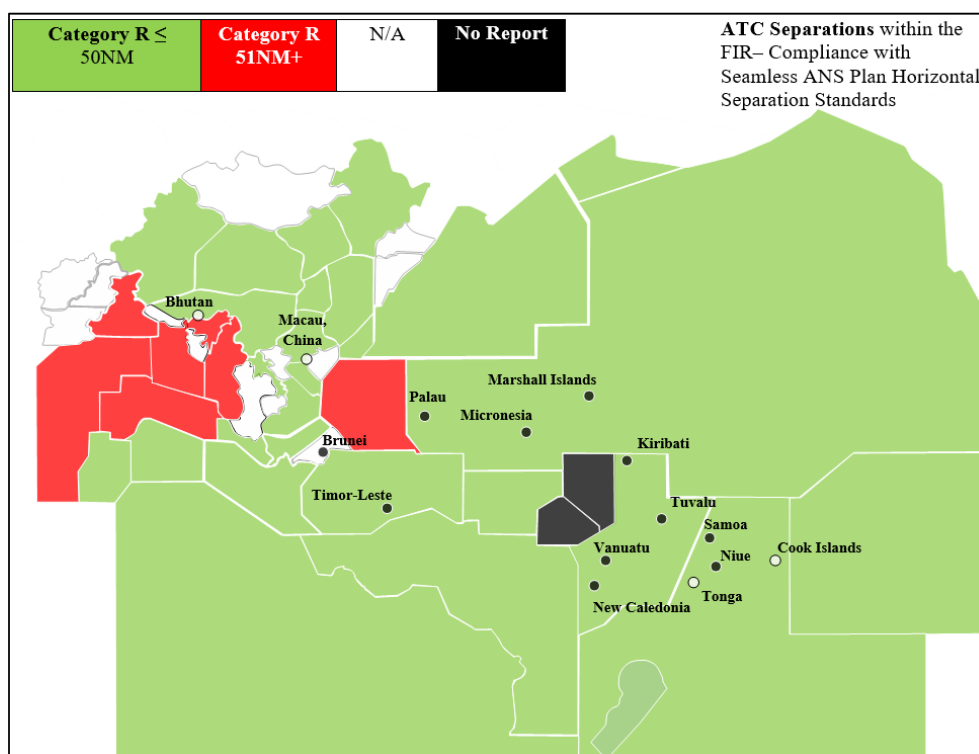


Figure 1: Category R Horizontal Separation Minimums within the FIR

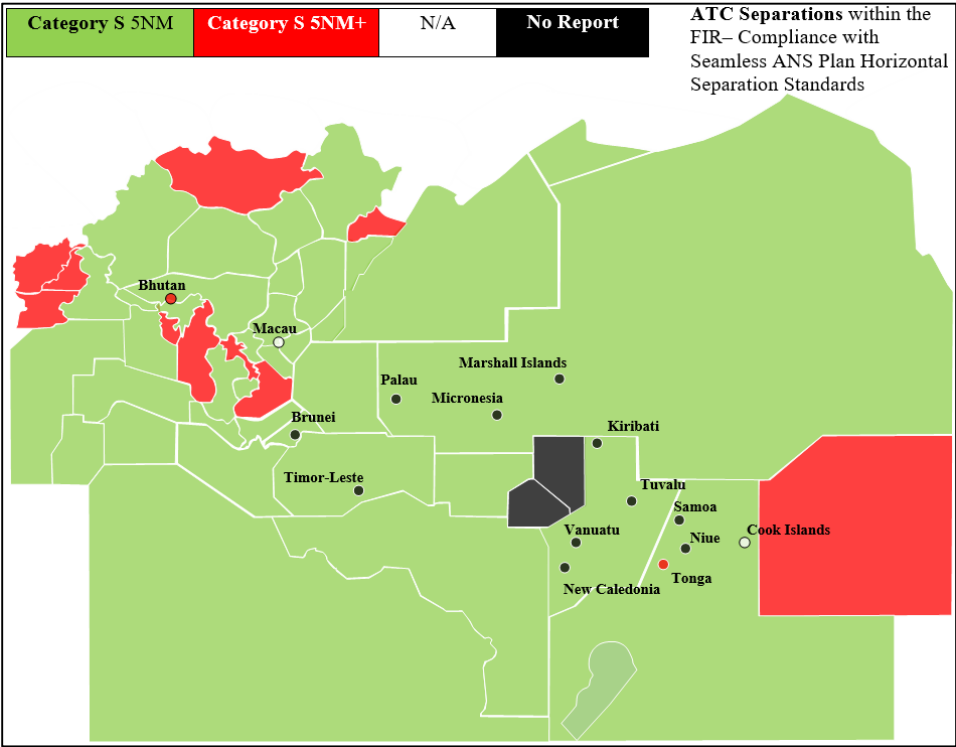


Figure 2: Category S Horizontal Separation Minimums within the FIR

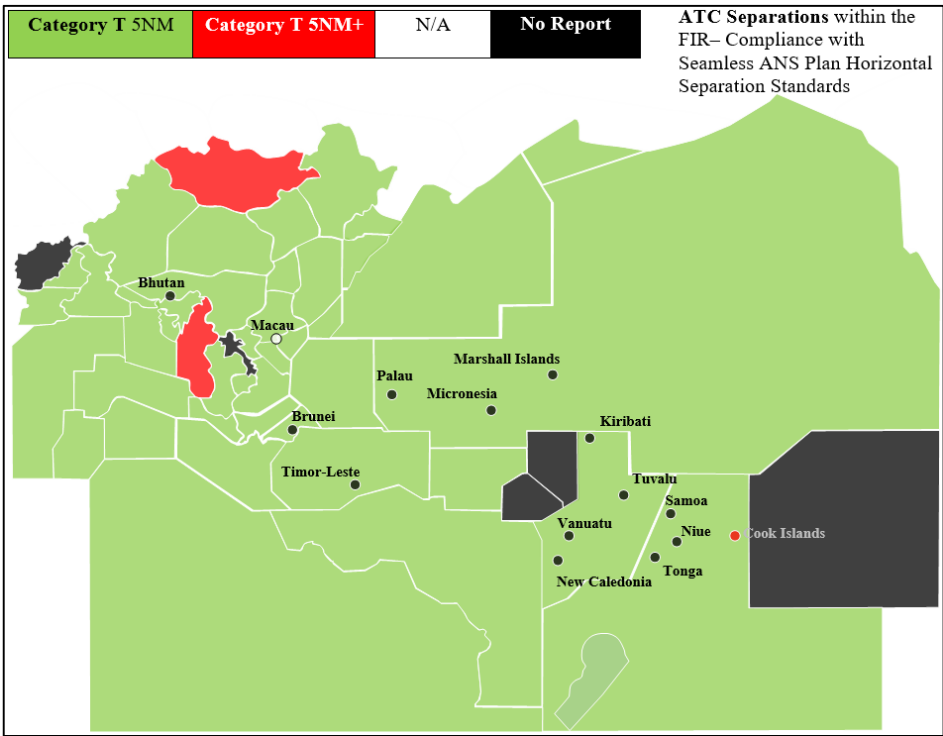


Figure 3: Category T Horizontal Separation Minimums within the FIR

2.5 Q1 requested the minimum horizontal separation standard within State/administration’s FIR namely Category R, Category S and Category T airspace. 25% (11 of 44) of APAC States and

Administrations have all categories of airspace within the FIR with minimum separation compliant with the APAC Seamless ANS Plan.

2.6 States that utilize more than 5NM in Category S airspace:

Afghanistan, Bangladesh, Bhutan, DPR Korea, French Polynesia, Lao PDR, Mongolia, Myanmar, Pakistan, Tonga, and Vietnam.

2.7 States that utilize more than 5NM in Category T airspace:

Cook Islands, Mongolia and Myanmar

2.8 Q2 of the survey looked at three categories separations at Inbound FIR TOC points shown below and the total number of TOC points surveyed this year. After a review, the criteria for Category R→ S TOC has been revised from 10 NM to 50NM. The analysis of Q2 of the survey are presented separately for the three categories in **Figure 4**, **Figure 5** and **Figure 6** respectively.

Q2 Criteria

- Category R/S → R TOC- Acceptable standard: ≤ 50 NM
- Category R → S TOC - Acceptable standard: ≤ 50 NM
- Category S → S TOC - Acceptable standard: ≤ 10 NM

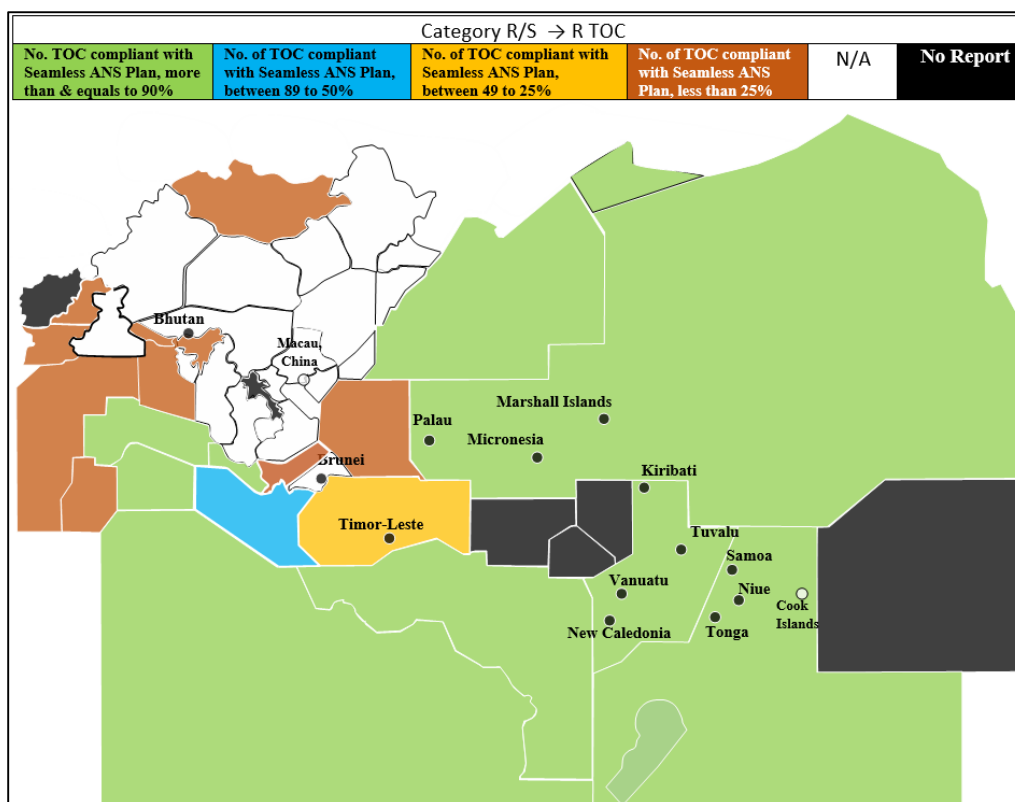
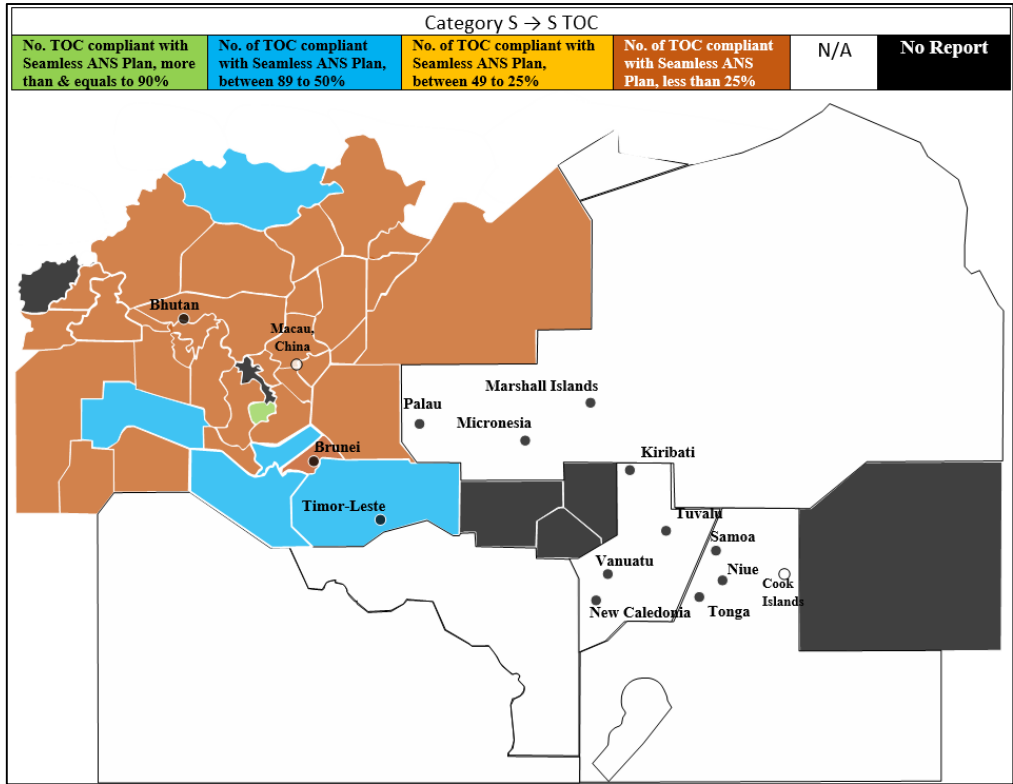
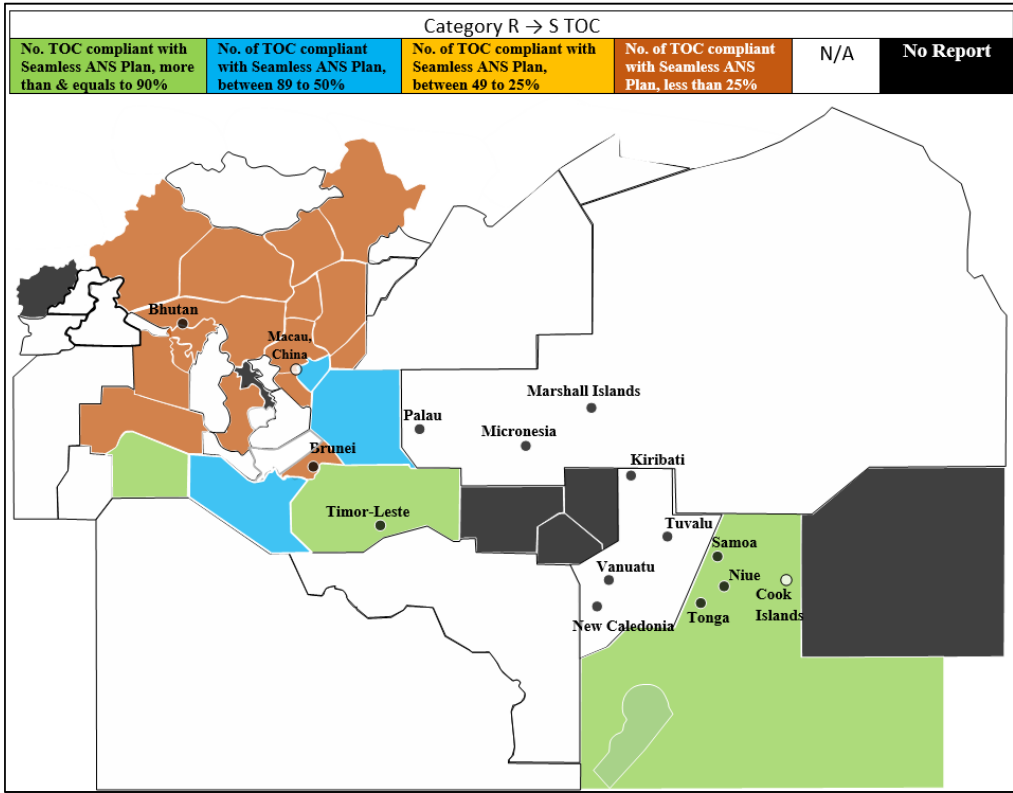


Figure 4: Category R/S → R TOC ATC Horizontal Spacing at Inbound FIR TOC points



2.9 Only five States/administrations achieved more than or equals to 90% of the total Inbound FIR TOC points compliant with the Seamless ANS plan for all applicable categories.

Australia, Cambodia, Fiji, New Zealand, United States

2.10 The further analysis of the compliance of the three categories of inbound TOC by States is shown in **Figure 3**.

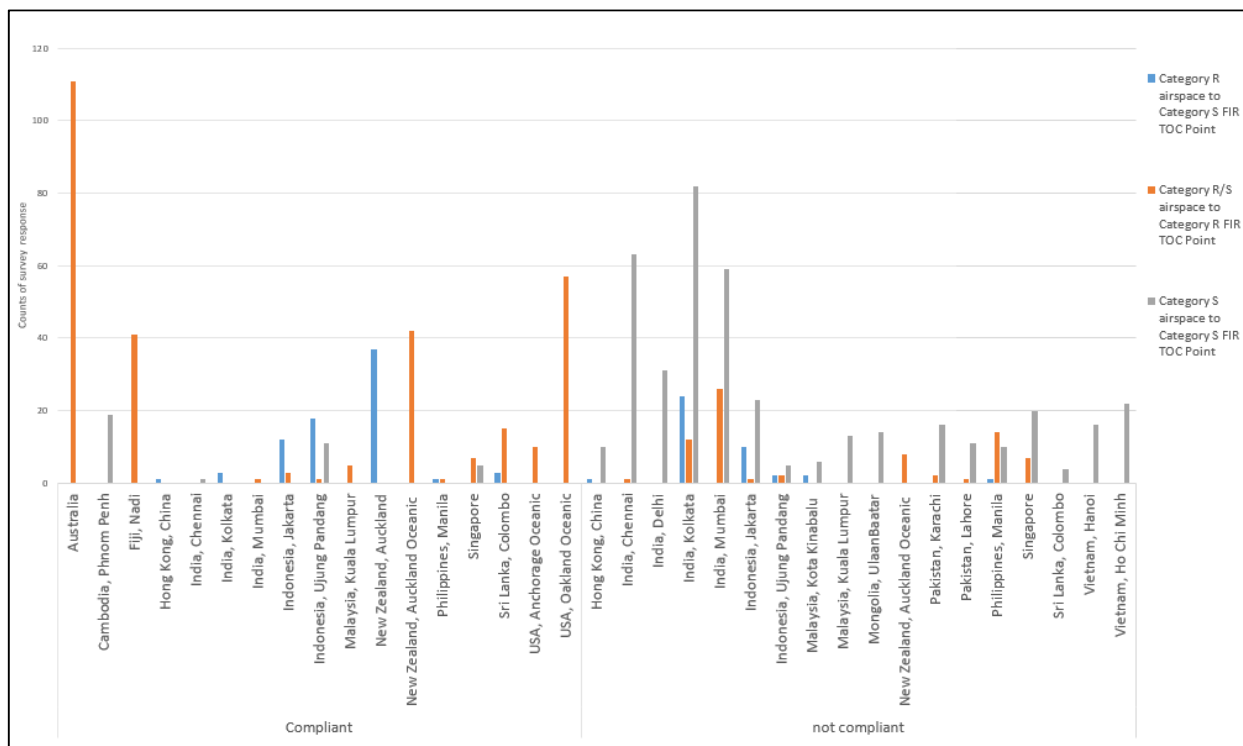


Figure 3: Analysis of Inbound TOC categories by Administration, March 2024

2.11 **Table 2** showed the comparison of Inbound TOC points, the highest non-compliant TOC points, belong to Category S airspace to Category S FIR TOC Points. Even with surveillance coverage, the separation minimum of more than 10NM are currently implemented at TOC points in the APAC region.

	Number of Category R airspace to Category S FIR TOC Point	Number of Category R/S airspace to Category R FIR TOC Point	Number of Category S airspace to Category S FIR TOC Point	Total
Compliant	75	294	36	405
Not compliant	40	74	405	519
Total	115	368	441	924

Table 2: Comparison of compliance of inbound TOC points

Conclusions

2.12 It was identified that Air Operations is one component of ICAO Long Term Aspirational Goal (LTAG) to reduce carbon emissions, therefore ICAO urges all APAC States and Administrations to address this key aspect of capacity and efficiency within their National Air Navigation Plans.

2.13 In addition, ICAO APAC Regional Office (and from a global perspective, ICAO HQ) also has a role in highlighting the human performance aspects that act as barriers to the implementation of more efficient horizontal separations and aircraft spacing at TOC points, particularly those contained within the Asia/Pacific Seamless ANS Plan, E.g.: human performance-based training and procedures for operational staff providing ATS, including the application of tactical, surveillance-based ATC separation and control techniques near minimum ATC separation.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

- a) note the information contained in this paper;
- b) urge all Administrations that have not done so to implement separation minimums to improve ATC service levels and update their ATS LOAs to meet the expectations of the *Asia/Pacific Seamless ANS Plan*; and
- c) discuss any relevant matters as appropriate.

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