



**INTERNATIONAL CIVIL AVIATION ORGANIZATION**

**REPORT OF THE THIRD MEETING OF THE  
PERFORMANCE BASED NAVIGATION SUB-GROUP**

**(PBN SG/3)**

*(Cairo, Egypt, 11 – 13 February 2018)*

The views expressed in this Report should be taken as those of the PBN Sub-Group and not of the Organization. This Report will, however, be submitted to the MIDANPIRG and any formal action taken will be published in due course as a Supplement to the Report.

Approved by the Meeting  
and published by authority of the Secretary General

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## **PART I – HISTORY OF THE MEETING**

### **1. PLACE AND DURATION**

1.1 The Third meeting of the Performance Based Navigation Sub-Group (PBN SG/3) was successfully held at the ICAO MID Office, Cairo, Egypt, from 11 to 13 February 2018.

### **2. OPENING**

2.1 The meeting was opened by Mr. Mohamed Smaoui, Deputy Regional Director, ICAO Middle East Office, who welcomed the participants to Cairo and wished them a successful and fruitful meeting. Mr. Smaoui provided the meeting with an overview of the subjects that will be addressed during the meeting and highlighted the main expected outcomes of the meeting.

2.2 Mr. Smaoui highlighted the advantages of PBN implementation and emphasized that the introduction of PBN has met the expectations of the entire aviation community. However, PBN implementation is still facing many challenges such as adequate training, lack of procedure designers and closer coordination between States and the aviation stakeholders. Mr. Smaoui highlighted that PBN in the MID Region had been progressing but with a low pace, and the implementation was still far behind the agreed targets. Therefore, ICAO is supporting the establishment of the MID Flight Procedure Programme (MID FPP) in order to assist States to improve and expedite PBN implementation. In this respect, he encouraged all Stakeholders to join the MID FPP.

2.3 In closing, Mr. Smaoui thanked the participants for their presence and wished the meeting every success in its deliberations.

### **3. ATTENDANCE**

3.1 The meeting was attended by a total of thirty-four (34) participants from nine (9) States (Egypt, Iraq, Iran, Jordan, Lebanon, Saudi Arabia, Sudan, United Arab Emirates, and Yemen) and two (2) International Organizations (IATA and IFATCA). The list of participants is at **Attachment A** to the Report.

### **4. OFFICERS AND SECRETARIAT**

4.1 In the absence of the Chairperson of the PBN Sub-Group, Mr. Ahmed Mohamed Al Eshaq, Director of Air Navigation, Civil Aviation Authority, Qatar; Mr. Ehab Raslan, Air Traffic Controller Supervisor, National Air Navigation Services Company (NANSC), Egypt and Vice Chairperson of the PBN Sub-Group, chaired the meeting.

4.2 Mr. Elie El Khoury, Regional Officer ATM/SAR and Mr. Abbas Niknejad, Regional Officer AIM/ATM were the Secretaries of the meeting, supported by Mr. Mohamed Smaoui, Deputy Regional Director, ICAO Middle East Office.

### **5. LANGUAGE**

5.1 The discussions were conducted in the English language and documentation was issued in English.

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**6. AGENDA**

6.1 The following Agenda was adopted:

- Agenda Item 1: Adoption of the Provisional Agenda
- Agenda Item 2: Follow-up on DGCA-MID/4 and MIDANPIRG/16 Conclusions and Decisions relevant to PBN
- Agenda Item 3: Global and Regional Developments related to PBN
- Agenda Item 4: PBN Planning and Implementation in the MID Region
- Agenda Item 5: Future Work Programme
- Agenda Item 6: Any other Business

**7. CONCLUSIONS AND DECISIONS – DEFINITION**

7.1 The MIDANPIRG records its actions in the form of Conclusions and Decisions with the following significance:

- a) **Conclusions** deal with matters that, according to the Group’s terms of reference, merit directly the attention of States, or on which further action will be initiated by the Secretary in accordance with established procedures; and
- b) **Decisions** relate solely to matters dealing with the internal working arrangements of the Group and its Sub-Groups.

**8. LIST OF DRAFT CONCLUSIONS AND DRAFT DECISIONS**

*DRAFT CONCLUSION 3/1: ACTION PLAN FOR THE IMPLEMENTATION OF RNAV TO RNP CHART NAMING CONVENTION*

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**PART II: REPORT ON AGENDA ITEMS**

**REPORT ON AGENDA ITEM 1: ADOPTION OF THE PROVISIONAL AGENDA**

1.1           The meeting reviewed and adopted the Provisional Agenda as at Para 6 of the History of the Meeting.

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**REPORT ON AGENDA ITEM 2: FOLLOW-UP ON MIDANPIRG/16 AND MSG/5 CONCLUSIONS AND DECISIONS RELEVANT TO PBN**

2.1           The meeting noted the status of the MIDANPIRG/16 and MSG/5 Conclusions and Decisions relevant to PBN and the follow-up actions taken by concerned parties as at **Appendix 2A**.

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**REPORT ON AGENDA ITEM 3: GLOBAL AND REGIONAL DEVELOPMENTS RELATED TO PBN*****GLOBAL AND REGIONAL DEVELOPMENTS***

3.1 The subject was addressed in PPT/1 and PPT/2 presented by the Secretariat.

***Update related to PFA and Amendments of the ICAO SARPs related to PBN***

3.2 The meeting noted the recent approved and proposed amendments to ICAO provisions related to PBN (SARPs and PANS).

***GBAS CAT II/III Operations***

3.3 The meeting noted the Proposal for the amendment of Annex 10, Volume I dated 30 March 2017, concerning ground-based augmentation system (GBAS) support of Category II/III operations and other enhancements, satellite-based augmentation system (SBAS) and the strategy for introduction and application of non-visual aids to approach and landing.

3.4 The meeting recalled that the current SARPs for GBAS CAT I are based on a system architecture in which the GBAS ground facility is solely responsible for ensuring the integrity and the continuity of the position solution. It was highlighted that the PFA to Annex 10, while leaving unchanged the current Category I provisions for backward compatibility reasons, adopts a different approach to deal with Category II/III requirements whereby the responsibility for ensuring integrity and continuity is partially shifted from the ground facility to the aircraft.

***RNAV to RNP Instrument Approach Chart Depiction***

3.5 The meeting recalled that the Amendment 6 to the *Procedures for Air Navigation Services — Aircraft Operations* (PANS-OPS, DOC 8168) introduced a change to the approach charts by introducing the “PBN Requirements Box” and a change in chart identifications for performance-based navigation (PBN) approaches (transition from RNAV to RNP approach chart identification). It was noted that, as part of PBN procedures naming convention, only the term RNP will be permitted as the Procedure identification instead of RNAV (GNSS) and/or RNAV (GPS); and RNP (AR) instead of RNAV (RNP), as of 1 December 2022.

3.6 The meeting noted that ICAO Circular 336, *Area Navigation (RNAV) to Required Navigation Performance (RNP) Instrument Approach Chart Depiction*, was issued in support of Amendment 6 to provide guidance on the change, in particular managing the risks involved during the transition period. However, after the adoption of Amendment 6, some concerns have been raised regarding the implementation of this change. The attention of the 39th Session of the Assembly was drawn to these concerns, and ICAO was encouraged to update the guidance available and develop a regionally coordinated transition plan to support the effective rollout of the change.

3.7 It was noted that, in order to address concerns related particularly to transition arrangements and potential confusion for operators being faced with variations in chart titling during the transition period, Circular 336 was withdrawn and the new material has been developed by the IFPP and will be published soon.

3.8 Based on the above, the meeting agreed that the following procedure should be included in the MID Region PBN Implementation Plan (MID Doc 007) as the MID Region Transition Plan for the RNAV to RNP Charting Depiction; and requested the Secretariat to present it to the AIM SG/4 meeting:

- MID States, that have not yet done so, should implement RNAV to RNP Chart naming convention for their current PBN Approach Procedures published in their AIPs, starting from 29 March 2019 up to 8 September 2022.
- New PBN Approach Procedures, planned to be published before 29 March 2019, should be published using the new naming convention, if practicable.
- If a PBN Approach Procedure published in the National AIP is amended and re-published before 29 March 2019 (for any reason), the new naming convention should be used, if practicable.

3.9 The meeting agreed that States are required to provide the ICAO MID Office with their action plan for the implementation of RNAV to RNP Chart naming convention and keep the MID Office apprised of the status of implementation. Accordingly, the meeting agreed to the following Draft Conclusion:

***DRAFT CONCLUSION 3/1: ACTION PLAN FOR THE IMPLEMENTATION OF RNAV TO RNP CHART NAMING CONVENTION***

*That, States be urged to provide the ICAO MID Office with their action plan for the implementation of RNAV to RNP Chart naming convention, and keep the MID Office apprised of the status of implementation*

***Outcome of the ACAC/ICAO GNSS Workshop***

3.10 The meeting was apprised of the outcome of the ACAC/ICAO GNSS Workshop held in Rabat, Morocco, from 7 to 8 November 2017. The meeting noted with concern that the level of attendance of the MID States in the Workshop was low; only four (4) States attended (Egypt, Lebanon, Libya and Yemen).

3.11 The meeting noted that the main topics addressed by the Workshop covered mainly the following:

- a) Global and Regional Developments related to GNSS
- b) SBAS implementation
- c) EGNOS and SBAS initiative for GCC States, Iraq and Yemen
- d) SBAS Initiative in East Africa
- e) GAGAN implementation
- f) GBAS implementation
- g) GNSS vulnerabilities and mitigation measures

3.12 The Presentations and Summary of Discussions of the Workshop are available on the ICAO MID Office website at: <https://www.icao.int/MID/Pages/2017/GNSS-Wksp.aspx>

3.13 The PBN SG Vice Chairman, through PPT/15, provided an overview about SBAS and a comparison of SBAS approaches with other types of approaches.

***RAIM Prediction System***

3.14 The subject was addressed in IP/03 presented by Iran. The meeting noted the update related to the RAIM Prediction system.

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**REPORT ON AGENDA ITEM 4: PBN IMPLEMENTATION IN THE MID REGION*****STATUS OF PBN IMPLEMENTATION IN THE MID REGION***

4.1 The subject was addressed in PPT/8 presented by the Secretariat. The meeting reviewed and updated the status of PBN implementation (Terminal and Approach) in the MID Region, using the PBN Table of the MID eANP VOL III, as at **Appendix 4A**.

4.2 The meeting noted with concern that the level of implementation of LNAV and LNAV/VNAV is far below the targets set out in the MID Region Air Navigation Strategy (MID Doc 002).

4.3 It was highlighted that only nine (9) States had provided their National PBN Implementation Plan. The meeting re-iterated MSG Conclusion 4/11 - *States' PBN Implementation Plans*. Accordingly, the meeting urged States to provide the ICAO MID Regional Office with their updated PBN Implementation Plans on an annual basis (by end of December).

4.4 The meeting noted with appreciation that the MID Region Air Navigation Report-2016 was published further to the endorsement by MIDANPIRG/16.

4.5 The meeting recalled that States were expected to implement the provisions of the MIDANPIRG Conclusion 16/8, and provide the ICAO MID Office, with relevant data necessary for the development of the MID Region Air Navigation Report-2017, by 1 November 2017. In this respect, the meeting urged States, that have not yet done so, to provide the ICAO MID Office with their inputs before **30 April 2018**.

***USERS' REQUIREMENTS RELATED TO PBN***

4.6 The subject was addressed in PPT/3 presented by IATA. The meeting noted the IATA position related to PBN:

- as a matter of high-priority, IATA supports the implementation of ICAO PBN in all phases of flight, as well as support the deployment of Approaches with Vertical Guidance (APV) based on RNP APCH procedures with Baro-VNAV. These procedures should include LNAV/VNAV minima and should not rely on ground-based conventional navigations.
- IATA does not support mandating specific PBN navigation specifications without corresponding operational benefits. Requirements for PBN navigation specifications should be based on agreed operational and safety improvements, short and long term planning and projection of fleet equipage. While aiming towards regional and global harmonization, ANSPs and regulators should work closely with airlines and other airspace users to determine an appropriate navigation specification for specific airspace based on targeted ATM operations, airspace concept and separation standards to be applied.
- IATA supports the use of GNSS as the primary navigation infrastructure supporting current and future applications and enhancements of PBN.

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***STATES' UPDATE ON PBN IMPLEMENTATION***

4.7 The subject was addressed in PPT/4, PPT/5, PPT/6, PPT/7, PPT/11, PPT/12, PPT/13 and PPT/14 presented by Egypt, Iran, Iraq, UAE, Jordan, Saudi Arabia, Lebanon, and Sudan, respectively. Yemen also provided a verbal briefing/update on the status of implementation of PBN.

4.8 The meeting noted with appreciation the States' commitment to meet the PBN agreed targets. The meeting was apprised of the latest activities related to PBN implementation carried out by States. The meeting noted the challenges impeding States to meet the agreed targets as well as the lessons learned and mitigation measures taken/proposed by States to improve the implementation of PBN.

4.9 The meeting highlighted the importance of the assessment of PBN post implementation. In this respect, the meeting reiterated MIDANPIRG/16 Conclusion 16/5 - *Assessment of PBN Implementation* and urged States to report, on annual basis (by 1 November), the environmental benefits accrued from PBN implementation to the ICAO MID Office in order to be included in the MID Region Air Navigation Report.

4.10 Based on the above, the meeting encouraged States to use the Key Performance Indicators (KPIs) included in the Global Air Navigation Plan (ICAO Doc 9750) or develop their own KPIs to be used for the assessment of PBN implementation.

4.11 The following are the main lessons learned highlighted during the meeting:

***Lessons Learned/Success Stories***

- No efficient PBN plan without the engagement of the Airspace stakeholders.
- Introduction of PBN had reduced ATC workload.
- RNAV SIDs and STARs could be aligned, to some extent, with the radar vectoring techniques used by ATCOs.
- Implementation of PBN approach for runway ends where ILS is not feasible due high mountainous area (RWY 21 at OLBA).
- Back-up for ILS approaches.
- Promotion of PBN requirements is crucial.
- Provide proper operational documentation such as Standard Operating Procedures (SOPs) to ensure effective use of PBN.
- Importance of proper coordination with stakeholders (Regulator, Aircraft Operators, Aerodrome authorities, ATS units, Flight Procedure Designers, Airspace Planners, military, etc.) for successful PBN solutions.
- Importance of continuous review of PBN implementation goals and rectifying issues for uninterrupted process.
- Quality assurance on all aspects ensures safety.
- Post implementation reviews to monitor project objectives and if there are deviations, mitigation strategies to be planned to reach the goals.

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### *Challenges*

4.12 The meeting recognized that the following challenges, identified by the PBN SG/2 meeting, represent 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 competency;
- lack of airspace and procedure design training: initial, OJT, and/or recurrent;
- lack of capabilities to implement Quality Assurance;
- lack of regulatory expertise to oversee the process leading to procedure publication;
- low level of civil/military cooperation;
- unstable political and security situation in some States;
- data gathering and validation;
- fleet equipage;
- Operational Improvements Assessment;
- catering for non-compliance (mixed equipage environment);
- fully integrated system (IFP, AIM, eTOD);
- airspace changes to accommodate current and projected traffic increase and further improve safety, capacity and efficiency;
- GNSS signal vulnerability;
- maintain Target Level of Safety (TLS); and
- stakeholders (ATCOs, Pilots, etc.) training and readiness.

### *Recommendations*

4.13 The meeting encouraged States 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 at National level PBN Workshops;
- engage all stakeholders and in particular the Regulator in the planning and design processes;
- share experience and support each other;
- use IFSET and/or other tools for the assessment of the benefit accrued for the implementation of PBN;
- review the published IFPs at least each 5 years, in accordance with ICAO provisions; and
- join the MID FPP.

4.14 The meeting recalled that Saudi Arabia presented their experience related to the monitoring of GPS signal, and the capability of the system to cover adjacent FIRs. Accordingly, the meeting invited Saudi Arabia to present the same to the CNS SG/8 meeting and share experience with other States.

***PREPARATION FOR ASBU B1 –APTA AND CDO***

4.15 The subject was addressed in PPT/9 presented by the Secretariat. The meeting was provided with an overview of the latest developments related to the update of GANP 2019 and the revised ASBU framework that should be presented to the AN-Conf/13 meeting in October 2018. The meeting agreed that the B1-APTA and B1-CDO would apply to certain aerodromes/runway ends. In this regard, the meeting encouraged States to identify the runway ends where GLS CAT II/III approaches and the aerodromes/TMAs where B1-CDO would be implemented.

4.16 Taking into consideration the expected significant changes to the GANP 2019 edition and the current MID Region status of implementation of the ASBU B0-APTA, B0-CCO and B0-CDO, the meeting agreed to maintain the current elements of the above ABSU Modules unchanged, with the exception of the “PBN Plans”, which would be removed. Nevertheless, the status of development of PBN National Implementation plans is monitored through the MID ANP Vol III.

4.17 Based on the above, the meeting reviewed and updated the MID Region PBN Implementation Plan (MID Doc 007), as at **Appendix 4B**, for further inputs by the CNS SG/8 and ATM SG/4 meetings.

4.18 The meeting reviewed and updated the list of PBN Focal Points in the MID Region as at **Appendix 4C**.

***MID FLIGHT PROCEDURE PROGRAMME (MID FPP) ESTABLISHMENT***

4.19 The subject was addressed in PPT/10 presented by the Secretariat. The meeting was apprised of the outcome of the MID FPP kick-off meeting (Cairo, Egypt, 22-24 January 2018) and the latest developments related to the establishment of the MID FPP.

4.20 The meeting re-iterated that the MID Flight Procedure Programme (MID FPP) is the optimal solution that would support States to overcome most of the identified challenges, which will foster the PBN implementation in the MID Region. Accordingly, the meeting urged States to join the MID FPP through the signature of the MID FPP ProDoc once circulated by ICAO.

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**REPORT ON AGENDA ITEM 5: FUTURE WORK PROGRAMME**

5.1 The meeting reviewed the PBN SG Terms of References (TORs) and agreed that they are still valid and current.

5.2 Taking into consideration, the planned ICAO MID Regional events which are of relevance to the activity of the PBN Sub-Group, in particular the MIDANPIRG/17 meeting, it was agreed that the PBN SG/4 meeting be held during the second half of 2019. The venue will be the ICAO MID Regional Office in Cairo, unless a State is willing to host the meeting.

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**REPORT ON AGENDA ITEM 6: ANY OTHER BUSINESS**

6.1 Nothing has been discussed under this Agenda Item.

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# *APPENDICES*

APPENDIX 2A

FOLLOW-UP ACTION PLAN ON MIDANPIRG/16 CONCLUSIONS AND DECISIONS RELEVANT TO PBN

| CONCLUSIONS AND DECISIONS  | TO BE INITIATED BY       | DELIVERABLE  | TARGET DATE                           | STATUS/REMARKS   |
|--|--------------------------|--|---------------------------------------|--|
| <p><b>CONCLUSION 16/3: MID REGION AIR NAVIGATION STRATEGY</b></p> <p>That, the revised MID Region Air Navigation Strategy (MID Doc 002, Edition February 2017) at Appendix 5.1A is endorsed.</p>   | MIDANPIRG/16             | MID AN Strategy (MID Doc 002)  | Feb. 2017                             | <b>Completed</b>   |
| <p><b>CONCLUSION 16/4: APPROVAL OF THE AMENDMENT TO THE MID eANP VOLUME III</b></p> <p>That, the amendment to the MID eANP Volume III at Appendix 5.1B is approved.</p>  | MIDANPIRG/16<br>ICAO     | Amendment<br>Notification of amendment                                       | Feb. 2017<br>May 2017                 | <b>Completed</b><br>Amendment was approved by MIDANPIRG/16<br>Notification of amendment issued on 18 June 2017 |
| <p><b>CONCLUSION 16/5: ASSESSMENT OF PBN IMPLEMENTATION</b></p> <p>That, States be invited to:</p> <p>a) explore means and ways to assess the benefit accrued from the implementation of PBN; and</p> <p>b) report on annual basis (by 1 November), the environmental benefits accrued from PBN implementation to the ICAO MID Office in order to be included in the MID Region Air Navigation Report.</p>                                 | ICAO<br>States           | State Letter<br>Benefits accrued form PBN Implementation                     | Apr. 2017<br>Nov. 2017 (annual basis) | <b>Actioned</b><br>SL Ref.: AN 6/28 – 17/120 dated 12 April 2017 (Bahrain, Jordan, Sudan)                      |
| <p><b>CONCLUSION 16/7: MID REGION AIR NAVIGATION REPORT-2016</b></p> <p>That, the MID Region Air Navigation Report-2016 is endorsed.</p>   | MIDANPIRG/16             | MID AN Report  | Feb. 2017                             | <b>Completed</b>   |
| <p><b>CONCLUSION 16/8: MID REGION AIR NAVIGATION REPORT-2017</b></p> <p>That, MID States be urged to:</p> <p>a) develop/update their National ASBU Implementation Plan, ensuring the alignment with and support to the MID Region Air Navigation Strategy (MID Doc 002); and</p> <p>b) provide the ICAO MID Office, with relevant data necessary for the development of the MID Region Air Navigation Report-2017, by 1 November 2017.</p> | ICAO<br>States<br>States | State Letter<br>National ASBU Implementation Plan<br>Data for AN Report 2017 | Sep. 2017<br>Nov. 2017<br>Nov. 2017   | <b>Actioned</b><br>SL Ref.: AN 1/7 – 17/188 dated 2 July 2017 (Bahrain, Egypt, Jordan, Qatar, Sudan & UAE)     |

| CONCLUSIONS AND DECISIONS   | TO BE INITIATED BY                                    | DELIVERABLE  | TARGET DATE                       | STATUS/REMARKS   |
|---|---|--|-----------------------------------|--|
| <p><b>CONCLUSION 16/12: INTERREGIONAL SEMINAR ON “SERVICE IMPROVEMENT THROUGH INTEGRATION OF DIGITAL AIM, MET AND ATM INFORMATION”</b></p> <p>That, States, Organizations and Industry be invited to actively participate in the Interregional Seminar on “Service Improvement through Integration of Digital AIM, MET and ATM Information Services” (Brussels, Belgium, 2-5 October 2017).</p> | <p>ICAO</p> <p>States, Organizations and Industry</p> | <p>State Letter</p> <p>Actively participate in the Seminar</p> | <p>Jun. 2017</p> <p>Oct. 2017</p> | <p><b>Completed</b></p> <p>SL Ref.: AN 8/28.1-17/175 dated 14 June 2017<br/>Only 6 MID States participated</p> |
| <p><b>DECISION 16/13: DISSOLUTION OF THE MPCT</b></p> <p>That, the MAEP Projects Coordination Team (MPCT) is dissolved and its duties and responsibilities be taken over by the MAEP Board.</p>   | <p>MIDANPIRG/16</p>                                   | <p>Dissolution of MPCT</p>                                     | <p>Feb. 2017</p>                  | <p><b>Completed</b></p>  |
| <p><b>DECISION 16/14: MAEP BOARD TERMS OF REFERENCE</b></p> <p>That, the MAEP Board Terms of Reference be endorsed as at <b>Appendix 5.2.2E</b>.</p>  | <p>MIDANPIRG/16</p>                                   | <p>MAEP Board ToR</p>  | <p>Feb. 2017</p>                  | <p><b>Completed</b></p>  |
| <p><b>DECISION 16/23: MID REGION SURVEILLANCE PLAN</b></p> <p>That, the MID Region Surveillance Plan be developed by the CNS SG, based on the operational needs identified by the ATM SG.</p>   | <p>CNS SG</p>   | <p>MID Region Surveillance Plan</p>                            | <p>Q1 2018</p>                    | <p><b>Ongoing</b></p>  |
| <p><b>CONCLUSION 16/29: PROPOSAL FOR AMENDMENT TO MID ANP VOLUMES I AND II (MET PART)</b></p> <p>That ICAO initiate proposals for amendment to the MID ANP (Doc 9708) Volumes I and II, to include the changes at <b>Appendices 5.2.2R</b> and <b>5.2.2S</b>, respectively.</p>   | <p>ICAO</p>   | <p>Coordination with HQ</p>                                    | <p>Apr 2018</p>                   | <p><b>Ongoing</b></p> <p>Coordination with HQ ongoing</p>  |
| <p><b>DECISION 16/30: DISSOLUTION OF THE ATM PERFORMANCE MEASUREMENT TASK FORCE (APM TF)</b></p> <p>That,</p> <p>a) the APM TF is dissolved; and</p> <p>b) the MIDANPIRG Organizational Structure contained in the MIDANPIRG Procedural Handbook (MID Doc 001) be amended accordingly.</p>  | <p>MIDANPIRG/16</p> <p>ICAO</p>                       | <p>APM TF dissolution</p> <p>MID Doc 001 updated</p>           | <p>Feb. 2017</p> <p>May 2017</p>  | <p><b>Completed</b></p> <p>Completed</p> <p>Completed</p>  |

| CONCLUSIONS AND DECISIONS  | TO BE INITIATED BY              | DELIVERABLE  | TARGET DATE                      | STATUS/REMARKS   |
|--|---------------------------------|--|----------------------------------|--|
| <p><b>CONCLUSION 16/31: ENVIRONMENTAL PROTECTION</b></p> <p>That, States that have not yet done so, be invited to:</p> <p>a) provide the ICAO MID Regional Office with updated contact details of their State’s CO2 Action Plan/Environment Focal Points;</p> <p>b) develop/update their State Action Plans on CO2 emission reduction, using the guidelines contained in the ICAO Doc 9988; and submit them to ICAO through the APER website or the ICAO MID Regional Office; and</p> <p>c) take necessary actions for the implementation of the mitigation measures included in their Action Plan, commensurate with the establishment of a dedicated structure (e.g. Department, Section, etc.) within the Civil Aviation Authorities dealing with aviation environmental issues</p> | <p>ICAO</p> <p>States</p>       | <p>State Letter</p> <p>CO2 Action Plans</p> <p>Dedicated structure to Environmental protection</p> | <p>May 2017</p> <p>2018</p>      | <p><b>Actioned/Ongoing</b></p> <p>SL Ref: EN 1/5-17/171 dated 7 June 2017 (Egypt, Iraq, Qatar)</p> |
| <p><b>DECISION 16/32: REVISED ANSIG TERMS OF REFERENCE</b></p> <p>That,</p> <p>a) the ANSIG Terms of Reference (TORs) be updated as at <b>Appendix 7A</b>; and</p> <p>b) the MIDANPIRG Procedural Handbook (MID Doc 001) be amended accordingly.</p>   | <p>MIDANPIRG/16</p> <p>ICAO</p> | <p>Updated TORs</p> <p>MID Doc 001 updated</p>   | <p>Feb. 2017</p> <p>May 2017</p> | <p><b>Completed</b></p> <p>Completed</p> <p>Completed</p>  |

**FOLLOW-UP ACTION PLAN ON MSG/5 CONCLUSIONS RELEVANT TO PBN**

| CONCLUSIONS AND DECISIONS   | TO BE INITIATED BY     | DELIVERABLE                              | TARGET DATE                       | STATUS/REMARKS  |
|---|------------------------|--|-----------------------------------|---|
| <p><b>MSG CONCLUSION 5/7: TRANSITION PLAN FOR THE RNAV TO RNP INSTRUMENT APPROACH CHART DEPICTION</b></p> <p>That, States be urged to provide their transition plan for the RNAV to RNP Instrument Approach Chart Depiction (Chart Title) to the ICAO MID Regional Office before 31 October 2016, taking into consideration the provisions/timelines set forth in Amendment 6 to PANS-OPS, Volume II, Part III, Section 5, Chapter 1 and the ICAO Circular 336.</p> | <p>ICAO<br/>States</p> | <p>State Letter<br/>Transition Plans</p> | <p>Apr. 2016<br/>31 Oct. 2016</p> | <p><b>Actioned</b></p> <p>SL AN 6/29-16/336 dated 1 December 2016</p> <p>Bahrain and Jordan provide their planned date for implementation</p> |
| <p><b>MSG CONCLUSION 5/8: MID REGION PBN IMPLEMENTATION PLAN</b></p> <p>That, the revised version of the MID Region PBN Implementation Plan (MID Doc 007, Edition April 2016) is endorsed.</p>  | <p>MSG/5</p>           | <p>MID Doc 007</p>                       | <p>Feb. 2016</p>                  | <p><b>Completed</b></p>   |

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MID REGION TMAs Procedures Implementation (ASBU B0-APTA, B0-CCO and B0-CDO)  
(Status as of December 2017)

| Int'l AD<br>(Ref. MID ANP) | RWY      | Conventional Approaches |     |            | APTA                 |            |             | CCO        |           |          |          |          | CDO        |            |          |          | Remarks |
|----------------------------|----------|-------------------------|-----|------------|----------------------|------------|-------------|------------|-----------|----------|----------|----------|------------|------------|----------|----------|---------|
|                            |          | Precision               |     | VOR or NDB | PBN PLAN Update date | LNAV       | LNAV / VNAV | PBN RWY    | RNA V SID | PER AD   | CCO      | PER AD   | RNAV STAR  | PER AD     | CDO      | PER AD   |         |
|                            |          | xLS                     | CAT |            |                      |            |             |            |           |          |          |          |            |            |          |          |         |
| <b>BAHRAIN</b>             |          |                         |     |            |                      |            |             |            |           |          |          |          |            |            |          |          | 1       |
| OBBI                       | 12L      | ILS                     | I   | VORDME     |                      | Y          |             | Y          |           |          |          |          | Y          | Y          |          |          |         |
|                            | 30R      | ILS                     | I   | VORDME     |                      | Y          |             | Y          |           |          |          |          | Y          |            |          |          |         |
| <b>Total</b>               | <b>2</b> | <b>2</b>                |     | <b>2</b>   | <b>Y</b>             | <b>2</b>   | <b>0</b>    | <b>2</b>   | <b>0</b>  | <b>0</b> | <b>0</b> | <b>0</b> | <b>2</b>   | <b>1</b>   | <b>0</b> | <b>0</b> |         |
| <b>%</b>                   |          | <b>100</b>              |     | <b>100</b> | <b>Dec 2016</b>      | <b>100</b> | <b>0</b>    | <b>100</b> | <b>0</b>  | <b>0</b> | <b>0</b> | <b>0</b> | <b>100</b> | <b>100</b> | <b>0</b> | <b>0</b> |         |
| <b>EGYPT</b>               |          |                         |     |            |                      |            |             |            |           |          |          |          |            |            |          |          | 7       |
| HEBA                       | 14       |                         |     |            |                      |            |             |            |           |          |          |          |            |            |          |          |         |
|                            | 32       | ILS                     | I   |            |                      | Y          |             | Y          | Y         | Y        |          |          |            |            |          |          |         |
| HESN                       | 17       |                         |     | VORDME     |                      | Y          |             | Y          | Y         | Y        |          |          | Y          | Y          |          |          |         |
|                            | 35       | ILS                     | I   | VORDME     |                      | Y          |             | Y          | Y         |          |          |          | Y          |            |          |          |         |
| HECA                       | 05L      | ILS                     | I   | VORDME     |                      | Y          |             | Y          |           |          |          |          |            |            |          |          |         |
|                            | 05C      | ILS                     | II  | VORDME     |                      | Y          |             | Y          |           |          |          |          |            |            |          |          |         |
|                            | 05R      | ILS                     | II  |            |                      | Y          |             | Y          |           |          |          |          |            |            |          |          |         |
|                            | 23L      | ILS                     | II  | VORDME     |                      | Y          |             | Y          |           |          |          |          |            |            |          |          |         |
|                            | 23C      | ILS                     | II  | VORDME     |                      | Y          |             | Y          |           |          |          |          |            |            |          |          |         |
|                            | 23R      | ILS                     | I   | VORDME     |                      | Y          |             | Y          |           |          |          |          |            |            |          |          |         |
| HEGN                       | 16L      |                         |     | VORDME     |                      | Y          | Y           | Y          |           | Y        |          |          |            | Y          |          |          |         |
|                            | 16R      |                         |     | VORDME     |                      | Y          | Y           | Y          |           |          |          |          |            |            |          |          |         |
|                            | 34L      |                         |     | VORDME     |                      | Y          | Y           | Y          | Y         |          |          |          | Y          |            |          |          |         |
|                            | 34R      | ILS                     | I   | VORDME     |                      | Y          | Y           | Y          | Y         |          |          |          | Y          |            |          |          |         |
| HELX                       | 2        | ILS                     | I   | VORDME     |                      | Y          |             | Y          | Y         | Y        |          |          | Y          | Y          |          |          |         |
|                            | 20       | ILS                     | I   | VORDME     |                      | Y          |             | Y          | Y         |          |          |          | Y          |            |          |          |         |

| Int'l AD<br>(Ref. MID ANP) | RWY       | Conventional Approaches |     | APTA       |                      |           | CCO         |           |           |           |          | CDO      |           |           | Remarks  |          |        |
|----------------------------|-----------|-------------------------|-----|------------|----------------------|-----------|-------------|-----------|-----------|-----------|----------|----------|-----------|-----------|----------|----------|--------|
|                            |           | Precision               |     | VOR or NDB | PBN PLAN Update date | LNAV      | LNAV / VNAV | PBN RWY   | RNA V SID | PER AD    | CCO      | PER AD   | RNAV STAR | PER AD    |          | CDO      | PER AD |
|                            |           | xLS                     | CAT |            |                      |           |             |           |           |           |          |          |           |           |          |          |        |
| HEMA                       | 15        |                         |     | VORDME     |                      | Y         |             | Y         | Y         | Y         |          |          | Y         | Y         |          |          |        |
|                            | 33        |                         |     | VORDME     |                      | Y         |             | Y         | Y         |           |          |          | Y         |           |          |          |        |
| HESH                       | 04L       | ILS                     | I   | VORDME     |                      | Y         | Y           | Y         | Y         | Y         |          |          | Y         | Y         |          |          |        |
|                            | 04R       |                         |     | VORDME     |                      | Y         | Y           | Y         | Y         |           |          |          | Y         |           |          |          |        |
|                            | 22L       |                         |     |            |                      | Y         | Y           | Y         | Y         |           |          |          | Y         |           |          |          |        |
|                            | 22R       |                         |     |            |                      | Y         | Y           | Y         | Y         |           |          |          | Y         |           |          |          |        |
| <b>Total</b>               | <b>22</b> | <b>12</b>               |     | <b>17</b>  | <b>Y</b>             | <b>21</b> | <b>8</b>    | <b>21</b> | <b>13</b> | <b>6</b>  | <b>0</b> | <b>0</b> | <b>12</b> | <b>5</b>  | <b>0</b> | <b>0</b> |        |
| <b>%</b>                   |           | <b>55</b>               |     | <b>77</b>  | <b>Oct 2017</b>      | <b>95</b> | <b>36</b>   | <b>95</b> | <b>59</b> | <b>86</b> | <b>0</b> | <b>0</b> | <b>55</b> | <b>71</b> | <b>0</b> | <b>0</b> |        |





| Int'l AD<br>(Ref. MID ANP) | RWY       | Conventional Approaches |     |            | APTA                 |           |             | CCO       |           |           |          |          | CDO       |           |          | Remarks  |        |
|----------------------------|-----------|-------------------------|-----|------------|----------------------|-----------|-------------|-----------|-----------|-----------|----------|----------|-----------|-----------|----------|----------|--------|
|                            |           | Precision               |     | VOR or NDB | PBN PLAN Update date | LNAV      | LNAV / VNAV | PBN RWY   | RNA V SID | PER AD    | CCO      | PER AD   | RNAV STAR | PER AD    | CDO      |          | PER AD |
|                            |           | xLS                     | CAT |            |                      |           |             |           |           |           |          |          |           |           |          |          |        |
| ORNI                       | 10        | ILS                     | I   | VOR        |                      | Y         | Y           | Y         | Y         | Y         |          |          | Y         | Y         |          |          |        |
|                            | 28        | ILS                     | I   | VOR        |                      | Y         | Y           | Y         | Y         |           |          |          | Y         |           |          |          |        |
| ORBM                       | 15        |                         |     |            |                      |           |             |           |           |           |          |          |           |           |          |          |        |
|                            | 33        |                         |     |            |                      |           |             |           |           |           |          |          |           |           |          |          |        |
| <b>Total</b>               | <b>14</b> | <b>9</b>                |     | <b>8</b>   | <b>N</b>             | <b>8</b>  | <b>2</b>    | <b>8</b>  | <b>2</b>  | <b>1</b>  | <b>0</b> | <b>0</b> | <b>2</b>  | <b>1</b>  | <b>0</b> | <b>0</b> |        |
| <b>%</b>                   |           | <b>64</b>               |     | <b>57</b>  |                      | <b>57</b> | <b>14</b>   | <b>57</b> | <b>14</b> | <b>17</b> | <b>0</b> | <b>0</b> | <b>14</b> | <b>17</b> | <b>0</b> | <b>0</b> |        |

| Int'l AD<br>(Ref. MID ANP) | RWY      | Conventional Approaches |     |              | APTA                 |            |             | CCO        |            |            |          |          | CDO        |            |            | Remarks    |                          |
|----------------------------|----------|-------------------------|-----|--------------|----------------------|------------|-------------|------------|------------|------------|----------|----------|------------|------------|------------|------------|--------------------------|
|                            |          | Precision               |     | VOR or NDB   | PBN PLAN Update date | LNAV       | LNAV / VNAV | PBN RWY    | RNA V SID  | PER AD     | CCO      | PER AD   | RNAV STAR  | PER AD     | CDO        |            | PER AD                   |
|                            |          | xLS                     | CAT |              |                      |            |             |            |            |            |          |          |            |            |            |            |                          |
| <b>JORDAN</b>              |          |                         |     |              |                      |            |             |            |            |            |          |          |            |            |            |            | 2                        |
| OJAI                       | 08L      | ILS                     | I   | NDB          |                      |            |             | Y          | Y          |            |          | Y        | Y          |            |            |            |                          |
|                            | 08R      |                         |     | NDB          |                      |            |             | Y          |            |            |          | Y        |            |            |            |            |                          |
|                            | 26L      | ILS                     | II  | VOR          |                      | Y          | Y           | Y          | Y          |            |          | Y        |            |            |            |            |                          |
|                            | 26R      | ILS                     | I   | VORDME       |                      | Y          | Y           | Y          | Y          |            |          | Y        |            |            |            |            |                          |
| OJAI                       | 1        | ILS                     | I   |              |                      | Y          | Y           | Y          | Y          | Y          |          | Y        | Y          |            |            |            |                          |
|                            | 19       | ILS                     | I   |              |                      | Y          | N/A         | Y          | Y          |            |          | Y        |            |            |            |            | LNAV/VNAV not feasible   |
| <b>Total</b>               | <b>6</b> | <b>5</b>                |     | <b>4</b>     | <b>Y</b>             | <b>4</b>   | <b>4</b>    | <b>4</b>   | <b>6</b>   | <b>2</b>   | <b>0</b> | <b>0</b> | <b>6</b>   | <b>2</b>   | <b>0</b>   | <b>0</b>   |                          |
| <b>%</b>                   |          | <b>83</b>               |     | <b>67</b>    | <b>July 2009</b>     | <b>67</b>  | <b>67</b>   | <b>67</b>  | <b>100</b> | <b>100</b> | <b>0</b> | <b>0</b> | <b>100</b> | <b>100</b> | <b>0</b>   | <b>0</b>   | <b>Plan needs update</b> |
| <b>KUWAIT</b>              |          |                         |     |              |                      |            |             |            |            |            |          |          |            |            |            |            | 1                        |
| OKBK                       | 15L      | ILS                     | II  | VORDME       |                      | Y          | Y           | Y          | Y          | Y          |          | Y        | Y          |            |            |            |                          |
|                            | 15R      | ILS                     | II  | VORDME       |                      | Y          | Y           | Y          | Y          |            |          | Y        |            |            |            |            |                          |
|                            | 33L      | ILS                     | II  | VORDME       |                      | Y          | Y           | Y          | Y          |            |          | Y        |            |            |            |            |                          |
|                            | 33R      | ILS                     | II  | VORDME       |                      | Y          | Y           | Y          | Y          |            |          | Y        |            |            |            |            |                          |
| <b>Total</b>               | <b>4</b> | <b>4</b>                |     | <b>4</b>     | <b>Y</b>             | <b>4</b>   | <b>4</b>    | <b>4</b>   | <b>4</b>   | <b>1</b>   | <b>0</b> | <b>0</b> | <b>4</b>   | <b>1</b>   | <b>0</b>   | <b>0</b>   |                          |
| <b>%</b>                   |          | <b>100</b>              |     | <b>100</b>   | <b>Mar. 2015</b>     | <b>100</b> | <b>100</b>  | <b>100</b> | <b>100</b> | <b>100</b> | <b>0</b> | <b>0</b> | <b>100</b> | <b>100</b> | <b>0</b>   | <b>0</b>   | <b>Plan needs update</b> |
| <b>LEBANON</b>             |          |                         |     |              |                      |            |             |            |            |            |          |          |            |            |            |            | 1                        |
| OLBA                       | 3        | ILS                     | I   | VORDME       |                      | Y          |             | Y          |            |            |          | Y        | Y          | Y          | Y          |            |                          |
|                            | 16       | ILS                     | I   | VORDME       |                      | Y          |             | Y          |            |            |          | Y        |            | Y          |            |            |                          |
|                            | 17       | ILS                     | I   | VORDME / NDB |                      | Y          |             | Y          |            |            |          | Y        |            | Y          |            |            |                          |
|                            | 21       |                         |     |              |                      | Y          |             | Y          |            |            |          | Y        |            | Y          |            |            |                          |
|                            | 34       | N/A                     |     | N/A          |                      |            |             |            |            |            |          |          |            |            |            |            | Not used for landing     |
|                            | 35       | N/A                     |     | N/A          |                      |            |             |            |            |            |          |          |            |            |            |            | Not used for landing     |
| <b>Total</b>               | <b>4</b> | <b>5</b>                |     | <b>5</b>     | <b>N</b>             | <b>4</b>   | <b>0</b>    | <b>4</b>   | <b>0</b>   | <b>0</b>   | <b>0</b> | <b>0</b> | <b>4</b>   | <b>1</b>   | <b>4</b>   | <b>1</b>   |                          |
| <b>%</b>                   |          | <b>125</b>              |     | <b>125</b>   |                      | <b>100</b> | <b>0</b>    | <b>100</b> | <b>0</b>   | <b>0</b>   | <b>0</b> | <b>0</b> | <b>100</b> | <b>100</b> | <b>100</b> | <b>100</b> |                          |

| Int'l AD<br>(Ref. MID ANP) | RWY      | Conventional Approaches |        | APTA       |                      |            | CCO         |            |            |            |          | CDO      |            |            | Remarks  |                             |        |
|----------------------------|----------|-------------------------|--------|------------|----------------------|------------|-------------|------------|------------|------------|----------|----------|------------|------------|----------|-----------------------------|--------|
|                            |          | Precision               |        | VOR or NDB | PBN PLAN Update date | LNAV       | LNAV / VNAV | PBN RWY    | RNA V SID  | PER AD     | CCO      | PER AD   | RNAV STAR  | PER AD     |          | CDO                         | PER AD |
|                            |          | xLS                     | CAT    |            |                      |            |             |            |            |            |          |          |            |            |          |                             |        |
| <b>LIBYA</b>               |          |                         |        |            |                      |            |             |            |            |            |          |          |            |            |          | 3                           |        |
| 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      |        |
| <b>Total</b>               | <b>8</b> | <b>3</b>                |        | <b>8</b>   | <b>N</b>             | <b>0</b>   | <b>0</b>    | <b>0</b>   | <b>0</b>   | <b>0</b>   | <b>0</b> | <b>0</b> | <b>0</b>   | <b>0</b>   | <b>0</b> |                             |        |
| <b>%</b>                   |          | <b>38</b>               |        | <b>100</b> |                      | <b>0</b>   | <b>0</b>    | <b>0</b>   | <b>0</b>   | <b>0</b>   | <b>0</b> | <b>0</b> | <b>0</b>   | <b>0</b>   | <b>0</b> |                             |        |
| <b>OMAN</b>                |          |                         |        |            |                      |            |             |            |            |            |          |          |            |            |          | 2                           |        |
| OOMS                       | 08L      | ILS                     | I      | VORDME     |                      | Y          | Y           | Y          | Y          | Y          |          |          | Y          | Y          |          |                             |        |
|                            | 26R      | ILS                     | I      | VORDME     |                      | Y          | Y           | Y          | Y          |            |          |          | Y          |            |          |                             |        |
| OOSA                       | 7        | ILS                     | I      | VORDME     |                      | Y          | Y           | Y          | Y          | Y          |          |          | Y          | Y          |          |                             |        |
|                            | 25       | ILS                     | I      | VORDME     |                      | Y          | Y           | Y          | Y          |            |          |          | Y          |            |          |                             |        |
| <b>Total</b>               | <b>4</b> | <b>4</b>                |        | <b>4</b>   | <b>Y</b>             | <b>4</b>   | <b>4</b>    | <b>4</b>   | <b>4</b>   | <b>2</b>   | <b>0</b> | <b>0</b> | <b>4</b>   | <b>2</b>   | <b>0</b> | <b>0</b>                    |        |
| <b>%</b>                   |          | <b>100</b>              |        | <b>100</b> | <b>Feb. 2015</b>     | <b>100</b> | <b>100</b>  | <b>100</b> | <b>100</b> | <b>100</b> | <b>0</b> | <b>0</b> | <b>100</b> | <b>100</b> | <b>0</b> | <b>0</b>                    |        |
| <b>QATAR</b>               |          |                         |        |            |                      |            |             |            |            |            |          |          |            |            |          | 2                           |        |
| OTBD                       | 15       | ILS                     | I      | VORDME     |                      | Y          | N/A         | Y          | Y          | Y          | Y        | Y        | Y          | Y          | Y        | LNAV/VNAV not feasible      |        |
|                            | 33       | ILS                     | II/III | VORDME/NDB |                      | Y          | Y           | Y          | Y          |            | Y        |          | Y          |            | Y        | CCO/CDO tactically achieved |        |



| Int'l AD<br>(Ref. MID ANP) | RWY       | Conventional Approaches |     |            | APTA                 |           |             | CCO       |           |           |          |          | CDO       |           |          | Remarks  |        |
|----------------------------|-----------|-------------------------|-----|------------|----------------------|-----------|-------------|-----------|-----------|-----------|----------|----------|-----------|-----------|----------|----------|--------|
|                            |           | Precision               |     | VOR or NDB | PBN PLAN Update date | LNAV      | LNAV / VNAV | PBN RWY   | RNA V SID | PER AD    | CCO      | PER AD   | RNAV STAR | PER AD    | CDO      |          | PER AD |
|                            |           | xLS                     | CAT |            |                      |           |             |           |           |           |          |          |           |           |          |          |        |
| SAUDI ARABIA               |           |                         |     |            |                      |           |             |           |           |           |          |          |           |           |          | 4        |        |
| OEDF                       | 16L       | ILS                     | I   | VORDME     |                      |           |             |           |           |           |          |          |           |           |          |          |        |
|                            | 16R       | ILS                     | I   | VORDME     |                      |           |             |           |           |           |          |          |           |           |          |          |        |
|                            | 34L       | ILS                     | I   | VORDME     |                      |           |             |           |           |           |          |          |           |           |          |          |        |
|                            | 34R       | ILS                     | I   | VORDME     |                      |           |             |           |           |           |          |          |           |           |          |          |        |
| OEJN                       | 16L       | ILS                     | I   |            |                      |           |             |           |           |           |          |          |           |           |          |          |        |
|                            | 16C       | ILS                     | I   |            |                      |           |             |           |           |           |          |          |           |           |          |          |        |
|                            | 16R       | ILS                     | I   | VORDME     |                      |           |             |           |           |           |          |          |           |           |          |          |        |
|                            | 34L       | ILS                     | I   | VORDME     |                      |           |             |           |           |           |          |          |           |           |          |          |        |
|                            | 34C       | ILS                     | I   | VORDME     |                      |           |             |           |           |           |          |          |           |           |          |          |        |
|                            | 34R       | ILS                     | I   |            |                      |           |             |           |           |           |          |          |           |           |          |          |        |
| OEMA                       | 17        | ILS                     | I   | VORDME     |                      | Y         | Y           | Y         | Y         |           |          | Y        | Y         |           |          |          |        |
|                            | 18        |                         |     | VORDME     |                      | Y         | Y           | Y         |           |           |          | Y        |           |           |          |          |        |
|                            | 35        | ILS                     | I   | VORDME     |                      | Y         | Y           | Y         |           |           |          | Y        |           |           |          |          |        |
|                            | 36        | ILS                     | I   | VORDME     |                      | Y         | Y           | Y         |           |           |          | Y        |           |           |          |          |        |
| OERK                       | 15L       | ILS                     | I   | VORDME     |                      |           |             |           |           |           |          |          |           |           |          |          |        |
|                            | 15R       | ILS                     | I   |            |                      |           |             |           |           |           |          |          |           |           |          |          |        |
|                            | 33L       | ILS                     | I   |            |                      |           |             |           |           |           |          |          |           |           |          |          |        |
|                            | 33R       | ILS                     | I   | VORDME     |                      |           |             |           |           |           |          |          |           |           |          |          |        |
| <b>Total</b>               | <b>18</b> | <b>17</b>               |     | <b>13</b>  | <b>Y</b>             | <b>4</b>  | <b>0</b>    | <b>4</b>  | <b>4</b>  | <b>1</b>  | <b>0</b> | <b>0</b> | <b>4</b>  | <b>1</b>  | <b>0</b> | <b>0</b> |        |
| <b>%</b>                   |           | <b>94</b>               |     | <b>72</b>  | <b>May 2012</b>      | <b>22</b> | <b>0</b>    | <b>22</b> | <b>22</b> | <b>25</b> | <b>0</b> | <b>0</b> | <b>22</b> | <b>25</b> | <b>0</b> | <b>0</b> |        |

Plan needs update



4A-11

| Int'l AD<br>(Ref. MID<br>ANP) | RWY       | Conventional<br>Approaches |          | APTA          |                               |           | CCO            |            |                 |            |            | CDO        |              |            |           | Remarks    |           |
|-------------------------------|-----------|----------------------------|----------|---------------|-------------------------------|-----------|----------------|------------|-----------------|------------|------------|------------|--------------|------------|-----------|------------|-----------|
|                               |           | Precision                  |          | VOR or<br>NDB | PBN<br>PLAN<br>Update<br>date | LNAV      | LNAV /<br>VNAV | PBN<br>RWY | RNA<br>V<br>SID | PER<br>AD  | CCO        | PER<br>AD  | RNAV<br>STAR | PER<br>AD  | CDO       |            | PER<br>AD |
|                               |           | xLS                        | CAT      |               |                               |           |                |            |                 |            |            |            |              |            |           |            |           |
| UNITED<br>ARAB<br>EMIRATES    |           |                            |          |               |                               |           |                |            |                 |            |            |            |              |            |           |            | 8         |
| OMAA                          | 13L       | ILS                        | II       |               |                               | AR        | AR             | Y          | Y               | Y          | Y          | Y          | Y            | Y          | Y         | Y          | RNP AR    |
|                               | 13R       | ILS                        | I        | VOR           |                               | AR        | AR             | Y          | Y               |            | Y          |            | Y            |            | Y         |            | RNP AR    |
|                               | 31L       | ILS                        | II/III   | VOR           |                               | AR        | AR             | Y          | Y               |            | Y          |            | Y            |            | Y         |            | RNP AR    |
|                               | 31R       | ILS                        | II       |               |                               | AR        | AR             | Y          | Y               |            | Y          |            | Y            |            | Y         |            | RNP AR    |
| OMAD                          | 13        |                            |          | VORDME        |                               | Y         |                | Y          | Y               | Y          | Y          | Y          | Y            | Y          | Y         | Y          |           |
|                               | 31        | ILS                        | I        | VORDME        |                               | Y         |                | Y          | Y               |            | Y          |            | Y            |            | Y         |            |           |
| OMAL                          | 1         | ILS                        | I        | VOR           |                               | Y         | Y              | Y          | Y               | Y          | Y          | Y          | Y            | Y          | Y         | Y          |           |
|                               | 19        |                            |          | VOR           |                               | Y         | Y              | Y          | Y               |            | Y          |            | Y            |            | Y         |            |           |
| OMDB                          | 12L       | ILS                        | I/II/III |               |                               | Y         | Y              | Y          | Y               | Y          | Y          | Y          | Y            | Y          | Y         | Y          |           |
|                               | 12R       | ILS                        | I/II/III |               |                               | Y         | Y              | Y          | Y               |            | Y          |            | Y            |            | Y         |            |           |
|                               | 30L       | ILS                        | I/II/III |               |                               | Y         | Y              | Y          | Y               |            | Y          |            | Y            |            | Y         |            |           |
|                               | 30R       | ILS                        | I/II/III |               |                               | Y         | Y              | Y          | Y               |            | Y          |            | Y            |            | Y         |            |           |
| OMDW                          | 12        | ILS                        | II/III   |               |                               | Y         | Y              | Y          | Y               | Y          | Y          | Y          | Y            | Y          | Y         | Y          |           |
|                               | 30        | ILS                        | II/III   |               |                               | Y         | Y              | Y          | Y               |            | Y          |            | Y            |            | Y         |            |           |
| OMFJ                          | 11        |                            |          |               |                               |           |                |            | Y               | Y          | Y          | Y          |              | Y          |           | Y          |           |
|                               | 29        | ILS                        | I        | VOR           |                               | Y         | Y              | Y          | Y               |            | Y          |            | Y            |            | Y         |            |           |
| OMRK                          | 16        |                            |          | VOR           |                               | Y         | Y              | Y          | Y               | Y          | Y          | Y          | Y            | Y          | Y         | Y          |           |
|                               | 34        | ILS                        | I        | VOR           |                               | Y         | Y              | Y          | Y               |            | Y          |            | Y            |            | Y         |            |           |
| OMSJ                          | 12        | ILS                        | I        |               |                               | Y         | Y              | Y          | Y               | Y          | Y          | Y          | Y            | Y          | Y         | Y          | RNP AR    |
|                               | 30        | ILS                        | II       |               |                               | Y         | Y              | Y          | Y               |            | Y          |            | Y            |            | Y         |            | RNP AR    |
| <b>Total</b>                  | <b>20</b> | <b>16</b>                  |          | <b>9</b>      | <b>Y</b>                      | <b>19</b> | <b>17</b>      | <b>19</b>  | <b>20</b>       | <b>8</b>   | <b>20</b>  | <b>8</b>   | <b>19</b>    | <b>8</b>   | <b>19</b> | <b>8</b>   |           |
| <b>%</b>                      |           | <b>80</b>                  |          | <b>45</b>     | <b>Dec.<br/>2015</b>          | <b>95</b> | <b>85</b>      | <b>95</b>  | <b>100</b>      | <b>100</b> | <b>100</b> | <b>100</b> | <b>95</b>    | <b>100</b> | <b>95</b> | <b>100</b> |           |

| Int'l AD<br>(Ref. MID ANP) | RWY        | Conventional Approaches |     | APTA        |                      |           | CCO         |            |           |            |           | CDO        |           |             | Remarks   |            |  |
|----------------------------|------------|-------------------------|-----|-------------|----------------------|-----------|-------------|------------|-----------|------------|-----------|------------|-----------|-------------|-----------|------------|--|
|                            |            | Precision               |     | VOR or NDB  | PBN PLAN Update date | LNAV      | LNAV / VNAV | PBN RWY    | RNA V SID | PER AD     | CCO       | PER AD     | RNAV STAR | PER AD      |           | CDO        | PER AD                                     |
|                            |            | xLS                     | CAT |             |                      |           |             |            |           |            |           |            |           |             |           |            |  |
| YEMEN                      |            |                         |     |             |                      |           |             |            |           |            |           |            |           |             |           |            | 5  |
| OYAA                       | 8          | ILS                     | I   | VORDME      |                      |           |             |            |           |            |           |            |           |             |           |            |  |
|                            | 26         |                         |     | VORDME      |                      |           |             |            |           |            |           |            |           |             |           |            |  |
| OYHD                       | 3          |                         |     | VOR         |                      |           |             |            |           |            |           |            |           |             | Y         |            |  |
|                            | 21         |                         |     | VOR / NDB   |                      | Y         |             | Y          |           |            |           |            | Y         |             |           |            |  |
| OYRN                       | 6          |                         |     |             |                      |           |             |            |           |            |           |            |           |             |           |            |  |
|                            | 24         |                         |     | VORDME      |                      |           |             |            |           |            |           |            |           |             |           |            |  |
| OYSN                       | 18         | ILS                     | I   | VORDME/ NDB |                      | Y         | Y           | Y          | Y         | Y          |           |            | Y         | Y           |           |            |  |
|                            | 36         |                         |     | VOR         |                      | Y         | Y           | Y          | Y         |            |           |            | Y         |             |           |            |  |
| OYTZ                       | 1          |                         |     |             |                      |           |             |            |           |            |           |            |           |             |           |            |  |
|                            | 19         |                         |     |             |                      |           |             |            |           |            |           |            |           |             |           |            |  |
| <b>Total</b>               | <b>10</b>  | <b>2</b>                |     | <b>7</b>    | <b>Draft Plan</b>    | <b>3</b>  | <b>2</b>    | <b>3</b>   | <b>2</b>  | <b>1</b>   | <b>0</b>  | <b>0</b>   | <b>3</b>  | <b>2</b>    | <b>0</b>  | <b>0</b>   | <b>58</b>                                  |
| <b>%</b>                   |            | <b>20</b>               |     | <b>70</b>   | <b>Jan. 2010</b>     | <b>30</b> | <b>20</b>   | <b>30</b>  | <b>20</b> | <b>20</b>  | <b>0</b>  | <b>0</b>   | <b>30</b> | <b>40</b>   | <b>0</b>  | <b>0</b>   |  |
| <b>Results</b>             |            |                         |     |             | <b>Plans</b>         |           |             | <b>PBN</b> |           | <b>SID</b> |           | <b>CCO</b> |           | <b>STAR</b> |           | <b>CDO</b> |  |
| <b>Total</b>               | <b>164</b> | <b>101</b>              |     | <b>124</b>  | <b>10</b>            | <b>90</b> | <b>51</b>   | <b>90</b>  | <b>63</b> | <b>25</b>  | <b>26</b> | <b>10</b>  | <b>74</b> | <b>29</b>   | <b>29</b> | <b>11</b>  | <b>13 PBN APV + 102 ILS (115/160)</b>      |
| <b>Percentage (%)</b>      |            | <b>62</b>               |     | <b>76</b>   | <b>67</b>            | <b>55</b> | <b>31</b>   | <b>55</b>  | <b>38</b> | <b>43</b>  | <b>16</b> | <b>17</b>  | <b>18</b> | <b>50</b>   | <b>18</b> | <b>19</b>  | <b>72% RWY Ends with Vertical guidance</b> |
| <b>58</b>                  | Aerodromes |                         |     |             |                      |           |             |            |           |            |           |            |           |             |           |            |  |

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

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**INTERNATIONAL CIVIL AVIATION ORGANIZATION**

**MIDDLE EAST AIR NAVIGATION PLANNING  
AND IMPLEMENTATION REGIONAL GROUP  
(MIDANPIRG)**

**MID REGION  
PERFORMANCE BASED NAVIGATION  
IMPLEMENTATION PLAN**

EDITION ~~FEBRUARY~~ ~~APRIL~~, 2016~~8~~

The designations employed and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of ICAO concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontier or boundaries.



## EXECUTIVE SUMMARY

The MID Region Performance Based Navigation (PBN) Implementation Plan has been developed to harmonize PBN implementation in the MID Region and to address the strategic objectives of PBN based on clearly established operational requirements, avoiding equipage of multiple on-board or ground based equipment, avoidance of multiple airworthiness and operational approvals and explains in detail contents relating to potential navigation applications.

The Plan was prepared in accordance with ICAO provisions related to PBN, the Global Air Navigation Plan, Aviation System Block Upgrades (ASBU) methodology, MID Region Air Navigation Plan and the MID Region Air Navigation Strategy. In addition to the Assembly Resolutions and the twelfth Air Navigation Conference (AN-Conf/12) Recommendations related to PBN.

The plan envisages pre- and post-implementation safety assessments and continued availability of conventional air navigation procedures during transition. The plan discusses issues related to implementation which include traffic forecasts, aircraft fleet readiness, adequacy of ground-based CNS infrastructure etc. Implementation targets for various categories of airspace for the short term (2013 – ~~2017~~2018) and for the medium term (~~2018-2019~~ – ~~2022~~2025) have been projected in tabular forms to facilitate easy reference. For the long term (~~2023-2026~~ and beyond) it has been envisaged that GNSS and its augmentation system would become the primary navigation infrastructure

This Document consolidates, updates and supersedes all previous MID Region PBN and GNSS Strategies/Plans.

The parts related to PBN implementation for En-route will be reviewed and updated by the ATM Sub-Group and those related to terminal and approach will be reviewed and updated by the PBN Sub-Group.

### Explanation of Terms

The drafting and explanation of this document is based on the understanding of some particular terms and expressions that are described below:

**MID Region PBN Implementation Plan** - A document offering appropriate guidance for air navigation service providers, airspace operators and users, regulating agencies, and international organizations, on the evolution of navigation, as one of the key systems supporting air traffic management, and which describes the RNAV and RNP navigation applications that should be implemented in the short, medium and long term in the MID Region.

**Performance Based Navigation** - Performance based navigation specifies RNAV and RNP system performance requirements for aircraft operating along an ATS route, on an instrument approach procedure or in an airspace.

**Performance requirements** - Performance requirements are defined in terms of accuracy, integrity, continuity, availability and functionality needed for the proposed operation in the context of a particular airspace concept. Performance requirements are identified in navigation specifications which also identify which navigation sensors and equipment may be used to meet the performance requirement.

## **REFERENCE DOCUMENTS**

The below ICAO Documents provide Guidance related to the PBN implementation:

- PANS-ATM (Doc 4444)
- PANS-Ops (Doc 8168)
- PBN Manual (Doc 9613)
- GNSS Manual (Doc 9849)
- RNP AR Procedure Design Manual (Doc 9905)
- CDO Manual (Doc 9931)
- Manual on Use of PBN in Airspace Design (Doc 9992)
- CCO Manual (Doc 9993)
- Procedure QA Manual (Doc 9906)
- PBN Ops Approval Manual (Doc 9997)

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## ACRONYMS

The acronyms used in this document along with their expansions are given in the following List:

|           |   |
|-----------|---|
| AACO      | Arab Air Carrier Association  |
| ABAS      | Aircraft-Based Augmentation System                                    |
| ACAC      | Arab Civil Aviation Commission  |
| AIS       | Aeronautical Information System                                       |
| APAC      | Asia and Pacific Regions  |
| APCH      | Approach  |
| APV       | Approach Procedures with Vertical Guidance                            |
| AOC       | Air operator certificate  |
| ATC       | Air Traffic Control   |
| ASBU      | Aviation System Block Upgrades  |
| Baro VNAV | Barometric Vertical Navigation  |
| CCO       | Continuous Climb Operations   |
| CDO       | Continuous Decent Operations  |
| CNS/ATM   | Communication Navigation Surveillance/Air Traffic Management          |
| CPDLC     | Controller Pilot Data Link Communications                             |
| DME       | Distance Measuring Equipment  |
| FIR       | Flight Information Region   |
| FMS       | Flight Management System  |
| GBAS      | Ground-Based Augmentation System                                      |
| GNSS      | Global Navigation Satellite System                                    |
| GLS       | GBAS Landing System   |
| IATA      | International Air Transport Association                               |
| IFALPA    | International Federation of Air Line Pilots' Associations             |
| IFATCA    | International Federation of Air Traffic Controllers' Associations     |
| IFF       | Identification Friend or Foe  |
| INS       | Inertial Navigation System  |
| IRU       | Inertial Reference Unit   |
| MEL       | Minimum equipment list  |
| MID eANP  | MID Region Air Navigation Plan  |
| MIDANPIRG | Middle East Air Navigation Planning and Implementation Regional Group |
| MIDRMA    | Middle East Regional Monitoring Agency                                |
| MLAT      | Multilateration   |
| PANS      | Procedures for Air Navigation Services                                |
| PBN       | Performance Based Navigation  |
| PIRG      | Planning and Implementation Regional Group                            |
| RCP       | Required Communication Performance                                    |
| RNAV      | Area Navigation   |
| RNP       | Required Navigation Performance                                       |
| SARP      | Standards and Recommended Practices                                   |
| SBAS      | Satellite-Based Augmentation System                                   |
| SID       | Standard Instrument Departure   |
| SOP       | Standard operating procedure  |
| STAR      | Standard Instrument Arrival   |
| TAWS      | Terrain awareness warning system                                      |
| TMA       | Terminal Control Area   |
| VOR       | VHF Omni-directional Radio-range                                      |
| WGS       | World Geodetic System   |

## CHAPTER 1

### PERFORMANCE BASED NAVIGATION

#### 1. INTRODUCTION

1.1 The Performance Based Navigation (PBN) concept specifies aircraft RNAV system performance requirements in terms of accuracy, integrity, availability, continuity and functionality needed for the proposed operations in the context of a particular airspace concept, when supported by the appropriate navigation infrastructure. In this context, the PBN concept represents a shift from sensor-based to performance based navigation.

1.2 The main tool for optimizing the airspace structure is the implementation of PBN, which will foster the necessary conditions for the utilization of RNAV and RNP capabilities by a significant portion of airspace users in the MID Region.

1.3 The MID Regional PBN Implementation Plan will serve as guidance for regional projects for the implementation of air navigation infrastructure, as well as for the development of national implementation plans.

1.4 The PBN Manual (Doc 9613) provides guidance on PBN navigation specifications and encompasses two types of approvals: airworthiness, exclusively relating to the approval of aircraft, and operational, dealing with the operational aspects of the operator. PBN approval will be granted to operators that comply with these two types of approval.

1.5 After the implementation of PBN as part of the airspace concept, the total system needs to be monitored to ensure that safety of the system is maintained. A system safety assessment shall be conducted during and after implementation and evidence collected to ensure that the safety of the system is assured.

#### 2. BENEFITS OF PERFORMANCE BASED NAVIGATION

- a) *Access and Equity*: Increased aerodrome accessibility.
- b) *Capacity*: In contrast with ILS, the GNSS based approaches do not require the definition and management of sensitive and critical areas resulting in potentially increased runway capacity.
- c) *Efficiency*: Cost savings related to the benefits of lower approach minima: fewer diversions, overflights, cancellations and delays. Cost savings related to higher airport capacity in certain circumstances (e.g. closely spaced parallels) by taking advantage of the flexibility to offset approaches and define displaced thresholds.
- d) *Environment*: Environmental benefits through reduced fuel burn.
- e) *Safety*: Stabilized approach paths.
- f) *Cost Benefit Analysis*: Aircraft operators and air navigation service providers (ANSPs) can quantify the benefits of lower minima by using historical aerodrome weather observations and modeling airport accessibility with existing and new minima. Each aircraft operator can then assess benefits against the cost of any required avionics upgrade. Until there are GBAS (CAT II/III) Standards, GLS cannot be considered as a candidate to globally replace ILS. The GLS business case needs to consider the cost of retaining ILS or MLS to allow continued operations during an interference event

### 3. GOALS AND OBJECTIVES OF PBN IMPLEMENTATION

- 3.1. The MID Region PBN Implementation Plan has the following strategic objectives:
- a) ensure that implementation of the navigation element of the MID CNS/ATM system is based on clearly established operational requirements;
  - b) avoid unnecessarily imposing the mandate for multiple equipment on board or multiple systems on ground;
  - c) avoid the need for multiple airworthiness and operational approvals for intra and inter-regional operations; and
  - d) avoid an eclipsing of ATM operational requirements by commercial interests, generating unnecessary costs to States, organizations, and airspace users.
- 3.2. Furthermore, the Plan will provide a high-level strategy for the evolution of the navigation applications to be implemented in the MID Region in the short term (2013-2018), medium term (2019-2025).
- 3.3. The plan is intended to assist the main stakeholders of the aviation community to plan the future transition and their investment strategies. For example, Operators can use this Regional Plan to plan future equipage and additional navigation capability investment; Air Navigation Service Providers can plan a gradual transition for the evolving ground infrastructure, Regulating Agencies will be able to anticipate and plan for the criteria that will be needed in the future.

### 4. PLANNING PRINCIPLES

- 4.1. The implementation of PBN in the MID Region shall be based on the following principles:
- a) implementation of PBN specification and granting PBN operational approvals should be in compliance with ICAO provisions;
  - b) States conduct pre- and post-implementation safety assessments to ensure the application and maintenance of the established target level of safety;
  - c) continued application of conventional air navigation procedures during the transition period, to guarantee the operation by users that are not PBN capable;
  - d) Users/operational requirements should be taken into consideration while planning for PBN implementation;
  - e) States should provide the ICAO MID Regional Office with their updated PBN implementation Plan on annual basis (before December);
  - ~~f) the implementation of Advanced RNP should start by January 2015;~~
  - ~~g) implementation of approach procedures with vertical guidance (APV) (Baro-VNAV and/or augmented GNSS), including LNAV only minima, for all runway ends at international Aerodromes, either as the primary approach or as a back up for precision approaches by 2017 with intermediate milestones as follows: 50 percent by 2015 and 70 per cent by 2016;~~
  - ~~h) implementation of straight in LNAV only procedures, as an exception to g) 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; and~~

ðf) States should assess the benefit accrued from the implementation of PBN procedures and ATS Routes, and to report the environmental benefits to the ICAO MID Regional Office.

## 5. PBN OPERATIONAL REQUIREMENTS AND IMPLEMENTATION STRATEGY

5.1. Introduction of PBN should be consistent with the Global Air Navigation Plan. Moreover, PBN Implementation shall be in full compliance with ICAO SARPs and PANS.

5.2. Continuous Climb and Descent Operations (CCO and CDO) ~~are two of several tools available to aircraft operators and ANSPs, through collaboration between stakeholders,~~ would enhance efficiency, flight predictability, while reducing fuel burn, emissions and controller-pilot communications, thereby enhancing safety.

### En-route

5.3. Considering the traffic characteristic and CNS/ATM capability of the Region, the en-route operations can be classified as oceanic, remote continental, continental, and local/domestic. In principle, each classification of the en-route operations should adopt, but not be limited to single PBN navigation specification. This implementation strategy will be applied by the States and international organizations themselves, as coordinated at regional level to ensure harmonization.

5.4. In areas where operational benefits can be achieved and appropriate CNS/ATM capability exists or can be provided for a more accurate navigation specification, States are encouraged to introduce more accurate navigation specification on the basis of coordination with stakeholders and affected neighbouring States.

### Terminal

5.5. Terminal operations have their own characteristics, taking into account the applicable separation minima between aircraft and between aircraft and obstacles. It also involves the diversity of aircraft, including low-performance aircraft flying in the lower airspace and conducting arrival and departure procedures on the same path or close to the paths of high-performance aircraft.

5.6. In this context, the States should develop their own national plans for the implementation of PBN in Terminal Control Areas (TMAs), based on the MID Region PBN Implementation Plan, seeking the harmonization of the application of PBN and avoiding the need for multiple operational approvals for intra- and inter-regional operations, and the applicable aircraft separation criteria.

### Approach

5.7. ATC workload should be taken into account while developing PBN Approach Procedures. One possible way to accomplish this would be by co-locating the Initial Approach Waypoint (IAW) for PBN with the Initial Approach Fix (IAF) of the conventional approaches. States should phase-out conventional non-precision approach procedures at a certain point when deemed operationally suitable and taking in consideration GNSS integrity requirements.

5.8. MID States are encouraged to include implementation of CCO and CDO, where appropriate, as part of their PBN implementation plans, in compliance with the provisions of ICAO Documents 9931 and 9993, and in accordance with the MID Region Air Navigation Strategy.

5.9. States are encouraged to plan for the implementation of RNP AR procedures, which can provide significant operational and safety advantages over other area navigation (RNAV) procedures by incorporating additional navigational accuracy, integrity and functional capabilities to permit operations using reduced obstacle clearance tolerances that enable approach and departure procedures to be implemented in circumstances where other types of approach and departure procedures are not

operationally possible or satisfactory. Procedures implemented in accordance with RNP AR Procedure Design Manual (Doc 9905) allow the exploitation of high-quality, managed lateral and vertical navigation (VNAV) capabilities that provide improvements in operational safety and reduced un-stabilized approaches and Controlled Flight Into Terrain (CFIT) risks.

## CHAPTER 2

### CNS INFRASTRUCTURE

#### 1. NAVIGATION INFRASTRUCTURE

##### *Global Navigation Satellite System (GNSS)*

1.1. Global Navigation Satellite System (GNSS) is a satellite-based navigation system utilizing satellite signals, such as Global Positioning System (GPS), and GLONASS for providing accurate and reliable position, navigation, and time services to airspace users. In 1996, the International Civil Aviation Organization (ICAO) endorsed the development and use of GNSS as a primary source of future navigation for civil aviation. ICAO noted the increased flight safety, route flexibility and operational efficiencies that could be realized from the move to space-based navigation.

1.2. GNSS supports both RNAV and RNP operations. Through the use of appropriate GNSS augmentations. GNSS navigation provides sufficient accuracy, integrity, availability and continuity to support en-route, terminal area, and approach operations. Approval of RNP operations with appropriate certified avionics provides on-board performance monitoring and alerting capability enhancing the integrity of aircraft navigation.

1.3. GNSS augmentations include Aircraft-Based Augmentation System (ABAS), Satellite-Based Augmentation System (SBAS) and Ground-Based Augmentation System (GBAS).

1.4. For GNSS implementation States need to provide effective spectrum management and protection of GNSS frequencies by enforcing strong regulatory framework governing the use of GNSS repeaters, and jammers. States need to assess the likelihood and effects of GNSS vulnerabilities in their airspace and apply, as necessary, recognized and available mitigation methods.

1.5. During transition to GNSS, sufficient ground infrastructure for current navigation systems must remain available. Before existing ground infrastructure is considered for removal, users should be consulted and given reasonable transition time to allow them to equip accordingly.

1.6. GNSS implementation should take advantage of the improved robustness and availability made possible by the existence of multiple global navigation satellite system constellations and associated augmentation systems.

1.7. Operators consider equipage with GNSS receivers able to process more than one constellation in order to gain the benefits associated with the support of more demanding operations. States allow for realization of the full advantages of on-board mitigation techniques.

#### 2. OTHER NAVIGATION INFRASTRUCTURE SUPPORTING PBN

2.1. Other navigation infrastructure that supports PBN applications includes INS, VOR/DME, DME/DME, and DME/DME/IRU. These navigation infrastructures may satisfy the requirements of RNAV navigation specifications, but not those of RNP.

2.2. INS may be used to support PBN en-route operations with RNAV-10 and RNAV 5 navigation specifications.

2.3. VOR/DME may be used to support PBN en-route operations based on RNAV 5 navigation specification.

2.4. DME/DME and DME/DME/IRU may support PBN en-route and terminal area operations based on RNAV 5, and RNAV 1 navigation specifications. Validation of DME/DME coverage area and appropriate DME/DME geometry should be conducted to identify possible DME/DME gaps, including identification of critical DMEs, and to ensure proper DME/DME service

coverage.

*Note.- The conventional Navaid infrastructure should be maintained to support non-equipped aircraft during a transition period.*

### **3. SURVEILLANCE INFRASTRUCTURE**

3.1. For RNAV operations, States should ensure that sufficient surveillance coverage is provided to assure the safety of the operations. Because of the on-board performance monitoring and alerting requirements for RNP operations, surveillance coverage may not be required. Details on the surveillance requirements for PBN implementation can be found in the ICAO PBN Manual (Doc 9613) and ICAO PANS-ATM (Doc 4444), and information on the current surveillance infrastructure in the MID can be found in the MID eANP.

3.2. Multilateration (MLAT) employs a number of ground stations, which are placed in strategic locations around an airport, its local terminal area or a wider area that covers the larger surrounding airspace. Multilateration requires no additional avionics equipment, as it uses replies from Mode A, C and S transponders, as well as military IFF and ADS-B transponders.

### **4. COMMUNICATION INFRASTRUCTURE**

4.1. Implementation of RNAV and RNP routes includes communication requirements. Details on the communication requirements for PBN implementation can be found in ICAO PANS-ATM (Doc 4444), ICAO RCP Manual (Doc 9869), and ICAO Annex 10. Information on the current communication infrastructure in the MID can also be found in MID eANP.

## CHAPTER 3

### IMPLEMENTATION OF PBN

#### 1. ATM OPERATIONAL REQUIREMENTS

1.1. The Global ATM Operational Concept (Doc 9854) makes it necessary to adopt an airspace concept able to provide an operational scenario that includes route networks, minimum separation standards, assessment of obstacle clearance, and a CNS infrastructure that satisfies specific strategic objectives, including safety, access, capacity, efficiency, and environment.

1.2. During the planning phase of any implementation of PBN, States should gather inputs from all aviation stakeholders to obtain operational needs and requirements. These needs and requirements should then be used to derive airspace concepts and to select appropriate PBN navigation specification

1.3. In this regard, the following should be taken into consideration:

- a) Traffic and cost benefit analyses
- b) Necessary updates on automation
- c) Operational simulations in different scenarios
- d) ATC personnel training
- e) Flight plan processing
- f) Flight procedure design training to include PBN concepts and ARINC-424 coding standard
- g) Enhanced electronic data and processes to ensure appropriate level of AIS data accuracy, integrity and timeliness
- h) WGS-84 implementation in accordance with ICAO Annex 15 provisions
- i) Uniform classification of adjacent and regional airspaces, where practicable
- j) RNAV/RNP applications for SIDs and STARs
- k) Coordinated RNAV/RNP routes implementation
- l) RNP approach with vertical guidance
- m) Establish PBN approval database

1.4. Table 23-1 shows the navigation specifications published in PBN Manual (Doc 9613), Volume II. It demonstrates, for example, that navigation specifications extend over various phases of flight. It also contains the NavAids/Sensor associated with each PBN specification.

1.5. The implementation of PBN additional functionalities/path terminator should be considered while planning/designing new procedures such as:

- the Radius to Fix (RF) for approach;
- Fixed Radius Transition (FRT) for En-route; and
- Time of Arrival Control (TOAC).

**Table 3-1. Application of navigation specification by flight phase**

| Navigation Specification                | FLIGHT PHASE            |                      |         |          |              |                  |                     | NAVAIDS/SENSORS |      |     |         |             |         |     |                             |     |
|---|-------------------------|----------------------|---------|----------|--------------|------------------|---------------------|-----------------|------|-----|---------|-------------|---------|-----|-----------------------------|-----|
|   | En-route oceanic/remote | En-route continental | Arrival | Approach |              |                  |                     | DEP             | GNSS | IRU | DME/DME | DME/DME/IRU | VOR/DME |     |                             |     |
|   |                         |                      |         | Initial  | Intermediate | Final            | Missed <sup>1</sup> |                 |      |     |         |             |         |     |                             |     |
| <b>RNAV 10</b>                          | 10                      | N/A                  |         | N/A      |              |                  |                     | N/A             | O    | O   | N/A     |             |         |     |                             |     |
| <b>RNAV 5<sup>2</sup></b>               | N/A                     | 5                    | 5       |          |              |                  |                     | N/A             |      |     |         | O           | O       | O   | <del>N/A</del> <sup>3</sup> | O   |
| <b>RNAV 2</b>                           |                         | 2                    | 2       | N/A      |              |                  |                     |                 |      |     |         | 2           | O       | O   | O                           | N/A |
| <b>RNAV 1</b>                           |                         | 1                    | 1       |          |              |                  |                     |                 |      |     |         | 1           | 1       | N/A | 1                           |     |
| <b>RNP 4</b>                            | 4                       | N/A                  |         |          |              |                  |                     | N/A             |      |     |         | N/A         | M       |     |                             |     |
| <b>RNP 2</b>                            | 2                       | 2                    | N/A     | N/A      |              |                  |                     |                 |      |     |         | M           |         | SR  | SR                          |     |
| <b>RNP 1<sup>3</sup></b>                | N/A                     |                      | 1       |          |              |                  |                     | 1               | 1    | N/A | 1       | 1           | M       | SR  | SR                          |     |
| <b>Advanced RNP (A-RNP)<sup>4</sup></b> | 2                       | 2 or 1               | 1       | 1        | 1            | 0.3              | 1                   | 1               | M    | N/A | SR      | SR          | N/A     |     |                             |     |
| <b>RNP APCH<sup>6</sup></b>             | N/A                     |                      |         | 1        | 1            | 0.3 <sup>7</sup> | 1                   | N/A             | M    | N/A |         |             |         |     |                             |     |
| <b>RNP AR APCH</b>                      |                         |                      |         | 1-0.1    | 1-0.1        | 0.3-0.1          | 1-0.1               |                 | M    |     |         |             |         |     |                             |     |
| <b>RNP APCH APV</b>                     |                         |                      |         | 1        | 1            | 0.3              | 1                   |                 | M    |     |         |             |         |     |                             |     |
| <b>RNP 0.3<sup>8</sup></b>              | N/A                     |                      | 0.3     | 0.3      | 0.3          | 0.3              | 0.3                 | 0.3             | M    |     |         |             |         |     |                             |     |

O: Optional; M: Mandatory; SR: Subject ANSP Requirements

1. Only applies once 50 m (40 m, Cat H) obstacle clearance has been achieved after the start of climb.
2. RNAV 5 is an en-route navigation specification which may be used for the initial part of a STAR outside 30 NM and above MSA.
3. The RNP 1 specification is limited to use on STARs, SIDs, the initial and intermediate segments of IAPs and the missed approach after the initial climb phase. Beyond 30 NM from the ARP, the accuracy value for alerting becomes 2 NM.
4. A-RNP also permits a range of scalable RNP lateral navigation accuracies
5. PBN manual contains two sections related to the RNP APCH specification: Section A is enabled by GNSS and Baro-VNAV, Section B is enabled by SBAS.
6. RNP 0.3 is applicable to RNP APCH Section A. Different angular performance requirements are applicable to RNP APCH Section B only.
7. The RNP 0.3 specification is primarily intended for helicopter operations.

**2. IMPLEMENTATION PHASES:**

**En-route**

**Short Term:**

- 2.1. The current application of RNAV 10 will continue for Oceanic and Remote continental routes.
- 2.2. For Continental RNAV 5 specifications should be completed by December 2017. Before the PBN concept, the MID Region adopted the Regional implementation of RNP 5. Further to application of the PBN concept, RNP 5 routes have been changed into RNAV 5 routes. Based on operational requirements, States may choose to implement RNAV 1 routes to enhance efficiency of airspace usages and support closer route spacing, noting that appropriate communication and surveillance coverage is provided. Details of these requirements are provided in the PBN manual (Doc 9613) and PANS-ATM (Doc 4444).

**Medium Term:**

2.3. RNP 4 and/or RNP 2 routes would be considered for implementation for the en-route oceanic/remote operations.

2.4. RNP 2 or RNAV 1 would be considered for implementation for en-route continental/local domestic operations.

**Terminal**

**Short Term:**

2.5. In a non-surveillance environment and/or in an environment without adequate ground navigation infrastructure, the SID/STAR application of RNP 1 is expected in selected TMAs with exclusive application of GNSS.

2.6. CCO and CDO should be implemented at the defined TMAs, in accordance with the State PBN implementation Plans, the MID Region Air Navigation Strategy and the MID ANP.

**Medium Term:**

2.7. RNAV 1, A-RNP 1 will be implemented in all TMAs, ~~expected target will be 70% by the end of this term.~~

**Approach**

**Short Term:**

2.8. Implementation of PBN approaches with vertical guidance (~~(LNAV/VNAV minima) (APV)~~) for runway ends at the international aerodromes listed in the MID ANP ~~should be completed by December 2017~~, including LNAV only minima.

2.9. The application of RNP AR APCH procedures would be limited to selected airports, where obvious operational benefits can be obtained due to the existence of significant obstacles.

**Medium Term:**

2.10. The extended application of RNP AR APCH should continue for airports where there are operational benefits.

2.11. To progress further with the universal implementation of PBN approaches. GLS procedures should be implemented for the defined runway ends to enhance the reliability and predictability of approaches to runways increasing safety, accessibility, and efficiency.

2.12. Table 3-2 summarizes the implementation targets of each PBN navigation specification in the MID Region:

**Table 3-2. SUMMARY TABLE AND IMPLEMENTATION TARGETS**

| Airspace                             | Short term<br><del>2013-2018</del> <b>Up to 2020</b>  |  | Medium term<br><del>2019</del> <b>2021-2025</b>   |                                     |
|--------------------------------------|---|--|---|-------------------------------------|
|                                      | Navigation Specification Preferred  | Targets  | Navigation Specification Acceptable   | Targets                             |
| <b>En-route – Oceanic</b>            | RNAV 10   | 100 % by 2016  | RNP 4*<br>RNP 2*<br>Defined airspace (A-RNP)  | TBD                                 |
| <b>En-route - Remote continental</b> | RNAV 5<br>RNAV 10   | W/A<br>100% by 2016  | RNP 4*<br>RNP 2*<br>Defined airspace (A-RNP)  | TBD                                 |
| <b>En-route – Continental</b>        | RNAV 5<br>RNAV 1  | 100 % by 2017<br>W/A <sup>1</sup>  | RNP 2*<br>Defined airspace (A-RNP)  | TBD                                 |
| <b>En-route - Local / Domestic</b>   | RNAV 5<br>RNAV 1  | 100 % by 2017<br>W/A   | RNP 2<br>Defined airspace (A-RNP)   | TBD                                 |
| <b>TMA – Arrival</b>                 | RNAV 1 (surveillance environment) <u>or</u> RNP 1 (non-surveillance environment)  | 50% by December 2016<br><br>100% by <del>2018</del> <b>2020</b>  | <del>RNP 1 and RNP 2 beyond 30 NM from ARP</del><br>(A-RNP)                             | <del>100% by 2025</del> <b>TBD</b>  |
| <b>TMA – Departure</b>               | RNAV 1 (surveillance environment) <u>or</u> RNP 1 (non-surveillance environment)  | 50% by 2016<br><br>100% by <del>2018</del> <b>2020</b>   | <del>RNP 1 and RNP 2 beyond 30 NM from ARP</del><br>(A-RNP)                             | <del>100% by 2025</del> <b>TBD</b>  |
| <b>Approach</b>                      | LNAV:<br>for all RWY Ends at International Aerodromes<br><br>LNAV/VNAV:<br>for all RWY Ends at International Aerodromes | 80 % by 2014.<br><br>100% by <del>2016</del> <b>2020</b><br><br>70% by 2016<br><br>100% by <del>2018</del> <b>2020</b> | GLS (GBAS)<br><br>For the defined RWY Ends<br><u>Based on operational needs and CBA</u> | TBD                                 |
| <b>CCO and CDO</b>                   | W/A   | 100% by <del>2018</del> <b>2020</b>  | W/A   | <del>TBD</del> <b>100 % by 2025</b> |

- W/A: where applicable/defined Airspace, in accordance with State PBN implementation Plans, the MID Region Air ~~navigation~~Navigation Strategy and the MID ANP.
- \* would be considered for implementation at the identified Airspace/TMAs
- When no month is specified (e.g. by 2017) means by the end of the year (December 2017).

**Long Term (202~~5~~6 and Beyond)**

2.13. In this phase, GNSS augmentation is expected to be a primary navigation infrastructure for PBN implementation. States should work co-operatively on a multinational basis to implement GNSS in order to facilitate seamless and inter-operable systems and undertake coordinated Research and Development (R&D) programs on GNSS implementation and operation.

2.14. Moreover, during this phase, States are encouraged to consider segregating traffic according to navigation capability and granting preferred routes to aircraft with better navigation performance.

2.15. The required PBN navigation specifications and their associated targets to be implemented for the Long term will be defined in due course.

## CHAPTER 4

### SAFETY ASSESSMENT AND MONITORING

#### 1. NEED FOR SAFETY ASSESSMENT

1.1. To ensure that the introduction of PBN en-route applications within the MID Region is undertaken in a safe manner and in accordance with relevant ICAO provisions, implementation shall only take place following conduct of a safety assessment that has demonstrated that an acceptable level of safety will be met. This assessment may also need to demonstrate levels of risk associated with specific PBN en-route implementation. Additionally, ongoing periodic safety reviews shall be undertaken where required in order to establish that operations continue to meet the target levels of safety

#### 2. ROLES AND RESPONSIBILITIES

2.1. To demonstrate that the system is safe, it will be necessary that the implementing agency – a State or group of States - ensures that a safety assessment and, where required, ongoing monitoring of the PBN en-route implementation are undertaken.

2.2. In undertaking a safety assessment to enable en-route implementation of PBN, a State or the implementing agency shall:

- a) establish and maintain a ~~database~~-registry of PBN approvals;
- b) monitor aircraft horizontal-plane navigation performance and the occurrence of large navigation errors and report results;
- c) conduct safety and readiness assessments;
- d) monitor operator compliance with State approval requirements after PBN implementation; and
- e) initiate necessary remedial actions if PBN requirements are not met.

## **CHAPTER 5 OPERATIONAL APPROVAL**

### **1. OPERATIONAL APPROVAL REQUIREMENTS**

1.2. Operational approval is usually the responsibility of the regulatory authority of the State of the Operator for commercial air transport operations and the State of Registry for general Aviation (GA) operations. For certain operations, GA operators may not be required to follow the same authorization model as commercial operators.

1.3. The operational approval assessment must take account of the following:

- a) aircraft eligibility and airworthiness compliance;
- b) operating procedures for the navigation systems used;
- c) control of operating procedures (documented in the OM);
- d) flight crew initial training and competency requirements and continuing competency requirements;
- e) dispatch training requirements; and
- f) control of navigation database procedures. Where a navigation database is required, operators need to have documented procedures for the management of such databases. These procedures will define the sourcing of navigation data from approved suppliers, data validation procedures for navigation databases and the installation of updates to databases into aircraft so that the databases remain current with the AIRAC cycle. (For RNP AR applications, the control of the terrain database used by TAWS must also be addressed.)

#### **Aircraft eligibility**

1.4. An aircraft is eligible for a particular PBN application provided there is clear statement in:

- a) the Type Certificate (TC); or
- b) the Supplement Type Certificate (STC); or
- c) the associated documentation — Aircraft Flight manual (AFM) or equivalent document; or
- d) a compliance statement from the manufacturer that has been approved by the State of Design and accepted by the State of Registry or the State of the Operator, if different.

1.5. The operator must have a configuration list detailing the pertinent hardware and software components and equipment used for the PBN operation.

1.6. The TC is the approved standard for the production of a specified type/series of aircraft. The aircraft specification for that type/series, as part of the TC, will generally include a navigation standard. The aircraft documentation for that type/series will define the system use, operational limitations, equipment fitted and the maintenance practices and procedures. No changes (modifications) are permitted to an aircraft unless the CAA of the State of Registry either approves such changes through a modification approval process, STC or accepts technical data defining a design change that has been approved by another State.

1.7. For recently manufactured aircraft, where the PBN capability is approved under the TC, there may be a statement in the AFM limitations section identifying the operations for which the aircraft is approved. There is also usually a statement that the stated approval does not itself constitute an approval for an operator to conduct those operations. Alternate methods of achieving the

airworthiness approval of the aircraft for PBN operations is for the aircraft to be modified in accordance with approved data. (e.g. STC, minor modification, etc.)

1.8. One means of modifying an aircraft is the approved Service Bulletin (SB) issued by the aircraft manufacturer. The SB is a document approved by the State of Design to enable changes to the specified aircraft type and the modification then becomes part of the type design of the aircraft. Its applicability will normally be restricted by the airframe serial number. The SB describes the intention of the change and the work to be done to the aircraft. Any deviations from the SB require a design change approval; any deviations not approved will invalidate the SB approval. The State of Registry accepts the application of an SB and changes to the maintenance programme, while the State of the Operator accepts changes to the maintenance programme and approves changes to the MEL, training programmes and Operations specifications. An Original Equipment Manufacturer (OEM) SB may be obtained for current production or out of production aircraft.

1.9. In respect of PBN, in many cases for legacy aircraft, while the aircraft is capable of meeting all the airworthiness requirements, there may be no clear statement in the applicable TC or STC or associated documents (AFM or equivalent document). In such cases, the aircraft manufacturer may elect to issue an SB with appropriate AFM update or instead may publish a compliance statement in the form of a letter, for simple changes, or a detailed aircraft type specific document for more complex changes. The State of Registry may determine that an AFM change is not required if it accepts the OEM documentation. **Table 5-1** lists the possible scenarios facing an operator who wishes to obtain approval for a PBN application, together with the appropriate courses of action.

**Table 5-1**

| <b>Scenario</b> | <b>Aircraft certification status</b>   | <b>Actions by operator/owner</b>   |
|-----------------|--|--|
| 1               | Aircraft designed and type certificated for PBN application. Documented in AFM, TC or the STC  | No action required, aircraft eligible for PBN application  |
| 2               | Aircraft equipped for PBN application but not certified. No statement in AFM. SB available from the aircraft manufacturer                          | Obtain SB (and associated amendment pages to the AFM) from the aircraft manufacturer   |
| 3               | Aircraft equipped for PBN application. No statement in AFM. SB not available. Statement of compliance available from the aircraft manufacturer     | Establish whether the statement of compliance is acceptable to the regulatory authority of the State of Registry of the aircraft   |
| 4               | Aircraft equipped for PBN application. No statement in AFM. SB not available. Statement of compliance from the aircraft manufacturer not available | Develop detailed submission to State of Registry showing how the existing aircraft equipment meets the PBN application requirements  |
| 5               | Aircraft not equipped for PBN application  | Modify aircraft in accordance with the aircraft manufacturer's SB or develop a major modification in conjunction with an approved design organization in order to obtain an approval from the State of Registry (STC). |

## **Operating procedures**

1.10. The Standard operating procedure (SOP) must be developed to cover both normal and non-normal (contingency) procedures for the systems used in the PBN operation. The SOP must address:

- a) preflight planning requirements including the MEL and, where appropriate, RNP/RAIM prediction;
- b) actions to be taken prior to commencing the PBN operation;
- c) actions to be taken during the PBN operation; and
- d) actions to be taken in the event of a contingency, including the reporting of significant incidents

GA pilots must ensure that they have suitable procedures/checklists covering all these areas

## **Control of operating procedures**

1.11. The SOP must be adequately documented in the OM and checklists

## **Flight crew and dispatch training**

1.12. A flight crew and dispatch training programme for the PBN operation must cover all the tasks associated with the operation and provide sufficient background to ensure a comprehensive understanding of all aspects of the operation. The operator must have adequate records of course completion for flight crew, flight dispatchers and maintenance personnel.

## **Control of navigation database procedures**

1.13. If a navigation database is required, the procedures for maintaining currency, checking for errors and reporting errors to the navigation database supplier must be documented in the maintenance manual by commercial operators

## **2. DOCUMENTATION OF OPERATIONAL APPROVAL**

2.1. Operational approval may be documented as an endorsement of the Air operator certificate (AOC) through:

- a) Operations specification, associated with the AOC; or
- b) amendment to the OM; or
- c) LOA.

2.2. During the validity of the operational approval, the CAA should consider any anomaly reports received from the operator or other interested party. Repeated navigation error occurrences attributed to a specific piece of navigation equipment may result in restrictions on use or cancellation of the approval for use of that equipment. Information that indicates the potential for repeated errors may require modification of an operator's training programme. Information that attributes multiple errors to a particular pilot or crew may necessitate remedial training and checking or a review of the operational approval.

2.3. The State may determine that a GA aircraft may operate on a PBN route/procedure provided that the operator has ensured that the aircraft has suitably approved equipment (is eligible), the navigation database is valid, the pilot is suitably qualified and current with respect to the equipment, and adequate procedures (checklists) are in place.

### **3. STATE REGULATORY MATERIAL**

3.1. Individual States must develop national regulatory material which addresses the PBN applications relevant to their airspace or relevant to operations conducted in another State by the State's operators or by aircraft registered in that State. The regulations may be categorized by operation, flight phase, area of operation and/or navigation specification. Approvals for commercial operations should require specific authorization.

### **4. APPROVAL PROCESS**

#### **General**

4.2. Since each operation may differ significantly in complexity and scope, the project manager and the operational approval team need considerable latitude in taking decisions and making recommendations during the approval process. The ultimate recommendation by the project manager and decision by the DGCA regarding operational approval should be based on the determination of whether or not the applicant:

- a) meets the requirements established by the State in its air navigation regulations;
- b) is adequately equipped; and
- c) is capable of conducting the proposed operation in a safe and efficient manner.

4.3. The complexity of the approval process is based on the inspector's assessment of the applicant's proposed operation. For simple approvals, some steps can be condensed or eliminated. Some applicants may lack a basic understanding of what is required for approval. Other applicants may propose a complex operation, but may be well prepared and knowledgeable. Because of the variety in proposed operations and differences in an applicant's knowledge, the process must be thorough enough and flexible enough to apply to all possibilities.

#### **Phases of the approval process**

##### **Step 1 — Pre-application phase**

4.4. The operator initiates the approval process by reviewing the requirements; establishing that the aircraft, the operating procedures, the maintenance procedures and the training meet the requirements; and developing a written proposal to the regulator. A number of regulators have published "job aids" to assist the operator in gathering the necessary evidence to support the approval application. At this stage a pre-application meeting with the regulator can also be very beneficial. If the proposed application is complex, the operator may need to obtain advice and assistance from OEMs or other design organizations, training establishments, data providers, etc.

##### **Step 2 — Formal application phase**

4.5. The operator submits a formal, written application for approval to the CAA, which appoints a project manager either for the specific approval or generally for PBN approvals.

##### **Step 3 — Document evaluation phase**

4.6. The CAA project manager evaluates the formal, written application for approval to determine whether all the requirements are being met. If the proposed application is complex, the project manager may need to obtain advice and assistance from other organizations such as regional agencies or experts in other States.

#### **Step 4 — Demonstration and inspection phase**

4.7. During a formal inspection by the project manager (assisted as necessary by a CAA team), the operator demonstrates how the requirements are being met.

#### **Step 5 — Approval phase**

4.8. Following a successful formal inspection by the CAA, approval is given through:

- a) Operations specification, associated with the AOC; or
- b) amendment to the OM; or
- c) LOA.

Some PBN applications may not require formal approval for GA operations — this will be determined by the State of Registry.

*Note.— The approval procedure described above consists of a simplified process of the certification guidance contained in Part III of the Manual of Procedures for Operations Inspection, Certification and Continued Surveillance (Doc 8335).*

### **5. FOREIGN OPERATIONS**

5.1. A State undertakes, in accordance with Article 12 to the Convention, to ensure that every aircraft flying over or maneuvering within its territory shall comply with the rules and regulations relating to the flight and maneuver of aircraft there in force. Article 33 to the Convention provides that certificates of airworthiness and certificates of competency and licenses issued, or rendered valid, by the State in which an aircraft is registered, shall be recognized by other States, provided that the requirements under which such certificates or licenses were issued or rendered valid are equal to or above the minimum standards which may be established by ICAO. This requirement for recognition is now extended by Annex 6, Part I and Part III, Section II, such that Contracting States shall recognize as valid an AOC issued by another Contracting State, provided that the requirements under which the certificate was issued are at least equal to the applicable Standards specified in Annex 6, Part I and Part III.

5.2. States should establish procedures to facilitate the application by foreign operators for approval to operate into their territory. States should be careful in their requirements for applications, to request only details relevant to the evaluation of the safety of the operations under consideration and their future surveillance. When evaluating an application by an operator from another State to operate within its territory a State will examine both the safety oversight capabilities and record of the State of the Operator and, if different, the State of Registry, as well as the operational procedures and practices of the operator. This is necessary in order for the State, in the terms of Article 33 to the Convention, to have confidence in the validity of the certificates and licenses associated with the operator, its personnel and aircraft, in the operational capabilities of the operator and in the level of certification and oversight applied to the activities of the operator by the State of the Operator.

5.3. The operator will need to make applications to each State into or over which it is intended to operate. The operator will also need to keep its own CAA, as the authority of the State of the Operator, informed of all applications to operate in other States. Applications should be made direct to the CAAs of the States into which it is intended to operate. In some cases it will be possible to download information and instructions for making an application and the necessary forms from a website maintained by the CAA in question.

5.4. States should promote the implementation and operational approval of Advanced RNP (A-RNP) navigation specifications, which serves all the flight phases as follows:

- En-Route Oceanic, Remote: RNP 2;
- En-Route Continental: RNP 2 or RNP 1;
- Arrival and Departures: RNP 1;
- Initial, intermediate and missed approach phases: RNP 1; and
- Final Approach Phase: RNP 0.3.

5.5. Because functional and performance requirements are defined for each navigation specification, an aircraft approved for an RNP specification is not automatically approved for all RNAV specifications. Similarly, an aircraft approved for an RNP or RNAV specification having a stringent accuracy requirement (e.g. RNP 0.3 specification) is not automatically approved for a navigation specification having a less stringent accuracy requirement (e.g. RNP 4).

**CHAPTER 6**

**PBN CHARTING**

**1. INTRODUCTION**

6.1 Charting of PBN Instrument Approach Procedures in the MID Region should follow the criteria included in Annex 4 and the PANS OPS (DOC 8168).

**2. TRANSITION PLAN FOR RNAV TO RNP INSTRUMENT APPROACH CHART DEPICTION**

6.2 For a harmonized implementation of the Amendment 6 to the PANS OPS related to RNAV to RNP Approach Chart Depiction, the following transition plan should apply in the MID Region:

- MID States, that have not yet done so, should implement RNAV to RNP Chart naming convention for their current PBN Approach Procedures published in their AIPs, starting from 29 March 2019 up to 8 September 2022.
- New PBN Approach Procedures, planned to be published before 29 March 2019, should be published using the new naming convention, if practicable.
- If a PBN Approach Procedure published in the National AIP is amended and re-published before 29 March 2019 (for any reason), the new naming convention should be used, if practicable.

6.3 States are required to provide the ICAO MID Office with their action plan for the implementation of RNAV to RNP Chart naming convention, and keep the MID Office apprised of the status of implementation.

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APPENDIX 4C

PBN IMPLEMENTATION FOCAL POINT

| STATE          | NAME                        | TITLE   | ADDRESS   | EMAIL   | FAX                        | TEL             | MOBILE           |
|----------------|-----------------------------|---|---|---|----------------------------|-----------------|------------------|
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