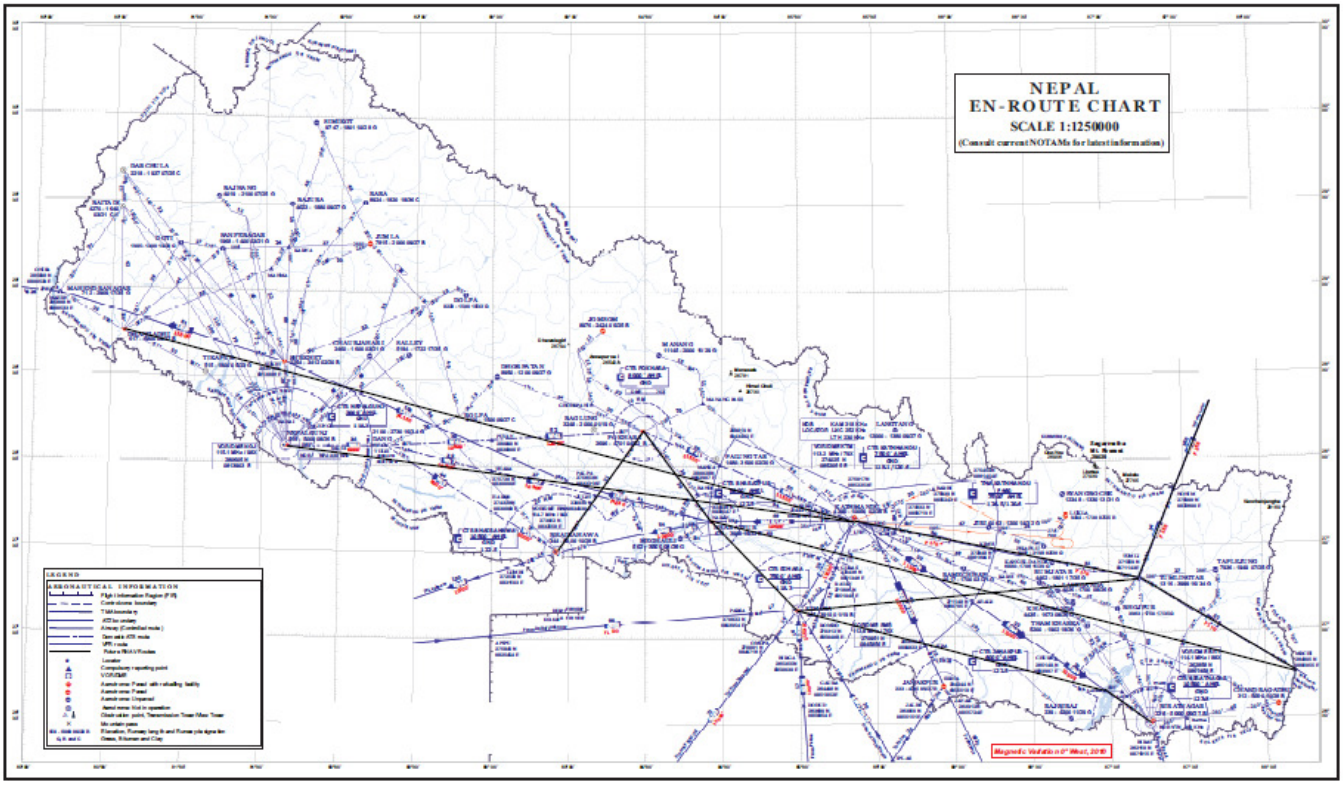
Nepal

PBN Implementation Plan



Civil Aviation Authority of Nepal

Babarmahal, Kathmandu

December 2016

Nepal

PBN Implementation Plan

Civil Aviation Authority of Nepal
Babarmahal, Kathmandu

December 2016

Amendments

Amendments and Corrigenda to this "PBN Implementation Plan" are issued by Director General of CAA, Nepal. The space below is provided to keep a record of such amendments.

RECORD OF AMENDMENTS AND CORRIGENDA

AMENDMENT				CORRIGENDA			
No.	DATE APPLICABLE	DATE ENTERED	ENTERED BY	No.	DATE APPLICABLE	DATE ENTERED	ENTERED BY

Table of Contents

NEPAL

PBN IMPLEMENTATION PLAN

Summary

In December 2010, Nepal National PBN Task Force Main Committee for PBN has reviewed the Nepal PBN Implementation Plan in accordance with the review report of ICAO APAC Regional Office. This Plan aims to provide aviation stakeholders with appropriate implementation guidance and timelines to allow proper preparation for PBN implementations within Kathmandu Flight Information Region (VNSM). This plan has been produced in line with Resolution A 36/23 adopted by ICAO Assembly in its 36th Session held in September 2007 and with the Asia/Pacific Regional PBN implementation Plan developed by ICAO Asia/Pacific PBN Task Force.

1. BACKGROUND

At the 36th Session of ICAO Assembly, it has been resolved: "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." The specific requirements are as follows:

- Each contracting State should develop an implementation roadmap and implement RNAV and RNP operations in the en route to terminal areas according to the established schedule;
- Each contracting State should implement the approach procedures with vertical guidance (Baro-VNAV and/or augmented GNSS) for all instrument runways, either as the primary approach or as a back-up for precision approaches, by 2016, and meet the intermediate implementation milestones of 30% by 2010 and 70% by 2014.

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

2. OBJECTIVE

- To provide the continuity to the development in the field of air navigation including the GNSS-based procedures- a step for transitioning to PBN
- To implement the PBN (RNAV/ RNP) activities in a planned, harmonized and coordinated way and in line with the ICAO PBN guidelines.

3. AIRCRAFT FLEET

The Air traffic in Nepal has increased tremendously in the last 10 years. International air traffic continues to record steady growth with more frequent services in many Indian cities and in the Middle East. The number of international aircraft movement at Tribhuwan International Airport (TIA), Kathmandu in 2010 was 23 % increase over that of 2009 whereas the aircraft movement compared between 2012 and 2013 indicates the increase was about 1.3%. In the case of domestic services, the traffic movement in 2010 has increased by 4.9 % as compared to 2009 whereas the movement in 2013 compared to 2012 was decreased by 2.5% because of introduction of bigger fleet.

3.1 International Operation

Tribhuvan International Airport is being served by 27 international airlines having air-links with 24 destinations in 14 countries. The aircraft fleet comprises A333, A332, A330, A321, A320, A319, A310, B777, B772, B757, B739, B738, B737, DH8 and ATR72/42. State registered airlines in international operations include Nepal Airlines, Buddha Air and Himalayan Airlines; the later airline has recently started international operations.

3.2 Domestic Operation

In the domestic sector, 23 operators operate 55 fixed wing aircraft, 24 rotor wing aircraft and 5 Aviation Sports aircraft. The aircraft fleet comprises ATR72, ATR42, B1900, J41, D228, DHC6, Pilatus, Cessna, rotor wing aircraft MI8, MI17, BA46, A320, B06, AL03 and microlights, paragliders in aviation sports.

4. AIRSPACE AND AIR-ROUTE STRUCTURE

4.1 Airspace

Nepal is a mountainous country with 83% hills and mountains including the highest peak of the world Mt. Everest. It is rectangular and landlocked by India and China. Due to its topographical feature, there is limited airspace for the airspace design and air route planning limiting the efficient use of airspace. There are 48 aerodromes scattered all over country including one international airport, the Tribhuwan International. Despite this factor, traffic is increasing day by day both in domestic and international operation. The biggest issue following the traffic growth is the congestion of airspace. Over 80 % of the total traffic used Tribhuvan International Airport making it congested both in the air and on the ground. The congestion has caused delays both in the air and on the ground resulting in heavier ATC workload and impeding the efficient flight operation.

4.2 Airspace Classes:

Class C Airspace- Within controlled airspace (TMA, CTR, ATZ and Airways)

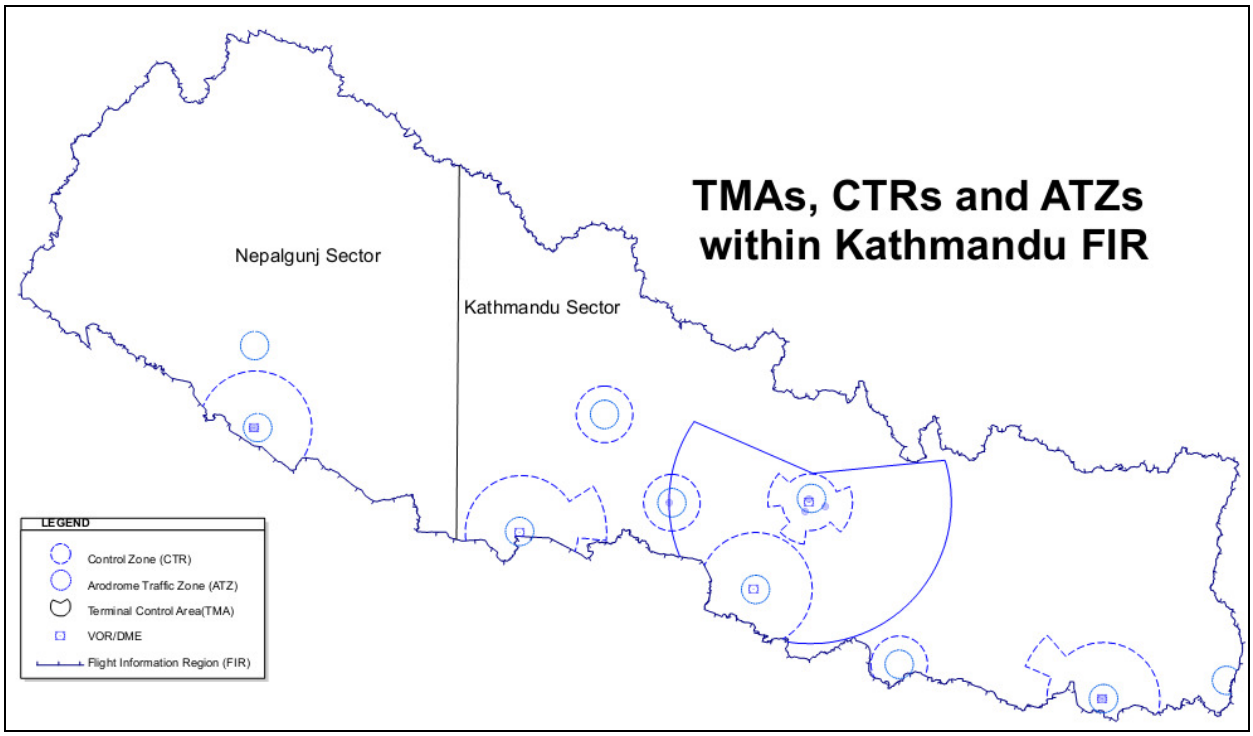
Class G Airspace- Outside controlled airspace

4.3 FIR Sectorization:

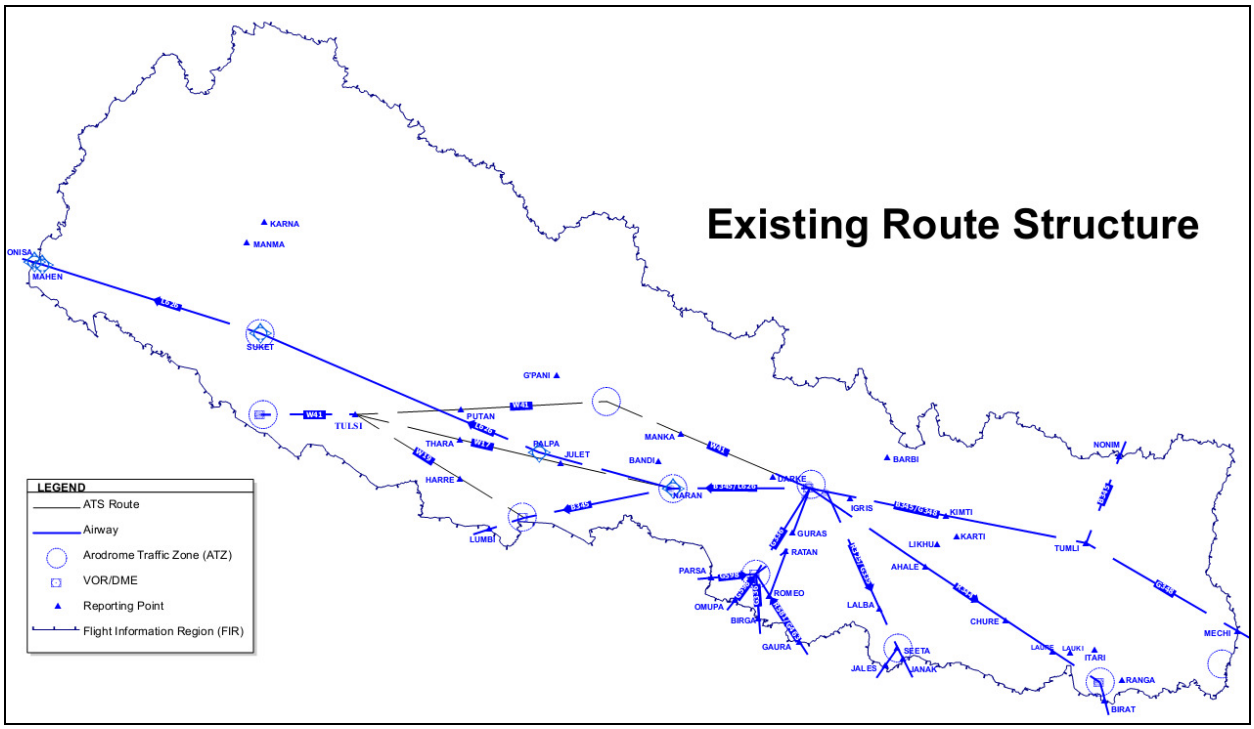
Kathmandu FIR (VNSM) is divided into two sectors- Kathmandu Sector and Nepalgunj Sector. These sectors are divided by 83°E longitude and has jurisdiction from ground level to unlimited vertical airspace over the territory of Nepal.

4.4 TMAs, CTRs and ATZs:

There are 2 TMAs (Kathmandu and Nepalgunj) and 8 CTRs (Nepalgunj, Bhairhawa, Pokhara, Bharatpur, Simara, Kathmandu, Janakpur and Biratnagar) and 10 ATZs (Nepalgunj, Surkhet, Bhairhawa, Pokhara, Bharatpur, Simara, Kathmandu, Janakpur, Biratnagar and Chandragadi) within Kathmandu FIR.



4.5 Route Structure:



- **International ATS Routes**

There are following airways to and from Kathmandu FIR:

L626 **Kathmandu-NARAN-PALPA-SUKET-MAHEN-ONISA**-Pantanagar-SSB-Delhi (RNP10)

B345: Lhasa-**NONIM-TUMLI-KTM-NARAN-BWA-LUMBI**-Lucknow

G335: **Kathmandu-LNC-LALBA-SEETA-JALES**-Patna

R325: **Kathmandu-LNC-LALBA-SEETA-JANAK**-Kolkata

G348: **Kathmandu-KIMTI-TUMLI-MECHI-BBD**-Paro

G336: Patna-**BIRGA-SMR-Kathmandu**

G590: Varanashi-**OMUPA-SMR**

G598: Lucknow-**APIPU-PARSA-SMR**

R581/G463: MONDA-IPLAS-**GAURA-ROMEO-SMR**

Note: Bold letters indicate the route segments within Kathmandu FIR

- **Domestic Routes**

There are 3 domestic routes in Kathmandu FIR. They are:

W17: Bharatpur (NARAN)-JULET-THARA- Dang (TULSI)

W19: Bhairahawa-HARRE-Dang (TULSI)

W41: Kathmandu-MANKA-Pokhara-Dang (TULSI)-Nepalgunj

Routes (domestic routes and airways both) within Kathmandu FIR are redefined by waypoints instead of previously defined significant points based on NDBs. They are:

NARAN instead of BHP

TULSI instead of DNG

SEETA instead of JKP

TUMLI instead of TTR

5. COMMUNICATION INFRASTRUCTURE

- VHF- RCAG at Mt. Phulchoki, Nepalgunj Airport and Biratnagar Airport
- Existing VHF Remote Control Air Ground (RCAG) system at Mt. Phulchoki and Nepalgunj airport provides ACC VHF coverage up to the western boundary of Nepal.
- Newly installed RCAG system at Biratnagar airport will provide ACC VHF coverage up to the eastern boundary of Nepal. This enhances the VHF coverage throughout Nepalese FIR.
- Existing AFTN system already has been upgraded to AMHS as per the ICAO requirements. AFTN/AMHS link with Beijing and Mumbai for data communication and Lhasa for ATS Direct Speech and data communication for International purpose and for domestic purpose Biratnagar, Simara, Nepalgunj, Lukla, Bhairahawa, Bharatpur, Jomosom and Jumla have been connected to Kathmandu through AMHS nodes.

- Hotline service has been provided in Simara, Biratnagar and Bhairahawa airports for rapid ground to ground communication.
- HF coverage in whole FIR for ground to ground communication and can be used for air to ground communication during contingency operation.

6. NAVIGATION INFRASTRUCTURE

NDB, VOR/DME and other ground radio navigation aids are developed in order to overcome operational restrictions posed by early navigation that relied on pilot's eye. In Nepal also conventional navigation that fly along the radio signals provided by ground facilities has contributed for enhancing flights safety and accessibility in far and wide. However, out of 17 NDBs in different parts of the country, 12 NDBs are already decommissioned and remaining NDBs have been planned to be withdrawn in another 5 years.

6.1 Conventional NAV Aids:

NAV Aid	Location	Remarks
DVOR	Kathmandu, Biratnagar, Nepalgunj, Bhairahawa and Simara	Facilities are being used as En-route and Landing Aids.
DME	Kathmandu, Biratnagar, Nepalgunj, Bhairahawa, Simara and Pokhara	With collocated VOR, En-route and landing aids.
NDB	Kathmandu, Biratnagar, Nepalgunj, Janakpur and Bharatpur	Homing Aids until the life of the facilities.
Locator	Nalinchowk and Thecho	Locator Nalinchowk is being used as En-route Aid.

6.2 GNSS

- WGS-84 Coordinates

  CAA Nepal completed WGS-84 survey of the runway thresholds, critical positions of runway and Navigation Aids of TIA and all domestic airports in operation in 1999 and data have been published in the AIP Nepal.

  Re-verification of WGS-84 data and survey of other essential points at Kathmandu & Biratnagar Airports has been carried out in 2010.

- **Transition to GNSS**

  To take early benefit of the satellite based navigation, GNSS based approach procedures for TIA and 8 major domestic aerodromes were developed in 1999, some of them were flight validated.

  GNSS NPA procedures were reviewed and some GNSS/RNAV departure procedures were developed based on PANS/OPS in 2005. Some of them were flight validated.

GNSS based approach and departure procedures were designed at about nine domestic airports including Tribhuvan International Airport and some of them were flight validated.

GPS with TSO C129 Standard has been mandated to be on-board the aircraft since 2001 on selected ATS routes within Kathmandu FIR for en-route purposely only.

7. SURVEILLANCE INFRASTRUCTURE

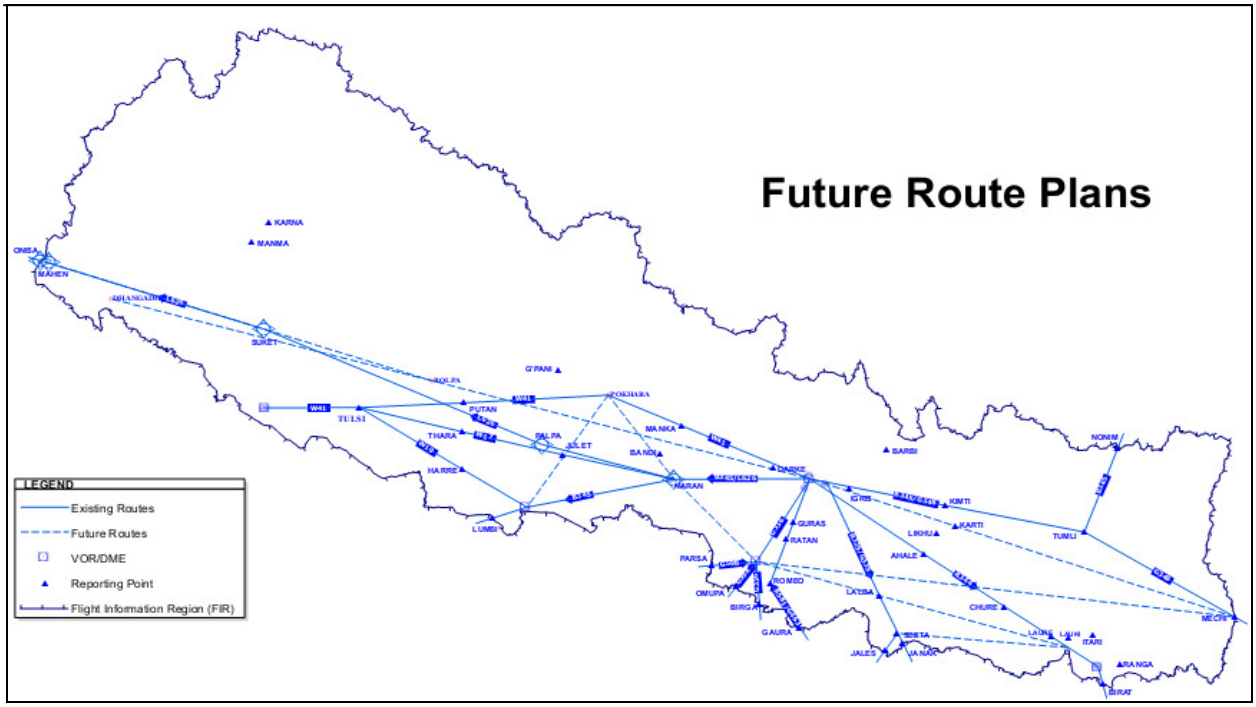
- PSR/SSR was installed and implemented in 1998 and a new MSSR has already been installed in Kathmandu to be used for terminal operations.
- Installation of new MSSR has almost been completed and in near future, will be operational for en-route operation.
- Outside radar coverage, surveillance based on Voice Position Reporting

8. FUTURE PLAN

8.1 ATS route plan

- Domestic routes will be upgraded to RNAV-5 routes.
- Existing airways will be redefined with PBN specifications after consultation with the authorities of adjacent FIRs.
- L626 will be revised to make it more direct within Kathmandu FIR between KTM and ONISA.
- Possibility will be studied to connect the hub airports and some of the mountainous airports of the country with RNAV routes where the flight frequency is high.
- New RNAV-5 routes within Kathmnaud FIR for domestic purpose will be developed as follows:
    - Kathmandu – Tumlingtar
    - Kathmandu – Chandragadhi
    - Kathmandu – Biratnagar
    - Kathmandu – Janakapur
    - Kathmandu – Simara
    - Kathmandu – Bharatpur – Bhairahawa
    - Kathmandu – Nepalgunj
    - Kathmandu – Surkhet – Dhangadhi
    - Kathmandu – Pokhara
    - Biratnagar – Tumlingtar
    - Pokhara – Bharatpur
    - Pokhara – Bhairahawa
    - Nepalgunj – Surkhet
    - Nepalgunj - Dhangadhi

- Inside Kathmandu FIR, existing L626 route will be made straight from ONISA to KTM, being regional navigational route, will be consulted with concerned stakeholders.
- Himalaya 2 Route (Kathmandu – BBD – Guwahati – Imphal – Kunming): This route will be pursued to be developed and materialized, and consultation will be done for the extension of L626 to connect it with Himalayan 2 Route, and if possible, will be continued up to Kunming.



8.2 Communication Plan

- ATS communication system at TIA will be enhanced by introducing automation and new communication equipment including consoles.
- AMHS system will be upgraded and extended to some additional domestic airports and operators.
- Hotline service will be extended to Pokhara, Bharatpur, and Nepalhunj.
- AIDC will be introduced between Kathmandu ACC and ACC's of adjacent FIRs.

8.3 Surveillance Plan

- Newly installed MSSR at Kathmandu for Terminal and at Bhattedanda for en-route will be fully implemented for operations.
- Study will be carried out for the possibility and application of ADS-B outside Radar coverage area as well as backup for existing RADAR system.

9. PBN IMPLEMENTATION IN NEPAL

9.1 New Development

Due to the global air traffic growth and limitation of ground based navigation system, ICAO recommended GNSS as Future Navigation System. To cope with the increasing global traffic demands, ICAO further developed the concept of RNAV and RNP, which is now called as Performance Based Navigation (PBN). PBN is a broad airspace concept in the global CNS/ATM system environment.

9.2 Initiation toward implementing PBN

As per the ICAO Assembly Resolutions and APANPIRG Resolution, CAA Nepal has initiated various works towards PBN since 2009.

CAAN has formed a National PBN Task Force headed by Deputy Director General of CAAN and members from various disciplines including airline pilots. The National PBN Taskforce has been mandated to develop PBN implementation plan, continuously review it as per the guidelines of ICAO Regional PBN Implementation Plan and Global Plan.

PBN Focal Point has been nominated and tasked to coordinate ICAO and various stake-holders, follow up the PBN Implementations Program, regularly update about the progress to PBN National Taskforce.

In order to strengthen PBN procedure design and PBN operational approval capabilities, CAAN has sent its employees to participate in the Procedure Design (including PBN) Training and PBN Operational Approval Training respectively.

RNP AR APCH and the associated STARS have been successfully implemented in Kathmandu (VNKT) with the continuous support from Airbus' subsidiary Airbus ProSky, previous QUOVADIS. RNAV (GNSS) APCH and associated STAR have been implemented in one of the domestic airports Biratnagar (VNVT) with in-house capability. CAAN has also planned to introduce RNAV SIDs/STARs and IAPs in some major airports including restructuring of entire route network primarily focusing on the development of more direct RNAV routes.

10. PBN IMPLEMENTATION ROAD MAP

CAAN in coordination with AAI has promulgated ATS route L626 (RNP 10) since November 2009 between Kathmandu and Delhi, and most of the international airlines departing from Kathmandu towards West and Middle-east destinations are using this route.

CAAN has implemented Required Navigation Performance – Authorization Required (RNP-AR) procedure for TIA with technical support from COSCAP and QUOVADIS, sister organization of Airbus Company which came into effect by 28 June 2012.

Eight International Operators are successfully conducting RNP AR APCH at TIA in full-fledged operations and some more are in pipeline.

Furthermore, CAAN has formulated the PBN Implementation Road Map as short term (2010–2012), medium term (2013–2016) and long term (2017–2025) plan as shown in the table below:

Implementation Road Map

Period	En-Route	DEP/ARR (Terminal)	Approach
Short term (2010-2012)	• L626 (RNP 10) has been implemented for en-route operation.	• RNP1 STAR has been implemented for RNAV (GNSS) approach at Biratnagar Airport. • RNP1 STARs has been implemented for RNP AR APCH at TIA.	• RNP AR APCH for TIA has been implemented since 28 June 2012. • RNP APCH for Biratnagar Airport has been implemented since 28 June 2012.

Medium term (2013-2016)	• Existing domestic routes are planned to be redefined as RNAV 5 where applicable and new routes will be developed as necessary. Preliminary route design has been developed and will be implemented in the next phase.	• RNAV SIDs has been designed for Dhangadi (domestic airport) which will be implemented in the next phase.
		• New and updated RNAV STARs for RNP AR APCH at Kathmandu has been revised and will be implemented from 2 February 2017.
		• RNAV STARs have been developed for RNP APCH at following domestic airports and will be implemented in the next phase:
		  • One at Biratnagar Airport
		  • Two at Dhangadi Airport
			• RNP AR Missed APCH segment at Kathmandu has been modified and will be implemented from 2 February 2017.
			• RNAV (GNSS) APCH has been designed for Dhangadi Airport and will be implemented in the next phase.

Long term (2017-2025)	• An extension of L626 will be proposed from Kathmandu to Kunming via Bagdogra-Guwahati- Imphal, India in order to materialize the proposed Himalayan 2 Route and make it bidirectional.
	• RNAV 5 domestic routes will be implemented replacing the existing routes. Some more routes will be designed and implement to connect the major domestic airports.
	• Selective International ATS routes for regional navigation i.e., B345, R344, G335, G336, R325 and G348 will be redefined as RNAV 5 routes in consultation with the adjacent FIRs.
		• RNAV SIDs will be designed and implemented at Kathmandu Airport (VNKT).
		• RNAV STARs/SIDs will be designed/implemented in all other major airports.
		  - Chandragadi (VNCG)
		  - Janakpur (VNJP)
		  - Nepalgunj (VNNG)
		  - Dhangadi (VNDH)
		  - Bhairahawa (VNBW)
		  - Pokhara (VNPK) - if feasible
		  - Other airports as necessary.
			• Introduce RNAV APCH at all major airports:
			  - Chandragadi (VNCG),
			  - Janakpur (VNJP),
			  - Nepalgunj (VNNG),
			  - Dhangadi (VNDH)
			  - Bhairahawa (VNBW)
			  - Pokhara (VNPK) - if feasible
			  - Other airports as necessary
			• Feasibility study for RNP Approach with BARO-VNAV will be done and introduced in selective instrument runways.
			• Feasibility study will be conducted for RNP AR APCH and if feasible, will be implemented at some airports critically located around challenging terrain, if needed.

10.1 Short Term (2010－2012)

En-route

- L626 (RNP 10) has been implemented for en-route operation.

Terminal

- RNP1 STAR has been implemented for RNAV (GNSS) approach at Biratnagar Airport.
- RNP1 STARs has been implemented for RNP AR APCH at TIA.

Approach

- RNP AR APCH for TIA has been implemented since 28 June 2012.
- RNP APCH for Biratnagar Airport has been implemented since 28 June 2012.

10.2 Medium Term (2013-2016)

En-route

- Existing domestic routes are planned to be redefined as RNAV 5 where applicable and new routes will be developed as necessary. Preliminary route design has been developed and will be implemented in the next phase.

Terminal

- RNAV SIDs has been designed for Dhangadi (domestic airport) which will be implemented in the next phase.
- New and updated RNAV STARs for RNP AR APCH at Kathmandu has been revised and will be implemented from 2 February 2017.
- RNAV STARs have been developed for RNP APCH at following domestic airports and will be implemented in the next phase:
  - One at Biratnagar Airport (VNVT)
  - Two at Dhangadi Airport (VNDH)

Approach

- RNP AR Missed APCH segment at Kathmandu has been modified and will be implemented from 2 February 2017.
- RNAV (GNSS) APCH has been designed for Dhangadi Airport and will be implemented in the next phase.

10.3 Long Term (2017-2025)

PBN operations will be introduced in all phases of flight, including en route, terminal and approach operation, and the co-existence of conventional operations and PBN operations will evolve into full PBN operations.

En-route

- An extension of L626 will be proposed from Kathmandu to Kunming via Bagdogra-Guwahati- Imphal, India in order to materialize the proposed Himalayan 2 Route and make it bidirectional.
- RNAV 5 domestic routes will be implemented replacing the existing routes. Some more routes will be designed and implement to connect the major domestic airports.
- Selective International ATS routes for regional navigation i.e., B345, R344, G335, G336, R325 and G348 will be redefined as RNAV 5 routes in consultation with the adjacent FIRs.
- An extension of L626 will be proposed from Kathmandu to Kunming via Bagdogra-Guwahati- Imphal, India in order to materialize the proposed Himalayan 2 Route and make it bidirectional.

Terminal

- Priority will also be given to introduce RNAV SIDs in Tribhuvan International Airports and some other major domestic airports of the country.
- RNAV SIDs will be designed and implemented at Kathmandu Airport (VNKT).
- RNAV STARs/SIDs will be designed/implemented in all other major airports.
  - Chandragadi (VNCG)
  - Janakpur (VNJP)
  - Nepalgunj (VNNG)
  - Dhangadi (VNDH)
  - Bhairahawa (VNBW)
  - Pokhara (VNPK) - if feasible
  - Other airports as necessary.

Approach

- Introduce RNAV (GNSS) APCH at all major airports:
  - Chandragadi (VNCG),
  - Janakpur (VNJP),
  - Nepalgunj (VNNG),
  - Dhangadi (VNDH)
  - Bhairahawa (VNBW)
  - Pokhara (VNPK) - if feasible
  - Other airports as necessary

- Feasibility study for RNP Approach with BARO-VNAV will be done and introduced in selective instrument runways.
- Feasibility study will be conducted for RNP AR APCH and if feasible, will be implemented at some airports critically located around challenging terrain, if needed.

11. DESCRIPTION OF THE TANGIBLE BENEFITS

The major tangible benefits of implementing PBN in Nepal are:

- With the application of RNAV route (L626), the flight time in between Kathmandu and Delhi has been reduced by 20 miles for outbound international traffic to Delhi and West. This has reduced the associated cost of fuel as well as the carbon emissions, and has reduced the congestions over the Indian Airspace especially in Baranasi Control Jurisdiction to some extent.
- RNP AR APCH at Tribhuvan International Airport (TIA) will offer more precise and stabilized approach path thereby providing the improved access to and safer landing at TIA. The frequency of diversion will be significantly reduced with the application of lower visibility minima. Because of the above reasons, the operational cost of the airline will be significantly reduced.
- With the introduction of RNP APCH (RNAV/GNSS) approach at Biratnagar Airport, which is almost an overlay of current VOR/DME straight-in approach procedure, it will serve as a back-up in case of NAVAID failure. This approach will also provide the easily manoeuvrable, safe and predictable flight paths. More benefits will be observed if major domestic airports will be provided with the RNP APCH procedure as per plan.
- With the implementation of RNAV/RNP SIDs and STARs in Terminal Operations (some designs have already been developed), flight time as well as the associated cost will be reduced and will significantly smooth the flow of flight as well as increase the predictability of flight path.
- With the introduction of RNAV5 routes for domestic operations as per the plan (preliminary design has already been conceptualized), it will significantly reduce the need to maintain the sensor-specific routes as well as reduce the need of installation and/or maintenance cost of en-route navigation aids. With this, the routes will be more straight, short and economical.
- Implementation of PBN Plan in Nepalese airspace allow the operators to use the RNAV and/or RNP capabilities that already exist in a significant percentage of the aircraft fleet flying in Nepalese Airspace- both domestic and international operations;
- With the effective implementation of PBN plan, ATC and pilot workload will be reduced by utilizing RNAV/RNP procedures and airborne capabilities, and foster the smoother, expeditious and safer flow of the traffic.

12. TRANSITIONAL CONSIDERATIONS

- During the coexistence period, conventional navigations systems will be retained to provide services for the aircraft with no PBN equipage;
- The operators and other airspace users are encouraged to install the avionics that are necessary for the PBN operations;
- The CAAN will conduct safety assessment and periodic safety inspections and make contingency plans to ensure continuous operational safety;
- Thorough operation monitoring will be carried out, including the operator qualifications, aircraft navigation performance, navigation error, etc, and corrective measures will be formulated;
- Harmonization of conventional procedure and PBN flight procedure shall be considered in flight procedure design to reduce the risk of procedure conflict while conventional operations and PBN operations coexist;
- Air traffic control trainings to controllers and safety measures will be in place for blended operational environment to ensure the required minimum separation;
- The operators shall be informed as early as possible before PBN operations are to be implemented at the airports or en-route, and the national air carriers will be encouraged in applying for operational and airworthiness approval to conduct the PBN operations.

13. SAFETY ASSESSMENT & MONITORING REQUIREMENTS

13.1 Safety Assessment

- To ensure that the introduction of PBN applications within Nepal is undertaken in a safe manner, in accordance with relevant ICAO provisions, implementation shall only take place following the conduct of a safety assessment that has demonstrated that an acceptable level of safety will be met.
- This assessment is also essential to demonstrate that levels of risk associated with specific PBN implementations are acceptable. Additionally, ongoing periodic safety reviews shall be undertaken where required in order to establish that operations continue to meet the target levels of safety.

13.2 On-going Monitoring/Post Implementation Review

- To demonstrate that the system is safe, ongoing monitoring of the PBN en-route implementation would be undertaken through appropriate post implementation review mechanism.
- Assistance and support from Asia/Pacific Regional Airspace Safety Monitoring Advisory Group (RASMAG) will be requested wherever required. Necessary support to Regional Airspace Safety Monitoring Advisory Group (RASMAG) will be extended though provision of relevant data.

- In undertaking a safety assessment and ongoing monitoring to enable en-route implementation of PBN, the following strategy will be adopted on regular basis:
  - Establish and maintain a PBN approval database;
  - Monitor aircraft horizontal-plane navigation performance and the occurrence of large navigation errors and report results appropriately to the RASMAG;
  - Conduct safety and readiness assessments and report results appropriately to the RASMAG;
  - Monitor operator compliance with State approval requirements after PBN implementation;
  - Initiate necessary remedial actions if PBN requirements are not met.

--- END ---