International Civil Aviation Organization

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

CROSS-BORDER DIRECT ROUTING OPERATIONS (DRO) BETWEEN INDONESIA AND SINGAPORE

(Presented by Indonesia and Singapore)

SUMMARY

This paper presents the collaborative efforts between Indonesia and Singapore to implement cross-border Direct Routing Operations (DRO) based on the Free Route Operations (FRTO) concept. The aim is to enhance flight efficiency and provide airspace users with the option to select preferred routes, serving as an initial step towards Trajectory-Based Operations (TBO).

1. INTRODUCTION

1.1 The Global Air Traffic Management Operational Concept (Doc 9854) delineates the inter-relationship of seven ATM operational concept components, and the exchange and management of information. These components converge to enable Trajectory-based Operations (TBO), a concept to allow 4-dimensional trajectory (4DT) management for aircraft to optimize operations gate-to-gate. TBO aims to provide flexible trajectories for airspace users through participation in trajectory negotiation, collaborative decision making (CDM), advanced and automated ground systems, and common data standards communication between stakeholders.

1.2 To achieve flexible trajectories, the development of Free Route Operations (FRTO) is crucial as a key element in the ICAO Aviation System Block Upgrades (ASBU). The building blocks within FRTO describe the shift from rigid en-route trajectories constrained by fixed ATS route networks to enable airspace users 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 November 2024 and the expected timeframe for the regional implementation of System Wide Information Management (SWIM) in 2030, as set by the ICAO Asia/Pacific (APAC) SWIM Taskforce, it is timely for States/Administrations in APAC region to consider the implementation of FRTO to harness the benefits of future ATM digitalization and transformation.

2. DISCUSSION

Implementation of UPR within Jakarta and Ujung Pandang FIRs

2.1 During the COVID-19 pandemic, the air traffic had experienced a significant downturn, with domestic, international, and overflying traffic plummeted to 90% of the normal volume. Indonesia

had discussions with IATA in early 2020, to carry out User Preferred Route (UPR) trial operation, which is new and had not been implemented in Indonesia before. As the air traffic level was significantly low, the UPR was to act as a stimulus for air traffic growth in the region. UPR trials were strategically phased to allow ATCOs to adapt a more complex operation and for airspace users to optimally utilize UPR procedures and rules.

2.2 Indonesia adopted a phased approach to conducting UPR trials over3 years between 8 June 2020 to 5 October 2023. The details of the UPR trial phases are as follow:

a) Phase 1

User	: International overflying only
Levels	: FL350-FL600
Entry and Exit	: Published waypoint only
Intermediary point	: Published waypoint (include navaids & ATS Route)
Proposal submission	: Not earlier than 12 hours but not later than 6 hours before EOBT;
Usage	: Qatar Airways (QTR) 2 flight

The evaluation of the initial phase was held on 8 September 2020 involving IATA. It was found that the flight that used UPR was only from one airline. The discussion reached the result that the airline's condition during the pandemic and the entry and exit points that did not meet the airline's preference due to weather or wind conditions were the points that needed to be considered for the next UPR trial. Besides that, the proposal submission procedures for FPL that were not earlier than 12 hours but not later than 6 hours before EOBT needed to be shortened.

b) Phase 2

User	: International overflying only
Levels	: FL350-FL600
Entry and Exit	: Published waypoint only
Intermediary point	: Published waypoint (include navaids & ATS Route) Designated waypoint (latitude/longitude)
Proposal submission	: At least 3 hours before EOBT Responded by AirNav within 2 hours after submission

The second evaluation was held on 11 November 2022 and showed a significant number of traffic that used UPR. Furthermore, the entry and exit points using designated point with latitude and longitude was still the preference needed by the airlines. To continue the trial to fulfill the users' needs, the third phase of the UPR Trial Operation began on May 2022 and was published by AIP Supplement.

c) Phase 3

User	: International flight & overflying only
Levels	: FL310-FL600
Entry and Exit	: Published waypoint Designated point (latitude/longitude)
Intermediary point	: Published waypoint (include navaids & ATS Route) Designated point (latitude/longitude)
Proposal submission	: At least 3 hours before EOBT Responded by AirNav within 2 hours after submission
Usage	: Eva Air (EVA) regularly 68 flights Hongkong Express (3 Months trial)

The third evaluation was held on 9 June 2023 and showed a bigger number of traffic used UPR than traffic recorded second evaluation. The entry and exit points using designated points with latitude and longitude were still the preference needed by the airlines.

d) Phase 4

User	: International flight & overflying only
Levels	: FL310-FL600
Entry and Exit	: Published waypoint Designated point (latitude/longitude)
Intermediary point	: Published waypoint (include navaids & ATS Route) Designated point (latitude/longitude)
Proposal submission	: Filled FPL before EOBT Responded by AirNav ASAP after submission
Usage	: Eva Air (EVA) regularly 68 flights Hongkong Express (3 Months trial)

2.3 After 3 years of experience in carrying out UPR trials, Indonesia proceeded to implement UPR on 5 October 2023 in Jakarta FIR and Ujung Pandang FIR, with details as follow:

User	: International flight & overflying
Levels	: FL310-FL600
Entry and Exit	: Published waypoint Designated point (latitude/longitude)
Intermediary point	: Published waypoint (include navaids & ATS Route) Designated point (latitude/longitude)

2.4 Through feedback from airline operators and IATA, the following benefits of UPR for the airline operators are as follow:

a) **Reduced airline operational operator cost and flight times**: UPRs enable more direct and efficient routes, minimizing unnecessary detours. This leads to shorter flight durations, benefiting both airlines and passengers.

b) **Increased Passenger and Cargo Weight Capacities**: By flying more efficient routes, airlines can carry additional payload (passengers or cargo) while still meeting safety and regulatory requirements.

c) **Reduced Fuel Burn and Carbon Emissions**: UPRs allow each aircraft to follow a unique flight path instead of predefined routes set by air traffic control (ATC). By optimizing routes based on factors like aircraft type, weather, and operating time, UPRs can significantly reduce fuel consumption and emissions. **The total reduction of CO2 emissions based in a total of 1,268 flights that had used UPR from 2020 to 2023 was about 4,427 tons.**

d) **Better customer service:** UPR can provide a better flight experience for passengers by reducing flight time, improving on-time performance, and decreasing travel costs.

Implementation of DRO within Singapore FIR

2.5 During the COVID-19 pandemic, Singapore similarly conducted trials aimed at assisting airspace users in reducing operating costs by minimizing fuel burn. Taking advantage of reduced traffic volume, Singapore initiated DRO operational trials 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, resulting in 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 for all flights using L642 and N892 into Singapore Changi Airport.

2.6 In April 2023, the DRO implementation was expanded to include overflights transiting through Singapore FIR. The initiative was progressively and safely implemented, with support from air traffic controllers and airspace users. The DRO implementation has resulted in an estimated fuel savings of approximately 2,500,000kg (as of May 2024).

2.7 Singapore has also engaged adjacent ANSPs to share its effort 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 interest for cross-border collaboration.

Cross-Border Direct Routing Operations (DRO) between Indonesia and Singapore

2.8 With the initiatives of both Indonesia's UPR and Singapore's DRO, both collaborated on cross-border DRO on ATS route G579, from waypoint PARDI direct to waypoint PU. An operational trial took place from 21 March to 4 September 2024, revealing a 30% utilization rate of the cross-border DRO. Subsequently, both States will enhance engagement with operators and airspace users to promote the use of cross-border DRO.

2.9 Following the trial, this cross-border DRO between Indonesia and Singapore was jointly implemented on 5 September 2024, 0000UTC. With this successful joint implementation, both States will explore further collaboration and expansion of other cross-border DRO opportunities.

Expanding the Collaboration

2.10 The joint implementation of cross-border DRO between Indonesia and Singapore sets the stage for further exploration and expansion of similar opportunities. Apart from bilateral collaboration, there's also opportunity for wider multilateral collaboration such as the Southeast Asia-Oceania Implementation of FRTO project, an initiative under the Asia/Pacific ANSP Committee (AAC), which both Indonesia and Singapore are a member of. These developments showcase a significant stride in bolstering collaborative air traffic management in the region.

2.11 Furthermore, active collaboration and participation by States/Administrations in developing FRTO can propel the APAC region towards fulfilling the ICAO vision of Trajectory-based Operations (TBO) and harmonizing air travel within and between regions. This can be achieved by enhancing the safety and efficiency of air traffic management. As the implementation of FRTO gains traction in the APAC region, States/Administrations can consider cross-border collaboration to maximize benefits for aviation stakeholders and contribute to the ICAO sustainability goal of achieving 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 boundaries.

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