



INTERNATIONAL CIVIL AVIATION ORGANIZATION

**TWENTY-SECOND MEETING OF THE
ASIA/PACIFIC AIR NAVIGATION PLANNING AND
IMPLEMENTATION REGIONAL GROUP (APANPIRG/22)**

Bangkok, Thailand, 5-9 September 2011

Agenda Item 3: Performance Framework for Regional Air Navigation Planning and Implementation

3.4: CNS/MET

RNP AR APCH AND PBN IMPLEMENTATION STATUS

(Presented by Nepal)

SUMMARY

Nepal prepared its National PBN Implementation Plan in 2010 in line with ICAO 36th Assembly Resolution. As per the review report of ICAO APAC Regional Office, the Plan was updated and sent to ICAO Regional Office for further review. Further, Nepal issued an AIC to provide information for airspace users concerning the introduction of PBN operations in Nepalese Airspace. Nepal is in the way of implementing RNP AR APCH at Tribhuvan International Airport by the end of December 2011.

1. INTRODUCTION

As per the Resolution A36/23 of ICAO Assembly in its 36th Session held in September 2007 that all the Contracting States should have a PBN Implementation Plan in place by 2009 to ensure a globally harmonized and coordinated transition to PBN by 2016, Nepal developed its National PBN Implementation Plan in 2010 in accordance with the Asia/Pacific Regional PBN Implementation Plan.

After getting ICAO APAC Review Report, the plan was updated in April 2011 and sent to ICAO Regional Office for further review.

Further, in 1 August 2011, Nepal issued an AIC to provide information for airspace users concerning the introduction of PBN operations in Nepalese Airspace and the requirements for its use by operators. As a move further ahead, Nepal is in the way of implementing RNP AR APCH by the end of December 2011.

2. PBN IMPLEMENTATION STATUS IN NEPAL

Despite the mountainous terrain thereby limiting the efficient use of Nepalese airspace, air traffic growth has increased continuously in Nepal. As PBN being the core element for broad airspace concept developed in aviation industry and as ICAO focuses on its use, Nepal is also obliged to adopt this concept into aviation operations.

By introducing PBN System and GNSS technology, CAAN wants to facilitate more efficient use of airspace, reducing the limitations of conventional system and more flexibility for procedure design which cooperatively result in improved safety, capability, predictability, operational efficiency, fuel economy and environmental aspects.

Some of the initiatives towards PBN implementation are as follows:

- a) RNAV 10 (RNP 10) route L626 Kathmandu-Delhi has been implemented from November 19, 2009;
- b) National PBN Committee including the representatives from the operators has been formed and PBN focal Point has been designated;
- c) Some of the routes have been redefined by waypoints instead of VOR/NDB;
- d) Conceptual procedure design and data survey for RNP-AR APCH at Tribhuvan International Airport has been completed with the support of Airbus' Quovadis and the final design will be produced by the end of December 2011;
- e) 1 August 2011, Nepal issued an AIC to provide information for airspace users concerning the introduction of PBN operations in Nepalese Airspace and the requirements for its use by operators; and
- f) CAAN will further introduce other PBN operations (RNAV/GNSS) into its airspace in phase-wise manner as per the National PBN Implementation Plan.

3. NATIONAL PBN IMPLEMENTATION PLAN

As per the PBN Plan, Nepal is implementing the PBN activities in three phases:

1. Short Term (2010—2012)

En-route: Nepal intends to extend its existing L626 (RNP10) route in consultation with neighbours and wants to establish new RNAV5 route for its domestic operations.

Terminal: Basic RNP1 SIDs, STARs will be developed within Kathmandu TMA and in some major domestic airports of Nepal by 2012.

Approach: GNSS based approach procedures will be introduced at TIA and some major domestic airports and RNP AR APCH at TIA will be established and start test operation by December 2011.

2. Medium Term (2013-2016)

En-route: An extension of L626 or new route will be proposed from Kathmandu to Kunming (China) via Bagdogra-Guwahati-Imphal, India in order to materialize the proposed Himalayan Route.

Terminal: RNP1 or RNAV1 STARs/ SIDs will be introduced in other major airports.

Approach: RNP Approach with BARO-VNAV will be introduced in selective instrument runways, RNP AR APCH will be continued for full-fledged operation at TIA and RNP Approach will be introduced at all other major airports by 2016.

3. Long Term (2017-2025)

En-route: RNAV 5 routes will be fully introduced in the whole Nepalese FIR.

Terminal: RNP1 or RNAV1 STARs/SIDs will be fully implemented in all major airports.

Approach: RNP AR Approach will be introduced at other major airports on need basis.

4. ISSUANCE OF AIC TO IMPLEMENT PBN OPERATION INTO NEPALESE AIRSPACE

The purpose of this AIC is to provide information and guidelines concerning the introduction of Performance-based navigation (PBN) operations in Nepalese Airspace.

The information provided by this AIC applies to all users of the procedures in the Terminal (SIDs and STARs), Approach and En-route operations based on PBN specifications in Kathmandu FIR (VNSM).

The AIC specifies the PBN Operational Requirements to operate flights along ATS routes, on instrument approach procedure, or in a designated airspace where a navigation specification (as specified in AIP Nepal) has been prescribed.

For navigation within Kathmandu FIR aircraft may use appropriately FAA or EASA TSO certified GNSS Sensor(s) – E/TSO C129a, E/TSO C145 or E/TSO C146, to fly published waypoints on established ATS routes in the mixed navigation environment.

The database must be current and provided by an approved supplier.

The AIC also details flight planning and ATC procedures such as operators of aircraft intending to operate in Nepalese airspace shall have been approved for the type of PBN operations. The operator shall, insert the necessary designators in Item 10 of the flight plan form.

Pilots are required to inform ATC if they cannot accept a PBN procedure for which they have been cleared

Similarly aircraft and operator without RNAV and/or RNP specifications approval may still fly in the conventional routes and procedures within Kathmandu FIR by using the ground based navigation aids (VOR/DME or NDB).

5 RNP AR APCH IMPLEMENTATION

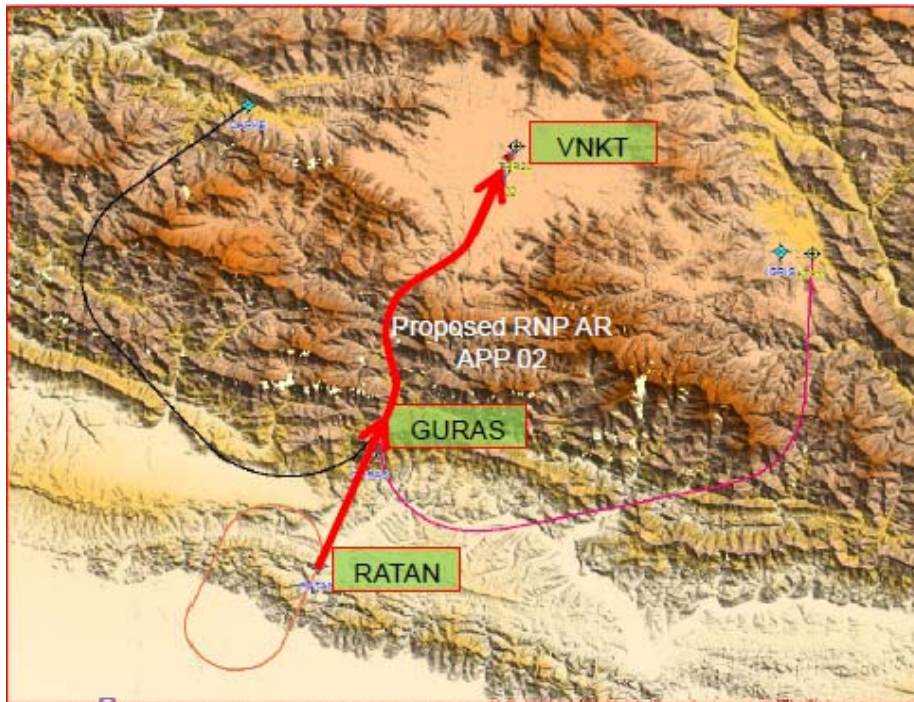
The Civil Aviation Authority of Nepal (CAAN) is implementing Required Navigation Performance with Authorization Required (RNP-AR) operations at Tribhuvan International airport in the near future with the support of Quovadis.

This RNP-AR project is the result of an initiative between the CAAN, Airbus and Qatar Airways to further improve the safety of the operations at Kathmandu.

Tribhuvan International Airport (TIA) is well known in the aviation community for its challenging surrounding terrain, which does not allow for the use of Instrument Landing System (ILS). Several initiatives such as the recent publication of a new VOR DME approach procedure have been undertaken to facilitate the airport access but these efforts have reached the limits of conventional navigation.

By taking full benefit of aircraft capabilities and GNSS based navigation, RNP allows an aircraft to fly accurate and repeatable trajectories without relying on ground-based navigation aids. The additional track flexibility provided by RNP AR will allow to circumnavigate the terrain currently overflown when using the conventional approach. RNP AR will provide a smooth descent and fully stabilized approach, therefore significantly improving safety while lowering minima and reducing required visibility compared to conventional procedures.

Quovadis has already performed a data survey of obstacles and will develop RNP AR arrivals to Runway 02. It will also provide a PBN training to Air Traffic Controllers for a smooth introduction of RNP AR operations into Kathmandu airspace.



RNP AR conceptual design - VNKT Runway 02 (Source : Quovadis)

6. CONCLUSION

The implementation of RNP AR operations at TIA is a big step forward to enhance safety and reliability. By choosing RNP AR the CAAN believes that it will also optimize the use of TIA airspace, thus increasing the airport capacity to enable future growth of air traffic in Nepal as well as offers to all operators flying to Kathmandu the opportunity to reduce their operational costs.

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