



**INTERNATIONAL CIVIL AVIATION ORGANIZATION**

**REPORT OF THE FIFTH MEETING OF THE  
PERFORMANCE BASED NAVIGATION/GLOBAL  
NAVIGATION SATELLITE SYSTEM TASK FORCE**

**(PBN/GNSS TF/5)**

*(Cairo, Egypt, 15 – 17 April 2013)*

The views expressed in this Report should be taken as those of the PBN/GNSS Task Force 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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History of the Meeting

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

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

1.1 The Fifth Meeting of the Performance Based Navigation/Global Navigation Satellite System Task Force (PBN/GNSS TF/5) was held at the ICAO MID Regional Office in Cairo, Egypt, 15 – 17 April 2013.

### **2. OPENING**

2.1 Mr. Jehad Faqir, ICAO MID Regional Office, Deputy Regional Director, on behalf of Mr. Mohamed R. M. Khonji, the Regional Director, welcomed the participants to Cairo and wished them a successful and fruitful meeting. He highlighted the traffic growth in the MID Region that is expected to increase at a rate of 8.2 per cent per annum through to the year 2025, while the total aircraft movements to/from and within the Middle East Region. The total aircraft movements to/from and within the Middle East Region are estimated to increase from some 625000 in 2007 to around 2346000 in 2025. This continuing growth of Traffic in the MID Region places increased demand on airspace capacity and emphasizes the need for the optimum utilization of the available airspace and the airports.

2.2 Mr. Faqir indicated that the application of PBN techniques is expected to reduce flight delays, maximize airspace utilization and enhance cost effectiveness due to reduction in flight time and would result in improved safety and efficiency of flight operations not to forget the benefits to the environment. Furthermore, he mentioned that this meeting comes after the PBN Symposium and the Twelfth Air Navigation Conference (AN-Conf/12) which gained consensus on the Aviation System Block Upgrade and the Revised Global Air Navigation Plan, accordingly the meeting has to consider all these development during the discussion. Finally he wished the meeting successful deliberation.

### **3. ATTENDANCE**

3.1 The meeting was attended by a total of thirty five (35) participants from eight (8) States (Bahrain, Egypt, Jordan, Kuwait, Qatar, Saudi Arabia, Sudan, and United Arab Emirates) and one (1) International Organization (IATA). The list of participants is at **Attachment A** to the Report.

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

4.1 The Chairperson of the meeting was Mr. Ahmed Al Eshaq, Director of ANS, Civil Aviation Authority, Qatar. Mr. Raza Gulam, Regional Officer CNS, and Mr. Elie El Khoury, Regional Officer ATM/SAR acted as Secretaries of the meeting.

### **5. LANGUAGE**

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

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History of the Meeting

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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 MIDANPIRG/13 Conclusions/Decisions relevant to PBN and GNSS |
| Agenda Item 3: | Developments in PBN and GNSS   |
| Agenda Item 4: | MID Regional PBN Implementation Plan and Guidance Materials              |
| Agenda Item 5: | State PBN Implementation and MID PBN Support Team Plans                  |
| Agenda Item 6: | Future Work Programme  |
| Agenda Item 7: | 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 CONCLUSIONS AND DECISIONS**

- |                              |  |
|------------------------------|--|
| <i>DRAFT CONCLUSION 5/1:</i> | <i>STRATEGY FOR IMPLEMENTATION OF GNSS IN THE MID REGION</i> |
| <i>DRAFT CONCLUSION 5/2:</i> | <i>MID REGIONAL PBN IMPLEMENTATION STRATEGY AND PLAN</i>     |
| <i>DRAFT DECISION 5/3:</i>   | <i>TERMS OF REFERENCE OF THE PBN/GNSS TASK FORCE</i>         |

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PBN/GNSS TF/5  
Report on Agenda Item 1

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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 Paragraph 6 of the History of the Meeting.

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Report on Agenda Item 2

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**REPORT ON AGENDA ITEM 2: FOLLOW-UP ON MIDANPIRG/13 CONCLUSIONS/DECISIONS  
RELEVANT TO PBN AND GNSS**

2.1 The meeting recalled that in order to enhance efficiency and keep track on the follow-up of Conclusions and Decision, each MIDANPIRG subsidiary body should review the MIDANPIRG Conclusions/Decisions related to its Terms of Reference (TOR) and decide whether to maintain, remove or replace these Conclusions/Decisions with more up-to-date ones (with new numbers i.e. Conclusion 5/XX).

2.2 The meeting noted that MIDANPIRG decided that those Conclusions/Decisions which are of general nature and whose status of implementation would be “Ongoing” for many years are more suitable for inclusion in Handbooks, Manuals, Guidelines, etc, as appropriate.

2.3 The meeting was provided with an update on the status of MIDANPIRG/13 Conclusions and Decisions related to the PBN/GNSS TF and the follow-up actions taken by concerned parties

2.4 Based on the above, the meeting noted the status of relevant MIDANPIRG/13 Conclusions and Decisions related to the PBN and GNSS and the follow up actions taken by concerned parties and updated the follow-up as at **Appendix 2A** to the Report on Agenda Item 2.

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PBN/GNSS TF/5  
Appendix 2A to the Report on Agenda Item 2

**MIDANPIRG/13 Conclusions and Decisions pertaining to PBN GNSS Task Force for consideration by the PBN/GNSS TF/5 meeting**

| CONCLUSIONS AND DECISIONS  | FOLLOW-UP                | TO BE INITIATED BY | DELIVERABLE                          | TARGET DATE                      | REMARKS   |
|--|--------------------------|--------------------|--------------------------------------|----------------------------------|---|
| <p><b>CONCLUSION 13/3: IMPROVEMENT OF THE ATS ROUTE STRUCTURE IN THE MID REGION</b></p> <p>That, as a first step towards the rationalization of the ATS route network in the MID Region:</p> <p>a) States be urged to;</p> <p>i) identify those ATS Routes that are not economically structured within their airspaces;</p> <p>ii) coordinate and agree with appropriate authorities on the priority of action to replace the identified routes with more economical routes based on the definition of City Pairs, the PBN and FUA concepts;</p> <p>b) Users to;</p> <p>i) identify those ATS Routes that are not economically structured in the MID Region;</p> <p>ii) provide priority of action; and</p> <p>c) States and Users; provide feedback to the ARN TF/6 meeting</p> | Implement the Conclusion | ICAO States        | State Letter                         | Sep. 2012                        | AN 6/5.8 - 12/164 dated 12 June 2012                              |
| <p><b>CONCLUSION 13/4: MIDRAR PROJECT</b></p> <p>That States, be invited to support the MIDRAR Project and assign Focal Points to provide necessary information to the MIDRAR Team</p>   | Implement the Conclusion | ICAO States        | State Letter                         | 30 Aug. 2012                     | AN 6/5.8.3 – 12/167 dated 12 June 2012                            |
| <p><b>CONCLUSION 13/30: NATIONAL PERFORMANCE FRAMEWORK</b></p> <p>That, States be urged to:</p> <p>a) develop, update and/or complete their National Performance Framework, including the National Performance Framework Forms (PFFs), ensuring the alignment with and support to the regional performance objectives;</p>   | Implement the Conclusion | ICAO States        | State Letter<br>Feedback and reports | 30 Jun. 2012<br>On regular basis | Ongoing<br>AN 7/26.1 – 12/233 dated 6 Aug. 2012<br>(To be closed) |

| CONCLUSIONS AND DECISIONS  | FOLLOW-UP                    | TO BE INITIATED BY | DELIVERABLE                   | TARGET DATE  | REMARKS   |
|--|------------------------------|--------------------|-------------------------------|--------------|-----------|
| b) incorporate the agreed MID Region Performance Metrics into their National performance monitoring process; and<br>c) report relevant data necessary for performance monitoring of the air navigation systems to the ICAO MID Regional Office, on a regular basis, with a view to update the Regional PFFs and monitor the MID Region Performance Metrics.  |                              |                    |                               |              |           |
| <b>CONCLUSION 13/31: ENDORSEMENT OF THE AIM PARTS OF THE MID BASIC ANP AND FASID</b><br><br>That, the AIM Parts of the MID Basic ANP and FASID, including the AIM FASID Tables at <b>Appendices 4.5F, 4.5G and 4.5H</b> to the Report on Agenda Item 4.5:<br>a) are endorsed;<br>b) be used as a planning document for the transition from AIS to AIM in the MID Region; and<br>c) be formally included in the MID ANP through a proposal for amendment, when the new structure of the MID ANP is finalized and the AIM FASID Tables are populated with relevant data. | Implement the Conclusion     | MIDANPIRG/13       | Basic ANP and FASID AIM Parts | Apr. 2012    | Completed |
| <b>DECISION 13/32: ESTABLISHMENT OF THE MID AIR NAVIGATION PLAN AD-HOC WORKING GROUP (ANP WG)</b><br><br>That, the MID Air Navigation Plan Ad-hoc Working Group (ANP WG) be established to fulfil the requirements set up by MIDANPIRG through Decision 12/49.   | Convene the ANP WG/1 meeting | MIDANPIRG/13       | ANP WG established            | Apr. 2012    | Completed |
| <b>CONCLUSION 13/33: STATE ACTION PLANS FOR CO<sub>2</sub> EMISSION</b><br><br>That, States, that have not yet done so, be urged to:<br>a) send the contact details of their CO <sub>2</sub> emission focal point to the ICAO MID Regional Office; and<br>b) submit their action plan for CO <sub>2</sub> emission to ICAO before 30 June  | Implement the Conclusion     | States             | Action Plan                   | 30 Jun. 2012 | Ongoing   |

| CONCLUSIONS AND DECISIONS   | FOLLOW-UP                     | TO BE INITIATED BY   | DELIVERABLE   | TARGET DATE           | REMARKS   |
|---|-------------------------------|--|---|-----------------------|---|
| 2012.   |                               |  |   |                       |   |
| <p><b>DECISION 13/34: ESTABLISHMENT OF THE AIR TRAFFIC MANAGEMENT MEASUREMENT TASK FORCE (ATMM TF)</b></p> <p>That, the ATMM TF be established with Terms of Reference (TOR) as at <b>Appendix 4.5J</b> to the Report on Agenda Item 4.5.</p>   | Convene the ATMM TF/1 meeting | MIDANPIRG/13   | ATMM TF established   | Apr. 2012             | Ongoing<br><br>First meeting (8-9 September 2013)   |
| <p><b>CONCLUSION 13/35: ESTIMATING ENVIRONMENT BENEFITS</b></p> <p>That, in order to allow the Air Traffic Management Measurement Task Force (ATMM TF) and the CNS/ATM/IC SG to follow-up the implementation of the ATM operational improvements and estimate the fuel savings accrued from the corresponding improvements on regional basis</p> <p>a) States be urged to:</p> <p>i) use IFSET or a more advanced model/measurement capability available to estimate environment benefits accrued from operational improvements;</p> <p>ii) send the IFSET reports/the accrued environmental benefits to ICAO MID Regional office on a bi-annual basis.</p> <p>b) IATA to:</p> <p>i) encourage users to support the programme; and</p> <p>ii) consolidate users' inputs and report the accrued environmental benefits to ICAO MID Regional office on a bi-annual basis.</p> | Implement the Conclusion      | ICAO<br><br>States/Users<br><br>ATMM TF and<br>CNS/ATM/IC SG | State Letter<br><br>Feedback (IFSET reports)<br>Reports of meetings | Dec. 2012<br><br>2013 | Ongoing<br><br>AN 6/15 – 13/028 dated 20 Jan 2013<br><br>First meeting (8-9 September 2013) |
| <p><b>CONCLUSION 13/44: PROTECTION OF GNSS SIGNAL</b></p> <p>That, States that are listed in the footnotes 5.362B and 5.362C be urged to take necessary measures to remove their names from these footnotes as soon as possible.</p>  | Implement the Conclusion      | ICAO<br>States   | State Letter  | Jun.2012              | Completed<br><br>AN 6/28-12/217 dated 18 Jul. 2012  |

| CONCLUSIONS AND DECISIONS  | FOLLOW-UP                | TO BE INITIATED BY            | DELIVERABLE                          | TARGET DATE | REMARKS  |
|--|--------------------------|-------------------------------|--------------------------------------|-------------|--|
| <p><b>CONCLUSION 13/45: STRATEGY FOR THE IMPLEMENTATION OF GNSS IN THE MID REGION</b></p> <p>That, the Strategy for implementation of GNSS in the MID Region be updated as at <b>Appendix 4.5R</b> to the Report on Agenda Item 4.</p>   | Implement the Strategy   | MIDANPIRG/13                  | Strategy                             | Apr. 2012   | Completed  |
| <p><b>CONCLUSION 13/46: GNSS SURVEY</b></p> <p>That, States complete the GNSS questionnaire as at <b>Appendix 4.5S</b> to the Report on Agenda Item 4.5 and send it to the ICAO MID Regional Office before 1 September 2012.</p>   | Implement the Conclusion | ICAO<br>States                | State Letter<br><br>Completed Survey | Sep.2012    | Completed  |
| <p><b>CONCLUSION 13/47: MID REGIONAL PBN IMPLEMENTATION STRATEGY AND PLAN</b></p> <p>That, the MID Regional PBN Implementation Strategy and Plan be updated as at <b>Appendix4.5T</b> to the Report on Agenda Item 4.5.</p>  | Implement the Strategy   | MIDANPIRG/13                  | Strategy                             | Apr. 2012   | Completed  |
| <p><b>DECISION 13/48: ESTABLISHMENT OF MID PBN SUPPORT TEAM (MPST)</b></p> <p>That, MPST be established with TOR as at <b>Appendix 4.5U</b> to the Report on Agenda Item 4.5.</p>  | Implement Decision       | MIDANPIRG/13                  | MPST established                     | Apr. 2012   | Completed  |
| <p><b>CONCLUSION 13/49: MID PBN SUPPORT TEAM (MPST)</b></p> <p>That,</p> <ul style="list-style-type: none"> <li>a) ICAO MID Regional Office provide the leadership for MPST;</li> <li>b) UAE be the champion for the MPST;</li> <li>c) IATA fully commit and support the MPST; and</li> <li>d) States assign members to MPST and allocate necessary resources</li> </ul> | Implement the Conclusion | ICAO<br>States<br>UAE<br>IATA | State Letter<br>MPST Visit           | Sep. 2012   | On going<br><br>Coordination on-going with IATA, Egypt, Jordan and UAE |

| CONCLUSIONS AND DECISIONS  | FOLLOW-UP                | TO BE INITIATED BY | DELIVERABLE                               | TARGET DATE                  | REMARKS  |
|--|--------------------------|--------------------|---|------------------------------|--|
| <p><b>CONCLUSION 13/50: PBN IMPLEMENTATION PROGRESS REPORT</b></p> <p>That, for future reporting on the status of PBN implementation, States be urged to:</p> <p>a) use the excel sheet as at <b>Appendix 4.5X</b> to the Report on Agenda Item 4.5, and PBN Implementation Progress Report Template as at <b>Appendix 4.5Y</b> to the Report on Agenda Item 4.5; and</p> <p>b) submit progress reports to ICAO MID Regional Office every six months and whenever major progress is achieved.</p>  | Implement the Conclusion | States             | Progress Report                           | Every 6 months               | On going<br>AN 6/28-12/211 dated 11 Jul. 20112 |
| <p><b>CONCLUSION13/61: CENTRALIZED AIR NAVIGATION DEFICIENCY DATABASE</b></p> <p>That, States and international organizations be invited to:</p> <p>a) test the centralized air navigation deficiency database on iSTARS platform using the guidance in <b>Appendix 5.1A</b> to the Report on Agenda Item 5.1;</p> <p>b) update the data as necessary in coordination with the ICAO MID Regional Office; and</p> <p>c) provide feedback to the ICAO MID Regional Office by <b>31 August 2012</b></p>   | Implement the Conclusion | ICAO<br>States     | State Letter<br>Feedback                  | 30 Jun. 2012<br>31 Aug. 2013 | Ongoing<br>AN 2/2 – 12/189 dated 21 Jun.2012   |
| <p><b>CONCLUSION 13/63: ELIMINATION OF AIR NAVIGATION DEFICIENCIES IN THE MID REGION</b></p> <p>That, States be urged to:</p> <p>a) review their respective lists of identified deficiencies, develop associated Corrective Action Plans and forward them to the ICAO MID Regional Office prior to 15 June 2012; and</p> <p>b) use the ICAO MID Air Navigation Deficiency Database (MANDD) for submitting online requests for addition, update, and elimination of air navigation deficiencies, until the official launch of the Centralized Air Navigation Deficiency Database on iSTARS.</p> | Implement the Conclusion | ICAO<br>States     | State Letter<br>CAP and necessary updates | 15 Jun. 2012                 | Ongoing<br>AN 2/2 – 12/189 dated 21 June 2012  |

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**REPORT ON AGENDA ITEM 3: DEVELOPMENT IN PBN AND GNSS**

3.1 The meeting recalled that the Twelfth Air Navigation Conference (AN-Conf/12) held in Montreal, Canada, from 19 to 30 November 2012, adopted 56 Recommendations, from which 15 considered relevant to the work of the PBN/GNSS TF.

3.2 The meeting recalled that the AN-Conf/12 acknowledged the notable work that had already been completed by ICAO and its partners to support the global implementation of Performance-Based Navigation (PBN), also recognized that there is a shortfall in meeting Assembly Resolution A37/11 regarding production of State PBN Implementation Plans and instrument approach procedures with vertical guidance. Consequently, the AN-Conf/12 recognized that States still require assistance with PBN implementation especially in the areas of operational approvals and training of personnel. However, it was highlighted that the resources to support PBN were extremely limited and must be managed effectively. The AN-Conf/12 agreed that ICAO should continue to provide support, with assistance from States, International Organizations and Industry, in order to facilitate the timely implementation of PBN.

3.3 The meeting noted that AN-Conf/12 acknowledged the need for additional ICAO provisions to support specific PBN applications for specific situations including PBN Standard Terminal Arrival Routes (STARS) for simultaneous parallel runway operations. It was also agreed on the development of separation standards to support all PBN specifications and which will also allow for operations where mixed navigation performance requirements are in effect.

3.4 The AN-Conf/12 recognized that airport authorities are a key stakeholder and need to be involved early in the PBN planning process in order to address/mitigate potential impacts such as community noise exposure and airport infrastructure requirements. The AN-Conf/12 supported sharing of Required Navigation Performance Authorization Required (RNP AR) Implementation and Flight Operational Safety Assessment (FOSA) documentation as a means to inform States with examples of the safe implementation of RNP AR procedures.

3.5 The meeting recognized that frequency interference-free operation of Global Navigation Satellite System (GNSS) is essential, and that the frequency band 1 559 - 1 610 MHz, is used for elements of GNSS.

3.6 The meeting recalled that the MIDANPIRG/13 Meeting noted that the International Telecommunication Union (ITU) process, allows under footnotes No. 5.362B and 5.362C the operation of fixed service in some States on a secondary basis until 1 January 2015. The continued use by the fixed service constitutes a severe constraint on the safe and effective use of GNSS in some areas of the world, as distances of up to 400 km between the stations of the fixed service and the aircraft is required to ensure safe operation of GNSS. Ten States have removed their names from footnotes 5.362B and 5.362C during WRC-12. This was a significant step forward towards achieving better worldwide protection of GNSS.

3.7 MIDANPIRG/13 urged the following MID States (*Iraq, Jordan, Qatar, Sudan, Syria and Yemen*) to delete their names from the footnotes 5.362B and/or 5.362C and agreed to the Conclusion 13/44: *Protection of GNSS Signal*.

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3.8 The meeting noted that as a follow-up to above, ICAO MID Regional Office issued State Letter AN 6/28-12/216 dated 18 July 2012, and the following States replied (Jordan, Kuwait, Oman, and Qatar).

3.9 The meeting reiterated the importance of protection of the GNSS Signal and urged Iraq, Jordan, Qatar, Sudan Syria and Yemen to have their names removed from footnotes 5.362B and/or 5.362C in coordination with the State spectrum regulatory authorities, according to the ITU procedures.

3.10 The meeting recalled that the 12th Air Navigation Conference noted the information on the implementation status of Global Navigation Satellite System (GNSS) constellations and augmentations systems, and considered a number of related implementation issues. Mainly the modernization of Global Positioning System (GPS), and Global Navigation Satellite System (GLONASS). Furthermore, the AN-Conf/12 noted the updates Galileo GNSS constellation, the BeiDou system, a GNSS constellation developed and operated by China, implementation status of several Satellite-Based Augmentation Systems (EGNOS, GAGAN) and discussed the introduction of multi-constellation, multi-frequency GNSS will entail number of new technical and regulatory challenges beyond those already associated with current GNSS implementation.

3.11 The meeting was apprised of the following Recommendations related to mitigating GNSS vulnerabilities adopted by AN-Conf/12:

*Recommendation 6/7 – Assistance to States in Mitigating Global Navigation Satellite System Vulnerabilities*

*That, ICAO:*

- a) continue technical evaluation of known threats to the Global Navigation Satellite System, including space weather issues, and make the information available to States;*
- b) compile and publish more detailed guidance for States to use in the assessment of Global Navigation Satellite System vulnerabilities;*
- c) develop a formal mechanism with the International Telecommunication Union and other appropriate UN bodies to address specific cases of harmful interference to the Global Navigation Satellite System reported by States to ICAO; and*
- d) assess the need for, and feasibility of, an alternative position, navigation and timing system.*

*Recommendation 6/8 – Planning for Mitigation of Global Navigation Satellite System Vulnerabilities*

*That, States:*

- a) assess the likelihood and effects of Global Navigation Satellite System vulnerabilities in their airspace and apply, as necessary, recognized and available mitigation methods;*

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- b) provide effective spectrum management and protection of Global Navigation Satellite System (GNSS) frequencies to reduce the likelihood of unintentional interference or degradation of GNSS performance;*
- c) report to ICAO cases of harmful interference to Global Navigation Satellite System that may have an impact on International Civil Aviation operations;*
- d) develop and enforce a strong regulatory framework governing the use of Global Navigation Satellite System repeaters, pseudolites, spoofers and jammers;*
- e) allow for realization of the full advantages of on-board mitigation techniques, particularly inertial navigation systems; and*
- f) where it is determined that terrestrial aids are needed as part of a mitigation strategy, give priority to retention of Distance Measuring Equipment (DME) in support of Inertial Navigation System (INS)/DME or DME/DME Area Navigation, and of Instrument Landing System at selected runways.*

*Recommendation 6/9 – Ionosphere and Space Weather Information for Future Global Navigation Satellite System Implementation*

*That, ICAO:*

- a) coordinate regional and global activities on ionosphere characterization for Global Navigation Satellite System implementation;*
- b) continue its effort to address the Global Navigation Satellite System (GNSS) vulnerability to space weather to assist States in GNSS implementation taking into account of long-term GNSS evolution as well as projected space weather phenomena;*
- c) study the optimum use of space weather information that is globally applicable from low to high magnetic latitude regions for enhanced Global Navigation Satellite System performance at a global context; and*

*That, States:*

- d) consider a collaborative approach to resolve ionospheric issues including ionospheric characterization for cost-effective, harmonized and regionally suitable Global Navigation Satellite System implementation.*

3.12 Furthermore, the meeting noted that AN-Conf/12 discussed the opportunities for the rationalization of terrestrial navigation aids arising with the implementation of Performance-Based Navigation enabled by GNSS capability in the aircraft. It considered an approach that aimed at maximizing the greatest economic benefits of rationalization, namely those that come from avoiding the replacement of navigation aids at the end of their lifecycle. The approach was based on an analysis aimed at identifying rationalization opportunities, evaluating the necessary route changes and determining whether a limited PBN implementation on the affected routes would be more cost effective than the replacement of the aids.

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3.13 The meeting noted that one constraint on the rationalization process is that a minimum network of terrestrial aids should be maintained to cope with temporary loss of GNSS service. In general, the fundamental requirement to be met by such a network is to fully maintain safety following the loss of GNSS service, and maintain an acceptable level of efficiency and continuity to the extent possible, and agreed to following Recommendation

*Recommendation 6/10 – Rationalization of Terrestrial Navigation Aids*

*That, in planning for the implementation of Performance-Based Navigation, States should:*

- a) assess the opportunity for realizing economic benefits by reducing the number of navigation aids through the implementation of Performance-Based Navigation;*
- b) ensure that an adequate terrestrial navigation and air traffic management infrastructure remains available to mitigate the potential loss of Global Navigation Satellite System service in their airspace; and*
- c) align Performance-Based Navigation Implementation Plans with navigation aid replacement cycles, where feasible, to maximize cost savings by avoiding unnecessary infrastructure investment.*

3.14 The meeting agreed that thorough study by States and the MIDANPIRG subsidiary bodies is required in order to plan for the proper Rationalization of Terrestrial Navigation Aids.

3.15 The meeting noted that MIDANPIRG/13 reviewed and updated the Strategy for the implementation of GNSS in the MID Region to be in line with ICAO General Assembly Resolution A37-11, and agreed Conclusion 13/45: *STRATEGY FOR THE IMPLEMENTATION OF GNSS IN THE MID REGION*. Adopting the Strategy and Conclusion 13/46: *GNSS SURVEY* requesting States to reply to a survey.

3.16 The meeting noted that the following States (Jordan, Kuwait, Oman, and Qatar) replied to the survey which was analyzed by the meeting, showed that many States are planning for GBAS installation.

3.17 The meeting also noted that the following States (Egypt, Iran, Jordan, and Syria) did not decommission NDB which is still in operation at international airports. The meeting encouraged these States to properly plan the decommissioning of NDBs.

3.18 Based on all above, the meeting updated the Strategy for implementation of GNSS to be in line with the An-Conf/12 Recommendation and the development in the MID States and agreed to the following Draft Conclusion:

***Draft Conclusion 5/1: Strategy for Implementation of GNSS in the MID Region***

*That, the Strategy for implementation of GNSS in the MID Region be updated as at **Appendix 3A** to the Report on Agenda Item 3.*

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3.19 The meeting noted that the revised Fourth Edition of the *Global Air Navigation Plan* (Doc 9750, GANP) version provides a global planning framework which, among other things, provides a timeline for which future improvements can be implemented by States in accordance with their needs. In addition, it identifies the need for the development of standards and recommended practices, regulatory requirements, procedures and technology associated with the Aviation System Block Upgrades (ASBU). The ASBUs are supplemented by Communications, Navigation, Surveillance (CNS), avionics and information management roadmaps. High-level impediments to implementation such as cyber security were identified and considered during the discussions. Arrangements to ensure the periodic update of the ASBUs and roadmaps on a rolling fifteen-year planning horizon were discussed.

3.20 The meeting noted that the GANP has a global perspective, it is not intended that all ASBU modules are to be applied around the globe. When the ASBU blocks and modules are adopted by Regions, Sub-regions or States they should be followed in close accordance with the specific ASBU requirements to ensure global interoperability and harmonization of Air Traffic Management. It is expected that some ASBU modules will be essential at the global level and therefore may eventually be the subject of ICAO mandated implementation dates.

3.21 The implementation of air navigation measures, including those identified in the ASBUs can require significant investment of finite resources. When considering the adoption of different blocks and modules, ICAO Regions, Sub-regions and States should undertake cost benefit analyses to determine the business case for implementation in their particular region or State.

3.22 ICAO should complete the development of guidance material on cost-benefit analysis for the purposes of advising the States and implementing the GANP. ICAO should review the GANP every three years and if necessary, all relevant Air Navigation Planning documents through the established and transparent process. The Appendices to the GANP should be analysed annually by the Air Navigation Commission to ensure they remain accurate and up-to-date.

3.23 The meeting noted that the progress and effectiveness of ICAO Regions and States against the priorities set should be annually reported, using a consistent reporting format, to ICAO. This will assist Regions and States adjust their priorities to reflect actual performance and address any emerging air navigation issues.

3.24 The meeting recalled that, the MIDANPIRG/13 Meeting, endorsed an initial set of operational improvements of the Aviation System Block Upgrades (ASBU) modules relevant to the MID Region, and agreed that MIDANPIRG subsidiary bodies further review these improvements based on the outcome of the ICAO Twelfth Air Navigation Conference (AN-Conf/12).

3.25 Based on the above, the meeting noted that ICAO MID Regional Office circulated a Survey on Aviation System Block Upgrades ASBU Block Zero Modules, attached to the State Letter Ref AN 7/26.1-13/056 dated 18 February 2013, in order to prioritize the appropriate ASBU modules relevant to the MID Region, and the following States: Bahrain, Egypt, Jordan, Oman, Qatar and UAE replied to the Survey as at **Appendix 3B** to the Report on Agenda Item 3.

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3.26 The meeting was apprised on PBN Symposium in Montréal from 15 to 19 October 2012. The four-day Symposium and Workshops brought together over 400 participants from 67 countries and 13 International Organizations. Representation included aircraft manufacturers, Air Navigation Service Providers (ANSPs), airlines, regulators, ATC system manufacturers, avionics designers, air traffic controllers, pilots, the military, aeronautical information companies and instrument procedure designers.

3.27 The meeting was also apprised on other ICAO Regions activities related to PBN in order to harmonize the implementation between regions and share experiences, where it was noted that all regions are conducting Regional Seminars and Workshop related to PBN and GNSS.

3.28 The meeting noted that PBN, Continuous Descent Operations (CDO) and Continuous Climb Operations (CCO) are ICAO and Global Air Navigation immediate priorities.

3.29 The meeting noted that EUR PBN Task Force highlighted the lack of procedure designers is one of the challenges to PBN, where a cooperative efforts was suggested to overcome this challenge, and consideration are given for the establishment of Regional Procedure Design Office like the one in ICAO APAC Region. In this regard, the meeting recalled that MID Regional Procedure Office was suggested during PBN/GNSS TF/1 and it was not supported by the Region.

3.30 The meeting recalled that Para 2.5.1 of Doc 9997 stated the following: "Individual States must publish 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 on their Registry. The regulations may be categorized by operation, flight phase, area of operation and/or navigation specification. Approvals for commercial operations should require specific authorization.

3.31 The meeting reviewed the Advisory Circulars covering operational approval for PBN applications revised by EUR Region that were originally developed by the ICAO South American Office (SAM). The meeting was of the view that States may use these Advisory Circular after adapting it to their requirements.

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PBN/GNSS TF/5  
Appendix 3A to the Report on Agenda Item 3

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**REVISED STRATEGY FOR THE IMPLEMENTATION OF GNSS  
IN THE MID REGION**

The following is the Strategy for the implementation of GNSS aligned with PBN in the MID Region:

Considering that:

- a) Safety is the highest priority.
- b) Elements of Global Air Navigation Plan on GNSS and requirements for the GNSS implementation will be incorporated into the CNS part of FASID.
- c) GNSS Standards and Recommended Practices (SARPs), PANS and guidance material for GNSS implementation are available.
- d) Human, environmental and economic factors will affect the implementation.
- e) The availability of avionics, their capabilities and the level of user equipage.
- f) The development of GNSS systems including satellite constellations, augmentation systems and improvement in system performance.
- g) The airworthiness and operational approvals allowing the current GNSS applied for en-route and non-precision approach phases of flight without the need for augmentation services external to the aircraft.
- h) The effects of ionosphere on GNSS and availability of mitigation techniques;
- i) The PBN concept and the availability of PBN guidance material
- j) The monitoring of the GNSS signal according to Annex 10, ICAO Document 9849 (GNSS Manual) and other related ICAO documents
- k) States pay fair cost for GNSS to service providers (according to ICAO provisional policy guidance on GNSS cost allocation)

The general strategy for the implementation of GNSS in the MID Region is detailed below:

- 1) Introduction of GNSS Navigation Capability should be consistent with the Global Air Navigation Plan;
- 2) implementation of GNSS and Augmentations should be in full compliance with ICAO Standards and Recommended Practices and PANS;
- 3) assessment of the extent to which the GNSS system accessible in the Region can meet the navigational requirements of ATM service providers and aircraft operators in the Region;
- 4) implementation of RNAV and RNP operations (where required) for en-route and terminal areas-according to established timelines and intermediate milestones:
  - implementation of approach procedures with vertical guidance (APV) (Baro VNAV and/or augmented GNSS), including LNAV-only minima, for all instrument runway ends, either as the primary approach or as a back-up for precision approaches by 2016 with intermediate milestones as follows: 30 per cent by 2010, 70 per cent by 2014; and
  - implementation of straight-in LNAV-only procedures, as an exception to 2) 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.

- 5) States, in their planning and introduction of GNSS services, take full advantage of future benefits accrued from using independent core satellite constellations, other GNSS elements and their combinations, and avoid limitations on the use of specific system elements;
- 6) facilitate the use of GNSS; as enabler for PBN for en-route, terminal, approach and departure navigation. States should coordinate to ensure that harmonized separation standards and procedures are developed and introduced concurrently in adjacent flight information regions along major traffic flows to allow for a seamless transition to GNSS based navigation;
- 7) States should to the extent possible work co-operatively on a multinational basis under ICAO MID Office guidance to implement GNSS in order to facilitate seamless and inter-operable systems and undertake coordinated R&D programmes on GNSS implementation and operation;
- 8) States consider segregating traffic according to navigation capability and granting preferred routes to aircraft that are appropriately equipped for PBN to realize the benefits of such equipage taking due consideration of the need of State aircraft;
- 9) ICAO and States should undertake education and training programs to provide necessary knowledge in AIM, PBN, GNSS, Augmentation systems and operational application;
- 11) States, in their planning for implementation of GNSS services, provide effective spectrum management and protection of GNSS frequencies to reduce the possibility of unintentional interference;
- 12) 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 given reasonable transition time to allow them to equip accordingly;
- 13) States should approach removal of existing ground infrastructure with caution to ensure that safety is not compromised, such as by performance of safety assessment, consultation with users through regional air navigation planning and plan for complete decommissioning of NDBs by 2012;
- 14) implement GNSS with augmentation as required for APV where operationally required in accordance with the MID Regional and National PBN Implementation plans;
- 15) States continue their efforts to implement GNSS applications for en-route, APV and TMA operations. Attention should be accorded to meeting all GNSS implementation requirements, including establishment of GNSS legislation, regulatory framework, and approval procedure;
- 16) introduce rationalizing terrestrial navigation aids, retaining a minimum network of terrestrial aids necessary to maintain safety of aircraft operations; and
- 17) when planning to implement GNSS-based operations, States are encouraged to refer to the GANP and relevant ASBUs, to comply with ICAO provisions and to take advantage of the expertise and information available at the ICAO planning and implementation regional groups (PIRGs).

**Notes:**

GNSS (and ABAS using RAIM in particular) is available on a worldwide basis, not much needs to be done in terms of infrastructure assessment. Nonetheless, the responsibility for providing services based on GNSS within the airspace of a particular State remains within that State.

A decision on whether or not to develop a status monitoring and NOTAM system for ABAS operations should be made by taking into account the nature of PBN approvals. In many cases ABAS operations are predicated on having a full complement of traditional NAVAIDS available for back-up when ABAS cannot support service.

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PBN/GNSS TF/5  
Appendix 3B to the Report on Agenda Item 3

**State: EGYPT**

**Survey on Aviation System Block Upgrades-ASBU Block Zero Modules**

| International aerodromes/ICAO designator   | HEAR    | HEAT    | HEAX    | HEBA    | HEAZ    | HECA    | HEGN    | HELX    | HEMA    |
|--|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 1. Certified (YES or NO)   | NO      | YES     |
| 2. A-CDM(YES or NO)  | NO/2018 |
| 3. A-SMSGCS(YES or NO)   | NO      | NO      | NO      | NO      | NO      | YES     | NO      | NO      | NO      |
| 4. Number of Runways ends used for landing   | 2       | 2       | 4       | 2       | 4       | 6       | 2       | 2       | 2       |
| 5. Number of Instrument runways ENDS provided with GNSS Approach Procedures (LNAV) | -----   | 2       | 2       | 1       | 1       | 6       | 2       | 2       | -----   |
| 6. Number of Instrument runways ENDS provided with APV Approach Procedures (VNAV)  | -----   | -----   | -----   | -----   | -----   | -----   | -----   | -----   | -----   |
| 7. Number of Instrument runways ENDS provided with Instrument Landing System(ILS)  | 2       | 2       | 4       | 1       | 2       | 6       | 2       | 2       | 2       |
| 8. CDO (YES or NO)   | NO/2018 |
| 9. RNAV STARs (YES or NO)  | NO      | Y/GNSS  | Y/GNSS  | NO      | NO      | Y/GNSS  | Y/GNSS  | Y/GNSS  | NO      |
| 10. Conventional STARs (YES or NO)   | YES     |
| 11. CCO (YES or NO)  | NO/2018 |
| 12. RNAV SIDs (YES or NO)  | NO      | Y/GNSS  | Y/GNSS  | Y/GNSS  | NO      | Y/GNSS  | Y/GNSS  | Y/GNSS  | NO      |
| 13. Conventional SIDs (YES or NO)  | YES     |
| 14. Total flights per month (ARR+DEP)  | 169     | 330     | 620     | 1930    | 194     | 12570   | 4000    | 1115    | 710     |

**Part 1- ASBU Modules B0-05, 20,65,75,80 Enablers (Performance Implement Areas: Efficiency Flight Path and Airport Operations)**

- If your Answer is YES , please indicate the date of certification or Implementation
- If your Answer is NO, please indicate the planned date of certification or Implementation, or N/A if NOT Applicable.

**State: EGYPT**

| International aerodromes/ICAO designator   | HEOW    | HEPS    | HESC    | HESH    | HESN    | HETB    | HEMK    | HEAL    |  |
|--|---------|---------|---------|---------|---------|---------|---------|---------|--|
| 1. Certified (YES or NO)   | NO      |  |
| 2. A-CDM(YES or NO)  | NO/2018 |  |
| 3. A-SMSGCS(YES or NO)   | NO      |  |
| 4. Number of Runways ends used for landing   | 2       | 2       | 2       | 4       | 2       | 2       | 2       | 2       |  |
| 5. Number of Instrument runways ENDS provided with GNSS Approach Procedures (LNAV) | -----   | -----   | -----   | 4       | 2       | 2       | -----   | 2       |  |
| 6. Number of Instrument runways ENDS provided with APV Approach Procedures (VNAV)  | -----   | -----   | -----   | 2/VNAV  | -----   | -----   | -----   | -----   |  |
| 7. Number of Instrument runways ENDS provided with Instrument Landing System(ILS)  | -----   | -----   | -----   | 1       | 1       | 1       | -----   | -----   |  |
| 8. CDO (YES or NO)   | NO/2018 |  |
| 9. RNAV STARs (YES or NO)  | NO      | NO      | NO      | Y/GNSS  | Y/GNSS  | Y/GNSS  | NO      | NO      |  |
| 10. Conventional STARs (YES or NO)   | YES     |  |
| 11. CCO (YES or NO)  | NO/2018 |  |
| 12. RNAV SIDs (YES or NO)  | NO      | NO      | NO      | Y/GNSS  | Y/GNSS  | Y/GNSS  | NO      | NO      |  |
| 13. Conventional SIDs (YES or NO)  | YES     |  |
| 14. Total flights per month (ARR+DEP)  | 25      | 850     | 10      | 3980    | 575     | 310     | 260     | 20      |  |

**Survey on Aviation System Block Upgrades-ASBU Block Zero Modules**

**Part 1- ASBU Modules B0-05, 20,65,75,80 Enablers (Performance Implement Areas: Efficiency Flight Path and Airport Operations)**

- If your Answer is YES , please indicate the date of certification or Implementation
- If your Answer is NO, please indicate the planned date of certification or Implementation, or N/A if NOT Applicable.



Part 111 – ASBU Modules B0 – 25, 30, 105 Enablers (Performance Implementation Area: Globally Interoperable System)

| ASBU Block 0 modules   |                      | Implemented<br>YES/NO | IF NO,<br>Date of planned implementation | Remarks                   |
|--|----------------------|-----------------------|--|---------------------------|
| <b>B0-25</b>   |                      |                       |  |                           |
| 20. Implementation of AMHS based on IP   |                      | YES                   |  |                           |
| <b>B0-30</b>   |                      |                       |  |                           |
| 21. Implementation of AIXM based AIS database                                      |                      | NO                    | 2013                                     |                           |
| 22. Implementation of e AIP  |                      | NO                    | 2013                                     |                           |
| 23. Implementation of Digital NOTAM  |                      | NO                    | 2013                                     |                           |
| Implementation of<br>WGS - 84  | 24. ENR              | YES                   |  |                           |
|  | 25. Terminal         | YES                   |  |                           |
|  | 26. Aerodrome        | YES                   |  |                           |
|  | 27. Geoid Undulation | YES                   |  |                           |
| Implementation of<br>e TOD   | 28. Area 1 terrain   | YES                   |  |                           |
|  | 29. Area 1 Obstacles | NO                    | 2015                                     |                           |
|  | 30. Area 4 terrain   | YES                   |  | HECA/HESH only            |
|  | 31. Area 4 Obstacles | NO                    |  | Not applicable            |
| 32. Implementation of QMS for AIM  |                      | YES                   |  |                           |
| <b>B0-105</b>  |                      |                       |  |                           |
| 33. Implementation of SADIS 2G satellite broadcast and/or Secure SADIS ETP service |                      | YES                   |  | HECA/HEGN/HEAX/HELX/ HESH |

Part IV – ASBU Modules B0 – 10 Enablers (Performance Improvement Area: Optimum Capacity and Flexible Flights)

|  |     |  |
|--|-----|--|
| 34. Percentage of Airspace under full control of Civil Authority   | 80% | Percentage with reference to total volume of<br>Airspace |
| 35. Percentage of Airspace under full control of Military Authority (Dangerous, Prohibited, Restricted Areas etc...) | 20% |  |
| 36. Percentage of Airspace jointly used by Civil and Military Authorities  | 10% |  |
| 37. Percentage of TIME the portion of Airspace indicated in (36)above is open for civil flights                      | 10% | Percentage on weekly basis                               |
| 38. Number of established Routes overflying segregated airspace, as indicated in(36)above                            | 00% |  |

|   |       |  |
|---|-------|--|
| 39. If no routes established as in (38)above , what is the planned date of implantation of such Flexible Use of Airspace (FUA) Concept. | ----- |  |
|---|-------|--|

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**Part V – ASBU Modules B0 – 84 Enablers (Performance Improvement Area: Optimum Capacity and Flexible Flights)**

| Technology   | ADS – B   | MLAT      | Remarks |
|--|-----------|-----------|---------|
| 40. Implemented (YES or NO) IF NO , Indicate date of planned implementation  | <b>NO</b> | <b>NO</b> |         |
| 41. Purpose of implementation (used for) (Area Control , or Approach Control, Tower Control or Ground Movement Surveillance) | <b>NO</b> | <b>NO</b> |         |

- Use N/A where not Applicable.
- Date of implementation should be precise (Month and Year)

END

4

State...**JORDAN** .....

**Survey on Aviation System Block Upgrades- ASBU Block Zero Modules**

**Part I - ASBU Modules B0- 05, 20, 65, 75, 80 Enablers (Performance Improvement Areas: Efficiency Flight Path and Airport Operations)**

| International Aerodromes / ICAO Designator   | OJAI  | OJAM  | OJAQ  | Remarks  |
|--|-------|-------|-------|--|
| 1. Certified (YES or NO)   | NO    | NO    | YES   | Queen Alia airport is the renewal in process:<br>Amman Maroua Airport filed application: |
| 2. A-CDM (YES or NO)   | YES   | NO    | YES   |  |
| 3. A-SMGCS (YES or NO)   | NO    | NO    | NO    |  |
| 4. Number of Runways ENDS used for Landing   | 4     | 2     | 2     | Currently due to closure of runway 26R-08L   |
| 5. Number of Instrument Runways ENDS provided with GNSS Approach Procedures (LNAV) | 4     | 2     | 2     |  |
| 6. Number of instrument Runways ENDS provided with APV Approach procedures (VNAV)  | 4     | 2     | 1     |  |
| 7. Number of instrument Runways ENDS provided with Instrument Landing System (ILS) | 3     | 1     | 1     | Currently due to closure of runway 26R-08L   |
| 8. CDO (YES or NO)   | NO NA | NO NA | NO NA |  |
| 9. RNAV STARs (YES or NO)  | YES   | YES   | YES   |  |
| 10. Conventional STARs (YES or NO)   | YES   | YES   | YES   |  |
| 11. CCO (YES or NO)  | NO NA | NO NA | NO NA |  |
| 12. RNAV SIDs (YES or NO)  | YES   | YES   | YES   |  |
| 13. Conventional SIDs (YES or NO)  | YES   | YES   | YES   |  |
| 14. Total Flights per Month (ARR + DEP)  | 67189 | 8681  | 6019  |  |

- If your Answer is YES, please indicate the date of Certification or Implementation,
- If your Answer is NO, please indicate the planned date of Certification or Implementation, or N/A If Not Applicable.

nr



**Part III- ASBU Modules B0- 25, 30, 105 Enablers (Performance Improvement Area: Globally Interoperable Systems)**

| ASBU Block 0 modules   | Implemented Yes/No   | IF NO, Date of planned implementation | Remarks |
|--|----------------------|---------------------------------------|---------|
| <b>B0-25</b>   |                      |                                       |         |
| 20. Implementation of AMHS based on IP   | YES                  |                                       |         |
| <b>B0-30</b>   |                      |                                       |         |
| 21. Implementation of AIXM based AIS database                                      | YES                  |                                       |         |
| 22. Implementation of eAIP   | ON GOING             | 2014                                  |         |
| 23. Implementation of Digital NOTAM  | NO                   |                                       |         |
| Implementation of WGS-84   | 24. ENR              | YES                                   |         |
|  | 25. Terminal         | YES                                   |         |
|  | 26. Aerodrome        | YES                                   |         |
|  | 27. Geoid Undulation | YES                                   |         |
| Implementation of eTOD   | 28. Area 1 Terrain   | YES                                   |         |
|  | 29. Area 1 Obstacles | YES                                   |         |
|  | 30. Area 4 Terrain   | ON GOING                              | 2014    |
|  | 31. Area 4 Obstacles | ON GOING                              | 2014    |
| 32. Implementation of QMS for AIM  | YES                  |                                       |         |
| <b>B0-105</b>  |                      |                                       |         |
| 33. Implementation of SADIS 2G satellite broadcast and/or Secure SADIS ETP service | YES                  |                                       |         |

**Part IV- ASBU Modules B0- 10 Enablers (Performance Improvement Area: Optimum Capacity and Flexible Flights)**

|   |     |   |
|---|-----|---|
| 34. Percentage of Airspace under Full Control of Civil Authority  | 70% | Percentage with reference to total volume of Airspace |
| 35. Percentage of Airspace under Full Control of Military Authority (Dangerous, Prohibited, Restricted Areas etc...)                      | 30% |   |
| 36. Percentage of Airspace Jointly used by Civil and Military Authorities   | 10% |   |
| 37. Percentage of TIME the portion of Airspace indicated in (36) above is open for Civil Flights  | 50% | Percentage on weekly basis                            |
| 38. Number of established Routes overflying segregated airspace, as indicated in (36) above   | 1   |   |
| 39. If no routes established as in (38) above, what is the planned date of implementation of such Flexible Use of Airspace (FUA) Concept. |     |   |

Part V- ASBU Modules B0- 84 Enablers (Performance Improvement Area: Optimum Capacity and Flexible Flights)

| Technology   | ADS -B                           | MLAT | Remarks                          |
|--|----------------------------------|------|----------------------------------|
| 40. Implemented (YES or NO) If NO, Indicate date of planned implementation   | YES                              | NO   | 2014                             |
| 41. Purpose of Implementation (Used for) (Area Control, Approach Control, Tower Control or Ground Movement Surveillance) | Area control<br>Approach control |      | Area control<br>Approach control |

- Use N/A where Not Applicable.
- Date of implementation should be precise (Month and Year)

END

  
 تانف اسبى  
 2013/3/17

**State: SULTANATE OF OMAN**

**Survey on Aviation System Block Upgrades- ASBU Block Zero Modules**

**Part I – ASBU Modules B0- 05, 20, 65, 75, 80 Enablers (Performance Improvement Areas: Efficiency Flight Path and Airport Operations)**

| International Aerodromes / ICAO Designator  | OOMS            | OOSA           |  |  |  |  |  |  |  |
|---|-----------------|----------------|--|--|--|--|--|--|--|
| 1.Certified (YES or NO)   | YES<br>Feb 2013 | NO<br>Mar 2013 |  |  |  |  |  |  |  |
| 2.A-CDM (YES or NO)   | NO              | NO             |  |  |  |  |  |  |  |
| 3.A-SMGCS (YES or NO)   | 2015            | NO             |  |  |  |  |  |  |  |
| 4.Number of Runways ENDS used for Landing   | 2<br>(4-2014)   | 2              |  |  |  |  |  |  |  |
| 5.Number of Instrument Runways ENDS provided with GNSS Approach Procedures (LNAV) | 0<br>(4-2014)   | 0<br>(2-2014)  |  |  |  |  |  |  |  |
| 6.Number of instrument Runways ENDS provided with APV Approach procedures (VNAV)  | 0<br>(4-2014)   | 0<br>(2-2014)  |  |  |  |  |  |  |  |
| 7.Number of instrument Runways ENDS provided with Instrument Landing System (ILS) | 2<br>(4-2014)   | 1              |  |  |  |  |  |  |  |
| 8. CDO (YES or NO)  | NO              | NO             |  |  |  |  |  |  |  |
| 9.RNAV STARs (YES or NO)  | NO<br>2014      | NO             |  |  |  |  |  |  |  |
| 10. Conventional STARs (YES or NO)  | NO<br>2014      | NO             |  |  |  |  |  |  |  |
| 11. CCO (YES or NO)   | NO              | NO             |  |  |  |  |  |  |  |
| 12. RNAV SIDs (YES or NO)   | NO<br>2014      | YES            |  |  |  |  |  |  |  |
| 13. Conventional SIDs (YES or NO)   | YES             | YES            |  |  |  |  |  |  |  |
| 14. Total Flights per Month (ARR + DEP)   | 7240            | 639            |  |  |  |  |  |  |  |

- If your Answer is YES, please indicate the date of Certification or Implementation,
- If your Answer is NO, please indicate the planned date of Certification or Implementation, or N/A If Not Applicable.



**Part III- ASBU Modules B0- 25, 30, 105 Enablers (Performance Improvement Area: Globally Interoperable Systems)**

| ASBU Block 0 modules   |                      | Implemented<br>Yes/No | IF NO,<br>Date of planned implementation | Remarks  |
|--|----------------------|-----------------------|--|--|
| <b>B0-25</b>   |                      |                       |  |  |
| 20. Implementation of AMHS based on IP   |                      | only with Abu Dhabi   |  | Testing with other States  |
| <b>B0-30</b>   |                      |                       |  |  |
| 21. Implementation of AIXM based AIS database                                      |                      | NO                    | December 2013                            | New AIM equipment with AIXM 5.1 version will be installed in December 2013 |
| 22. Implementation of eAIP   |                      | NO                    | December 2015                            |  |
| 23. Implementation of Digital NOTAM  |                      | NO                    | December 2017                            |  |
| Implementation of<br>WGS-84  | 24. ENR              | YES                   |  | Fully compliant  |
|  | 25. Terminal         | YES                   |  | Fully compliant  |
|  | 26. Aerodrome        | YES                   |  | Fully compliant  |
|  | 27. Geoid Undulation | YES                   |  | Fully compliant  |
| Implementation of<br>eTOD  | 28. Area 1 Terrain   | NO                    | December 2015                            |  |
|  | 29. Area 1 Obstacles | NO                    | December 2015                            |  |
|  | 30. Area 4 Terrain   | NO                    | December 2015                            |  |
|  | 31. Area 4 Obstacles | NO                    | December 2015                            |  |
| 32. Implementation of QMS for AIM  |                      | NO                    | December 2013                            |  |
| <b>B0-105</b>  |                      |                       |  |  |
| 33. Implementation of SADIS 2G satellite broadcast and/or Secure SADIS ETP service |                      | YES                   |  | 2G in 2010; ETP in May 2012  |

**Part IV- ASBU Modules B0- 10 Enablers (Performance Improvement Area: Optimum Capacity and Flexible Flights)**

|  |  |                  |  |
|--|--|------------------|--|
| 34. Percentage of Airspace under Full Control of Civil Authority   |  | 67%              | Percentage with reference to total volume of<br>Airspace |
| 35. Percentage of Airspace under Full Control of Military Authority (Dangerous, Prohibited, Restricted Areas etc...) |  | 33%              |  |
| 36. Percentage of Airspace Jointly used by Civil and Military Authorities  |  | 67%              |  |
| 37. Percentage of TIME the portion of Airspace indicated in (36) above is open for Civil Flights                     |  | 100%             | Percentage on weekly basis                               |
| 38. Number of established Routes overflying segregated airspace, as indicated in (36) above                          |  | NONE for the 33% |  |

|   |         |  |
|---|---------|--|
| 39. If no routes established as in (38) above, what is the planned date of implementation of such Flexible Use of Airspace (FUA) Concept. | UNKNOWN |  |
|---|---------|--|

**Part V- ASBU Modules B0- 84 Enablers (Performance Improvement Area: Optimum Capacity and Flexible Flights)**

| Technology   | ADS -B | MLAT | Remarks |
|--|--------|------|---------|
| 40. Implemented (YES or NO) If NO, Indicate date of planned implementation   | 2015   | 2015 |         |
| 41. Purpose of Implementation (Used for) (Area Control, Approach Control, Tower Control or Ground Movement Surveillance) | ALL    | ALL  |         |

- Use N/A where Not Applicable.
- Date of implementation should be precise (Month and Year)

END

State: QATAR

Survey on Aviation System Block Upgrades- ASBU Block Zero Modules

Part I – ASBU Modules B0- 05, 20, 65, 75, 80 Enablers (Performance Improvement Areas: Efficiency Flight Path and Airport Operations)

| International Aerodromes / ICAO Designator  | OTBD                           | OTHH  |  |  |  |  |  |  |  |
|---|--------------------------------|---|--|--|--|--|--|--|--|
| 1. Certified (YES or NO)  | Yes<br>March 2010              | Yes<br>March 2013                             |  |  |  |  |  |  |  |
| 2.A-CDM (YES or NO)   | No N/A                         | No Jan 2015                                   |  |  |  |  |  |  |  |
| 3.A-SMGCS (YES or NO)   | Yes Jan<br>2011                | Yes<br>April 2013                             |  |  |  |  |  |  |  |
| 4.Number of Runways ENDS used for Landing   | 2                              | 2   |  |  |  |  |  |  |  |
| 5.Number of Instrument Runways ENDS provided with GNSS Approach Procedures (LNAV) | 2                              | 2   |  |  |  |  |  |  |  |
| 6.Number of instrument Runways ENDS provided with APV Approach procedures (VNAV)  | 1                              | 2   |  |  |  |  |  |  |  |
| 7.Number of instrument Runways ENDS provided with Instrument Landing System (ILS) | 2                              | 4   |  |  |  |  |  |  |  |
| 8. CDO (YES or NO)  | No N/A                         | No N/A  |  |  |  |  |  |  |  |
| 9.RNAV STARs (YES or NO)  | NO<br>(JAN 2014)               | NO<br>(JAN 2014)                              |  |  |  |  |  |  |  |
| 10. Conventional STARs (YES or NO)  | NO<br>(JAN 2014)               | NO<br>(JAN 2014)                              |  |  |  |  |  |  |  |
| 11. CCO (YES or NO)   | No N/A                         | No N/A  |  |  |  |  |  |  |  |
| 12. RNAV SIDs (YES or NO)   | NO<br>(JAN 2014)               | NO<br>(JAN 2014)                              |  |  |  |  |  |  |  |
| 13. Conventional SIDs (YES or NO)   | NO<br>(JAN 2014)               | NO<br>(JAN 2014)                              |  |  |  |  |  |  |  |
| 14. Total Flights per Month (ARR + DEP)   | 17,334<br>(Jan 2013<br>figure) | Ops<br>commence<br>April 1 <sup>st</sup> 2013 |  |  |  |  |  |  |  |

- If your Answer is YES, please indicate the date of Certification or Implementation,
- If your Answer is NO, please indicate the planned date of Certification or Implementation, or N/A If Not Applicable.



**Part III- ASBU Modules B0- 25, 30, 105 Enablers (Performance Improvement Area: Globally Interoperable Systems)**

| ASBU Block 0 modules   | Implemented Yes/No   | IF NO, Date of planned implementation | Remarks  |
|--|----------------------|---------------------------------------|--|
| <b>B0-25</b>   |                      |                                       |  |
| 20. Implementation of AMHS based on IP   | Yes                  | JAN 2012                              | AUH set up 2012 at OTBD. At OTHH awaiting for partners BAH, KWI and Jeddah to be based as IP |
| <b>B0-30</b>   |                      |                                       |  |
| 21. Implementation of AIXM based AIS database                                      | No                   | JAN 2014                              |  |
| 22. Implementation of eAIP   | No                   | JAN 2014                              |  |
| 23. Implementation of Digital NOTAM  | No                   | JAN 2014                              |  |
| Implementation of WGS-84   | 24. ENR              | Yes                                   |  |
|  | 25. Terminal         | Yes                                   |  |
|  | 26. Aerodrome        | Yes                                   |  |
|  | 27. Geoid Undulation | Yes                                   |  |
| Implementation of eTOD   | 28. Area 1 Terrain   | Yes                                   |  |
|  | 29. Area 1 Obstacles | Yes                                   |  |
|  | 30. Area 4 Terrain   | Yes                                   |  |
|  | 31. Area 4 Obstacles | Yes                                   |  |
| 32. Implementation of QMS for AIM  | Yes                  |                                       |  |
| <b>B0-105</b>  |                      |                                       |  |
| 33. Implementation of SADIS 2G satellite broadcast and/or Secure SADIS ETP service |                      |                                       |  |

**Part IV- ASBU Modules B0- 10 Enablers (Performance Improvement Area: Optimum Capacity and Flexible Flights)**

|  |     |   |
|--|-----|---|
| 34. Percentage of Airspace under Full Control of Civil Authority   | 20% | Percentage with reference to total volume of Airspace |
| 35. Percentage of Airspace under Full Control of Military Authority (Dangerous, Prohibited, Restricted Areas etc...) | 70% |   |
| 36. Percentage of Airspace Jointly used by Civil and Military Authorities  | 10% |   |
| 37. Percentage of TIME the portion of Airspace indicated in (36) above is open for Civil Flights                     | 25% | Percentage on weekly basis                            |

|   |     |  |
|---|-----|--|
| 38. Number of established Routes overflying segregated airspace, as indicated in (36) above   | 2   | Not strictly FUA in application                              |
| 39. If no routes established as in (38) above, what is the planned date of implementation of such Flexible Use of Airspace (FUA) Concept. | TBA | Concept currently under discussion with military authorities |

**Part V- ASBU Modules B0- 84 Enablers (Performance Improvement Area: Optimum Capacity and Flexible Flights)**

| Technology  | ADS -B OTBD                                    | ADS-B OTHH | MLAT OTBD  | MLAT OTHH | Remarks OTBD   | Remarks OTHH                              |
|---|--|------------|--|-----------|--|---|
| 1. Implemented (YES or NO) If NO, Indicate date of planned implementation   | YES  | Yes        | YES  | Yes       | Installed in 2010 and in service 2011<br>2 ADSB Receivers<br>13 MLAT Sensors | Installing 2013<br>Commissioning Dec 2013 |
| 2. Purpose of Implementation (Used for) (Area Control, Approach Control, Tower Control or Ground Movement Surveillance) | Tower Control and Ground Movement Surveillance |            | Approach Control (Wide Area Multilateration), Tower Control and Ground Movement Surveillance |           |  |   |

- Use N/A where Not Applicable.
- Date of implementation should be precise (Month and Year)

END

State:...UAE.....

**Survey on Aviation System Block Upgrades- ASBU Block Zero Modules**

**Part I – ASBU Modules B0- 05, 20, 65, 75, 80 Enablers (Performance Improvement Areas: Efficiency Flight Path and Airport Operations)**

| International Aerodromes / ICAO Designator  | OMAA      | OMAL           | OMDW      | OMDB      | OMSJ      | OMFJ           | OMRK           | OMAD      | Dates   |
|---|-----------|----------------|-----------|-----------|-----------|----------------|----------------|-----------|---|
| 1.Certified (YES or NO)   | Y<br>2008 | Y<br>2009      | Y<br>2010 | Y<br>2009 | Y<br>2009 | Y<br>2009      | Y<br>2009      | Y<br>2009 |   |
| 2.A-CDM (YES or NO)   | NO        | NO             | NO        | NO        | NO        | NO             | NO             | NO        | Under<br>discussion                               |
| 3.A-SMGCS (YES or NO)   | NO        | NO             | NO        | NO        | NO        | NO             | NO             | NO        | TBA   |
| 4.Number of Runways ENDS used for Landing   | 4         | 2              | 2         | 4         | 2         | 2              | 2              | 2         |   |
| 5.Number of Instrument Runways ENDS provided with GNSS Approach Procedures (LNAV) | 4         | 0 <sup>1</sup> | 2         | 4         | 2         | 0 <sup>2</sup> | 0 <sup>2</sup> | 2         | 0 <sup>1</sup> TBA<br>0 <sup>2</sup> Q3 2013      |
| 6.Number of instrument Runways ENDS provided with APV Approach procedures (VNAV)  | 4         | 0 <sup>1</sup> | 2         | 4         | 2         | 0 <sup>2</sup> | 0 <sup>2</sup> | 2         |   |
| 7.Number of instrument Runways ENDS provided with Instrument Landing System (ILS) | 4         | 1              | 2         | 4         | 2         | 1              | 1              | 1         |   |
| 8. CDO (YES or NO)  | NO        | NO             | NO        | NO        | NO        | NO             | NO             | NO        | TBA Based<br>on<br>ANSS2012<br>033                |
| 9.RNAV STARs (YES or NO)  | YES       | NO*            | YES       | YES       | YES       | YES            | NO*            | YES       | *2014   |
| 10. Conventional STARs (YES or NO)  | NO        | NO             | NO        | NO        | NO        | NO             | NO             | NO        | N/A   |
| 11. CCO (YES or NO)   | NO        | NO             | NO        | NO        | NO        | NO             | NO             | NO        | TBA Based<br>on<br>Airspace<br>study<br>underway. |
| 12. RNAV SIDs (YES or NO)   | YES       | NO *           | YES       | YES       | YES       | YES            | NO*            | YES       | 2014  |
| 13. Conventional SIDs (YES or NO)   | NO        | NO             | NO        | NO        | NO        | NO             | YES            | YES       | N/A   |

|   |       |      |      |       |      |      |      |      |  |
|---|-------|------|------|-------|------|------|------|------|--|
| 14. Total Flights per Month (ARR + DEP) | 10136 | 8340 | 1360 | 28848 | 5859 | 2218 | 1317 | 2428 |  |
|---|-------|------|------|-------|------|------|------|------|--|

- If your Answer is YES, please indicate the date of Certification or Implementation,
- If your Answer is NO, please indicate the planned date of Certification or Implementation, or N/A If Not Applicable.

**Part II- ASBU Modules B0- 25, B0-35 Enablers (Performance Improvement Areas: Globally Interoperable Systems and Data and Optimum Capacity and Flexible Flights)**

| ATS Unit Designator<br>(ACC, APP, TWR) | AIDC/OLDI                      |                            |  | Air traffic Flow Management (ATFM) |  |
|--|--------------------------------|----------------------------|--|------------------------------------|--|
|  | 15. Implemented<br>(YES or NO) | 16. capable<br>(YES or NO) | 17. If NO, date of<br>Planned Implementation | 18. Implemented<br>(YES or NO)     | 19. If NO, date of<br>Planned Implementation |
| OMAE ACC                               | YES                            | YES                        | *  | YES                                |  |
| OMAA APP                               | YES                            | YES (AIDC)                 |  |                                    |  |
| OMAA TWR                               | NO                             | NO                         |  |                                    |  |
| OMAL TWR                               | YES                            | YES                        |  |                                    |  |
| OMDW TWR                               | NO                             | *                          |  |                                    |  |
| OMDB APP                               | YES                            | *                          |  |                                    |  |
| OMDB TWR                               | NO                             | *                          |  |                                    |  |
| OMSJ TWR                               | YES                            | YES                        |  |                                    |  |
| OMFJ APP                               | *                              | *                          |  |                                    |  |
| OMFJ TWR                               | *                              | *                          |  |                                    |  |
| OMRK APP                               | YES                            | YES                        |  |                                    |  |
| OMRK TWR                               | YES                            | YES                        |  |                                    |  |
|  |                                |                            |  |                                    |  |
|  |                                |                            |  |                                    |  |
|  |                                |                            |  |                                    |  |
|  |                                |                            |  |                                    |  |
|  |                                |                            |  |                                    |  |
|  |                                |                            |  |                                    |  |
|  |                                |                            |  |                                    |  |
|  |                                |                            |  |                                    |  |

|  |  |  |  |  |  |
|--|--|--|--|--|--|
|  |  |  |  |  |  |
|  |  |  |  |  |  |

**Part III- ASBU Modules B0- 25, 30, 105 Enablers (Performance Improvement Area: Globally Interoperable Systems)**

| ASBU Block 0 modules   | Implemented Yes/No   | IF NO, Date of planned implementation | Remarks       |
|--|----------------------|---------------------------------------|---------------|
| <b>B0-25</b>   |                      |                                       |               |
| 20. Implementation of AMHS based on IP   | YES                  |                                       |               |
| <b>B0-30</b>   |                      |                                       |               |
| 21. Implementation of AIXM based AIS database                                      | YES                  |                                       |               |
| 22. Implementation of eAIP   | YES                  |                                       |               |
| 23. Implementation of Digital NOTAM  | NO                   | TBA                                   |               |
| Implementation of WGS-84   | 24. ENR              | YES                                   |               |
|  | 25. Terminal         | YES                                   |               |
|  | 26. Aerodrome        | YES                                   |               |
|  | 27. Geoid Undulation | YES                                   |               |
| Implementation of eTOD   | 28. Area 1 Terrain   | YES                                   |               |
|  | 29. Area 1 Obstacles | YES                                   |               |
|  | 30. Area 4 Terrain   | YES                                   | Not published |
|  | 31. Area 4 Obstacles | YES                                   | Not Published |
| 32. Implementation of QMS for AIM  | YES                  |                                       |               |
| <b>B0-105</b>  |                      |                                       |               |
| 33. Implementation of SADIS 2G satellite broadcast and/or Secure SADIS ETP service | Y                    |                                       |               |

**Part IV- ASBU Modules B0- 10 Enablers (Performance Improvement Area: Optimum Capacity and Flexible Flights)**

|  |     |  |
|--|-----|--|
| 34. Percentage of Airspace under Full Control of Civil Authority | 45% | Percentage with reference to total volume of |
|--|-----|--|

|   |                  |                            |
|---|------------------|----------------------------|
| 35. Percentage of Airspace under Full Control of Military Authority (Dangerous, Prohibited, Restricted Areas etc...)                      | 45%              | Airspace                   |
| 36. Percentage of Airspace Jointly used by Civil and Military Authorities   | 10%              |                            |
| 37. Percentage of TIME the portion of Airspace indicated in (36) above is open for Civil Flights  | +/- 90% (ad hoc) | Percentage on weekly basis |
| 38. Number of established Routes overflying segregated airspace, as indicated in (36) above   | 6                |                            |
| 39. If no routes established as in (38) above, what is the planned date of implementation of such Flexible Use of Airspace (FUA) Concept. | n/a              |                            |

**Part V- ASBU Modules B0- 84 Enablers (Performance Improvement Area: Optimum Capacity and Flexible Flights)**

| <b>Technology</b>  | <b>ADS -B</b> | <b>MLAT</b>  | <b>Remarks</b>                            |
|--|---------------|--------------|---|
| 40. Implemented (YES or NO) If NO, Indicate date of planned implementation   | YES           | NO           | WAM is planned for implementation in 2014 |
| 41. Purpose of Implementation (Used for) (Area Control, Approach Control, Tower Control or Ground Movement Surveillance) | Area Control  | Area Control |   |

- Use N/A where Not Applicable.
- Date of implementation should be precise (Month and Year)

END

Note 1: UAE PBN Implementation Plan is accessible on the GCAA website

Note 2: The DRAFT UAE ATM Strategic plan is available on the GCAA website (incl. ASBU)

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**REPORT ON AGENDA ITEM 4: MID REGIONAL PBN IMPLEMENTATION PLAN AND GUIDANCE MATERIAL**

4.1 The meeting recalled that MIDANPIRG/13 (Abu Dhabi, UAE, 22 - 26 April 2012), noted that the 36 ICAO General Assembly Resolution A36-23 urged the Planning and Implementation Regional Groups (PIRGs) and States, inter alia, to complete a States PBN Implementation Plan by 2009 to achieve specific implementation goals starting with 2010. Accordingly, the MID Regional PBN Implementation Strategy and Plan were developed in October 2008 and adopted by MIDANPIRG/11 in February 2009 in order to allow sufficient time for the MID States to complete the development of their States PBN Implementation Plans by December 2009. Furthermore, A36-23 resolution was superseded by Resolution A37-11.

4.2 The A37/11 Resolution urged States to include in their PBN Implementation Plan provisions for implementation of Approach Procedures with Vertical Guidance (APV) to all runway end serving aircraft with a maximum certificated take-off mass of 5 700 kg or more, according to established timelines and intermediate milestones, and instructed the Council to provide a progress report on PBN Implementation.

4.3 The meeting recognized that several PBN Implementation challenges need to be met in order to progressively implement PBN and achieve the desired benefits. The list of challenges is not limited to the following:

- Airspace concept development
- WGS-84 surveys
- Electronic Terrain and Obstacle Data
- Procedure design
- Ground and Flight Validation
- Operational approval
- Safety assessment
- Awareness and training for pilots and ATC

4.4 The meeting noted that in order to standardize and harmonize the development and implementation of CCO and CDO, the airspace and instrument flight procedure design and ATC techniques should all be employed in a cohesive manner. This will facilitate the ability of flight crews to use in-flight techniques to reduce the overall environmental footprint and increase the efficiency of commercial aviation. The implementation guidance in the Manuals is intended to support collaboration among the different stakeholders involved in implementing these Continuous Operations, and in light of the completion of the ICAO CCO, CDO Manuals (DOC 9931 and DOC 9993), States are encouraged to consult the CCO/CDO Manuals during their SID and STAR implementations.

4.5 The 12th Air Navigation Conference (AN-Conf/12) considered developments in regard to the synchronization of traffic flows at merging points in the en-route environment and in Terminal Control Areas (TMAs) to optimize the landing sequence, by application of time-based metering at intermediate points. Departure and arrival procedures that take into account airspace and traffic complexity while facilitating flight via optimum profiles by enabling Continuous Climb Operations (CCOs), Continuous Descent Operations (CDOs) and Optimized Profile Descents (OPDs) were also addressed. Supporting ATM procedures and arrangements such as conflict management, airspace organization and management, demand and capacity balancing and environmental management were an essential component of these discussions

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4.6 The meeting noted that AN-Conf/12 highlighted on the importance of the continuous operations and agreed on the following Recommendation:

*Recommendation 5/3 – Increased Flexibility and Efficiency in Descent and  
Departure Profiles*

*That, States:*

- a) as supported by their operational requirements and a positive business case, implement as a matter of urgency, the Aviation System Block Upgrade modules relating to continuous climb operations and continuous descent operations included in blocks 0 and 1;*
- b) as supported by their operational requirements and a positive business case, use point merge technique as an application towards achieving full continuous descent operations, when developing Performance-Based Navigation standard instrument arrivals (stars);*
- c) endorse the Aviation System Block Upgrade module relating to continuous descent operations included in block 1;*
- d) agree in principle to the Aviation System Block Upgrade module relating to continuous descent operations included in block 2; and*

*That, ICAO:*

- e) include, following further development and editorial review, The Aviation System Block Upgrade modules relating to continuous climb operations and continuous descent operations in the draft Fourth Edition of the Global Air Navigation Plan (Doc 9750, GANP).*

4.7 Based on the above the meeting reviewed and updated the MID Regional PBN Implementation Strategy and Plan to include the developments globally and in the Region and agreed to the following Draft Conclusion to replace and supersede MIDANPIRG/13 Conclusion 13/47:.

***DRAFT CONCLUSION 5/2: MID REGIONAL PBN IMPLEMENTATION  
STRATEGY AND PLAN***

*That, the MID Regional PBN Implementation Strategy and Plan be updated as at  
Appendix 4A to the Report on Agenda Item 4.*

4.8 The meeting was apprised about CANSO Middle East ANSP, Airspace Users & Stakeholder Engagement WG (MEAUSE WG), the work of which include PBN, in this regard the meeting agreed that close coordination with these WGs should exist, in order to avoid any duplication of efforts. The meeting agreed that ICAO MID Regional Office coordinate with CANSO, where CANSO can play the role of assisting States in the implementation of PBN, in this regard the meeting noted that ICAO MID Office coordinated the relevant surveys.

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4.9 The meeting noted that ICAO has developed the eANPs as an online system for maintaining, storing and displaying information contained in the Regional ANPs. In July 2011, the amendment process was automated to further reduce the process time within ICAO. But despite these improvements, the challenge remained to keep the paper-based regional ANPs updated, particularly in view of continuous air navigation technological developments.

4.10 To simplify its introduction, all procedures that apply to the current paper-based ANPs will continue for the eANPs. However, to make full use of the online system, ICAO will continue to simplify the workflows related to the amendment process, and related to the data within the eANP, to increase the efficiency, accuracy, and accessibility in maintaining the narrative and data in the ANPs. As part of the eANPs project, the ATM, CNS, AIM, AOP and MET FASID tables in Volume II will be standardized and harmonized across all Regions and aligned with ASBU methodology.

4.11 The meeting noted that a Task Force has been established in Europe for the development of the AIM Parts of the EUR ANP. In the same vein the MIDANPIRG/13 Meeting agreed to the establishment of an Ad-hoc Working Group tasked with the development of a revised version of the MID ANP (both Basic ANP and FASID).

4.12 The meeting noted that the *Global Air Navigation Plan* (Doc 9750, GANP) and its supporting concepts including the ASBUs, the technology roadmaps and a regional planning framework and associated metrics, along with the importance of adequate frequency spectrum to support the ASBUs, were discussed during the AN-Conf/12, and the following Recommendations accepted by the conference:

*Recommendation 1/1 – The Draft Fourth Edition of the Global Air Navigation Plan  
(Doc 9750, GANP)*

*That, States:*

- a) agree in-principle, with the inclusion of high level policy principles and other proposed improvements made at this conference, with the updated draft Fourth Edition of the GANP;*
- b) should have the opportunity to provide any final comments on the updated draft GANP to ICAO before it is considered by the ICAO Assembly in 2013;*

*That, ICAO:*

- c) convene a symposium in 2014 where interested stakeholders will be invited to join together to provide end-to-end system demonstrations of new Air Traffic Management (ATM) concepts;*
- d) develop financial policies which support efficient acquisition and implementation of global air navigation services infrastructure and aircraft equipage;*
- e) taking a total systems and performance-based approach, create a Standards and Recommended Practices development plan for the Aviation System Block upgrades including the establishment of agreed global priorities between the different blocks and modules;*

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- f) *define a stable and efficient process for endorsement by the 38th Session of the Assembly, for updating the GANP that ensures stability in module timelines for any future updates; and*
- g) *ensure that the nature and status of the planning information in the various documents pertaining to the GANP are consistent and complete and allow due account to be taken of the inputs from ATM research, development and deployment programmes.*

*Recommendation 1/2 – Implementation*

*That, ICAO:*

- a) *through its Regional Offices, provide guidance and practical assistance to States and Regions and Sub-Regions when they decide to implement individual blocks or modules of the ASBUs;*
- b) *establish a group and improved mechanism for interregional cooperation to ensure harmonization of ATM; and*
- c) *assist States and Regions in training and capacity-building towards implementation of the relevant modules of the Aviation System Block upgrades.*

4.13 With regard to Regional Air Navigation Plans (ANPs) and for the process of aligning the Regional ANPs with the GANP, AN-Conf/12 agreed that PIRGs should focus initially on implementing ASBU Block 0 Modules and finalize the development of their ASBU aligned regional plans by May 2014. Furthermore, as a means of interregional harmonization for ASBU implementation, AN-Conf/12 agreed to use the various means available to address impediments, including the All Planning and Implementation Regional Group (ALLPIRG) Meetings. In this regard, the AN-Conf/12 welcomed the proposal of ICAO to convene an ALLPIRG Meeting in March 2013. In order to identify and resolve any roadblocks for ASBU implementation, the an-Conf/12 encouraged States and PIRGs to use the Air Navigation Report Form (ANRF) which was developed to identify such issues. These templates were explained in details during the Special Implementation Project (SIP) Workshop On Preparations for An-Conf/12 – ASBU Methodology held at the ICAO MID Regional Office (Cairo, 30 September - 4 October 2012).

4.14 The meeting recalled that the current Regional ANP are no longer reflect the requirements and mostly being capturing and updating of the existing infrastructure/facilities, accordingly they were no longer achieving the full expected results, and there is a need to revise them to keep pace with the ASBU developments, and the outcome of the Twelfth Air Navigation Conference (AN-Conf/12).

4.15 The meeting was updated with the following AN-Conf/12 Recommendation concerning the Regional Performance Framework – Planning Methodology:

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*Recommendation 6/1 – Regional Performance Framework – Planning Methodologies and Tools*

*That States and PIRGs:*

- a) develop and maintain Regional Air Navigation Plans consistent with the Global Air Navigation Plan;*
- b) finalize the alignment of Regional Air Navigation Plans with the Fourth Edition of the Global Air Navigation Plan by May 2014;*
- c) focus on implementing Aviation System Block Upgrade Block 0 Modules on the basis of operational requirements, recognizing that these modules are ready for deployment;*
- d) use the electronic Regional Air Navigation Plans as the primary tool to assist in the implementation of the agreed regional planning framework for air navigation services and facilities;*
- e) consider how the continuous monitoring approach to safety oversight maps to the evaluation of Member States' safety oversight capabilities concerning Aviation System Block Upgrades;*
- f) involve regulatory and industry personnel during all stages of planning and implementation of Aviation System Block Upgrade modules;*
- g) develop action plans to address the identified impediments to Air Traffic Management modernization as part of Aviation System Block Upgrade planning and implementation activities;*

*That, ICAO:*

- h) review the current amendment process to the Regional Air Navigation Plans (ANPs) and recommend improvements to increase efficiencies related to the approval and maintenance of the data in the Regional ANPs;*
- i) develop guidance material, on the basis of best practices employed worldwide, for the regional/local deployment of new ATM technologies, required procedures, operational approvals and continue to support States in the implementation of the Aviation System Block Upgrades;*
- j) identify the issues, funding, training and resource requirements necessary to support a safety framework that would lay the foundation for successful implementation the Aviation System Block Upgrades;*
- k) develop an outreach strategy to address the economic and institutional impediments to implementation of the Aviation System Block Upgrades; and*
- l) develop a mechanism for sharing of best practices for the Aviation System Block Upgrade implementation.*

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4.16           The meeting reviewed and updated the CNS3 table (Navigation) as at **Appendix 4B** to the Report on Agenda Item 4. The meeting received examples of other navigation tables and was of the view to keep the table as at **Appendix 4C** to the Report on Agenda Item 4 updated as it reflects more precisely performance based model and will be efficient in reporting the needed progress. Furthermore, the meeting encouraged States to actively participate in the ANP Working Group Meeting planned to be held 27-29 May 2013.

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**MID REGIONAL PERFORMANCE-BASED NAVIGATION IMPLEMENTATION  
STRATEGY AND PLAN**

**1. EXECUTIVE SUMMARY**

1.1 The MID Regional Performance Based Navigation (PBN) Implementation Strategy and Plan has been produced and updated in line with Resolutions A 36/23 and A 37/11. The Regional Plan addresses the strategic objectives of PBN implementation 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.

1.2 This version was prepared to align the MID Regional PBN implementation Strategy and Plan with the Aviation System Block Upgrades (ASBU) implementation, taking into consideration, the twelfth Air Navigation Conference (AN-Conf/12) Recommendations, the Global Air Navigation Plan Fourth Edition, MID Regional Air Navigation Plan and the MID Region Air Navigation Strategy. This required the amendment of the implementations targets dates.

1.3 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) and for the medium term (2018 – 2022) have been projected in tabular forms to facilitate easy reference. For the long term (2023 and beyond) it has been envisaged that GNSS will be the primary navigation infrastructure. It is also envisaged that precision approach capability using GNSS and its augmentation system will become available in the long term.

**2. EXPLANATION OF TERMS**

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

2.1.1 **MID Regional PBN Implementation Strategy and 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.

2.1.2 **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.

2.1.3 **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.

### 3. ACRONYMS

3.1 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                            |
| 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  |
| FASID     | Facilities and Services Implementation Document                       |
| 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   |
| MIDANPIRG | Middle East Air Navigation Planning and Implementation Regional Group |
| MID RMA   | 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   |
| STAR      | Standard Instrument Arrival   |
| TMA       | Terminal Control Area   |
| VOR       | VHF Omni-directional Radio-range                                      |
| WGS       | World Geodetic System   |

## 4. INTRODUCTION

### *Need for the Roadmap*

4.1 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.

4.2 The implementation of RVSM on 27 NOV 2003 in the MID Region brought significant airspace and operational benefits to the Region. However, the realizations of new benefits from RVSM have reached a point of diminishing returns. 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.

4.3 In view of the need for detailed navigation planning, it was deemed advisable to prepare a PBN Roadmap to provide proper guidance to air navigation service providers, airspace operators and user, regulating agencies, and international organization, on the evolution of performance base navigation, as one of the key systems supporting air traffic management, which describes the RNAV and RNP navigation applications that should be implemented in the short and medium term in the MID Region.

4.4 Furthermore, the MID PBN roadmap will be the basic material for the development of a boarder MID air navigation strategy, which will serve as guidance for regional projects for the implementation of air navigation infrastructure, such as SBAS, GBAS, GLS etc., as well as for the development of national implementation plans.

4.5 The PBN Manual (Doc 9613) provides guidance on RNAV/RNP 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. RNAV/RNP approval will be granted to operators that comply with these two types of approval.

4.6 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.

### *Benefits of Performance-Based Navigation*

- a) *Access and Equity*: Increased aerodrome accessibility.
- b) *Capacity*: In contrast with ILS, the GNSS-based approaches (PBN and GLS) 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

#### ***Goals and Objectives of PBN Implementation***

4.7 The MIDANPIRG/11 Meeting required that PBN be implemented in a strategic manner in the MID Region and accordingly established the PBN/GNSS Task Force which, *inter alia*, was required to follow up developments related to PBN and develop an implementation strategy. The 36th Session of ICAO Assembly adopted Resolution A36-23: *Performance based navigation global goals*, which, amongst others, highlighted global and regional harmonization in the implementation of PBN. Accordingly, the MID PBN Implementation Regional Plan has the following strategic objectives:

- a) To ensure that implementation of the navigation element of the MID CNS/ATM system is based on clearly established operational requirement.
- b) To avoid unnecessarily imposing the mandate for multiple equipment on board or multiple systems on ground.
- c) To avoid the need for multiple airworthiness and operational approvals for intra and inter-regional operations.
- d) To avoid an eclipsing of ATM operational requirements by commercial interests, generating unnecessary costs States, international organization, and airspace users.
- e) To explain in detail the contents of the MID air navigation plan and of the MID CNS/ATM plan, describing potential navigation application.

4.8 Furthermore, the MID PBN roadmap will provide a high-level strategy for the evolution of the navigation applications to be implemented in the MID region in the short term (2013-2017), medium term (2018-2022). This strategy is based on the coverage of area navigation (RNAV) and required navigation performance (RNP), which will be applied to aircraft operations involving instrument approaches, standard departure (SID) routes, standard arrival (STAR) routes, and ATS routes in oceanic and continental areas.

4.9 The MID PBN implementation regional plan is developed by MID States together with the international and Regional organizations concerned, and is intended to assist the main stakeholders of the aviation community to plan a gradual transition to the RNAV and RNP concepts. The main stakeholders of the aviation community that benefit from this roadmap are:

- Airspace operators and users
- Air navigation service providers
- Regulating agencies
- International and Regional organizations
- Military Authorities

4.10 The plan is intended to assist the main stakeholders of the aviation community to plan the future transition and their investment strategies. For example, airlines and 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.

*Planning Principles*

4.11 The implementation of PBN in the MID Region shall be based on the following principles:

- a) develop strategic objectives and airspace concepts as described in the PBN manual (Doc 9613) to justify the implementation of the RNAV and/or RNP concepts in each particular airspace;
- b) States conduct pre- and post-implementation safety assessments to ensure the application and maintenance of the established target level of safety;
- c) development of airspace concept, applying airspace modelling tools as well as real-time and accelerated simulations, which identify the navigation applications that are compatible with the aforementioned concept;
- d) continued application of conventional air navigation procedures during the transition period, to guarantee the operation by users that are not RNAV- and/or RNP-equipped;
- e) operational requirement and Stake holder consultation; and
- f) early implementation is encouraged based on operational requirements and States readiness.

4.12 Planning Documentation: The implementation of PBN in the MID Region will be incorporated into the Regional Supplementary Procedures (Doc 7030) as approved by the ICAO Council. The States' PBN implementation plan will include a concise and detailed schedule of implementation for all phases of flight which will be endorsed through Regional agreement processes and considered by the Council as requirements for incorporation in the Air Navigation Plan (ANP).

**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 and be supported by ICAO Global Plan Initiatives.

5.2 In November 2006 the ICAO Council accepted the second amendment to the Global Air Navigation Plan for the CNS/ATM System, which has been renamed the Global Air Navigation Plan (Doc 9750), referred to as the Global Plan. A key part of the Global Plan framework are Global Plan Initiatives (GPIs), which are options for air navigation system improvements that when implemented, result in direct performance enhancements. The GPIs include implementation of performance based navigation (PBN) and navigation system. The introduction of PBN must be supported by an appropriate navigation infrastructure consisting of an appropriate combination of Global Navigation Satellite System (GNSS), Self-contained Navigation System (inertial navigation system) and Conventional Ground-based Navigation Aids.

5.3 It is envisaged that for the short term and medium term implementation of PBN, the establishment of a backup system in case of GNSS failure or the development of contingency procedures will be necessary.

#### ***En-route***

5.4 Considering the traffic characteristic and CNS/ATM capability of the region, the en-route operation 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 RNAV or RNP navigation specification. This implementation strategy will be applied by the States and international organizations themselves, as coordinated at regional level to ensure harmonization.

5.5 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 the more accurate navigation specification on the basis of coordination with stakeholders and affected neighbouring States.

#### ***Terminal***

5.6 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.

5.7 In this context, the States should develop their own national plans for the implementation of PBN in TMAs, based on the MID PBN Regional 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.

#### ***Approaches***

5.8 During early implementation of PBN, IFR Approaches based on PBN should be designed to accommodate mixed-equipage (PBN and non-PBN) environment. ATC workload should be taken into account while developing approach procedures. One possible way to accomplish this is to co-locate the Initial Approach Waypoint for both PBN and 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, and planning for CDO implementation.

5.9 Recognizing the efficiency and environmental benefits of CCO and CDO, and the need to harmonize these operations in the interest of safety, MID States are encouraged to include implementation of CCO and CDO as part of their PBN implementation plans in accordance with the ICAO CCO and CDO Manuals Doc 9993 and 9931 respectively..

#### ***Implementation Strategy***

5.10 In order to address the operational requirements, the following PBN Implementation & Harmonisation Strategy for the ICAO MID Region is formulated as follows:

- a) Implementation of any RNAV or RNP application shall be in compliance with ICAO PBN Manual (Doc 9613);
- b) implementation of RNAV5/RNAV1 depending on operational requirements for continental en-route and local/domestic en-route applications at least until 2016;

- c) implementation of RNAV1/Basic-RNP-1 depending on operational requirements for terminal applications at least until 2016;
- d) implementation of RNAV-10 for oceanic/remote continental until at least 2016;
- e) the use of RNAV 5 / RNAV 1 specification by RNP specifications (e.g. advanced-RNP-1) for the use in the en-route and terminal airspace to commence by 2016;
- f) implementation of approach procedures with vertical guidance (APV) (Baro-VNAV and/or augmented GNSS), including LNAV only minima, for all instrument runway ends, either as the primary approach or as a back-up for precision approaches by 2016 with intermediate milestones as follows: 30 per cent by 2010, 70 per cent by 2014;
- g) implementation of straight-in LNAV only procedures, as an exception to f) 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;
- h) the use of NDB for approach operations shall be terminated not later than 2012. the following States (Egypt, Iran, Jordan and Syria) requested extension and would provide their plans for termination of NDB to ICAO MID;
- i) the operation of CCO and CDO to commence 2013; and
- j) the RNP AR Approaches to commence depending on States operational requirement starting 2012.

## 6. CURRENT STATUS AND FORECAST

### *MID Traffic Forecast*

6.1 The GEN part of FASID (Part II) provides the information and data of the following traffic forecasts and trends:

- air traffic demand for air navigation systems planning
- Passenger traffic
- Aircraft movements
- Major city-pairs traffic

6.2 The forecast data as well as the figures contained in the FASID document are the results of the regular meetings of, MIDANPIRG Traffic Forecasting Sub-group, which had in last meeting in April 2007. Notably however, in the past two years, air traffic growth trend for the MID Region has signalled a significantly higher aircraft fleet and traffic growth than was previously forecast.

6.3 World scheduled traffic measured in terms of Passenger-kilometers Performed (PKPs) is forecast to increase at a “most likely” average annual rate at 4.6 per cent for the period 2005-2025. International traffic is expected to increase at 5.3 per cent per annum.

6.4 The airlines of the Middle East Regions are expected to experience the highest growth in passenger traffic at 5.8 per cent per annum through to the year 2025 compared to the world average of 4.6%.

6.5 World scheduled freight traffic measured in terms of tonne-kilometres performed is forecast to increase at a “most likely” average annual rate of 6.6 per cent for the period 2005-2025. International freight traffic is expected to increase at an average annual growth rate of 6.9 per cent.

6.6 Air freight traffic of the airlines of Middle East region is expected to remain higher than the world average at 7.8 per annum.

6.7 The following major route groups to, from and within the Middle East Region have been identified:

- Between Middle East – Europe
- Between Middle East - Africa
- Between Middle East - Asia/Pacific
- Between Middle East - North America
- Intra Middle East

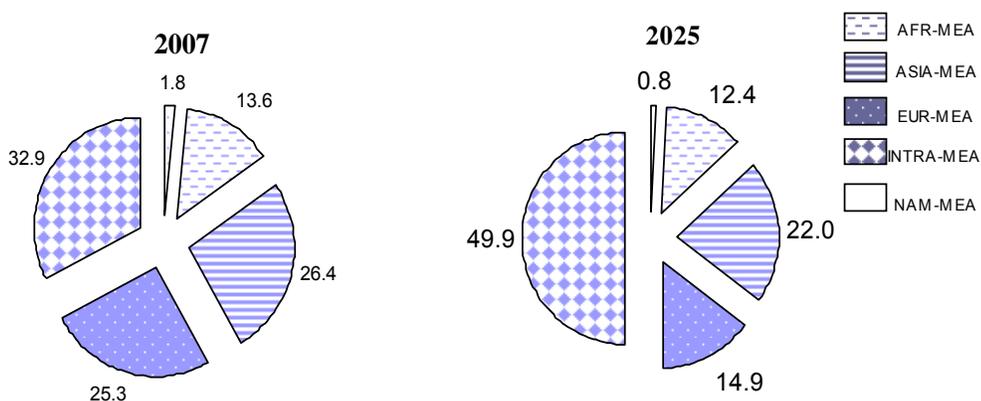
6.8 Movement forecasts for the major route groups for the 2007-2025 periods are depicted in **Table 1**:

**TABLE 1**  
**AIRCRAFT MOVEMENTS FORECAST TO THE YEAR 2025**

|                  | Actual | Forecast | Average                 | Annual | Growths |
|------------------|--------|----------|-------------------------|--------|---------|
|                  | 2007   | 2025     | (per cent)<br>2007-2025 |        |         |
| <b>AFR-MEA</b>   | 84933  | 291159   | 7.1                     |        |         |
| <b>ASIA-MEA</b>  | 165364 | 514979   | 6.5                     |        |         |
| <b>EUR-MEA</b>   | 158346 | 350380   | 4.5                     |        |         |
| <b>INTRA MEA</b> | 205769 | 1170709  | 10.1                    |        |         |
| <b>NAM-MEA</b>   | 11075  | 18703    | 3.0                     |        |         |
| <b>TOTAL</b>     | 625487 | 2345929  | 7.6                     |        |         |

6.9 The total aircraft movements to/from and within the Middle East region are estimated to increase from some 625000 in 2007 to around 2346000 in 2025 at an average annual growth rate of 7.6 per cent. The resulting movements’ shares for the year 2025 are depicted in **Figure 1**:

**FIGURE 1**  
**SHARES OF SELECTED ROUTE GROUPS IN AIRCRAFT MOVEMENTS**



***Aircraft Fleet Readiness***

6.10 IATA had circulated survey and will be compiling the results in report which could be referred to for details.

***CNS Infrastructure***

***Navigation infrastructure***

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

6.11 Global Navigation Satellite System (GNSS) is a satellite-based navigation system utilizing satellite signals, such as Global Positioning System (GPS), 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.

6.12 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.

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

6.14 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. MLAT is under consideration by several MID States (Bahrain, Egypt, Oman and UAE).

***Other PBN Infrastructure***

6.15 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.

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

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

6.18 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 until at least 2016.*

### *Surveillance Infrastructure*

6.19 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 and ICAO PANS-ATM (Doc 4444), and information on the current surveillance infrastructure in the MID can be found in ICAO FASID table.

### *Communication Infrastructure*

6.20 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 ICAO FASID table.

## **7. IMPLEMENTATION ROADMAP OF PBN**

### *ATM Operational Requirements*

7.1 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.

7.2 In this regard, the following programmes will be developed:

- 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
- 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

7.3 The above programmes should conform to the performance objectives and regional action plan supporting the regional implementation plan (roadmap).

### **Short Term (2013-2017)**

#### *En-route*

7.4 During the planning phase of any implementation of PBN routes, 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.

7.5 In this phase, the current application of RNAV 10 is expected to continue for Oceanic and Remote continental routes.

7.6 For Continental routes, the applications of RNAV 5 and RNAV 1 navigation specifications are expected. Before the PBN concept was established, the MID Region adopted the Regional implementation of RNP 5. Under the PBN concept it is now required that RNP 5 will change into RNAV 5. 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).

7.7 **Operational approval.** Operators are required to have operational approval for RNAV 5. Depending on operational requirement RNAV 1 for terminal operations and RNAV 10 for Oceanic/Remote Continental operations.

7.8 Application of RNAV 5 or RNAV 1 for continental en-route will be mandated by the end of 2012.

### *Terminal*

7.9 In selected TMAs, the application of RNAV-1 in a surveillance environment can be supported through the use of GNSS or ground navigation infrastructure, such as DME/DME and DME/DME/IRU. In this phase, mixed operations (equipped and non-equipped) will be permitted.

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

7.11 **Operational approval.** Operators are required to have operational approval for RNAV 1. In addition, operators are required to have Basic RNP 1 approval when operating in procedural control TMAs.

*Note: In order to avoid unnecessary approvals, operators equipped with GNSS should apply for combined RNAV 1 and Basic RNP 1.*

### *Approach*

7.12 The application of RNP APCH procedures is expected to be implemented in the maximum possible number of airports, primarily international airports. To facilitate transitional period, conventional approach procedures and conventional navigation aids should be maintained for non-equipped aircraft.

7.13 States should promote the use of APV operations (Baro-VNAV SBAS) to enhance safety of RNP approaches and accessibility of runways.

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

7.15 States should implement CCO and CDO in their International Airports, in accordance with ASBU Module B0-APTA.

7.16 **Operational approval requirements.** Operators shall plan to have operational approval for RNP APCH with VNAV operations (Baro-VNAV). Depending on operational need, aircraft shall also meet the RNP AR APCH specification.

7.17 Application of RNAV 1 or Basic RNP-1 for all terminal areas and APV/Baro VNAV or APV/SBAS for all instrument runway ends, either as the primary approach or as a back-up for precision approaches will be mandated by 2016.

**SUMMARY TABLE AND IMPLEMENTATION TARGETS**

| <b>SHORT TERM (2013-2017)</b>  |  |  |
|--|--|--|
| <i>Airspace</i>  | <i>Navigation Specification Preferred</i>  | <i>Navigation Specification Acceptable</i> |
| En-route – Oceanic   | RNAV 10  | RNAV 10                                    |
| En-route - Remote continental  | RNAV 5, RNAV 10  | RNAV 10                                    |
| En-route – Continental   | RNAV 5, RNAV 1   | RNAV 5                                     |
| En-route - Local / Domestic  | RNAV 5, RNAV 1   | RNAV 5                                     |
| TMA – Arrival  | RNAV 1 in surveillance environment and with adequate navigation infrastructure. Basic RNP 1 in non-surveillance environment  | RNAV 1                                     |
| TMA – Departure  | RNAV 1 in surveillance environment and with adequate navigation infrastructure. Basic RNP 1 in non-surveillance environment  | RNAV 1                                     |
| Approach   | RNP APCH with Baro VNAV in all possible airports;<br>RNP AR APCH in airport where there are obvious operational benefits.<br>Implementation of straight-in LNAV only procedures, as an exception | LNAV/VNAV                                  |
| <p><b>Implementation Targets</b></p> <ul style="list-style-type: none"> <li>▪ Implementation of approach procedures with vertical guidance (APV) (Baro-VNAV and/or augmented GNSS), including LNAV only minima, for all instrument runway ends, either as the primary approach or as a back-up for precision approaches by 2016 with intermediate milestones as follows: 30% by 2010, and 50 % by 2012; and priority should be given to airports with most significant operational benefits.</li> <li>▪ RNAV 1 SIDs/STARs for 30% of international airports by 2010 and 50% by 2012 and priority should be given to airports with RNP Approach.</li> </ul> |  |  |

**Medium Term (2018-2022)**

*En-route*

7.18 Noting the current development of route spacing standards for RNAV 1, in this phase, it is expected that the implementations of all existing RNAV/RNP routes are consistent with PBN standards. However, in order to ensure implementation harmonization, States are urged to implement their RNAV/RNP routes based on a Regional agreements and consistent PBN navigation specifications and separation standards.

7.19 With regard to oceanic remote operations, it is expected that with the additional surveillance capability, the requirement for RNAV 10 will disappear, and be replaced by navigation specifications for continental en-route applications.

7.20 **Operational approval.** Operators are required to have operational approval for RNAV 5 and RNAV 1.

*Terminal*

7.21 RNAV 1 or Basic RNP 1 will be fully implemented in all TMAs by the end of this term.

7.22 **Operational approval.** Operators are required to have operational approval for RNAV 1/Basic RNP 1 approval.

*Note: In order to avoid unnecessary approvals, operators equipped with GNSS should apply for combined RNAV 1 and Basic RNP 1*

*Approach*

7.23 In this phase, full implementation of RNP APCH with Baro VNAV or APV SBAS for all instrument runways is expected. These applications may also serve as a back-up to precision approaches.

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

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

7.26 **Operational approval requirements.** Operators are required to have operational approval for RNP APCH with VNAV operations (Baro VNAV). Depending on operations, aircraft shall also meet RNP AR specification and the PBN and GLS (CAT II/III) operations.

**SUMMARY TABLE AND IMPLEMENTATION TARGETS**

| <b>MEDIUM TERM (2018-2022)</b>  |   |  |
|---|---|--|
| <i>Airspace</i>   | <i>Navigation Specification (preferred)</i>   | <i>Navigation Specification (/acceptable)</i>  |
| En-route – Oceanic  | RNAV 10   | RNAV 10  |
| En-route - Remote continental   | NIL   | RNAV 10  |
| En-route – Continental  | RNAV 1, RNAV 5  | RNAV 1, RNAV 5   |
| En-route - Local / Domestic   | RNAV 1 , RNAV 5   | RNAV 1,  |
| TMA – (Arrival, Departure)  | RNAV1 or RNP 1 application  | RNAV 1 or RNP 1 application  |
| Approach  | RNP APCH (with Baro VNAV) and APV Expansion of RNP AR APCH where there are operational benefits Introduction of landing capability using GNSS and its augmentations | RNP APCH (with Baro VNAV) and APV Expansion of RNP AR APCH where there are operational benefits Implementation of landing capability using PBN and GLS |
| <p><b>Implementation Targets</b></p> <ul style="list-style-type: none"> <li>▪ RNP APCH with Baro VNAV or APV or LNAV in 100% of instrument runways by 2016</li> <li>▪ RNAV 1 or RNP 1 SID/STAR for 100% of international airports by 2016</li> <li>▪ RNAV 1 or Basic RNP 1 SID/STAR at busy domestic airports where there are operational benefits</li> <li>▪ Implementation additional RNAV/RNP routes</li> <li>▪ CCO and CDO Implementation will continue in this term</li> </ul> |   |  |

**Long Term (2023 and Beyond)**

7.27 In this phase, GNSS 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.

7.28 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.

7.29 Noting the current development of Advanced RNP-1 navigation specification, it is expected that this navigation specification will play an important role in the long term implementation of PBN for enroute and terminal operations.

7.30 With the expectation that precision approach capability using GNSS and its augmentation systems will become available, States are encouraged to explore the use of such capability where there are operational and financial benefits.

7.31 During this term the use of Advanced RNP-1 for terminal and en-route will be mandated by a date to be determined.

## **8. TRANSITIONAL STRATEGIES**

8.1 During the transitional phases of PBN implementation, sufficient ground infrastructure for conventional 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 appropriately to attain equivalent PBN-based navigation performance. States should approach removal of existing ground infrastructure with caution to ensure that safety is not compromised, such as by performance of safety assessment, consultation with users through regional air navigation planning process and national consultative forums. Moreover, noting that navigation systems located in a particular State/FIR may be supporting air navigation in airspaces in other States/FIRs States are required to cooperate and coordinate bilaterally, multilaterally and within the framework of Regional agreements, in the phasing out of conventional ground based navigation systems and maintaining the serviceability of required navigation aids for area navigation (e.g. DME).

8.2 States should ensure that harmonized separation standards and procedures are developed and introduced concurrently in all flight information regions to allow for a seamless transition towards PBN.

8.3 States should cooperate on a multinational basis to implement PBN in order to facilitate seamless and inter-operable systems and undertake coordinated R&D programs on PBN implementation and operation.

8.4 States are encouraged to consider segregating traffic according to navigation capability and granting preferred routes to aircraft with better navigation performance, taking due consideration of the need of State/Military aircraft.

8.5 States should encourage operators and other airspace users to equip with PBN avionics. This can be achieved through early introductions of RNP approaches, preferably those with vertical guidance.

8.6 ICAO MID Region Regional Office should provide leadership supporting implementation and transition towards PBN.

8.7 States should have PBN operational approval process.

8.8 Early Implementation of PBN are encouraged.

## **9. SAFETY ASSESSMENT AND MONITORS**

### *Methodology*

#### **Need for Safety Assessment**

9.1 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.

### **Roles and Responsibilities**

9.2 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. The implementing agency may have the capability to undertake such activities or may seek assistance from the Middle East Regional Monitoring Agency (MID RMA). The latter course of action is preferred as the MID RMA would be in a position to establish the necessary monitoring and data collection activity in an effective manner. Furthermore, the MIDANPIRG/10 meeting in April 2007 adopted the revised Terms of Reference of the MID RMA, whose scope includes safety monitoring of RNP/RNAV.

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

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

9.4 The duties and responsibilities of the MID RMA as well as the agreed principles for its establishment are available from the ICAO MID Regional Office.

## **10. PERIODIC REVIEW OF IMPLEMENTATION ACTIVITIES**

### ***Procedures to Modify the Regional Plan***

Whenever a need is identified for a change to this document, the Request for Change (RFC) Form should be completed and submitted to the ICAO MID Regional Office. The Regional Office will collate RFCs for consideration by the PBN/GNSS Task Force.

10.1 When an amendment has been agreed by a meeting of the PBN/GNSS Task Force, a new version of the PBN Regional Plan will be prepared, with the changes marked by an “[ ]” in the margin, and an endnote indicating the relevant RFC, to enable a reader to note the origin of the change. If the change is in a table cell, the outside edges of the table will be highlighted. Final approval for publication of an amendment to the PBN Regional Plan will be the responsibility of MIDANPIRG.

### **Appendix A – Practical Examples of Tangible Benefits (living document)**

#### **Egypt/ Bahrain / UAE with figures will be provided and inserted here.**

Practical examples of tangible benefits derived from the implementation of PBN are:

- Increased airspace safety through the implementation of continuous and stabilized descent procedures using vertical guidance;

- Provision of runway-aligned final approach path which may not be possible from conventional navigation;
- Reduced aircraft flight time due to the implementation of optimal flight paths, with the resulting savings in fuel, noise reduction, and enhanced environmental protection;
- Improved airport and airspace arrival paths in all weather conditions, and the possibility of meeting critical obstacle clearance and environmental requirements through the application of optimized RNAV or RNP paths;
- Implementation of more precise approach, departure, and arrival paths that will reduce dispersion and will foster smoother traffic flows;
- Reduced delays in high-density airspaces and airports through the implementation of additional parallel routes and additional arrival and departure points in terminal areas;
- Reduction of lateral and longitudinal separation between aircraft to accommodate more traffic;
- Decrease ATC and pilot workload by utilizing RNAV/RNP procedures and airborne capability and reduce the needs for ATC-Pilot communications and radar vectoring;
- Increase of predictability of the flight path; and
- Reduction of maintenance and flight inspection costs associated with conventional navigation aids

**Appendix B – Reference Documentation for Developing Operational and Airworthiness Approval Regulations/Procedures**

Performance-Based Navigation (PBN) Operational Approval Manual (Doc 9997) and General Guidelines for Obtaining Airworthiness and Operational Approvals for PBN Navigation Specifications, Version 1.0, International Air Transport Association, August 2008.

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| Station                                  | RWY Type | Function      | ILS    | L | DME | VOR | NDB | Coverage | GNSS |      |           | REMARKS<br>OBSERVACIONES |
|--|----------|---------------|--------|---|-----|-----|-----|----------|------|------|-----------|--------------------------|
|  |          |               |        |   |     |     |     |          | GPS  | LNAV | LNAV/VNAV |                          |
| 1  | 2        | 3             | 4      | 5 | 6   | 7   | 8   | 9        | 10   | 11   | 12        | 13                       |
| CAIRO/Cairo Intl                         | 05R PA 2 | A/L           | II     | X | XI  | XI  |     | 150/45   |      | I    |           |                          |
|  | 23R PA 2 | A/L           | II(I)  | X |     |     |     |          |      | I    |           |                          |
|  | 23L PA 2 | A/L           | II (I) | X | XI  | XI  |     | 200/45   |      | I    |           |                          |
|  | 05L PA 2 | A/L<br>T<br>E | II (I) | X |     |     |     |          |      |      |           |                          |
|  | 23C PA   |               |        |   |     |     |     |          |      | I    |           |                          |
|  | 05C PA   |               |        |   |     |     |     |          |      | I    |           |                          |
|  | 16 NPA   |               |        |   |     |     |     |          |      |      |           |                          |
|  | 34 NPA   |               |        |   |     |     |     |          |      |      |           |                          |
| HURGHADA/ Hurghada Intl                  | 16 NPA   | A/L           | I*(I)  |   | XI  | XI  |     |          |      | I    |           |                          |
|  | 34 PA 2  | T<br>E        |        |   | XI  | XI  |     | 100/45   |      | I    |           |                          |
| LUXOR/ Luxor Intl                        | 02 NPA   | A/L           | I* (I) |   | XI  | XI  |     |          |      | I    |           |                          |
|  | 20 PA 1  | T<br>E        |        |   | XI  | XI  |     | 150/45   |      | I    |           |                          |
| MARSA ALAM/ Marsa Alam Int'l             | 15 NPA   | A/L           |        |   | XI  | XI  |     | 150/45   |      |      |           |                          |
|  | 33 NPA   |               |        |   |     |     |     |          |      |      |           |                          |
| SHARK EL OWEINAT/ Shark El Oweinat Int'l | 01 NPA   | L             |        |   |     |     | XI  | 100/45   |      |      |           |                          |
|  | 19 NPA   |               |        |   |     |     |     |          |      |      |           |                          |
| PORT –SAID/ Port –Said Int'l             | 10 NPA   | L             |        |   | XI  | XI  |     | 200/45   |      |      |           |                          |
|  | 28 NPA   |               |        |   |     |     |     |          |      |      |           |                          |
| ST. CATHERINE/ St. Catherine Intl        | 17 NPA   | L             |        |   |     |     | XI  | 150/45   |      |      |           |                          |
|  | 35 NINST |               |        |   |     |     |     |          |      |      |           |                          |
| SHARM EL SHEIKH/ Sharm El Sheikh Intl    | 04L PA1  | A/L           | I (II) | X | XI  | XI  | XI  | 100/45   |      | I    |           |                          |
|  | 22R NPA  | T<br>E        |        |   | XI  | XI  |     | 200/50   |      | I    |           |                          |
|  | 04R NPA  |               |        |   |     |     |     |          |      | I    |           |                          |
|  | 22L NPA  |               |        |   |     |     |     |          |      | I    |           |                          |
| ASWAN/ Aswan Intl                        | 17 PA1   | A/L           | II     | X | XI  | XI  |     | 150/45   |      | I    |           |                          |
|  | 35 PA1   | T<br>E        |        |   | XI  | XI  |     |          |      | I    |           |                          |

| Station                              | RWY Type         | Function | ILS    | L | DME | VOR | NDB | Coverage         | GNSS |        |           | REMARKS<br>OBSERVACIONES |
|--------------------------------------|------------------|----------|--------|---|-----|-----|-----|------------------|------|--------|-----------|--------------------------|
|                                      |                  |          |        |   |     |     |     |                  | GPS  | LNAV   | LNAV/VNAV |                          |
| 1                                    | 2                | 3        | 4      | 5 | 6   | 7   | 8   | 9                | 10   | 11     | 12        | 13                       |
| TABA/ Taba Int'l                     | 04 NPA<br>22 NPA | A/L<br>T |        |   | X   | XI  | XI  | 150/45<br>100/45 |      | I<br>I |           |                          |
| <b>IRAN, ISLAMIC<br/>REPUBLIC OF</b> |                  |          |        |   |     |     |     |                  |      |        |           |                          |
| ABADAN                               | 32L PA 1         | A/L<br>E | I* (I) |   | XI  | XI  |     | 200/45           |      |        |           |                          |
| AHWAZ                                | 30 PA 1          | A/L<br>E | I* (I) |   | XI  | XI  |     | 300/45           |      |        |           |                          |
| ARDABIL                              | 33 PA 1          | A/L<br>E | I* (I) |   | XI  | XI  |     | 200/45           |      |        |           |                          |
| ASALOYEH                             | 30 PA 1          | A/L<br>E | I*     |   | XI  | XI  |     | 300/45           |      |        |           |                          |
| BANDAR ABBAS/Intl                    | 21L PA1          | A/L<br>E | I* (I) |   | XI  | XI  |     | 200/45           |      |        |           |                          |
| BANDAR LENGEH                        | NPA              | A/L<br>E |        |   | XI  | XI  |     | 200/45           |      |        |           |                          |
| BANDAR MAHSHAHR /<br>MAHSHAHR        | NPA              | A/L<br>E |        |   | XI  | XI  |     | 300/45           |      |        |           |                          |
| BIRJAND                              |                  | E        |        |   | XI  | XI  |     | 300/50           |      |        |           |                          |
| BOJNORD                              | NINST            | E        |        |   | XI  | XI  |     | 150/45           |      |        |           |                          |
| BUSHEHR                              | 30 PA2           | A/L<br>E | I*     |   | XI  | XI  |     | 300/45           |      |        |           |                          |
| CHAH BAHAR /<br>KONARAK              | NPA              | A/L<br>E |        |   | XI  | XI  |     | 200/45           |      |        |           |                          |
| DARBAND                              |                  | E        |        |   | XI  | XI  |     | 300/45           |      |        |           |                          |
| DEH-NAMAK                            |                  | E        |        |   | XI  | XI  |     | 300/45           |      |        |           |                          |
| ESFAHAN / Shahid<br>Beheshti Intl    | 26R PA 1         | A/L<br>E | I*(I)  |   | XI  | XI  |     | 300/45           |      |        |           |                          |
| HAMADAN                              | NPA              | A/L<br>E |        |   | XI  | XI  |     | 200/45           |      |        |           |                          |

| Station                                 | RWY Type | Function | ILS    | L | DME | VOR | NDB | Coverage | GNSS |      |           | REMARKS<br>OBSERVACIONES |
|---|----------|----------|--------|---|-----|-----|-----|----------|------|------|-----------|--------------------------|
|   |          |          |        |   |     |     |     |          | GPS  | LNAV | LNAV/VNAV |                          |
| 1                                       | 2        | 3        | 4      | 5 | 6   | 7   | 8   | 9        | 10   | 11   | 12        | 13                       |
| ILAM                                    | NPA      | A/L<br>E |        |   | XI  | XI  |     | 300/45   |      |      |           |                          |
| IRAN-SHAHR                              | NPA      | A/L<br>E |        |   | X   | X   |     | 300/45   |      |      |           |                          |
| JAM/TOHID                               | NPA      | A/L      |        |   | XI  | XI  |     | 300/45   |      |      |           |                          |
| KARAJ / PAYAM                           | NPA      | A/L      |        |   | XI  | XI  |     | 200/45   |      |      |           |                          |
| KERMAN                                  | 34 PA1   | A/L<br>E | I*(I)  |   | XI  | XI  |     | 200/45   |      |      |           |                          |
| KERMANSHAH / Shahid<br>Ashrafi Esfahani | 29 PA1   | A/L<br>E | I* (I) |   | XI  | XI  |     | 300/45   |      |      |           |                          |
| KHARK ISLAND /Khark                     | NPA      | A/L<br>E |        |   | XI  | XI  |     | 300/45   |      |      |           |                          |
| KHORAM ABAD                             | 29 PA 1  | A/L<br>E | I*     |   | XI  | XI  |     | 200/45   |      |      |           |                          |
| KISH ISLAND                             | NPA      | A/L<br>E |        |   | XI  | XI  |     | 200/45   |      |      |           |                          |
| MALAYER                                 |          | E        |        |   | XI  | XI  |     | 300/45   |      |      |           |                          |
| MASHHAD / Shahid<br>Hashemi Nejad Intl  | 31R PA1  | A/L<br>E | I* (I) |   | XI  | XI  |     | 300/45   |      |      |           |                          |
| NOSHAHR                                 | NPA      | A/L<br>E |        |   | X   | X   |     | 200/45   |      |      |           |                          |
| OMIDIYEH                                | NPA      | A/L      |        |   | XI  | XI  |     | 200/45   |      |      |           |                          |
| RASHT                                   | 27 PA 1  | A/L<br>E | I* (I) |   | XI  | XI  |     | 300/45   |      |      |           |                          |
| SABZEVAR                                | NPA      | A/L<br>E |        |   | XI  | XI  |     | 300/45   |      |      |           |                          |
| ANARAK                                  |          | E        |        |   | XI  | XI  |     | 300/45   |      |      |           |                          |
| SANANDAJ                                | NPA      | A/L<br>E |        |   | XI  | XI  |     | 200/45   |      |      |           |                          |

| Station                        | RWY Type                    | Function                      | ILS                                  | L                    | DME                  | VOR                  | NDB | Coverage | GNSS     |        |           | REMARKS<br>OBSERVACIONES |
|--------------------------------|-----------------------------|-------------------------------|--------------------------------------|----------------------|----------------------|----------------------|-----|----------|----------|--------|-----------|--------------------------|
|                                |                             |                               |                                      |                      |                      |                      |     |          | GPS      | LNAV   | LNAV/VNAV |                          |
| 1                              | 2                           | 3                             | 4                                    | 5                    | 6                    | 7                    | 8   | 9        | 10       | 11     | 12        | 13                       |
| SARI/Dashte-Naz                | NPA                         | A/L<br>E                      |                                      |                      | XI                   | XI                   |     | 300/45   |          |        |           |                          |
| SAVEH                          |                             | E                             |                                      |                      | XI                   | X                    |     | 300/45   |          |        |           |                          |
| SHIRAZ / Shahid Dastghaib Intl | 29L PA 1                    | A/L<br>E                      | I* (I)                               |                      | XI                   | XI                   |     | 300/45   |          | I      |           |                          |
| SIRJAN                         | NPA                         | A/L<br>E                      |                                      |                      | XI                   | XI                   |     | 200/45   |          |        |           |                          |
| TABRIZ Intl                    | 30R PA 1                    | A/L<br>E                      | I* (I)                               |                      | XI                   | XI                   |     | 200/45   |          |        |           |                          |
| TEHRAN/Imam Khomeini Intl      | 29R PA 2                    | A/L                           | II* (I)                              |                      | XI                   | XI                   |     | 300/45   |          |        |           |                          |
| TEHRAN/Mehrabad Intl           | 29L PA 1                    | A/L<br>E                      | I* (I)                               | XI                   | XI                   | XI                   |     | 300/45   |          | I      |           |                          |
| UROMIYEH                       | 21 PA1                      | A/L<br>E                      | I* (I)                               |                      | XI                   | XI                   |     | 200/45   |          |        |           |                          |
| YAZD / Shahid Sadooghi         | NPA                         | A/L<br>E                      |                                      |                      | XI                   | XI                   |     | 300/45   |          |        |           |                          |
| ZAHEDAN                        | 35 PA1                      | A/L<br>E                      | I* (I)                               |                      | XI                   | XI                   |     | 200/45   |          |        |           |                          |
| ZANJAN                         | NPA                         | E                             |                                      |                      | XI                   | XI                   | XI  | 200/45   |          |        |           |                          |
| <b>IRAQ</b>                    |                             |                               |                                      |                      |                      |                      |     |          |          |        |           |                          |
| AIN ZALAH                      |                             | E                             |                                      |                      | X                    | X                    |     | 100/50   |          |        |           |                          |
| BAGHDAD/ Baghdad Int'l         | 15R PA 1<br>INST<br>33L NPA | A/L<br>A/L<br>A/L<br>A/L<br>E | II (I)<br>II (I)<br>II (I)<br>II (I) | XI<br>XI<br>XI<br>XI | XI<br>XI<br>XI<br>XI | XI<br>XI<br>XI<br>XI |     | 200/45   | XI<br>XI | I<br>I |           |                          |

| Station                     | RWY Type                                    | Function                 | ILS                          | L                   | DME                 | VOR                  | NDB                  | Coverage         | GNSS     |                  |           | REMARKS<br>OBSERVACIONES |
|-----------------------------|---|--------------------------|------------------------------|---------------------|---------------------|----------------------|----------------------|------------------|----------|------------------|-----------|--------------------------|
|                             |   |                          |                              |                     |                     |                      |                      |                  | GPS      | LNAV             | LNAV/VNAV |                          |
| 1                           | 2   | 3                        | 4                            | 5                   | 6                   | 7                    | 8                    | 9                | 10       | 11               | 12        | 13                       |
| BASRAH/Intl                 | 14 NINST<br>32 NPA                          | A/L<br>A/L<br>E          | II<br>II (I)                 | XI<br>XI            | XI<br>XI            | XI<br>XI             |                      | 300/45           |          |                  |           |                          |
| HASHIMIYA                   |   | E                        |                              |                     | X                   | X                    |                      | 200/45           |          |                  |           |                          |
| (HADITHA)                   |   | E                        |                              |                     | X                   | X                    |                      | 100/50           |          |                  |           |                          |
| MANDALY                     |   | E                        |                              |                     |                     |                      |                      |                  |          |                  |           |                          |
| MOSUL                       | PA 1  | A/L                      |                              | X                   | X                   | X                    |                      |                  | XI<br>XI |                  |           |                          |
| SAMARA                      |   | E                        |                              |                     | X                   | X                    |                      | 200/45           |          |                  |           |                          |
| HAWIJA                      |   | E                        |                              |                     | X                   | X                    |                      | 100/50           |          |                  |           |                          |
| SHATRA                      |   | E                        |                              |                     | X                   | X                    |                      | 100/50           |          |                  |           |                          |
| ORNI Al Najaf/Al Najaf Intl | 10 NPA                                      |                          |                              |                     |                     |                      |                      |                  |          |                  |           |                          |
| <b>JORDAN</b>               |   |                          |                              |                     |                     |                      |                      |                  |          |                  |           |                          |
| AMMAN/MARKA                 | 24 PA 1<br>06 NPA                           | A/L<br>A/L               | I (I)                        | XI<br>X             | XI                  | XI                   | XI                   | 175/37.5         |          |                  |           |                          |
| AMMAN/Queen Alia            | 08R NPA<br>26L PA 2<br>08L PA 2<br>26R PA 2 | A/L<br>A/L<br>A/L<br>A/L | X<br>II(I)<br>II(I)<br>II(I) | X<br>XI<br>XI<br>XI | X<br>XI<br>XI<br>XI | XI<br>XI<br>XI<br>XI | XI<br>XI<br>XI<br>XI |                  |          | I<br>I<br>I<br>I |           |                          |
| AQABA/king Hussein          | 01 PA 1                                     | A/L<br>E                 | I(I)                         | XI                  | XI                  | XI                   | X                    | 200/50<br>200/50 |          | I                |           |                          |
| METSA                       |   | E                        |                              |                     | X                   | X                    |                      | 150/50           |          |                  |           |                          |
| QATRANEH                    |   | E                        |                              |                     | XI                  | XI                   |                      | 100/50           |          |                  |           |                          |

| Station              | RWY Type                                     | Function                           | ILS  | L                | DME                        | VOR                  | NDB | Coverage | GNSS             |                  |                  | REMARKS<br>OBSERVACIONES |
|----------------------|--|------------------------------------|--|------------------|----------------------------|----------------------|-----|----------|------------------|------------------|------------------|--------------------------|
|                      |  |                                    |  |                  |                            |                      |     |          | GPS              | LNAV             | LNAV/VNAV        |                          |
| 1                    | 2  | 3                                  | 4  | 5                | 6                          | 7                    | 8   | 9        | 10               | 11               | 12               | 13                       |
| <b>KUWAIT</b>        |  |                                    |  |                  |                            |                      |     |          |                  |                  |                  |                          |
| KUWAIT/Intl          | 15R PA 2<br>33L PA 2<br>15L PA 2<br>33R PA 2 | A/L<br>A/L<br>A/L<br>A/L<br>T<br>E | II (I)<br>II (I)<br>II (I)<br>II (I)         | XI<br>XI         | XI<br>XI<br>XI<br>XI<br>XI |                      |     |          | 300/50<br>300/50 | I<br>I<br>I<br>I | I<br>I<br>I<br>I |                          |
| <b>LEBANON</b>       |  |                                    |  |                  |                            |                      |     |          |                  |                  |                  |                          |
| BEIRUT/Beirut Intl   | 16 PA 1<br>17 PA 1<br>03 PA 1<br>21 PA1      | A/L<br>A/L<br>A/L<br>A/L           | I* (I) D<br>I* (I) D<br>I* (I) D<br>I* (I) D | X<br>X<br>X<br>X | XI<br>XI<br>XI<br>XI       | XI<br>XI<br>XI<br>XI | XI  |          |                  | I<br>I<br>I<br>I |                  | 150/45                   |
| CHEKKA               |  | E                                  |  |                  | Xi                         | XI                   |     | 150/50   |                  |                  |                  |                          |
| HALDE                |  | E/T                                |  |                  | Xi                         | XI                   |     | 150/50   |                  |                  |                  |                          |
| BOD                  |  | E/T                                |  |                  |                            |                      | XI  | 150      |                  |                  |                  |                          |
| BAB                  |  | E/T                                |  |                  |                            |                      | XI  | 150      |                  |                  |                  |                          |
| <b>OMAN</b>          |  |                                    |  |                  |                            |                      |     |          |                  |                  |                  |                          |
| HAIMA                |  | E                                  |  |                  | XI                         | XI                   |     | 200/45   |                  |                  |                  |                          |
| IZKI                 |  | E                                  |  |                  | XI                         | XI                   |     | 200/45   |                  |                  |                  |                          |
| MARMUL               | 14 NPA<br>32 NPA                             | E                                  |  |                  |                            |                      |     |          |                  |                  | I<br>I           |                          |
| MUSCAT/ Intl         | 08 PA 1<br>26 PA 1                           | A/L<br>A/L<br>E                    | I* (I) D<br>I* (I) D                         |                  | XI<br>XI<br>XI             | XI                   |     | 200/45   |                  |                  |                  |                          |
| SALALAH/Salalah Intl | 07 NPA<br>25 PA 1                            | A/L<br>A/L<br>E                    | I* (I) D                                     |                  | XI<br>XI<br>XI             | XI<br>XI<br>XI       |     | 200/45   |                  |                  |                  |                          |

| Station                        | RWY Type                              | Function                      | ILS    | L | DME                     | VOR                     | NDB | Coverage | GNSS |        |           | REMARKS<br>OBSERVACIONES |
|--------------------------------|---------------------------------------|-------------------------------|--------|---|-------------------------|-------------------------|-----|----------|------|--------|-----------|--------------------------|
|                                |                                       |                               |        |   |                         |                         |     |          | GPS  | LNAV   | LNAV/VNAV |                          |
| 1                              | 2                                     | 3                             | 4      | 5 | 6                       | 7                       | 8   | 9        | 10   | 11     | 12        | 13                       |
| SUR                            |                                       | E                             |        |   | X I                     | X I                     |     | 200/45   |      |        |           |                          |
| <b>QATAR</b><br>DOHA/Doha Intl | 16 NPA<br>34 PA 1                     | A/L<br>A/L<br>E               | I* (I) | X | X<br>X<br>X             | X<br>X<br>X             |     | 300/45   |      | I<br>I |           |                          |
| <b>SAUDI ARABIA</b><br>AL JOUF | 10 NPA<br>28 NPA<br>28 PA 1           | A/L<br>A/L<br>A/L<br>T        | I*     |   | XI<br>XI<br>XI<br>X     | XI<br>XI<br>XI<br>X     |     | 300/50   |      |        |           |                          |
| AL SHIGAR                      |                                       | E                             |        |   | XI                      | XI                      |     | 300/50   |      |        |           |                          |
| ARAR                           | 10 NPA<br>28 NPA                      | A/L<br>A/L<br>T<br>E          |        |   | XI<br>XI<br>X<br>XI     | XI<br>XI<br>X<br>XI     |     | 300/50   |      | I<br>I |           |                          |
| BAHA                           | 07 NPA<br>25 NPA<br>25 NPA<br>25 PA 1 | A/L<br>A/L<br>A/L<br>A/L<br>T | I*     | X | XI<br>XI<br>XI<br>X     | XI<br>XI<br>XI<br>X     |     | 300/50   |      | I<br>I |           |                          |
| BIR DURB                       |                                       | E                             |        |   | X                       | X                       |     | 300/50   |      |        |           |                          |
| BISHA                          | 18 NPA<br>36 NPA<br>18 PA1            | A/L<br>A/L<br>A/L<br>T<br>E   | I*     |   | XI<br>XI<br>X<br>X<br>X | XI<br>XI<br>X<br>X<br>X |     | 300/50   |      | I      |           |                          |

| Station                  | RWY Type | Function | ILS   | L  | DME | VOR | NDB | Coverage | GNSS |      |           | REMARKS<br>OBSERVACIONES |
|--------------------------|----------|----------|-------|----|-----|-----|-----|----------|------|------|-----------|--------------------------|
|                          |          |          |       |    |     |     |     |          | GPS  | LNAV | LNAV/VNAV |                          |
| 1                        | 2        | 3        | 4     | 5  | 6   | 7   | 8   | 9        | 10   | 11   | 12        | 13                       |
| BOPAN                    |          | E        |       |    | XI  | XI  |     | 300/50   |      |      |           |                          |
| DAFINAH                  |          | E        |       |    | XI  | XI  |     | 300/50   |      |      |           |                          |
| DAMMAM (King Fahad Intl) | 16L PA 2 | A/L      | I (I) |    | XI  | XI  |     | 300/50   |      |      |           |                          |
|                          | 34R PA 2 | A/L      | I (I) |    | XI  | XI  |     |          |      |      |           |                          |
|                          | 16R PA 2 | A/L      | I (I) |    | XI  | XI  |     |          |      |      |           |                          |
|                          | 34L PA 2 | A/L      | I (I) |    | XI  | XI  |     |          |      |      |           |                          |
|                          | T        |          |       |    | XI  | XI  |     |          |      |      |           |                          |
|                          | E        |          |       | XI | XI  |     |     |          |      |      |           |                          |
| GASSIM                   | 15 NPA   | A/L      |       |    | XI  | XI  |     | 300/50   |      |      |           |                          |
|                          | 33 NPA   | A/L      |       |    | XI  | XI  |     |          |      |      |           |                          |
|                          | 15 PA 1  | A/L      | I*    |    | X   |     |     |          |      |      |           |                          |
|                          | T        |          |       |    | X   | X   |     |          |      |      |           |                          |
|                          | E        |          |       |    | X   | X   |     |          |      |      |           |                          |
| GURIAT                   | 10 NPA   | A/L      |       |    | XI  | XI  |     | 300/50   |      |      |           |                          |
|                          | 28 NPA   | A/L      |       | X  |     |     |     |          |      |      |           |                          |
|                          | 28 NPA   | A/L      |       |    | XI  | X   |     |          |      |      |           |                          |
|                          | T        |          |       |    | X   | X   |     |          |      |      |           |                          |
|                          | E        |          |       |    | X   | X   |     |          |      |      |           |                          |
| HAFR AL-BATIN            | 16 NPA   | A/L      |       |    | XI  | XI  |     | 300/50   |      |      |           |                          |
|                          | 34 NPA   | A/L      |       |    | XI  | XI  |     |          |      |      |           |                          |
|                          | T        |          |       |    | X   | X   |     |          |      |      |           |                          |
|                          | E        |          |       |    | XI  | XI  |     |          |      |      |           |                          |
|                          |          |          |       |    |     |     |     |          |      |      |           |                          |
| HAIL                     | 18 NPA   | A/L      |       |    | XI  | XI  |     | 300/50   |      |      |           |                          |
|                          | 36 NPA   | A/L      |       |    | XI  | XI  |     |          |      |      |           |                          |
|                          | 18 PA 1  | A/L      | I*    |    | X   |     |     |          |      |      |           |                          |
|                          | T        |          |       |    | X   | X   |     |          |      |      |           |                          |
|                          | E        |          |       |    | X   | X   |     |          |      |      |           |                          |
| HALAIFA                  |          | E        |       |    | XI  | XI  |     | 300/50   |      |      |           |                          |

| Station                               | RWY Type  | Function                               | ILS  | L      | DME                              | VOR                              | NDB | Coverage | GNSS |                            |           | REMARKS<br>OBSERVACIONES |
|---------------------------------------|---|--|--|--------|----------------------------------|----------------------------------|-----|----------|------|----------------------------|-----------|--------------------------|
|                                       |   |  |  |        |                                  |                                  |     |          | GPS  | LNAV                       | LNAV/VNAV |                          |
| 1                                     | 2   | 3                                      | 4  | 5      | 6                                | 7                                | 8   | 9        | 10   | 11                         | 12        | 13                       |
| JEDDAH/King Abdul Aziz Intl           | 16R PA 2<br>34L PA 2<br>16L PA 1<br>34R PA 1<br>16C PA 2<br>34C PA2 | A/L<br>A/L<br>A/L<br>A/L<br>A/L<br>A/L | II (I)<br>II (I)<br>I* (I)<br>I* (I)<br>II (I)<br>II (I) |        | XI<br>XI<br>XI<br>XI<br>XI<br>XI | XI<br>XI<br>XI<br>XI<br>XI<br>XI |     |          |      | I<br>I<br>I<br>I<br>I<br>I |           |                          |
|                                       |   | T<br>E                                 |  |        | XI<br>XI                         | XI<br>XI                         |     | 300/50   |      |                            |           |                          |
| JUBAIL                                | 17 NPA<br>35 NPA<br>35 PA 1   | A/L<br>A/L<br>A/L                      | I*<br>I*<br>I*   |        | X<br>X                           | X<br>X                           |     |          |      |                            |           |                          |
|                                       |   | T                                      |  |        | X                                |                                  |     | 300/50   |      |                            |           |                          |
| MADINAH/Prince Mohammad Bin Abdulaziz | 17 PA 1<br>35 PA 1<br>36 PA 1<br>18 NPA                             | A/L<br>A/L<br>A/L<br>A/L               | I*<br>I*<br>I*<br>I*                                     | X<br>X | XI<br>XI<br>XI<br>XI             | XI<br>XI<br>XI<br>XI             |     |          |      |                            |           |                          |
|                                       |   | T<br>E                                 |  |        | XI<br>XI                         | XI<br>XI                         |     | 300/50   |      |                            |           |                          |
| MAGALA                                |   | E                                      |  |        | XI                               | XI                               |     | 300/50   |      |                            |           |                          |
| RABIGH                                |   | E                                      |  |        | XI                               | XI                               |     | 300/50   |      |                            |           |                          |
| RAFHA                                 | 11 NPA<br>29 NPA  | A/L<br>A/L                             |  |        | XI<br>XI                         | XI<br>XI                         | I   |          |      |                            |           |                          |
|                                       |   | T<br>E                                 |  |        | X<br>XI                          | X<br>XI                          |     | 300/50   |      |                            |           |                          |
| RAGHBA                                |   | E                                      |  |        | XI                               | XI                               |     | 300/50   |      |                            |           |                          |
| RIYADH/King Khalid Intl               | 15L PA 1<br>33R PA 1<br>15R PA 1<br>33L PA 1                        | A/L<br>A/L<br>A/L<br>A/L               | I* (I)<br>I* (I)<br>I* (I)<br>I* (I)                     |        | XI<br>XI<br>XI<br>XI             | XI<br>XI<br>XI<br>XI             |     |          |      |                            |           |                          |
|                                       |   | T<br>E                                 |  |        | XI<br>XI                         | XI<br>XI                         |     | 300/50   |      |                            |           |                          |

| Station                     | RWY Type                              | Function                           | ILS    | L | DME                       | VOR                       | NDB              | Coverage | GNSS |        |           | REMARKS<br>OBSERVACIONES |
|-----------------------------|---------------------------------------|------------------------------------|--------|---|---------------------------|---------------------------|------------------|----------|------|--------|-----------|--------------------------|
|                             |                                       |                                    |        |   |                           |                           |                  |          | GPS  | LNAV   | LNAV/VNAV |                          |
| 1                           | 2                                     | 3                                  | 4      | 5 | 6                         | 7                         | 8                | 9        | 10   | 11     | 12        | 13                       |
| TURAIF                      | 10 NPA<br>28 NPA                      | A/L<br>A/L<br>T<br>E               |        |   | XI<br>XI<br>X<br>XI       | XI<br>XI<br>X<br>XI       |                  | 300/50   |      |        |           |                          |
| WADI AL-DAWASIR             | 10 NPA<br>28 NPA<br>10 PA 1           | A/L<br>A/L<br>A/L<br>T<br>E        | I*     |   | XI<br>XI<br>XI<br>X<br>XI | XI<br>XI<br>XI<br>X<br>XI |                  | 300/50   |      | I<br>I |           |                          |
| WEDJH                       | 15 NPA<br>33 NPA<br>33 NPA<br>33 PA 1 | A/L<br>A/L<br>A/L<br>A/L<br>T<br>E | I*     | X | XI<br>XI<br><br>X<br>XI   | XI<br>XI<br><br>X<br>XI   |                  | 300/50   |      | I      |           |                          |
| YENBO                       | 10 NPA<br>28 NPA<br>28 PA 1           | A/L<br>A/L<br>A/L<br>T<br>E        | I*     |   | XI<br>XI<br>XI<br>X<br>XI | XI<br>XI<br>XI<br>X<br>XI |                  | 300/50   |      | I<br>I |           |                          |
| <b>SYRIAN ARAB REPUBLIC</b> |                                       |                                    |        |   |                           |                           |                  |          |      |        |           |                          |
| ALEPPO/Neirab               | 27 PA2                                | A/L<br>E                           |        | X |                           | X<br>X                    |                  | 150/50   |      |        |           |                          |
| DAMASCUS/Intl               | 05L PA2<br>23R PA 2<br>05R PA2        | A/L<br>A/L<br>A/L<br>E             | I* (I) | X | XI<br>XI<br>XI<br>XI      | XI<br>XI<br>XI<br>XI      | I<br>I<br>I<br>I | 150/50   |      | I      | I         |                          |
| KARIATAIN                   |                                       | E                                  |        |   | X                         | X                         |                  | 150/50   |      |        |           |                          |
| LATAKIA/Bassel -Al- Assad   | 17 NPA                                | A/L                                |        | X | XI                        | XI                        |                  |          |      |        |           |                          |

| Station                               | RWY Type                                     | Function                      | ILS                                    | L      | DME                        | VOR                        | NDB | Coverage | GNSS |        |           | REMARKS<br>OBSERVACIONES |
|---------------------------------------|--|-------------------------------|--|--------|----------------------------|----------------------------|-----|----------|------|--------|-----------|--------------------------|
|                                       |  |                               |  |        |                            |                            |     |          | GPS  | LNAV   | LNAV/VNAV |                          |
| 1                                     | 2  | 3                             | 4                                      | 5      | 6                          | 7                          | 8   | 9        | 10   | 11     | 12        | 13                       |
| TANF                                  |  | E                             |  |        |                            | X                          |     | 160/40   |      |        |           |                          |
| <b>UNITED ARAB<br/>EMIRATES</b>       |  |                               |  |        |                            |                            |     |          |      |        |           |                          |
| ABU DHABI/Abu Dhabi<br>Intl           | 13 PA 1<br>31 PA 3                           | A/L<br>A/L<br>E               | I* (I)<br>III (I)                      |        | XI<br>XI<br>XI             | XI<br>XI<br>XI             |     | 300/45   |      | I<br>I |           | RNP AR<br>RNP AR         |
| AL AIN/AI Ain Intl                    | 01 PA 1<br>19 NPA                            | A/L<br>A/L<br>E               | I*                                     |        | XI<br>XI<br>XI             | XI<br>XI<br>XI             |     | 300/45   |      |        |           |                          |
| DUBAI/Dubai Intl                      | 12L PA 3<br>30R PA 3<br>12R PA 2<br>30L PA 2 | A/L<br>A/L<br>A/L<br>A/L<br>E | III (I)<br>III (I)<br>II (I)<br>II (I) |        | XI<br>XI<br>XI<br>XI<br>XI | XI<br>XI<br>XI<br>XI<br>XI |     | 300/45   |      | I<br>I |           |                          |
| FUJAIRAH/Fujairah Intl                | 11 NPA<br>29 PA 1                            | A/L<br>A/L<br>T               | I* (I)                                 |        | XI<br>XI<br>XI             | XI<br>XI<br>XI             |     | 40/25    |      | I<br>I |           |                          |
| RAS AL KHAIMAH/Ras al<br>Khaimah Intl | 16 NPA<br>34 PA 1                            | A/L<br>A/L                    | I* (I)                                 | X<br>X | XI                         | XI                         |     |          |      |        |           |                          |
| SHARJAH/Sharjah Intl                  | 12 NPA<br>30 PA 1                            | A/L<br>A/L<br>E               | I* (I)                                 | X I    | XI<br>XI                   | X<br>X<br>XI               |     | 300/45   |      | I<br>I | I<br>I    |                          |
| <b>YEMEN</b>                          |  |                               |  |        |                            |                            |     |          |      |        |           |                          |
| ADEN/Intl                             | 08 NPA<br>26 PA 1                            | A/L<br>A/L<br>E               | I* (I)                                 | X      | XI<br>XI<br>XI             | XI<br>XI<br>XI             |     | 300/50   |      |        |           |                          |
| AL-GHAIDAH                            |  | E                             |  |        | X                          | X                          |     | 300/50   |      |        |           |                          |

| Station       | RWY Type          | Function        | ILS    | L      | DME            | VOR            | NDB | Coverage | GNSS |      |           | REMARKS<br>OBSERVACIONES |
|---------------|-------------------|-----------------|--------|--------|----------------|----------------|-----|----------|------|------|-----------|--------------------------|
|               |                   |                 |        |        |                |                |     |          | GPS  | LNAV | LNAV/VNAV |                          |
| 1             | 2                 | 3               | 4      | 5      | 6              | 7              | 8   | 9        | 10   | 11   | 12        | 13                       |
| HODEIDAH      | 03 NPA<br>21 NPA  | A/L<br>A/L<br>E |        | X<br>X | X<br>X<br>X    | X<br>X<br>X    |     | 200/45   |      | I    |           |                          |
| MUKALALA/Intl | 06 NPA<br>24 NPA  | A/L<br>A/L<br>E |        |        | X<br>X<br>X    | X<br>X<br>X    |     | 300/50   |      |      |           |                          |
| SANA'A/Intl   | 18 PA 1<br>36 NPA | A/L<br>A/L<br>E | I* (I) | X      | XI<br>XI<br>XI | XI<br>XI<br>XI |     | 200/45   |      |      |           |                          |
| SIYUN         |                   | E               |        |        | X              | X              |     | 150/45   |      |      |           |                          |
| TAIZ/Intl     | 01 NPA<br>19 NPA  | A/L<br>A/L<br>E |        | X<br>X | X<br>X<br>X    | X<br>X<br>X    |     | 200/45   |      |      |           |                          |

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PBN/GNSS TF/5  
Appendix 4C to the Report on Agenda Item 4

**MID REGION TMA<sub>s</sub> PROCEDURES PLAN**

| Int'l<br>Aerodrome | RWY | Approach  |     |            |      |                |        |    |     | SID          |      | STAR         |      | Remarks |
|--------------------|-----|-----------|-----|------------|------|----------------|--------|----|-----|--------------|------|--------------|------|---------|
|                    |     | Precision |     | VOR or NDB | LNAV | LNAV /<br>VNAV | RNP AR | LP | LPV | Conventional | RNAV | Conventional | RNAV |         |
|                    |     | xLS       | CAT |            |      |                |        |    |     |              |      |              |      |         |
| <b>BAHRAIN</b>     |     |           |     |            |      |                |        |    |     |              |      |              |      |         |
| OBBI               | 12L | ILS       | I   | VORDME     | Y    | -              | -      | -  | -   | -            | Y    | -            | Y    |         |
|                    | 30R | ILS       | I   | VORDME     | Y    | -              | -      | -  | -   | -            | Y    | -            | Y    |         |
| <b>EGYPT</b>       |     |           |     |            |      |                |        |    |     |              |      |              |      |         |
| HEAX               | 04  | -         | -   | VORDME     | Y    | -              | -      | -  | -   | -            | -    | -            | Y    |         |
|                    | 18  | -         | -   | -          |      | -              | -      | -  | -   | -            | -    | -            |      |         |
|                    | 22  | -         | -   | VORDME     | Y    | -              | -      | -  | -   | -            | -    | -            | Y    |         |
|                    | 36  | -         | -   | VORDME     | -    | -              | -      | -  | -   | -            | -    | -            | -    |         |
| HEBA               | 14  | -         | -   | -          | -    | -              | -      | -  | -   | -            | -    | -            | -    |         |
|                    | 32  | ILS       | I   | -          | Y    | -              | -      | -  | -   | -            | Y    | -            | -    |         |
| HESN               | 17  | -         | -   | VORDME     | Y    | -              | -      | -  | -   | -            | Y    | -            | Y    |         |
|                    | 35  | ILS       | I   | VORDME     | Y    | -              | -      | -  | -   | -            | Y    | -            | Y    |         |
| HEAT               | 13  | -         | -   | -          | Y    | -              | -      | -  | -   | -            | Y    | -            | Y    |         |
|                    | 31  | ILS       | I   | VORDME     | Y    | -              | -      | -  | -   | -            | Y    | -            | Y    |         |
| HECA               | 05L | ILS       | I   | VORDME     | Y    | -              | -      | -  | -   | -            | -    | -            | -    |         |
|                    | 05C | ILS       | II  | VORDME     | Y    | -              | -      | -  | -   | -            | -    | -            | -    |         |
|                    | 05R | ILS       | I   | -          | -    | -              | -      | -  | -   | -            | -    | -            | -    |         |
|                    | 23L | ILS       | I   | VORDME     | -    | -              | -      | -  | -   | -            | -    | -            | -    |         |
|                    | 23C | ILS       | II  | VORDME     | Y    | -              | -      | -  | -   | -            | -    | -            | -    |         |
|                    | 23R | ILS       | I   | VORDME     | Y    | -              | -      | -  | -   | -            | -    | -            | -    |         |
| HEAR               | 16  | -         | -   | -          | -    | -              | -      | -  | -   | -            | -    | -            | -    |         |
|                    | 34  | -         | -   | VORDME     | -    | -              | -      | -  | -   | -            | -    | -            | -    |         |
| HEGN               | 16  | -         | -   | VORDME     | Y    | -              | -      | -  | -   | -            | Y    | -            | Y    |         |
|                    | 34  | ILS       | I   | VORDME     | Y    | -              | -      | -  | -   | -            | Y    | -            | Y    |         |

PBN/GNSS TF/5-REPORT  
**APPENDIX 4C**

4C-2

| Int'l<br>Aerodrome | RWY | Approach  |     |                 |      |                |        |    |     | SID          |      | STAR         |      | Remarks |
|--------------------|-----|-----------|-----|-----------------|------|----------------|--------|----|-----|--------------|------|--------------|------|---------|
|                    |     | Precision |     | VOR or NDB      | LNAV | LNAV /<br>VNAV | RNP AR | LP | LPV | Conventional | RNAV | Conventional | RNAV |         |
|                    |     | xLS       | CAT |                 |      |                |        |    |     |              |      |              |      |         |
| HELX               | 02  | -         | -   | VORDME          | Y    | -              | -      | -  | -   | -            | Y    | -            | Y    |         |
|                    | 20  | ILS       | I   | VORDME          | Y    | -              | -      | -  | -   | -            | Y    | -            | Y    |         |
| HEMA               | 15  | -         | -   | VORDME          | -    | -              | -      | -  | -   | -            | -    | -            | -    |         |
|                    | 33  | -         | -   | VORDME          | -    | -              | -      | -  | -   | -            | -    | -            | -    |         |
| HEPS               | 10  | -         | -   | VORDME          | -    | -              | -      | -  | -   | -            | -    | -            | -    |         |
|                    | 28  | -         | -   | -               | -    | -              | -      | -  | -   | -            | -    | -            | -    |         |
| HEOW               | 01  | -         | -   | NDB             | -    | -              | -      | -  | -   | -            | -    | -            | -    |         |
|                    | 19  | -         | -   | -               | -    | -              | -      | -  | -   | -            | -    | -            | -    |         |
| HESH               | 04L | ILS       | I   | VORDME          | Y    | -              | -      | -  | -   | -            | Y    | -            | Y    |         |
|                    | 04R | -         | -   | VORDME          | Y    | -              | -      | -  | -   | -            | Y    | -            | Y    |         |
|                    | 22L | -         | -   | VORDME          | Y    | -              | -      | -  | -   | -            | Y    | -            | Y    |         |
|                    | 22R | -         | -   | VORDME          | Y    | -              | -      | -  | -   | -            | Y    | -            | Y    |         |
| HESC               | 17  | -         | -   | NDB             | -    | -              | -      | -  | -   | -            | -    | -            | -    |         |
|                    | 35  | -         | -   | NDB             | -    | -              | -      | -  | -   | -            | -    | -            | -    |         |
| HETB               | 04  | ILS       | I   | VORDME          | Y    | -              | -      | -  | -   | -            | Y    | -            | Y    |         |
|                    | 22  | -         | -   | VORDME          | Y    | -              | -      | -  | -   | -            | Y    | -            | Y    |         |
| HEAL               | 13  | -         | -   | VORDME          | Y    | -              | -      | -  | -   | -            | -    | -            | -    |         |
|                    | 31  | -         | -   | VORDME          | Y    | -              | -      | -  | -   | -            | -    | -            | -    |         |
| HESG               | 15  | -         | -   | VORDME          | -    | -              | -      | -  | -   | -            | -    | -            | -    |         |
|                    | 33  | -         | -   | VORDME          | -    | -              | -      | -  | -   | -            | -    | -            | -    |         |
| <b>I.R. IRAN</b>   |     |           |     |                 |      |                |        |    |     |              |      |              |      |         |
| OIKB               | 03L | -         | -   |                 |      |                |        |    |     |              |      |              |      |         |
|                    | 03R | -         | -   | VORDME /<br>NDB | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |
|                    | 21L | ILS       | I   | VORDME /<br>NDB | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |

4C-3

| Int'l<br>Aerodrome | RWY | Approach  |     |                 |      |                |        |    |     | SID          |      | STAR         |      | Remarks |
|--------------------|-----|-----------|-----|-----------------|------|----------------|--------|----|-----|--------------|------|--------------|------|---------|
|                    |     | Precision |     | VOR or NDB      | LNAV | LNAV /<br>VNAV | RNP AR | LP | LPV | Conventional | RNAV | Conventional | RNAV |         |
|                    |     | xLS       | CAT |                 |      |                |        |    |     |              |      |              |      |         |
|                    | 21R | -         | -   | -               | -    | -              | -      | -  | -   | -            | -    | -            | -    |         |
| OIFM               | 08L | -         | -   | VORDME /<br>NDB | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |
|                    | 08R | -         | -   | VORDME /<br>NDB | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |
|                    | 26L | -         | -   | VORDME /<br>NDB | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |
|                    | 26R | ILS       | I   | VORDME /<br>NDB | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |
| OIMM               | 13L | -         | -   | VORDME          | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |
|                    | 13R | -         | -   | VORDME          | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |
|                    | 31L | -         | -   | VORDME /<br>NDB | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |
|                    | 31R | ILS       | I   | VORDME /<br>NDB | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |
| OISS               | 11L | -         | -   | -               | -    | -              | -      | -  | -   | Y            | -    | -            | -    |         |
|                    | 11R | -         | -   | -               | -    | -              | -      | -  | -   | Y            | -    | -            | -    |         |
|                    | 29L | ILS       | I   | VORDME /<br>NDB | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |
|                    | 29R | -         | -   | VORDME /<br>NDB | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |
| OITT               | 12L | -         | -   | -               | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |
|                    | 12R | -         | -   | -               | -    | -              | -      | -  | -   | -            | -    | -            | -    |         |
|                    | 30L | -         | -   | -               | -    | -              | -      | -  | -   | -            | -    | -            | -    |         |
|                    | 30R | ILS       | I   | VORDME          | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |
| OIIE               | 11L | ILS       | I   | VORDME /<br>NDB | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |
|                    | 11R | -         | -   | VORDME /<br>NDB | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |
|                    | 29L | -         | -   | VORDME          | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |

PBN/GNSS TF/5-REPORT  
**APPENDIX 4C**

4C-4

| Int'l<br>Aerodrome | RWY | Approach  |     |                 |      |                |        |    |     | SID          |      | STAR         |      | Remarks |
|--------------------|-----|-----------|-----|-----------------|------|----------------|--------|----|-----|--------------|------|--------------|------|---------|
|                    |     | Precision |     | VOR or NDB      | LNAV | LNAV /<br>VNAV | RNP AR | LP | LPV | Conventional | RNAV | Conventional | RNAV |         |
|                    |     | xLS       | CAT |                 |      |                |        |    |     |              |      |              |      |         |
|                    | 29R | ILS       | II  | VORDME /<br>NDB | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |
| OIII               | 11L | -         | -   | VORDME          | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |
|                    | 11R | -         | -   | VORDME          | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |
|                    | 29L | ILS       | I   | VORDME          | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |
|                    | 29R | -         | -   | -               | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |
| OIZH               | 17  | -         | -   | -               | -    | -              | -      | -  | -   | Y            | -    | -            | -    |         |
|                    | 35  | ILS       | I   | VORDME          | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |
| <b>IRAQ</b>        |     |           |     |                 |      |                |        |    |     |              |      |              |      |         |
| ORBI               | 15L | ILS       | I   | VORDME          | -    | -              | -      | -  | -   | Y            | -    | -            | -    |         |
|                    | 15R | -         | -   | -               | -    | -              | -      | -  | -   | Y            | -    | -            | -    |         |
|                    | 33L | -         | -   | -               | -    | -              | -      | -  | -   | Y            | -    | -            | -    |         |
|                    | 33R | ILS       | I   | VORDME          | -    | -              | -      | -  | -   | Y            | -    | -            | -    |         |
| ORMM               | 14  | -         | -   | VORDME          | -    | -              | -      | -  | -   | -            | -    | -            | -    |         |
|                    | 32  | ILS       | I   | VORDME          | -    | -              | -      | -  | -   | -            | -    | -            | -    |         |
| ORER               | 18  | ILS       | II  | -               | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |
|                    | 36  | ILS       | I   | -               | -    | -              | -      | -  | -   | Y            | -    | -            | -    |         |
| ORSU               | 13  | ILS       | I   | VOR             | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |
|                    | 31  | ILS       | I   | VOR             | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |
| ORNI               | 10  | -         | -   | -               | -    | -              | -      | -  | -   | -            | -    | -            | -    |         |
|                    | 28  | ILS       | I   | VOR             | -    | -              | -      | -  | -   | -            | -    | -            | -    |         |
| ORBМ               | -   | -         | -   | --              | -    | -              | -      | -  | -   | -            | -    | -            | -    | NO DATA |
| <b>JORDAN</b>      |     |           |     |                 |      |                |        |    |     |              |      |              |      |         |
| OJAM               | 06  | -         | -   | -               | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |
|                    | 24  | ILS       | I   | VORDME /<br>NDB | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |

4C-5

| Int'l<br>Aerodrome | RWY | Approach  |     |                 |      |                |        |    |     | SID          |      | STAR         |      | Remarks |
|--------------------|-----|-----------|-----|-----------------|------|----------------|--------|----|-----|--------------|------|--------------|------|---------|
|                    |     | Precision |     | VOR or NDB      | LNAV | LNAV /<br>VNAV | RNP AR | LP | LPV | Conventional | RNAV | Conventional | RNAV |         |
|                    |     | xLS       | CAT |                 |      |                |        |    |     |              |      |              |      |         |
| OJAI               | 08L | ILS       | I   | NDB DME         | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |
|                    | 08R | -         | -   | NDB DME         | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |
|                    | 26L | ILS       | II  | VOR / NDB       | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |
|                    | 26R | ILS       | I   | VORDME /<br>NDB | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |
| OJAQ               | 01  | ILS       | I   | VORDME          | -    | -              | -      | -  | -   | Y            | -    | -            | -    |         |
|                    | 19  | -         | -   | -               | -    | -              | -      | -  | -   | Y            | -    | -            | -    |         |
| <b>KUWAIT</b>      |     |           |     |                 |      |                |        |    |     |              |      |              |      |         |
| OKBK               | 15L | ILS       | II  | -               | Y    | Y              | -      | -  | -   | -            | Y    | -            | Y    |         |
|                    | 15R | ILS       | II  | VORDME          | Y    | Y              | -      | -  | -   | -            | Y    | -            | Y    |         |
|                    | 33L | ILS       | II  | VORDME          | Y    | Y              | -      | -  | -   | -            | Y    | -            | Y    |         |
|                    | 33R | ILS       | II  | -               | Y    | Y              | -      | -  | -   | -            | Y    | -            | Y    |         |
| <b>LEBANON</b>     |     |           |     |                 |      |                |        |    |     |              |      |              |      |         |
| OLBA               | 03  | ILS       | I   | VORDME          | Y    | -              | -      | -  | -   | Y            | -    | Y            | Y    |         |
|                    | 16  | ILS       | I   | VORDME          | Y    | -              | -      | -  | -   | -            | -    | Y            | Y    |         |
|                    | 17  | ILS       | I   | VORDME /<br>NDB | Y    | -              | -      | -  | -   | Y            | -    | Y            | Y    |         |
|                    | 21  | -         | -   | -               | Y    | -              | -      | -  | -   | Y            | -    | Y            | Y    |         |
|                    | 34  | -         | -   | -               | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |
|                    | 35  | -         | -   | -               | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |
| <b>OMAN</b>        |     |           |     |                 |      |                |        |    |     |              |      |              |      |         |
| OOMS               | 08R | ILS       | I   | VORDME          | -    | -              | -      | -  | -   | Y            | -    | -            | -    |         |
|                    | 26L | ILS       | I   | VORDME          | -    | -              | -      | -  | -   | Y            | -    | -            | -    |         |
| OOSA               | 07  | -         | -   | VORDME          | -    | -              | -      | -  | -   | Y            | -    | -            | -    |         |
|                    | 25  | ILS       | I   | VORDME          | -    | -              | -      | -  | -   | Y            | -    | -            | -    |         |
| <b>QATAR</b>       |     |           |     |                 |      |                |        |    |     |              |      |              |      |         |

PBN/GNSS TF/5-REPORT  
**APPENDIX 4C**

4C-6

| Int'l<br>Aerodrome  | RWY | Approach  |        |            |      |                |        |    |     | SID          |      | STAR         |      | Remarks |
|---------------------|-----|-----------|--------|------------|------|----------------|--------|----|-----|--------------|------|--------------|------|---------|
|                     |     | Precision |        | VOR or NDB | LNAV | LNAV /<br>VNAV | RNP AR | LP | LPV | Conventional | RNAV | Conventional | RNAV |         |
|                     |     | xLS       | CAT    |            |      |                |        |    |     |              |      |              |      |         |
| OTBD                | 15  | ILS       | I      | VORDME     | Y    | -              | -      | -  | -   | -            | -    | -            | -    |         |
|                     | 33  | ILS       | II/III | VORDME     | Y    | Y              | -      | -  | -   | -            | -    | -            | -    |         |
| OTHH                | 16L | ILS       | I      | VORDME     | -    | -              | -      | -  | -   | -            | -    | -            | -    |         |
|                     | 16R | -         | -      | -          | -    | -              | -      | -  | -   | -            | -    | -            | -    |         |
|                     | 34L | -         | -      | -          | -    | -              | -      | -  | -   | -            | -    | -            | -    |         |
|                     | 34R | ILS       | I      | VORDME     | -    | -              | -      | -  | -   | -            | -    | -            | -    |         |
| <b>SAUDI ARABIA</b> |     |           |        |            |      |                |        |    |     |              |      |              |      |         |
| OEDF                | 16L | ILS       | II     | VORDME     | -    | -              | -      | -  | -   | Y            | -    | -            | -    |         |
|                     | 16R | ILS       | II     | VORDME     | -    | -              | -      | -  | -   | -            | -    | -            | -    |         |
|                     | 34L | ILS       | II     | VORDME     | -    | -              | -      | -  | -   | -            | -    | -            | -    |         |
|                     | 34R | ILS       | II     | VORDME     | -    | -              | -      | -  | -   | Y            | -    | -            | -    |         |
| OEJN                | 16L | ILS       | I      | VORDME     | Y    | -              | -      | -  | -   | Y            | -    | -            | Y    |         |
|                     | 16C | ILS       | II     | -          | Y    | -              | -      | -  | -   | Y            | -    | -            | Y    |         |
|                     | 16R | ILS       | II     | -          | Y    | -              | -      | -  | -   | Y            | -    | -            | Y    |         |
|                     | 34L | ILS       | II     | -          | Y    | -              | -      | -  | -   | Y            | -    | -            | Y    |         |
|                     | 34C | ILS       | II     | VORDME     | Y    | -              | -      | -  | -   | Y            | -    | -            | Y    |         |
|                     | 34R | ILS       | I      | VORDME     | Y    | -              | -      | -  | -   | Y            | -    | -            | Y    |         |
| OEMA                | 17  | ILS       | I      | VORDME     | -    | -              | -      | -  | -   | Y            | -    | -            | -    |         |
|                     | 18  | -         | -      | VORDME     | -    | -              | -      | -  | -   | Y            | -    | -            | -    |         |
|                     | 35  | ILS       | I      | VORDME     | -    | -              | -      | -  | -   | Y            | -    | -            | -    |         |
|                     | 36  | ILS       | I      | VORDME     | -    | -              | -      | -  | -   | Y            | -    | -            | -    |         |
| OERK                | 15L | ILS       | I      | VORDME     | -    | -              | -      | -  | -   | Y            | -    | -            | -    |         |
|                     | 15R | ILS       | I      | -          | -    | -              | -      | -  | -   | Y            | -    | -            | -    |         |
|                     | 33L | ILS       | I      | -          | -    | -              | -      | -  | -   | Y            | -    | -            | -    |         |
|                     | 33R | ILS       | I      | VORDME     | -    | -              | -      | -  | -   | Y            | -    | -            | -    |         |
| <b>SYRIA</b>        |     |           |        |            |      |                |        |    |     |              |      |              |      |         |

4C-7

| Int'l<br>Aerodrome          | RWY | Approach  |        |                     |      |                |        |    |     | SID          |      | STAR         |      | Remarks |
|-----------------------------|-----|-----------|--------|---------------------|------|----------------|--------|----|-----|--------------|------|--------------|------|---------|
|                             |     | Precision |        | VOR or NDB          | LNAV | LNAV /<br>VNAV | RNP AR | LP | LPV | Conventional | RNAV | Conventional | RNAV |         |
|                             |     | xLS       | CAT    |                     |      |                |        |    |     |              |      |              |      |         |
| OSAP                        | 09  | -         | -      | VORDME              | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |
|                             | 27  | ILS       | II     | VORDME /<br>NDB     | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |
| OSLK                        | 17  | ILS       | I      | VORDME /<br>NDB     | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |
|                             | 35  | -         | -      | -                   | -    | -              | -      | -  | -   | -            | -    | -            | -    |         |
| OSDI                        | 05L | -         | -      | VOR                 | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |
|                             | 05R | ILS       | II     | VORDME /<br>NDB     | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |
|                             | 23L | -         | -      | VORDME /<br>NDB DME | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |
|                             | 23R | ILS       | II     | VORDME              | -    | Y              | -      | -  | -   | Y            | -    | Y            | -    |         |
| <b>UNITED ARAB EMIRATES</b> |     |           |        |                     |      |                |        |    |     |              |      |              |      |         |
| OMAA                        | 13L | ILS       | II     | -                   | -    | -              | Y      | -  | -   | -            | Y    | -            | Y    |         |
|                             | 13R | ILS       | I      | VOR                 | -    | -              | Y      | -  | -   | -            | Y    | -            | Y    |         |
|                             | 31L | ILS       | II/III | VOR                 | -    | -              | Y      | -  | -   | -            | Y    | -            | Y    |         |
|                             | 31R | ILS       | II     | -                   | -    | -              | Y      | -  | -   | -            | Y    | -            | Y    |         |
| OMAD                        | 13  | -         | -      | VORDME              | Y    | -              | -      | -  | -   | Y            | -    | -            | -    |         |
|                             | 31  | ILS       | I      | VORDME              | Y    | -              | -      | -  | -   | Y            | -    | -            | -    |         |
| OMAL                        | 01  | ILS       | I      | VOR                 | -    | -              | -      | -  | -   | -            | -    | -            | -    |         |
|                             | 19  | -         | -      | VOR                 | -    | -              | -      | -  | -   | -            | -    | -            | -    |         |
| OMDB                        | 12L | ILS       | II/III | VOR                 | -    | Y              | -      | -  | -   | -            | Y    | -            | Y    |         |
|                             | 12R | ILS       | I      | VOR                 | -    | Y              | -      | -  | -   | -            | Y    | -            | Y    |         |
|                             | 30L | ILS       | I      | -                   | -    | Y              | -      | -  | -   | -            | Y    | -            | Y    |         |
|                             | 30R | ILS       | II/III | VOR                 | -    | Y              | -      | -  | -   | -            | Y    | -            | Y    |         |
| OMDW                        | 12  | ILS       | II/III | -                   | -    | Y              | -      | -  | -   | -            | Y    | -            | Y    |         |
|                             | 30  | ILS       | II/III | -                   | -    | Y              | -      | -  | -   | -            | Y    | -            | Y    |         |
| OMFJ                        | 11  | -         | -      | -                   | -    | -              | -      | -  | -   | -            | Y    | -            | -    |         |

PBN/GNSS TF/5-REPORT  
**APPENDIX 4C**

4C-8

| Int'l<br>Aerodrome | RWY | Approach  |     |            |      |                |        |    |     | SID          |      | STAR         |      | Remarks |
|--------------------|-----|-----------|-----|------------|------|----------------|--------|----|-----|--------------|------|--------------|------|---------|
|                    |     | Precision |     | VOR or NDB | LNAV | LNAV /<br>VNAV | RNP AR | LP | LPV | Conventional | RNAV | Conventional | RNAV |         |
|                    |     | xLS       | CAT |            |      |                |        |    |     |              |      |              |      |         |
|                    | 29  | ILS       | I   | VOR        | -    | -              | -      | -  | -   | -            | Y    | -            | -    |         |
| OMRK               | 16  | -         | -   | VOR        | -    | -              | -      | -  | -   | -            | -    | -            | -    |         |
|                    | 34  | ILS       | I   | VOR        | -    | -              | -      | -  | -   | Y            | -    | -            | -    |         |
| OMSJ               | 12  | ILS       | I   | -          | -    | Y              | -      | -  | -   | -            | Y    | -            | Y    |         |
|                    | 30  | ILS       | II  | -          | -    | Y              | -      | -  | -   | -            | Y    | -            | Y    |         |
| <b>YEMEN</b>       |     |           |     |            |      |                |        |    |     |              |      |              |      |         |
| OYAA               | 08  | ILS       | I   | VORDME     | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |
|                    | 26  | -         | -   | VORDME     | -    | -              | -      | -  | -   | Y            | -    | Y            | -    |         |
| OYHD               | 03  | -         | -   | VOR        | -    | -              | -      | -  | -   | -            | -    | -            | -    |         |
|                    | 21  | -         | -   | VOR / NDB  | Y    | -              | -      | -  | -   | -            | -    | -            | Y    |         |
| OYRN               | 06  | -         | -   | -          | -    | -              | -      | -  | -   | -            | -    | -            | -    |         |
|                    | 24  | -         | -   | VORDME     | -    | -              | -      | -  | -   | -            | -    | -            | -    |         |
| OYSN               | 18  | ILS       | I   | VORDME     | -    | Y              | -      | -  | -   | Y            | Y    | Y            | Y    |         |
|                    | 36  | -         | -   | VOR        | -    | Y              | -      | -  | -   | Y            | Y    | Y            | Y    |         |
| OYTZ               | -   | -         | -   | -          | -    | -              | -      | -  | -   | -            | -    | -            | -    | NO DATA |

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PBN/GNSS TF/5  
Report on Agenda Item 5

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**REPORT ON AGENDA ITEM 5: STATE PBN IMPLEMENTATION AND MID PBN SUPPORT TEAM PLANS**

5.1 The meeting recalled the 36th Session of the ICAO Assembly (18-28 September 2007) Resolution 36/23 on PBN global goals. The Resolution urged all States to implement Area Navigation (RNAV) and Required Navigation Performance (RNP) Air Traffic Services (ATS) routes and approach procedures in accordance with the ICAO Performance Based Navigation (PBN) concept laid down in the ICAO PBN Manual (Doc 9613). It also resolved that States should complete a PBN Implementation Plan by 2009 to achieve:

- implementation of RNAV and RNP operations (where required) for en route and terminal areas according to established timelines and intermediate milestones; and
- implementation of Approach Procedures with Vertical guidance (APV) (Baro-VNAV and/or augmented Global Navigation Satellite Systems (GNSS)) for all instrument runway ends, either as the primary approach or as a back-up for precision approaches by 2016 with intermediate milestones of 30 per cent by 2010 and 70 per cent by 2014.

5.2 The meeting noted that the Assembly Resolution A36/23 was superseded by the 37th ICAO Assembly (28 September - 8 October 2010) Resolution A37-11, which resolves that, States complete a PBN Implementation Plan as a matter of urgency to achieve:

- implementation of Approach Procedures with Vertical guidance (APV) (Baro-VNAV and/or augmented GNSS), including LNAV only minima, for all instrument runway ends, either as the primary approach or as a back-up for precision approaches by 2016 with intermediate milestones as follows: 30 per cent by 2010, 70 per cent by 2014; and
- implementation of straight-in LNAV only procedures, as an exception to the 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.

5.3 The meeting further noted that the modification of Assembly Resolution A36/23 with A37/11 basically means that aerodromes that do not have any operations of aircraft equipped with APV are exempted to introduce APV procedures. On one side this could be interpreted as a relaxation of the resolution, on the other hand, it is bolstering of Safety, the reason being that it was reported that many States had the excuse of not having APV equipped aircraft to particular aerodromes, not doing anything on improvement of the approach procedures. This means that even when there are GNSS equipped aircraft, they left old (less safe) approach procedures such as NDB and circling as the only option. Now with A37/11, even for those runways that are not served with APV aircraft there has to be at least a GNSS procedure with LNAV only.

PBN/GNSS TF/5  
Report on Agenda Item 5

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5.4 The meeting noted that MIDANPIRG/13 Meeting was of the view that prompt action by the Region and States is required to accelerate PBN planning, development and implementation to a pace of at least achieving closer to the ICAO Resolution implementation targets. Accordingly, MIDANPIRG/13 agreed to comprehensive Regional Support Strategy that includes the following objectives:

- promotion of PBN to decision makers within States to create the political will to invest and devote the necessary resources for PBN implementation;
- establishing a regional working-level team or forum to identify implementation needs and to direct and/or organize the appropriate resources that will deliver PBN solutions to States;
- formulation of cooperative arrangements to assist States in PBN implementation; and
- development of additional support mechanisms that create skills and capabilities within States to implement and to sustain PBN operations.

5.5 Based on the above, MIDANPIRG/13 under Decision 13/38 agreed to establish MID PBN Support Team (MPST), and under Conclusion 13/49 agreed that UAE be the champion of MPST, and IATA to provide the required support. Furthermore, MIDANPIRG/13 encouraged MID States that are advanced in PBN implementation to participate in the work of MPST. It was highlighted that the three areas of work for the MPST: 1) promote PBN and convince Stakeholders to support PBN; 2) Gap Analysis and States PBN Implementation Plan update/improvement; and 3) Implementation of PBN.

5.6 The meeting noted that Egypt, Jordan and Oman expressed interest to receive MPST visit. Accordingly, the meeting reviewed and updated the procedure for the conduct of MPST visit as at **Appendix 5A** to the Report on Agenda Item 5.

5.7 The meeting was briefed on the progress made for the MPST visit to Egypt where a side meeting was held during the meeting. The MPST visit to Egypt is planned for May 2013, the dates have been coordinated with Egypt, UAE, IATA and Qatar had also volunteered to provide expert to participate in the visit.

5.8 The meeting noted that MIDANPIRG/13 Meeting reviewed and updated the status of the MID Region State PBN Implementation Plan and PBN implementation focal points which was reviewed and updated as at **Appendices 5B** and **5C** to the Report on Agenda Item 5.

5.9 The meeting was apprised on the importance of providing PBN Implementation progress reports as per MIDANPIRG/13 Conclusion 13/50, it was emphasized that the progress reports needs only to be updated and sent with new dates every six month which will not be a time consuming exercise for the State focal points. The following States (Bahrain, Egypt, Jordan, Kuwait, Qatar, UAE) provided the reports as at **Appendix 5D** to the Report on Agenda Item 5.

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5.10 The meeting was also apprised on the PBN Symposium held at ICAO HQ (Montreal 15 to 19 October 2012) with the theme of “Expediting Implementation Together”, which indicated the collaborative team approach required for successful PBN implementation. Furthermore, it was highlighted that during the symposium, ICAO endorsed Instrument Procedure Design Organizations which is simply a statement of support. It does not constitute an authorization, an approval or a certification of an Organization nor the procedures it designs. The State is solely responsible for approving and authorizing an Instrument Approach Design Organization as well as the Instrument Flight Procedures it designs for use within the State.

5.11 The meeting received information on RNAV 1 implementation in Bahrain, and it was noted that with the implementation of RNAV 1, Bahrain has increased the Airspace capacity by 40%, from 4 AWYs to 7 AWYs within Bahrain Flight Information Region.

5.12 The meeting also received information on the PBN Implementation in UAE and it was noted that the short term targets of the UAE PBN Implementation Plan have been met. The plan includes the ICAO targets of 30% Implementation by 2010, 70% by 2014 and 100% by 2016 (RNAV 1 SIDs/ STARS and RNP Approach/VNAV). Additionally, the UAE has set internal targets of 50% by 2012, 80% by 2014 and full implementation by 2016. Last year witnessed the introduction of RNP AR Approach and RNAV1 STARS at OMAA and the introduction of RNAV1 SIDs and STARS at Dubai and Sharjah airports.

5.13 The meeting received a presentation from Egypt and it was noted that study of the current airspace and infrastructure is being done and the new suggested orientations has been defined to be in line with PBN concept where traffic conflicts and controller work load is reduced.

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PBN/GNSS TF/5  
Appendix 5A to the Report on Agenda Item 5

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**PROCEDURE FOR MPST**

1. MIDANPIRG/13 established MID PBN Support Team (MPST), to support MID States in the Performance Based Navigation (PBN) implementation, Conclusion 13/49 below refers:

**CONCLUSION 13/49: MID PBN SUPPORT TEAM (MPST)**

*That,*

- a) ICAO MID Regional Office provide the leadership for MPST;*
- b) UAE be the champion for the MPST;*
- c) IATA fully commit and support the MPST; and*
- d) MID States assign members to MPST and allocate necessary resources.*

2. MPST main focus areas are:

- Promotion of PBN to decision makers within States to create the political will to invest and devote the necessary resources for PBN implementation;
- establishing a regional working-level team or forum to identify implementation needs and to direct and/or organize the appropriate resources that will deliver PBN solutions to States;
- formulation of cooperative arrangements to assist States in PBN implementation; and
- development of additional support mechanisms that create skills and capabilities within States to implement and to sustain PBN operations.

3. Procedure for the conduct of MPST visit:

- a) State to send official request to ICAO MID Regional Office;
- b) State to nominate Focal Point;
- c) ICAO MID Regional Office confirm with GAP analysis questionnaire;
- d) States to reply to the GAP analysis questionnaire within ten (10) days;
- e) Organise conference calls between all concerned (State, ICAO, IATA and Champion) to discuss the GAP analysis and to define scope of work;
- f) agree on the required resources for the MPST visit;
- g) coordinate and agree on dates for the MPST visit; and
- h) MPST to provide visit report within a month.

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PBN/GNSS TF/5  
 Appendix 5B to the Report on Agenda Item 5

**STATUS OF MID STATES PBN IMPLEMENTATION PLAN  
 (APRIL 2013)**

| State        | Plan Submission<br>Last update | Percentage of Implementation |        |           |               | Remark  |
|--------------|--------------------------------|------------------------------|--------|-----------|---------------|---|
|              |                                | SID %                        | STAR % | Approach% |               |   |
|              |                                |                              |        | LNAV      | LNAV/<br>VNAV |   |
| Bahrain      | Submitted                      | 100                          | 100    | 100       | 0             | RNAV 1 implemented for En-route   |
| Egypt        | Submitted                      | 37                           | 40     | 57        | 0             | Plan need user input  |
| Iran         | Not submitted                  | 0                            | 0      | 0         | 0             | Only PBN approach and Terminal implementation status received   |
| Iraq         | Not submitted                  | 0                            | 0      | 0         | 0             |   |
| Jordan       | Submitted                      | 0                            | 0      | 0         | 0             |   |
| Kuwait       | Submitted                      | 100                          | 100    | 100       | 100           |   |
| Lebanon      | Not submitted                  | 0                            | 100    | 100       | 0             | Only PBN approach and Terminal implementation status received also 2 runways end are not used for landing |
| Oman         | submitted                      | 0                            | 0      | 0         | 0             |   |
| Qatar        | Submitted                      | 0                            | 0      | 33        | 16            |   |
| Saudi Arabia | submitted                      | 0                            | 33     | 33        | 0             |   |
| Syria        | Submitted                      | 0                            | 0      | 12        | 12            |   |
| UAE          | submitted                      | 70                           | 60     | 50        | 40            | Implemented (4) RNP AR  |
| Yemen        | Submitted                      | 25                           | 37     | 37        | 25            |   |

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**PBN IMPLEMENTATION FOCAL POINT**

| STATE          | NAME                       | TITLE  | ADDRESS   | EMAIL                            | FAX                        | TEL             | MOBILE          |
|----------------|----------------------------|--|---|----------------------------------|----------------------------|-----------------|-----------------|
| <b>Bahrain</b> | Fareed Abdullah Al Alawi   | Head, air Traffic Operations                   | Civil Aviation Affairs<br>P.O. Box 586  | falalawi@caa.gov.bh              | +973 17321992              | +973 17321158   | +97339651596    |
| <b>Bahrain</b> | Saleem Mohamed Hassan      | Chief Air Traffic Management                   | Civil Aviation Affairs<br>P.O. Box 586  | saleemmh@caa.gov.bh              | +973 17329966              | +973 17321117   | +97339608860    |
| <b>Egypt</b>   | Badr Mohamed Shouman       | General Director HCAA                          | Ministry of Civil Aviation<br>Egyptian Civil Aviation Authority<br>Cairo International Airport Road<br>Cairo - EGYPT  | badrshoman@yahoo.com             | +202 2268 0627             | +202 2265 7849  | +20100 601 3603 |
| <b>Iran</b>    | Habib Davoudi Dana         | Chief of Procedure Design<br>Office            | ATM Department<br>Mehrabad International Airport<br>Tehran 13445  | h.davoudi@yahoo.com              | +982144649269              | +982 166025013  |                 |
| <b>Iran</b>    | Mohammad Khodakarami       | D.G. of Aeronautical Affairs (in<br>CAO)       | Mehrabad International Airport<br>P.O. Box 13445 – 1798   | mkhd4444@yahoo.com               | +98214464 9269             | +982 16603 6241 |                 |
| <b>Iraq</b>    |                            |  |   |                                  |                            |                 |                 |
| <b>Jordan</b>  | Nayef Marshoud             | Director ATM department                        | P.O. Box 7547   | datm@carc.gov.jo                 | +962 6 4891266             | +962 6 4897729  | +962 797498992  |
| <b>Kuwait</b>  | Adel Mohammed Al Yagout    | Superintendent of Air<br>Navigation Department | Directorate General of Civil Aviation<br>Kuwait International Airport<br>P.O. Box 17 Safat 13001                      | Q8dga_danoff@hotmail.com         | +965 4346221               | +965 4346220    | +965 9571755    |
| <b>Lebanon</b> | Walid Alhassanieh          | Chief ACC                                      | Air Navigation Department<br>Beirut Rafic Hariri Int'l Airport  | hassaniehw @beirutairport.gov.lb | +9611629023<br>+9611629106 | +961 1629026    | +961 3509902    |
| <b>Oman</b>    | Sabri Said Saud Al-Busaidy | DMS Manager                                    | Directorate General of Meteorology<br>& Air Navigation (DGMAN)<br>Muscat International Airport<br>P.O. Box 1 CPO Seeb | sabri@dgc.gov.om                 | +96824518990<br>+24519 939 | +968 24519501   | +968 99359415   |

| STATE               | NAME                    | TITLE   | ADDRESS  | EMAIL                      | FAX                         | TEL                         | MOBILE           |
|---------------------|-------------------------|---|--|----------------------------|-----------------------------|-----------------------------|------------------|
| <b>Qatar</b>        | Ahmed Al-Eshaq          | Director Air Navigation   | Civil Aviation Authority<br>P.O. Box 3000<br>Doha – QATAR                              | ahmed@caa.gov.qa           | (974) 465 6554              | (974) 462 2300              | (974) 555 0440   |
| <b>Qatar</b>        | Faisal Alqahtan         | Head of AIS   | Civil Aviation Authority<br>P.O. Box 73<br>Doha – QATAR                                | Faisal.alqahtan@caa.gov.qa | (974)44656554               | (974)44656221               | (974) 5553 7060  |
| <b>Saudi Arabia</b> | Ali H. Hakami           | Navigational Aids Systems Planner                                   | General Authority of Civil Aviation<br>P.O. Box 21444<br>Jeddah 21444                  | yaro123@yahoo.com          | +966 2 671 7717<br>Ext 1594 | +966 2 671 7717<br>Ext 1593 | +966 59 840 2598 |
| <b>Syria</b>        | Al Layth Al Hammoud     | Chief of Air Navigation   |  |                            |                             |                             |                  |
| <b>UAE</b>          | Talal Al Hammadi        | Head - Airspace Coordination<br>General Civil Aviation<br>Authority | Sheikh Zayed Air Navigation Centre<br>P.O. Box 66<br>Abu Dhabi – UAE                   | thammadi@szc.gcaa.ae       | +97125996883                | 97125996890                 | +971508180873    |
| <b>Yemen</b>        | Ahmed Mohamed Al Kobati | Director Air Navigation<br>Operations                               | Air Navigation Sector CAMA<br>Airport Road P.O. Box 3473<br>Sana'a – REPUBLIC OF YEMEN | cama570@yahoo.com          | +9671344047                 | +9671345402                 | +967 777241375   |

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**PBN IMPLEMENTATION PROGRESS REPORT**

Date: 16 APR 2013

**State: State of Kuwait**

**Designation of PBN Focal Point**

*Reference:* MID State Letter Ref AN 6/28 – 149 dated 21 April 2008 and follow up letter Ref AN6/28 – 293 dated 10 August “ in order to facilitate necessary follow-up and coordination, to provide a PBN Implementation Focal Point by 21 August 2008 “

*Status:* Nominated

*Focal Point:* **Abdullah Aladwani- Superintendent of AIM Directorate General of Civil Aviation Kuwait International Airport P.O. Box 17 Safat 13001.  
abm.aladwani@dgca.gov.kw TEL: +965 24762531 Mobile: +965 66051116**

**State PBN Implementation Plan**

*Reference:* ICAO Assembly Resolution 37/11: Performance-based navigation global goals

*Recognizing* that not all States have developed a PBN implementation plan by the target date of 2009; *The Assembly: Urges* all States to implement RNAV and RNP air traffic services (ATS) routes and approach procedures in accordance with the ICAO PBN concept laid down in the Performance-based Navigation (PBN) Manual (Doc 9613);

*Status:* Approved by DGCA and reviewed by ICAO PBN/GNSS TF

**Approach Operations**

*Reference:* ICAO Assembly Resolution A37/11

“States complete a PBN implementation plan to achieve: implementation of approach procedures with vertical guidance (APV) (Baro-VNAV and/or augmented GNSS), including LNAV only minima, for all instrument runway ends, either as the primary approach or as a back-up for precision approaches by 2016 with intermediate milestones as follows: 30 per cent by 2010, 70 per cent by 2014 and implementation of straight-in LNAV only procedures, as an exception, 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.

| Implementation Targets<br>(# of RWY Ends) |       |       | Completed<br>(# of RWY Ends) |           | On Progress<br>(# of RWY Ends) |           |
|---|-------|-------|------------------------------|-----------|--------------------------------|-----------|
| Y2012                                     | Y2014 | Y2016 | LNAV                         | LNAV/VNAV | LNAV                           | LNAV/VNAV |
|   |       |       | RWY 15L                      | RWY 15L   |                                |           |
|   |       |       | RWY 33R                      | RWY 33R   |                                |           |
|   |       |       | RWY 15R                      | RWY 15R   |                                |           |
|   |       |       | RWY 33L                      | RWY 33L   |                                |           |
| OKBK                                      |       |       |                              |           |                                |           |

**Arrival and Departure Operations**

*Reference:* ICAO Assembly Resolution A37/11

| Implementation Targets<br>(# of Int'l Airports) |       |       | Completed<br>(# of Int'l Airports) |                 | On Progress<br>(# of Int'l Airports) |           |
|---|-------|-------|------------------------------------|-----------------|--------------------------------------|-----------|
| Y2012   | Y2014 | Y2016 | Arrival                            | Departure       | Arrival                              | Departure |
| OKBK  |       |       | RNAV1 all RWYS                     | RNAV 1 all RWYS |                                      |           |

APPENDIX x

PBN IMPLEMENTATION PROGRESS REPORT

State: UNITED ARAB EMIRATE)

Date: 30 June 2012

Designation of PBN Focal Point

Reference:

MID State Letter Ref AN 6/28 – 149 dated 21 April 2008 and follow up letter Ref AN6/28 – 293 dated 10 August “ in order to facilitate necessary follow-up and coordination, to provide a PBN Implementation Focal Point by 21 August 2008 “

Status: Nominated

Focal Point: Talal Al Hammadi, Head of Airspace Planning, PO Box 666, Abu Dhabi, thammadi@szc.gcaa.ae, +971 2 xxxx)

State PBN Implementation Plan

Reference:

MIDANPIRG Conclusion 11/74 – PBN State implementation Plan

“That, in order to give effect to Assembly Resolution A36-23: Performance based navigation global goals, Member States are urged to complete development of their individual State Implementation plans based on the regional PBN implementation plan by 30 September 2009 so that it may be reviewed by the ATM/SAR/AIS SG as part of the Regional agreement process.

Status: Approved by GCAA, Adopted by NASAC and reviewed by ICAO GNSS TF

Note(s):

The UAE PBN Implementation plan was submitted to ICAO in March 2011 and will be reviewed on an annual basis.

Approach Operations

Reference:

ICAO Assembly Resolution A36-23

“States and planning and implementation regional groups (PIRGs) complete a PBN implementation plan 2009 to achieve: implementation of approach procedures with vertical guidance (APV) (Baro-VNAV and augmented GNSS) for all instrument runway ends, either as the primary approach or as back up for precision approaches by 2016 with intermediate milestones as follows: 30 percent by 2010, 70 percent by 2014.”

Status:

| Implementation Targets |         |       |       | Completed       |   |           | In Progress     |           |  |
|------------------------|---------|-------|-------|-----------------|---|-----------|-----------------|-----------|--|
| (# of RWY Ends)        |         |       |       | (# of RWY Ends) |   |           | (# of RWY Ends) |           |  |
| Y2010                  | Y2011   | Y2012 | Y2016 | LNAV            |   | LNAV/VNAV | LNAV            | LNAV/VNAV |  |
| OMAA 13L               |         |       |       |                 |   | OMAA 13L  | Y               |           |  |
| OMAA 13R               |         |       |       |                 |   | OMAA 13R  | Y               |           |  |
| OMAA 31L               |         |       |       |                 |   | OMAA 31L  | Y               |           |  |
| OMAA 31R               |         |       |       |                 |   | OMAA 31R  | Y               |           |  |
| OMAD 31                |         |       |       | OMAD 31         | Y |           |                 | OMAD 31   |  |
| OMAD 13                |         |       |       | OMAD 13         | Y |           |                 | OMAD 13   |  |
|                        | OMAL 01 |       |       |                 |   |           |                 |           |  |
|                        | OMAL 13 |       |       |                 |   |           |                 |           |  |
| OMDB 12L               |         |       |       | OMDB 12L        | Y | OMDB 12L  | Y               |           |  |
| OMDB 12R               |         |       |       | OMDB 12R        | Y | OMDB 12R  | Y               |           |  |
| OMDB 30L               |         |       |       | OMDB 30L        | Y | OMDB 30L  | Y               |           |  |
| OMDB 30R               |         |       |       | OMDB 30R        | Y | OMDB 30R  | Y               |           |  |
| OMDW 12                |         |       |       |                 |   | OMDW 12   | Y               |           |  |
| OMDW 30                |         |       |       |                 |   | OMDW 30   | Y               |           |  |
|                        | OMFJ 11 |       |       |                 |   |           |                 |           |  |
|                        | OMFJ 20 |       |       |                 |   |           |                 |           |  |
|                        | OMRK 16 |       |       |                 |   |           |                 | OMRK 16   |  |
|                        | OMRK 34 |       |       |                 |   |           |                 | OMRK 34   |  |
| OMSJ 12                |         |       |       | OMSJ 12         | Y | OMSJ 12   | Y               |           |  |
| OMSJ 30                |         |       |       | OMSJ 30         | Y | OMSJ 30   | Y               |           |  |

Note(s):

OMAD is busy with projects to implement RNP-AR procedures – scheduled for implementation in Q4 2012.  
OMRK is busy with a project to implement RNPAPCH-VNAV – scheduled for implementation Q4 2012.

**Arrival and Departure Operations**

Reference: 1) ICAO Assembly Resolution A36-23

"States and planning and implementation regional groups (PIRGs) complete a PBN implementation plan by 2009 to achieve: implementation of RNAV and RNP operations (where required) for en route and terminal areas according to established timelines and intermediate milestones."

2) MID PBN Regional Implementation Plan and Strategy

"Short-term Implementation Targets:  RNP APCH (with Baro-VNAV) in 30% of instrument runways by 2010 and 50% by 2012 and priority should be given to airports with most significant operational benefits RNAV-1 SID/STARs for 30% of international airports by 2010 and 50% by 2012 and priority should be given to airports with RNP Approach RNP-5 and B-RNAV which is implemented in MID Region to be redefined as per ICAO PBN terminology by 2009 (MIDANPIRG/11), full implementation of PBN by 2012 for continental en-route.."

■ "Medium-term Implementation Targets: RNP APCH with Baro-VNAV or APV in 100% of instrument runways by 2016. RNAV-1 or RNP-1 SID/STAR for 100% of international airports by 2016 and RNAV-1 or Basic RNP-1 SID/STAR at busy domestic airports where there are operational benefits

| Implementation Targets |         |         |  | Completed           |          | Design/Review In Progress |     |
|------------------------|---------|---------|--|---------------------|----------|---------------------------|-----|
| # of Int'l Airports    |         |         |  | # of Int'l Airports |          | # of Int'l Airports       |     |
| Y2010                  | Y2014   | Y2016   |  | STAR                | SID      | STAR                      | SID |
| OMAA 13L               |         |         |  | OMAA 13L            | OMAA 13L |                           |     |
| OMAA 13R               |         |         |  | OMAA 13R            | OMAA 13R |                           |     |
| OMAA 31L               |         |         |  | OMAA 31L            | OMAA 31L |                           |     |
| OMAA 31R               |         |         |  | OMAA 31R            | OMAA 31R |                           |     |
| OMAD 31                |         |         |  |                     |          | OMAD 31                   |     |
| OMAD 13                |         |         |  |                     |          | OMAD 13                   |     |
|                        |         | OMAL 01 |  |                     |          |                           |     |
|                        |         | OMAL 19 |  |                     |          |                           |     |
| OMDB 12L               |         |         |  | OMDB 12L            | OMDB 12L |                           |     |
| OMDB 12R               |         |         |  | OMDB 12R            | OMDB 12R |                           |     |
| OMDB 30L               |         |         |  | OMDB 30L            | OMDB 30L |                           |     |
| OMDB 30R               |         |         |  | OMDB 30R            | OMDB 30R |                           |     |
| OMDW 12                |         |         |  | OMDW 12             | OMDW 12  |                           |     |
| OMDW 30                |         |         |  | OMDW 30             | OMDW 30  |                           |     |
|                        | OMFJ 11 |         |  |                     |          | OMFJ 11                   |     |
|                        | OMFJ 29 |         |  |                     |          | OMFJ 29                   |     |
|                        |         | OMRK 16 |  |                     |          |                           |     |
|                        |         | OMRK 34 |  |                     |          |                           |     |
| OMSJ 12                |         |         |  | OMSJ 12             | OMSJ 12  |                           |     |
| OMSJ 30                |         |         |  | OMSJ 30             | OMSJ 30  |                           |     |

**Note(s):**

OMAD is busy with projects to implement RNAV-1 STAR procedures – scheduled for implementation in Q4 2012.

See the attached spreadsheet for further detail.

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UPDATED: 1/12/2012

|        |        |  |  |
|--------|--------|--|--|
|        |        |  |  |
| RNAV-5 | May-11 |  |  |
| RNAV-5 | May-11 |  |  |
| No     | No     |  |  |
| No     | No     |  |  |
| RNAV-5 | May-11 |  |  |
| RNAV-5 | May-11 |  |  |
| No     | No     |  |  |
| No     | No     |  |  |

for LNAV/VNAV the enter the RNP AR on a separate

appropriate, if PBN or RNAV approaches, SIDs or STARs

STATES PBN APPROACH AND TERMINAL IMPLEMENTATION TUS

JORDAN

UPDATED 06/08/2012

| 1 MID | OJAI | Queen Alia International | JORDAN | Y | 26L | Y | NIL | BOTH | May-13 | RNAV 1 | 11-11 | RNAV 1 | May-13 |
|-------|------|--------------------------|--------|---|-----|---|-----|------|--------|--------|-------|--------|--------|
| 2 MID | OJAI | Queen Alia International | JORDAN | Y | 26R | Y | NIL | BOTH | May-13 | RNAV 1 | 11-11 | RNAV 1 | May-13 |
| 3 MID | OJAI | Queen Alia International | JORDAN | Y | 08L | Y | NIL | BOTH | May-13 | RNAV 1 | 11-11 | RNAV 1 | 11-11  |
| 4 MID | OJAI | Queen Alia International | JORDAN | Y | 08R | N | NIL | BOTH | May-13 | RNAV 1 | 11-11 | RNAV 1 | 11-11  |
| 5 MID | OJAM | AMMAN MARKA              | JORDAN | Y | 24  | Y | NIL | BOTH | May-13 | RNAV 1 | 11-11 | RNAV 1 | 11-11  |
| 6 MID | OJAM | AMMAN MARKA              | JORDAN | Y | 06  | N | NIL | BOTH | May-13 | RNAV 1 | 11-11 | RNAV 1 | 11-11  |
| 7 MID | OJAO | KING HUSSEIN             | JORDAN | Y | 01  | Y | NIL | BOTH | May-13 | RNAV 1 | 11-11 | RNAV 1 | 11-11  |
| 8 MID | OJAO | KING HUSSEIN             | JORDAN | Y | 19  | Y | NIL | LNAV | May-13 | RNAV 1 | 11-11 | RNAV 1 | 11-11  |
| 9     |      |                          |        |   |     |   |     |      |        |        |       |        |        |
| 10    |      |                          |        |   |     |   |     |      |        |        |       |        |        |
| 11    |      |                          |        |   |     |   |     |      |        |        |       |        |        |
| 12    |      |                          |        |   |     |   |     |      |        |        |       |        |        |
| 13    |      |                          |        |   |     |   |     |      |        |        |       |        |        |
| 14    |      |                          |        |   |     |   |     |      |        |        |       |        |        |
| 15    |      |                          |        |   |     |   |     |      |        |        |       |        |        |
| 16    |      |                          |        |   |     |   |     |      |        |        |       |        |        |
| 17    |      |                          |        |   |     |   |     |      |        |        |       |        |        |
| 18    |      |                          |        |   |     |   |     |      |        |        |       |        |        |
| 19    |      |                          |        |   |     |   |     |      |        |        |       |        |        |
| 20    |      |                          |        |   |     |   |     |      |        |        |       |        |        |
| 21    |      |                          |        |   |     |   |     |      |        |        |       |        |        |
| 22    |      |                          |        |   |     |   |     |      |        |        |       |        |        |
| 23    |      |                          |        |   |     |   |     |      |        |        |       |        |        |
| 24    |      |                          |        |   |     |   |     |      |        |        |       |        |        |
| 25    |      |                          |        |   |     |   |     |      |        |        |       |        |        |
| 26    |      |                          |        |   |     |   |     |      |        |        |       |        |        |
| 27    |      |                          |        |   |     |   |     |      |        |        |       |        |        |
| 28    |      |                          |        |   |     |   |     |      |        |        |       |        |        |
| 29    |      |                          |        |   |     |   |     |      |        |        |       |        |        |
| 30    |      |                          |        |   |     |   |     |      |        |        |       |        |        |
| 31    |      |                          |        |   |     |   |     |      |        |        |       |        |        |
| 32    |      |                          |        |   |     |   |     |      |        |        |       |        |        |
| 33    |      |                          |        |   |     |   |     |      |        |        |       |        |        |
| 34    |      |                          |        |   |     |   |     |      |        |        |       |        |        |
| 35    |      |                          |        |   |     |   |     |      |        |        |       |        |        |
| 36    |      |                          |        |   |     |   |     |      |        |        |       |        |        |
| 37    |      |                          |        |   |     |   |     |      |        |        |       |        |        |
| 38    |      |                          |        |   |     |   |     |      |        |        |       |        |        |
| 39    |      |                          |        |   |     |   |     |      |        |        |       |        |        |
| 40    |      |                          |        |   |     |   |     |      |        |        |       |        |        |
| 41    |      |                          |        |   |     |   |     |      |        |        |       |        |        |
| 42    |      |                          |        |   |     |   |     |      |        |        |       |        |        |
| 43    |      |                          |        |   |     |   |     |      |        |        |       |        |        |
| 44    |      |                          |        |   |     |   |     |      |        |        |       |        |        |
| 45    |      |                          |        |   |     |   |     |      |        |        |       |        |        |
| 46    |      |                          |        |   |     |   |     |      |        |        |       |        |        |
| 47    |      |                          |        |   |     |   |     |      |        |        |       |        |        |
| 48    |      |                          |        |   |     |   |     |      |        |        |       |        |        |
| 49    |      |                          |        |   |     |   |     |      |        |        |       |        |        |
| 50    |      |                          |        |   |     |   |     |      |        |        |       |        |        |

1. If the aerodrome is used for international operations, including as an alternate, enter 'Y', if not, enter 'N'. 2. If LNAV only, enter LNAV. If LNAV/ANAV only enter LNAV/ANAV. If both enter BOTH. If RNP AR, enter RNP AR. If there is an RNP AR to the same runway that also has an LNAV and/or LNAV/ANAV the enter the RNP AR on a separate line for that runway. 3. If RNAV or RNP SID exists for this runway, note navigation specification, RNAV-1, RNAV 2, or Basic-RNP 1. If not based on a PBN navigation specification, enter RNAV. 4. If RNAV or RNP STAR exists for this aerodrome note navigation specification, RNAV-1, RNAV 2, or Basic-RNP 1. If not based on a PBN navigation specification, enter RNAV. 5. Should list all instrumented aerodromes and runway ends in the State, as well as non-instrument runway ends that may be used by aircraft in excess of 5700 kg MTOW. Leave blank blocks L-N as appropriate, if PBN or RNAV approaches, SIDs or STARs are not implemented or planned to be implemented yet as part of the State PBN Implementation Plan. 6. Enter actual effective date or proposed future effective date as month-year

**PBN IMPLEMENTATION PROGRESS REPORT**

State: State of Qatar

Date: 15/11/2012

**Designation of PBN Focal Point**

**Reference** : MID State Letter Ref AN 6/28 – 149 dated 21 April 2008 and follow up letter Ref AN6/28 – 293 dated 10 August 2008 “ in order to facilitate necessary follow-up and coordination, to provide a PBN Implementation Focal Point by 21 August 2008 “

**Status** : Nominated

**Focal Point** : Ahmed Al Eshaq  
Director Air Navigation  
P. O. Box 73  
Civil Aviation Authority  
State of Qatar.

Email : [ahmed@caa.gov.qa](mailto:ahmed@caa.gov.qa)  
Phone : +974 4465 6555  
Fax : +974 4465 6554

**State PBN Implementation Plan**

**Reference** : ICAO Assembly Resolution 37/11: Performance-based navigation global goals

*Recognizing* that not all States have developed a PBN implementation plan by the target date of 2009; *The Assembly Urges* all States to implement RNAV and RNP air traffic services (ATS) routes and approach procedures in accordance with the ICAO PBN concept laid down in the Performance-based Navigation (PBN) Manual (Doc 9613);

**Status** : Adopted by Civil Aviation Authority State of Qatar, Air Navigation Department and to be reviewed by ICAO PBN/GNSS TF

**Approach Operations**

**Reference** : ICAO Assembly Resolution A37/11

*States complete a PBN implementation plan to achieve:* implementation of approach procedures with vertical guidance (APV) (Baro-VNAV and/or augmented GNSS), including LNAV only minima, for all instrument runway ends, either as the primary approach or as a back-up for precision approaches by 2016 with intermediate milestones as follows: 30 per cent by 2010, 70 per cent by 2014 and implementation of straight-in LNAV only procedures, as an exception, 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.

| Implementation Targets<br>(# of RWY Ends) |       |       | Completed<br>(# of RWY Ends) |           | On Progress<br>(# of RWY Ends) |           |
|---|-------|-------|------------------------------|-----------|--------------------------------|-----------|
| Y2012                                     | Y2014 | Y2016 | LNAV                         | LNAV/VNAV | LNAV                           | LNAV/VNAV |
| 2   | 6     | 6     | 2                            | 1         | 4                              | 4         |

*Note(s):* (States may include information on recent publications of new PBN approach procedures.)

**Arrival and Departure Operations**

*Reference:* ICAO Assembly Resolution A37/11

| Implementation Targets<br>(# of Int'l Airports) |       |       | Completed<br>(# of Int'l Airports) |           | On Progress<br>(# of Int'l Airports) |           |
|---|-------|-------|------------------------------------|-----------|--------------------------------------|-----------|
| Y2012   | Y2014 | Y2016 | Arrival                            | Departure | Arrival                              | Departure |
| 1   | 2     | 2     | 1                                  | 0         | 2                                    | 2         |

*Note(s):* (States may include information on recent publications with new PBN arrival/departure procedures.)

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STATE OF QATAR PBN APPROACH and TERMINAL IMPLEMENTATION STATUS

| NO | ICAO REGION | ICAO DESIG | AIRPORT NAME | COUNTRY | INTL (Y/N) | RUNWAY | INST RWY Y/N | RESTRICTIONS | APPROACH LNAV/VNAV | APPR EFF DATE | RNAV/RNP SID | SID EFF DATE | RNAV/RNP STAR | STAR EFF DATE      | COMMENTS        |
|----|-------------|------------|--------------|---------|------------|--------|--------------|--------------|--------------------|---------------|--------------|--------------|---------------|--------------------|-----------------|
| 1  | MID         | OTBD       | DOHA INTL    | QATAR   | Y          | 15     | Y            |              | LNAV               | Jun-07        | RNAV-1 SID   | TBN          | RNAV-1 STAR   | Under Construction | 7 SIDs, 3 STARS |
| 2  | MID         | OTBD       | DOHA INTL    | QATAR   | Y          | 33     | Y            |              | LNAV/VNAV          | Jun-07        | RNAV-1 SID   | TBN          | RNAV-1 STAR   | Under Construction | 7 SIDs, 3 STARS |
| 3  | MID         | OTHH       | HAMAD INTL   | QATAR   | Y          | 16L    | Y            |              | LNAV               | TBN           | RNAV-1 SID   | TBN          | RNAV-1 STAR   | TBN                | 7 SIDs, 3 STARS |
| 4  | MID         | OTHH       | HAMAD INTL   | QATAR   | Y          | 34R    | Y            |              | LNAV/VNAV          | TBN           | RNAV-1 SID   | TBN          | RNAV-1 STAR   | TBN                | 7 SIDs, 3 STARS |
| 5  | MID         | OTHH       | HAMAD INTL   | QATAR   | Y          | 16R    | Y            |              | LNAV               | TBN           | RNAV-1 SID   | TBN          | RNAV-1 STAR   | TBN                | 7 SIDs, 3 STARS |
| 6  | MID         | OTHH       | HAMAD INTL   | QATAR   | Y          | 34L    | Y            |              | LNAV/VNAV          | TBN           | RNAV-1 SID   | TBN          | RNAV-1 STAR   | TBN                | 7 SIDs, 3 STARS |

UPDATED: 15/11/2012

Notes:

- 1 If the aerodrome is used for international operations, including as an alternate, enter 'Y'. If not, enter 'N'.
- 2 If LNAV only, enter LNAV. If LNAV/VNAV only, enter LNAV/VNAV. If both enter BOTH. If RNP AR, enter RNP AR. If there is an RNP AR to the same runway that also has an LNAV and/or LNAV/VNAV the enter the RNP AR on a separate line for that runway.
- 3 If RNP or RNP STAR exists for this runway, note navigation specification, RNAV 1, RNAV 2, or Basic-RNP 1. If not based on a PBN navigation specification, enter RNAV.
- 4 If RNAV or RNP STAR exists for this aerodrome, note navigation specification, RNAV-1, RNAV 2, or Basic-RNP 1. If not based on a PBN navigation specification, enter RNAV.
- 5 Should list all instrument aerodromes and runway ends in the State, as well as non-measurement runway ends that are used by aircraft in excess of 5700 kg MTOW. Leave blank blocks L-N as appropriate. If PBN or RNAV approaches, SIDs or STARs are not implemented or planned to be implemented, list as part of the State PBN Implementation Plan.
- 6 Enter actual effective date or proposed future effective date as month-year.

PBN/GNSS TF/5  
Appendix 5D to the Report on Agenda Item 5

**PBN IMPLEMENTATION PROGRESS REPORT**

State: (EGYPT)

Date: (15/04/13)

**Designation of PBN Focal Point**

Reference: MID State Letter Ref AN 6/28 – 149 dated 21 April 2008 and follow up letter Ref AN6/28 – 293 dated 10 August “ in order to facilitate necessary follow-up and coordination, to provide a PBN Implementation Focal Point by 21 August 2008 “

Status: (EGYPT)

Focal Point: Badr Mohamed Badr Shoman

**State PBN Implementation Plan**

Reference: MIDANPIRG Conclusion 11/74 – PBN State implementation Plan  
“That, That, in order to give effect to Assembly Resolution A36-23: Performance based navigation global goals, MID States are urged to complete development of their individual State Implementation plans based on the regional PBN implementation plan by 30 September 2009 so that it may be reviewed by the ATM/SAR/AIS SG as part of the Regional agreement process.

Status: by (EGYPT) and (Reviewed) by ICAO PBN/GNSS TF

Note(s): (States may include information on publication date and location for State PBN Implementation Plan and other relevant information.)

**Approach Operations**

Reference: ICAO Assembly Resolution A36-23  
“States and planning and implementation regional groups (PIRGs) complete a PBN implementation plan by 2009 to achieve: implementation of approach procedures with vertical guidance (APV) (Baro-VNAV and/or augmented GNSS) for all instrument runway ends, either as the primary approach or as back up for precision approaches by 2016 with intermediate milestones as follows: 30 percent by 2010, 70 percent by 2014.”

Status:

| Implementation Targets<br>(# of RWY Ends) |       |       | Completed<br>(# of RWY Ends) |           | On Progress<br>(# of RWY Ends) |           |
|---|-------|-------|------------------------------|-----------|--------------------------------|-----------|
| Y2010                                     | Y2014 | Y2016 | LNAV                         | LNAV/VNAV | LNAV                           | LNAV/VNAV |
| 31/54                                     | 6     | 17    | 31                           |           | 3                              |           |

Note: published on 1 MAY 2012 ( AIP Amendment 104 )

**Arrival and Departure Operations**

Reference: 1) ICAO Assembly Resolution A36-23  
“States and planning and implementation regional groups (PIRGs) complete a PBN implementation plan by 2009 to achieve: implementation of RNAV and RNP operations (where required) for en route and terminal areas according to established timelines and intermediate milestones.”

2) MID PBN Regional Implementation Plan and Strategy

“Short-term Implementation Targets: □ RNP APCH (with Baro-VNAV) in 30% of instrument runways by 2010 and 50% by 2012 and priority should be given to airports with most significant operational benefits RNAV-1 SIDs/STARs for 30% of international airports by 2010 and 50% by 2012 and priority should be given to airports with RNP Approach RNP-5 and B-RNAV which is implemented in MID Region to be redefined as per ICAO PBN terminology by 2009 (MIDANPIRG/11), full implementation of PBN by 2012 for continental en-route..”

■ “Medium-term Implementation Targets: RNP APCH with Baro-VNAV or APV in 100% of instrument runways by 2016. RNAV-1 or RNP-1 SID/STAR for 100% of international airports by 2016 and RNAV-1 or Basic RNP-1 SID/STAR at busy domestic airports where there are operational benefits

| Implementation Targets<br>(# of Int'l Airports) |       |       | Completed<br>(# of Int'l Airports) |           | On Progress<br>(# of Int'l Airports) |           |
|---|-------|-------|------------------------------------|-----------|--------------------------------------|-----------|
| Y2010   | Y2014 | Y2016 | Arrival                            | Departure | Arrival                              | Departure |
| 0/13  | 6     | 7     | -----                              | -----     | 3                                    | 3         |

Note(s): : published on 1 MAY 2012 (AMDT 104 AIP )

PBN/GNSS TF5  
Report on Agenda Item 6

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**REPORT ON AGENDA ITEM 6: FUTURE WORK PROGRAMME**

6.1 The meeting reviewed the list of tasks developed by PBN/GNSS TF/4 and noted that most of the tasks are completed. Accordingly, the meeting agreed to discontinue the update of the tasks, IATA was requested to provide the aircraft fleet readiness status in order to assist the Task Force to prioritize the PBN Implementation. IATA had also identified the following Runway ends in the MID Region where the airlines believe that APV with Vertical guidance are a priority:

- Najaf ORNI/NJF Rwy 10,
- Alexandria HEBA/HBE Rwy 14
- Tripoli HLLT/TIP Rwy 09
- Amman OJAM/AMM Rwy 08R
- Benghazi HLBN/BEN Rwy 15L, 15R, 33R

6.2 The meeting reviewed and updated the Terms of Reference (TOR) and Work Programme of PBN/GNSS Task Force, taking into consideration the work accomplished during this Task Force Meeting and the developments in PBN/GNSS. Specially the outcome of the Twelfth Air Navigation Conference. Accordingly, the meeting agreed to the following Draft Decision:

***DRAFT DECISION 5/3: TERMS OF REFERENCE OF THE PBN/GNSS TASK FORCE***

*That, the Terms of Reference and Work Programme of the PBN/GNSS Task Force be updated as at **Appendix 6A** to the Report on Agenda Item 6.*

6.3 The meeting noted that CNS/ATM/IC SG/7 will be held in September 2013 and MIDANPIRG/14 will be held in December 2013. Consequently, the meeting was of the view that the dates of the next meeting could be in the first or second quarter of 2014, and agreed that the Secretariat Coordinate with other activities of the ICAO MID Regional Office, and decide the exact dates. The venue will be Cairo, unless a State is willing to host the meeting.

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PBN/GNSS TF/5  
Appendix 6A to the Report on Agenda Item 6

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**PROPOSED TERMS OF REFERENCE FOR  
PBN/GNSS TASK FORCE**

**1. TERMS OF REFERENCE**

- a) Carry out specific studies to support the implementation of Performance Based Navigation (PBN) in the MID, in accordance with the ICAO Strategic Objectives and Global Plan;
- b) Identify issues/actions arising from the work of ICAO or for consideration by ICAO in order to facilitate regional and global harmonization of existing applications as well as future implementation of Performance Based Navigation operations.
- c) Determine and recommend, on the basis of the study, the PBN strategy and Implementation Plan for the MID Region, based on the ICAO PBN Implementation goals as reflected in assembly resolution 37-11.
- d) Assist States that may require support in the implementation of PBN, through support teams
- e) Monitor the progress of studies, projects, trials and demonstrations by the MID Region States, and other ICAO Regions.
- f) Provide a forum for active exchange of information between States related to the implementation of GNSS.
- g) Identify deficiencies and constraints that would impede implementation of GNSS, and propose solutions that would facilitate the rectification of such problems.
- h) Identify and address, to the extent possible, institutional, financial and legal matters related to the GNSS implementation in the MID Region.
- i) Develop a system of post-implementation reviews to ensure the effective and safe introduction of PBN and non-PBN GNSS operation.

**2. WORK PROGRAMME**

- a) Study and assess the Regional RNAV and RNP (PBN) requirements;
- b) focus assistance to States that may require support on development of the State PBN implementation plans;
- c) identify priority runways for Approach Procedures with Vertical Guidance (APV) to be implemented based on the ICAO RNP APCH navigation specification (APV/Baro-VNAV);
- d) identify guidance material and training needs;
- e) update the Regional PBN Strategy and plans including global developments;

- f) initiate coordinate with other ICAO Regions as necessary to address implementation interface issues;
- g) undertake other functions relevant to implementation of PBN as assigned by MIDANPIRG;
- h) report to CNS/ATM/IC SG and keep ATM/SAR/AIS SG and CNS SG closely briefed;
- i) monitor and follow-up the studies pertaining to the possible use of GNSS, and different augmentation systems in the MID Region;
- j) review and identify intra and inter regional co-ordination issues related to the implementation of GNSS and where appropriate recommend actions to address those issues;
- k) examine to what extent the GNSS including Augmentation system accessible in the Region can meet the navigational requirements of ATM service providers and aircraft operators in the Region;
- l) identify and co-ordinate GNSS implementation priorities in the MID Region;
- m) provide assistance to MID States in planning and implementation of GNSS, including the development of GNSS procedures;
- n) suggest ways and means for rectifying the problems as they arise related to the implementation of GNSS; and
- o) coordinate for the provision of the necessary support for PBN operational approvals.

**3. THE TASK FORCE SHALL IN ITS WORK BE GUIDED BY THE FOLLOWING PRINCIPLES**

- a) Implementation of PBN shall follow the ICAO PBN goals and milestones;
- b) avoid undue equipage of multiple on board equipment and/or ground-based systems;
- c) avoid the need for multiple airworthiness and operational approvals for intra- and inter-regional operations;
- d) continue application of conventional air navigation procedures during the transition period, to guarantee the operations by users that are not RNAV- and/or RNP-equipped;
- e) cognizance that the primary objective of ICAO is to ensure the safe and efficient performance of the global Air Navigation System, ensure that pre- and post-implementation safety assessments will be conducted to ensure the application and maintenance of the established target levels of safety;
- f) take into account the introduction of new technologies, encourage implementation and development in GNSS; and
- g) apply ICAO guidance material and information as may be applicable to the Region to facilitate the implementation of PBN.

**4. COMPOSITION OF THE TASK FORCE**

**STATES**

MID Region States

**ORGANIZATIONS (AS OBSERVERS)**

IATA, IFALPA, IFATCA, EUROCONTROL, ACAC, CANSO and additional representative from Industry, International/Regional Organizations may be invited when required.

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PBN/GNSS TF/5  
Report on Agenda Item 7

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**REPORT ON AGENDA ITEM 7: ANY OTHER BUSINESS**

7.1 The meeting noted that Egypt has adopted an initiative to establish a Regional Aeronautical Mobile Satellite (Route) System to provide Aeronautical Safety Communication, Navigation and Surveillance/Air Traffic Management Services over Africa and Middle East Regions, the initiative is called "NAVISAT".

7.2 The NAVISAT is comprised of two Geostationary (GEO) Satellites in Ka-band, two Ground Earth Stations (GES) and a number of Gateways. NAVISAT will offer Aeronautical Communication (mobile/fixed) along with Navigation Payload and complementary services. The meeting noted the status of the project, where business and technical feasibility studies were completed in November 2012, fund raising started in December 2012, RFP was released on March 2013, procurement contract of the Satellite systems will be signed in June 2013, and Satellites will be launched in 2015/2016.

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PBN/GNSS TF/5  
Attachment A to the Report

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**LIST OF PARTICIPANTS**

| <b>NAME</b>                                     | <b>TITLE &amp; ADDRESS</b>  |
|---|---|
| <b><u>STATES</u></b>                            |   |
| <b>BAHRAIN</b><br>Mr. Mohammed Hassan Al-Asfoor | Senior Nav aids Engineer<br>Civil Aviation Affairs<br>P.O. Box 586<br>KINGDOM OF BAHRAIN<br>Fax: 973 17 329 966<br>Tel: 973 17 321 035<br>Mobile: 973 3969 1035<br>Email: malasfoor@caa.gov.bh  |
| Mr. Salah Mohamed Alhumood                      | Head, Aeronautical Information & Airspace<br>Planning<br>Civil Aviation Affairs<br>Bahrain International Airport<br>P.O. Box 586<br>KINGDOM OF BAHRAIN<br>Fax: 973 17 329966<br>Tel: 973 17 321 180<br>Mobile: 973 3640 0424<br>Email: shumood@caa.gov.bh |
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| Mr. Mohamed Talaat Metwally  | Head of Technical Bureau for the Minister of Civil Aviation<br>Ministry of Civil Aviation<br>Cairo Airport Road<br>Cairo - EGYPT<br>Fax: 202 2268 8378<br>Tel: 202 2696 0668<br>Mobile: 01222214441<br>Email: mohtalaat@yahoo.com   |
| Mr. Naeyl Abdel Aziz Mohamed | Director of Procedure Design<br>National Air Navigation Services Company (NANSC)<br>Cairo Airport Road<br>Cairo - EGYPT<br>Fax: 202 2267 8882<br>Tel: 202 2267 9009<br>Mobile: 0100 154 6857<br>Email: naeylessa@rocketmail.com   |

| NAME                                    | TITLE & ADDRESS  |
|---|--|
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| Eng. Said Abd El Hamid Jouban           | General Director Air Navigation Facilities<br>Egyptian Civil Aviation Authority<br>Fax: 202 22678537<br>Tel: 202 22678537<br>Mobile: 201113334138<br>Email: saidjouban@gmail.com   |
| Mr. Salama Hussein M. El Sakka          | General Director for Control Tower<br>National Air Navigation Services Company<br>(NANSC)<br>Cairo Air Navigation Centre (CANC)<br>Cairo Airport Road<br>Cairo - EGYPT<br>Fax: 202 2265 7868<br>Tel: 202 2268 3901<br>Mobile: 010 160 6037<br>Email: s.elsakka@yahoo.com |
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| Eng. Sayed Mohamed Ahmed Ali            | NAVAIDS Engineer<br>National Air Navigation Services Company<br>(NANSC)<br>Cairo Air Navigation Centre (CANC)<br>Cairo Airport Road<br>Cairo - EGYPT<br>Fax: 202 22672589<br>Tel: 202 22657973/22657957<br>Mobile: 01009454150<br>Email: sayed.ali_nav@yahoo.com         |

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