



International Civil Aviation Organization

INFORMATION PAPER

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FOURTEENTH AIR NAVIGATION CONFERENCE

Montréal, Canada, 26 August to 6 September 2024

- Agenda Item 1: Update on the ICAO 2023-2025 Business Plan and long-term strategic planning**
1.1: Reprioritization of the ICAO 2023-2025 Business Plan

IMPLEMENTATION OF REQUIRED NAVIGATION PERFORMANCE AUTHORIZATION REQUIRED (RNP AR) PROCEDURES IN MALAYSIA

(Presented by Malaysia)

EXECUTIVE SUMMARY

This paper presents the implementation status of Required Navigation Performance Authorization Required (RNP AR) procedure at airports within the Kuala Lumpur (KL) and Kota Kinabalu (KK) Flight Information Regions (FIRs). The use of RNP AR procedures has shown significant improvements in airline operations, including enhanced on-time performance, reduced fuel consumption, increased efficiency, and decreased carbon emissions. Additionally, recent stakeholder engagements have led to further advancements in the adoption of performance-based navigation (PBN) approaches.

1. INTRODUCTION

1.1 The RNP AR approach, or the Required Navigation Performance Authorization Required Approach, is an advanced performance-based navigation (PBN) technology that allows pilots to use onboard Global Positioning System (GPS) technology to follow precise tracks independent of ground aids beacon. This design shortens the distance an aircraft has to fly en-route and reduces fuel burn, exhaust emissions, and noise pollution in communities near airports. For air traffic control (ATC), it assists in reducing congestion and flight delays.

1.2 In view of its operational benefits, since 2013, Malaysia has progressively published and implemented RNP AR procedures at 15 airports across Malaysia. The location of each airport and track miles savings utilizing the RNP AR procedure as opposed to the conventional standard instrument arrival (STAR) is described in Figure 1 and Table 1, respectively.

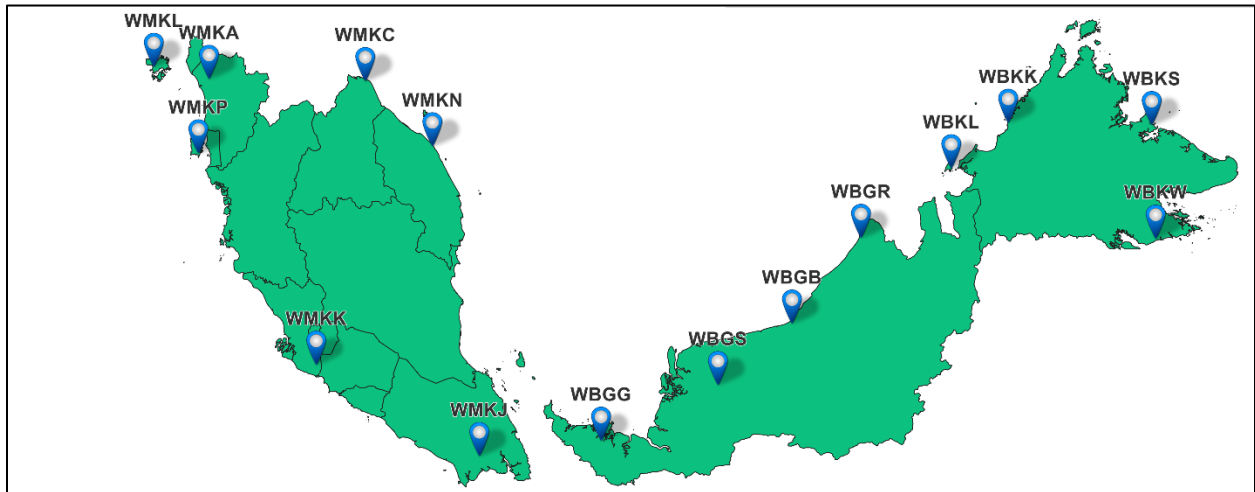


Figure 1. Location of airport with RNP-AR procedure

1.3 Currently, existing precision procedures using instrument landing systems (ILS) remain the primary means of instrument flight procedures, and the PBN/RNP AR approaches are utilized “on an opportunity basis” when there is a request by the pilot.

2. OPERATIONAL BENEFITS

2.1 The implementation of RNP AR procedures has led to significant operational benefits for airline operators and service provider such as:

- a) **Enhanced Safety**
Provides precise lateral and vertical guidance, reducing the risk of navigational errors.
- b) **Operational Efficiency**
Shortens flight paths, reducing fuel consumption and flight times.
- c) **Environmental Benefits**
Lowers fuel burn and emissions, contributing to reduced environmental impact.
- d) **Noise Reduction**
Minimizes pollution in communities near airports.
- e) **Reduced Congestion**
Improves air traffic management, leading to fewer delays and less congestion in busy airspaces.
- f) **Carbon Emission Reduction**
Decreased fuel consumption results in lower carbon emissions, helping airlines meet sustainability goals.

2.2 These benefits contribute to overall improvements in airline operations and environmental sustainability.

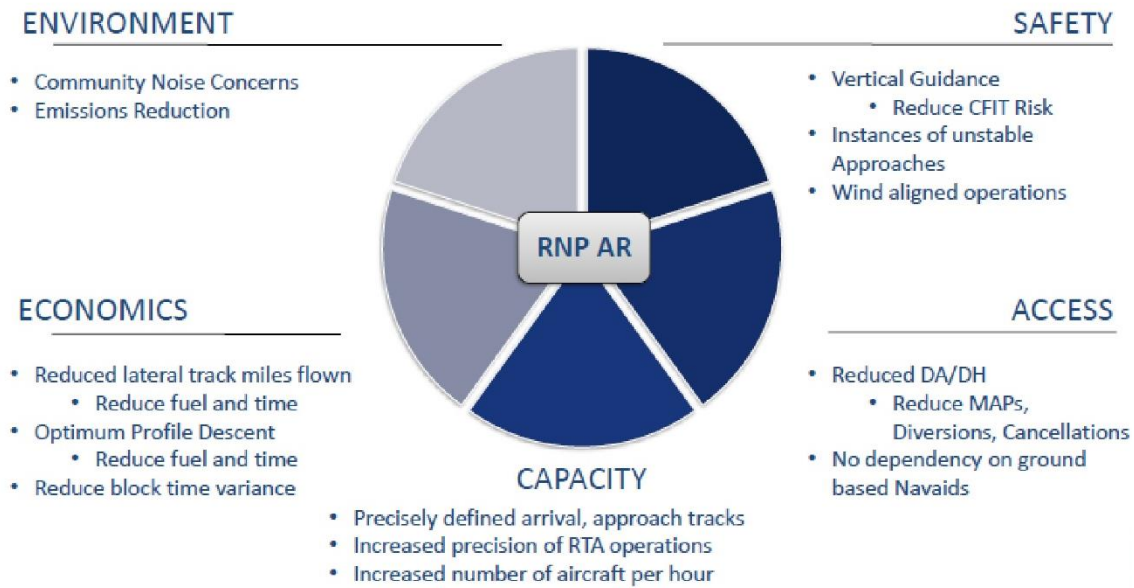


Figure 2.

3. IMPLEMENTATION STATUS

3.1 Collaborative efforts with air operators have been crucial in achieving ICAO Aviation System Block Upgrades (ASBUs) under PBN implementation and continuous descent operations (CDO), resulting in reduced fuel consumption, increased efficiencies, reduced noise and decreased carbon emissions.

3.2 AirAsia, Malaysia's largest low-cost carrier, led the initiative by engaging a third-party designer, General Electric (GE), to design and undertake all implementation processes to start RNP AR in selected airports within KL and KK FIRs. Under the terms of the agreement, GE designed, deployed, validated, and maintained a network of precise RNP procedures to utilize the performance characteristics of AirAsia's Airbus 320 (A320) fleet. Malaysia Airlines also certified their fleet and crew to perform the RNP instrument flight procedure (IFP) by 2015.

3.3 In a recent engagement session with stakeholders on April 29-30, 2024, the Civil Aviation Authority of Malaysia (CAAM) and other stakeholders agreed to adopt the PBN approaches as the default arrival procedure at all airports in Malaysia, excluding Kuala Lumpur International Airport (KLIA). This decision was based on data indicating that all local airlines operating at these airports are PBN compliant.

3.4 Based on CAAM's assessment, the other airports potentially included in this planning are Penang, Langkawi, Kota Bharu, Johor Bahru, Kuching, Kota Kinabalu, Sibul, and Tawau. This is due to the availability of approach surveillance services to support the implementation.

3.5 CAAM will provide awareness training to the ATC and believes this implementation can commence no later than October 2024.

4. TRACK MILES AND FUEL SAVINGS

4.1 The implementation of RNP AR procedures has shown significant savings in track miles and fuel consumption across various airports. Table 1 below provides details of these savings.

Table 1.

NO.	AIRPORT	STAR ENTRY	STAR DISTANCE (NM)	RNP AR DISTANCE (NM)	DIFFERENCE (NM)	SAVINGS IN FUEL (USD)
1	WMKA	PAYAR	58.3	55.5	-2.8	584.48
2	WMKC	RUPOS	50.6	47.6	-3.0	626.22
3	WMKJ	TOPOR	29.5	24.9	-4.6	960.20
4	WMKL	KAPKO	32.9	28.8	-4.1	855.84
5	WMKN	GUNBO	36.9	35.7	-1.2	250.48
6	WMKP	PAYAR	58.3	55.5	-2.8	584.48
7	WBGB	ADGAB	43.5	29.0	-14.5	3026.74
8	WBGG	ESBAL	78.4	61.1	-17.3	3611.20
9	WBGR	GODOM	47.7	13.9	-33.8	7055.42
10	WBGS	TAMIG	42.9	34.8	-8.1	1690.78
11	WBKK	SABNU	29.3	20.5	-8.8	1836.92
12	WBKL	KAPLA	28.9	13.4	-15.5	3235.48
13	WBKS	TOMEN	28.0	24.6	-3.4	709.72
14	WBKW	DUDOL	30.6	19.3	-11.3	2358.76
15	WMKK	KK887	46.2	26.1	-20.1	4469.65

4.2 As of now, 26 RNP AR procedures have been implemented in Malaysia, with an additional two new RNP AR procedures being developed for KLIA's Runway 32R and Runway 33. This implementation is anticipated to significantly increase capacity and efficiency, providing additional advantages to airline operators while adhering to environmental preservation by reducing carbon emissions.

4.3 The graphics provided below, illustrate the fuel savings and tracked miles by airlines operating into Senai International Airport (WMKJ) located in KL FIR and Kuching International Airport (WBGG) which is located in KK FIR.

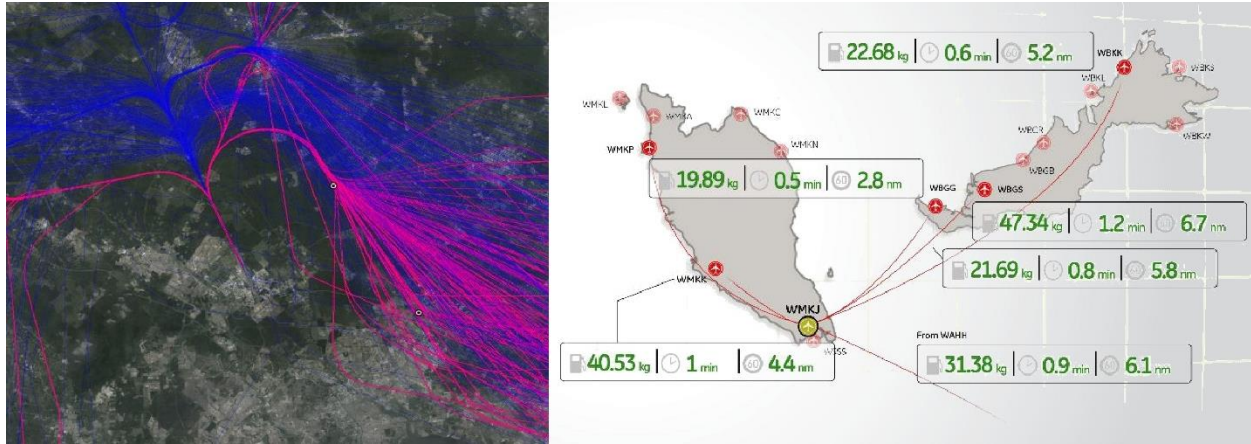


Figure 3. WMKJ fuel and track miles saving

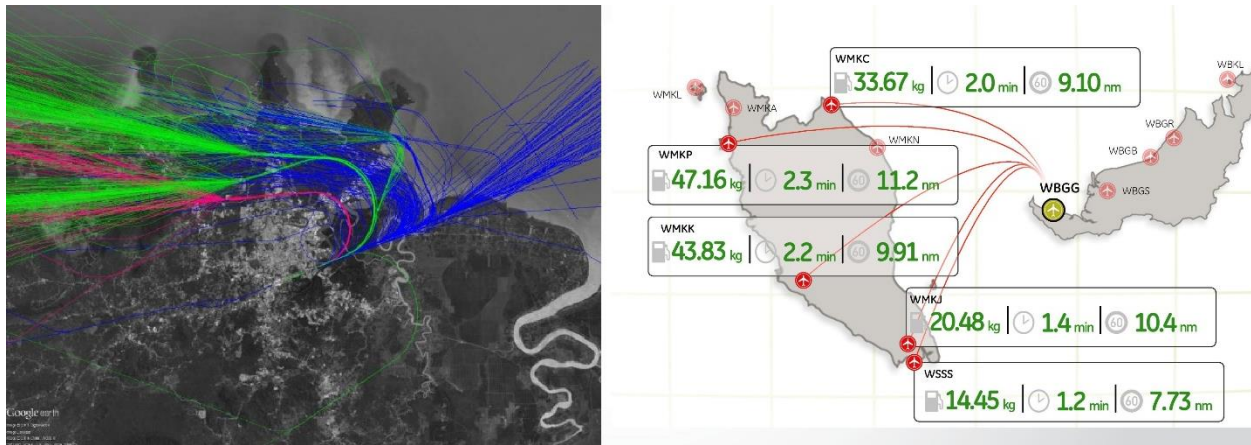


Figure 4. WBGG fuel and track miles saving

4.4 RNP AR procedures have seen an upward trend for airports within Malaysia, with an expected use exceeding 28 000 by 2025. Table 2 below provides the number of aircraft utilising the RNP AR procedure between 2017 and 2019, which shows that in 2019, it almost achieved the target already. Furthermore, with this implementation, the fuel savings were at least US\$ 2 032 216.

Table 2.

Year	Aircraft Utilizing RNP AR Procedures
2017	4277
2018	11319
2019	26074

5. **CONCLUSION**

5.1 The meeting is invited to:

- a) note the information contained in this document;
- b) note that fuel savings between 2017 and 2019 amount to US\$ 2 032 216, which provides an advantage to airline operators and could lead to more attractive airfares for consumers;
- c) urge States/administration to consider deploying the RNP AR procedure, especially at airports surrounded by challenging terrain, limited navigation infrastructure, and airspace constraints, to ensure safer operations, increased capacity at airports and airspace, and improved efficiency in overall operations; and
- d) discuss any relevant matters, as appropriate.

— END —