Agenda Item 2 – Global & Regional PBN Updates

V.K. Mishra,
Regional Officer, PBN, APAC

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, as an exception to 2) above, 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;

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

ASIA/PACIFIC SEAMLESS ANS PLAN V3.0

Table 1: Asia/Pacific ASBU Block 0 and Block 1 Priority- PBN

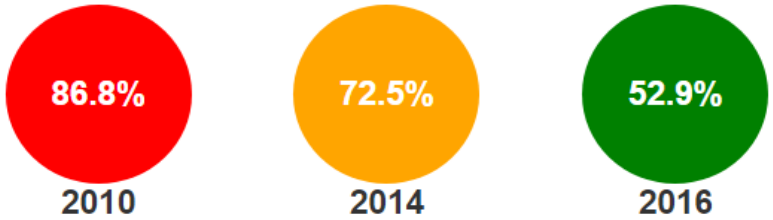
ASBU Element	Priority
APTA-B0/1 – 2: Basic PBN SID and STAR procedures, PBN non-precision approaches (PARS 7.4, 7.5, 7.10, 7.13, 7.14, 7.21) Preferred Aerodrome/Airspace and Route Specifications (PARS)	1
APTA-B0/3 and 6: SBAS/GBAS CAT I precision approach procedures, and PBN Helicopter PinS Operations (PARS 7.5, 7.6, 7.10, 7.14, 7.21)	3
APTA-B0/4 – 5, 7 – 8: CDO (Basic) and CCO (Basic), and performance-based aerodrome operating minima for advanced/basic aircraft (PARS 7.14, 7.19, 7.21)	2
APTA-B1/1 – 5: advanced capability PBN approaches, PBN SID and STAR procedures and performance-based aerodrome operating minima for advanced aircraft with SVGS, CDO and CCO (Advanced) (PARS 7.14, 7.21, 7.22, 7.23)	3

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

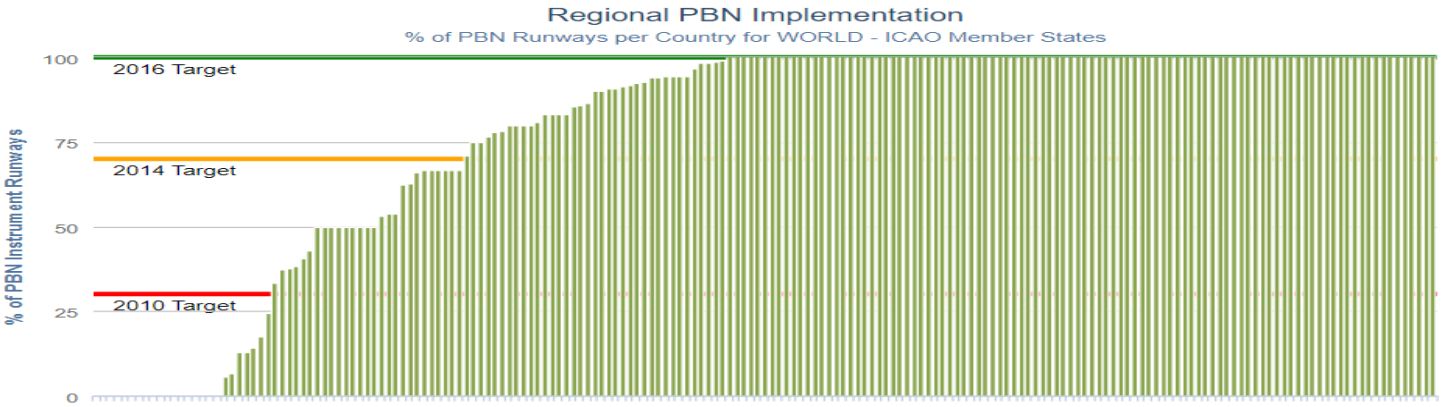
PBN IMPLEMENTATION (Approach Procedures) TRENDS

Percentage of States in WORLD - ICAO Member States meeting the Resolution Targets for Applicable Years



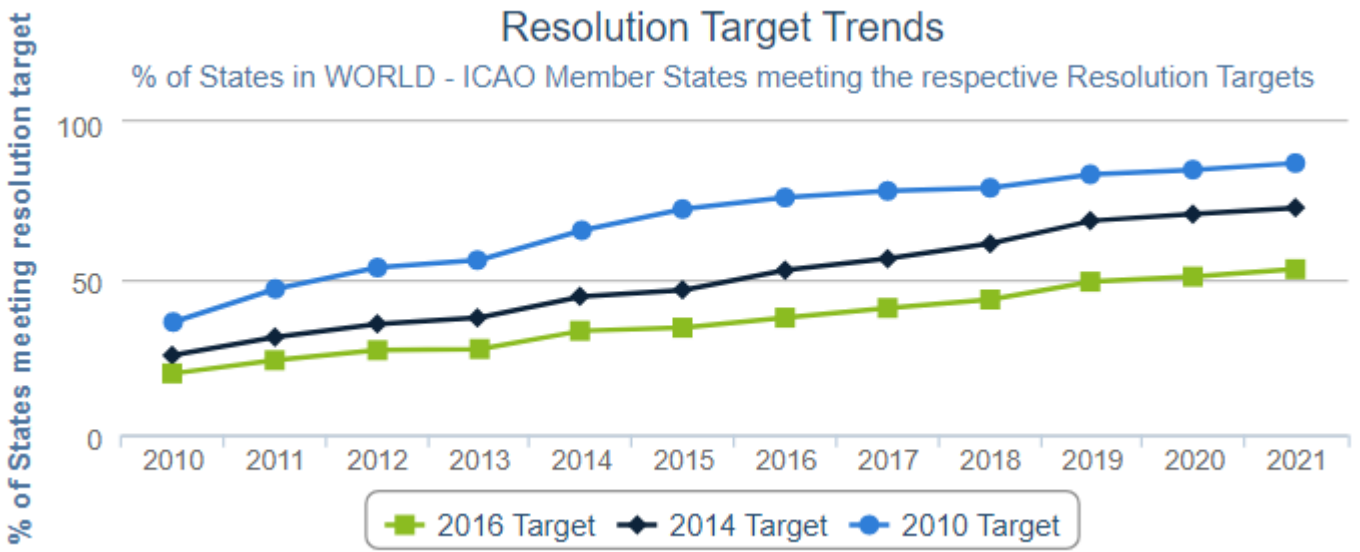
- *This data is taken from iSTARS , updated as on September 2021 and is based on the International Aerodromes as listed in the Regional Air Navigation Plans*

PBN IMPLEMENTATION (Approach Procedures) TRENDS

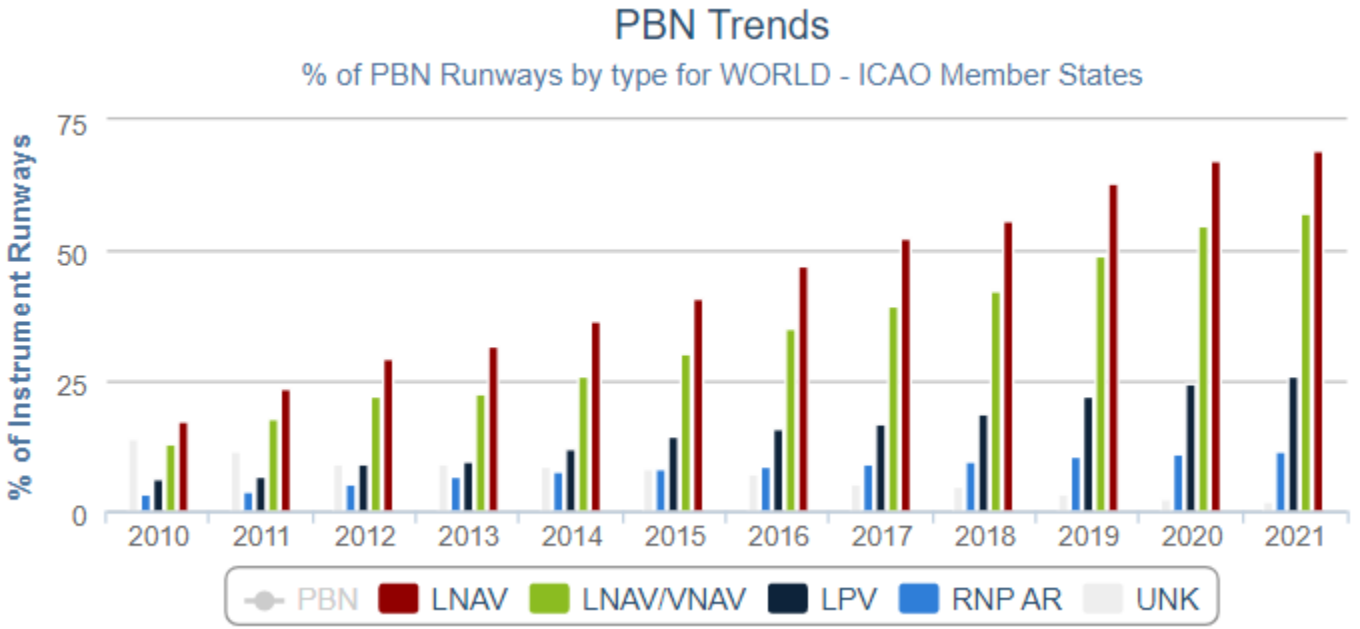


States in WORLD - ICAO Member States	PBN Runway Ends	Intr. Runway Ends	PBN Runway Ends (%)
189	2462	3319	74.2%

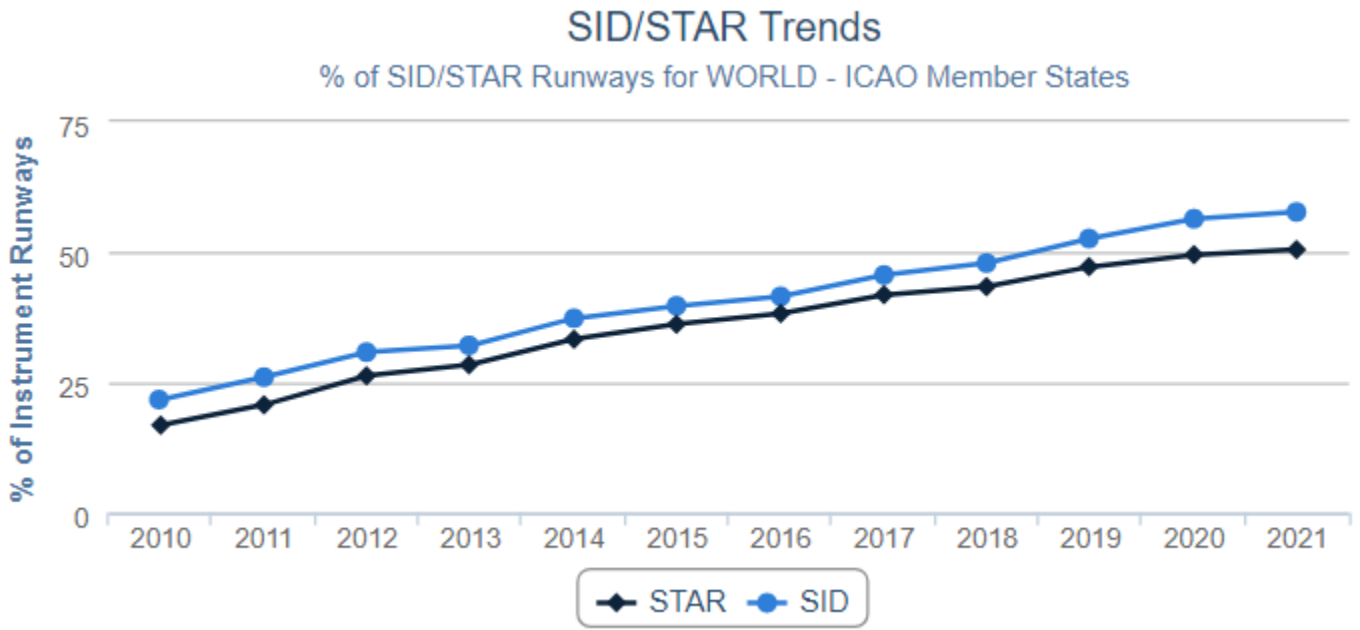
PBN IMPLEMENTATION (Approach Procedures) TRENDS



PBN IMPLEMENTATION (Approach Procedures) TRENDS

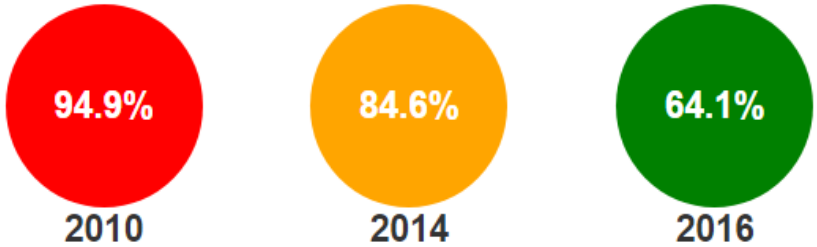


PBN IMPLEMENTATION (Terminal procedures) TRENDS

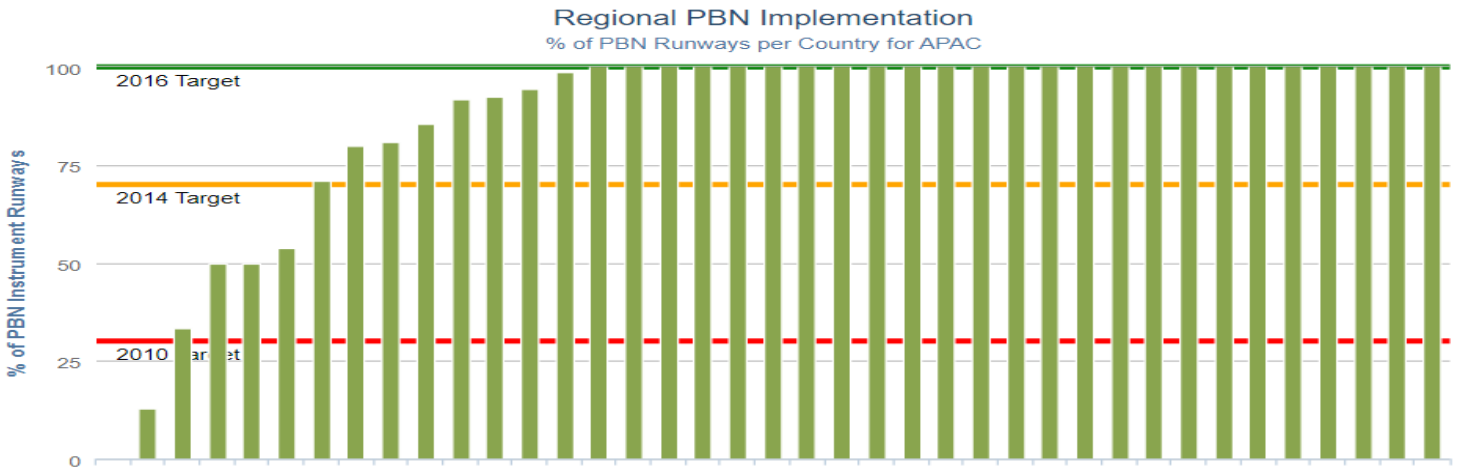


PBN IMPLEMENTATION (Approach Procedures) TRENDS

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

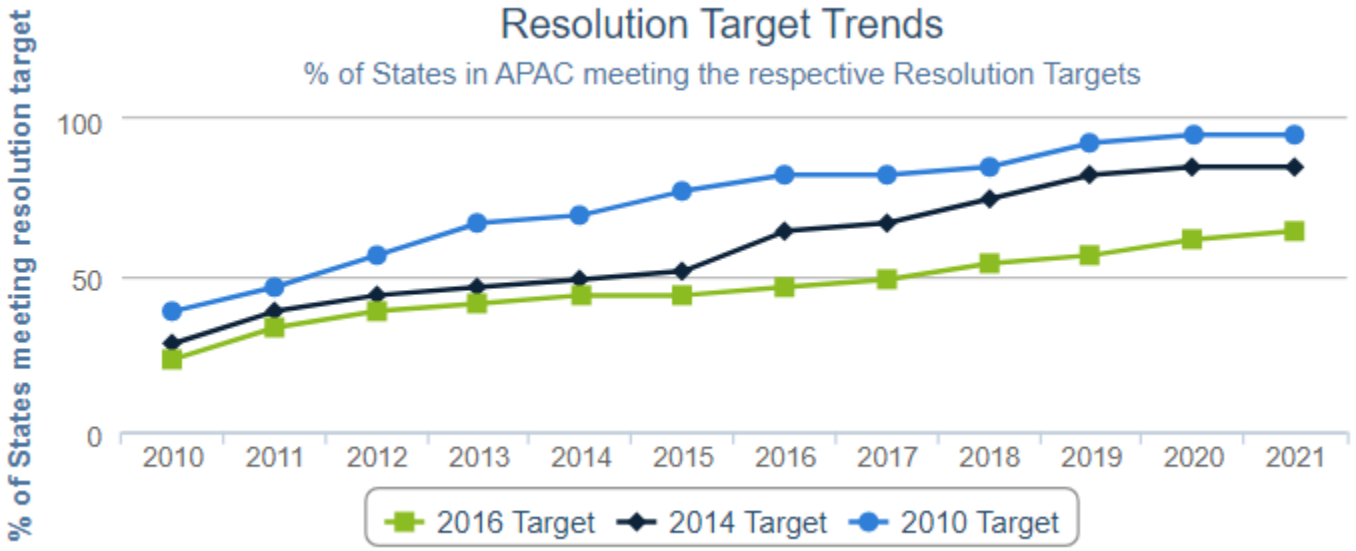


PBN IMPLEMENTATION (Approach Procedures) TRENDS

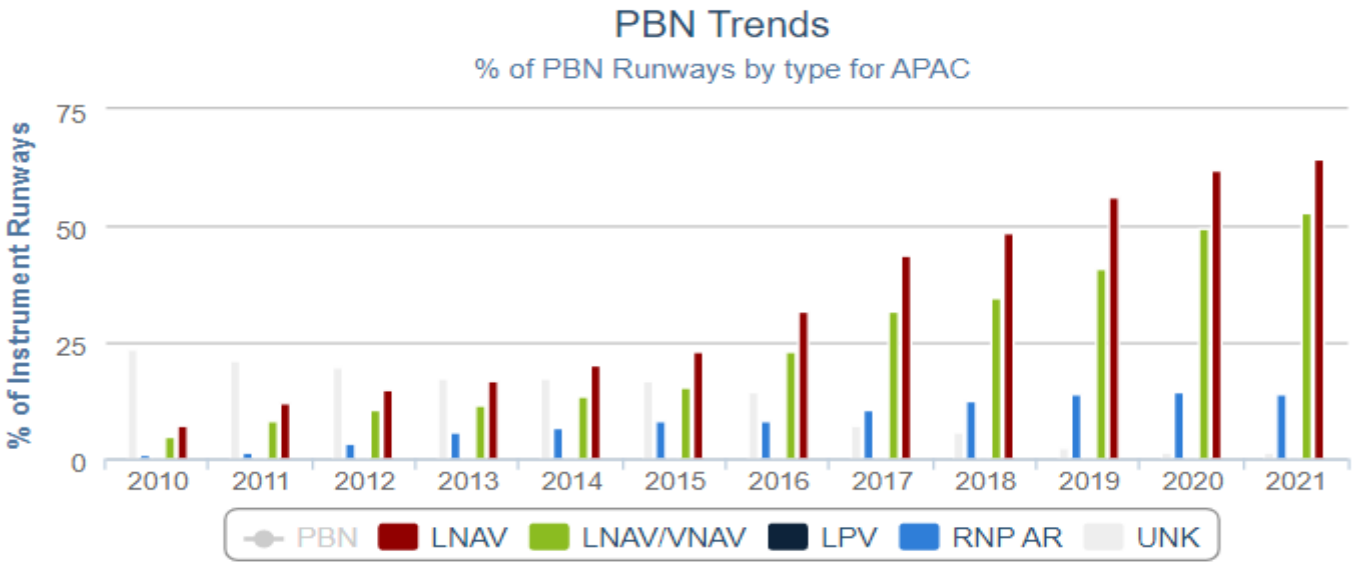


States in APAC	PBN Runway Ends	Intr. Runway Ends	PBN Runway Ends (%)
39	455	637	71.4%

PBN IMPLEMENTATION (Approach Procedures) TRENDS



PBN IMPLEMENTATION (Approach Procedures) TRENDS

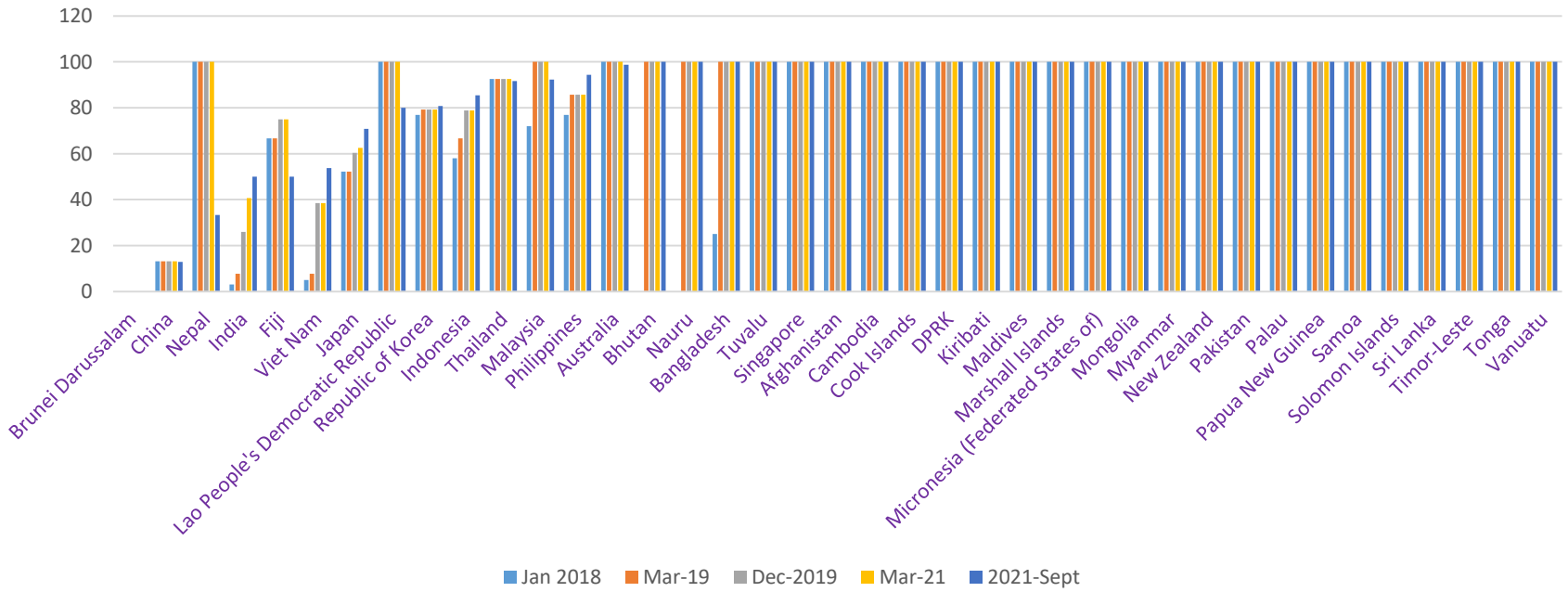


PBN IMPLEMENTATION (Approach Procedures) Status

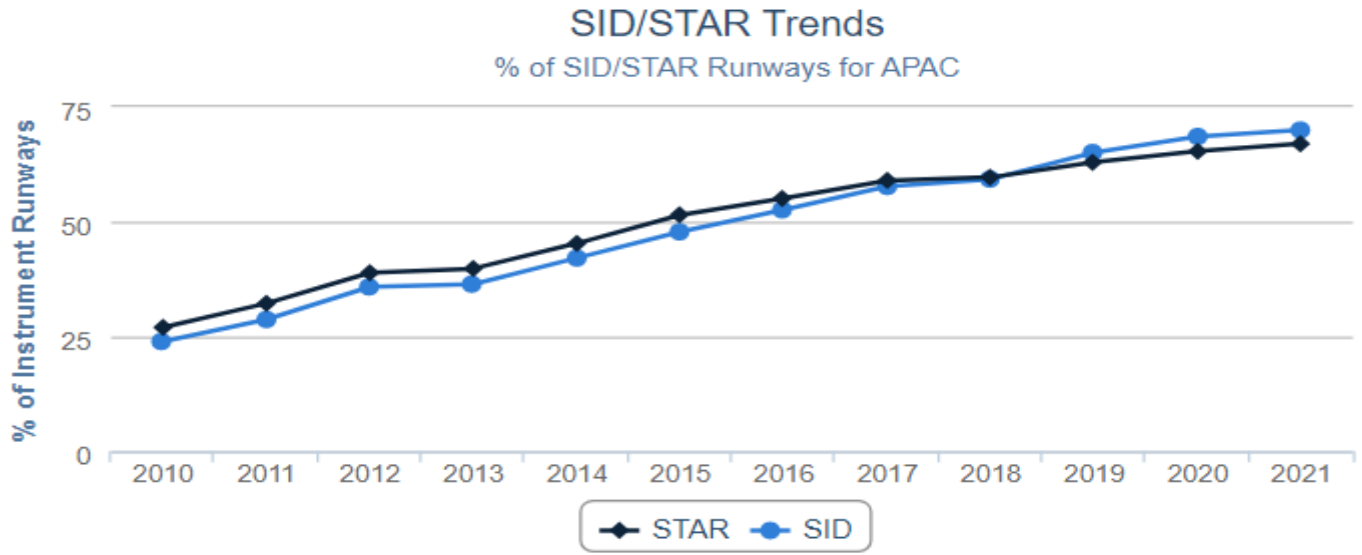
Sept 2021	LNAV	APV		PBN SID	PBN STAR
		LNAV/VNAV	LPV		
Global (%)	69.3	57.3	26.2	57.7	50.5
Asia/Pacific (%)	64.5	52.7	0	70	67

March 2021	LNAV	APV		PBN SID	PBN STAR
		LNAV/VNAV	LPV		
Global (%)	71.4	59.4	34.4	49.4	44.8
Asia/Pacific (%)	57.5	47.1	0	71.6	68.8

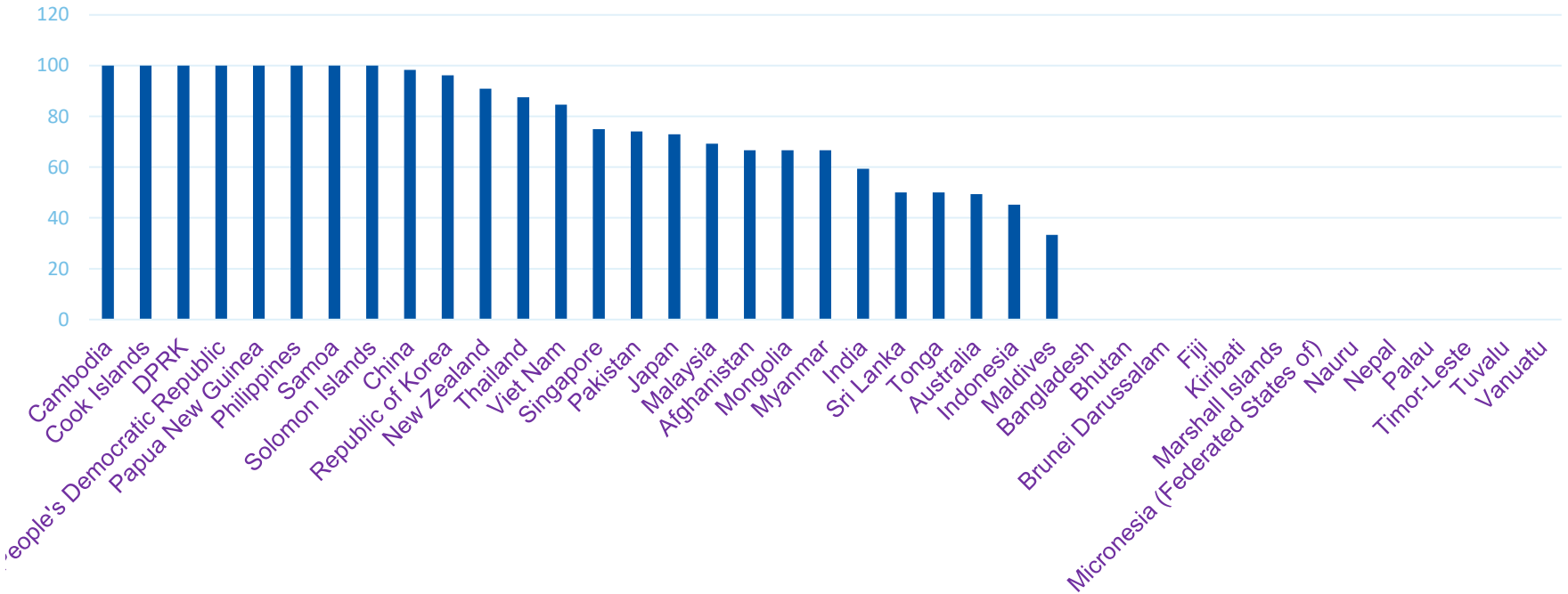
PBN Implementation Approach



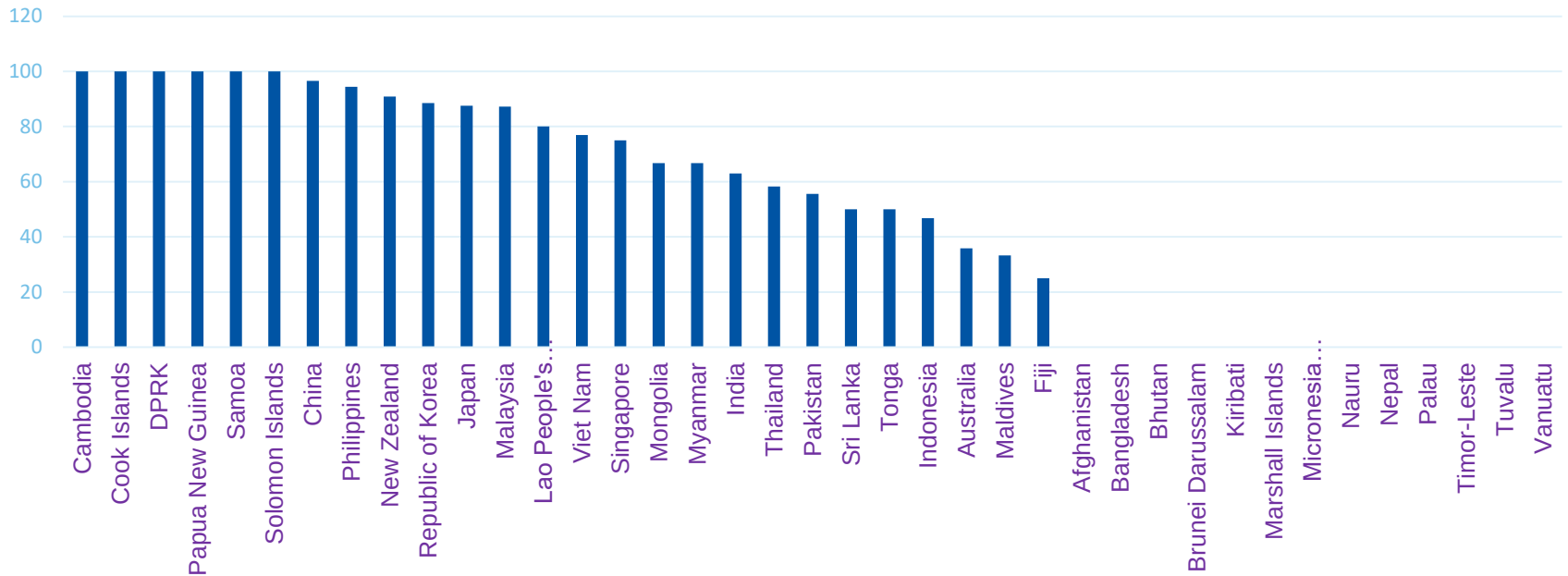
PBN IMPLEMENTATION (Terminal procedures) TRENDS



PBN SID Implementation



PBN STAR Implementation



PBN Approaches: Analysis

- Main benefit to be gained from vertically guided approaches(LNAV/VNAV)
  - Reduction in CFIT
  - Improved access
- Implementation of LNAV/VNAV in APAC is still low (52.7% vs. 57.3 for World)

PBN SID/STAR: Analysis

APAC Regions is ahead of the global average

- Above 70% for SID and 67% for STAR
- Global average around 57%(SID) & 50%(STAR)

Activities related to PBN in APAC post PBNICG/8

- Report of PBNICG/8 was reviewed in CNS SG/25 held from 18 –22 Oct 2021 and APANPIRG/32 held from 1-3 December 2021.
- Discrepancy about the list of International Airports in iSTARS and ANP has been resolved after sustained coordination with iSTARS team. This is reflected in PBN Implementation of the States. However, States should update list of Airports in ANP Vol-I & Vol-II as urged by APANPIRG/31.
- A meeting to exchange information about PBN Implementation in other ICAO Regions was initiated by APAC Region, in which we shared the following initiatives of this region:
  - Safety Assessment of PBN Procedure Implementation
  - PBN Go-Teams visit to assist States in PBN Implementation
  - PBN-in-a-Page
  - GBAS-SBAS ITF
  - GBAS-SBAS Implementation Status
  - GBAS-SBAS Information Sharing Platform

  This meeting will be held every quarter amongst RO PBN of all the regions to exchange information to promote PBN Implementation.

GBAS-SBAS ITF

In order to promote GBAS-SBAS Implementation in the Region, two Expert Sub-groups with the following tasks have been constituted based on the nominations received from States as per decision of the GBAS-SBAS ITF/3 meeting :-

I) Expert Sub-group 3-1 - Review and revise the GBAS and SBAS safety assessment guidance document related to anomalous ionospheric conditions.

II) Expert Sub-group 3-2- Draft a Guidance Document on Implementation Process for GBAS/SBAS.

The sub-groups are expected to come out with initial draft of the documents by the next GBAS-SBAS ITF/4 meeting. These documents will help the States in GBAS-SBAS implementation.

STANDARDS AND RECOMMENDED PRACTICES (SARPS) FOR

ADVANCED RECEIVER AUTONOMOUS INTEGRITY MONITORING (ARAIM):

(BASELINE DRAFT VERSION FOR VALIDATION)

- The ICAO Navigation Systems Panel (NSP) has recently completed the draft version of a proposed set of new SARPs for GNSS advanced receiver autonomous integrity monitoring (ARAIM).
- ARAIM refers to any implementation of GNSS-receiver based ABAS other than GPS receiver autonomous integrity monitoring (RAIM), including single or dual frequency, and single or multiple constellation modes.
- Compared to the RAIM, ARAIM enables the use of dynamic integrity support data (ISD).
- ISD is defined as a set of parameters that describe the signal-in-space accuracy and level of trust that can be placed in that accuracy for each specific constellation and ARAIM service type.
- With dynamic ISD, integrity parameters can be adapted to actual core satellite constellation performance and available performance history.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THANK YOU!