International Civil Aviation Organization

The Sixth Meeting of the APANPIRG ATM Sub-Group (ATM SG/6)

Hong Kong, China, 30 July – 03 August 2018

Agenda Item 3: Performance Frameworks and Metrics

APPLICATION OF ATC SEPARATION STANDARDS

(Presented by Secretariat)

SUMMARY

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

1. INTRODUCTION

1.1 In an endeavour to track the effectiveness of the Seamless Air Traffic Management (ATM) element implementation related to the use of tactical (ATC surveillance-based and datalink-supported) ATC separation standards, the ICAO Regional Office issued State Letter T 3/3.7-AP004117 (ATM) dated 06 January 2017, with a response date of 17 February 2017 (**Attachment A**).

1.2 The survey requested respondents to advise the minimum horizontal separation standards authorized for use by controllers within Category R (remote) and S (surveilled by radar, Automatic Dependent Surveillance-Broadcast (ADS-B) or Multilateration (MLAT)). A copy of the survey is at **Attachment B**.

1.3 The specific parts from the Seamless ATM Plan being referred to in the survey were:

> *7.35 The delivery of CNS/ATM services should be based primarily on the CNS/ATM capability. 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:*
>
> *a) the automation of the ATM system;*
>
> *b) the capability of the ATC communications system;*
>
> *c) the performance of the ATS surveillance system, including data-sharing or overlapping coverage at TOC points; and*
>
> *d) ensuring the competency of air traffic controllers to apply the full tactical capability of ATS surveillance systems.*

7.44 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) <u>Category R</u> 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*

b) <u>Category S</u> airspace with the agreement of all ANSPs that provide services:

- *where crossing track conflictions 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

<u>Response</u>

2.1 The response from Asia/Pacific States and administrations to the initial survey was poor, with only 12 replies (30%) and after the re-circulation it improved to 19 replies (45% of administrations). The responses are provided in **Attachment C**. It should be noted that the data in Attachment C has been coloured so that red indicates non-compliance with the Asia/Pacific Seamless ATM Plan expectations, while green means compliance.

2.2 **Figure 1** provides an indication of the efficiency of ATC separations, as they are theoretically being applied.

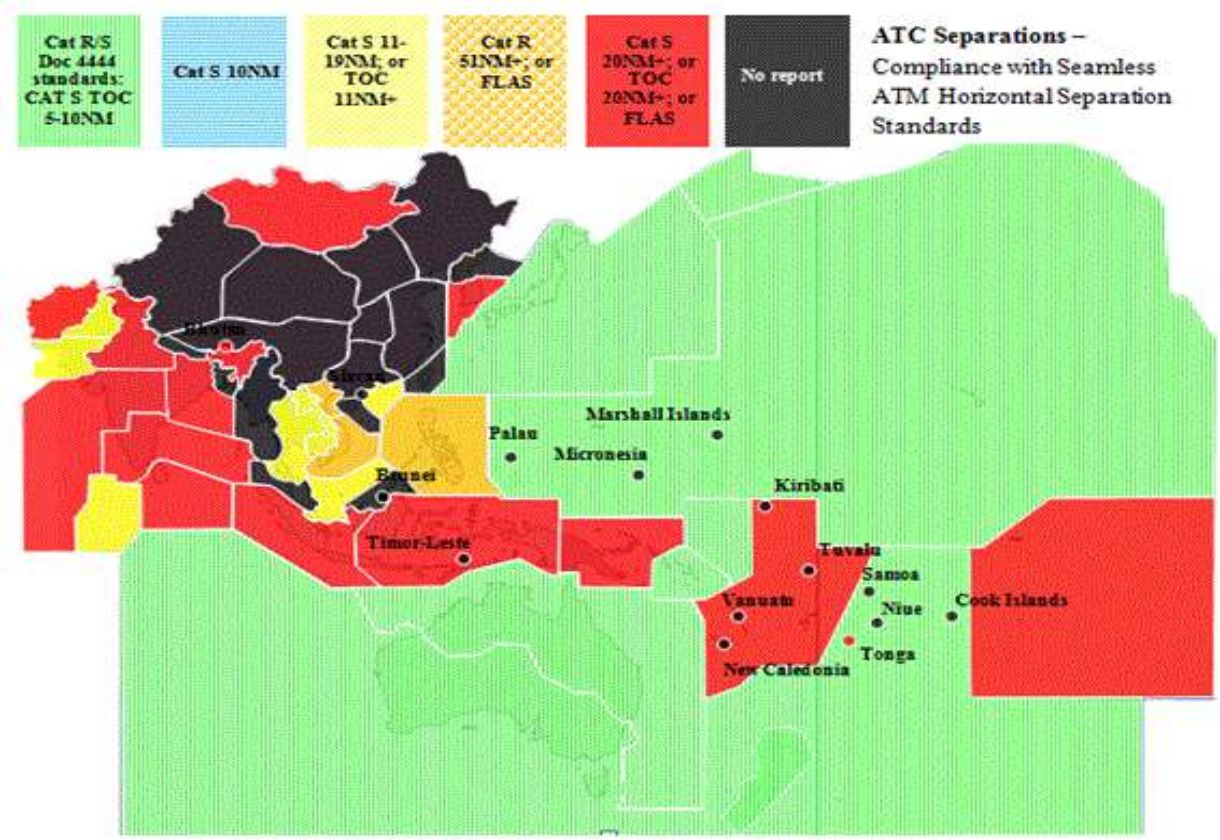

Figure 1: Compliance with Seamless ATM Horizontal Separation Standards

2.3 States not responding are listed as follows:

Bangladesh, Bhutan, Brunei, China, Cook Islands, DPR Korea, Kiribati, Macau China, Malaysia, Maldives, Marshall Islands, Micronesia (Federated State of), Mongolia, Myanmar, Nauru, Nepal, Palau, Samoa, Solomon Islands, Timor Leste, Tonga, Vanuatu and Viet Nam.

2.4 Given the survey response after re-circulation, there are many States/Administration that had not responded. This survey requires few resources, and yet it is important to understand how efficient the region is when matching the service delivery with both the capability of the aircraft, and the existing or planned ground systems.

Alternative Procedural Backup for Surveillance

2.5 Recently, a radar failure within the southern portion of Uzbekistan's Samarkand Flight Information Region (FIR) led to a discussion about procedural separation standards that are able to be used as a backup for surveillance-based separations, subject to appropriate training and the normal safety case (**Figure 2**).

Figure 2: Uzbekistan radar outage area

2.6 In this example, the Uzbekistan Air Navigation Service Provider (Uzaeronavigatsia) unfortunately reverted to a 10-minute longitudinal separation standard, which was understood to be due to this being referenced in Uzbekistan's aviation law. Thailand provided data that indicated that during New Year week this caused LAJAK - SITAX traffic to decrease by 11.4% as airlines avoided the restriction. However, the remaining traffic still encountered an increased average Air Traffic Flow Management (ATFM) delay of 4.7%.

2.7 Assuming controllers are trained appropriately and there are no safety issues impeding the application of the standard under the normal implementation safety case, there appears to be no impediment for ATC to apply 20NM minimum separation longitudinally within Very High Frequency (VHF) coverage instead, based on the PANS ATM excerpt:

5.4.2.3.3.1Aircraft on the same track

a) 37km (20NM), provided:

1) each aircraft utilizes:

i) the same 'on track' DME station when both aircraft are utilizing DME; or

ii) an 'on track' DME station and a collocated waypoint when one aircraft is utilizing DME and the other is utilizing GNSS; or

iii) the same waypoint when both aircraft are using GNSS.

2.8 Even in Category S surveillance airspace, controllers are normally using longitudinal distances between aircraft of 20-30NM, dependent on the circumstances, while using the minimum 5NM for tactical measures such as crossing traffic or climbs and descents. Therefore, the use of a 20NM backup based on DME and/or GNSS would appear to be a suitable contingency reversion if surveillance is not available, and there does not appear to be any reason why greater longitudinal separations are used in Asia/Pacific's Category S airspace.

SAIOACG/8 and SEACG/25 Discussion on the ATC Separations Standards

2.9 The Combined Eighth Meeting of the South Asia – Indian Ocean ATM Coordination Group and Twenty-Fifth Meeting South East Asia ATS Coordination Group (SAIOACG/8 and SEACG/25, Siem Reap, Cambodia, 26 to 30 March 2018) was presented with initial information on the survey

2.10 Noting the need for the survey to be recirculated, the meeting agreed to the following Draft Conclusion:

<table>
<tr><th colspan="3">Draft Conclusion SAIOACG/8 and SEACG/25-2: ATC Separations Standards Survey</th></tr>
<tr><td colspan="2">What: That, States are urged to study and respond to the ATC Separation Standards Survey, to be circulated by the ICAO APAC Regional Office by State Letter.</td><td>Expected impact:
☐ Political / Global
☐ Inter-regional
☐ Economic
☐ Environmental
☒ Ops/Technical</td></tr>
<tr><td>Why: To enhance the level of reporting in order to improve the implementation of the Asia/Pacific Seamless ATM Plan's element on the application of appropriate ATC separation standards.</td><td colspan="2">Follow-up: ☒Required from States</td></tr>
<tr><td>When: 30-Mar-18</td><td colspan="2">Status: Draft to be adopted by Subgroup</td></tr>
<tr><td colspan="3">Who: ☐Sub groups ☒APAC States ☐ICAO APAC RO ☐ICAO HQ ☐Other:</td></tr>
</table>

Conclusion

2.11 No State in Asia appears to be applying the proper ATC separation standard based on the provisions of the Seamless ATM Plan and ICAO Document 4444; therefore, the Asian Region as a whole was failing to deliver the service levels new CNS systems were capable of.

2.12 There appears to be no specific technical reasons why developed States such as Australia, New Zealand and the United States were able to provide more efficient levels of service than States in Asia, using essentially the same CNS/ATM equipment. It would also be inappropriate to suggest that Asian air traffic controllers were not as capable as their counterparts providing services in the Pacific. Therefore, only human decision-making at management level could be responsible for this poor result, indicating a region-wide paradigm shift in organisational culture was necessary.

2.13 As the cost of new CNS/ATM systems were generally not providing a commensurate increase of efficiency in service, States should consider the ramifications of this in terms of safety (especially with regards to ATC workload), efficiency for airlines and environmental consequences, which ultimately had a political dimension when the public becomes aware of the comparatively poor performance in Asia. Given the increasing air traffic in Asia in particular, Asian States should recognise the problem and establish policies, rules and procedures for ANSPs to greatly improve the benefits from modern CNS/ATM systems, including training for senior managers so they might recognise the gap between current practice and best practice.

2.14 The ICAO will monitor the situation and if more survey results indicated no significant improvement, the matter will be brought to the attention of States through the DGCA Conference and Ministerial forums in the future.

3 ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper;

b) discuss the Draft Conclusion on a survey;

c) urge States, particularly those in the Asian Region, to review their CNS/ATM system capability and match this with a service performance, in accordance with the expectations of the Asia/Pacific Seamless ATM Plan; and

d) discuss any relevant matters as appropriate.

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Ref.: T 3/3.7 – AP004/17(ATM) 6 January 2017

Subject: APAC Air Traffic Management Survey

Action required: To review and reply by 17 February 2017

Sir/Madam,

Please find attached an Asia/Pacific Air Traffic Management survey for Asia/Pacific States/Administrations which have a Flight Information Region (FIR), in order to clarify the separation minima used to determine the implementation of this aspect of Asia/Pacific Seamless ATM Plan.

Accordingly, States/Administrations are requested to take note of the survey and review their minimum separation standards presently authorized by ATC and use of Flight Level Allocation Schemes (FLAS). The Regional Office will analyse, tabulate and present a paper with reported capabilities at appropriate Air Navigation Service meetings.

Please return the completed survey forms to the Regional Office attention Mr Raymond Seah at kseah@icao.int by 17 February 2017, so the Regional Office has the opportunity to analyse the data and present it to the appropriate ANS meetings.

Accept, Sir/Madam, the assurances of my highest consideration.

Arun Mishra
Regional Director

Enclosure: APAC ATM Survey form

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252/1 Vibhavadi Rangsit Road
Chatuchak
Bangkok 10900
Thailand

Postal Address:
P.O. Box 11
Samyaek Ladprao
Bangkok 10901
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Tel.: +66 (2) 537-8189
Fax: +66 (2) 537-8199

www.icao.int/apac
E-mail: apac@icao.int

Instructions: For each FIR administered by your State or Administration, complete the survey below:
Q1: Noting the categorization of airspace in the Asia/Pacific Seamless ATM Plan paragraph 1.4 and the performance expectation in paragraph 7.35, both copied below, what minimum horizontal separation standard has been authorized for controllers to use within your Category R and Category S airspace Category R airspace: NM Category S airspace: NM
Remarks:
Q2: What minimum horizontal separation standard has been authorized by Air Traffic Services Letter of Agreement (ATS LOA) or other instrument on each of your Flight Information Region (FIR) Transfer of Control (TOC) points? Category S airspace FIR TOC Points: NM Category R airspace FIR TOC Points: NM – *Note: This Includes FIR TOC points where the Category S airspace of one FIR adjoins the Category R airspace of a neighbouring FIR.*
Remarks:
Q3: Noting the expectations of the Asia/Pacific Seamless ATM Plan paragraph 7.44 copied below, does your Administration apply a Flight Level Allocation Scheme within its FIR(s)? if so please provide details. YES/NO
Details/Remarks:

Excerpts from the Asia/Pacific Seamless ATM Plan

1.4 The Plan does not use 'continental', 'remote' and 'oceanic' areas to refer to an assumed geographical application area, as many Asia/Pacific States have islands or archipelagos that can support a higher density of Communications, Navigation, Surveillance (CNS) systems than in a purely 'oceanic' environment. In accordance with the CONOPS that air navigation services should be provided commensurate with the capability of the CNS equipment, it is important to categorise airspace in this manner, and simplify the numerous references to this capability throughout the Plan. Thus the Plan categorises airspace by reference to its CNS (Communications, Navigation and Surveillance) capability as:

a) Category R: remote en-route airspace with Air Traffic Services (ATS) HF or CPDLC communications and outside the coverage of ground-based surveillance coverage; or

b) Category S: serviced (or potentially serviced) en-route airspace – by direct (not dependent on a Communication Service Provider (CSP) ATS communications and surveillance; or

c) Category T: terminal operations serviced by direct ATS communications and surveillance.

7.35 The delivery of CNS/ATM services should be based primarily on the CNS/ATM capability. All ATC units should authorize 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:

a) the automation of the ATM system;

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

7.44 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:

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

b) Category S airspace with the agreement of all ANSPs that provide services:
- *where crossing track conflictions 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.*

Instructions: For each FIR administered by your State or Administration, complete the survey below:

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Category R airspace: NM

Category S airspace: NM

Remarks:

Q2: What minimum horizontal separation standard has been authorized by Air Traffic Services Letter of Agreement (ATS LOA) or other instrument on each of your Flight Information Region (FIR) Transfer of Control (TOC) points?

Category S airspace to Category S FIR TOC Points: NM

Category S airspace to Category R FIR TOC (and vice-versa) Points: NM

Category R airspace to Category R FIR TOC Points: NM

Remarks:

Q3: Noting the expectations of the Asia/Pacific Seamless ATM Plan paragraph 7.44 copied below, does your Administration apply a Flight Level Allocation Scheme within its FIR(s)? if so please provide details.

YES/NO

Details/Remarks:

Excerpts from the Asia/Pacific Seamless ATM Plan

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States/Administration	Category R Horizontal Separation	Category S Horizontal Separation	Category R-R TOC	Category R-S TOC	Category S-S TOC	FLAS
Afghanistan	N/A	50 NM	N/A	50 NM	50 NM	YES
Australia	30 NM	5 NM	5 - 50 NM or 10 minutes	30 - 50 NM	5 NM	NO
Bhutan		50 NM	50 NM	50NM	50 NM	
Cambodia	N/A	10 NM	N/A	N/A	10 NM or 10 mins	YES
China	Under Review	Under Review	Under Review	Under Review	Under Review	
Fiji	30 NM RNP 4	20 NM RNP 4	30 NM RNP 4; 50 NM RNP 10	20 - 30 NM	20 NM	NO
French Polynesia	30 NM	10-20 NM	50/100 NM	50/100 NM	100 NM	NO
Hong Kong	10 NM	5 NM	50 NM or 5 mins	16 - 50 NM	16 - 30 NM or 7 mins	YES
India	50 NM	20 NM	50 NM	50 NM	20 NM	YES
Indonesia	10 minutes	10 NM	10 -15 mins	50 NM	20 NM	YES
Lao P D R	10 NM	10 NM	10 - 15 NM	10-15 NM	10-15 NM	YES
Japan	30 NM	5 NM	30 NM	30NM	15 NM	NO
New Zealand	30 NM RNP 4	5 NM	30 NM RNP 4; 50 NM RNP 10	30 - 50 NM	5 NM	NO*
Pakistan	N/A	15 NM	10 mins	15 - 50 NM	50 NM	YES
Papua New Guinea	50 NM	20 NM RNP 4	50 NM	50 NM	50 NM	NO
Philippines	50 NM	10 NM	50 NM	40 - 50 NM	40 NM	YES
Republic of Korea	N/A	5 NM	N/A	17 - 30 NM	17-60 NM	YES
Singapore	50 NM RNAV 10 30 nm RNP 4	5 NM	50 NM or 10 minutes MNT	50 NM	15 - 20 NM 10 mins MNT	YES
Sri Lanka	80 NM on MNT	5 NM CTA 8-10NM TMA	120 NM	80 - 120 NM	30-80 NM	YES
Thailand	N/A	5 NM	20 - 50 NM or 10 mins	40 - 50 NM	10-40 NM	NO
Tonga	N/A	25 NM	20 mins	N/A	N/A	NO
United States	30 NM	5 NM	30 NM	30 NM	5 NM	NO*
Viet Nam	50 NM	30 NM	50 NM	50 NM	30 NM	

*NZ responded regarding the Flight Level Orientation Scheme (FLOS), not a FLAS
*United States responded regarding uni-directional routes using all levels, not a FLAS blocking levels for procedural separation

As at 25 April 2018