

PBN UPDATE

APAC

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PBN Programme Manager



March 2015

Major input to the PBN Program



12th Air Navigation Conference

ICAO Headquarters
Montreal, Canada
19-30 November 2012





Key PBN Related Outcomes

- States urged to comply with A37-11 targets
- States to continue to support ICAO PBN initiatives with resources
- ICAO to develop additional PBN provisions aligned with the Aviation System Block Upgrades (ASBUs), GANP and GASP
- Need for continuous implementation support
 - PBN Training and Education
 - Implementation projects
 - Flight Procedures Programme
- **Regulatory oversight improvement**



HLSC – MONTRÉAL DECLARATION ON PLANNING FOR AVIATION SAFETY IMPROVEMENT

Recognizing that performance-based navigation (PBN) is the **primary air navigation priority** and that effective regulatory oversight is an essential requirement to achieve its safe implementation;

The Directors General for Civil Aviation and heads of other relevant authorities, :

Commit to act upon the plans agreed during this Conference by making use of all available resources to expedite full implementation of PBN regulatory oversight

Calls upon ICAO to continue assisting States in implementing PBN



So where are we today?



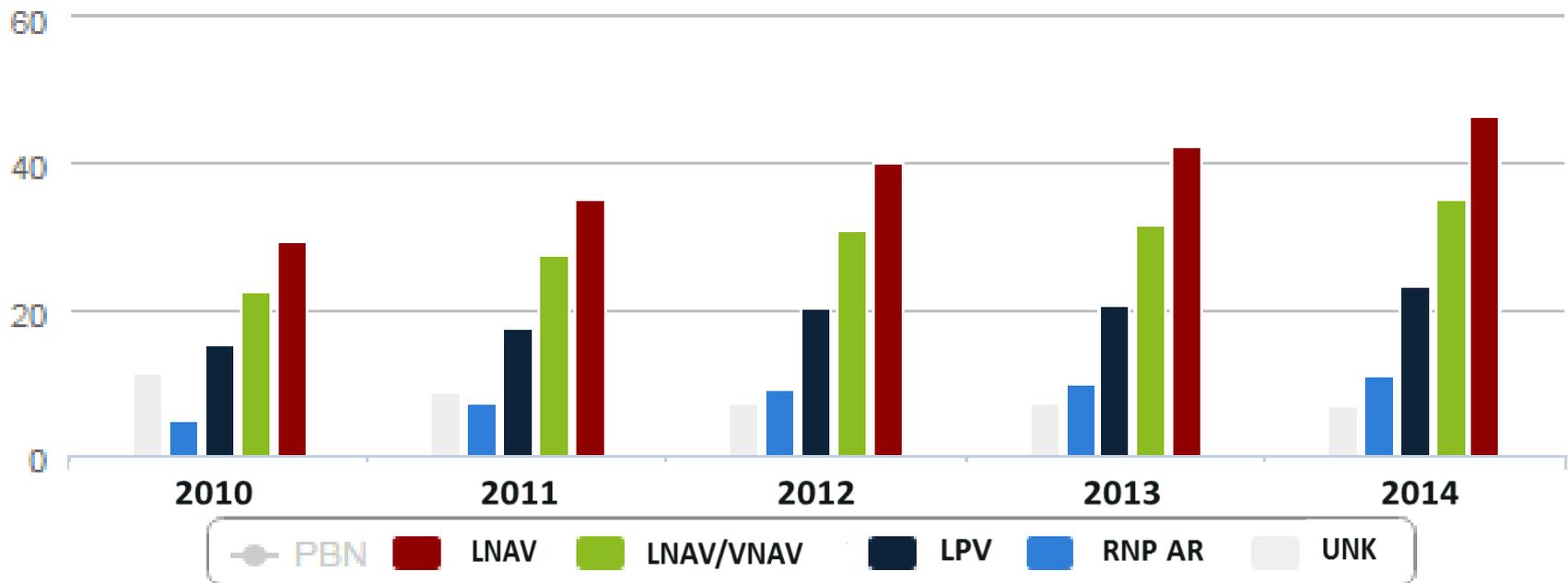
A37-11 PBN Global Targets

- **States complete a PBN Implementation Plan to achieve:**
 - Approach procedures with vertical guidance (APV (Baro-VNAV) including LNAV-only minima for all instrument runway ends by 2016:
 - 30% by 2010, 70% by 2014
 - Straight-in LNAV only procedures as an exception to the above where there is:
 - no local altimeter setting; and
 - no aircraft equipped for APV with max certified mass of 5700kg or more



PBN IMPLEMENTATION TRENDS

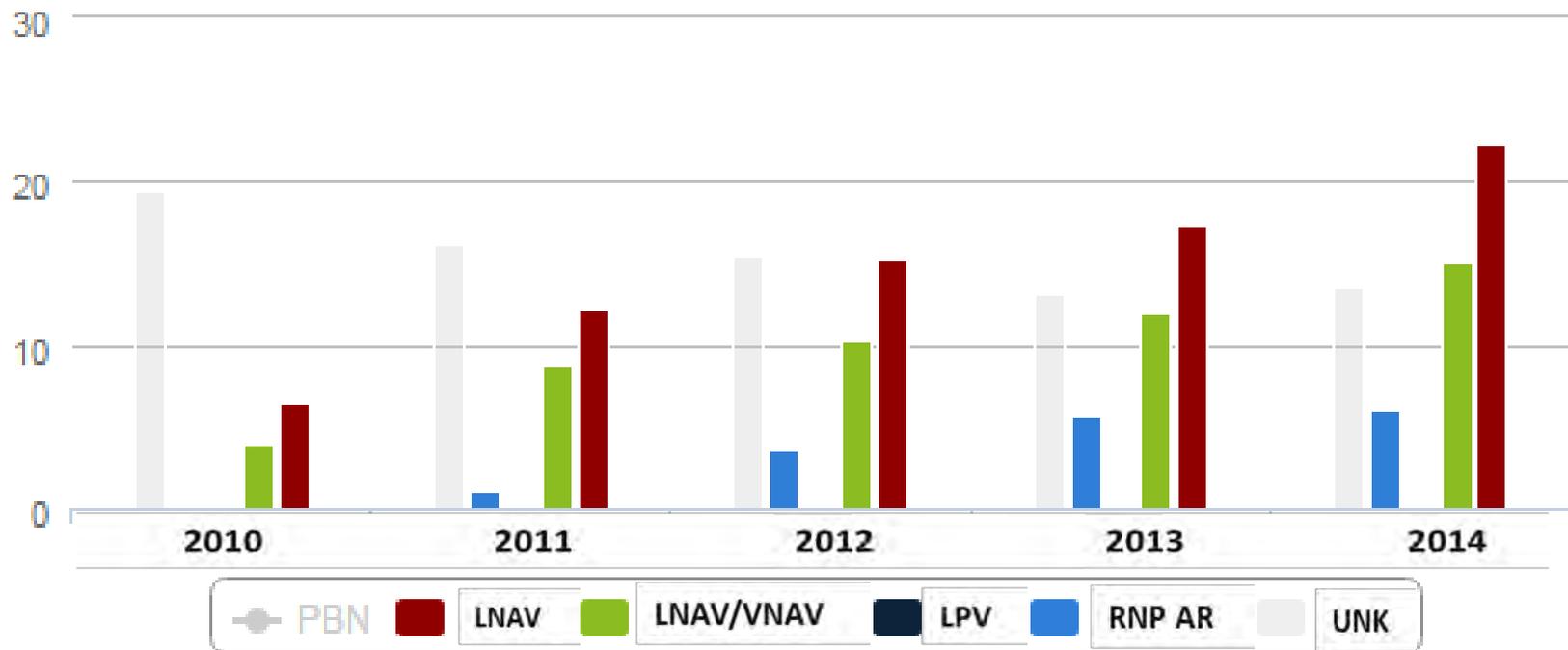
% of PBN Approaches by type for the world
(rate refers to the total number of instrument runways)



- *This data is based on the International Aerodromes as listed in the Regional Air Navigation Plans*
- *World States include the total number of ICAO Member States*

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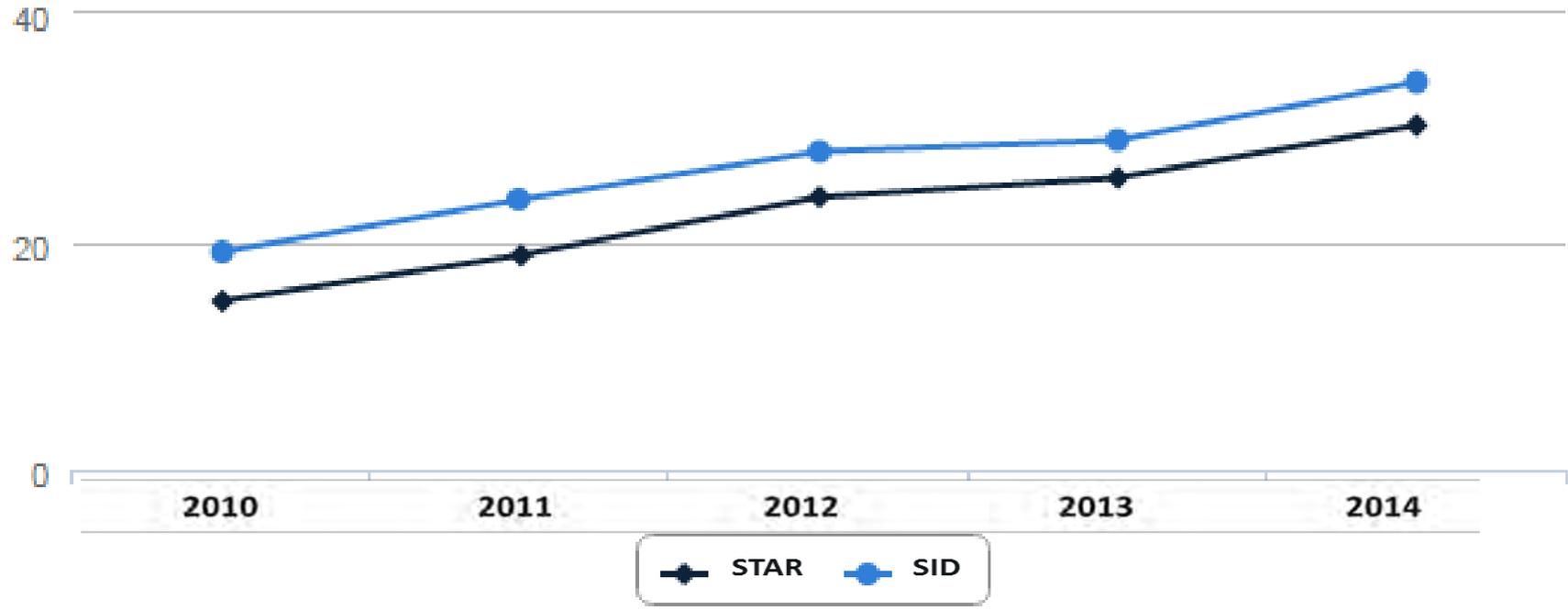


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PBN IMPLEMENTATION TRENDS

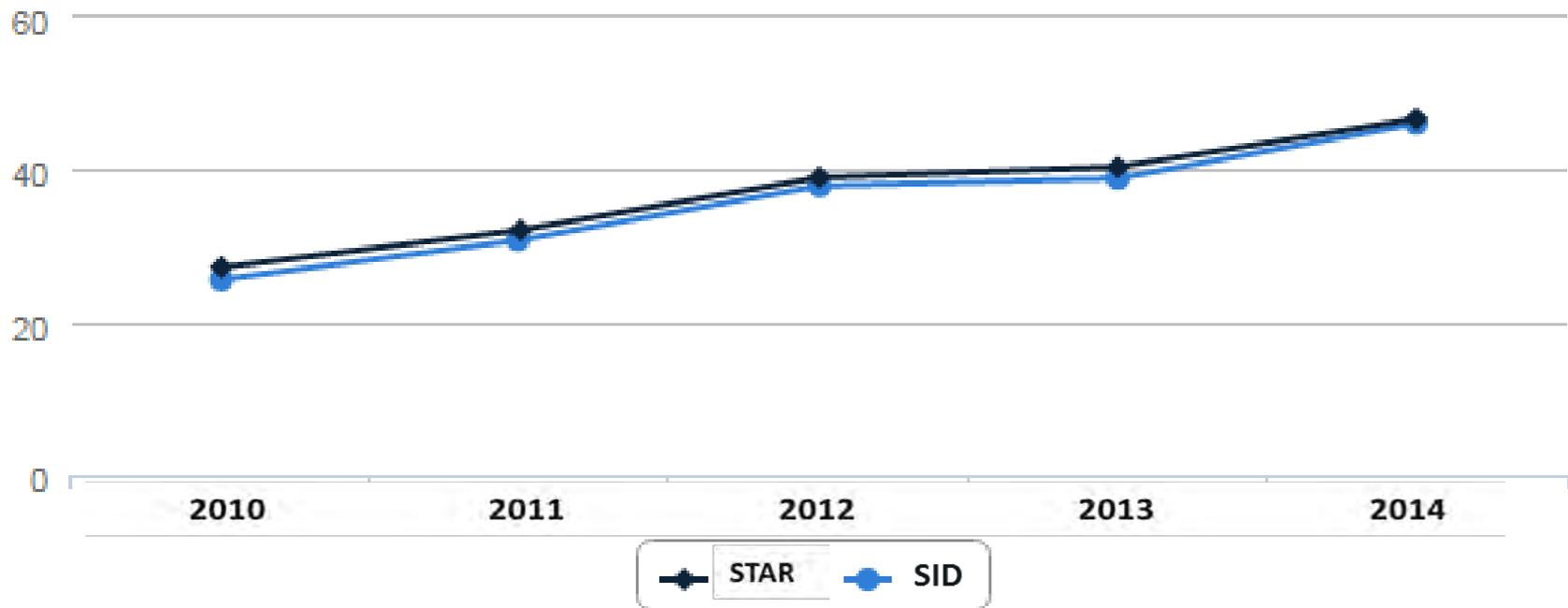
% of PBN SID/STAR for the world
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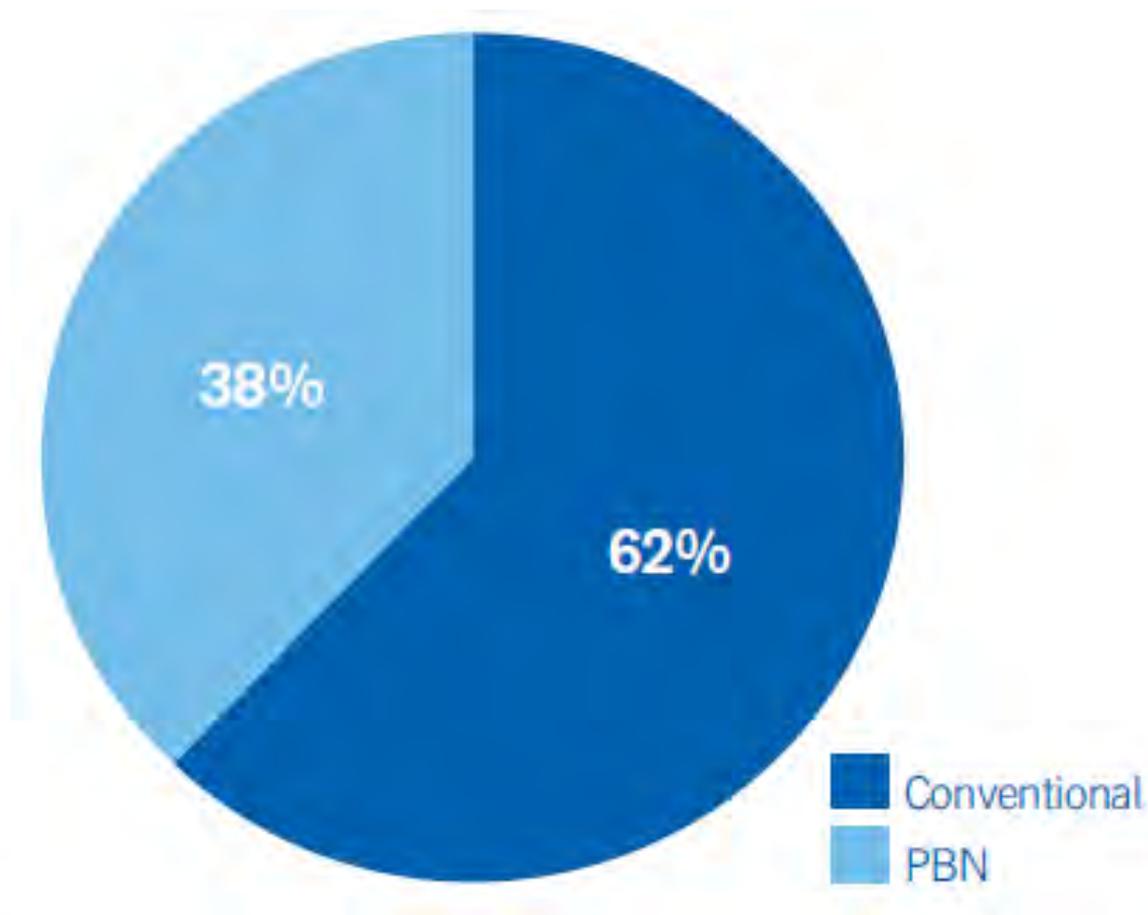
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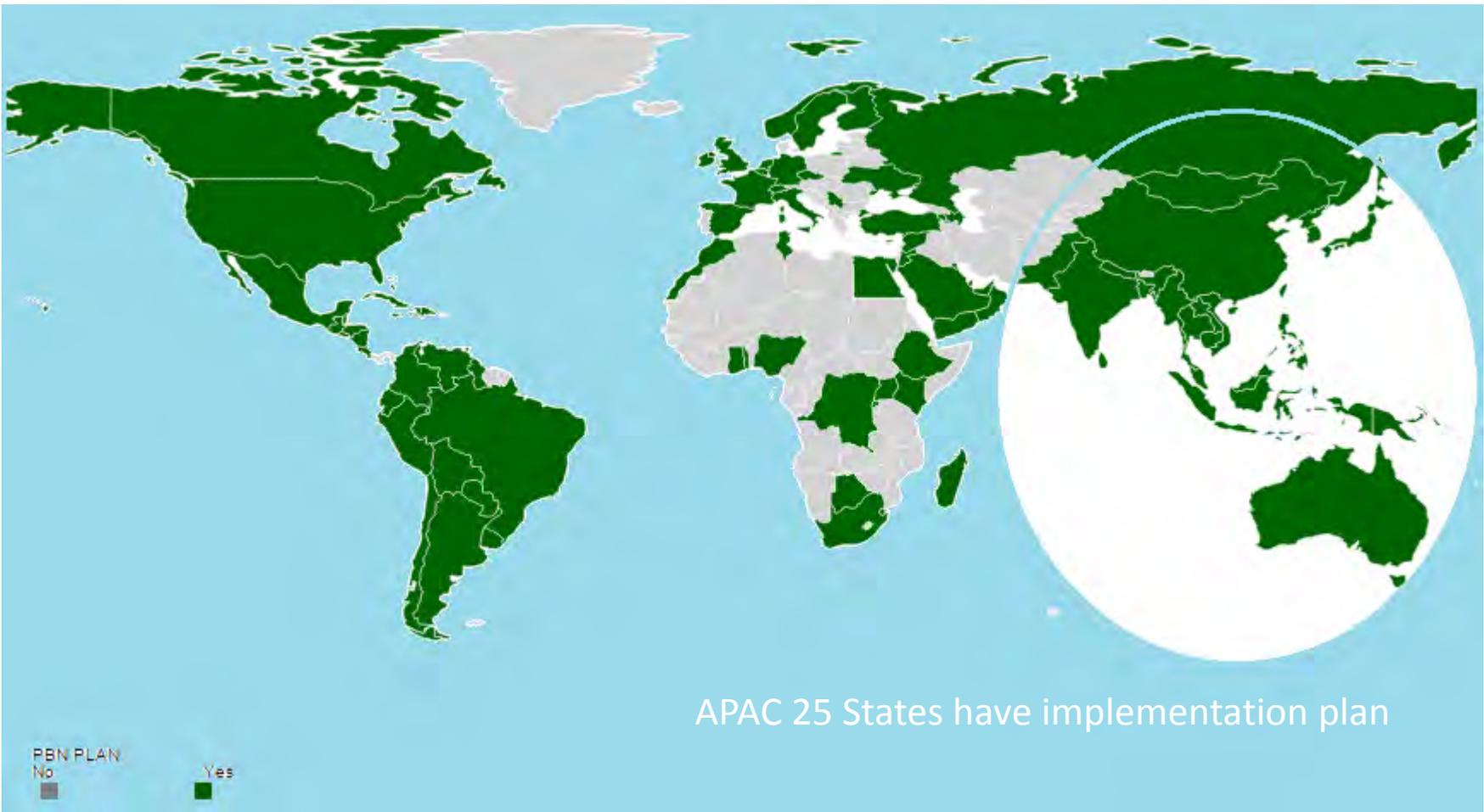


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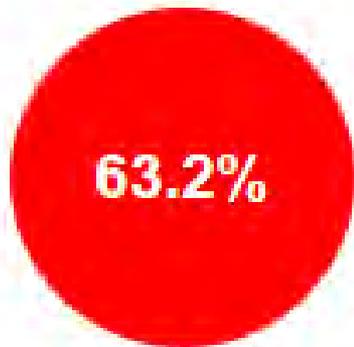
PBN Versus Conventional Routes



Implementation Plans



% of States in APAC meeting the Resolution Targets for Applicable Years (Airport in the ANP)



2010 (30%)



2014 (70%)



2016 (100%)

Around 35% of States do nothing

What has ICAO done to help States with implementation? . . .



PBN Programme Office

- **Officially established 1st October 2014**
- **Global coordination of PBN Programme**
 - Manages and oversees the Standards and other requirement and guidance on PBN
 - Coordinate with the ICAO Regions to ensure consistent and expeditious implementation
 - Leads and oversees large scale programmes such as Asia/Pacific Regional sub-office (APAC RSO), APAC Flight Procedure Programme (FPP) and African FPP in line with the ANB programme

Coordination with RO's

- PBN Focal points
- PBN TF's, ICGs – awareness and coordination among States
- Implementation Projects
- Go-Teams
- Symposia



ICAO/IATA PBN GO Teams

- **Expert Teams Visits to address specific implementation issues**
 - Phase I (PBN Requirements Assessment) completed
 - Phase II (Airspace Design and Operations Approvals) will be completed in early July (Last visit to China)
- **Future GO Team Visits will be specific to Region and State requirements for PBN Implementation**
 - On request basis
- **Focus/Services provided will be:**
 - PBN Assessments / Gap Analysis
 - PBN Plan Development
 - Training
 - Implementation Assistance

Completed Global Visits Phase (I and II)	
Thailand (2)	UAE (2)
Mexico	Kenya
Germany	India
Ecuador	Russia
South Africa	USA (CAR/SAM)

Flight Procedures Programme (FPP)

- **Beijing, China**
 - Upgraded to Regional Sub-Office
- **Dakar, Senegal**
 - FPP Office established 2014 (covers all African States)
- **MID Region?**



PBN Documentation Framework



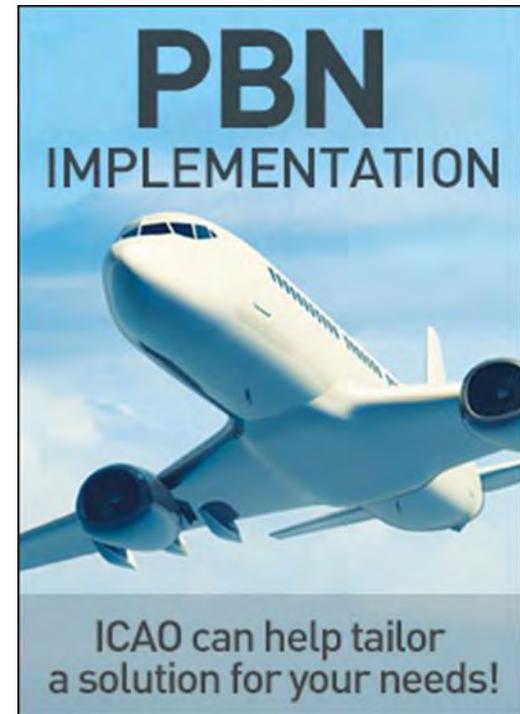
- PANS Ops Volume II
- PBN Manual (Doc 9613) 4th Edition
- RNP AR Procedure Design Manual (Doc 9905)
- PBN Ops Approval Manual (Doc 9997)*
- Manual on PBN Use in Airspace Design (Doc 9992)*
- CDO Manual (Doc 9931)
- CCO Manual (Doc 9993)*
- GNSS Manual (Doc 9849)
- Procedure QA Manual (Vol 1 to Vol 6) (Doc 9906)

* New



PBN Products and Services

- **PBN Start**
- **PBN Training**
 - CBT and Classroom
- **PBN Publication**
 - Bundled specifically for Stakeholders
 - Hard and soft copies
- **PBN Workshops**
- **PBN Implementation Assistance**
- **PBN Financial Aid**



Provided through ICAO HQ, Regional Offices, FPPs, ICAO Authorized Training Centers, On-line ICAO Store

Implementing Air Navigation's #1 Priority
Performance-based Navigation (PBN)

Having difficulty implementing PBN and achieving the many safety and efficiency benefits?

ICAO can help tailor a solution for your needs. Contact us at:
www.icao.int/PBNimplementation



PBN in Social Media



<http://www.icao.int/safety/pbn>



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Checkout our new website for #icaoPBN. Learn about Performance-Based Navigation! <http://ow.ly/JSq7K>

Introducing the redesigned and updated PBN Website

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www.twitter.com/hashtag/icaoPBN

PBN Endorsement – IFP Organizations

- Endorsement of Instrument procedure design organizations
- Consistent with other endorsements (training)
- To assist States with PBN Implementation
- Organizations approved by ICAO :
 - Airways New Zealand
 - ASAP s.r.o. (Slovakia)
 - CAAC Central-Southern Airport Design & Research Institute (China)
 - China Academy of Civil Aviation Science and Technology (CAST)
 - GE Aviation (USA)
 - Hughes Aerospace (USA)
 - Ingegneria Dei Sistemi S.p.A (Italy)
 - Two additional request pending



Future PBN SARPs and guidance

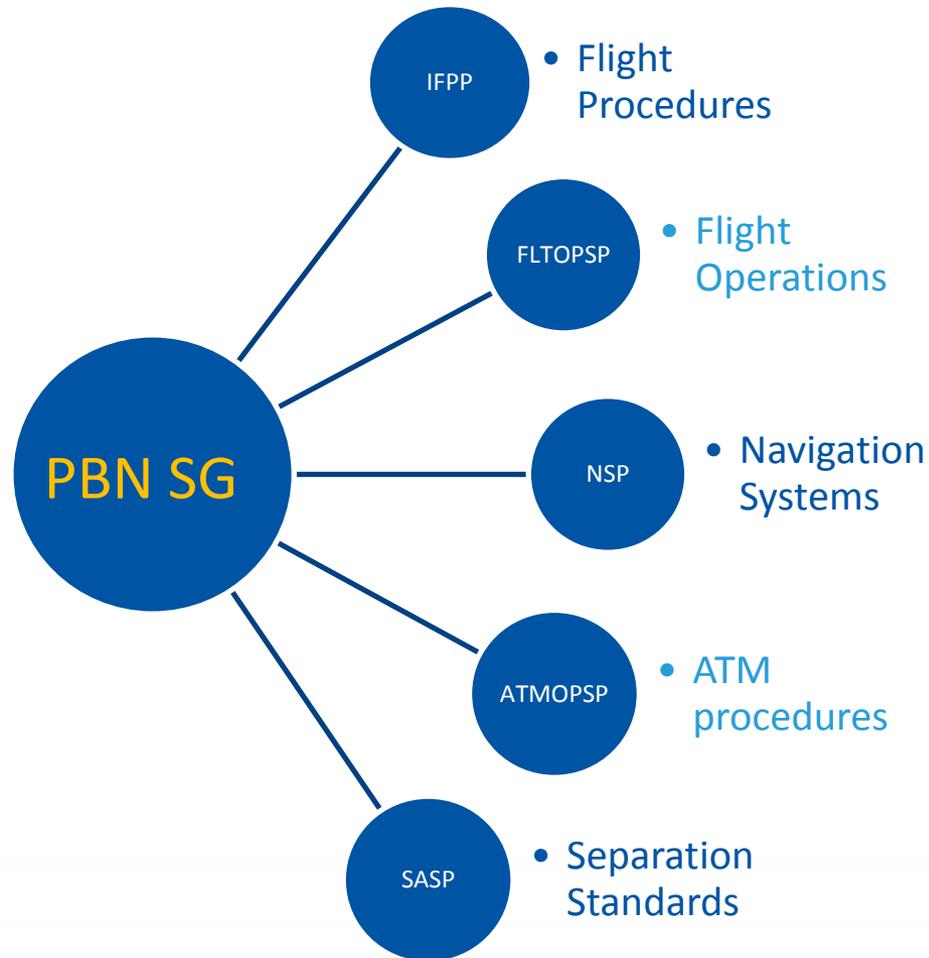


PBNSG Main Tasks

- To further mature the PBN Concept
 - Update the PBN Manual
 - Develop guidance material to close the gap
 - Free routes
 - Mixed mode operations
 - RNP AR departures
 - Ops approvals
- Coordinate with other ICAO Panels to ensure consistency within the PBN framework



PBN SG coordination



FLTOSP PBN Tasks

- **Making PBN the norm in operations rather than the exception (2016)**
 - Annex 6 amendment on PBN Ops Approval to be sent out in State letter end March
 - Work is ongoing to determine the definition of "Complex PBN"
 - GA framework developed for PBN based on CAT Operation Specifications – "Specific Approval " process

FLTOSP PBN Tasks

- **Guided Visual Approaches (formerly RNAV Visual) CONOPS being developed (2016)**
- **Use of Area Navigation (RNAV) on Conventional Routes and Procedures (2018)**
 - **Revise PANS-OPS provisions to address PBN for “Overlay” instrument approaches**
 - **Revise PANS-OPS provisions to address PBN for en-route “Alternate” and “Substitute” means of navigation**



IFPP PBN Main Tasks

- **Provisions for:**
 - LP/Baro-VNAV (2018)
 - GBAS CAT II/III (2018)
 - GBAS with GP inoperative
 - Visual procedures using PBN (2016)
 - RNP AR Departures (2018)
 - Fixed Radius Transitions (for enroute) (2018)

IFPP PBN Main Tasks

- **Provisions for Helicopter PBN operations (2018)**
- **PBN Charting Information/Harmonization**
 - PBN Box and Identification (completed)
 - RNAV arrival and departure charts (completed)
- **PBN with XLS final approach (2016)**
- **PBN/IFP Regulatory requirements (Annex 11) (2016)**
 - Develop guidance material on Safety Assessment (2016)
 - Develop guidance material for regulatory framework (2016)
 - Develop USOAP protocol questions (2016)
- **RNP AR departure (Revision of the RNP AR Design Manual) (2018)**

NSP Main Tasks

- GBAS CAT II/III (“GAST D”) SARPs validation (2018)
- Development of Galileo SARPs (TBD)
- Development of Beidou SARPs (TBD)
- Multi-frequency, multi-constellation (MFMC) issues (TBD)
- Fixes to existing GNSS SARPs as required (2016 onwards)
- Development of terrestrial navaids strategy (including rationalization) (2018)
- Advanced RAIM (TBD)

SASP Main PBN Tasks

- **PBN Separation Minima for Terminal Airspace (2016)**
 - RNP-1, A-RNP, RNP APCH or RNP AR APCH
 - Safety assessment for terminal area separation minima for surveillance and non-surveillance airspace
- **GBAS Landing System (GLS) for parallel rwy ops (2018)**
 - Procedures and guidance required
 - Comparative assessment (ILS/MLS vs GLS and RNP) to derive GLS requirements

SASP Main PBN Tasks

- **Reduced Divergence Departures – Separation Minimum for Equivalent Lateral Separation Operation (ELSO) (2018)**
 - Take advantage of PBN to provide more efficient operations in increasingly constrained airspace
- **Stabilized RNP approaches to parallel runways (2018)**
 - Take advantage of PBN capable aircraft
 - Undertake new safety assessment

SASP Main PBN Tasks

- **Oceanic/Continental Airspace LONG/LAT Separation Minima (2018)**
 - For RNP-2 and A-RNP
- **Application of PBN based lateral separation Minima to Special Use Airspace (SUA) (2018)**
 - Amendment proposals
 - Review Circular 324

SASP Main PBN Tasks

- **Airspace planning guidance for implementing PBN tracks (2018)**
 - Develop provisions to address establishing ATS routes for PBN equipped aircraft (mixed capability)
- **LAT/LONG Separation Guidance for Helicopter RNP 0.3 (Terminal and Enroute) operations (2018)**
 - Develop necessary provisions
 - Consider feasibility of expanding application to F/W aircraft

ATMOPSP Tasks related to PBN

- **SID/STAR phraseology** (2016)
 - Will facilitate use of CDO and CCO
- **PANS ATM provisions related to PBN closed path approaches** (2018)
 - For parallel runway operations

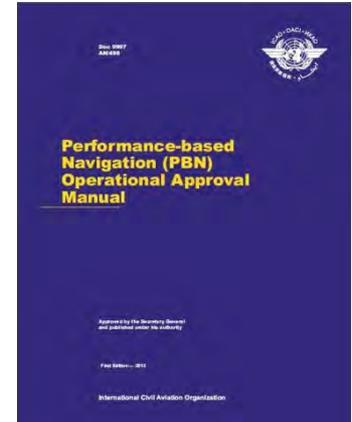
Coming soon

Revised Ops Approval Manual (Doc 9997)

Includes RNP 2, RNP 0.3 and A-RNP

Annex 6 change on PBN Ops Approval

State letter end March



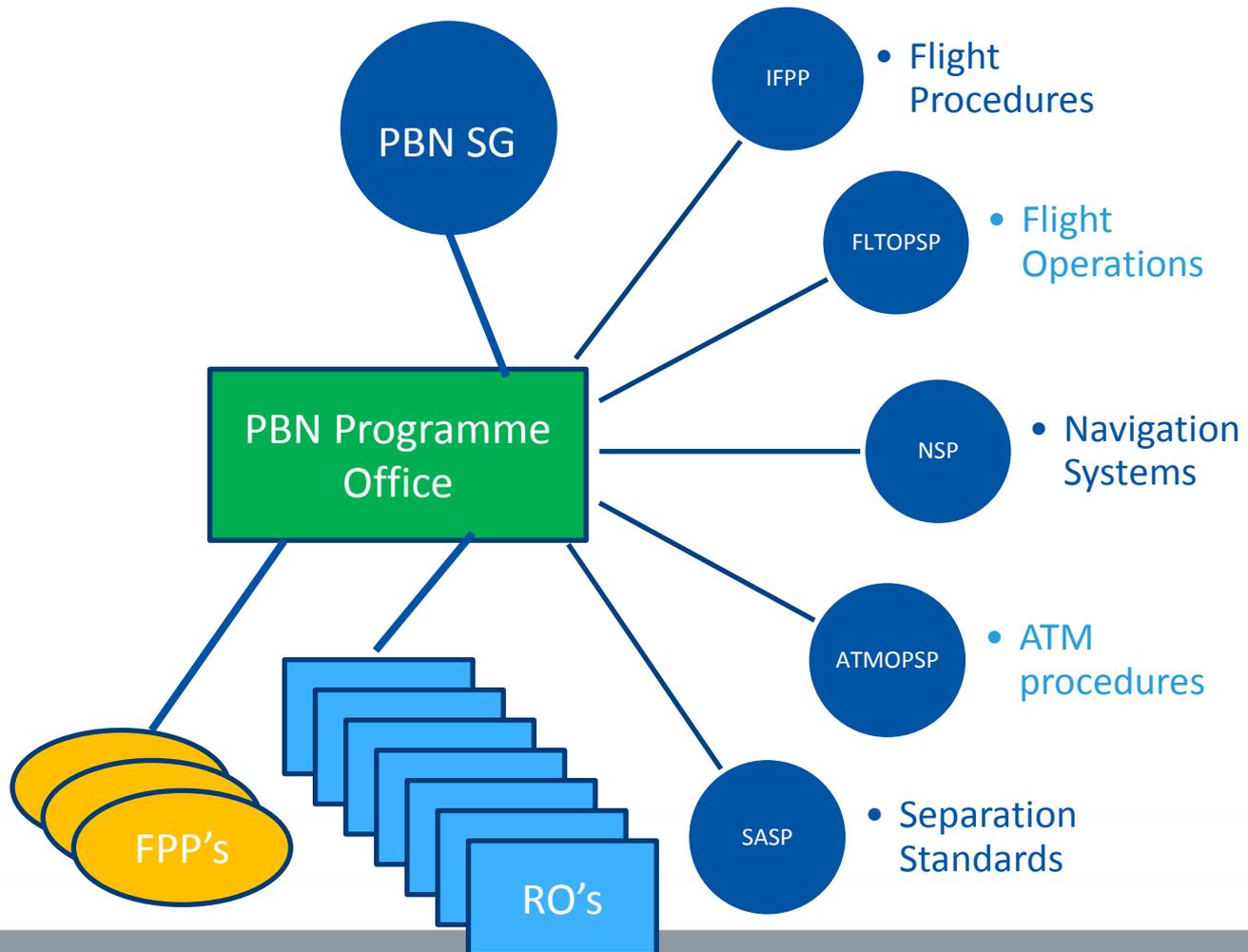
New CBT packages for pilots and air traffic controllers

IFPP completed work

PBN to XLS

Offset Baro-VNAV approaches

ICAO is ready to make the final step





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