International Civil Aviation Organization

Eleventh Meeting of the Air Traffic Management Sub-Group (ATM/SG/11) of APANPIRG

Singapore, 2 – 6 October 2023

Agenda Item 5: ATM Systems (Modernization, Seamless ATM, CNS, ATFM)

PROGRESSION OF FREE ROUTE OPERATIONS (FRTO) IN ASIA PACIFIC (APAC) AND SINGAPORE'S EFFORTS IN PROGRESSING FRTO

(Presented by Singapore)

SUMMARY

This paper presents the application of Free Route Operations (FRTO) concept to bring about flight efficiency benefits and a choice of preferred routes by airspace users as an initial step towards Trajectory-based Operations (TBO). Within Free Route Airspace (FRA), airspace users can fly as close as possible to the optimal trajectory without reference to a fixed ATS route network structure, potentially increasing capacity and contribute to aviation sustainability.

1. INTRODUCTION

1.1 The Global Air Traffic Management Operational Concept (Doc 9854) describes the inter-relationship of seven ATM operational concept components and the exchange and management of information. These components converge to form a single system, eventually enabling Trajectory-based Operations (TBO) which is a future concept that allows 4-dimensional trajectory (4DT) management for aircraft gate-to-gate optimization. TBO aims to optimize the use of airspace by providing airspace users with flexible trajectories through ability for the flight deck and Air Navigation Service Providers (ANSPs) to participate in the trajectory negotiation, sharing of information and collaborative decision making (CDM), advanced and automated grounds systems, and common data standards communication.

1.2 To achieve the objective of flexible trajectories, it is critical to consider the development of Free Route Operations (FRTO) to be one of the key elements in the ICAO Aviation System Block Upgrades (ASBU). The building blocks within FRTO describes the systemic changes from one which is limited by the rigidity of en-route trajectories, constrained by fixed ATS route network, to becoming an eco-system which caters for flexibility by allowing airlines to freely plan their trajectories.

1.3 With the applicability date for Flight and Flow Information for a Collaborative Environment (FF-ICE) Release 1 services in 2024, and the expected timeframe for the regional implementation of System Wide Information Management (SWIM) in 2030 set by the APAC SWIM Taskforce, it is timely for States/Administrations in APAC to consider the implementation of FRTO to reap the benefits of the future ATM digitalization and transformation.

2. DISCUSSION

Background

2.1 Taking reference from the EUROCONTROL (ECTL) Free Route Airspace (FRA) concept, FRA has been identified as a way of improving the aviation sector's efficiency, capacity and environmental problems. By allowing operational flexibility for airspace users to plan their flight for more direct and optimized routes, it paves the way for further enhancements to airspace design and ATM operational concepts whilst enabling closer civil-military cooperation through the flexible use of airspace.

2.2 Various forms of flight efficiency initiatives using a mix of Direct Routing Operations (DRO) and User-Preferred Routes (UPR) have been introduced in various regions, such as in Central America, South America, the Caribbean and in APAC. Within APAC, several examples of DRO and UPR are available in States/Administrations like Australia, Indonesia, New Zealand, and Singapore. Flex tracks, a form of UPR typically found in oceanic airspaces, enables airspace users to take advantage of the most optimal route, taking into consideration possible restrictions in the airspaces and forecasted winds.

2.3 When comparing the progress of FRTO implementation, the European region is surging ahead, supported by the European Route Network Improvement Plan (ERNIP) which defines how development and harmonization of airspaces will be achieved. While APAC had also commenced FRTO initiatives, States/Administrations in the APAC region should focus on the Block 0 (B0) of the FRTO element within their Flight Information Region (FIR) to make further progress. After this step, it is equally important to consider cross-border expansion of the FRTO initiatives to reap the maximum benefits and pave the way for future ATM concepts.

Priorities listed by the APAC Seamless ANS Plan

2.4 As highlighted by the APAC Seamless ANS Plan (The Plan), ATM modernization and initiatives are crucial to cope with the increase in traffic volume and complexity. The Plan lists out priorities in terms of operational improvements to promoting seamless ANS, with FRTO B0/1-4 being listed as 'Priority 1'. This means that having direct routing, flexibility in the use of airspace, preferred routes and basic conflict detection and monitoring tools could bring about the most benefits to the region.

Singapore's Efforts to Implement DRO in Singapore FIR

2.5 During the COVID-19 pandemic in 2020, Singapore conducted trials aimed to assist airspace users in reducing operating costs by reducing fuel burn. Taking advantage of the reduced traffic volume, Singapore initiated DRO operational trial for arriving aircraft into Singapore Changi Airport on two ATS routes L642 and N892 within Singapore FIR. In collaboration with Singapore Airlines, the two-year operational trial was conducted safely between 2020 and 2022, which yielded approximately 925,000kg of fuel savings. Following the successful operational trial, Singapore operationalized DRO in September 2022 and extended the option of flight planning using direct routes to all arriving aircraft into Singapore Changi Airport.

2.6 Subsequently in April 2023, the DRO implementation was expanded to include overflights transiting through Singapore FIR. Through a progressive and stepped-up approach, the DRO initiative was implemented in a safe manner, with buy-in from both air traffic controllers and airspace users.

2.7 Singapore has also reached out to adjacent ANSPs to share our efforts to implement DRO and exchange ideas to explore cross-border DRO and UPR. Taking the first step as a region to promote

more seamless ANS provision as set out by the APAC Seamless ANS Plan, such discussions were useful to broaden the scope of FRTO initiatives and seed the interest for cross-border collaboration.

Conclusion

2.8 Through active collaboration and participation by States/Administrations in developing FRTO, the APAC region can take steps to fulfil the ICAO vision of TBO and harmonize air travel between regions by improving the safety and efficiency of air traffic management. As the implementation of FRTO increases in the APAC region, States/Administration can then consider cross-border collaboration to greatly increase the benefits to aviation stakeholders and contribute to the ICAO sustainability goal of net-zero carbon emissions by 2050.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper;

b) consider the benefits of implementing FRTO to improve flight efficiency and as a lead-up towards realizing the future concept of TBO; and

c) discuss (as appropriate) on cross-border FRTO collaboration between States/Administrations to extend benefits across FIRs.

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