International Civil Aviation Organization

Thirteenth Meeting of Performance Based Navigation Implementation Coordination Group (PBNICG/13)

(Bangkok, Thailand, 14-16 October 2026)

Agenda Item 3: States' PBN Implementation Progress and challenges/lessons learnt

IMPLEMENTATION OF ESTABLISHED ON RNP AR (EOR) OPERATIONS AT HONG KONG INTERNATIONAL AIRPORT

(Presented by Hong Kong China)

SUMMARY

The Hong Kong International Airport (HKIA) operates within a highly constrained terminal environment characterized by limited maneuvering airspace, complex interactions with traffic from adjacent aerodromes and sustained high traffic density. Following the commissioning of the Three-runway System (3RS) in November 2024 and the introduction of Independent Parallel Departures, HKIA has planned to advance to the next stage, implementing Established on RNP AR (EoR) operations to enable Independent Parallel Approaches (IPA). This initiative is a crucial step for streamlining arrival flows and maximizing runway capacity.

This paper presents the operational context, procedure design and validation, safety risk assessments, and operational trial for EoR operations at HKIA.

1. INTRODUCTION

1.1 The commissioning of the Three-runway System in November 2024 marked a major milestone in the evolution of HKIA. Since then, HKIA has operated under a runway modality of ADM, that is Arrivals on North runway, Departures on Centre runway, and Mixed mode on South runway, with Independent Parallel Departures first introduced between the Centre and South Runways. Building on this foundation, further enhancing the airport capacity and efficiency remains a core priority to accommodate forecasted air traffic growth. The implementation of Independent Parallel Approach (IPA) is a critical enabler for progressively unlocking the full capacity of HKIA.

1.2 Given the airspace constraints to the north and west of the airport, the implementation of Established on RNP AR (EoR) operations has been identified as a practical solution to support simultaneous arrivals on parallel runways at HKIA. This is achieved through the application of new ATC separation standards that leverage advanced aircraft navigation capabilities, the stringent performance and eligibility requirements of high-precision RNP AR procedures.

2. DISCUSSION

Operational Context

2.1 HKIA is an international aviation hub located in one of the world's most congested airport clusters, with five major airports situated within 100 kilometres (km) radius. The airport is surrounded by mountainous terrain to the northeast and south and lies in close proximity to Macau International Airport approximately 20 nautical miles (NM) to the southwest and Shenzhen Bao'an International Airport approximately 19 NM to the north. The conventional separation standards required for dual-ILS independent parallel approaches necessitate extended final approach segments and are therefore not feasible for the airport's eastbound operations due to the airspace constraints.

Procedure Design

2.2 To implement IPA under EoR concepts of operations while addressing adjacent northern airspace restrictions, tailored instrument approach procedure pairs have been developed where both arrival streams are routed from the same southern side of the aerodrome:

- North Runway (07L / 25R): Straight-in ILS or RNP APCH procedures;
- South Runway (07R / 25L): Curved RNP AR APCH procedures incorporating Radius-to-Fix (RF) legs.

2.3 The newly designed RNP X RWY 07R (AR) procedure fully utilises the available airspace by incorporating a curved approach profile comprising four consecutive RF turns that skirt the hilly terrain of Lantau Island before aligning with the extended runway centreline of the South Runway shortly prior to touchdown, thereby avoiding penetration into the constrained airspace to the west while supporting IPA operations.

2.4 For the westbound EoR operations, the RNP Y RWY 25L (AR) procedure delivers environmental benefits by guiding arriving aircraft along precision tracks over water. Bypassing residential districts, this maritime flight path minimises urban noise exposure and facilitates Continuous Descent Operations (CDO), yielding immediate reduction in aircraft carbon emissions and fuel consumption.

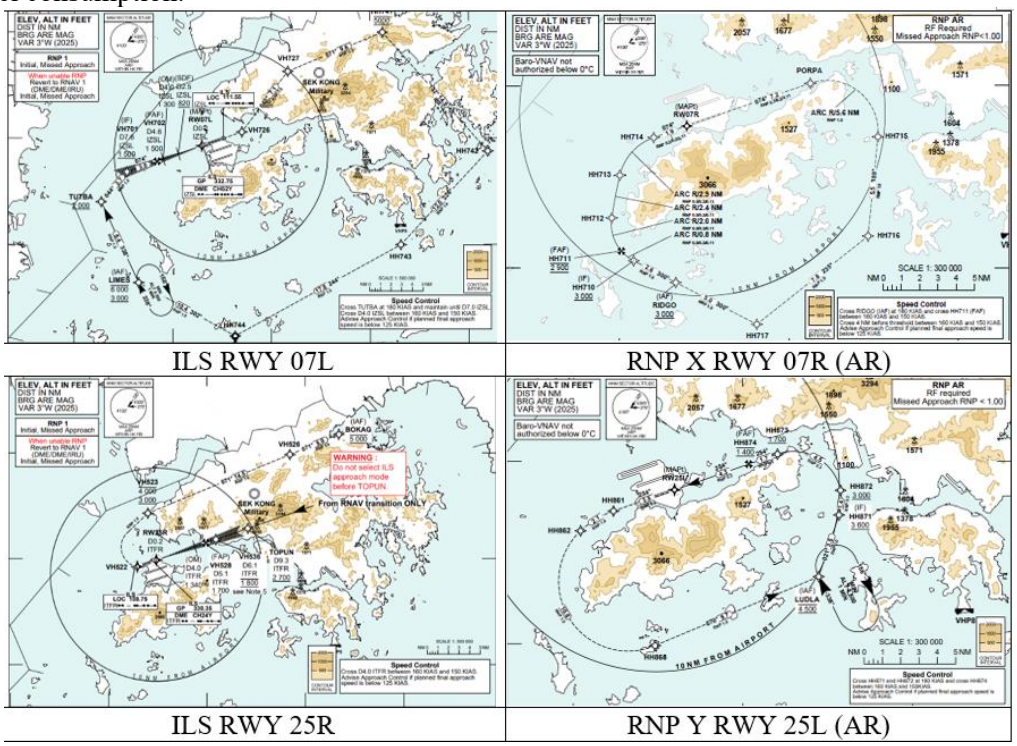


Figure 1. Approach procedures for HKIA EoR operations

The Break-out Procedures

2.5 The centreline spacing between the North and South Runways is 3,185 metres, more than double the minimum separation specified in ICAO Doc 9643. Leveraging the advantages of this physical configuration, an aeronautical study on breakout procedures assessed and established an expanded 1,300m Non-Transgression Zone (NTZ) between parallel extended runway centrelines. This enlarged NTZ provides air traffic controllers with increased reaction time to detect and resolve in the event of an unexpected approach deviations, thereby strengthening safety margins during simultaneous parallel operations. The study concluded that the breakout procedures, supported by timely air traffic control intervention, met the Target Level of Safety and were determined to be acceptably safe for operational use.

Procedure Validation and Safety Risk Assessments

2.6 The validation of the newly designed RNP X RWY 07R procedures and its associated connecting STAR was successfully completed in early 2026, following by flight simulator evaluation and flight validation conducted by the Flight Inspection Center (FIC) of Civil Aviation Administration of China (CAAC).

2.7 A multi-disciplinary safety risk assessment workshop was convened in March 2026 with satisfactory results. The workshop brought together representatives across regulatory, operational, training, safety and technical domains, including air traffic controllers, local aircraft operators, flight operations inspectors, ANSP regulators, subject matter experts from ATC systems and airport operator, to review the proposed ATC and pilot procedures, align implementation timelines, and collectively assess safety considerations and validate operational risk mitigations.

Operational Trial

2.8 ATC simulator training has been completed. The new flight procedures and associated operational procedures have been published in AIP Amendment 12/26 in October 2026 with an effective date of 26 November 2026. The operational trial of the RNP AR procedures for EoR operations will initially be limited to local operators with assigned parking stands near the South Runway during designated hours. Full details will be promulgated in an AIP SUP scheduled for publication in late October 2026.

2.9 The operational trial aims at providing valuable opportunity for both air traffic controllers and pilots to gain practical experience of and be conversant with the new flight procedures. Feedback collected during the trial will be used to refine operational procedures prior to full implementation.

Operational Dependencies and Safeguards

2.10 The operational efficiency gains and arrival capacity enhancement enabled by EoR operations are fundamentally shaped by fleet equipage readiness and prevailing weather conditions. Promoting RNP AR equipage is essential to fully realise these benefits, while robust ATFM measures are vital to safeguard performance and maintain operational resiliency during adverse weather.

2.11 Incentivizing RNP AR equipage does not only unlock throughput but also delivers tangible operational advantages to participating carriers. By assigning RNP AR-authorized flights to land on South Runway which is closer to the main terminal stands, aircraft could be benefited from significantly shortened taxi times, reducing ground congestion and fuel burn comparing with landing on the North runway. This alignment of operational efficiency with environmental performance presents a business case for airlines to invest in RNP AR capability, ultimately maximising the potential benefits of EoR implementation.

3. ACTION REQUIRED BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper; and
b) discuss any relevant matters as appropriate.