INTERNATIONAL CIVIL AVIATION ORGANIZATION

REPORT OF THE TENTH MEETING OF THE PERFORMANCE BASED NAVIGATION IMPLEMENTATION COORDINATION GROUP (PBNICG/10)

ICAO APAC RO Bangkok, Thailand
19-21 April 2023

The views expressed in this Report should be taken as those of the Meeting and not the Organization

Approved by the Meeting

and published by the ICAO Asia and Pacific Office, Bangkok

HISTORY OF THE MEETING

1. Introduction

1.1 The TENTH Meeting of the Performance Based Navigation Implementation Coordination Group (PBNICG/10) was held in ICAO APAC RO Bangkok, Thailand, from 19-21 April 2023.

2. Attendance

2.1 The meeting was attended by 79 participants from Australia, Bangladesh, Brunei Darussalam, Cambodia, China, Hong Kong China, India, Indonesia, Malaysia, Maldives, Mongolia, Myanmar, Nepal, New Zealand, Pakistan, Papua New Guinea, Philippines, Republic of Korea, Singapore, Sri Lanka, Thailand, United States of America, Vietnam, IATA and ICAO.

2.2 The participants from the States/Administrations were multi-disciplinary experts in various fields related to PBN implementation including CAA Regulators, Inspectors, ANSPs, instrument flight procedure designers, engineers and airlines. The relevant presentations and documents are available at https://www.icao.int/APAC/Meetings/Pages/2023-PBNICG10.aspx. The list of participants is placed at **Attachment 1.**

3. Opening of the Meeting

3.1 Mr. Tao Ma, Regional Director, ICAO Asia/Pacific Regional Office, welcomed the participants of the PBNICG/10. He mentioned the ICAO Assembly Resolution A37-11 on PBN Global goals and Beijing Declaration's commitment to implement PBN by 2022 and benefits of PBN such as, enhanced Safety, efficiency & Environment protection. He reminded the meeting that the region is lagging the global average in APV implementation. He emphasized that sharing experiences and learning from others were the most important objectives of the meeting. He then invited all States to actively participate in the meeting discussion and provide ideas to sustain the PBN implementation in the APAC region.

3.2 Mr. R.S. Jamwal, Director, ANSS, DGCA India was elected to chair the PBNICG/10 meeting.

4 Officers and Secretariat

4.1 The meeting was chaired by Mr. Jamwal. Mr. V. K. Mishra, Regional Officer (ATM-PBN), ICAO APAC RSO, acted as secretary and was supported by Mr. Raphael GUILLET, Chief of RSO, Mr. Luo Yi, RO, CNS, Ms. Zhong Wenhan, RO, CNS and Ms. Yang Siqi, Program Assistant, ICAO APAC RSO.

5. Working Arrangements, Language and Documentation

5.1. The working language of the meeting was English inclusive of all documentation and this Report. 14 Working Papers (WP), 09 Information Papers (IP) were presented in the meeting. A list of Working and Information Papers is provided at **Attachment 2**.

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Agenda Item 1: Adoption of agenda

1.1 The Chairman introduced the provisional agenda (WP01) to the meeting.

1.2 The Secretary explained the agenda items. The meeting reviewed and agreed to the proposed agenda without changes, as follows:

Agenda Item 1: Election of Chairperson

Agenda Item 2: Global and Regional PBN Updates

Agenda Item 3: Implementation status of the Regional Transition Plan for RNP APCH Chart Identification from RNAV to RNP

Agenda Item 4: States' PBN Implementation Progress

Agenda Item 5: PBN Training for ATC

Agenda Item 6: Established on RNP AR (EoR)

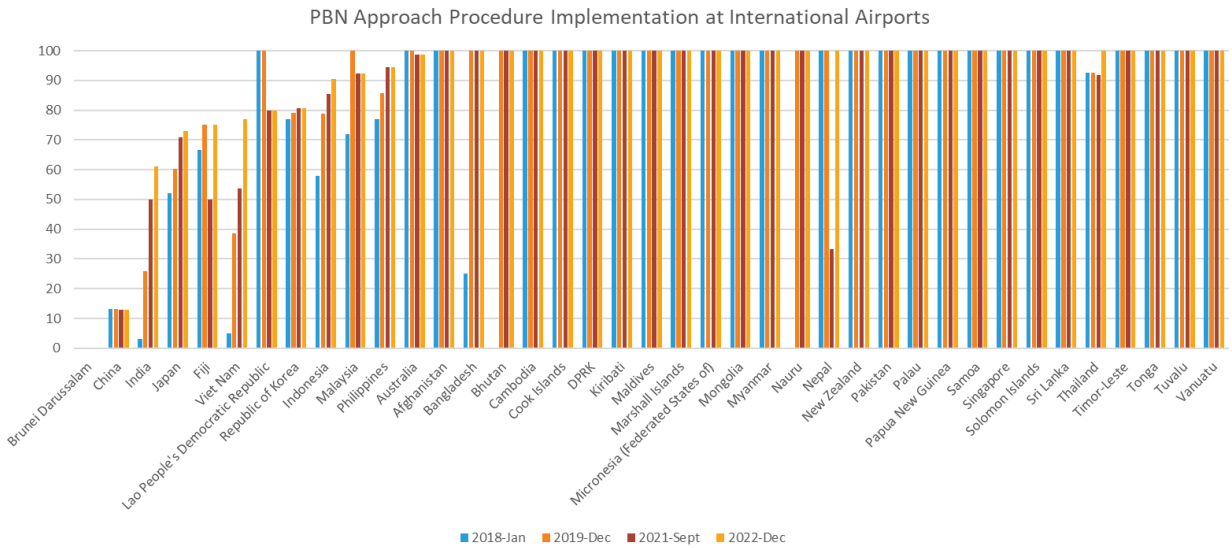
Agenda Item 7: Any other business

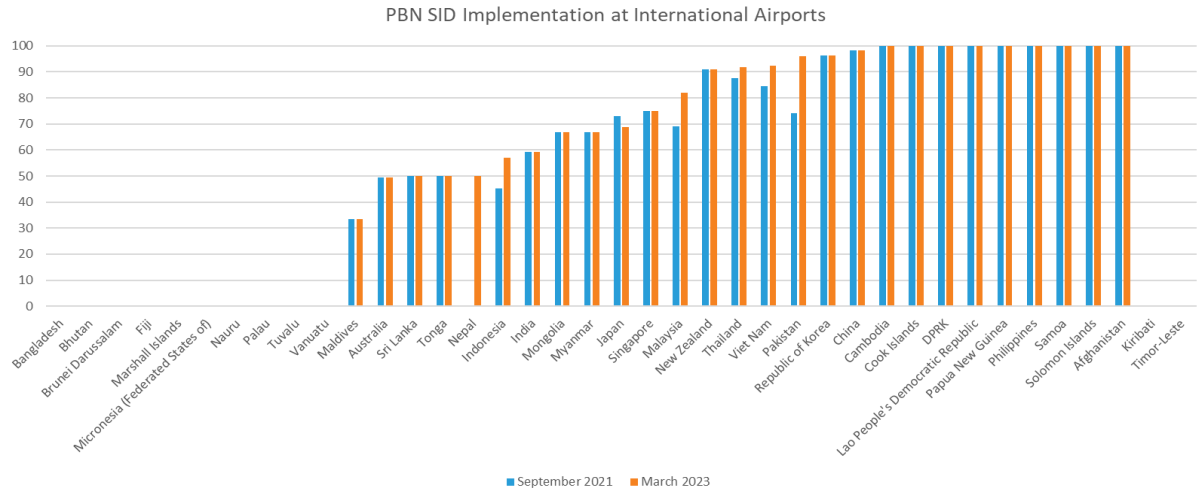
Agenda item2: Global and Regional PBN updates

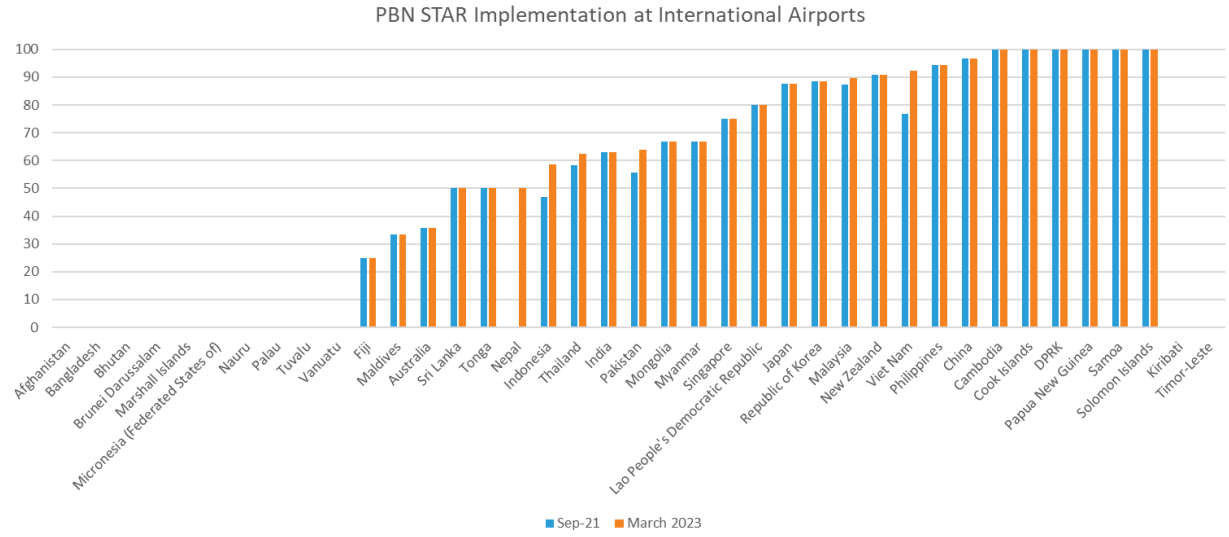
WP02– Global and Regional PBN Implementation Update (Secretariat)

ICAO presented global and regional PBN implementation status as available in ICAO iSTARS. ICAO informed that implementation of APV procedures for all instrument runway ends by 2016, key requirement of ICAO Assembly Resolution A37-11, was behind global achievement. However, implementation of PBN SID/STAR were above the global implementation status (see **Charts 1**).

Charts 1. PBN (Approach) Update, as on March 2023(as per iSTARS)







Singapore raised the reporting of SIDs/STARs and stated that States may decide not to implement SIDs/STARs at some of the airports having low volume of traffic as the Assembly Resolution says where required.

Pakistan commented that the State may decide not to implement PBN SID/STAR depending upon the traffic volume.

Australia observed that the traffic density and ATS operations at some airports might not warrant PBN implementation.

Vietnam suggested to have two charts, one based on iSTARS and another as per States' report. The Secretariat explained that if the procedures are published in AIP, which is available to international operators, then both the data will be same as iSTARS captures data published by the States and available for international operators.

Philippines, Australia, and India expressed that procedures for some airports may not be feasible or may not be on priority for the States and due to that 100% implementation will be very difficult to achieve. The secretariat further explained to the meeting that if the procedure is not feasible then it's acceptable.

Nepal raised the discrepancy in data of iSTARS for Kathmandu International Airport. The Secretariat

suggested Nepal to write directly to iSTARS.
The chairman suggested that during implementation, the usability of the procedures should be the criteria.

WP03 – Dual Frequency Multi Constellation (DFMC) (Secretariat)

2.10 The Secretariat informed the meeting that ICAO Council adopted ICAO SARPs for dual-frequency multi-constellation (DFMC) GNSS in March 2023 to improve overall safety, capacity and efficiency by providing better navigation performance and availability. The DFMC GNSS SARPs will introduce the next generation of GNSS for aviation, such as; two entirely new GNSS constellations, Galileo (Europe) and BeiDou (China), the existing SARPs for the GPS (USA) and GLONASS (Russia) constellations are being enhanced to introduce a second frequency and modernized technology and the existing satellite-based augmentation system (SBAS) SARPs are being enhanced to introduce a second frequency and the ability to augment the new constellations.

WP04 – Moving to True North (Secretariat)

2.11 The Secretariat informed the meeting that, Canada presented working papers with a proposal to move from a magnetic to a True North reference for heading and track in air operations, at the Twelfth and Thirteenth Air Navigation Conferences, in 2012 and 2018 respectively, to enhance safety and reduce the considerable cost of maintaining magnetic variation (MAGVAR) tables. The Conferences recommended that further study on the technical, operational, and economic feasibility of changing to a "True North" reference system should be conducted.
Issues in the existing system of working in Magnetic North:

- Differences between magnetic variation values in aircraft avionics systems and published magnetic variation values on charts can lead to pilot misinterpretation and potentially unsafe conditions during precision approaches and Autoland.
- Regular updating of magnetic variation data in aircraft, ATC systems and aeronautical charts.
- Maintaining runway signage and numbering to match magnetic orientation.
- Rotating VORs and TACANs periodically to account for magnetic variation; and
- Inconsistency of wind direction being reported in magnetic north by ATC but reported in true north by MET services, which can lead to errors when magnetic variation is significant.

Canada, in cooperation with the International Association of Institutes of Navigation (IAIN), has been investigating the feasibility of this topic and presented an information paper at the High-Level Conference on Covid-19 (HLCC) in 2021 to provide an update to States. ICAO, then, conducted a survey through State Letter AN 11/57-22/87 to seek feedback from States and their aviation industry on the level of support for ICAO to commence work on changing from a magnetic to True North reference for heading and track in air operations. The survey aimed to identify any concerns or challenges that may need to be addressed if True North reference is implemented.
ICAO also conducted two webinars on Moving from Magnetic to True North on 8th September and 27 October 2022 to raise awareness on the subject. Webinar material link.
https://www.icao.int/safety/OPS/OPS-Section/Documents/ICAO%20TN%20Webinar.pdf

The Secretariat provided survey result to the meeting, which indicates substantial participation, with 564 responses from 103 States, accounting for 53% of the 193 ICAO Contracting States. Responses were from diverse groups, such as, CAAs, air operators, ANSPs, aerodromes, OEMs, flight

procedures designers, training organizations, and the military. There was considerable support for moving to true north within a realistic timeframe; with 61% of total respondents either strongly in support (38%) or somewhat in support (23%) of a change. The majority of respondents estimated that it would take their sector 10 years or less to implement true north in their State.

WP05 – Revised Navigation Strategy of APAC Region

The Secretariat informed the meeting that ICAO APAC Regional Office sent a State letter in January 2023 to review Revised Navigation Strategy for Asia/Pacific Region, which was revised in 2016 by the Twentieth Meeting of Communications, Navigation and Surveillance Sub-group of APANPIRG (CNS SG/20) and adopted via Conclusion APANPIRG/27/37: Revised Navigation Strategy for the Asia/Pacific Region. In view of the latest developments in the field of navigation, a revisit of the strategy is needed. The meeting is invited to discuss the matter and arrive at consensus on Revised Navigation Strategy for the APAC region, which will also be reviewed by GBAS-SBAS ITF before being placed in CNS-SG for recommendation to APANPIRG for adoption.

The Secretariat explained to the meeting that this Navigation strategy along with other similar strategy on communication, surveillance, ATM etc. will form the basis to update the current seamless ANS plan and therefore decision of the group is critical for the navigation strategy of the region. Hong Kong China reported that, in response to the ICAO State Letter, Hong Kong China had provided comments on the Revised Navigation Strategy to ICAO and proposed the meeting to review and discuss Hong Kong's comments After discussion it was agreed that this paper together with States' comments received by ICAO will be further deliberated in the meeting on next day. Australia enquired if States could present a flimsy to express its opinion on the subject. The secretariat clarified that any flimsy on the subject was welcome.

The revised navigation was deliberated upon in detail on the second day and a consensus was arrived for final version of the strategy and is placed as **Attached 3**. The final version will be shared with NSP for their comments and will also be placed in GBAS-SBAS ITF/5 meeting scheduled to be held in June 2023. After deliberation in GBAS-SBAS ITF/5, it will be put up for further discussion and possible recommendation to APANPIRG for adoption.

Agenda Item 3: Implementation status of the Regional Transition Plan for RNP APCH Chart Identification from RNAV to RNP

WP13 – Implementation Status of Regional Transition Plan for RNP Chart Identification (Secretariat)

3.1 The Secretariat presented the Implementation status as on April 2023 of the regional transition plan for RNP APCH chart identification from RNAV to RNP, as adopted by APANPIRG/30 vide Conclusion APANPIRG/30/14 (CNS SG/23/8-PBNICG/6/1). Most of the States have already completed the transition and a few States are on track as per the plan. The Secretariat reminded the States that the target date was November 2022 for RNP transition. The plan is available at the following link on ICAO APAC webpage:
https://www.icao.int/APAC/Documents/edocs/APX.%20B%20-%20Regional%20Transition%20Plan%20for%20RNP%20Chart%20Identification.pdf

3.2 The Secretariat invited the participants to review if there was any change to their APAC Regional Transition Plan and to report the same to APAC-RSO@icao.int.

Agenda Item 4: States' PBN Implementation Progress

IP/01 – UPDATE ON PBN IMPLEMENTATION IN AUSTRALIA

Australia provided an update on PBN implementation activities in Australia. The transition of RNP APCH Chart identification is on schedule with expected completion Nov 2023. The Continuous Descent Operations (CDO) trial for managed descent has been successful so far and is now approved for expansion to capture further data.

The Secretariat appreciated that sequencing technique presented by Australia was quite simple and workable subject to availability of airspace.

India enquired the volume of traffic on this route and if it could be workable in high volume traffic environment. Australia explained that the route is quite busy.

IATA appreciated the work of Australia and informed the meeting that several IATA member airlines are participating in the trial operation.

IP/02- PBN IMPLEMENTATION PROGRESS IN INDIA

India presented the progress of PBN implementation including publication of two LPV procedures, eight LPV procedures at various level of validation and nineteen LPV procedures planned to be implemented. India also informed the meeting several RNP 2 routes have been published with 20 nm longitudinal separation. This paper also presented the challenges and lessons learnt in PBN implementation.

IATA reminded all States of previous discussions in ICAO forums that the best available ANS infrastructure-based separation as described in the seamless ANS plan should be deployed relative to the airspace category. Specifically, in Category S airspace, surveillance separation standards should be utilized in place of 20nm longitudinal spacing on RNP 2 routes.

On the challenge of FPD courses, the Secretariat explained that FPP and COSCAP-SA, which are State funded programs should be approached for this kind of course.

The Secretariat further explained that specimen charts are already available in ICAO charting Manual and information to be promulgated are described in Doc 8168, Vol-II, which should be the basis for depiction on chart. Other important information should be published in the relevant section of AIP.

IP/03- PBN IMPLEMENTATION PROGRESS IN INDONESIA

Indonesia presented the progress of PBN implementation and the updated PBN implementation plan. This paper also presented the challenges and lessons learnt in PBN implementation.

The Secretariat enquired the involvement of stakeholders in making PBN implementation plan to which Indonesia explained the process followed.

The Chairman appreciated the effort of Indonesia in participation of Stakeholders, PBN training for ATCOs and certification of air operators.

IATA informed the meeting about the fleet equipage survey data available with them and that IATA was willing to collaborate with States on this to improve the PBN implementation in a given airspace.

Vietnam wanted to know about the design of RNP AR APCH procedures in Indonesia. Indonesia explained that it was Govt to Govt project.

Philippines inquired if the challenges in handling mixed conventional and PBN routes in an airspace is both for En-route and terminal phase and what separation was used. Indonesia confirmed that it is both in En-route and terminal. Indonesia confirmed separation based on ANS infrastructure was provided.

IP/04- PBN IMPLEMENTATION PROGRESS IN MALAYSIA

Malaysia presented the progress of progress of Regional Transition Plan for RNP APCH Chart Identification from RNAV to RNP in Malaysia.

IP/05- PBN IMPLEMENTATION PROGRESS IN MYANMAR

Myanmar presented the progress of PBN implementation and the updated PBN implementation plan including PBN Operational approval status, PBN Training for ATC and expressed Civil-Military Cooperation is very useful for proposed implementation of RNP 2 city pair routes. This paper also presented the challenges and lessons learnt in PBN implementation.
The chairman expressed that there were quite a few challenges in terms of adequate number of flight procedure designers and other professionals.
The Secretariat commented that low percentage of PBN ops approval may be due to operators not forthcoming for PBN ops approval.

IP/06- PBN IMPLEMENTATION PROGRESS IN PAKISTAN

Pakistan informed the meeting that that it had completed implementation of RNP APCH procedures & PBN SIDs procedures at all functional airports and PBN STARs have been implemented at all major airports based on RNP 1 navigation specification incorporating the concept of CCO & CDO technique.
The Secretariat enquired from Pakistan about the strategy for SBAS in their country. Pakistan explained that they are conducting the preliminary studies for implementation of SBAS within Pakistan airspace. Subject to the feasibility in consultation with other agencies, the spade work for preparation of SBAS coverage will be conducted in future.
Vietnam enquired if Pakistan designed RNP AR APCH procedures, Pakistan informed that no they do not have this capability.
The Secretariat informed the meeting that ICAO Doc 9905 provides adequate guidance for design of RNP AR APCH, however its implementation may need support of some experienced State, agency, or vendor.

IP-07-PBN Implementation Status Brunei Darussalam

Brunei Darussalam presented the update on the planning and limitations/challenges of PBN Implementation for Department of Civil Aviation Brunei Darussalam.
The Chairman commented that there are quite a few challenges in human resource front. Brunei confirmed that.

IP-09 - RNAV to RNP Chart Transition Status- Philippines

Philippines presented status of transition from RNAV to RNP Transition of RNP APCH Chart Identification and informed the meeting that the transition has been completed within the target date for all the charts including PBN SIDs/STARs.

Update from Bangladesh

Bangladesh reported that 44 aircrafts out of 49 Bangladeshi registered aircrafts have been accorded PBN OPS Approval for various specifications, which amounts to 89.8% of the total capabilities. It was further informed that they have been waiting for last 3 years to publish the RNP APCH for 6 RWYs of 3 Domestic Airports for which designs were fully completed, but those are not yet published since flight validation has not been conducted.

The Chairman suggested to involve airlines of Bangladesh for this task to which Bangladesh informed about the complexity of database availability for the procedures.
The Secretariat reminded the meeting about provisions of ground and flight validation in Doc 9906.

Agenda Item 5: PBN Training for ATC

WP06 – PBN Training for ATC (Secretariat)

5.1 The Secretariat informed the meeting that although Baro-VNAV approaches provide significant safety benefits over conventional LOC, NDB and VOR approaches as they provide vertical guidance; however, they are significantly less robust than geometric PBN approaches enabled by SBAS, and GBAS as they depend on temperature & QNH setting. The main vulnerability of Baro-VNAV approaches lies in their dependence on correct altimeter setting, which involves multiple human interventions such as,

- determination of the local QNH by the meteorological service provider,
- publication of the local QNH in ATIS,
- transmission of the local QNH by ATC to the flight crew,
- altimeter setting by the flight crew, and
- correction for the effects of temperature on the atmospheric pressure at aircraft altitude.

Moreover, several reports of unsafe situations in the final approaches due to incorrect QNH setting have come to light over the years in various parts of the world. Mitigation for this is PBN training for ATC especially importance of correct QNH setting in Baro-VNAV needs more emphasis.
Vietnam, Bangladesh and Nepal commented about remote altimeter setting. The Secretariat clarified that if local QNH is not available at any airport, LNAV/VNAV procedure cannot be authorized.
India enquired how frequently the weather information needed to be passed to an aircraft. The Secretariat clarified that these conditions are prescribed in the relevant ICAO document. Philippines informed the meeting that as per Doc 4444, significant changes in wind speed and direction shall be passed to the aircraft on final approach.

WP07 – PBN Training for ATCOs (India)

5.3 India presented a paper, which describes the PBN training approach/practice followed for ATCOs in India. The Indian ATCOs are being sensitized on various PBN concepts prior to implementations of PBN procedures at the Airports considering ATC is the most critical link for safe and effective implementation of PBN being associated with real time operations. During this structured training program, the topics recommended in Doc9613 are generally considered.
The Chairman commented that the presentation covered various aspects of ATC training.

WP-10- PBN Considerations for ATC- Nav Canada

Nav-Canada explained the training methodology used for PBN training of ATCOs in terminal and approach procedures, including significance of correct QNH setting and temperature limitation in Baro-VNAV procedures. This presentation also covered PBN training for ATC for implementation of RNP AR and EoR.
The Chairman appreciated the efforts of Nav-Canada and commented that the presentation was quite comprehensive.

IP-08-PBN Training for ATC in Indonesia

Indonesia presented an update on the progress of Indonesia's PBN Training for ATC. The objective of the training is to facilitate the application of PBN procedures through the improvement of understanding of the PBN concept and the PBN procedures by air traffic controllers. This will also improve the efficiency and capacity of airspace and the safety of operations, which will accelerate PBN implementation in Indonesia.
The Chairman enquired on the number of training batches; Indonesia confirmed that these were number of ATC training batches conducted during the period.

Agenda Item 6: Established on RNP AR (EoR)
WP-08- Established on RNP AR(EoR)- Secretariat

The secretariat introduced to the meeting the concept of Established on RNP AR APCH, which is a procedure for simultaneous parallel independent approach that takes advantage of benefits of RNP AR. The operation considers aircraft stabilized on an RNP AR APCH to be similarly established to aircraft flying an ILS for the purpose of simultaneous parallel approach separation. Vertical separation is not required between an aircraft "Established" on a RNP AR APCH after a nominated point and an aircraft established on the approach course or track to an adjacent parallel runway. Benefits of EoR is flexibility in the design of simultaneous approach operations, shorter track miles and optimized descent profiles compared to traditional SOIR, increased operational efficiency in terms of runway or airspace capacity and environmental benefits such as a reduction in noise and greenhouse gas emissions.

WP-09 -EoR-Nav Canada

Nav-Canada provided a detailed presentation of various aspects of EoR implementation at two busy airports in Canada, Calgary and Toronto Pearson International Airports. The presentation covered Initial concept development, Regulatory process, Design consideration, Operational consideration, Safety aspects and additional deployments to implement EoR at these airports. ATC Training for EoR implementation was also explained. In Calgary, each RNP AR approach reduces flying time by 3-4 minutes over conventional "straight in", Saving approximately 9-11 track miles. This resulted in saving 250 000 track miles and consequent reduction of 4.1 million kg CO2 emissions.
India enquired if there are only RNP AR APCH procedures only on the runways where EoR has been implemented, Nav-Canada clarified that there are RNP APCH and ILS also on those runways.
Vietnam wanted to know if there was runway through put improvement with EoR implementation. Nav-Canada clarified that there was no significant runway through put improvement, but it was maintained. However, there was significant track mile saving and subsequent reduction in emission.
Vietnam also enquired about type of terrain data used in the RNP AR procedure design. Nav-Canada informed that it was known to him.

WP-11_EoR_Concept_Overview-NAVBLUE

NAVBLUE presented an overview of EoR concept covering operational requirements, such as, Aerodrome requirement including minimum distance between the parallel runways, ATS requirement for Monitoring controller in case of parallel runway operational and Instrument approach procedures

consideration in respect of evaluation of PAOAS (parallel Approach Obstacles Assessment surface) to protect the breakout procedures.

WP-12_EoR_RNPAR_Approval_NavBLUE

NAVBLUE presented requirements for RNP AR operation approval process as per Approval for RNP AR operations based on EASA AIR-OPS Nov 2022 including Flight Operations Safety Assessment (FOSA).

The chairman appreciated the presentation by NavBlue and thanked him for his effort.

Agenda 7 – Any Other Business (AOB)

WP-14- Introduction of APAC FPP (Flight Procedure Program)

FPP introduced its organizational structure, member States, user States, activity in the flight procedure design field, courses being conducted, courses planned for the next year, customized courses for the willing States etc.
Pakistan suggested that FPD training should preferably be onsite to get required skill of procedure design as there are various practical training. FPP Manager acknowledged the requirement of onsite training. The Chairman also supported the onsite training and suggested that theoretical portions may be online and practical training should be onsite to ensure effective learning.

Next meeting

7.1 The Chairperson proposed that PBNICG/11 would tentatively be held in March/April 2024 and invited the States to host the meeting in person or in hybrid mode. States willing to host may contact APAC-RSO@icao.int.

Closing of the meeting

7.2 The Chairperson thanked the participants for their contributions and expressed appreciation to the ICAO Asia/Pacific Regional and Regional Sub-Office for their support.

7.3 The Chief of ICAO APAC RSO, Mr. Raphael Guillet thanked all the participants and ICAO secretariat personnel for making this meeting meaningful.

International Civil Aviation Organization

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(Hybrid, 19 – 21 April 2023)

List of Participants

No	Name	Title/Organization	Email
	Australia (1)		
1.	Ms. Colleen Kitson (On-line)	Senior ATS Specialist Airservices Australia	colleen.kitson@airservicesaustralia.com
	Bangladesh(2)		
2.	Ms. Sabera Rahman (On-line)	Deputy Director (ATM) CAAB	mitasr@gmail.com
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	Brunei Darussalam(2)		
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	Cambodia (3)		
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List of Participants

No	Name	Title/Organization	Email
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10.	Mr. Garnet Miller (On-site)	Manager, Airspace Modernization Nav Canada	millerg@navcanada.ca
	China (8)		
11.	Mr. Bihe Wang (On-line)	Administration Staff CAAC	bh_wang@caac.gov.cn
12.	Ms. Ran Wang (On-line)	Deputy Director, Flight Procedure Office Airspace management Center ATMB,CAAC	wangran@atmb.net.cn
13.	Mr. Jiayi Peng (On-line)	Assistant Airspace management Center ATMB,CAAC	1466940598@qq.com
14.	Mr. Yu lei (On-line)	Engineer ATMB,CAAC	yulei@atmb.net.cn
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List of Participants

No	Name	Title/Organization	Email
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16.	Ms. Yannan Qi (On-line)	Instructor Civil Aviation University of China	ynqi@cauc.edu.cn
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18.	Mr. Xin Ma (On-line)	Associate Professor Civil Aviation Flight University of China	13096239379@163.com
	Hong Kong China(2)		
19.	Mr. Po Keung Cheng (On-site)	Chief Air Traffic Control Officer Civil Aviation Department Hong Kong	gpkcheng@cad.gov.hk
20.	Mr. Pik Hung Arthur Chan (On-site)	Project Officer Civil Aviation Department of Hong Kong SAR, China	aphchan@cad.gov.hk
	India(6)		

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List of Participants

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23.	Capt. Adhiraj Yadav (On-site)	SFOI DGCA India	Adhiraj.dgca@nic.in
24.	Mr. Debotosh Moitra (On-site)	General Manager Airports Authority Of India (AAI)	dmoitra@aai.aero
25.	Mr. Ashish Asthana (On-site)	DGM(ATM-FPD) Airports Authority Of India (AAI)	ashisha@aai.aero
26.	Mr. Soumen Podder (On-site)	Assistant GM(ATM) Airports Authority of India (AAI)	soumen72@aai.aero
	Indonesia (4)		
27.	Mr. M. Riza Semaryan Lubis	Inspector of Air Navigation DGCA Indonesia, Directorate of Air Navigation	mrizaslubis@gmail.com
28.	Mr. Reynold Widodo	Flight Operation Inspector DGCA Indonesia	64reynold@gmail.com

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List of Participants

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	Malaysia (2)		
31.	Mr. Hamizun Bin Jenal (On-site)	Principal Assistant Director Civil Aviation Authority of Malaysia	hamizun@caam.gov.my
32.	Mr. Hairul Anuar Mohd Jamil (On-site)	Air Traffic Controller Civil Aviation Authority of Malaysia	hairulanuar@caam.gov.my
	Maldives (2)		
33.	Mr. Hussain Didi (On-site)	Associate General Manager Maldives Airports Company Ltd	didi@macl.aero
34.	Mr. Ibrahim Saeed (On-site)	Flight Procedure Design Specialist Maldives Airports Company Ltd	i.saeed@macl.aero
	Mongolia (3)		

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List of Participants

No	Name	Title/Organization	Email
35.	Ms. Batbulgan Gombo (On-site)	Director of ATSD Civil Aviation Authority of Mongolia	batbulgan.g@mcaa.gov.mn
36.	Mr. Odgerel Chagnaadorj (On-site)	Director, Air Navigation and Airports Policy Regulation Department Civil Aviation Authority of Mongolia	odgerel.ch@mcaa.gov.mn
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List of Participants

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Attachment 2

List of WPs and IPs for PBNICG/10

Working Papers (WPs)

1. WP01 - Provisional Agenda (Secretariat)
2. WP02 - Provisional Order of Business (Secretariat)
3. WP03 - Global and Regional PBN Update (Secretariat)
4. WP04 - Moving to True North (Secretariat)
5. WP05 - Revised Navigation Strategy-APAC(Secretariat)
6. WP06 - PBN Training for ATC(Secretariat)
7. WP07 - PBN Training to ATCOs - India
8. WP08 - Established on RNP AR(EoR)- (Secretariat)
9. WP09 - EoR-ICAO APAC - Nav Canada
10. WP10 - PBN Considerations for ATC-ICAO APAC - Nav Canada
11. WP11- EoR – Concept - Overview - NavBLUE
12. WP12- EoR – RNPAR - Approval - NavBLUE
13. WP13- Implementation Status of Regional RNP transition plan (Secretariat)
14. WP14- Introduction of APAC FPP

Information Papers (IPs)

1. IP01 - PBNICG 10 Update on Australian PBN Implementation
2. IP02 - PBN Implementation India
3. IP03 - PBN Implementation Progress in Indonesia
4. IP04 - Malaysia Regional Transition Plan Progress.
5. IP05 - Progress of PBN Implementation in Myanmar
6. IP06 - Pakistan PBN progress
7. IP07 - PBN Implementation Status in Brunei Darussalam
8. IP08-PBN Training for ATC in Indonesia
9. IP09 – RNAV to RNP chart Transition - Philippines

REVISED NAVIGATION STRATEGY FOR THE ASIA/PACIFIC REGION

Considering:

a) Performance Based Navigation (PBN) as one of the Global priority of ICAO;

b) PBN implementation in Approach and Terminal area as one of the key ASBU elements to achieve capacity and efficiency;

c) ICAO Assembly resolution A37-11 on Global PBN Goals to implement PBN in all phases of flight;
d) the guidance/provisions contained in the Performance Based Navigation Manual (Doc 9613) for enroute approach, landing and departures operations;

e) operators are certified for PBN operations as applicable;

f) GNSS is the primary navigation system for RNP;

g) APV operations may be conducted with either BARO-VNAV or SBAS;

h) GBAS and SBAS able to support Category I operation, and GBAS is able to support up to Category II and III operations ;

i) ILS is capable to support precision approach and landing including Cat II/III operations ;

j) the need to maintain aircraft and ground interoperability both within the Region and between the Asia/Pacific Region and other ICAO regions and to provide flexibility for future aircraft equipage;

k) single-frequency GNSS may be susceptible to radio frequency interference and ionospheric disturbances and use of dual-frequency multi-constellation(DFMC) GNSS may mitigate risks caused by narrow band frequency interference and ionospheric disturbances.

Strategy

i) Transition from traditional terrestrial-based instrument flight procedures to PBN operations in En-route, Terminal and Approach

ii) Implement APV operation with Baro-VNAV or SBAS(LPV)

iii) implement SBAS/GBAS for precision approach Cat I and GBAS for Cat II/III where it is operationally and economically beneficial;

iv) retain ILS for precision approach especially for Cat II/III operations as long as it is operationally acceptable and economically beneficial;

v) rationalize terrestrial navigation aids, retaining a minimum network of terrestrial aids necessary to maintain safety of aircraft operations;

vi) protect all the Aeronautical Radio Navigation Service (ARNS) frequencies through education, appropriate regulation and the active detection and elimination of intentional and unintentional interference sources.;

vii) ensure civil-military interoperability so that military aircraft is also capable of operation in PBN environment as far as practicable;

viii) continue monitoring the development of GNSS elements and alternative position, navigation and timing, such as GNSS constellation and DFMC technology;

ix) strengthen protection on the ILS Critical and Sensitive Areas in three-dimensional volumes in accordance with ICAO Annex 10;

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