ICAO CAPACITY & EFFICIENCY

PBN implementation in the AFI and MID Regions

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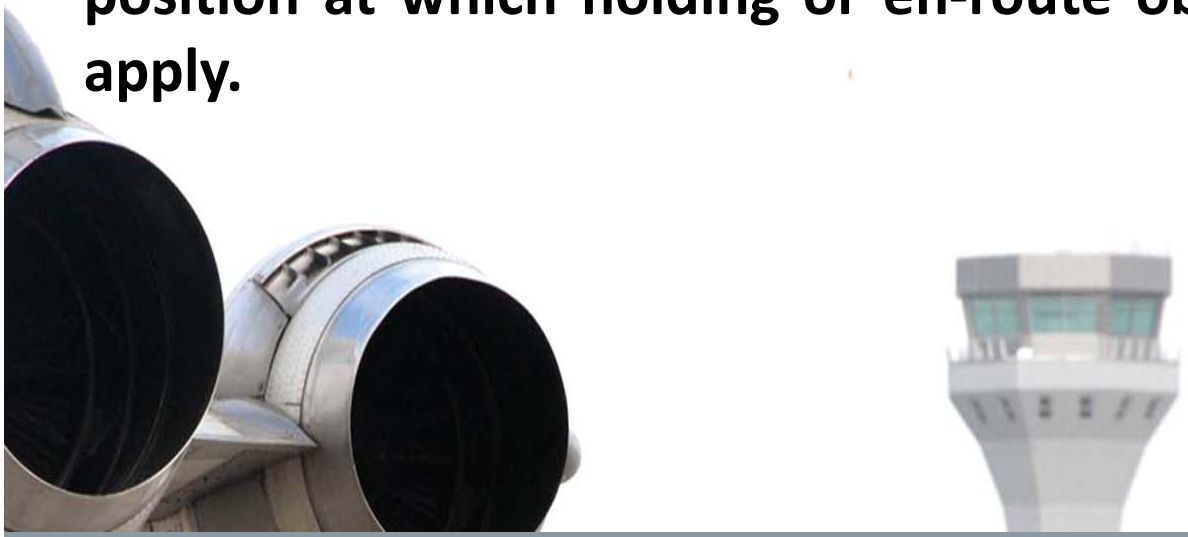
Presentation Outline

- Definition of IAP
- PBN
- General requirements
- PBN Status of implementation
- Challenges

What is IAP?

Instrument Approach Procedure (IAP)

A series of predetermined manoeuvres by reference to flight instruments with specified protection from obstacles from the initial approach fix, or where applicable, from the beginning of a defined arrival route to a point from which a landing can be completed and thereafter, if a landing is not completed, to a position at which holding or en-route obstacle clearance criteria apply.



IAP (Cont'd)

Instrument approach procedures are classified as follows:

Non-precision approach (NPA) procedure: An instrument approach procedure which utilizes lateral guidance but does not utilize vertical guidance.

Approach procedure with vertical guidance (APV): An instrument approach procedure which utilizes lateral and vertical guidance but does not meet the requirements established for precision approach and landing operations.

Precision approach (PA) procedure: An instrument approach procedure using precision lateral and vertical guidance with minima as determined by the category of operation.

Performance Based Navigation (PBN)

Area navigation based on performance requirements for aircraft operating along an ATS route, on an instrument approach procedure or in a designated airspace.

Area navigation:
A method of navigation which permits aircraft operation on any desired flight path within the coverage of ground or space-based navigation aids or within the limits of the capability of self-contained aids, or a combination of these.

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*

Documentation framework

- PANS Ops Volume II
- PBN Manual (Doc 9613)
- 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 (Doc 9906)

Computer Based Learning

PBN Overview

- Module 1 & 2

Operational Approval

Airspace Design

Prerequisites for formal courses

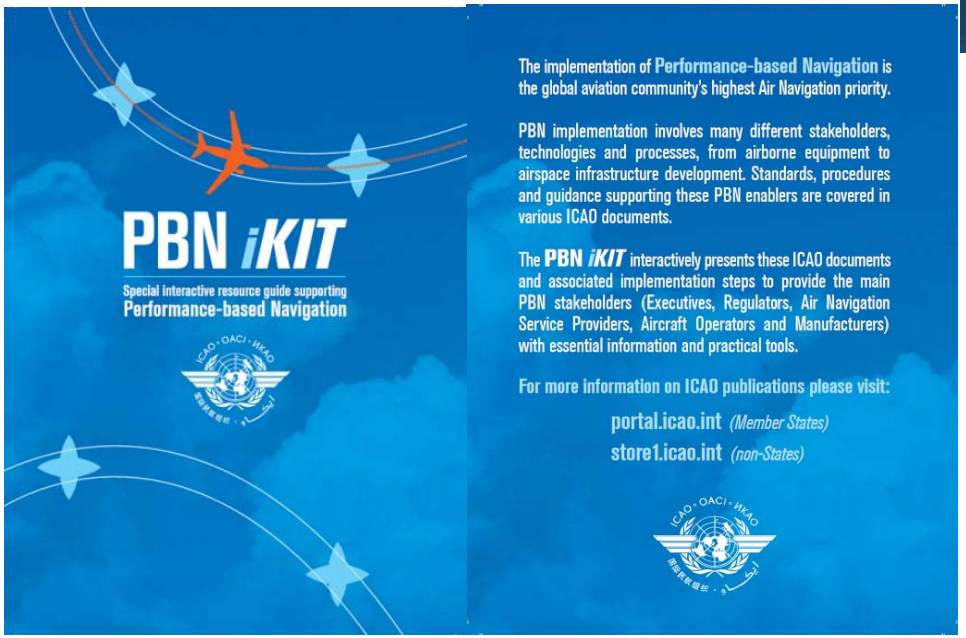
Formal Training Courses

- Operational Approvals
  - For regulators, Airline Operators
- Airspace Concept
  - For airspace designers

Involves classroom instruction and practical exercises

Updated PBN iKit

Provides the main stakeholders with essential information as well as links to practical documentation/guidance material on PBN in relation to their area.



http://www.icao.int/safety/pbn/PBNiKitV3/story.html

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

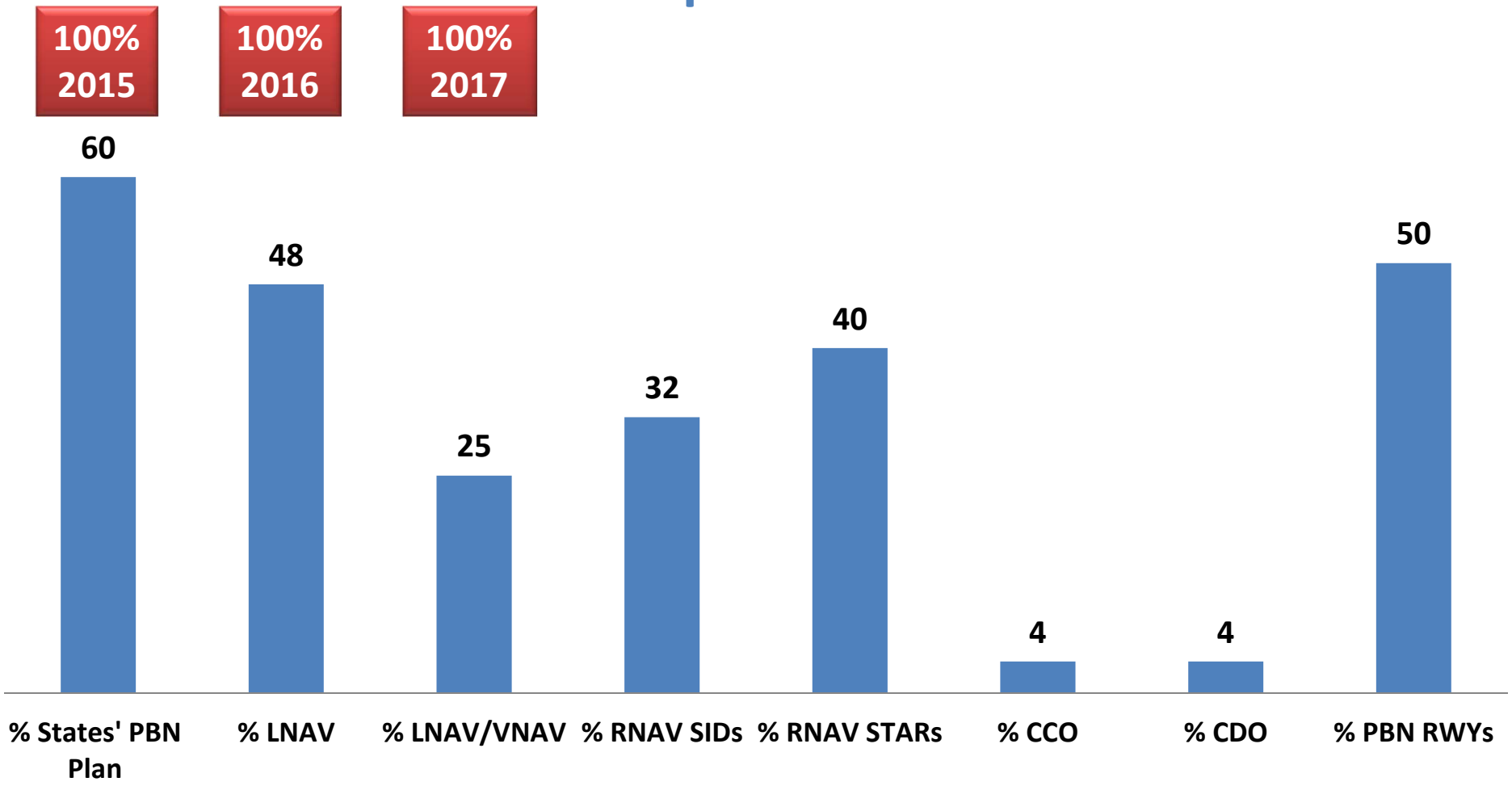
PBN implementation in the MID Region

- MID Region PBN Implementation Plan (MID Doc 007)
- Air Navigation Strategy

B0-APTA (MID Region)

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 Supporting metric: Number of States that provided updated PBN implementation Plan	80 % by Dec. 2014 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

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



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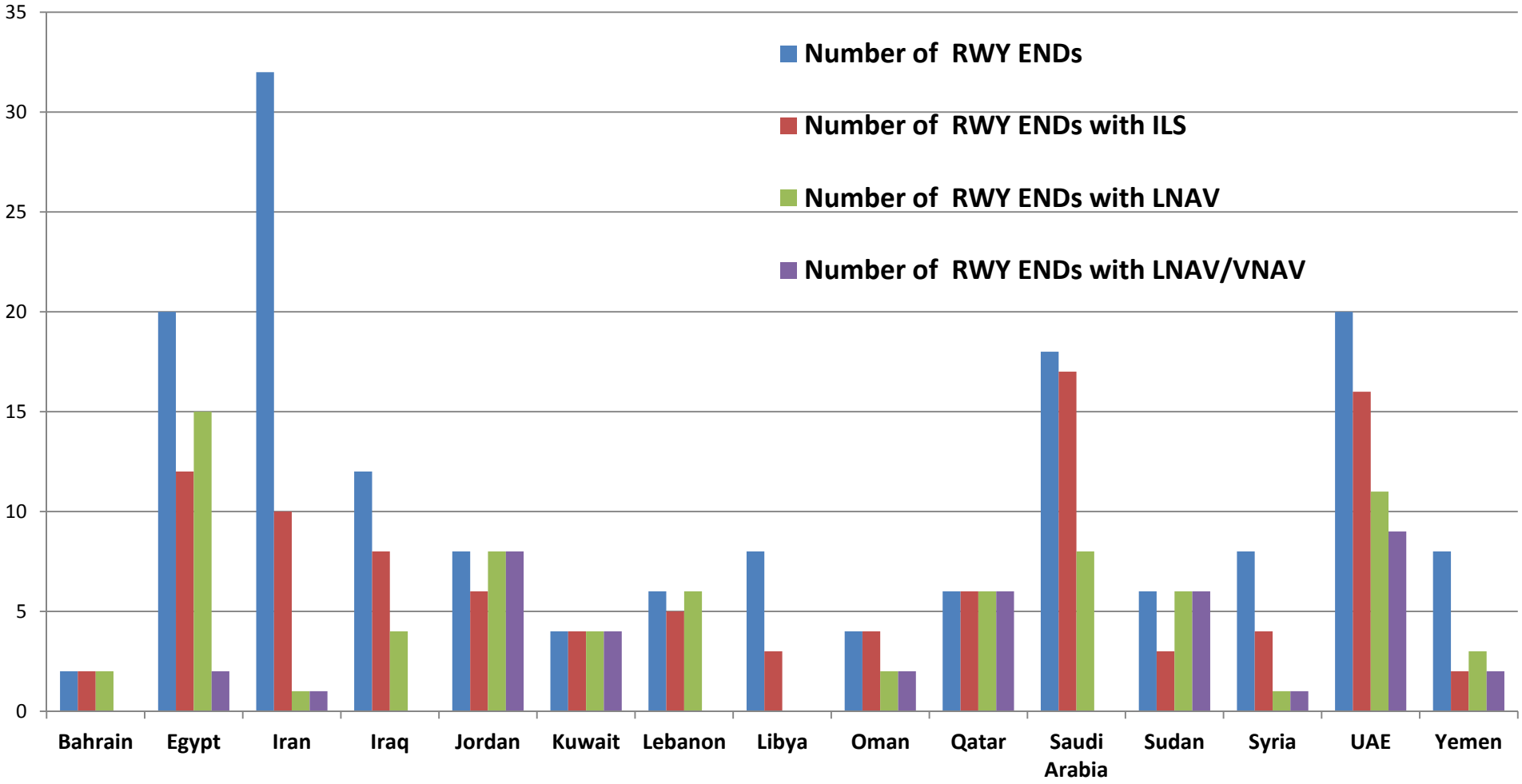

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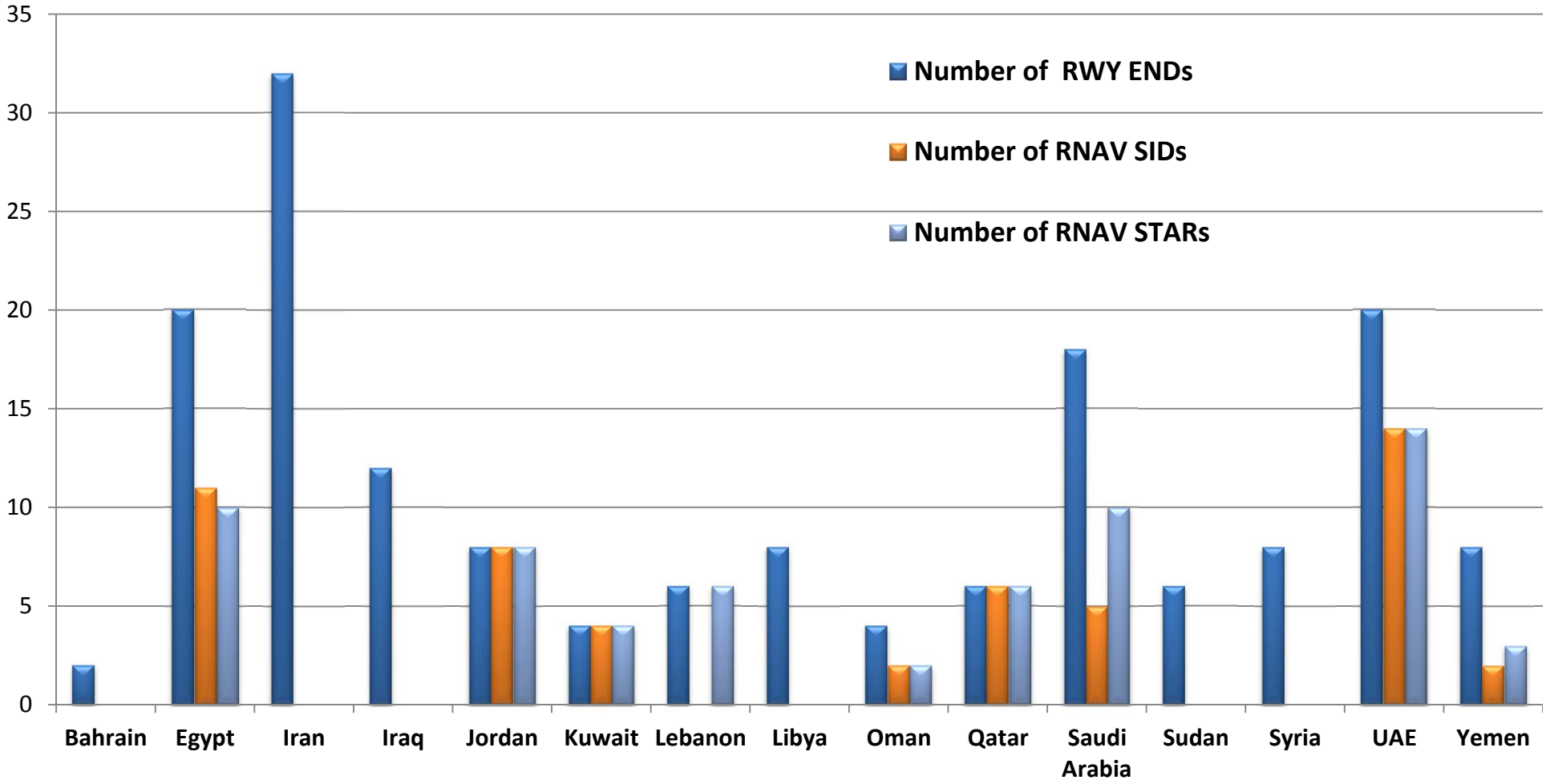

PBN implementation in the MID Region (Cont'd)

Doha Declaration

Implement PBN approach procedures with vertical guidance, for all runways ends at international aerodromes, either as the primary approach or as a back-up for the precision approaches by 2017.

AFI GNSS Implementation Strategy

- APIRG/12 (1999) agreed on the initial AFI GNSS Strategy
  - for the introduction of satellite-based augmentation systems
- APIRG/13 (2001) Major update based on existing and expected technologies
  - WAAC (Americas) and EGNOS (over ECAC) expected 2003. Galileo 2008 over ECAC, etc.
- Since then debates on SBAS viability vs ABAS. Independent CBA
- AU agreement on ENGOS for general applications. Civil aviation concerns on “risk” of civil aviation subsidizing other EGNOS user
- APIRG/19 (2013) Requirements for
  - Assessments of interference, ionospheric scintillation in equatorial regions, and mitigations by airspace; operational justification

APIRG Framework

2009

- Workshop and guidance on development of Plans & Implementation Action Plans, templates provided
- Examples of PBN Implementation Action & Action Plans

2010 – APIRG 17

- Concl. 17/47
  - Provided template for State PBN Implementation Plan
  - Urged completion as soon as possible
  - Feedback to Regional Offices by 30 Oct. 2010
- Concl. 17/48
  - Implementation tools provided: Action Plan Templates, project management; reference to others.

Mid term- 2013-2016 Implementation targets

- RNP APCH (APV) (Baro-VNAV or Augmented GNSS) in 100% of instrument runways where practical, by 2016.
- RNP APCH (LNAV only minima) in 70% of instrument runways by 2014, 100% by 2016
- Straight-in LNAV only procedures for instrument runways where there is no local altimeter setting available & where aircraft MTOM 5 700 kg or more are not suitably equipped for APV operations
- RNAV 1 or RNP 1 SID/STAR for 100% of international airports by 2016.
- RNAV 1 or RNP 1 SID/STAR for 70% of busy domestic airports where there are operational benefits.
- Implementation of additional RNAV/RNP Routes as required.

Status of PBN Implementation - Terminal

TOTAL NO OF INT'L AIRPORTS	TOTAL NO OF RWYS	TOTAL NO OF INST RWYS	TOTAL NO OF RNP APCH	TOTAL NO OF RNAV APCH	TOTAL NO OF RNAV/RNP SID	TOTAL NO OF RNAV/RNP STAR
60	120	96	13	15	38	41

Some of the issues in discussion:

- But, What is "International Airport/Aerodrome??
- Concerns about targets moving "to right…"

TOTAL NO OF DOMESTIC AIRPORTS	TOTAL NO OF RWYS	TOTAL NO OF INST RWYS	TOTAL NO OF RNP APCH	TOTAL NO OF RNAV APCH	TOTAL NO OF RNAV/RNP SID	TOTAL NO OF RNAV/RNP STAR
83	172	20	16	8	7	7

Challenges

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 publication
- Need to raise awareness of all stakeholders on PBN advantages and how to achieve an effective implementation
- Unstable political and security situation in some States

Some mitigation measures were also identified such as:

- States were encourage to:
  - ensure the training/recruitment of qualified experts in the fields of FPD, airspace planning, and operations approval
  - work cooperatively
  - request ICAO support for the training and implementation of PBN
  - organize PBN Workshops at national level

The FPPs would provide the optimum solution and foster the implementation of PBN


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Thank You