

**57th CONFERENCE OF
DIRECTORS GENERAL OF CIVIL AVIATION
ASIA AND PACIFIC REGIONS**

*Incheon, Republic of Korea
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AGENDA ITEM 4: AIR NAVIGATION

**IMPLEMENTATION OF REQUIRED NAVIGATION
PERFORMANCE AUTHORIZATION REQUIRED (RNP AR)
PROCEDURES**

Presented by Malaysia

SUMMARY

This paper presents the implementation status of Required Navigation Performance Authorization Required (RNP AR) procedure at airports within the Kuala Lumpur and Kota Kinabalu Flight Information Regions (FIRs). The use of RNP AR procedure has shown significant improvement to the operations of airline operators, in terms of improved on-time performance, reduced fuel consumption, improved efficiency and the reduction of carbon emission into the environment

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

1. INTRODUCTION

1.1 RNP AR procedure is an advanced form of Performance-based Navigation (PBN) technology which enables a higher level of navigation performance suited for (but not limited to) approaches in challenging areas (e.g. mountainous areas) and as a replacement for most existing circling approaches, this commensurate with the advancement in Air Traffic Management (ATM).

1.2 RNP AR procedure also provides significant operational and safety advantages over other Area Navigation (RNAV) procedures by incorporating additional navigational accuracy, integrity and functional capabilities to permit operations using reduced obstacle clearance tolerances that enable approach and departure procedures to be implemented in circumstances where other types of approach and departure procedures are not operationally possible or satisfactory.

1.3 In view of its operational benefits, since 2013, Malaysia had progressively published and implemented RNP AR procedure at 14 airports across Malaysia. The location of each airport and track miles savings utilizing the RNP AR procedure as opposed to the conventional Standard Arrival Route (STAR), is described in Figure 1 and Table 1 respectively.

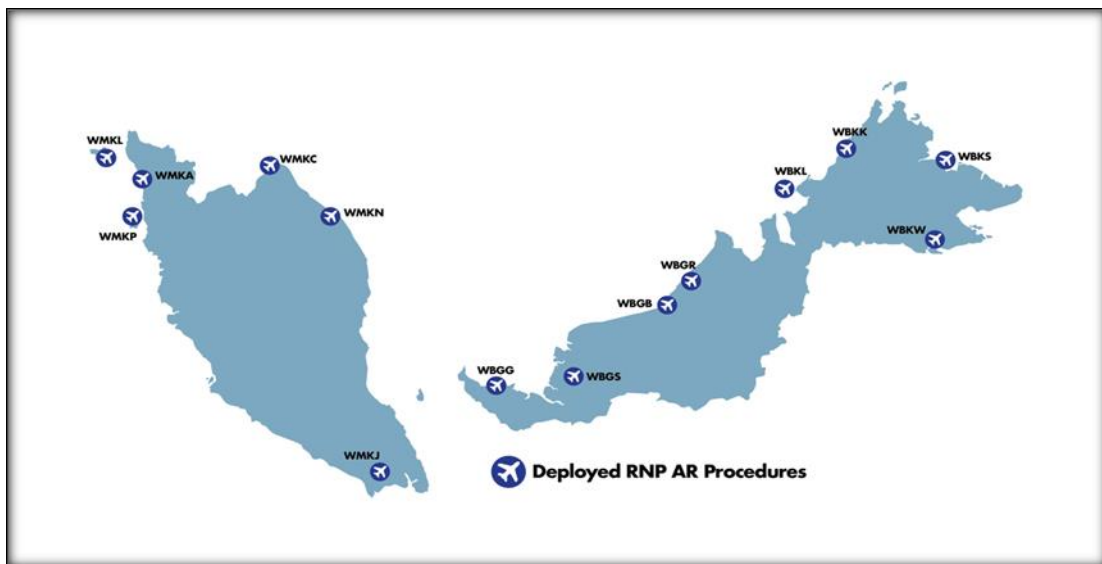


Figure 1: Location of Airports with RNP AR Procedure

No.	Airport	STAR Entry	STAR Distance (NM)	RNP AR Distance (NM)	Difference (NM)	Savings in Fuel (USD) (20 approaches/airport)
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	3,026.74
8.	WBGG	ESBAL	78.4	61.1	-17.3	3,611.20
9.	WBGR	GODOM	47.7	13.9	-33.8	7,055.42
10.	WBGs	TAMIG	42.9	34.8	-8.1	1,690.78
11.	WBKK	SABNU	29.3	20.5	-8.8	1,836.92
12.	WBKL	KAPLA	28.9	13.4	-15.5	3,235.48
13.	WBKS	TOMEN	28.0	24.6	-3.4	709.72
14.	WBKW	DUDOL	30.6	19.3	-11.3	2,358.76

Table 1: Track Miles Savings

* Fuel savings numbers are in USD and based on current fuel price ending 31st March 2022.

* Fuel savings calculation are based on 20 approaches per day.

* Successful RNP AR implementation requires investment in approach design, aircraft equipment and crew training.

2. DISCUSSION

2.1 26 RNP AR procedures have been implemented in Malaysia, and currently, an additional 2 new RNP AR procedures are being developed for Kuala Lumpur International Airport (KLIA)'s Runway 32R and Runway 33, this is expected to be implemented during the final quarter of 2022. As KLIA is the main hub for airline operators in Malaysia, the implementation of the RNP AR procedure at this airport is expected to significantly increase the capacity and efficiency, as well as provide additional advantages to airline operators, and at the same time adhering to preservation of the environment by means of reduced carbon emissions.

2.2 Based on available data, the use of RNP AR procedures has seen an upward trend (prior to the COVID-19 pandemic) for airports within Malaysia. It is anticipated that by 2023, the use of the RNP AR procedures in Malaysia is expected to exceed 28,000. **Table 2** below provides the number of aircraft which utilized the RNP AR procedure between 2017 – 2019.

	2017	2018	2019
Total	4,277	11,319	26,074

Table 2: Aircraft utilizing the RNP AR Procedures for the years 2017 – 2019

2.3 **Figure 2** illustrates the amount of time and fuel saved, including reduced carbon emissions, which had been successfully achieved, with the implementation of RNP AR procedures at airports within Malaysia for the years 2018 – 2021.

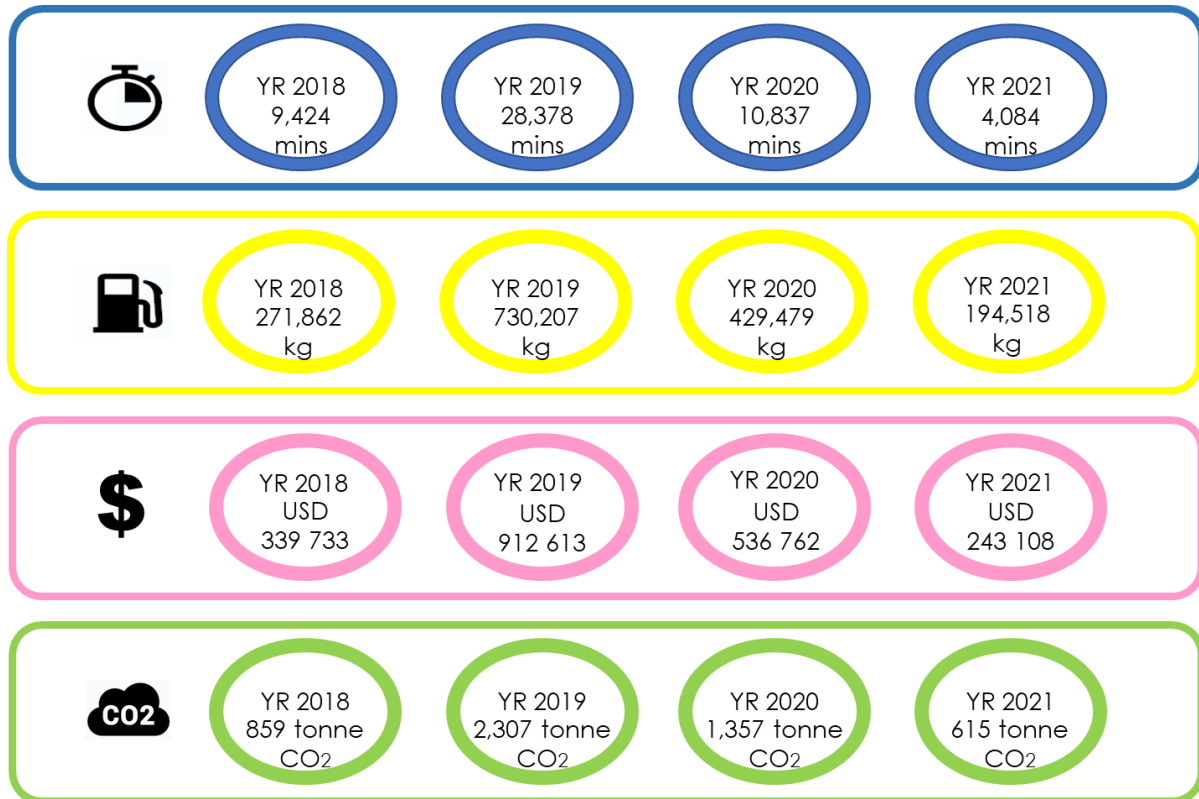


Figure 2: RNP AR Operational Benefits to Airline Operators

Note: The reduction in the figures for the years 2020 and 2021 was due to the worldwide COVID-19 pandemic which resulted in reduced number of flights.

3. ACTION BY THE CONFERENCE

3.1 The Conference is invited to:

- a) Note the information contained in this paper;
- b) Note the fuel savings between 2018 and 2021 amounting USD 2,032,216 which gives an advantage to airline operators that can lead to more attractive air fares being offered to consumers;
- c) Urge States/Administration to consider implementing 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.