*International Civil Aviation Organization*

**Middle East Air Navigation Planning and Implementation Regional Group**

**Fifteenth Meeting (MIDANPIRG/15)**
***(Bahrain, 8 – 11 June 2015)***

**Agenda Item 5.2.1: MID Region air navigation priorities and target (ASBU Implementation)**

# PBN IMPLEMENTATION IN THE MID REGION (B0-APTA, B0-CDO, AND B0-CCO)

*(Presented by the Secretariat)*

**SUMMARY**

The aim of this paper is to review and update the status of implementation of the B0-APTA, B0-CDO, and B0-CCO elements in the MID Region and explore ways and means to expedite the implementation in order to meet the agreed performance targets.

Action by the meeting is at paragraph 3.

**REFERENCES**

- ANSIG/1 Report
- MID Region Air Navigation Strategy
- MID Region PBN Implementation Plan
- MSG/4 Report
- PBN SG/1 Report

## 1. INTRODUCTION

1.1 The First meeting of the Air navigation Systems Implementation Group (ANISIG/1) was held in Cairo, Egypt, 10-12 February 2015. The ANSIG/1 meeting reviewed and updated the status of implementation of the different ASBU Module elements included in the MID Air Navigation Plan/Strategy.

1.2 The meeting may wish to note that ICAO is publishing the status of PBN implementation worldwide on the ICAO Performance Dashboards. In this regard, the agreed performance indicators/metrics for the MID Region are in line with those monitored through the Dashboard.

1.3 The meeting may wish to recall that MIDANPIRG/14 agreed that the PBN Sub-Group be responsible for PBN implementation for Terminal and Approach, while the responsibility for PBN implementation for Enroute is assigned to the ATM Sub-Group.

## 2. DISCUSSION

2.1 The use of performance-based navigation (PBN) will enhance the reliability and predictability of approaches to runways, thus increasing safety, accessibility, and efficiency. This is possible through the application of Basic global navigation satellite system (GNSS), Baro-Vertical Navigation (VNAV), satellite-based augmentation system (SBAS) and Ground-based Augmentation System (GBAS). The flexibility inherent in PBN approach design can be exploited to increase runway capacity.

2.2 The meeting may wish to note that the implementation of GBAS Landing System (GLS) has not been considered as a priority for the short term (2014-2017) in the MID Region. Accordingly, it was agreed that the implementation of GLS would be required at some identified runway ends starting 2018 and beyond.

2.3 It is to be highlighted that the MID Region PBN Implementation Plan (Version 1, November 2014), endorsed by the MSG/4 meeting, is available on the ICAO MID website: https://portal.icao.int/RO_MID/Pages/eDocs.aspx .

2.4 The meeting may wish to recall that the MSG/4 meeting noted with concerns that Iran, Iraq, Lebanon and Libya have not yet submitted their National PBN Implementation Plan. In this regard, the meeting urged MID States to provide the ICAO MID Regional Office with their updated PBN Implementation Plan, on an annual basis (by end of December). Moreover, the meeting underlined that the Users should be consulted during the process of development/update of the National PBN Implementation Plans. Accordingly, the meeting agreed to the following MSG Conclusion:

*MSG CONCLUSION 4/11: STATES' PBN IMPLEMENTATION PLANS*

*That, States be urged to:*

*a) develop/update their PBN implementation Plan taking into consideration the MID Region PBN Implementation Plan, the MID Air Navigation Strategy and the Users requirements; and*

*b) provide the ICAO MID Regional Office with their updated PBN Implementation Plan on an annual basis (by end of December).*

2.5 The ICAO MID Regional Office issued State Letter Ref. AN 6/28-14/334 dated 21 December 2014, as a follow-up action to the above Conclusion. It is to be noted that Bahrain, Egypt, Oman and UAE provided their updated National PBN Implementation Plan dated January 2015. Qatar and Sudan have already provided their updated Plans in August and April 2014, respectively.

2.6 The status of implementation of the different elements of the ASBU Modules B0-APTA, B0-CCO and B0-CDO included in the MID Air Navigation Strategy, was reviewed by the ANSIG/1 meeting and an updated status is reflected in the following Tables:

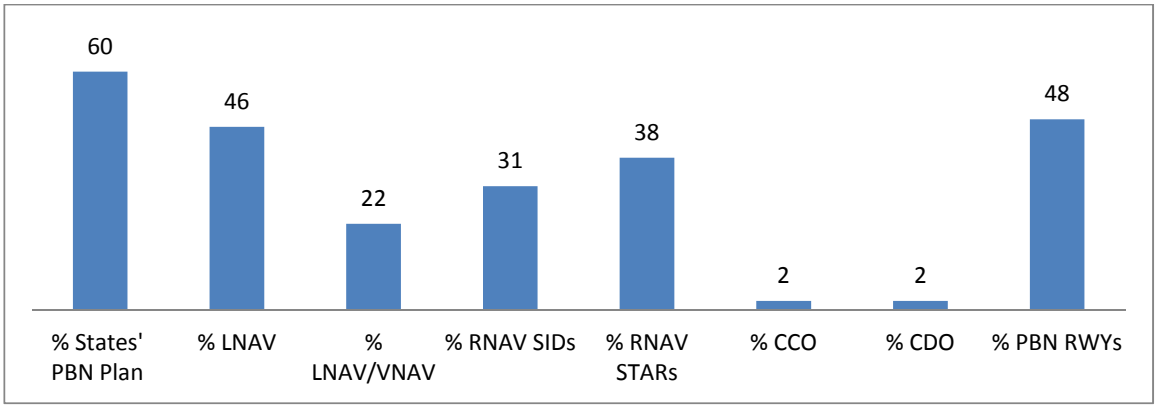
| ***B0 – APTA: Optimization of Approach Procedures including vertical guidance*** | | | | |
|---|---|---|---|---|
| **Elements** | **Applicability** | **Performance Indicators/Supporting Metrics** | **Targets** | **Status** |
| States' PBN Implementation Plans | All | Indicator: % of States that provided updated PBN implementation Plan<br><br>Supporting metric: Number of States that provided updated PBN implementation Plan | 80 % by Dec. 2014<br><br>100% by Dec. 2015 | 60% May 2015 *(9 States)* |

| | | | | |
|---|---|---|---|---|
| LNAV | All RWYs Ends at International Aerodromes | Indicator: % of runway ends at international aerodromes with RNAV(GNSS) Approach Procedures (LNAV)<br><br>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 | 46% May.2015 *(83 out of 180 RWY Ends)* |
| LNAV/VNAV | All RWYs ENDs at International Aerodromes | Indicator: % of runways ends at international aerodromes provided with Baro-VNAV approach procedures (LNAV/VNAV)<br><br>Supporting metric: Number of runways ends at international aerodromes provided with Baro-VNAV approach procedures (LNAV/VNAV) | All runway ends at Int'l Aerodromes, either as the primary approach or as a back-up for precision approaches by Dec. 2017 | 22% May 2014 *(39 out of 180 RWY Ends)* |

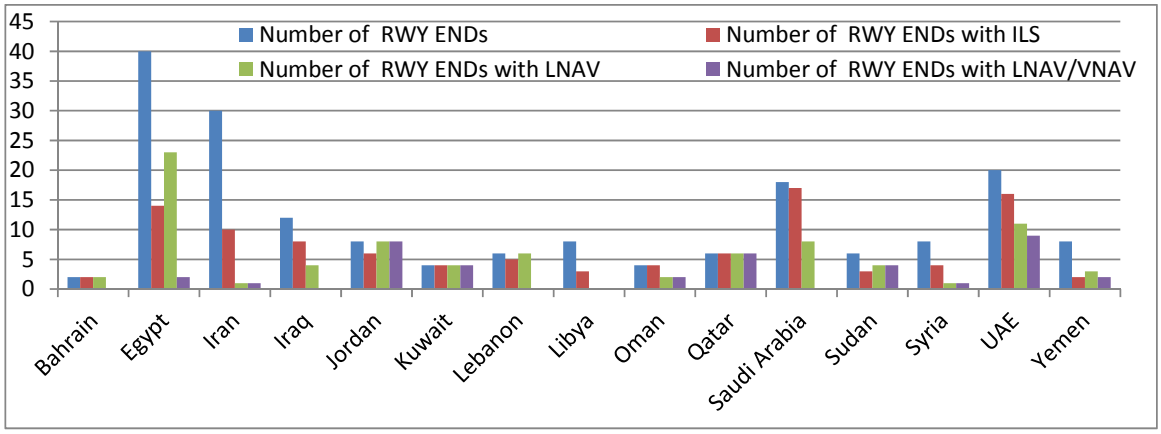
| ***B0 – CCO: Improved Flexibility and Efficiency Departure Profiles - Continuous Climb Operations (CCO)*** | | | | |
|---|---|---|---|---|
| **Elements** | **Applicability** | **Performance Indicators/Supporting Metrics** | **Targets** | **Status** |
| PBN SIDs | in accordance with States' implementation Plans | Indicator: % of International Aerodromes/TMA with PBN SID implemented as required.<br><br>Supporting Metric: Number of International Aerodromes/ TMAs with PBN SID implemented as required. | 100% by Dec. 2016 for the identified Aerodromes/TMAs<br><br>100% by Dec. 2018 for all the International Aerodromes/TMAs | To be determined by PBN SG/2 Nov. 2015<br><br>32% May 2015 *(21 out of 65 int'l Aerodromes)*<br>31% May 2015 *(56 out of 180 RWY Ends)* |
| International aerodromes/TMAs with CCO | in accordance with States' implementation Plans | Indicator: % of International Aerodromes/TMA with CCO implemented as required.<br><br>Supporting Metric: Number of International Aerodromes/TMAs with CCO implemented as required. | 100% by Dec. 2018 for the identified Aerodromes/TMAs | To be determined by PBN SG/2 Nov. 2015 |

| *B0 – CDO: Improved Flexibility and Efficiency in Descent Profiles (CDO)* | | | | |
|---|---|---|---|---|
| **Elements** | **Applicability** | **Performance Indicators/Supporting Metrics** | **Targets** | **Status** |
| PBN STARs | In accordance with States' implementation Plans | Indicator: % of International Aerodromes/TMA with PBN STAR implemented as required.<br><br>Supporting Metric: Number of International Aerodromes/TMAs with PBN STAR implemented as required. | 100% by Dec. 2016 for the identified Aerodromes/TMAs<br><br>100% by Dec. 2018 for all the International Aerodromes/TMAs | To be determined by PBN SG/2 Nov. 2015<br><br>34% May 2015 *(24 out of 65 int'l Aerodromes)*<br>38% May 2015 *(69 out of 180 RWY Ends)* |
| International aerodromes/TMAs with CDO | In accordance with States' implementation Plans | Indicator: % of International Aerodromes/TMA with CDO implemented as required.<br><br>Supporting Metric: Number of International Aerodromes/TMAs with CDO implemented as required. | 100% by Dec. 2018 for the identified Aerodromes/TMAs | To be determined by PBN SG/2 Nov. 2015 |

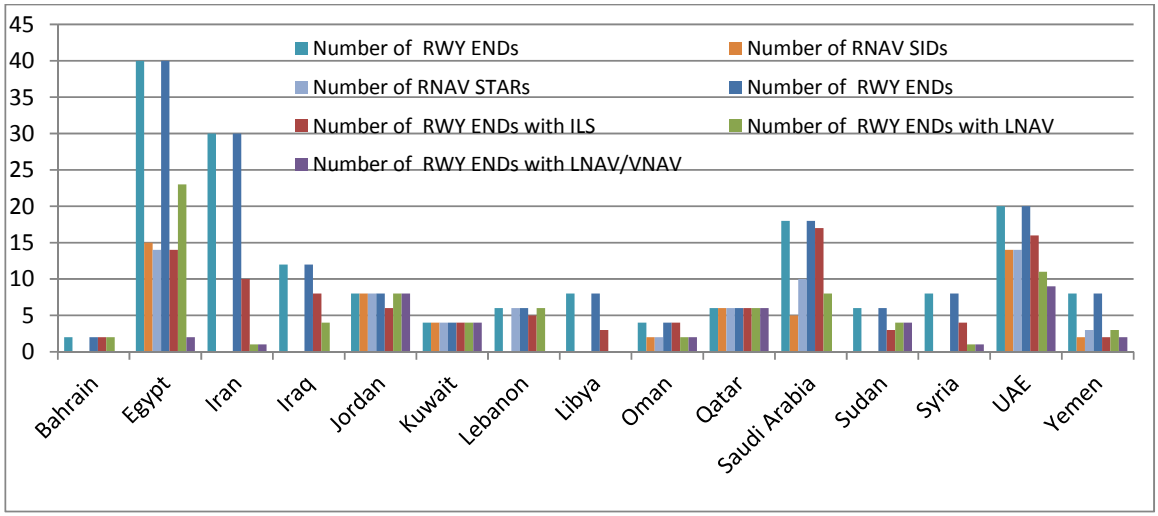
2.7 The source used for the collection of data are the States' Aeronautical Information Publications (AIPs). The below graphs reflect the status of implementation of the elements related to B0-APTA, B0-CCO and B0-CDO. Detailed information is provided at **Appendix A**.




**Status of the implementation of BO-APTA, BO-CCO and B0-CDO Elements as of January 2015**




**PBN RWYs Status by State as of May 2015**




**RNAV SIDs and STARs Status by State as of May 2015**

| Jan. 2015 | Bahrain | Egypt | Iran | Iraq | Jordan | Kuwait | Lebanon | Libya | Oman | Qatar | Saudi Arabia | Sudan | Syria | UAE | Yemen |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PBN Plan** | Y | Y | N | N | Y | Y | N | N | Y | Y | Y | Y | Draft | Y | Draft |
| **Date** | Mar. 2015 | Jan. 2015 | 0 | 0 | July 2009 | Jan. 2010 | 0 | 0 | Feb 2015 | Aug. 2014 | May 2012 | April 2014 | Dec. 2009 | Jan. 2015 | Jan. 2010 |
| **Includes CCO** | No | Y | No | No | No | No | No | No | Y | Y | No | Y | No | No | No |
| **Includes CDO** | No | Y | No | No | No | No | No | No | Y | Y | No | Y | No | No | No |
| Note. Y = Final version of the PBN Implementation Plan was provided and N = Not provided | | | | | | | | | | | | | | | |

**Status of the States' PBN Implementation Plans as of May 2015**

2.8 The following highlights the progress achieved in the implementation of PBN (Terminal and Approach) in the MID Region:

- Jordan, Kuwait and Qatar had completed the implementation of RNAV SIDs,

RNAV STARs and Approach procedures with vertical guidance (LNAV/VNAV) for all its instruments Runway ends.

- Bahrain completed the implementation of RNAV GNSS Approach (LNAV) for all its instruments Runway ends;
- Lebanon completed the implementation of RNAV STARs and RNAV GNSS Approach (LNAV) for all its instruments Runway ends;
- PBN implementation had significantly improved in Oman by an increase of 50%, and
- PBN implementation in UAE had reached 75%. It is to be emphasized that only UAE had implemented RNP-AR approaches in the MID Region, four (4) at Abu Dhabi and two (2) at Al Bateen International Airports.
- Iran has implemented the first PBN Approach with vertical guidance (LNAV/VNAV) at Imam Khoumaini International airport (OIIE) Runway 29R.
- PBN Approach with vertical guidance (LNAV/VNAV) has reached 67% in Sudan.

2.9 It is to be highlighted that only Qatar implemented CCOs and CDOs.

2.10 It is to be noted that the implementation of PBN in the MID Region, including the implementation of Approach Procedures with Vertical Guidance (APVs), RNAV SIDs, RNAV STARs, CCOs and CDOs is far below expectation, as reflected in the above graphs.

2.11 The meeting may wish to note that the ANSIG/1 meeting identified the main challenges facing the implementation of PBN in the MID Region and recommended measures that would overcome these challenges as reflected in the below Table. In this regard, the ANSIG/1 meeting encouraged all Stakeholders to collaborate together in order to foster the PBN implementation in the MID Region to meet the agreed targets:

| Challenges | Mitigation measures |
|---|---|
| Shortage of PANS-OPS, Airspace Planners and OPS-approval experts | • States should ensure the training/recruitment of qualified experts in the fields of flight procedure design, airspace planning, and operations approval.<br>• States are strongly encouraged to work cooperatively.<br>• For the long term the MID Flight Procedure Programme, when established, would provide the optimum solution and foster the implementation of PBN.<br>• States might request ICAO support for the training and implementation of PBN under the framework of the ICAO PBN Programme, all the required information are available on the programme website http://www.icao.int/safety/pbn/Pages/default.aspx<br>• Other Stakeholders might also provide the necessary support. |
| Need to raise awareness of all stakeholders on PBN advantages and how to achieve an effective implementation, | • States are strongly encouraged to organize at national level PBN Workshops; ICAO is willing to support these Workshops if required.<br>• Involvement of all stakeholders at national level in |

| | |
|---|---|
| | the planning and implementation process of PBN (application of the airspace concept, establishment of PBN National Committee, etc)<br>• For the long term the MID Flight Procedure Programme, when established, would provide the optimum solution and foster the implementation of PBN.<br>• PBN Publications and Bundles in addition to some PBN online courses are available on the ICAO PBN Programme website http://www.icao.int/safety/pbn/Pages/default.aspx |
| Unstable political and security situation in some States | |

## 3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) review and update the status of implementation of the different B0-APTA, BO-CCO and B0-CDO elements;

b) urge States, in accordance with MSG/4 Conclusion 4/11, to develop/update their PBN Implementation Plans and provide them to the ICAO MID Regional Office as soon as possible, taking into consideration the MID Air Navigation Strategy and the users' requirements;

c) review the challenges presented in para. 2.11 and identify additional difficulties, if any;

d) recommend measures to expedite the implementation process and meet the agreed performance targets; and

e) review and update the list of PBN focal points at **Appendix B**.

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# MID REGION TMAs PROCEDURES Implementation Status as of May 2015

| Int'l Aerodrome (Ref. MID ANP) | RWY | Conventional Approaches | | | APTA | | | CCO | | CDO | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Precision | | VOR or NDB | PBN PLAN Update date | LNAV | LNAV / VNAV | RNAV SID | CCO | RNAV STAR | CDO | |
| | | xLS | CAT | | | | | | | | | |
| **BAHRAIN** | | | | | | | | | | | | 1 airport |
| OBBI | 12L | ILS | I | VORDME | | Y | | | | | | |
| | 30R | ILS | I | VORDME | | Y | | | | | | |
| **Total** | **2** | **2** | | **2** | **Y** | **2** | **0** | **0** | **0** | **0** | **0** | |
| **%** | | **100** | | **100** | **Mar. 2015** | **100** | **0** | **0** | **0** | **0** | **0** | |
| **EGYPT** | | | | | | | | | | | | 16 airports |
| HEAX | 4 | | | VORDME | | Y | | | | | | |
| | 18 | | | | | | | | | | | |
| | 22 | | | VORDME | | Y | | | | | | |
| | 36 | | | VORDME | | | | | | | | |
| HEBA | 14 | | | | | | | | | | | |
| | 32 | ILS | I | | | Y | | Y | | | | |
| HESN | 17 | | | VORDME | | Y | | Y | | Y | | |
| | 35 | ILS | I | VORDME | | Y | | Y | | Y | | |
| HEAT | 13 | | | | | Y | | Y | | Y | | |
| | 31 | ILS | I | VORDME | | Y | | Y | | Y | | |
| HECA | 05L | ILS | I | VORDME | | Y | | | | | | |
| | 05C | ILS | II | VORDME | | Y | | | | | | |
| | 05R | ILS | I | | | | | | | | | |
| | 23L | ILS | I | VORDME | | | | | | | | |
| | 23C | ILS | II | VORDME | | Y | | | | | | |
| | 23R | ILS | I | VORDME | | Y | | | | | | |
| HEAR | 16 | | | | | | | | | | | |
| | 34 | | | VORDME | | | | | | | | |
| HEGN | 16 | | | VORDME | | Y | | Y | | Y | | |
| | 34 | ILS | I | VORDME | | Y | | Y | | Y | | |

| Int'l Aerodrome (Ref. MID ANP) | RWY | Conventional Approaches | | | APTA | | | CCO | | CDO | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Precision | | VOR or NDB | PBN PLAN Update date | LNAV | LNAV / VNAV | RNAV SID | CCO | RNAV STAR | CDO | |
| | | xLS | CAT | | | | | | | | | |
| HELX | 2 | ILS | I | VORDME | | Y | | Y | | Y | | |
| | 20 | ILS | I | VORDME | | Y | | Y | | Y | | |
| HEMA | 15 | | | VORDME | | | | | | | | |
| | 33 | | | VORDME | | | | | | | | |
| HEPS | 10 | | | VORDME | | | | | | | | |
| | 28 | | | | | | | | | | | |
| HEOW | 1 | | | NDB | | | | | | | | |
| | 19 | | | | | | | | | | | |
| HESH | 04L | ILS | I | VORDME | | Y | Y | Y | | Y | | |
| | 04R | | | VORDME | | Y | Y | Y | | Y | | |
| | 22L | | | VORDME | | Y | | Y | | Y | | |
| | 22R | | | VORDME | | Y | | Y | | Y | | |
| HESC | 17 | | | NDB | | | | | | | | |
| | 35 | | | NDB | | | | | | | | |
| HETB | 4 | ILS | I | VORDME | | Y | | Y | | Y | | |
| | 22 | | | VORDME | | Y | | Y | | Y | | |
| HEAL | 13 | | | VORDME | | Y | | | | | | |
| | 31 | | | VORDME | | Y | | | | | | |
| HESG | 15 | | | VORDME | | | | | | | | |
| | 33 | | | VORDME | | | | | | | | |
| Total | 40 | 14 | | 32 | Y | 23 | 2 | 15 | 0 | 14 | 0 | |
| % | | 35 | | 80 | Jan. 2015 | 58 | 5 | 38 | 0 | 35 | 0 | |

| Int'l Aerodrome (Ref. MID ANP) | RWY | Conventional Approaches | | | APTA | | | CCO | | CDO | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Precision | | VOR or NDB | PBN PLAN Update date | LNAV | LNAV / VNAV | RNAV SID | CCO | RNAV STAR | CDO | |
| | | xLS | CAT | | | | | | | | | |
| **I.R. IRAN** | | | | | | | | | | | | 8 airports |
| OIKB | 03L | | | | | | | | | | | |
| | 03R | | | VORDME / NDB | | | | | | | | |
| | 21L | ILS | I | VORDME / NDB | | | | | | | | |
| | 21R | | | | | | | | | | | |
| OIFM | 08L | | | VORDME / NDB | | | | | | | | |
| | 08R | | | VORDME / NDB | | | | | | | | |
| | 26L | | | VORDME / NDB | | | | | | | | |
| | 26R | ILS | I | VORDME / NDB | | | | | | | | |
| OIMM | 13L | | | VORDME | | | | | | | | |
| | 13R | | | VORDME | | | | | | | | |
| | 31L | | | VORDME / NDB | | | | | | | | |
| | 31R | ILS | I | VORDME / NDB | | | | | | | | |
| OISS | 11L | | | | | | | | | | | |
| | 11R | | | | | | | | | | | |
| | 29L | ILS | I | VORDME / NDB | | | | | | | | |
| | 29R | | | VORDME / NDB | | | | | | | | |
| OITT | 12L | | | | | | | | | | | |
| | 12R | | | | | | | | | | | |
| | 30L | ILS | I | VORDME | | | | | | | | |
| | 30R | ILS | I | VORDME | | | | | | | | |

| Int'l Aerodrome (Ref. MID ANP) | RWY | Conventional Approaches | | | APTA | | | CCO | | CDO | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Precision | | VOR or NDB | PBN PLAN Update date | LNAV | LNAV / VNAV | RNAV SID | CCO | RNAV STAR | CDO | |
| | | xLS | CAT | | | | | | | | | |
| OIIE | 11L | ILS | I | VORDME / NDB | | | | | | | | |
| | 11R | | | VORDME / NDB | | | | | | | | |
| | 29L | | | VORDME | | | | | | | | |
| | 29R | ILS | II | VORDME / NDB | | Y | Y | | | | | |
| OIII | 11L | | | VORDME | | | | | | | | |
| | 11R | | | VORDME | | | | | | | | |
| | 29L | ILS | I | VORDME | | | | | | | | |
| | 29R | | | | | | | | | | | |
| OIZH | 17 | | | | | | | | | | | |
| | 35 | ILS | I | VORDME | | | | | | | | |
| **Total** | **30** | **10** | | **22** | **N** | **1** | **1** | **0** | **0** | **0** | **0** | |
| **%** | | **33** | | **73** | | **3** | **3** | **0** | **0** | **0** | **0** | |
| **IRAQ** | | | | | | | | | | | | 6 airports |
| ORBI | 15L | ILS | I | VORDME | | | | | | | | |
| | 15R | | | | | Y | | | | | | |
| | 33L | | | | | Y | | | | | | |
| | 33R | ILS | I | VORDME | | | | | | | | |
| ORMM | 14 | | | VORDME | | | | | | | | |
| | 32 | ILS | I | VORDME | | | | | | | | |
| ORER | 18 | ILS | II | | | Y | | | | Y | | |
| | 36 | ILS | I | | | Y | | | | Y | | |
| ORSU | 13 | ILS | I | VOR | | | | | | | | |
| | 31 | ILS | I | VOR | | | | | | | | |
| ORNI | 10 | | | | | | | | | | | |
| | 28 | ILS | | VOR | | | | | | | | |
| ORBM | | | | | | | | | | | | NO DATA |
| **Total** | **12** | **8** | | **7** | **N** | **4** | **0** | **0** | **0** | **2** | **0** | |
| **%** | | **67** | | **58** | | **33** | **0** | **0** | **0** | **17** | **0** | |

| Int'l Aerodrome (Ref. MID ANP) | RWY | Conventional Approaches | | | APTA | | | CCO | | CDO | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Precision | | VOR or NDB | PBN PLAN Update date | LNAV | LNAV / VNAV | RNAV SID | CCO | RNAV STAR | CDO | |
| | | xLS | CAT | | | | | | | | | |
| **JORDAN** | | | | | | | | | | | | 3 airports |
| OJAM | 6 | | | | | Y | Y | Y | | Y | | |
| | 24 | ILS | I | VORDME / NDB | | Y | Y | Y | | Y | | |
| OJAI | 08L | ILS | I | NDB DME | | Y | Y | Y | | Y | | |
| | 08R | | | NDB DME | | Y | Y | Y | | Y | | |
| | 26L | ILS | II | VOR / NDB | | Y | Y | Y | | Y | | |
| | 26R | ILS | I | VORDME / NDB | | Y | Y | Y | | | | |
| OJAQ | 1 | ILS | I | VORDME | | Y | Y | Y | | Y | | |
| | 19 | N/A | N/A | | | Y | N/A | Y | | Y | | LNAV/VNAV not feasible |
| **Total** | **8** | **6** | | **6** | **Y** | **8** | **8** | **8** | **0** | **8** | **0** | |
| **%** | | **75** | | **75** | **July 2009** | **100** | **100** | **100** | **0** | **100** | **0** | **Plan needs update** |
| **KUWAIT** | | | | | | | | | | | | 1 airport |
| OKBK | 15L | ILS | II | | | Y | Y | Y | | Y | | |
| | 15R | ILS | II | VORDME | | Y | Y | Y | | Y | | |
| | 33L | ILS | II | VORDME | | Y | Y | Y | | Y | | |
| | 33R | ILS | II | | | Y | Y | Y | | Y | | |
| **Total** | **4** | **4** | | **2** | **Y** | **4** | **4** | **4** | **0** | **4** | **0** | |
| **%** | | **100** | | **50** | **Jan. 2010** | **100** | **100** | **100** | **0** | **100** | **0** | **Plan needs update** |
| **LEBANON** | | | | | | | | | | | | 1 airport |
| OLBA | 3 | ILS | I | VORDME | | Y | | | | Y | | |
| | 16 | ILS | I | VORDME | | Y | | | | Y | | |
| | 17 | ILS | I | VORDME / NDB | | Y | | | | Y | | |
| | 21 | | | | | Y | | | | Y | | |
| | 34 | N/A | | N/A | | N/A | | | | N/A | | Not used for landing |
| | 35 | N/A | | N/A | | N/A | | | | N/A | | Not used for landing |
| **Total** | **6** | **5** | | **5** | **N** | **6** | **0** | **0** | **0** | **6** | **0** | |
| **%** | | **83** | | **83** | | **100** | **0** | **0** | **0** | **100** | **0** | |

| Int'l Aerodrome (Ref. MID ANP) | RWY | Conventional Approaches | | | APTA | | | CCO | | CDO | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Precision | | VOR or NDB | PBN PLAN Update date | LNAV | LNAV / VNAV | RNAV SID | CCO | RNAV STAR | CDO | |
| | | xLS | CAT | | | | | | | | | |
| **LIBYA** | | | | | | | | | | | | 3 airports |
| HLLB | 15R | | | VORDME | | | | | | | | VOR not flight checked |
| | 15L | | | VORDME | | | | | | | | VOR not flight checked |
| | 33R | | | VORDME | | | | | | | | VOR not flight checked |
| | 33L | ILS | I | VORDME | | | | | | | | ILS not flight checked |
| HLLS | 13 | ILS | I | VORDME | | | | | | | | ILS not flight checked |
| | 31 | | | VORDME | | | | | | | | VOR not flight checked |
| HLLT | 9 | | | VORDME | | | | | | | | VOR not flight checked |
| | 27 | ILS | I | VORDME | | | | | | | | ILS not flight checked |
| **Total** | **8** | **3** | | **8** | **N** | **0** | **0** | **0** | **0** | **0** | **0** | |
| **%** | | **38** | | **100** | | **0** | **0** | **0** | **0** | **0** | **0** | |
| **OMAN** | | | | | | | | | | | | 2 airports |
| OOMS | 08R | ILS | I | VORDME | | | | | | | | |
| | 26L | ILS | I | VORDME | | | | | | | | |
| OOSA | 7 | ILS | I | VORDME | | Y | Y | Y | | Y | | |
| | 25 | ILS | I | VORDME | | Y | Y | Y | | Y | | |
| **Total** | **4** | **4** | | **4** | **Y** | **2** | **2** | **2** | **0** | **2** | **0** | |
| **%** | | **100** | | **100** | **Feb. 2015** | **50** | **50** | **50** | **0** | **50** | **0** | |
| **QATAR** | | | | | | | | | | | | 2 airports |
| OTBD | 15 | ILS | I | VORDME | | Y | N/A | Y | Y | Y | Y | LNAV/VNAV not feasible |
| | 33 | ILS | II/III | VORDME/NDB | | Y | Y | Y | Y | Y | Y | CCO/CDO tactically achieved |
| OTHH | 16L | ILS | I/II/III | VORDME | | Y | Y | Y | Y | Y | Y | CCO/CDO tactically achieved |
| | 16R | ILS | I/II/III | VORDME | | Y | Y | Y | Y | Y | Y | CCO/CDO tactically achieved |
| | 34L | ILS | I/II/III | VORDME | | Y | Y | Y | Y | Y | Y | CCO/CDO tactically achieved |
| | 34R | ILS | I/II/III | VORDME | | Y | Y | Y | Y | Y | Y | CCO/CDO tactically achieved |
| **Total** | **6** | **6** | | **6** | **Y** | **6** | **6** | **6** | **6** | **6** | **6** | |
| **%** | | **100** | | **100** | **Aug. 2014** | **100** | **100** | **100** | **100** | **100** | **100** | |

| Int'l Aerodrome (Ref. MID ANP) | RWY | Conventional Approaches | | | APTA | | | CCO | | CDO | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Precision | | VOR or NDB | PBN PLAN Update date | LNAV | LNAV / VNAV | RNAV SID | CCO | RNAV STAR | CDO | |
| | | xLS | CAT | | | | | | | | | |
| **SAUDI ARABIA** | | | | | | | | | | | | 4 airports |
| OEDF | 16L | ILS | II | VORDME | | | | | | | | |
| | 16R | ILS | II | VORDME | | | | | | | | |
| | 34L | ILS | II | VORDME | | | | | | | | |
| | 34R | ILS | II | VORDME | | | | | | | | |
| OEJN | 16L | ILS | I | VORDME | | Y | | | | Y | | |
| | 16C | ILS | II | | | | | | | Y | | |
| | 16R | ILS | II | | | Y | | | | Y | | |
| | 34L | ILS | II | | | Y | | | | Y | | |
| | 34C | ILS | II | VORDME | | | | | | Y | | |
| | 34R | ILS | I | VORDME | | Y | | | | Y | | |
| OEMA | 17 | ILS | I | VORDME | | Y | | Y | | Y | | |
| | 18 | | | VORDME | | Y | | Y | | Y | | |
| | 35 | ILS | I | VORDME | | Y | | Y | | Y | | |
| | 36 | ILS | I | VORDME | | Y | | Y | | Y | | |
| OERK | 15L | ILS | I | VORDME | | | | | | | | |
| | 15R | ILS | I | | | | | | | | | |
| | 33L | ILS | I | | | | | | | | | |
| | 33R | ILS | I | VORDME | | | | | | | | |
| **Total** | **18** | **17** | | **13** | **Y** | **8** | **0** | **5** | **0** | **10** | **0** | |
| **%** | | **94** | | **72** | **May 2012** | **44** | **0** | **28** | **0** | **56** | **0** | **Plan needs update** |

| Int'l Aerodrome (Ref. MID ANP) | RWY | Conventional Approaches | | | APTA | | | CCO | | CDO | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Precision | | VOR or NDB | PBN PLAN Update date | LNAV | LNAV / VNAV | RNAV SID | CCO | RNAV STAR | CDO | |
| | | xLS | CAT | | | | | | | | | |
| **SUDAN** | | | | | | | | | | | | 3 airports |
| HSKA | 2 | | | | | | | | | | | Charts are Not Published |
| | 20 | | | | | | | | | | | |
| HSSS | 18 | ILS | I | VORDME | | Y | Y | | | | | |
| | 36 | ILS | I | VORDME | | Y | Y | | | | | |
| HSPN | 17 | | | VORDME / NDB | | Y | Y | | | | | |
| | 35 | ILS | I | VORDME / NDB | | Y | Y | | | | | |
| **Total** | **6** | **3** | | **4** | **Y** | **4** | **4** | **0** | **0** | **0** | **0** | |
| **%** | | **50** | | **67** | **Apr. 2014** | **67** | **67** | **0** | **0** | **0** | **0** | |
| **SYRIA** | | | | | | | | | | | | 3 airports |
| OSAP | 9 | | | VORDME | | | | | | | | |
| | 27 | ILS | II | VORDME / NDB | | | | | | | | |
| OSLK | 17 | ILS | I | VORDME / NDB | | | | | | | | |
| | 35 | | | | | | | | | | | |
| OSDI | 05L | | | VOR | | | | | | | | |
| | 05R | ILS | II | VORDME / NDB | | | | | | | | |
| | 23L | | | VORDME / NDB DME | | | | | | | | |
| | 23R | ILS | II | VORDME | | Y | Y | | | | | |
| **Total** | **8** | **4** | | **7** | **Draft** | **1** | **1** | **0** | **0** | **0** | **0** | |
| **%** | | **50** | | **88** | **Dec. 2009** | **13** | **13** | **0** | **0** | **0** | **0** | |

| Int'l Aerodrome (Ref. MID ANP) | RWY | Conventional Approaches | | | APTA | | | CCO | | CDO | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Precision | | VOR or NDB | PBN PLAN Update date | LNAV | LNAV / VNAV | RNAV SID | CCO | RNAV STAR | CDO | |
| | | xLS | CAT | | | | | | | | | |
| **UNITED ARAB EMIRATES** | | | | | | | | | | | | 8 airports |
| OMAA | 13L | ILS | II | | | | | Y | | Y | | |
| | 13R | ILS | I | VOR | | | | Y | | Y | | |
| | 31L | ILS | II/III | VOR | | | | Y | | Y | | |
| | 31R | ILS | II | | | | | Y | | Y | | |
| OMAD | 13 | | | VORDME | | Y | | | | Y | | |
| | 31 | ILS | I | VORDME | | Y | | | | Y | | |
| OMAL | 1 | ILS | I | VOR | | | | | | | | |
| | 19 | | | VOR | | | | | | | | |
| OMDB | 12L | ILS | I/II/III | VOR | | Y | Y | Y | | Y | | |
| | 12R | ILS | I/II/III | VOR | | Y | Y | Y | | Y | | |
| | 30L | ILS | I/II/III | | | Y | Y | Y | | Y | | |
| | 30R | ILS | I/II/III | VOR | | Y | Y | Y | | Y | | |
| OMDW | 12 | ILS | II/III | | | Y | Y | Y | | Y | | |
| | 30 | ILS | II/III | | | Y | Y | Y | | Y | | |
| OMFJ | 11 | | | | | | | Y | | | | |
| | 29 | ILS | I | VOR | | Y | Y | Y | | | | |
| OMRK | 16 | | | VOR | | | | | | | | |
| | 34 | ILS | I | VOR | | | | | | | | |
| OMSJ | 12 | ILS | I | | | Y | Y | Y | | Y | | |
| | 30 | ILS | II | | | Y | Y | Y | | Y | | |
| **Total** | **20** | **16** | | **12** | **Y** | **11** | **9** | **14** | **0** | **14** | **0** | |
| **%** | | **80** | | **60** | **Jan. 2015** | **55** | **45** | **70** | **0** | **70** | **0** | |

| Int'l Aerodrome (Ref. MID ANP) | RWY | Conventional Approaches | | | APTA | | | CCO | | CDO | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Precision | | VOR or NDB | PBN PLAN Update date | LNAV | LNAV / VNAV | RNAV SID | CCO | RNAV STAR | CDO | |
| | | xLS | CAT | | | | | | | | | |
| **YEMEN** | | | | | | | | | | | | 4 Airports |
| OYAA | 8 | ILS | I | VORDME | | | | | | | | |
| | 26 | | | VORDME | | | | | | | | |
| OYHD | 3 | | | VOR | | | | | | | | |
| | 21 | | | VOR / NDB | | Y | | | | Y | | |
| OYRN | 6 | | | | | | | | | | | |
| | 24 | | | VORDME | | | | | | | | |
| OYSN | 18 | ILS | I | VORDME/NDB | | Y | Y | Y | | Y | | |
| | 36 | | | VOR | | Y | Y | Y | | Y | | |
| OYTZ | | | | | | | | | | | | NO DATA |
| Total | 8 | 2 | | 7 | Draft Plan | 3 | 2 | 2 | 0 | 3 | 0 | |
| % | | 25 | | 88 | Jan. 2010 | 38 | 25 | 25 | 0 | 38 | 0 | |

## Results

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total** | **180** | **104** | | **137** | **9** | **83** | **39** | **56** | **6** | **69** | **6** | **5 PBN APV + 104 ILS (109/180)** |
| **Percentage (%)** | | **58** | | **76** | **60** | **46** | **22** | **31** | **3** | **38** | **3** | **60% RWY Ends with Vertical guidance** |

**65 airport**

**PBN RWYs 83 + 4 = 87**

**87/180 = 48 %**

**Note.** 6 RNP AR Approach were implemented in OMAA, UAE.

# APPENDIX B

## PBN IMPLEMENTATION FOCAL POINT

| STATE | NAME | TITLE | ADDRESS | EMAIL | FAX | TEL | MOBILE |
|---|---|---|---|---|---|---|---|
| **Bahrain** | Saleem Mohamed Hassan | Chief Air Traffic Management | Civil Aviation Affairs<br>P.O. Box 586 | saleemmh@caa.gov.bh | +973 17329966 | +973 17321117 | +97339608860 |
| **Egypt** | Tayseer Mohamed Abdel Karim | General Director of ATS Inspectorate | Ministry of Civil Aviation<br>Egyptian Civil Aviation Authority<br>Cairo International Airport Road<br>Cairo - EGYPT | tetokareem4@gmail.com | (202) 2268 0627 | (202) 2265 7814 | (20100) 522 8675 |
| **Iran** | Habib Davoudi Dana | Chief of Procedure Design Office | ATM Department<br>Mehrabad International Airport<br>Tehran 13445 | h.davoudi@yahoo.com | +982144649269 | +982 166025013 | |
| **Iran** | Mohammad Khodakarami | D.G. of Aeronautical Affairs (in CAO) | Mehrabad International Airport<br>P.O. Box 13445 – 1798 | mkhd4444@yahoo.com | +98214464 9269 | +982 16603 6241 | |
| **Iraq** | | | | | | | |
| **Jordan** | Nayef Marshoud | Director ATM department | P.O. Box 7547 | datm@carc.gov.jo | +962 6 4891266 | +962 6 4897729 | +962 797498992 |
| **Kuwait** | Abdulla Adwani | Superintendent of AIS | Directorate General of Civil Aviation<br>Kuwait International Airport<br>P.O. Box 17 Safat 13001 | Q8dgca_danoff@hotmail.com | +965 4346221 | +965 4346220 | +965 9571755 |
| **Lebanon** | Walid Alhassanieh | Chief ACC | Air Navigation Department<br>Beirut Rafic Hariri Int'l Airport | hassaniehw @beirutairport.gov.lb | +9611629023<br>+9611629106 | +961 1629026 | +961 3509902 |
| **Libya** | | | | | | | |
| **Oman** | Sabri Said Saud Al-Busaidy | DMS Manager | Directorate General of Meteorology & Air Navigation (DGMAN)<br>Muscat International Airport<br>P.O. Box 1 CPO Seeb | sabri@dgcam.gov.om | +96824518990<br>+24519 939 | +968 24519501 | +968 99359415 |
| **Qatar** | Ahmed Al-Eshaq | Director Air Navigation | Civil Aviation Authority<br>P.O. Box 3000<br>Doha – QATAR | ahmed@caa.gov.qa | (974) 465 6554 | (974) 462 2300 | (974) 555 0440 |

| STATE | NAME | TITLE | ADDRESS | EMAIL | FAX | TEL | MOBILE |
|---|---|---|---|---|---|---|---|
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| **Saudi Arabia** | Ali H. Hakami | Navigational Aids Systems Planner | General Authority of Civil Aviation<br>P.O. Box 21444<br>Jeddah 21444 | yaro123@yahoo.com | +966 2 671 7717 Ext 1594 | +966 2 671 7717 Ext 1593 | 966 59 840 2598 |
| **Sudan** | Yasir Mohammed Ahmed Ali Abdalla | Chief Flight Instrument Procedures Design Unit | Sudan Civil Aviation Authority | yasiratc@hotmail.com | | | (249) 123499212 |
| **Syria** | Al Layth Al Hammoud | Chief of Air Navigation | | | | | |
| **UAE** | Muayyed Al Teneiji | Airspace Coordination General Civil Aviation Authority | Sheikh Zayed Air Navigation Centre<br>P.O. Box 66<br>Abu Dhabi – UAE | mtenaiji@szc.gcaa.ae | +97125996883 | 97125996890 | |
| **Yemen** | Ahmed Mohamed Al Kobati | Director Air Navigation Operations | Air Navigation Sector CAMA<br>Airport Road P.O. Box 3473<br>Sana'a – REPUBLIC OF YEMEN | cama570@yahoo.com | +9671344047 | +9671345402 | +967 777241375 |

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