International Civil Aviation Organization

Twelfth Meeting of the South China Sea Traffic Flow Review Group (SCSTFRG/12)

Bangkok Thailand, 11 – 12 November 2024

Agenda Item 4: Discussion on PBN Routes Development and FLAS/FLOS Optimisation

REVIEW OF THE EXISTING FLAS/FLOS IN SOUTH CHINA SEA AIRSPACE

(Presented by the Secretariat)

SUMMARY

This paper presents the considerations when reviewing the existing FLAS/FLOS operation and No-PDC FL in various FIRs of the South China Sea area. All Member States are invited to review the data and provide feedback on their current FLAS/FLOS operations to the ICAO Secretariat to improve the capacity, efficiency and safety.

1. INTRODUCTION

1.1 Since the inception of the South China Sea FLAS/FLOS operation in 2002 by the Asia-Pacific RVSM Implementation Task Force and amendment in 2007 by the South China Sea RVSM Scrutiny Group, circumstances have changed a lot over the last 20 years.

1.2 Whilst the traffic flow demand has evolved, particularly the traffic increase on the secondary crossing routes, and the improvement of communication and surveillance coverage within the area; aircraft navigation capabilities; and Air Traffic Management systems, higher capacity and efficiency are expected from the airspace users to maximize the benefits from investment in ANS systems.

1.3 At the SCSTFRG/10 meeting, to facilitate the discussion on the existing FLAS/FLOS to promote the long-term consideration of post-pandemic scenarios, the group agreed to the ***Decision SCSTFRG/10-1: Review of the existing South China Sea Flight Level Allocation Scheme (FLAS) and Flight Level Orientation Scheme (FLOS)***

2. DISCUSSION

Observation of FLAS/FLOS among the ATS Routes

2.1 Through the updated data submitted by South China Sea States prior to the meeting, the ICAO APAC Regional Sub-Office has corrected the data from the previous version of the Chart to provide an overview of the FLAS currently operating in the South China Sea airspace among the major routes, as illustrated in **Chart 1**.

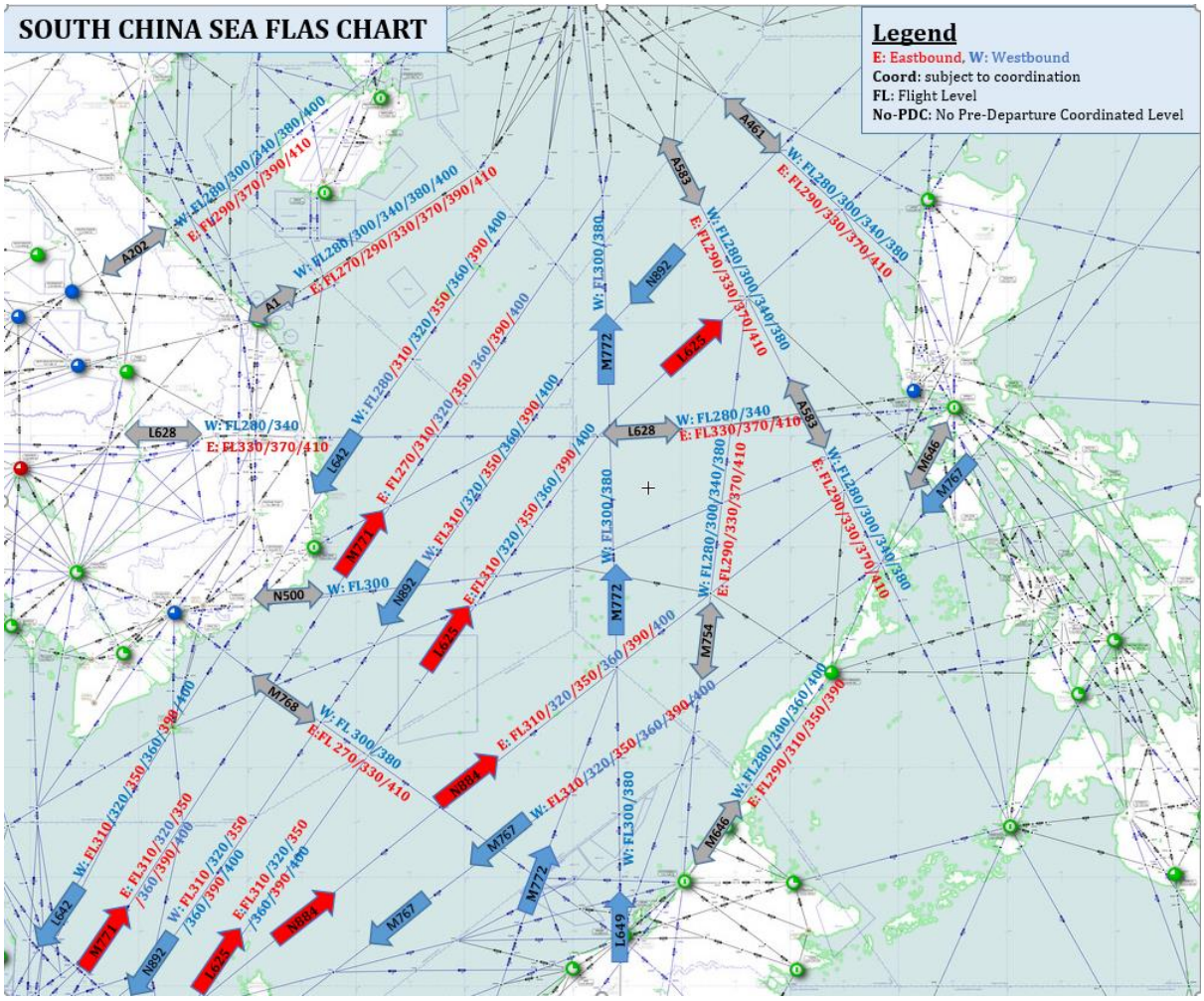

Chart 1: FLAS/FLOS among the ATS Routes

2.2 The SCS airspace structure used a non-standard Flight Level Orientation System (FLOS) and a complex Flight Level Allocation System (FLAS) providing vertical separation between the major routes and the less-busy crossing routes to overcome lengthy pre-departure coordination procedures.

2.3 As shown in the chart, non-standard FLOS is being used on the pairs of the unidirectional parallel routes system under the multilateral agreements of the relevant ACCs to fully utilize the limited usable flight levels ever since the SCS FLAS system was designed.

FLAS/FLOS Expectations in the APAC Seamless ANS Plan

2.4 The objective of Seamless ATM was agreed by the Asia/Pacific Seamless ATM Planning Group/APSAPG) as follows:

> *'The objective of Seamless ATM is the* ***safe and interoperable provision of harmonized and consistent air traffic management service*** *provided to a flight, appropriate to the airspace category and* ***free of transitions due to a change in the air navigation service provider or Flight Information Region****.'*

2.5 All States should use the ICAO Table of Cruising Levels (FLOS) based on feet as contained **in Annex 2 Appendix 3a.** as specified in paragraph 7.15 as Regional Seamless ANS Elements with Priority 2.

2.6 As per ATM performance expectations in the APAC Seamless ANS Plan PASL 7.35 (Priority 2), 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

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

- Where surveillance tract 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.

South China Sea ATS Surveillance and Communication coverage

2.7 According to the current *APAC Seamless ANS Plan version 3.0*, paragraph 6.13 identified the South China Sea lacking ATS surveillance and DCPC VHF coverage which need to be addressed with the highest priority. Recent developments in the CNS area since CNS SG/26 meeting might be of interest to SCSTFRG.

2.8 As of mid-August 2022, 16 states and administrations provided updated coverages, and all plottable data provided has been applied to update coverage maps. Based on the inputs from States/administrations, the South China Sea pictures of ATS surveillance and DCPC VHF coverage are given in Figures 1 and 2, respectively.

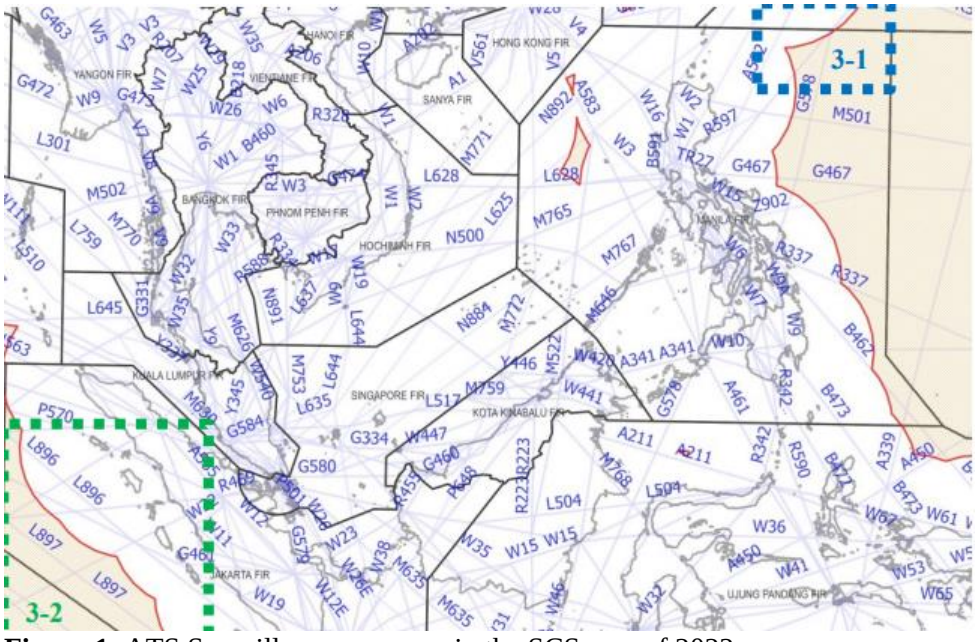

Figure 1: ATS Surveillance coverage in the SCS area of 2022

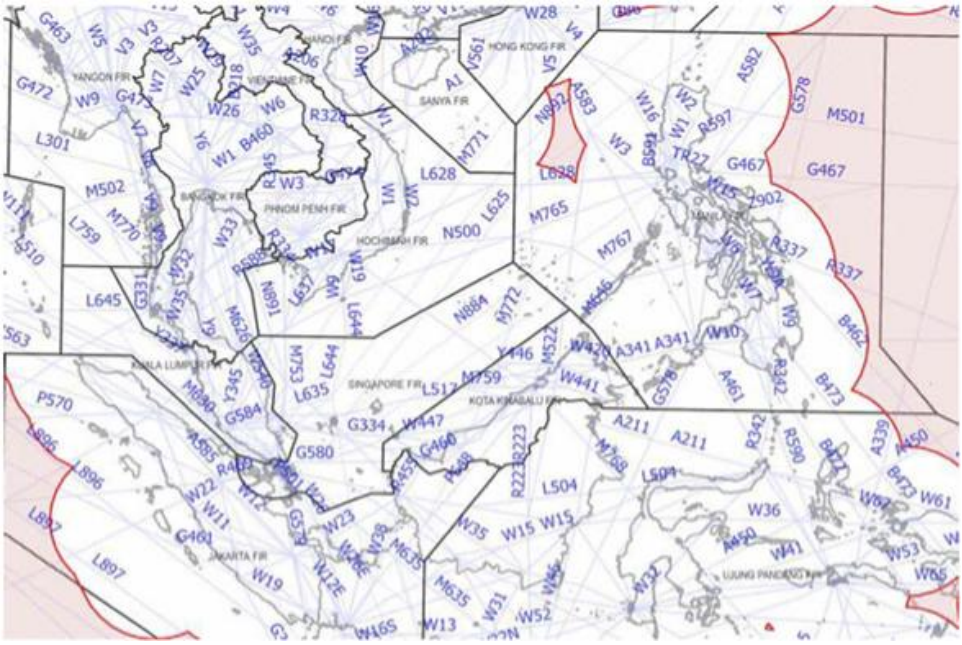

Figure 2: DCPC VHF coverage in the SCS area of 2022
Note: Figure 2 only considers DCPC VHF communications and does not include other forms of DCPC communications.

2.9 According to the figure, with other surveillance and communication enhancements such as ADS-B, ADS-C and CPDLC, it is believed that most of SCS airspace is almost surveillance and communication covered.

Limitations of the use of FLAS

2.10 Discussion on South China Sea FLAS/FLOS has been going on for several years. ACCs have increasingly relied on the FLAS system and have developed a series of risk response plans, such as the Large-Scale Detour Procedure and flexible coordination mechanism. In fact, the current FLAS system has proven to be reliable, however, the following limitations should be taken into consideration:

- As the most economical level may not be assigned to the flights, the desired gain in fuel efficiency and emissions may be lost.
- Frequent flight-level changes are made to accommodate the FLAS requirements across various route segments, which may result in unsafe situations.
- High demands for extra coordination resulting in an increase in the ATCOs' workload, particularly under adverse weather conditions.
- Lack of flexibility: In comparison to the original concept, some of the secondary crossing routes are now busier than the primary routes and it is necessary to make timely adjustments.
- Systemic risks associated with human errors. The likelihood of coordination errors during the ATC-to-ATC transfer of control may increase when transitioning from FLAS operation to the Large-Scale Detour procedure.
- Safety issues caused by the transition from non-standard FLOS to standard FLOS at the TOC points, particularly at the boundary of the SCS area.
- The capability and efficiency of current FLAS might be insufficient to cope with future traffic growth.

2.11 The group also recalled the Principles and Guidelines of the Optimization of SCS FLAS/FLOS. The following aspects should be taken into account when optimising the existing SCS FLAS/FLOS:

- Normalization of the SCS-modified Single Alternative FLOS to the ICAO Standard Single Alternative FLOS as per Annex 2 Appendix 3a;
- Service performance level commensurate with the CNS/ATM system capabilities in accordance with the expectations of the *Asia/Pacific Seamless ANS Plan*;
- Harmonized and consistent service provision of separation and procedures across the SCS area to reduce human errors;
- Removal of FLAS to allow more opportunities for better flight level allocation according to fleet capability;
- Recognition of the gap between current practice and best practice by ANSPs concerned; and
- Airspace users' expectations and needs for improved capacity, efficiency and safety, including economic and environmental considerations.

2.12 In view of the above-mentioned facts, the goal for the SCSTFRG should be the removal of FLAS in the SCS area to meet the *APAC Seamless ANS Plan*'s expectations. This cannot be achieved without a systematic and holistic roadmap supported by all stakeholders.

2.13 However, the SCSTFRG Priority 4 (optimisation of FLAS/FLOS operation) cannot be considered an isolated project; it has significant interconnectivity with the SCSTFRG Priority 1, 2 and 3 (reduction of longitudinal separation on primary routes). Horizontal efficiency and vertical efficiency are highly correlated and relevant to one another.

Roadmap of the SCS FLAS current situation

2.14 Mindful of the above aspects, some thoughts based on IFATCA's original proposal at the SCSTFRG/7, the review of existing FLAS and FLOS operating within the SCS could be conducted in five phases:

- *Phase 1: Revision of FLAS on selected ATS routes*

  Re-allocation of two of the six flight levels on the primary routes M767/N884, L625/N892 (one eastbound and one westbound flight levels) to the secondary crossing routes A461, A583, M758 and M761. The remaining four flight levels on the primary routes would provide adequate capacity under normal circumstances to satisfy the traffic demand. The additional capacity of one flight level in each direction on the secondary crossing routes would relieve some of the delays and restrictions that are currently imposed on traffic.

- *Phase 2: Reduction of longitudinal separation to enhance the horizontal efficiency*

  Reduce longitudinal separation (operationalization of 5-10NM ATC separation, 10-20 NM separation at Transfer of Control Points (TOC)) among ATS routes, especially for primary routes, which occupy the majority of flight level resources as soon as possible. As a result, the capacity of the ATS route will be significantly increased, and such an increase will release the demands of flight level.

- *Phase 3: Release flight level on selected ATS routes to enhance the vertical efficiency*

Release flight levels on selected ATS routes, which are supported by the aforementioned capacity increment. Revision of the FLOS on the primary routes L625/N892 and M767/N884, from the SCS modified single alternate FLOS to the standard FLOS (Annex 2, Appendix 3a) would serve the purpose of removing the need to transition flights at the FIRs boundary and thereby resolve the Large Height Deviation (LHD) safety issues.

- *Phase 4: Reshuffle the FLAS or flexibly use FLAS*

Dynamically and flexibly adjust the FLAS system using scientific methods.

Phase 5: Partial removal of FLAS

Gradually reducing dependence on FLAS systems. Suspended the FLAS operating in normal situations and only activated it in large-scale weather or contingency conditions.

- *Phase 6: Re-structure the SCS Route Network and Removal of FLAS*

Re-structure the South China Sea Airspace using RNAV 2/ RNP 2 – near parallel or parallel routes. Explore the possibility of cross-border FRA (Free Route Airspace) Operation.

3.1 The meeting is invited to:

a) note the information contained in this paper;

b) urge States to review CNS/ATM system capability and match this with service performance, in accordance with the expectations of the Asia/Pacific Seamless ANS Plan;

c) review and provide feedback to the South China Sea FLAS/FLOS Chart; and

d) discuss any relevant matters as appropriate.

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