International Civil Aviation Organization

The Second Meeting of the South Asia, Indian Ocean and Southeast Asia ATM Coordination Group (SAIOSEACG/2)

Bangkok, Thailand, 20 – 24 March 2023

Agenda Item 3: Review of Current Operations and Problem Areas

CONCEPT REVIEW OF SOUTH CHINA SEA AIRSPACE STRUCTURE

(Presented by IFATCA)

SUMMARY

This paper presents a concept for the phased introduction of a number of significant upgrades to the South China Sea airspace through the implementation of established ICAO Standards and Recommended Procedures. The proposed changes will provide benefits to controllers, pilots and aircraft operators. The concept is offered as a basis for further constructive thoughts and positive discussions on a complex subject that must be addressed to comply with the Asia/Pacific Seamless ANS Plan that all States have signed up to.

1. INTRODUCTION

1.1 The current South China Sea (SCS) airspace structure was introduced in 2002 as part of the major airspace revision associated with the implementation of RVSM in the region. It was based on a parallel route network based on RNAV10 principals linking major city pairs [see Fig. 1]:

(a) Hong Kong - Singapore (L642 and M771)
(b) Seoul - Singapore (L625 and N892) also serving Taipei
(c) Tokyo - Singapore (A582/M767 and N884) also serving Manila

1.2 The 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.

1.3 20 years ago this was a good solution to the previous chaotic airspace and procedures in this area and it was welcomed by the airline operators, pilots and controllers alike. In those 20 years many things changed, new airlines flying new routes, airline operating characteristics centred on economics and the environment, and up to 2019 an ever increasing traffic count. However there has been minimal change to the SCS airspace structure or the ATC procedures. In 2014 the South China Sea Major Traffic Flow Review Group (SCSMTFRG) was created at SEACG/21 to address the FLOS/FLAS and airspace safety issues.

1.4 This Group acknowledged the complexity of the issues and at an Airspace Concept Workshop a number of primary tasks were identified:

1. to enhance the longitudinal spacing on A1/A202 and develop a parallel route to A1(W);
2. to increase capacity on L642 and M771, and consider the development of further

parallel routes;

3. to improve the longitudinal spacing on A461/A583/L625/N892.

Later a fourth item was added:

4. to review of existing South FLAS/FLOS operating within the South China Sea (SCS) area.

1.5 Due to the complexity of the airspace structure and the number of ANSPs involved in the discussions, progress was slow, but with lengthy negotiations and the upgrading of some ATM system in the region, the first three primary tasks have either been completed or are at a satisfactory stage of coordination to resolve the remaining issues.

1.6 The Secretariat therefore requested all States/Administrations to address the fourth item - the existing FLAS/FLOS in SCS airspace. The meeting noted the interconnectivity of the airspace structure and the FLAS/FLOS system and agreed on a phased approach to the task, noting that any solution would require the collective efforts of all stakeholders.

2. DISCUSSION

Flight Level Orientation System (FLOS)

2.1 After some consideration of the fourth item by an IFATCA group, it was apparent that any change to the FLAS/FLOS procedures of the current route structure in one area could have a 'ripple' effect throughout the whole SCS area and involve extensive coordination between a number of parties. Alternatively, a 'clean sheet' approach with a complete revision to the SCS route structure and FLAS/FLOS procedures would be a very complex and time consuming task which would be outside the remit of the Group.

2.2 Therefore this concept paper looks at a phased approach for a review of the FLOS, the SCS route structure and the FLAS for one set of parallel routes at a time. The proposed phases are:

(a) Phase 1 Tokyo - Singapore, also serving Manila
(b) Phase 2 Seoul - Singapore, also serving Taipei
(c) Phase 3 Hong Kong - Singapore

2.3 This paper provides details of Phase 1 and outline proposals of the other two Phases. The review is limited to SCS airspace, but coordination with Japan and Taipei will be required to gain the full benefits of the revised routes. It is hoped that Japan will be able to accommodate the proposed revised routing in their major airspace restructuring progamme which is part of the JCAB CARATS project due for implementation in 2025. [See Fig.2]

Phase 1 Tokyo-Singapore

2.4 In 2022 routes A582/M767 and N884 within the SCS area were upgraded from RNAV10 to RNP4 standards with a consequent reduction in longitudinal separation,. but there was no review of the route structure and the current 60NM+ lateral spacing between the RNP4 routes remains.

2.5 The Phase 1 proposal is the replacement of the two current RNP4 routes (A583/M767 and N884) by parallel RNP2 routes aligned with a direct track from BISIG at the Fukuoka/ Manila FIR boundary to LUSMO in the Singapore TMA. The parallel RNP2 routes will be contained within the Manila and Singapore FIRs and spaced 20NM apart even though they are fully surveilled and have direct ANS communication coverage.

2.6 The current SCS non-standard FLOS will be replaced with the Annex 2 standard FLOS, but in order to retain the infrastructure of the crossing routes, initially a FLAS with a limited number of standard flight levels will be applicable to the RNP2 routes. This will result in a reduction from six to three in the number of flight levels available on the new routes, but route capacity will be maintained by the reduction in longitudinal separation provided by RNP2 procedures.

2.7 With the implementation of an Annex 2 standard FLOS on the RNP2 routes, the requirement for Manila ACC and Kobe ACC (Fukuoka in 2025) to transition flights between the SCS non-Standard FLOS and the ICAO standard FLOS will be removed. This transition activity has long been recognised as a potential hazard by the ICAO RASMAG group as it increases controller workload and the use of the non-Standard FLOS is contrary to the ICAO Asia/Pacific Seamless ANS Plan.

2.8 Currently there is the SCS Large Scale Weather Deviation (LSWD) procedure which has to be implemented on the parallel routes when pilots report significant turbulence. The LSWD requires 2000' vertical separation to be applied which halves the number of available flight levels, with consequent delays and the imposition of ATFM measures at departure points. With the reversion to Standard FLOS levels, 2000' vertical separation will always be applied between traffic on the same route, therefore LSWD procedures will not be required on the RNP2 routes and any track deviations due to convective activity will be managed on a tactical basis.

Phase 2 Seoul – Singapore

2.9 The airspace structure within the Taipei FIR is very complex and with numerous military restricted areas organizing new routes within their airspace is very difficult. Therefore at this time the parallel route structure to the north of the SCS is not addressed.

2.10 The Phase 2 proposal is the replacement of the two current RNP4 routes (L625 and N892) by parallel RNP2 routes spaced 20NM apart within the Manila, HoChiMinh and Singapore FIRs. The northern extremity of the RNP2 routes is between KABAM and POTIB at the Taipei/Manila FIR boundary with the direct track terminating close to MABLI within the Singapore TMA.

2.11 Similar to the Phase 1 proposal, the current SCS non-standard FLOS will be replaced with the Annex 2 standard FLOS, but a FLAS limited to three flight levels will be applicable to the RNP2 routes. This will remove the requirement for Taipei ACC and Manila ACC to transition flights to or from the current SCS non-Standard to the ICAO standard FLOS. The route capacity will be maintained by the reduction in longitudinal separation provided by RNP2 procedures. The LSWD procedures can also be withdrawn from these RNP2 routes and any track deviations can be managed on a tactical basis.

Phase 3 Hong Kong - Singapore

2.12 The Hong Kong-Singapore route is consistently the busiest of the three major traffic flows in SCS airspace and it is the only one which is contained within SCS airspace, therefore there is no requirement for a FLOS transition for flights between the respective airports.

2.13 The Phase 3 proposal is the replacement of the two current RNP4 routes (L642 and M771) by parallel RNP2 routes spaced 20NM apart within the Hong Kong, Sanya, Ho Chi Minh and Singapore FIRs. The northern extremity of the RNP2 routes will be close to EPDOS at the Hong Kong TMA boundary with the direct track terminating close to DOLOX within the Singapore TMA.

2.14 To maintain a uniform FLOS in SCS airspace, the current non-standard FLOS will be replaced with the Annex 2 standard FLOS with the FLAS limited to three flight levels on the RNP2 routes. The reduction in the number of flight levels will be offset by the introduction of surveillance managed 10NM longitudinal separation on these RNP2 routes to maintain capacity. LSWD procedures

can be withdrawn from these RNP2 routes and any track deviations can be managed on a tactical basis.

Flight Level Allocation System (FLAS)

2.15 A review of the FLAS requires a significant change to current ATC control procedures and practices. The FLAS is a safe procedure, but it is an inefficient use of airspace that generates unnecessary delay for aircraft operators and less than optimum flight levels for pilots. At ATM SG/9 meeting in 2021, ICAO stated that FLAS in airspace with surveillance and VHF communication coverage should not be necessary and does not meet the expectations of the Asia Pacific Seamless ANS Plan.

2.16 The removal of FLAS and adoption of traffic management based on strategic planning and tactical control using modern conflict detection tools will increase capacity on both the parallel routes and crossing routes.

2.17 It is proposed that the removal of the FLAS is conducted once the phased revision of the FLOS has been completed and controllers have gained experience of handling traffic with the new procedures. However, the ANSPs will have to ensure that the necessary systems and equipment are made available in good time to provide controllers with the appropriate tools to manage traffic in a dynamic scenario.

3. Conclusions

3.1 This concept paper has been prepared as a draft outline for the first step in a phased reversion of SCS airspace to the provisions of Annex 2 and the APAC Seamless ANS Plan. This could be the last opportunity to address the issue before there is the inevitable resurgence in traffic throughout the region and a return to the holding, ground delays and work overload of 2019. These proposals can be implemented by the States adopting established ICAO procedures and practices to provide a safe and effective ANS service with the following benefits:

a) for controllers
- withdrawal of the non-standard FLOS relieves the workload of transitioning flights at the TOC points;
- provision of direct communication and full surveillance on the new PBN routes provides greater flexibility in the application of enhanced separation minima and allocation of requested flight levels, thus relieving controller workload.

b) for operators:
- reduced track miles resulting in less environmental emissions;
- allocation of optimum cruising levels with consequent reduced fuel burn.

4. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper; and

b) discuss any relevant matters as appropriate.

Fig.1 2002 South China Sea Three Primary Parallel RNAV 10 Routes

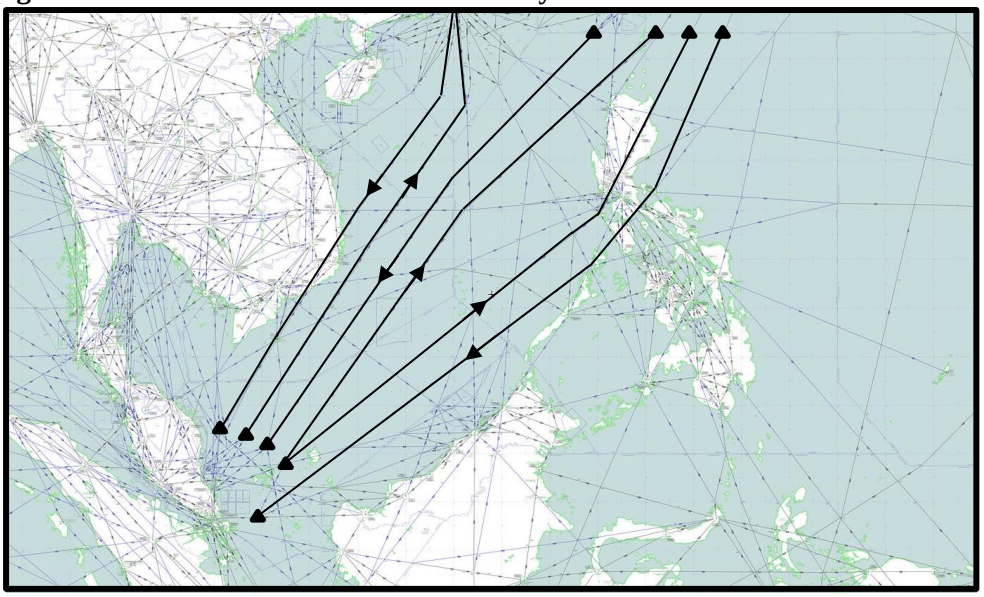

Fig.2 2030 Concept of South China Sea Three Parallel RNP2 Routes