58th CONFERENCE OF DIRECTORS GENERAL OF CIVIL AVIATION ASIA AND PACIFIC REGIONS

Dhaka, Bangladesh
15 to 19 October 2023

AGENDA ITEM 7: AVIATION AND ENVIRONMENT

AIR NAVIGATION SERVICE TO SUPPORT THE REDUCTION OF CARBON EMISSION IN AVIATION

(Presented by Indonesia)

SUMMARY

This Paper presents the measures and programs of Indonesia air navigation service that support the reduction of carbon emission in aviation. It covers the establishment of Performance Based Navigation (PBN) based ATS routes, the implementation of User Preferred Route (UPR), and other air navigation technologies that support the reduction of carbon emission.

AIR NAVIGATION SERVICE TO SUPPORT THE REDUCTION OF CARBON EMISSION IN AVIATION

1. INTRODUCTION

1.1 Aviation has become an integral part of modern society, enabling efficient transportation across vast distances. However, the rapid growth of the aviation industry has raised concerns about its significant contribution to greenhouse gas emissions, particularly carbon dioxide (CO2).

1.2 In response to mounting environmental concerns, regulatory bodies and industry stakeholders have collaborated to implement innovative measures to mitigate the ecological footprint of aviation. Among these measures, Indonesia has enacted a ministerial regulation number KM 8 Year 2023 on the establishment of climate change mitigation actions in the transportation sector to achieve the national set contribution targets.

1.3 In order to achieve the national target on the carbon emission on aviation, improvements in aviation navigation services have emerged as one of the crucial aspects of the solution. One of the primary approaches taken in reducing carbon emissions in aviation is optimizing flight routes and efficiency. Implementation of PBN enable ANSP to chart more direct ATS routes, avoiding unnecessary detours and reducing fuel consumption. These technologies utilize satellite-based positioning, allowing aircraft to navigate more accurately, reducing the need for excessive fuel usage.

1.4 Efforts to reduce carbon emissions also extend to air traffic management. Collaborative initiatives between air traffic control authorities and airlines have facilitated the implementation of dynamic airspace management and collaborative decision-making processes. Through the application of UPR, air traffic controllers and pilots can collaborate to create more streamlined flight trajectories that minimize fuel burn and associated greenhouse gas emissions.

2. DISCUSSION

PBN Implementation in Indonesia

2.1 PBN is a navigation concept that leverages satellite-based technology and advanced onboard avionics to define accurate and predictable flight paths. Unlike traditional ground-based navigation aids, PBN allows for more flexible and efficient routing, leading to significant benefits in terms of reduced fuel consumption and greenhouse gas emissions.

2.2 One of the key achievements in Indonesia’s PBN implementation is the acceleration of the PBN development for enroute, terminal, and approach.

2.3 For enroute, Indonesia has established PBN ATS routes that connect the most of the major cities and islands throughout Indonesia.

2.4 For terminal and approach segment, Indonesia has implemented PBN SID/STAR and PBN IAP on most of major and international airports. Currently, almost all of the international airports (93.75%) have implemented PBN RNP APCH.

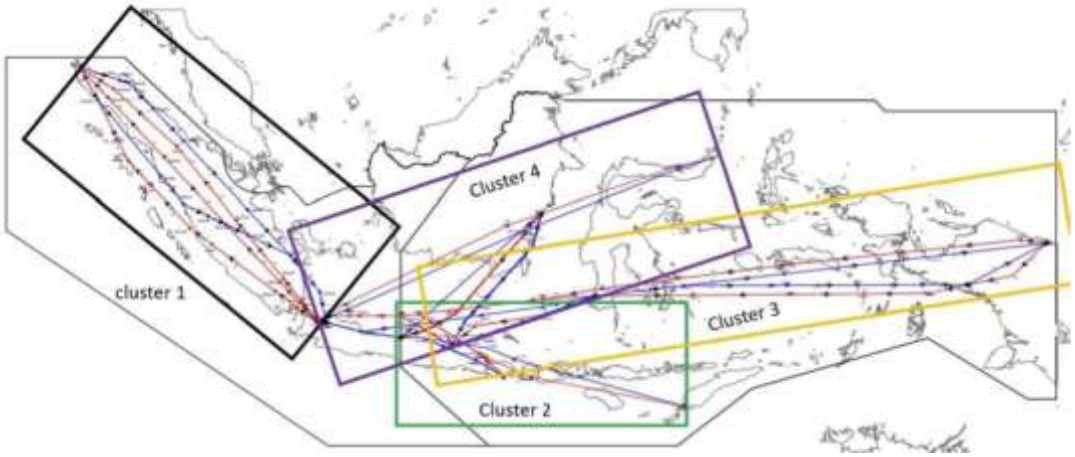

Figure 1: PBN Enroute Domestic

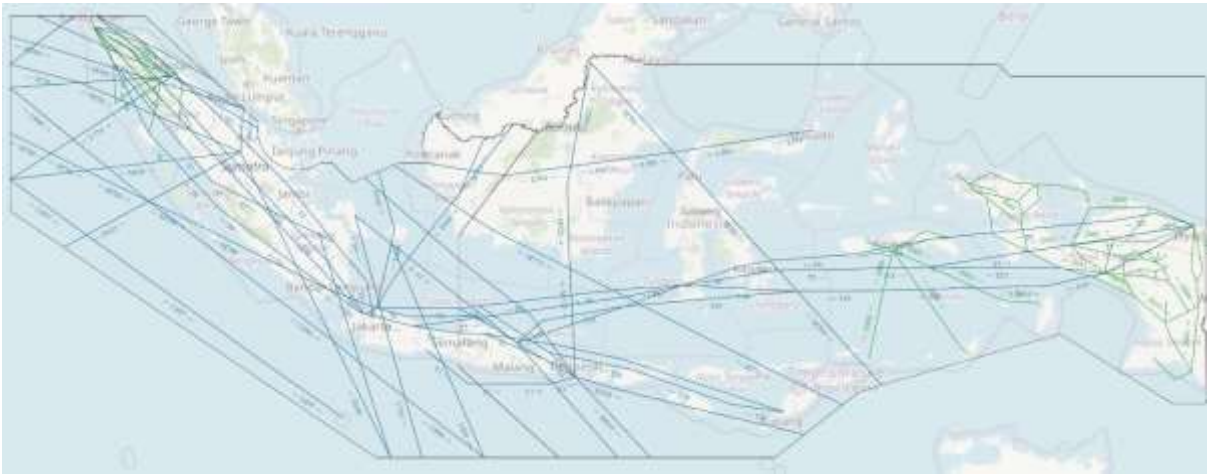

Figure 2: PBN ATS Routes International and Domestic

2.5 The implementation of PBN has supported the reduction of carbon emission in aviation. One of the example is the PBN ATS Route RNAV 2 connecting Jakarta - Surabaya - Bali - Makassar that has shorten the distance by 10 NM compare to the conventional routes. This leads to saving approximately 3 minutes of flying time and fuel reduction approximately 160 kg/flight.

UPR Implementation in Indonesia

2.6 UPR is a concept based on Free Route Airspace (FRTO), which grants aircraft the flexibility to create flight plans using waypoints instead of being restricted to predefined published ATS routes. By optimizing flight paths according to efficiency criteria, UPR can contribute significantly to reducing carbon emissions.

2.7 In the pursuit of fuel efficiency and carbon emission reduction, UPR prioritizes the most efficient route rather than the shortest distance. Factors such as weather conditions, wind direction and speed, air temperature, and aircraft performance play crucial roles in determining the optimal trajectory.

2.8 Since June 2020, Indonesia has been conducting a trial implementation of UPR in the Jakarta and Ujung Pandang FIRs. The trial has aimed to assess the feasibility and benefits of UPR in the Indonesian airspace. Preliminary findings indicate substantial reductions in carbon emissions, demonstrating the potential of UPR in achieving sustainability goals.

2.9 The trial implementation of UPR has proven effective in reducing carbon emissions, with a significant estimated reduction of 94.5 tons in 2022. These results underscore the importance of adopting UPR on a broader scale to further enhance the environmental sustainability of aviation in Indonesia.

2.10 Currently, Indonesia is in the final phase of the trial UPR implementation. At this phase of the trial period, applied conditions are as follows:

PARAMETER	PROCEDURES
Users	International flight
Level	F310 – F600
Entry and Exit	▪ Published Waypoint ▪ Designated point (latitude/longitude)
Intermediary point	▪ Published Waypoint (including navaid & ATS Route) ▪ Designated point (latitude/longitude)
Proposal submission procedures	No time restriction
Usage	7 (25 Jan – 24 Feb 2023)

2.11 The evaluation was held on 9 June 2023, and it was revealed that:

1. The international Hajj flights from Makassar, Balikpapan, Surabaya, and Jakarta has contributed to the significant growth of UPR flights over Indonesia airspace.

2. There are some difficulties experienced by some airlines regarding the input of the latitude/longitude of the intermediary points in item 15 FPL (unless the intermediary point is a published waypoint).

3. Most of the UPR flights proposed their intended level at around FL 340 and above.

4. Following the pandemic, the traffic is recovering. Both UPR and non-UPR flights are safely handled, and the ATSs have been more experienced as well as having more confidence.

2.12 Following the evaluation results, DGCA Indonesia and AirNav Indonesia agreed to process to full UPR implementation. The current publication of the last trial phase will be incorporated in the amendment of AIP ENR 1.8 (will be published on 24 August 2023 and effective date 5 October 2023). The full implementation of UPR is planned to be arranged as follows:

PARAMETER	PROCEDURES
Users	International flight
Level	F330 – F600
Entry and Exit	▪ Published Waypoint ▪ Designated point (latitude/longitude)
Intermediary point	▪ Published Waypoint (including navaid & ATS Route) ▪ Designated point (latitude/longitude) (do not oblige to input on item 15)
Proposal submission procedures	▪ At least 3 hours before EOBT ▪ Responded by AirNav within 2 hours after submission
Usage	To be informed at the next occasion

2.13 Indonesia commits to continue the target of UPR implementation will be in line with the airspace user's expectation. The evaluation will be carried out periodically.

3. ACTION BY THE CONFERENCE

3.1 The Conference is invited to:

a) Note the information contained in this Paper;

b) urge states/administration to consider improve the implementation of Performance Based Navigation (PBN) and the implementation of User Preferred Route (UPR) and other air navigation technologies that support the reduction of carbon emission; and

c) discuss any relevant matters as appropriate.

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