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CAPACITY & EFFICIENCY

Status of PBN implementation in the MID Region

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PBN SG/2 meeting

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Presentation Outline

- **General requirements for PBN**
- **APTA B0 (MID Air Navigation Strategy)**
- **APTA B1**
- **Status of implementation**
- **Challenges**
- **Mitigation measures**
- **MID Region PBN Implementation Plan**
- **MID Region PBN Focal Points**

What are the general requirements for PBN ?





General requirements

- ▶ **Legislations/Regulations**
- ▶ **Design Organization/Office**
- ▶ **Experts Qualifications and Training**
- ▶ **Resources**
- ▶ **Quality Assurance**
 - **Information/data**
 - **Design Process**
 - **Safety Assessment**
 - **Procedures Validation**
 - **Design Publication**
 - *Software validation*

Legislations/Regulations

- ▶ **States shall promulgated regulations as a bases for procedure design in accordance with ICAO PANS-OPS provisions**
- ▶ **State/CAA should carry out all safety oversight related tasks over the service providers, including:**
 - **review and revision of regulations**
 - **training of technical staff**
 - **development of guidance material**
 - **issuance of approvals**
 - **conducting of surveillance**
 - **resolution of identified safety concerns**



Design Organization/Office

- ▶ A design organization/Office should be established equipped with appropriate tools to enable the Designers to carry on their tasks
- ▶ the service provider should ensure that the designs of instrument flight procedure are in accordance with applicable ICAO provisions and the State's Regulations





Designer Qualifications and Training

Training Programme and Training Plans should be developed and appropriately implemented to ensure that:

- ▶ The person designing or amending a flight instrument procedure demonstrates required competency level for flight procedure design.
- ▶ Designers shall acquire and maintain this competency level through training and supervised on-the-job training (OJT).



Resource Requirements

This would include:

- ▶ having available equipment appropriate for the design, design validation, and maintenance of the types of procedures
- ▶ access to relevant and current data including, but not limited to, aeronautical data, land contour data, and obstacle data for the design, design validation, and maintenance of the procedures
- ▶ ready access to documentation that may be necessary for the design, design validation, and maintenance of the types of procedures
- ✓ *the integrity of aeronautical database and aeronautical data used for designing an IFP shall be ensured*
- ✓ *The data used shall be current, traceable, and meets the required level of verifiable accuracy for the design*

Quality Assurance

- ▶ A quality assurance system should be implemented in accordance with the provisions of ICAO Doc 9906
- ▶ PANS-OPS, Doc 8168 Volume II, Part 1, Section 2, Chapter 4, Quality Assurance refers to the ICAO Doc 9906 and requires that a State take measures to “control” the quality of the processes associated with the construction of instrument flight procedures
- ▶ Instrument flight procedures based on conventional ground-based navigational aids have always demanded a high level of quality control.
- ▶ The implementation of area navigation and associated airborne database navigation systems, however, means that even small errors in data can lead to catastrophic results.
- ▶ This significant change in data quality requirements (accuracy, resolution and integrity) has led to the need for a systemic quality assurance process (often part of a State Safety Management System).
- ▶ Data quality management, procedure designer training, and validation of software are all integral elements of a quality assurance programme.



B0 – APTA: Optimization of Approach Procedures including vertical guidance

| Elements | Applicability | Performance Indicators/Supporting Metrics | Targets |
|----------------------------------|---|---|---|
| States' PBN Implementation Plans | All | Indicator: % of States that provided updated PBN implementation Plan | 80 % by Dec. 2014 |
| | | Supporting metric: Number of States that provided updated PBN implementation Plan | 100% by Dec. 2015 |
| LNAV | All RWYs Ends at International Aerodromes | Indicator: % of runway ends at international aerodromes with RNAV(GNSS) Approach Procedures (LNAV) Supporting metric: Number of runway ends at international aerodromes with RNAV (GNSS) Approach Procedures (LNAV) | All runway ends at Int'l Aerodromes, either as the primary approach or as a back-up for precision approaches by Dec. 2016 |
| LNAV/VNAV | All RWYs ENDS at International Aerodromes | Indicator: % of runways ends at international aerodromes provided with Baro-VNAV approach procedures (LNAV/VNAV) Supporting metric: Number of runways ends at international aerodromes provided with Baro-VNAV approach procedures | All runway ends at Int'l Aerodromes, either as the primary approach or as a back-up for precision approaches by Dec. 2017 |



ASBU B1-APTA (ASBU Document)

To progress further with the universal implementation of PBN approaches. PBN and GLS (CAT II/III) procedures to enhance the reliability and predictability of approaches to runways increasing safety, accessibility and efficiency.

This module proposes to take advantage of the lowest available minima through the extension of GNSS-based approaches from CAT I capability to category CAT II/III capability at a limited number of airports.

It also harnesses the potential integration of the PBN STARS directly to all approaches with vertical guidance.

This capability allows for both curved approaches and segmented approaches in an integrated system. The emergence of multi-frequency/constellation GNSS may start to be developed to enhance approach procedures.



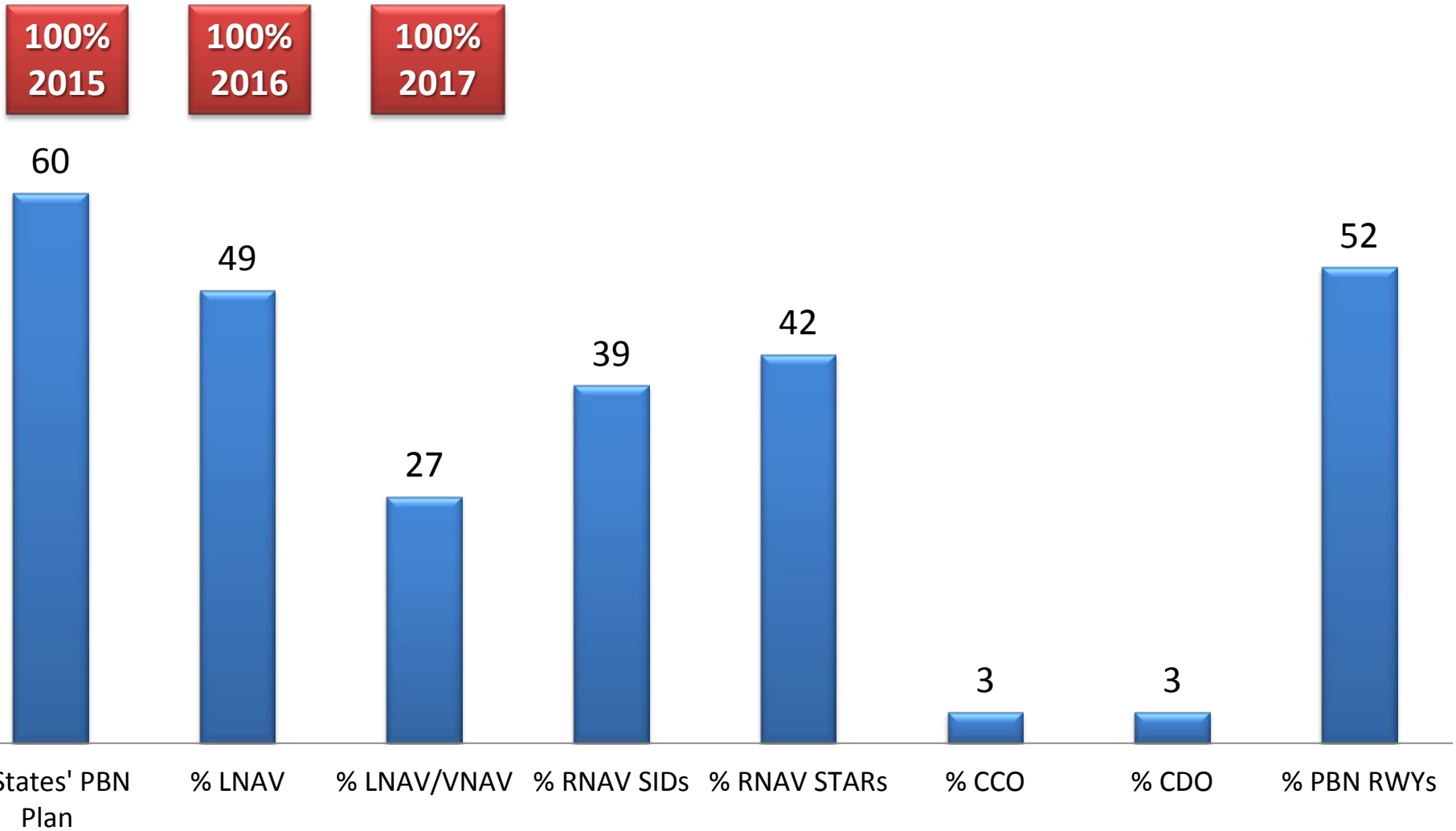
ASBU B1-CDO (ASBU Document)

- To enhance vertical flight path precision during descent, arrival, and enables aircraft to fly an arrival procedure not reliant on ground based equipment for vertical guidance.
- The main benefit is higher utilization of airports, improved fuel efficiency, increased safety through improved flight predictability and reduced radio transmissions, and better utilization of airspace.
- VNAV contributes to terminal airspace design and efficiency due to an aircraft's ability to maintain a vertical path during descent thus enabling vertical corridors for ingressing and egressing traffic.
- Other benefits include reduced aircraft level-offs, enhanced vertical precision in the terminal airspace, de-confliction of arrival and departure procedures and adjacent airport traffic flows, and the ability of an aircraft to fly an approach procedure not reliant upon ground based equipment for vertical navigation. This ultimately leads to higher utilization of airports.

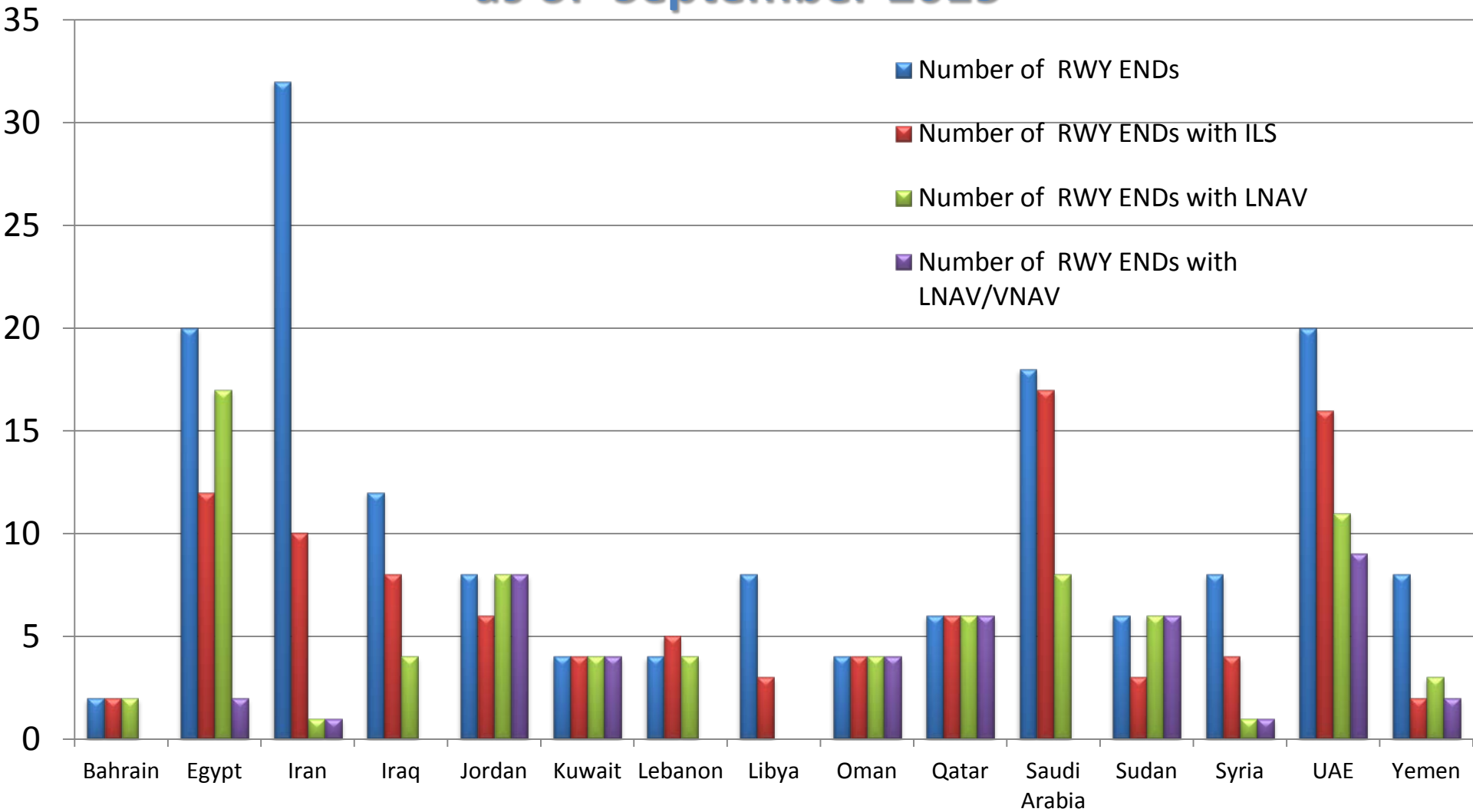
NO ASBU B1 for CCO



Status of PBN Implementation in the MID Region as of December 2015

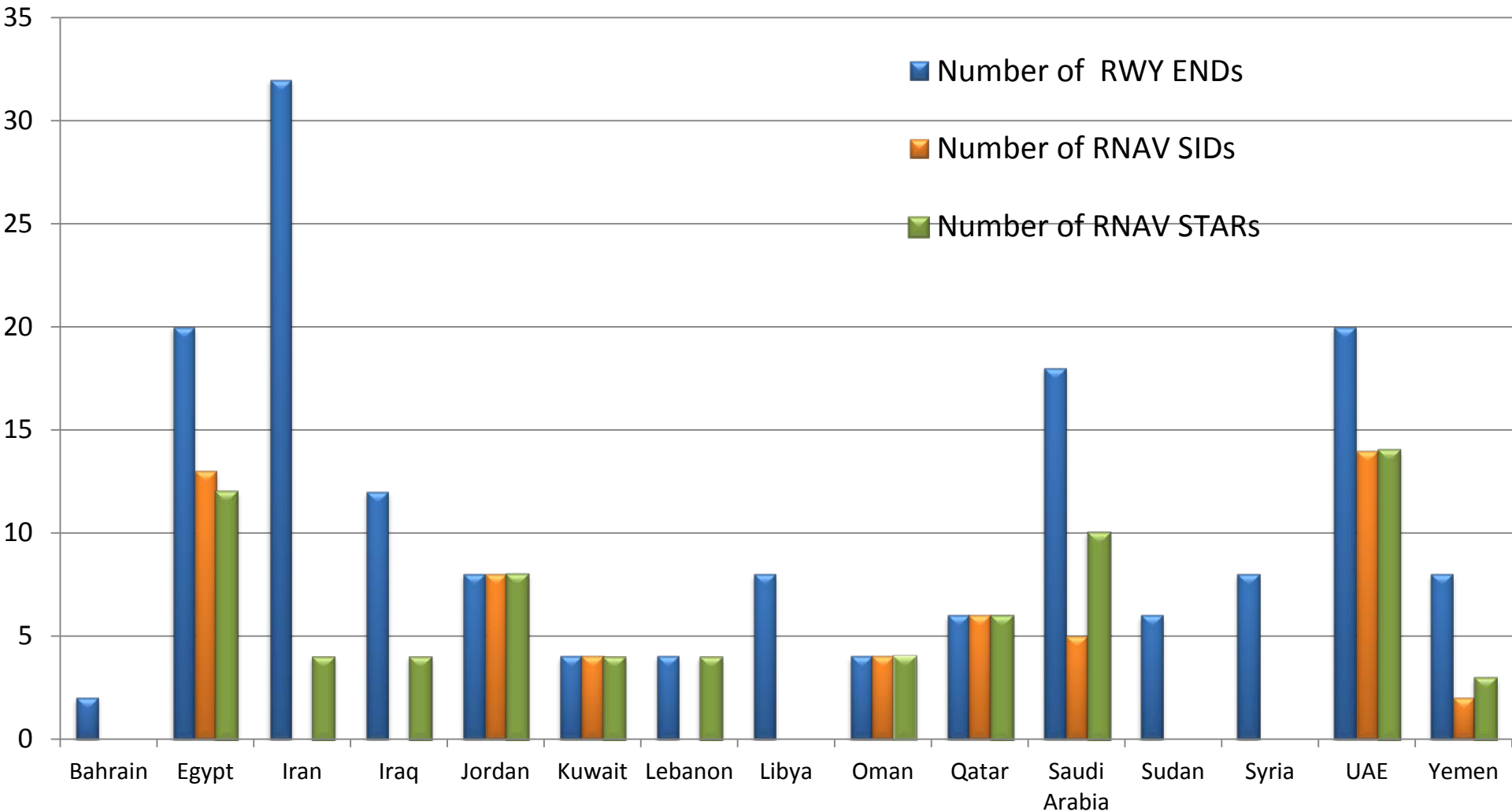


Status of PBN Implementation in the MID Region as of September 2015





Status of PBN Implementation in the MID Region as of September 2015



The following challenges have been identified as the main impediments to the advancement of PBN implementation in the Region:

- Shortage of PANS-OPS, Airspace Planners and OPS-approval experts
- Insufficient procedure design work in some States to attain or maintain proficiency
- Lack of airspace and procedure design training: initial, OJT, and/or recurrent
- Lack of capabilities to implement QA
- Lack of regulatory expertise to oversee the process leading to procedure approval
- Need to raise awareness on PBN advantages and benefits to have an effective implementation
- Civil/Military coordination
- Unstable political and security situation in some States
- eTOD Area 2
- Fleet equipage
- Operational Improvements Assessment

Some mitigation measures were also identified such as:

- States were encourage to:
 - ensure the training/recruitment of qualified experts in the field of FPD, airspace planning and OPS approval
 - work with ICAO for support for the training and implementation of PBN
 - organize at national level PBN Workshops
 - Request MID Civil/Military Support Team visits
- Regulator engagement
- Sharing experience and support each other
- Use IFSET and Other ICAO Tools for the operational improvements estimation of CO2 emission reduction

The MID FPP would provide the optimum solution and foster the implementation of PBN



Action by the meeting

The meeting is invited to open the discussions on what have been presented in order to:

- a. highlight the best practices and lessons learned
- b. identify the challenges impending PBN implementation
- c. agree on measures to overcome the identified challenges
- d. review and update the status of PBN implementation in the MID Region
- e. address APTA, CCO and CDO ASBU B1
- f. update the PBN list of PBN FPP
- g. review and update the MID Region PBN Implementation Plan
- h. States to provide the MID Office with their updated PBN Plans



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Thank You