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INTERNATIONAL CIVIL AVIATION ORGANIZATION

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**TENTH MEETING OF ASIA PACIFIC PERFORMANCE BASED NAVIGATION
IMPLEMENTATION COORDINATION GROUP (APAC PBNICG/10)
19-21 April 2023, Bangkok**

WP/02- Global & Regional PBN Updates

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Global & Regional PBN Updates

Assembly Resolution A37-11

States complete a PBN implementation plan as a matter of urgency to achieve:

- implementation of RNAV and RNP operations (where required) for en route and terminal areas;
- implementation of approach procedures with vertical guidance (APV) (Baro-VNAV and/or augmented GNSS), including LNAV only minima, for all instrument runway ends, either as the primary approach or as a back-up for precision approaches by 2016 with intermediate milestones as : 30 per cent by 2010, 70 per cent by 2014; and
- implementation of straight-in LNAV only procedures, for instrument runways at aerodromes where there is no local altimeter setting available and where there are no aircraft suitably equipped for APV operations with a maximum certificated take-off mass of 5 700 kg or more;

Global & Regional PBN Updates

Declaration of Asia Pacific Ministerial Conference on Civil Aviation (Beijing, China from 31 January to 1 February 2018)

2.0 Air Navigation Services

2.1 Commit to implementation by 2022 of the Asia/Pacific Seamless Air Traffic Management (ATM) Plan to enhance ATM capacity and harmonization in the Region, including a focus on:

- (a) Transitioning from Aeronautical Information Service (AIS) to Aeronautical Information Management (AIM) System;
- (b) Performance Based Navigation (PBN) implementation

Global & Regional PBN Updates

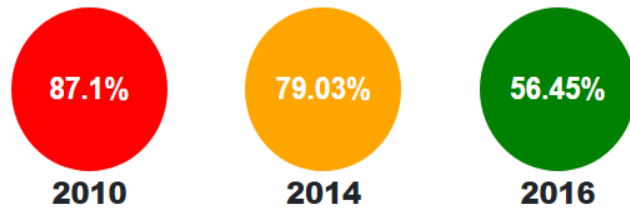
States in APAC region with no PBN Implementation plan, or which has not been received by ICAO:

- Afghanistan
- Bhutan
- Brunei Darussalam
- Cook Islands
- Kiribati
- Marshall Islands
- Micronesia (Federated States of)
- Nauru
- Palau
- Samoa
- Solomon Islands
- Timor-Leste
- Tuvalu
- Vanuatu

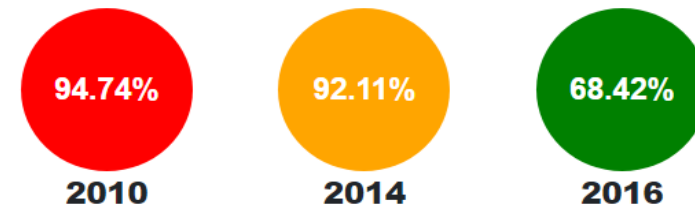
Global & Regional PBN Updates

PBN Implementation (Approach Procedures) Trend

Percentage of States in World meeting the Resolution Targets for Applicable Years



Percentage of States in APAC meeting the Resolution Targets for Applicable Years



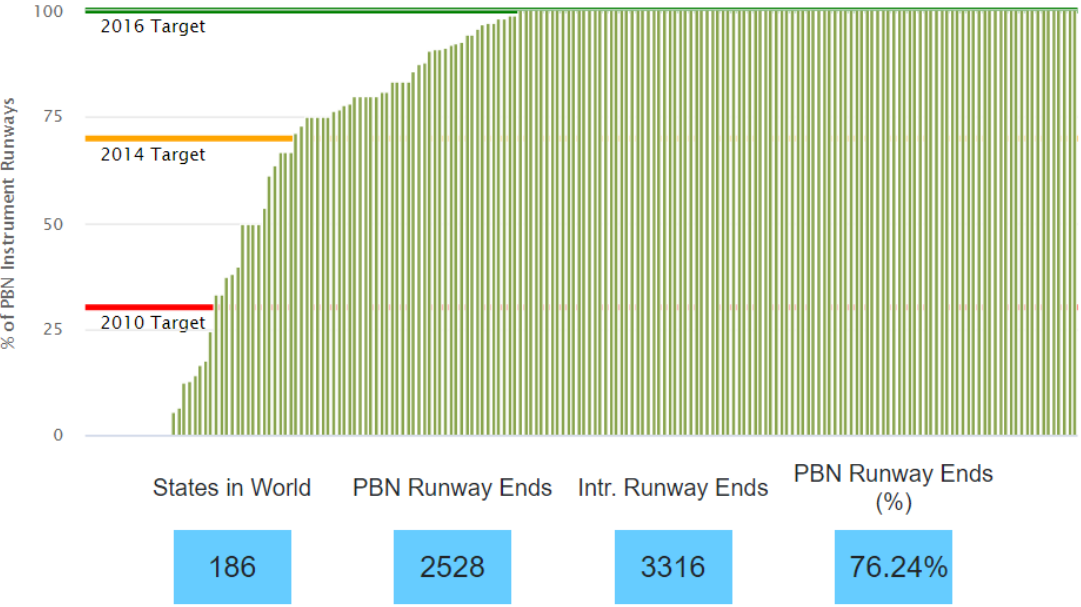
Note: This data is taken from iSTARS (<https://istars.icao.int/Sites/PBN>), updated as on March 2023 and is for International Aerodromes as listed in the APAC ANP.

Global & Regional PBN Updates

PBN Implementation (Approach Procedures) Trend

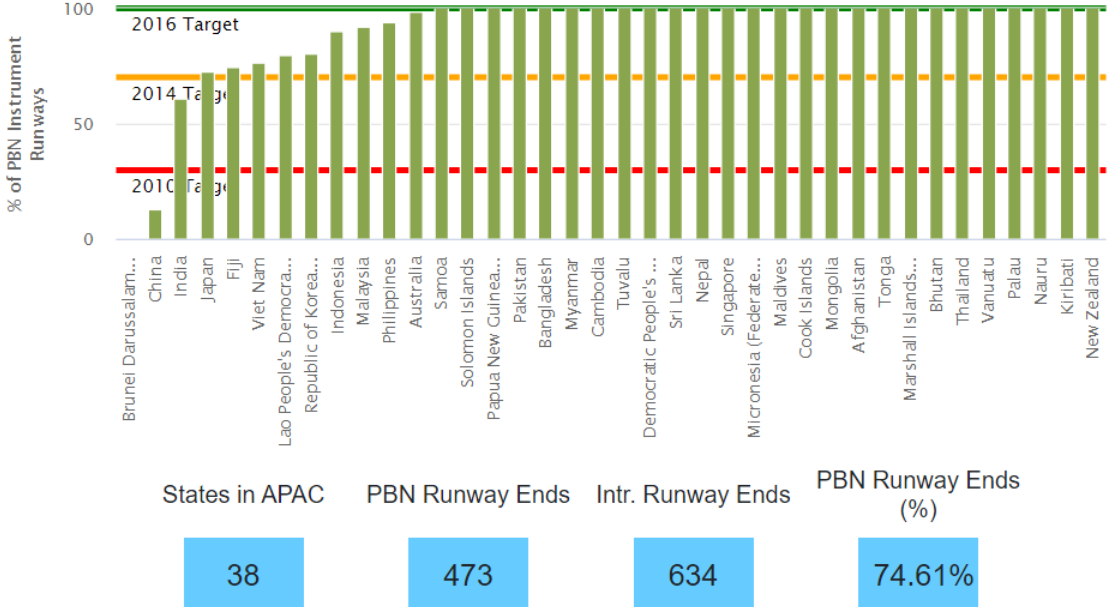
Regional PBN Implementation

% of PBN Runways per Country for World



Regional PBN Implementation

% of PBN Runways per Country for APAC

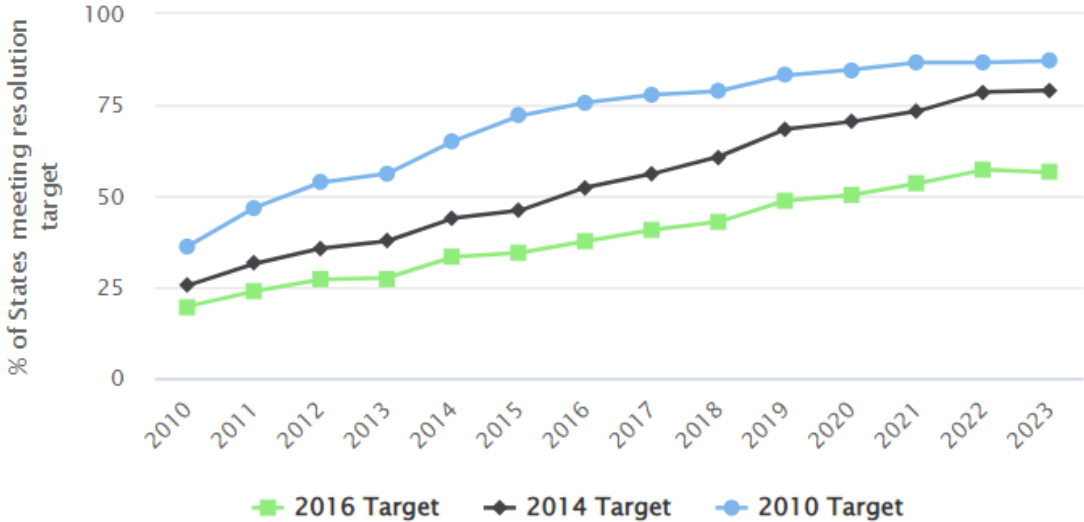


Global & Regional PBN Updates

PBN Implementation (Approach Procedures) Trend

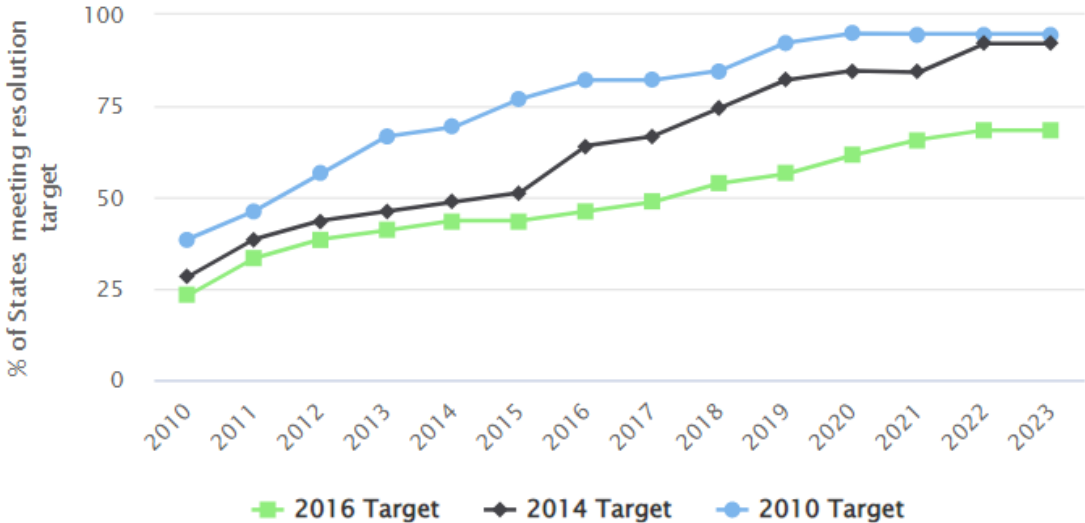
Resolution Target Trends

% of States in World meeting the respective Resolution Targets



Resolution Target Trends

% of States in APAC meeting the respective Resolution Targets

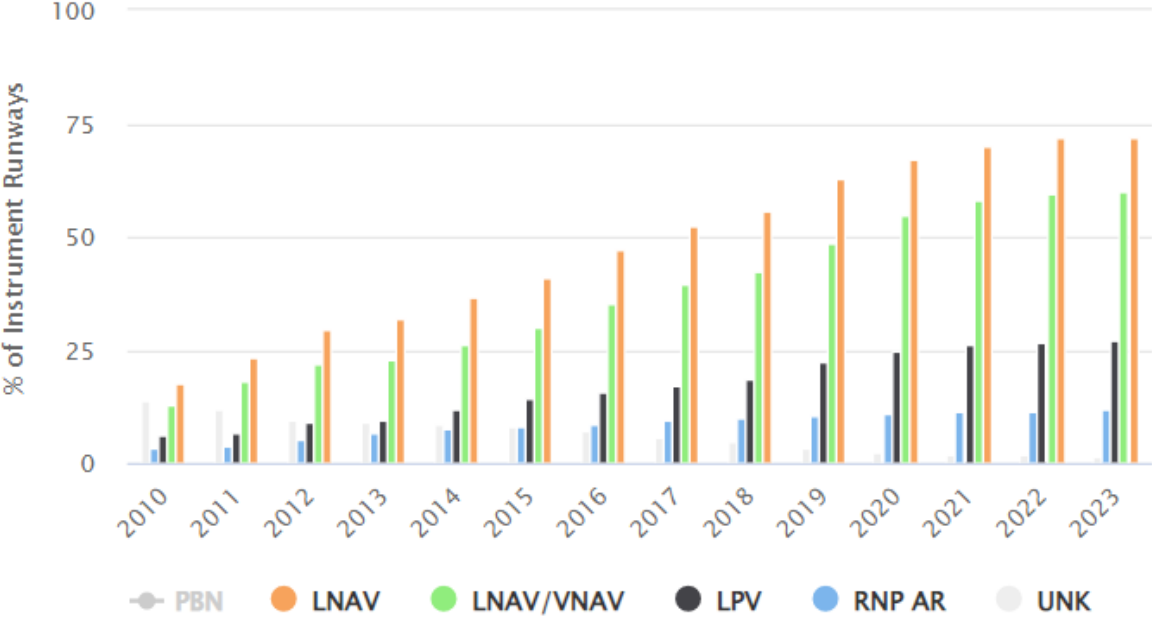


Global & Regional PBN Updates

PBN Implementation (Approach Procedures) Trend

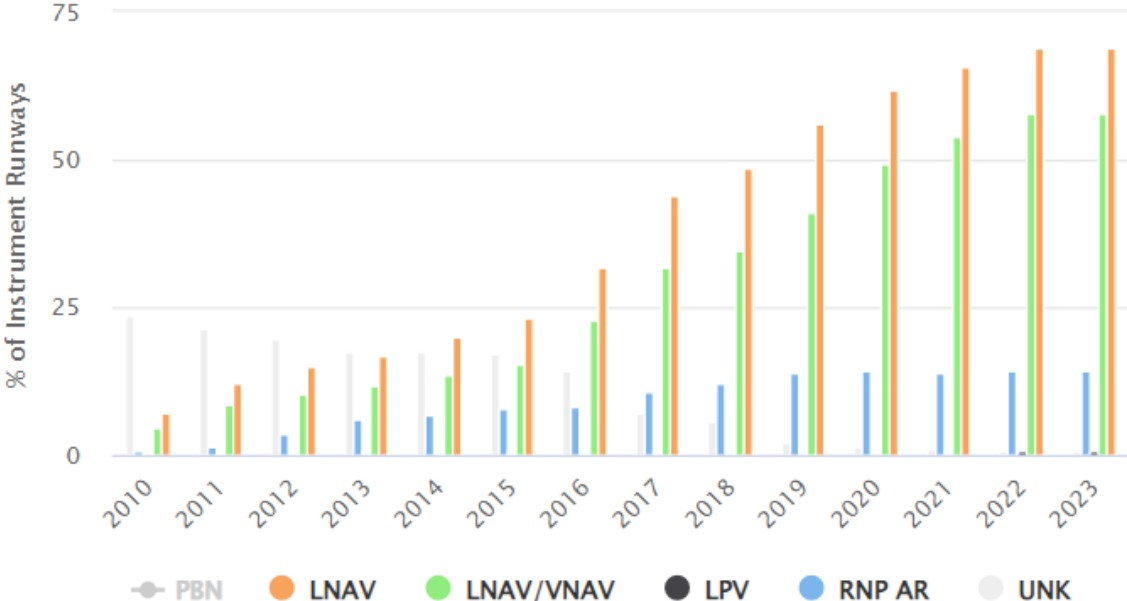
PBN Trends

% of PBN Runways by type for World



PBN Trends

% of PBN Runways by type for APAC

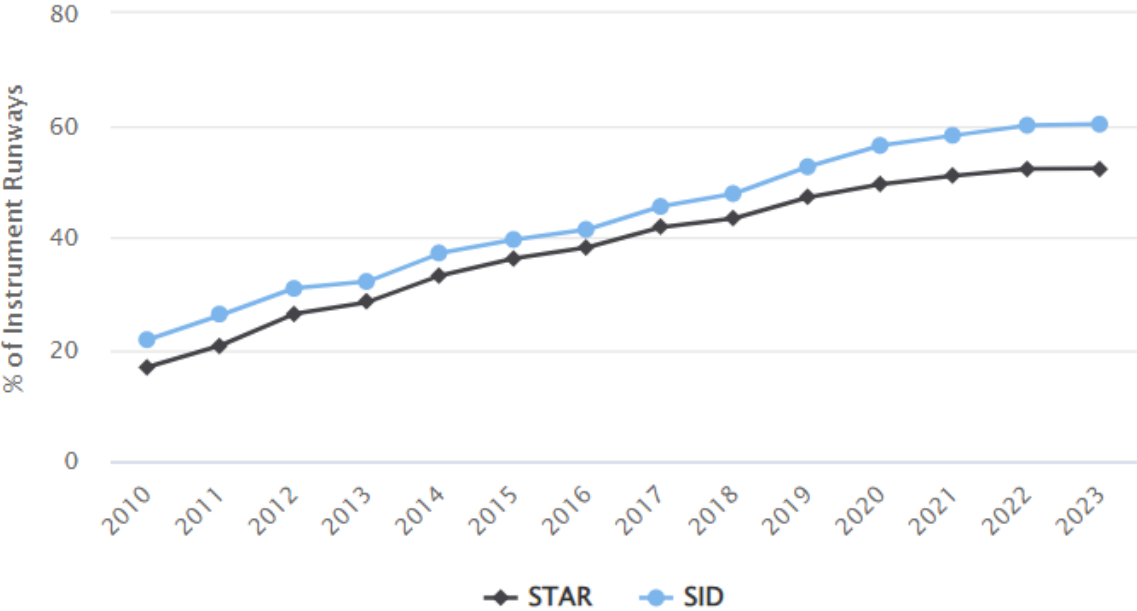


Global & Regional PBN Updates

PBN Implementation (Terminal Procedures) Trend

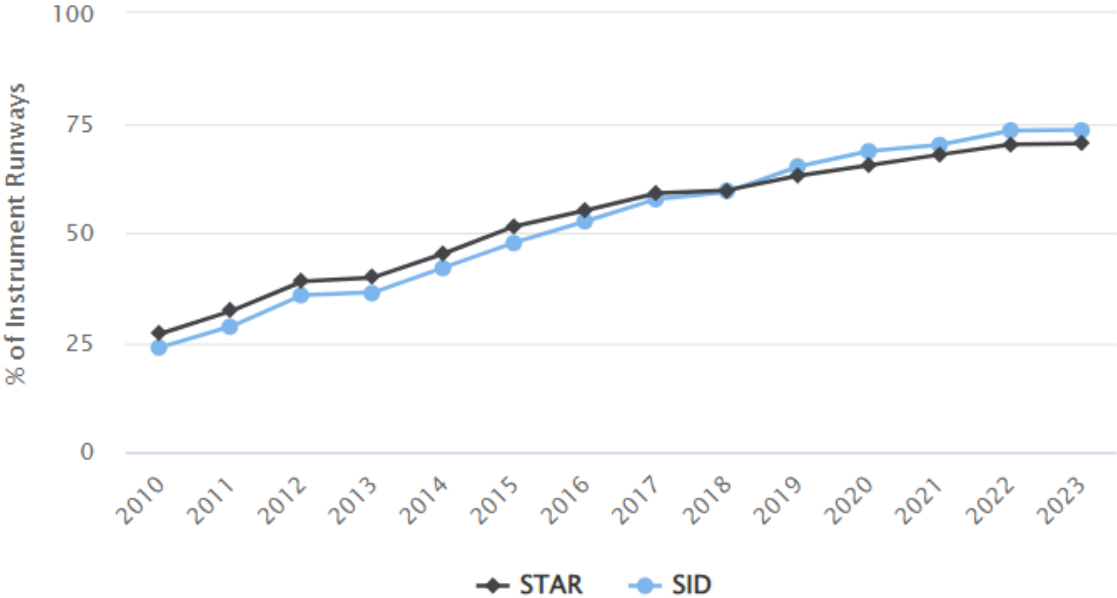
SID/STAR Trends

% of SID/STAR Runways for World



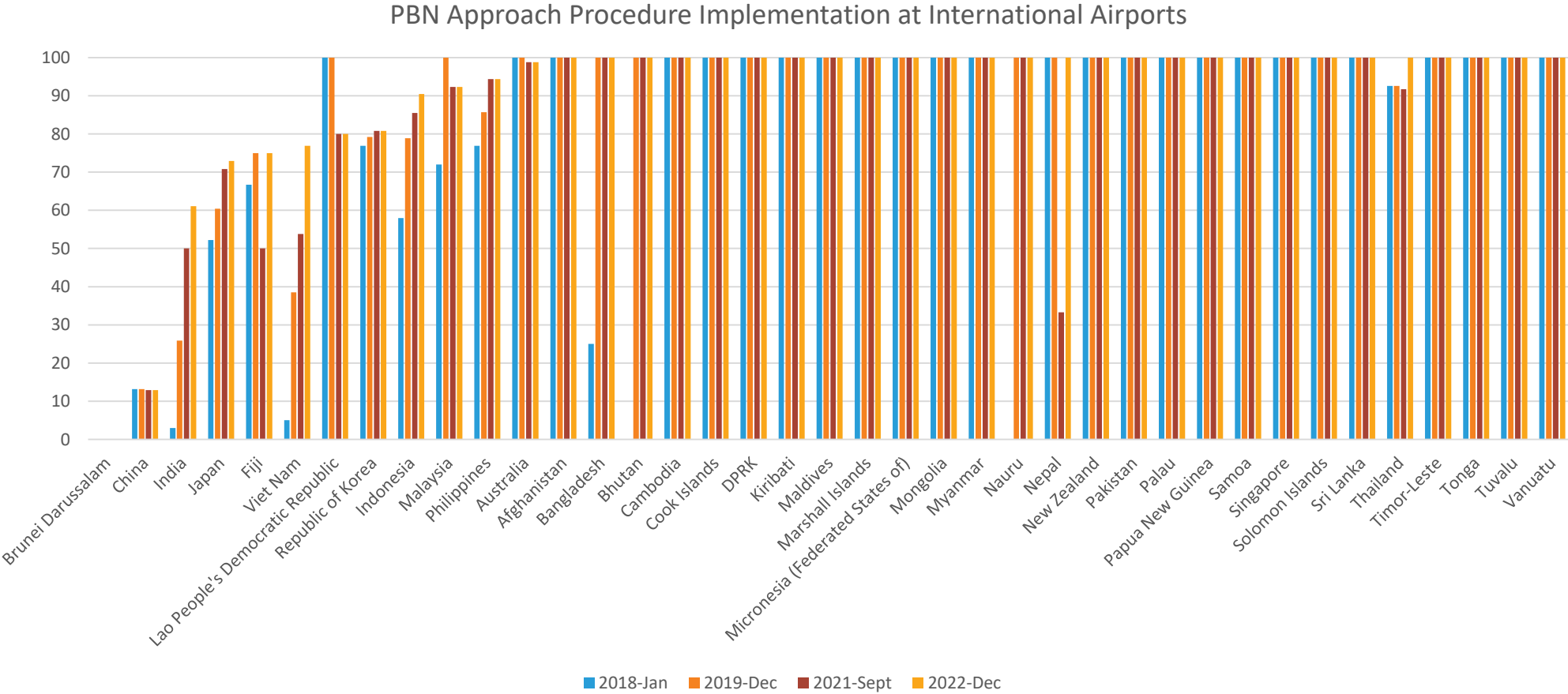
SID/STAR Trends

% of SID/STAR Runways for APAC



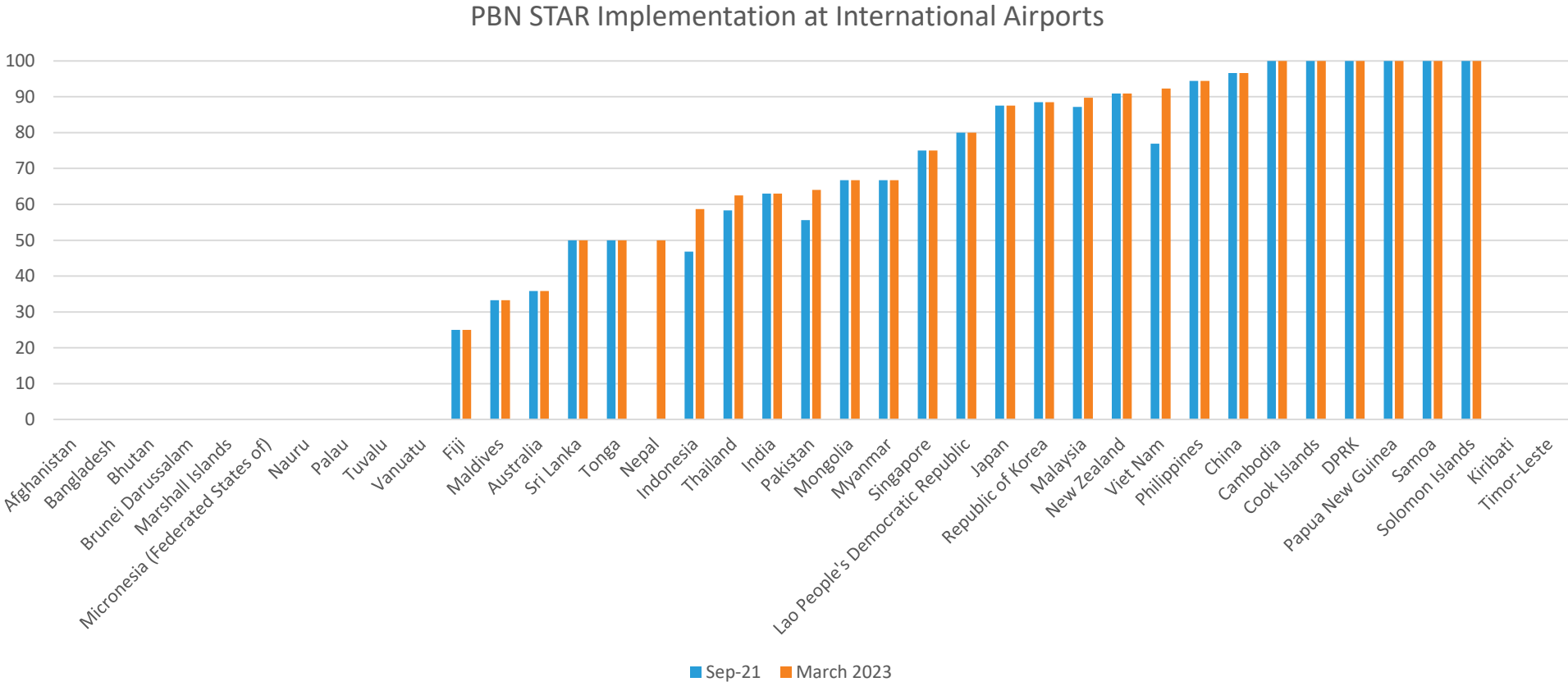
Global & Regional PBN Updates

PBN Implementation (Approach Procedures) APAC Trends



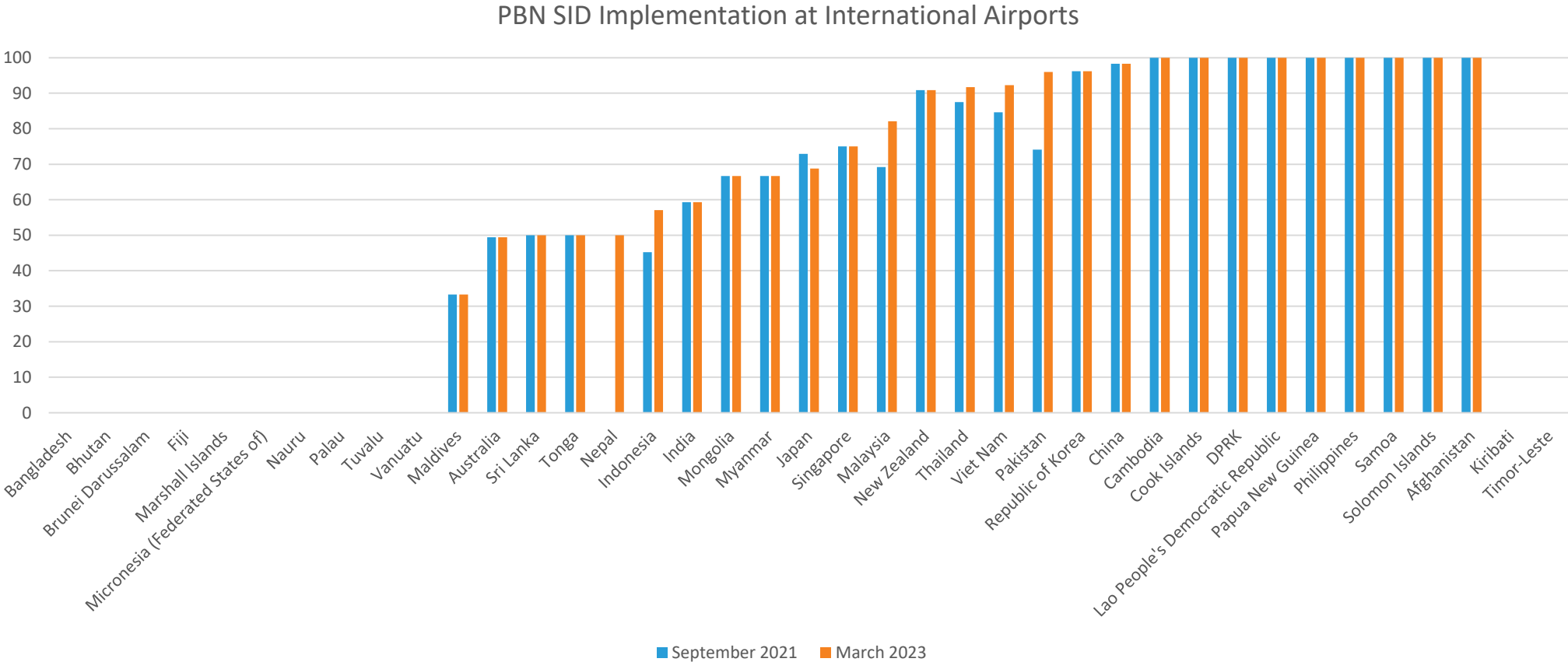
Global & Regional PBN Updates

PBN Implementation (Terminal Procedures) APAC Trend



Global & Regional PBN Updates

PBN Implementation (Terminal Procedures) APAC Trend



Global & Regional PBN Updates

PBN Procedures Implementation Analysis

- Implementation of LNAV/VNAV in APAC is still lagging behind (57.9% vs. 60% for World)
- APAC Regions is ahead of the global average in PBN SID/STAR implementation
 - 73.5% for SID and 70.3% for STAR
 - Global average 60.2%(SID) & 52.3%(STAR)

Global & Regional PBN Updates

5th Edition of PBN Manual(2023 Unedited)



Doc 9613 Performance-based Navigation (PBN) Manual

Fifth Edition (Advance unedited) — 2023

Disclaimer

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Approved by and published under the authority of the Secretary General

INTERNATIONAL CIVIL AVIATION ORGANIZATION

5th Edition of PBN Manual(2023 Unedited)

The 5th Edition has been updated to reflect new requirements, such as the use of RF legs and the introduction of RNP AR departures, as well as to provide additional or revised guidance on a range of subjects. Specific changes include:

- In Vol-1, Part B – Implementation Guidance removed and added as chapter 4.
- Attachment C to Vol-I on Operational Approval removed
- Additional guidance on temperature correction as New Attachment B to Vol-II, containing Temperature Compensation for Barometric VNAV.
- New Attachment D to Vol-II on Magnetic Variation is added.
- New Attachment E to Vol-II on Document references for navigation specifications is added.
- Addition of RNP AR DP criteria and a complete update of RNP AR APCH criteria.
- Recognition of GBAS as a positioning sensor
- Dual frequency multiple constellation(DFMC)

5th Edition of PBN Manual(2023 Unedited)

- clarification of the distinction between RNAV and RNP and related functionality, such as; speed restriction in RNP system.
- changes to the Advanced RNP navigation (A-RNP) specification & additional guidance on the implementation of A-RNP;
 - final approach segment no longer considered a part of A-RNP; and
- updates and additions to aircraft systems and equipment performance, functionality and capability reflecting RTCA or EUROCAE documents
- refinement regarding use of the radius to fix(RF) leg
- development of GNSS reversion capability;
- review of applicable path terminators for navigation specifications, and guidance on combinations of such path terminators in procedure design;
- RNP 0.3 navigation specification now explicitly defined as helicopter only;
- guidance on air traffic control (ATC) status monitoring for GNSS; and
- clarification on the definition and the use of holding capabilities.

Transition to performance-based navigation (PBN) operations in the single European sky(EU)

Regulation (EU) 2018/1048, PBNIR (the implementing regulation for PBN), seeks to transitioning to PBN by June 6, 2030.

Published in 2018, it stipulates that providers of ATM/ANS and operators of aerodromes must implement PBN routes and approach procedures according to specific implementation deadlines, i.e., 3 December 2020, 25 January 2024, and 6 June 2030.

These routes and approach procedures are to be based on the RNAV 1, RNP 1, RNP 0.3, RNAV 5, RNP APCH (to LNAV, LNAV/VNAV and LPV minima) or RNP AR APCH specifications, as required by the PBN IR implementation deadlines.

Global & Regional PBN Updates

Transition to performance-based navigation (PBN) operations in the single European sky

As of 6th June 2030, the PBN IR expressly forbids the use of conventional navigation procedures except in the event of contingencies (e.g., GNSS outages).

In particular, the Regulation restricts CAT I operations supported by ILS, while it requires the implementation of PBN approaches down to LPV minima at all instrument runway ends.

Aircraft operators should consider equipping their aircraft with SBAS avionics supporting RNP APCH operations to LPV minima and training their flight crews accordingly to ensure accessibility to airports in meteorological conditions requiring CAT I operations.

Since PBN cannot enable approach operations below CAT I minima, landing systems (i.e., ILS/GLS) enabling CAT II, CAT IIIA and CAT IIIB operations are expressly permitted after 5 June 2030.

Global & Regional PBN Updates

Transition to performance-based navigation (PBN) operations in the single European sky

PBN IR implementation deadlines

Implementation by 3 December 2020

- RNP APCH or RNP AR to all IREs without PA,
- RNAV 5 for all ATS routes at or above FL150

Implementation by 25 January 2024

- RNP APCH or RNP AR to all IREs, and, where required, RF legs
- For all IREs, RNAV 1 or RNP 1 for at least one established SID/STAR
- For all IREs, RNP 0.3 or RNP 1 or RNAV 1 for at least one established SID/STAR for rotorcraft operations
- RNAV 5 for ATS routes established below FL150
- RNP 0.3 or RNP 1 or RNAV 1 for ATS routes established below FL150 for rotorcraft operations

Implementation by 6 June 2030

- RNAV 1 or RNP 1 applicable to all SIDs/STARs when established
- RNP 0.3 or RNP 1 or RNAV 1 applicable to all SIDs/STARs for rotorcraft operations when established

Questions for discussion

1. What are the constraints for the States in the region to reach 100% PBN implementation as per Assembly resolution A37-11 and Beijing Declaration?
2. Whether the States in the region are satisfied with the quality of procedures published i.e. if LNAV-VNAV or only LNAV have been published?
3. What is the usability of PBN procedures, if not being fully utilized, what are the roadblocks?
4. Whether Safety Assessment with all the stakeholders is being carried out before implementation of the procedures?
5. Whether ATCOs are trained for the implementation of PBN procedures and content of such trainings.
6. What kind of system States use to capture incidents during execution of PBN procedures and what are the mitigation methodology?
7. What should be the strategy for the region in PBN procedure implementation as is being adopted in some other region?

Action by Meeting

The meeting is invited to:

1. note the information presented; and take action, as appropriate; and
2. provide update on the subject in subsequent meetings.



Thank You!