INTERNATIONAL CIVIL AVIATION ORGANIZATION

REPORT OF THE FIRST MEETING OF THE PERFORMANCE BASED NAVIGATION SUB-GROUP

(PBN SG/1)

(Cairo, Egypt, 1 – 3 April 2014)

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

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

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PART I – HISTORY OF THE MEETING

1. PLACE AND DURATION

1.1 The First Meeting of the Performance Based Navigation Sub-Group (PBN SG/1) was held at the ICAO MID Regional Office in Cairo, Egypt, 1 – 3 April 2014.

2. OPENING

2.1 Mr. Mohamed R. M. Khonji, ICAO MID Regional Office Regional Director, welcomed the participants to Cairo and wished them a successful and fruitful meeting. He highlighted the advantages of PBN implementation. Mr. Khonji emphasized that the introduction of PBN has met the expectations of the entire aviation community. However, PBN implementation is still facing a lot of challenges such as adequate training, lack of procedures designers and closer coordination between States and the aviation stakeholders.

2.2 Mr. Khonji highlighted that PBN in the MID Region had been progressing but with a low pace, and the implementation was still far behind the agreed targets. Therefore, ICAO is conducting PBN Workshops and Go Teams in order to support States to improve and expedite the PBN implementation. Moreover, he encouraged all Stakeholders to support the establishment of the MID Flight Procedure Programme (MID FPP) based on the experience of similar Programmes implemented successfully, especially in ICAO Asia Pacific (APAC) and AFI Regions.

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

3. ATTENDANCE

3.1 The meeting was attended by a total of thirty three (33) participants from ten (10) States (Bahrain, Egypt, Iraq, Jordan, Kuwait, Lebanon, 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 Mohamed Al Eshaq, Director of Air Navigation, Civil Aviation Authority, Qatar.

4.2 Mr. Raza Gulam, Regional Officer CNS and Mr. Elie El Khoury, Regional Officer ATM/SAR acted as Secretaries of the meeting, supported by Mr. Mohamed Smaoui, ICAO MID Regional Office Deputy Regional Director.

LANGUAGE

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

5. AGENDA

5.1 The following Agenda was adopted:

Agenda Item 1:	Adoption of the Provisional Agenda and election of Chairpersons
Agenda Item 2:	Follow-up on MIDANPIRG/14 Conclusions/Decisions relevant to PBN and GNSS
Agenda Item 3:	Global and Regional Developments in PBN and GNSS
Agenda Item 4:	PBN Implementation in the MID Region
Agenda Item 5:	GNSS Implementation in the MID Region
Agenda Item 6:	Future Work Programme
Agenda Item 7:	Any other business

6. CONCLUSIONS AND DECISIONS – DEFINITION

6.1 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

7. LIST OF CONCLUSIONS AND DECISIONS

DRAFT CONCLUSION 1/1:	*STATES' PBN IMPLEMENTATION PLANS*
DRAFT CONCLUSION 1/2:	*DRAFT MID REGION PBN IMPLEMENTATION PLAN*
DRAFT CONCLUSION 1/3:	*MID FPP*
DRAFT DECISION 1/4:	*DISSOLUTION OF THE MPST*
DRAFT CONCLUSION 1/5:	*GNSS SEMINAR*

PART II: REPORT ON AGENDA ITEMS

REPORT ON AGENDA ITEM 1: ADOPTION OF THE PROVISIONAL AGENDA AND ELECTION OF CHAIRPERSONS

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

1.2 In accordance with the MIDANPIRG Procedural Handbook, Seven Edition – December 2013, Mr. Ahmed Mohamed Al Eshaq, Director Air Navigation, Civil Aviation Authority, Qatar, and Mr. Ehab Raslan, Senior Air Traffic Controller, National Air Navigation Services Company, Egypt, were unanimously elected as the Chairperson and Vice Chairperson of the PBN Sub-Group, respectively.

REPORT ON AGENDA ITEM 2: FOLLOW-UP ON MIDANPIRG/14 CONCLUSIONS AND DECISIONS RELEVANT TO PBN AND GNSS

2.1 The meeting noted the status of relevant MIDANPIRG/14 Conclusions and Decisions related to the PBN and GNSS and the follow up actions taken by States, ICAO and other parties concerned as at **Appendix 2A**.

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

3.1 The meeting recalled that the the Twelfth Air Navigation Conference (AN-Conf/12) held in Montreal, 19-30 November 2012 acknowledged the notable work that had already been completed by ICAO and its partners to support the global implementation of PBN but 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.

3.2 Consequently, the Conference recognized that States still required 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 Conference 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 the Fourth edition of Global Air Navigation Plan (GANP) was endorsed by the ICAO 38th Assembly held in Montreal, Canada, from 24 September to 4 October 2013. It was highlighted that the 38th Assembly called upon States, Planning and Implementation Regional Groups (PIRGs), and the aviation industry to:

- utilize the guidance provided in the GANP for planning and implementation activities which establish priorities, targets and indicators consistent with globally-harmonized objectives, taking into account operational needs;
- provide timely information to ICAO, and to each other, regarding the implementation status of the GANP, including the lessons learned from the implementation of its provisions;

3.4 The 38th Assembly urged States:

- to take into consideration the GANP guidelines as an efficient operational measure for environmental protection;
- that are developing new generation plans for their own air navigation modernization to coordinate with ICAO and align their plans so as to ensure global compatibility and harmonization; and
- to utilize the Flight Procedures Programme, where available, for PBN implementation.

3.5 The meeting recalled that, at global level, PBN is considered as the highest priority for air navigation, in addition to the Continuous Descent Operations (CDO) and Continuous Climb Operations (CCO).

3.6 The meeting noted that the GANP includes Roadmaps, which depict migration paths for the implementation of PBN levels and precision approaches for the following operations: en-route oceanic and remote continental, en-route continental, TMA arrival/departure, and approach.

3.7 The meeting also recalled that the 38th Assembly approved the Regional Performance Dashboards. These Dashboards aim to provide a glance of both Safety and Air Navigation Capacity and Efficiency strategic objectives, using a set of indicators and targets based on the regional implementation of the Global Aviation Safety Plan (GASP) and the Global Air Navigation Plan (GANP).

3.8 It was highlighted that the purpose of these Dashboards is to show targeted performance at the regional level and, initially, contain graphics and maps with a planned expansion to include the Aviation System Block upgrades (ASBU) Block 0 Modules.

3.9 The meeting reviewed the Metrics and Indicators included in the Air Navigation Dashboard (V 1.0) and raised concern about few of them. It was agreed that the ICAO MID Office would follow-up the subject with ICAO HQ taking into consideration the outcome of the meeting.

3.10 The meeting was further apprised of other ICAO Regions activities related to PBN. It was noted that PBN Workshops have been organized in all the ICAO Regions, in order to foster the PBN implementation.

3.11 The meeting was apprised of the latest proposed amendments to the *Procedures for Air Navigation Services — Aircraft Operations* (PANS-OPS, DOC 8168), along with the consequential amendments to the Annexes 4, 6, 14 and 15, and to the *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM, Doc 4444). The proposed amendments were circulated to all Stakeholders for comments through ICAO State Letters, Ref.: SP 65/4-13/24 dated 14 June 2013 and Ref.: AN 13/2.5-13/85 dated 13 December 2013, respectively. It was noted that these amendments will be reviewed, updated and endorsed by the ICAO Council in accordance with the comments received. The planned date of applicability is 13 November 2014.

3.12 Based on the above, the meeting urged States to take necessary measures to plan for the implementation of the new provisions in a timely manner. In particular the provisions related to RNP charting, taking into consideration the one-step eight-year transition period, starting 13 November 2014, to convert the existing RNAV approach procedures charts depicting required navigation performance to RNP approach procedure charts by 2022. In this regard, it was highlighted that further coordination with the AIM Sub-Group is required to effectively follow-up this issue.

3.13 The meeting noted that the provisions, guidelines and computer based training courses related to PBN are available on the ICAO website accessible through the following link: http://www.icao.int/safety/pbn/Pages/default.aspx and encouraged all stakeholders to make use of the information available on that website.

3.14 The meeting noted that the NSP WGW/14 meeting covered topics that included updates to the GLONASS SARPs, initial SARPs material for the BeiDou and Galileo core constellations, updates to the SBAS SARPs, and other topics. The NSP WGW/14 meeting reviewed the status of GBAS implementations, and considered the maintenance of existing GBAS CAT I SARPs and the validation of the SARPs material on GBAS CATII/III.

3.15 It was also highlighted that the NSP WGW/14 meeting discussed the Methodology for GPS + RAIM performance monitoring and recording, where a study conducted identifies 4 main steps to implement GNSS monitoring (1-Data Input, 2-Data Recording, 3-Data Elaboration and 4-Reporting). The NSP agreed that further guidance on GNSS monitoring is required. Accordingly, the NSP established a drafting group to start preparing guidance material on GNSS monitoring.

3.16 The NSP WGW/14 meeting also discussed the development of future ICAO standards for Advanced RAIM. In this respect, the need to establish requirements for the data delivery mechanism, or Integrity Support Messages (ISM), including the data structure and the data contents, was highlighted.

3.17 The meeting was apprised of the status of the core constellations and the various augmentation systems, which included BeiDou, Galileo, EGNOS, GPS, GLONASS, ABAS, SBAS, and GBAS. Concerning avionics it was noted that RTCA SC 159 intends to start actively working on the development of a concept of operations for multi-frequency, multi-constellation SBAS solutions.

3.18 The meeting received information on EUROMED GNSS II/MEDUSA project (Global Navigation by Satellite Systems EGNOS/GALILEO) Egypt national workshop, NAVISAT and ACAC SBAS Implementation in the Regions of ACAC and ASECNA (SIRAJ) project. Furthermore, information on ICAO APAC ICAO Ionospheric Study Task Force and issues related to GAGAN, MSAS interoperability was provided.

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

4.1 The meeting reviewed and updated the status of PBN implementation (Terminal and Approach) in the MID Region as at **Appendix 4A**.

4.2 The meeting agreed to monitor the status of PBN implementation for all the runway (RWY) ends at the International Aerodromes listed in the MID ANP.

4.3 The meeting noted with appreciation that some States have completed the implementation of RNAV SIDs, RNAV STARs and PBN Approaches. It was highlighted that only UAE implemented RNP AR Approaches and they are planning for the implementation of Ground-Based Augmentation System (GBAS) Landing System (GLS).

4.4 In the same vein, the meeting noted that Qatar will complete the implementation of RNAV SIDs and RNAV STARs at Doha International Airport by May 2014. It was also noted that Qatar in cooperation/coordination with its adjacent States will implement Continuous Descent Operations (CDOs) in Doha Terminal control Area (TMA) starting July 2014.

4.5 The meeting noted with concern that only 32% of the total number of RWY ends in the MID Region are provided with ILS Approaches, 41% with RNAV (GNSS) Approaches (LNAV) and 13% with Baro-VNAV Approaches (LNAV/VNAV). In addition the implementation of RNAV SIDs and STARs is around 50%.

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

DRAFT CONCLUSION 1/1: STATES' PBN IMPLEMENTATION PLANS

That, States be urged to:

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

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

4.7 The meeting recognized the advantages of the Advanced RNP (A-RNP) navigation specifications and agreed that A-RNP should be considered for implementation in the MID Region in the mid-term and accordingly, A-RNP should be reflected in the MID Region PBN Implementation Plan.

4.8 The meeting received with appreciation the comprehensive presentation provided by Egypt related to the Egyptian Airspace and PBN Implementation Plan and the measures taken to improve the PBN implementation in Cairo FIR. The meeting encouraged all States to provide similar presentations during the future PBN SG meetings.

4.9 The meeting reviewed the list of PBN Focal Points at **Appendix 4B** and noted that no State has requested an update.

4.10 The meeting reviewed and updated the Draft MID Air Navigation Strategy Parts related to PBN, in particular the Aviation System Block Upgrades (ASBU) Block 0 Modules, APTA, CDO and CCO Monitoring Tables as at **Appendix 4C.**

4.11 The meeting agreed to monitor the status of the States' PBN Implementation Plans. In this regard the Metric and Indicator related to the States' PBN Implementation Plans have been added to the APTA Monitoring Table.

4.12 It was highlighted that the implementation of GLS is not considered as a priority for the short term (2014-2017) in the MID Region. Accordingly, the meeting agreed that the implementation of GLS would be required at some identified RWY ends starting 2018 and beyond.

4.13 Based on the above, the meeting agreed that the following MID Region PBN Performance Metrics should be reflected in the Air Navigation Regional Performance Dashboard:

a) Number of States that have provided updated PBN Implementation Plan;
b) Number of RWY ends with GNSS approach (LNAV); and
c) Number of RWY ends with Baro-VNAV approach (LNAV/VNAV).

4.14 Taking into consideration the Fourth Edition of the Global Air Navigation Plan, the status of PBN implementation and PBN/GNSS developments in the MID Region, the meeting reviewed and updated the Draft MID Region PBN Implementation Plan at **Appendix 4D**, which consolidates and updates the previous PBN and GNSS Strategies/Plans. Accordingly, the meeting agreed to the following Draft Conclusion:

DRAFT CONCLUSION 1/2: DRAFT MID REGION PBN IMPLEMENTATION PLAN

That, States be urged to provide the ICAO MID Regional Office with their inputs and comments related to the Draft MID Region PBN Implementation Plan at ***Appendix 4D****, by* ***30 June 2014****, for the consolidation of a final version for endorsement by the MSG/4 meeting.*

4.15 The meeting noted with appreciation that the two PBN Workshops on the use of PBN in airspace planning, organized for the MID Region, in UAE and Tunis were successful and fruitful. The Summaries of Discussions of the mentioned Workshops are available on the ICAO MID website.

4.16 In line with MIDANPIRG/14 outcome related to PBN and the benefit of the PBN Workshops, the meeting encouraged States to coordinate with ICAO the hosting of additional PBN Workshops. The Workshops would include a support mission to the hosting State to assess their current PBN implementation status and provide a list of recommendations to foster the PBN implementation with clear follow-up actions. In this respect, the meeting noted that Egypt requested to host a PBN Workshop beginning of 2015.

4.17 The meeting recalled that MIDANPIRG/14 underlined that the lack of procedure designers in the MID Region is one of the PBN implementation challenges. It was emphasized that cooperative efforts were necessary to overcome this challenge. In this respect, the meeting noted that the DGCA-MID/2 meeting, through Conclusion 2/5 agreed that a study related to the establishment of a MID Region Flight Procedure Programme (FPP) be carried out within the framework of the PBN Sub-Group, taking into consideration similar programmes in other ICAO Regions.

4.18 Based on the above, the meeting initiated the discussions on the establishment of the MID FPP, taking into consideration the experience of the Asia-Pacific (APAC) FPP and AFI FPP.

4.19 It was noted that the DGCA-MID/2 meeting established the MID Region ATM Enhancement Programme (MAEP), as a Regional platform that provides the basis for a collaborative approach towards planning and implementing projects in support of the MID Air Navigation Strategy, taking into consideration previous initiatives.

4.20 The meeting noted that the MAEP Special Coordination Meeting (MAEP SCM) held at the ICAO MID Regional Office, Cairo, Egypt, 18-20 February 2014, agreed to the following MAEP Organizational Structure:

- Strategic level: MAEP Board;
- Tactical level: MAEP Project Management Office (PMO); and
- Operational/implementation level: Projects/Working Packages.

4.21 Based on the above, the meeting agreed to propose to the MAEP Board the establishment of the MID FPP as a project/working package of the MAEP PMO. Accordingly, the meeting agreed to the following Draft Conclusion:

DRAFT CONCLUSION 1/3: MID FPP

That, the MID FPP be established under the MAEP framework as a project/working package of the MAEP Project Management Office (PMO).

4.22 The meeting reviewed the ToR of the MID PBN Support Team (MPST). Taking into consideration the latest developments related to PBN and the establishment of MAEP, the meeting agreed to the dissolution of the MPST. Accordingly, the meeting agreed the following Draft Decision:

DRAFT DECISION 1/4: DISSOLUTION OF THE MPST

That, the MPST be dissolved.

4.23 The meeting noted that Controlled Flight Into Terrain (CFIT) has been identified as one of the three main Focus Areas in the MID Region.

4.24 The meeting recalled that the RASG-MID recognized that PBN would reduce in many cases the number of unstable approaches, which was identified as one of the major root causes of CFIT accidents. The meeting reviewed and updated the Detailed Implementation Plan (DIP) related to CFIT as at **Appendix 4E**, as requested by MIDANPIRG and the RASG-MID.

4.25 The meeting agreed that as a first step, States and Users should provide their inputs to the ICAO MID Regional Office related to the airports/runways with high rate of unstable approaches, by **30 April 2014**.

REPORT ON AGENDA ITEM 5: GNSS IMPLEMENTATION IN THE MID REGION

5.1 The meeting recognized that the introduction of multi-constellation, multi-frequency GNSS that will entail number of new technical and regulatory challenges beyond those already associated with current GNSS implementation.

5.2 The meeting discussed at length the use of NDBs and noted that the following States (Egypt, Iran, Jordan, and Syria) did not complete the decommissioning of NDBs. Accordingly; the meeting urged the concerned States to submit their plans for the decommissioning of NDBs to the ICAO MID Regional Office by December 2014.

5.3 The meeting recalled that the PBN/GNSSTF/5 addressed the recommendations concerning GNSS adopted by the AN-Conf/12, and integrated them in the Strategy for GNSS implementation in the MID Region, which was endorsed by MIDANPIRG/14.

5.4 Since GNSS is mainly used to support PBN Implementation the meeting agreed that the Strategy for the GNSS implementation in MID Region be integrated within the new MID Region PBN implementation plan.

5.5 Based on the above, and in order to foster PBN and GNSS implementation the meeting reemphasized on the importance of thorough follow-up on GNSS developments and encouraged States to conduct Workshop/Seminars to share experiences related to PBN and GNSS including GBAS implementation.

5.6 The meeting urged States to provide the ICAO MID Regional Office with their GNSS implementation plans as part of their PBN implementation plan also to provide their observations of the effects of ionosphere on GNSS signal in their States, in order that mitigation measures could be proposed and actions taken accordingly.

5.7 The meeting received presentation from Jordan on the GNSS Strategy. The objective of the presentation is to formulate a future GNSS roadmap that fosters the implementation of advanced navigation systems in Jordan in order to improve flight efficiency and airports accessibility. It was highlighted that Jordan should consider the multiple GNSS constellations, associated augmentation system and assess the likelihood and effects of GNSS vulnerabilities.

5.8 Based on the above, the meeting agreed that the ICAO MID Regional Office organize Seminar on GNSS covering the augmentation systems (ABAS, GBAS and SBAS) and Multi-constellations during 2015. Accordingly, the meeting agreed to the following Draft Conclusion:

DRAFT CONCLUSION 1/5: GNSS SEMINAR

That, the ICAO MID Regional Office organizes, Seminar on GNSS covering the augmentation systems (ABAS, GBAS and SBAS) and Multi-constellations during 2015.

5.9 The meeting recognized that frequency interference-free operation of GNSS is essential, and that the frequency band 1 559 - 1 610 MHz, is used for elements of GNSS.

5.10 The meeting recalled 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 (none of them from the MID Region) 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.

5.11 The meeting noted that based on MIDANPIRG/13 recommendation, the subject related to deleting the footnotes and support of ICAO position to WRC was presented to the DGCA-MID/2 meeting in order to gain support at the highest possible level in the MID States. Accordingly, the DGCA-MID/2 meeting urged States to ensure continuous coordination with their Radio Frequency Spectrum Regulatory Authorities and the Arab Spectrum Management Group (ASMG) for the support of the ICAO position at WRC and its preparatory meetings.

5.12 The meeting was presented with ICAO State Letter E 3/5.15-13/57 dated 2 July 2013, concerning ICAO Position for the ITU WRC-15 and noted that the following States (*Iraq, Jordan, Qatar, Saudi Arabia, Sudan, Syria and Yemen)* still have their names in the footnotes 5.362B and/or 5.362C. In this regard, the meeting recalled MIDANPIRG/13 Conclusion *13/44: Protection of GNSS Signal,* urging the concerned Sates to delete their name from these footnotes.

5.13 Based on the above, the meeting reiterated the importance of protection of the GNSS Signal. Accordingly, the meeting again urged the concerned States to coordinate and take necessary actions with their National Radio Frequency Spectrum Regulatory Authorities (in some States it is called Telecom Regulatory Authority "TRA") in order to delete their names from the footnotes 5.362B and/or 5.362C at WRC-15.

5.14 The meeting noted that the ICAO MID Regional office is planning to organize a WRC-15 Workshop during the first Quarter of 2015, for preparing the MID States on the frequency spectrum issues of concern to civil aviation and explore ways and means on the support of ICAO Position at WRC-15. It was highlighted that the Workshop would cover the full aviation spectrum. It was also highlighted that the invitation should be extended to the TRAs and encouraged them to attend the Workshop.

5.15 The meeting received an update on GNSS NOTAM and noted that the traditional methods for providing navigation aid status information and NOTAMs cannot be directly applied to satellite navigation services. Furthermore, and in accordance with GNSS Manual (Doc 9849) it was highlighted that the issuance of GNSS NOTAM has not been mandated by ICAO. Accordingly, the meeting agreed that necessary follow-up on the developments of the GNSS NOTAM be carried out by the AIM SG, as deemed necessary.

5.16 The meeting noted that one of the ACAC Priorities/Projects is the GNSS implementation in the Region in collaboration with the European Commission based on the SBAS Implementation in the Regions of ACAC and ASECNA (SIRAJ) project (EGNOS extension).

5.17 The meeting recalled 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". It was noted with concern that Egypt was to organize a NAVISAT Seminar, as agreed in MIDANPIRG/14 meeting, and present its Recommendations to the PBN Sub Group. However, since no Seminar was organized, the meeting did not receive any update on the NAVISAT initiative.

5.18 The meeting noted that EUROMED GNSS II/MEDUSA project (Global Navigation by Satellite Systems EGNOS/GALILEO) held Egypt national workshop, in Cairo, Egypt 12 March 2014. Egypt informed the meeting on the outcome of the Workshop which was mainly about the EGNOS augmentation system (services, coverage, RIMs).

REPORT ON AGENDA ITEM 6: FUTURE WORK PROGRAMME

6.1 The meeting reviewed and updated the Terms of reference (TOR) of the PBN Sub-Group as at **Appendix 6A**.

6.2 Taking into consideration, the planned ICAO MID Regional upcoming events which are of relevance to the activity of the PBN Sub-Group, in particular the MSG/4, ANSIG/1 and MIDANPIRG/15, the meeting agreed that the PBN SG/2 meeting be held during the second half of 2015. The venue will be Cairo, unless a State is willing to host the meeting.

REPORT ON AGENDA ITEM 7: ANY OTHER BUSINESS

7.1 Nothing has been discussed under this agenda item.

APPENDICES

APPENDIX 2A

MIDANPIRG/14 Conclusions and Decisions relevant to PBN and GNSS

CONCLUSIONS AND DECISIONS	FOLLOW-UP	TO BE INITIATED BY	DELIVERABLE	TARGET DATE	REMARKS
DECISION 14/2: UPDATED OF THE MIDANPIRG PROCEDURAL HANDBOOK That, the Seventh Edition of the MIDANPIRG Procedural Handbook be endorsed as at **Appendix 4.1B** to the Report on Agenda Item 4.1.	Update the MIDANPIRG Procedural Handbook and post it on the web	ICAO	Seventh edition of the Procedural Handbook	Feb. 2014	Completed
CONCLUSION 14/5: MID REGION AIR NAVIGATION PRIORITIES That, a) the ASBU Block 0 Modules prioritization Table at **Appendices 4.1E** to the Report on Agenda Item 4.1 be endorsed as the initial version of the MID ASBU Implementation Plan; and b) the ASBU Block 0 Modules prioritization Table be reviewed on regular basis and be extended to cover Block 1 Modules, as appropriate.	Regular Review	MIDANPIRG/14 MIDANPIRG Subsidiary bodies	ASBU prioritization Table	Dec. 2013 Sep. 2014	Ongoing
CONCLUSION 14/6: DRAFT MID REGION AIR NAVIGATION STRATEGY That, a) the Draft MID Region Air Navigation Strategy at **Appendix 4.1F** to the Report on Agenda Item 4.1 be: i. endorsed as the initial version of the MID Region Air Navigation Strategy; and ii. further reviewed and completed by the different MIDANPIRG subsidiary bodies b) MID States be urged to: i. develop their National Air Navigation Performance Framework, ensuring the alignment with and support to the MID Region Air Navigation Strategy;	Implement the Strategy	MIDANPIRG/14 MIDANPIRG Subsidiary bodies ICAO States	Initial version of the Strategy Review and Update Strategy State Letter National Performance Framework	Dec. 2013 Sep. 2014 Feb. 2014 May 2014	Ongoing

CONCLUSIONS AND DECISIONS	FOLLOW-UP	TO BE INITIATED BY	DELIVERABLE	TARGET DATE	REMARKS
ii. incorporate the agreed MID Region Performance Metrics into their National reporting and monitoring mechanisms; and iii. provide the ICAO MID Regional Office, on annual basis, with relevant data necessary for regional air navigation planning and monitoring.		States	Feedback	Dec. 2014	
CONCLUSION 14/26: MID REGION GNSS IMPLEMENTATION STRATEGY That, the MID Region GNSS implementation Strategy be updated as at **Appendix 4.6x** to the Report on Agenda Item 4.6.	Implement the Strategy	MIDANPIRG/14	Updated Strategy	Dec. 2013	Completed
CONCLUSION 14/27: MID SURVEILLANCE STRATEGY That, the MID Surveillance Strategy be adopted as at **Appendix 4.6B** to the Report on Agenda Item 4.6.	Implement the Strategy	MIDANPIRG/14	Updated Strategy	Dec. 2013	Completed
CONCLUSION 14/28: MID REGIONAL PBN IMPLEMENTATION STRATEGY AND PLAN That, the MID Regional PBN Implementation Strategy and Plan be updated as at **Appendix 4.6C** to the Report on Agenda Item 4.6.	Implement the Strategy	MIDANPIRG/14	Updated Strategy	Dec. 2013	Completed
CONCLUSION 14/29: ESTIMATING AND REPORTING ENVIRONMENTAL BENEFITS That, in order to follow-up the implementation of the ATM operational improvements and estimate the accrued fuel savings and associated CO_2 emission reduction from the corresponding improvements on regional basis:	Implement the Conclusion				
a) States be encouraged to develop/update their Action Plans for CO_2 emissions and submit them to ICAO through the APER website on the ICAO Portal or the ICAO MID Regional Office;		ICAO States	State Letter States' Action Plan for CO_2 emissions	Apr. 2014 Sep. 2014	
b) States be urged to: i. identify the operational improvements which have been implemented within their FIR and/or international aerodromes;			IFSET Reports	Jun. and Dec. 2014	

CONCLUSIONS AND DECISIONS	FOLLOW-UP	TO BE INITIATED BY	DELIVERABLE	TARGET DATE	REMARKS
ii. collect necessary data for the estimation of the environmental benefits accrued from the identified operational improvements; iii. use IFSET to estimate the environmental benefits accrued from operational improvements; and iv. send the IFSET reports/the accrued environmental benefits to ICAO on bi-annual basis; and c) IATA to: i) encourage users to support the APM TF in the development of the MID Region Air Navigation Environmental Reports; and ii) consolidate users' inputs and report the accrued environmental benefits to the ICAO MID Regional Office on bi-annual basis.		IATA	Inputs from users	Jun. and Dec. 2014	

MID REGION TMAs PROCEDURES Implementation Status as of Marh 2014

Int'l Aerodrome	RWY	Approach							SID		STAR		Provided PBN PLAN Update date	Remarks
		Precision		VOR or NDB	LNAV	LNAV / VNAV	RNP AR	LPV	Conventional	RNAV	Conventional	RNAV		
		xLS	CAT											
BAHRAIN														
OBBI	12L	ILS	I	VORDME	Y					Y		Y		
	30R	ILS	I	VORDME	Y					Y		Y		
Total	**2**	**2**		**2**	**2**	**0**	**0**	**0**	**0**	**2**	**0**	**2**	**Y**	
%		**100**		**100**	**100**	**0**	**0**	**0**	**0**	**100**	**0**	**100**		
EGYPT														
HEAX	4			VORDME	Y									
	18													
	22			VORDME	Y									
	36			VORDME										
HEBA	14													
	32	ILS	I		Y					Y				
HESN	17			VORDME	Y					Y		Y		
	35	ILS	I	VORDME	Y					Y		Y		
HEAT	13				Y					Y		Y		
	31	ILS	I	VORDME	Y					Y		Y		
HECA	05L	ILS	I	VORDME	Y									
	05C	ILS	II	VORDME	Y									
	05R	ILS	I											
	23L	ILS	I	VORDME										
	23C	ILS	II	VORDME	Y									
	23R	ILS	I	VORDME	Y									
HEAR	16													
	34			VORDME										
HEGN	16			VORDME	Y					Y		Y		
	34	ILS	I	VORDME	Y					Y		Y		
HELX	2			VORDME	Y					Y		Y		
	20	ILS	I	VORDME	Y					Y		Y		

Int'l Aerodrome	RWY	Approach							SID		STAR		Provided PBN PLAN Update date	Remarks
		Precision		VOR or NDB	LNAV	LNAV / VNAV	RNP AR	LPV	Conventional	RNAV	Conventional	RNAV		
		xLS	CAT											
HEMA	15			VORDME										
	33			VORDME										
HEPS	10			VORDME										
	28													
HEOW	1			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	4	ILS	I	VORDME	Y					Y		Y		
	22			VORDME	Y					Y		Y		
HEAL	13			VORDME	Y									
	31			VORDME	Y									
HESG	15			VORDME										
	33			VORDME										
Total	**40**	**13**		**32**	**23**	**0**	**0**	**0**	**0**	**15**	**0**	**14**	**Y**	
%		**33**		**80**	**58**	**0**	**0**	**0**	**0**	**38**	**0**	**35**		
I.R. IRAN														
OIKB	03L													
	03R			VORDME / NDB					Y		Y			
	21L	ILS	I	VORDME / NDB					Y		Y			
	21R													
OIFM	08L			VORDME / NDB					Y		Y			
	08R			VORDME / NDB					Y		Y			
	26L			VORDME / NDB					Y		Y			
	26R	ILS	I	VORDME / NDB					Y		Y			

Int'l Aerodrome	RWY	Approach							SID		STAR		Provided PBN PLAN Update date	Remarks
		Precision		VOR or NDB	LNAV	LNAV / VNAV	RNP AR	LPV	Conventional	RNAV	Conventional	RNAV		
		xLS	CAT											
OIMM	13L			VORDME					Y		Y			
	13R			VORDME					Y		Y			
	31L			VORDME / NDB					Y		Y			
	31R	ILS	I	VORDME / NDB					Y		Y			
OISS	11L								Y					
	11R								Y					
	29L	ILS	I	VORDME / NDB					Y		Y			
	29R			VORDME / NDB					Y		Y			
OITT	12L								Y		Y			
	12R													
	30L			VORDME										
	30R	ILS	I	VORDME					Y		Y			
OIIE	11L	ILS	I	VORDME / NDB					Y		Y			
	11R			VORDME / NDB					Y		Y			
	29L			VORDME					Y		Y			
	29R	ILS	II	VORDME / 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			
Total	**30**	**9**		**22**	**0**	**0**	**0**	**0**	**26**	**0**	**23**	**0**	**N**	
%		**30**		**73**	**0**	**0**	**0**	**0**	**87**	**0**	**77**	**0**		
IRAQ														
ORBI	15L	ILS	I	VORDME					Y					
	15R				Y				Y					
	33L				Y				Y					
	33R	ILS	I	VORDME					Y					
ORMM	14			VORDME										
	32	ILS	I	VORDME										

Int'l Aerodrome	RWY	Approach							SID		STAR		Provided PBN PLAN Update date	Remarks
		Precision		VOR or NDB	LNAV	LNAV / VNAV	RNP AR	LPV	Conventional	RNAV	Conventional	RNAV		
		xLS	CAT											
ORER	18	ILS	II		Y				Y		Y			
	36	ILS	I		Y				Y		Y			
ORSU	13	ILS	I	VOR					Y		Y			
	31	ILS	I	VOR					Y		Y			
ORNI	10													
	28	ILS		VOR										
ORBM														NO DATA
Total	**12**	**8**		**7**	**4**	**0**	**0**	**0**	**8**	**0**	**4**	**0**	**N**	
%		**67**		**58**	**33**	**0**	**0**	**0**	**67**	**0**	**33**	**0**		
JORDAN														
OJAM	6				Y	Y			Y	Y	Y	Y		
	24	ILS	I	VORDME / NDB	Y	Y			Y	Y	Y	Y		
OJAI	08L	ILS	I	NDB DME	Y	Y			Y	Y	Y	Y		
	08R			NDB DME	Y	Y			Y	Y	Y	Y		
	26L	ILS	II	VOR / NDB	Y	Y			Y	Y	Y	Y		
	26R	ILS	I	VORDME / NDB	Y	Y			Y	Y	Y	Y		
OJAQ	1	ILS	I	VORDME	Y	Y			Y	Y		Y		
	19	N/A	N/A		Y	N/A			Y	Y	N/A	Y		LNAV/VNAV not feasabile
Total	**8**	**6**		**6**	**8**	**8**	**0**	**0**	**8**	**8**	**7**	**8**	**Y**	
%		**75**		**75**	**100**	**100**	**0**	**0**	**100**	**100**	**88**	**100**		
KUWAIT														
OKBK	15L	ILS	II		Y	Y				Y		Y		
	15R	ILS	II	VORDME	Y	Y				Y		Y		
	33L	ILS	II	VORDME	Y	Y				Y		Y		
	33R	ILS	II		Y	Y				Y		Y		
Total	**4**	**4**		**2**	**4**	**4**	**0**	**0**	**0**	**4**	**0**	**4**	**Y**	
%		**100**		**50**	**100**	**100**	**0**	**0**	**0**	**100**	**0**	**100**		

Int'l Aerodrome	RWY	Approach							SID		STAR		Provided PBN PLAN Update date	Remarks
		Precision		VOR or NDB	LNAV	LNAV / VNAV	RNP AR	LPV	Conventional	RNAV	Conventional	RNAV		
		xLS	CAT											
LEBANON														
OLBA	3	ILS	I	VORDME	Y				Y		Y	Y		
	16	ILS	I	VORDME	Y						Y	Y		
	17	ILS	I	VORDME / NDB	Y				Y		Y	Y		
	21				Y				Y		Y	Y		
	34	N/A		N/A	N/A				Y		N/A	N/A		Not used for landing
	35	N/A		N/A	N/A				Y		N/A	N/A		Not used for landing
Total	**6**	**5**		**5**	**6**	**0**	**0**	**0**	**5**	**0**	**6**	**6**	**N**	
%		**83**		**83**	**100**	**0**	**0**	**0**	**83**	**0**	**100**	**100**		
LIBYA														
HLLB	15R			VORDME					Y		Y			
	15L			VORDME					Y		Y			
	33R			VORDME					Y		Y			
	33L			VORDME					Y		Y			
HLLS	13	ILS	I	VORDME					Y		Y			ILS not flight checked
	31			VORDME					Y		Y			
HLLT	9			VORDME					Y		Y			
	27	ILS	I	VORDME					Y		Y			ILS not flight checked
Total	**8**	**2**		**8**	**0**	**0**	**0**	**0**	**8**	**0**	**8**	**0**	**N**	
%		**25**		**100**	**0**	**0**	**0**	**0**	**100**	**0**	**100**	**0**		
OMAN														
OOMS	08R	ILS	I	VORDME					Y					
	26L	ILS	I	VORDME					Y					
OOSA	7			VORDME					Y					
	25	ILS	I	VORDME					Y					
Total	**4**	**3**		**4**	**0**	**0**	**0**	**0**	**4**	**0**	**0**	**0**	**Y**	
%		**75**		**100**	**0**	**0**	**0**	**0**	**100**	**0**	**0**	**0**		

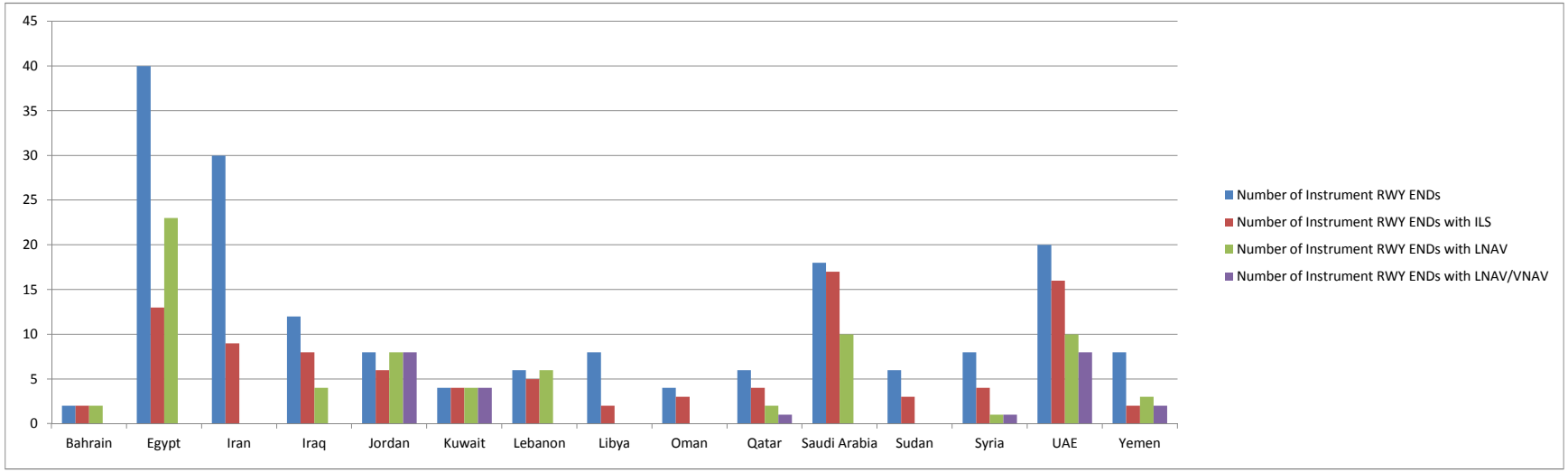
Int'l Aerodrome	RWY	Approach							SID		STAR		Provided PBN PLAN Update date	Remarks
		Precision		VOR or NDB	LNAV	LNAV / VNAV	RNP AR	LPV	Conventional	RNAV	Conventional	RNAV		
		xLS	CAT											
QATAR														
OTBD	15	ILS	I	VORDME	Y									
	33	ILS	II/III	VORDME	Y	Y								
OTHH	16L	ILS	I	VORDME										
	16R													
	34L													
	34R	ILS	I	VORDME										
Total	**6**	**4**		**4**	**2**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**Y**	
%		**67**		**67**	**33**	**17**	**0**	**0**	**0**	**0**	**0**	**0**		
SAUDI ARABIA														
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				Y	Y		Y		
	18			VORDME	Y				Y	Y		Y		
	35	ILS	I	VORDME	Y				Y	Y		Y		
	36	ILS	I	VORDME	Y				Y	Y		Y		
OERK	15L	ILS	I	VORDME					Y					
	15R	ILS	I						Y					
	33L	ILS	I						Y					
	33R	ILS	I	VORDME					Y					
Total	**18**	**17**		**13**	**10**	**0**	**0**	**0**	**16**	**4**	**0**	**10**	**Y**	
%		**94**		**72**	**56**	**0**	**0**	**0**	**89**	**22**	**0**	**56**		

Int'l Aerodrome	RWY	Approach							SID		STAR		Provided PBN PLAN Update date	Remarks
		Precision		VOR or NDB	LNAV	LNAV / VNAV	RNP AR	LPV	Conventional	RNAV	Conventional	RNAV		
		xLS	CAT											
SUDAN														
HSKA	2													Charts are Not Published
	20													
HSSS	18	ILS	I	VORDME										
	36	ILS	I	VORDME										
HSPN	17			VORDME / NDB										
	35	ILS	I	VORDME / NDB										
Total	**6**	**3**		**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**N**	
%		**50**		**67**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**		
SYRIA														
OSAP	9			VORDME					Y		Y			
	27	ILS	II	VORDME / NDB					Y		Y			
OSLK	17	ILS	I	VORDME / NDB					Y		Y			
	35													
OSDI	05L			VOR					Y		Y			
	05R	ILS	II	VORDME / NDB					Y		Y			
	23L			VORDME / NDB DME					Y		Y			
	23R	ILS	II	VORDME	Y	Y			Y		Y			
Total	**8**	**4**		**7**	**1**	**1**	**0**	**0**	**7**	**0**	**7**	**0**	**Y**	
%		**50**		**88**	**13**	**13**	**0**	**0**	**88**	**0**	**88**	**0**		
UNITED ARAB EMIRATES														
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		Y			Y		
	31	ILS	I	VORDME	Y		Y		Y			Y		
OMAL	1	ILS	I	VOR										
	19			VOR										
OMDB	12L	ILS	II/III	VOR	Y	Y				Y		Y		

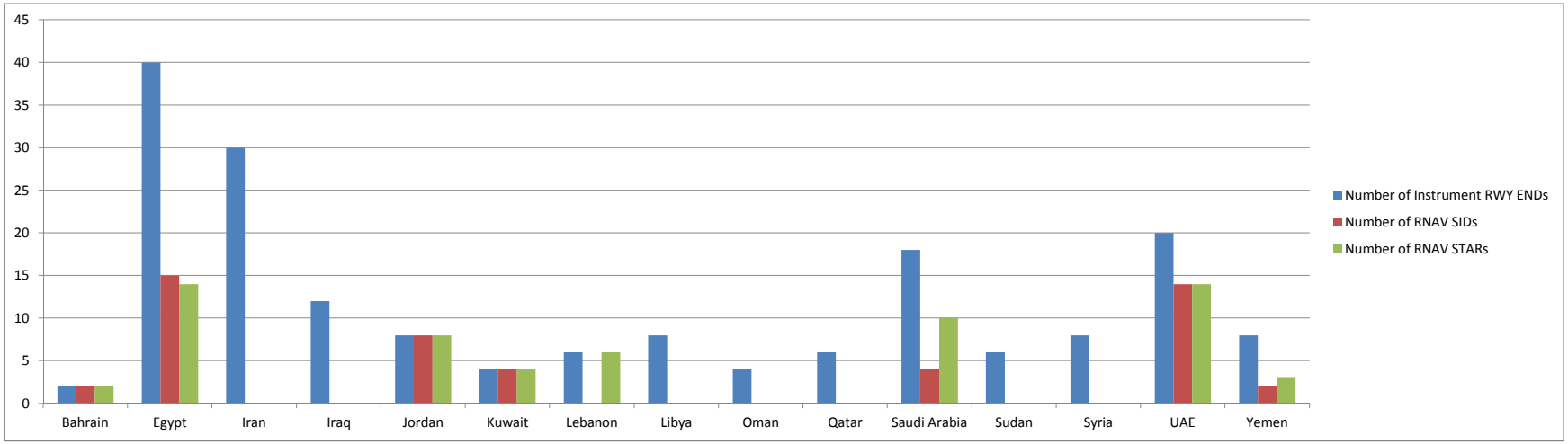
Int'l Aerodrome	RWY	Approach							SID		STAR		Provided PBN PLAN Update date	Remarks
		Precision		VOR or NDB	LNAV	LNAV / VNAV	RNP AR	LPV	Conventional	RNAV	Conventional	RNAV		
		xLS	CAT											
	12R	ILS	I	VOR	Y	Y				Y		Y		
	30L	ILS	I	-	Y	Y				Y		Y		
	30R	ILS	II/III	VOR	Y	Y				Y		Y		
OMDW	12	ILS	II/III		Y	Y				Y		Y		
	30	ILS	II/III		Y	Y				Y		Y		
OMFJ	11									Y				
	29	ILS	I	VOR						Y				
OMRK	16			VOR										
	34	ILS	I	VOR					Y					
OMSJ	12	ILS	I		Y	Y				Y		Y		
	30	ILS	II		Y	Y				Y		Y		
Total	**20**	**16**		**13**	**10**	**8**	**6**	**0**	**3**	**14**	**0**	**14**	**Y**	
%		**80**		**65**	**50**	**40**	**30**	**0**	**15**	**70**	**0**	**70**		
YEMEN														
OYAA	8	ILS	I	VORDME					Y		Y			
	26			VORDME					Y		Y			
OYHD	3			VOR										
	21			VOR / NDB	Y							Y		
OYRN	6													
	24			VORDME										
OYSN	18	ILS	I	VORDME	Y	Y			Y	Y	Y	Y		
	36			VOR	Y	Y			Y	Y	Y	Y		
OYTZ														NO DATA
Total	**8**	**2**		**7**	**3**	**2**	**0**	**0**	**4**	**2**	**4**	**3**	**Y**	
%		**25**		**88**	**38**	**25**	**0**	**0**	**50**	**25**	**50**	**38**		

Results

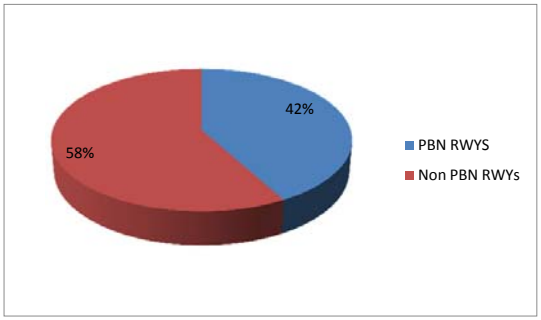
Total	**180**	**98**		**136**	**73**	**24**	**6**	**0**	**89**	**49**	**59**	**61**	**10**	**4 PBN APV + 54 ILS (58/180)**
%		**54**		**76**	**41**	**13**	**3**	**0**	**49**	**27**	**33**	**34**	**67**	**32% RWY Ends with APV**

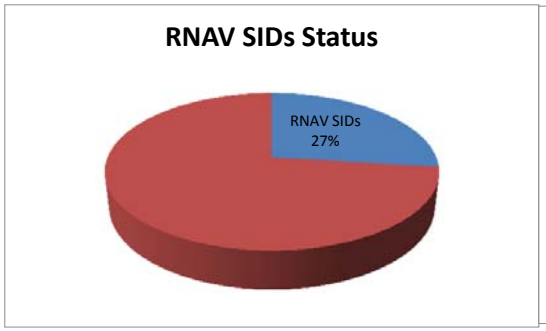


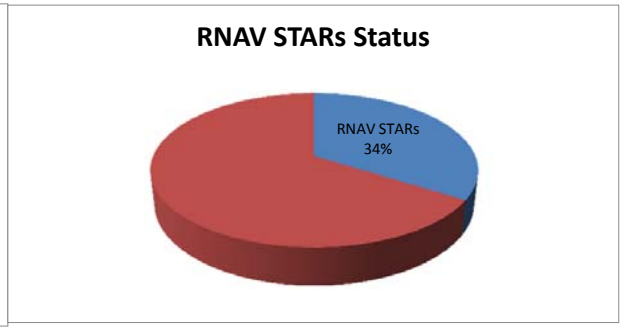
PBN RWYs Status by State

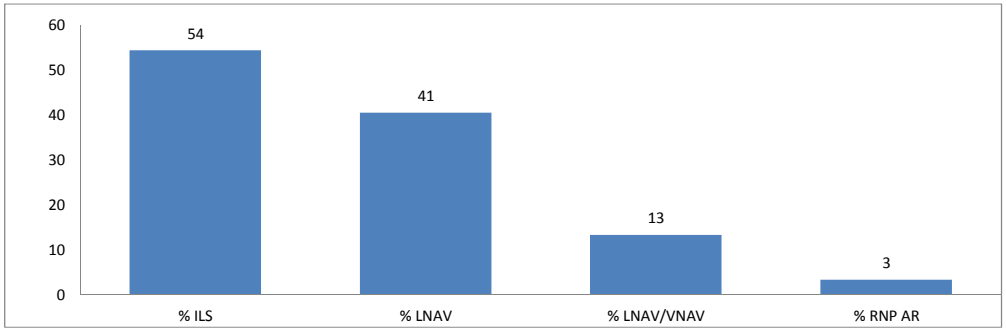


RNAV SIDs and STARs Status by State









Status of PBN RWYs in the MID Region

PBN IMPLEMENTATION FOCAL POINT

STATE	NAME	TITLE	ADDRESS	EMAIL	FAX	TEL	MOBILE
Bahrain	Saleem Mohamed Hassan	Chief Air Traffic Management	Civil Aviation Affairs P.O. Box 586	saleemmh@caa.gov.bh	+973 17329966	+973 17321117	+97339608860
Egypt	Ashraf Elkhashab		Ministry of Civil Aviation Egyptian Civil Aviation Authority Cairo International Airport Road Cairo - EGYPT	khshab@gmail.com			
Iran	Habib Davoudi Dana	Chief of Procedure Design Office	ATM Department Mehrabad International Airport Tehran 13445	h.davoudi@yahoo.com	+982144649269	+982 166025013	
Iran	Mohammad Khodakarami	D.G. of Aeronautical Affairs (in CAO)	Mehrabad International Airport P.O. Box 13445 – 1798	mkhd4444@yahoo.com	+98214464 9269	+982 16603 6241	
Iraq							
Jordan	Nayef Marshoud	Director ATM department	P.O. Box 7547	datm@carc.gov.jo	+962 6 4891266	+962 6 4897729	+962 797498992
Kuwait	Abdulla Adwani	Superintendent of AIS	Directorate General of Civil Aviation Kuwait International Airport P.O. Box 17 Safat 13001	Q8dgca_danoff@hotmail.com	+965 4346221	+965 4346220	+965 9571755
Lebanon	Walid Alhassanieh	Chief ACC	Air Navigation Department Beirut Rafic Hariri Int'l Airport	hassaniehw @beirutairport.gov.lb	+9611629023 +9611629106	+961 1629026	+961 3509902
Libya							
Oman	Sabri Said Saud Al-Busaidy	DMS Manager	Directorate General of Meteorology & Air Navigation (DGMAN) Muscat International Airport P.O. Box 1 CPO Seeb	sabri@dgcam.gov.om	+96824518990 +24519 939	+968 24519501	+968 99359415
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STATE	NAME	TITLE	ADDRESS	EMAIL	FAX	TEL	MOBILE
Qatar	Faisal Alqahtan	Head of AIS	Civil Aviation Authority P.O. Box 73 Doha – QATAR	Faisal.alqahtan@caa.gov.qa	(974)44656554	(974)44656221	(974) 5553 7060
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Sudan							
Syria	Al Layth Al Hammoud	Chief of Air Navigation					
UAE	Talal Al Hammadi	Head - Airspace Coordination General Civil Aviation Authority	Sheikh Zayed Air Navigation Centre P.O. Box 66 Abu Dhabi – UAE	thammadi@szc.gcaa.ae	+97125996883	97125996890	+971508180873
Yemen	Ahmed Mohamed Al Kobati	Director Air Navigation Operations	Air Navigation Sector CAMA Airport Road P.O. Box 3473 Sana'a – REPUBLIC OF YEMEN	cama570@yahoo.com	+9671344047	+9671345402	+967 777241375

APPENDIX 4C

B0 – APTA: Optimization of Approach Procedures including vertical guidance

Description and purpose

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

Main performance impact:

KPA- 01 – Access and Equity	KPA-02 – Capacity	KPA-04 – Efficiency	KPA-05 – Environment	KPA-10 – Safety
Y	Y	Y	Y	Y

Applicability consideration:

This module is applicable to all instrument, and precision instrument runway ends, and to a limited extent, non-instrument runway ends.

B0 – APTA: Optimization of Approach Procedures including vertical guidance					
Elements	***Applicability***	***Performance Indicators/Supporting Metrics***	***Targets***	***Action Plan***	***Remarks***
States' PBN Implementation Plans	All	Indicator: % of States that provided updated PBN implementation Plan Supporting metric: Number of States that provided updated PBN implementation Plan	80 % by Dec 2014. 100% by 2015	State to develop/update PBN Implementation Plan	
LNAV	All RWYs Ends at International Aerodromes (180)	Indicator: % of runway ends at international aerodromes with RNAV(GNSS) Approach Procedures (LNAV) Supporting metric: Number of runway ends at international aerodromes with RNAV (GNSS) Approach Procedures (LNAV)	All runway ends at Int'l Aerodromes, either as the primary approach or as a back-up for precision approaches by 31 Dec 2016	1) Assistance missions by between IATA, CANSO, ICAO and ACAC, when requested 2) PBN Workshops 3) Go-Team visits	Jan 2014 the implementation status was 41%

LNAV/VNAV	All RWYs ENDs at International Aerodromes (180)	Indicator: % of runways ends at international aerodromes provided with Baro-VNAV approach procedures (LNAV/VNAV) Supporting metric: Number of runways ends at international aerodromes provided with Baro-VNAV approach procedures (LNAV/VNAV)	All runway ends at Int'l Aerodromes, either as the primary approach or as a back-up for precision approaches by 31 Dec2017	4) GNSS/GBAS Workshop in 2015 5) Pilot projects and trials 6) PBN SG to monitor the implementation based on inputs from States and Users	Jan 2014 the implementation status was 13%

B0 – CDO: Improved Flexibility and Efficiency in Descent Profiles (CDO)

Description and purpose

To use performance-based airspace and arrival procedures allowing aircraft to fly their optimum profile using continuous descent operations (CDOs). This will optimize throughput, allow fuel efficient descent profiles and increase capacity in terminal areas.

Main performance impact:

KPA- 01 – Access and Equity	KPA-02 – Capacity	KPA-04 – Efficiency	KPA-05 – Environment	KPA-10 – Safety
N	Y	Y	Y	Y

Applicability consideration:
Regions, States or individual locations most in need of these improvements. For simplicity and implementation success, complexity can be divided into three tiers:

a) least complex – regional/States/locations with some foundational PBN operational experience that could capitalize on near term enhancements, which include integrating procedures and optimizing performance;

b) more complex – regional/States/locations that may or may not possess PBN experience, but would benefit from introducing new or enhanced procedures. However, many of these locations may have environmental and operational challenges that will add to the complexities of procedure development and implementation; and

c) most complex – regional/States/locations in this tier will be the most challenging and complex to introduce integrated and optimized PBN operations. Traffic volume and airspace constraints are added complexities that must be confronted. Operational changes to these areas can have a profound effect on the entire State, region or location.

B0 – CDO: Improved Flexibility and Efficiency in Descent Profiles (CDO)					
Elements	***Applicability***	***Performance Indicators/Supporting Metrics)***	***Targets***	***Action Plan***	***Remarks***
PBN STARs	in accordance with State's implementation Plans	Indicator: % of International Aerodromes/TMA with PBN STAR implemented as required. Supporting Metric: Number of International Aerodromes/TMAs with PBN STAR implemented as required.	100% by 2016 for the identified Aerodromes/TMAs 100% by 2018 for all the International Aerodromes/TMAs	1) Assistance missions by between IATA, CANSO, ICAO and ACAC, when requested 2) PBN Workshops 3) Go-Team visits 4) PBN SG to monitor the implementation based	List of ADs to be established through regional air navigation agreement.

				on inputs from States and Users	
International aerodromes/TMAs with CDO	in accordance with State's implementation Plans	Indicator: % of International Aerodromes/TMA with CDO implemented as required. Supporting Metric: Number of International Aerodromes/TMAs with CDO implemented as required.	100% by 2018 for the identified Aerodromes/TMAs	1) Pilot projects for CDOs 2) City-pair pilot projects for tailored arrivals 3) PBN Workshops	List of applicable ADs to be established through regional air navigation agreement.

B0 – CCO: Improved Flexibility and Efficiency Departure Profiles - Continuous Climb Operations (CCO)

Description and purpose

To implement continuous climb operations in conjunction with performance-based navigation (PBN) to provide opportunities to optimize throughput, improve flexibility, enable fuel-efficient climb profiles and increase capacity at congested terminal areas.

Main performance impact:

KPA- 01 – Access and Equity	KPA-02 – Capacity	KPA-04 – Efficiency	KPA-05 – Environment	KPA-10 – Safety
N/A	N/A	Y	Y	Y

Applicability consideration:

Regions, States or individual locations most in need of these improvements. For simplicity and implementation success, complexity can be divided into three tiers:

a) least complex: regional/States/locations with some foundational PBN operational experience that could capitalize on near-term enhancements, which include integrating procedures and optimizing performance;

b) more complex: regional/States/locations that may or may not possess PBN experience, but would benefit from introducing new or enhanced procedures. However, many of these locations may have environmental and operational challenges that will add to the complexities of procedure development and implementation; and

c) most complex: regional/States/locations in this tier will be the most challenging and complex to introduce integrated and optimized PBN operations. Traffic volume and airspace constraints are added complexities that must be confronted. Operational changes to these areas can have a profound effect on the entire State, region or location.

B0 – CCO: Improved Flexibility and Efficiency Departure Profiles - Continuous Climb Operations (CCO)					
Elements	***Applicability***	***Performance Indicators/Supporting Metrics***	***Targets***	***Action Plan***	***Remarks***
PBN SIDs	in accordance with State's implementation Plans	Indicator: % of International Aerodromes/TMA with PBN SID implemented as required. Supporting Metric: Number of International Aerodromes/ TMAs with PBN SID implemented as required.	100% by 2016 for the identified Aerodromes/TMAs 100% by 2018 for all the International Aerodromes/TMAs	1) Assistance missions by between IATA, CANSO, ICAO and ACAC, when requested 2) PBN Workshops 3) Go-Team visits 4) PBN SG to monitor the	List of ADs to be established through regional air navigation agreement.

				implementation based on inputs from States and Users	
International aerodromes/TMAs with CCO	in accordance with State's implementation Plans	Indicator: % of International Aerodromes/TMA with CCO implemented as required. Supporting Metric: Number of International Aerodromes/TMAs with CCO implemented as required.	100% 2018 for the identified Aerodromes/TMAs	1) Pilot projects for CCOs 2) PBN Workshops	List of ADs to be established through regional air navigation agreement.

APPENDIX 4D

INTERNATIONAL CIVIL AVIATION ORGANIZATION

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

MID REGION PERFORMANCE BASED NAVIGATION IMPLEMENTATION PLAN

Draft version 1.0
June, 2014

AMENDMENTS

The MID Region PBN Implementation Plan should be reviewed and updated by the PBN and/or the ATM Sub-Groups and presented to MIDANPIRG for endorsement.
Stakeholders shall submit their proposal for amendment to the Plan to the ICAO MID Regional Office at least three months prior the PBN or the ATM Sub-Groups meetings in order to ensure adequate time for appropriate coordination. The table below provides a means to record all amendments.
An up to date electronic version of the Plan will be available on the ICAO MID Regional Office website.

Amendment Number	Effective Date	Initiated by	Impacted pages	Remarks

EXECUTIVE SUMMARY

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

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

The plan envisages pre- and post-implementation safety assessments and continued availability of conventional air navigation procedures during transition. The plan discusses issues related to implementation which include traffic forecasts, aircraft fleet readiness, adequacy of ground-based CNS infrastructure etc. Implementation targets for various categories of airspace for the short term (2013 – 2017) 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 and its augmentation system would become the primary navigation infrastructure

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

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

Explanation of Terms

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

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

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

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

REFERENCE DOCUMENTS

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

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

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ACRONYMS

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

AACO	Arab Air Carrier Association
ABAS	Aircraft-Based Augmentation System
ACAC	Arab Civil Aviation Commission
AIS	Aeronautical Information System
APAC	Asia and Pacific Regions
APCH	Approach
APV	Approach Procedures with Vertical Guidance
AOC	Air operator certificate
ATC	Air Traffic Control
ASBU	Aviation System Block Upgrades
Baro VNAV	Barometric Vertical Navigation
CCO	Continuous Climb Operations
CDO	Continuous Decent Operations
CNS/ATM	Communication Navigation Surveillance/Air Traffic Management
CPDLC	Controller Pilot Data Link Communications
DME	Distance Measuring Equipment
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
MEL	Minimum equipment list
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
SOP	Standard operating procedure
STAR	Standard Instrument Arrival
TAWS	Terrain awareness warning system
TMA	Terminal Control Area
VOR	VHF Omni-directional Radio-range
WGS	World Geodetic System

CHAPTER 1

PERFORMANCE BASED NAVIGATION

1. INTRODUCTION

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

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

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

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

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

2. BENEFITS OF PERFORMANCE BASED NAVIGATION

a) *Access and Equity*: Increased aerodrome accessibility.

b) *Capacity*: In contrast with ILS, the GNSS based approaches do not require the definition and management of sensitive and critical areas resulting in potentially increased runway capacity.

c) *Efficiency*: Cost savings related to the benefits of lower approach minima: fewer diversions, overflights, cancellations and delays. Cost savings related to higher airport capacity in certain circumstances (e.g. closely spaced parallels) by taking advantage of the flexibility to offset approaches and define displaced thresholds.

d) *Environment*: Environmental benefits through reduced fuel burn.

e) *Safety*: Stabilized approach paths.

f) *Cost Benefit Analysis*: Aircraft operators and air navigation service providers (ANSPs) can quantify the benefits of lower minima by using historical aerodrome weather observations and modeling airport accessibility with existing and new minima. Each aircraft operator can then assess benefits against the cost of any required avionics upgrade. Until there are GBAS (CAT II/III) Standards, GLS cannot be considered as a candidate to globally replace ILS. The GLS business case needs to consider the cost of retaining ILS or MLS to allow continued operations during an interference event

3. GOALS AND OBJECTIVES OF PBN IMPLEMENTATION

3.1. The MID Region PBN Implementation Plan has the following strategic objectives:

a) ensure that implementation of the navigation element of the MID CNS/ATM system is based on clearly established operational requirements;

b) avoid unnecessarily imposing the mandate for multiple equipment on board or multiple systems on ground;

c) avoid the need for multiple airworthiness and operational approvals for intra and inter-regional operations; and

d) avoid an eclipsing of ATM operational requirements by commercial interests, generating unnecessary costs States, international organization, and airspace users.

3.2. Furthermore, the Plan will provide a high-level strategy for the evolution of the navigation applications to be implemented in the MID Region in the short term (2013-2017), medium term (2018-2022).

3.3. The plan is intended to assist the main stakeholders of the aviation community to plan the future transition and their investment strategies. For example, Operators can use this Regional Plan to plan future equipage and additional navigation capability investment; Air Navigation Service Providers can plan a gradual transition for the evolving ground infrastructure, Regulating Agencies will be able to anticipate and plan for the criteria that will be needed in the future.

4. PLANNING PRINCIPLES

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

a) implementation of PBN specification and granting PBN operational approvals should be in compliance with ICAO provisions;

b) States conduct pre- and post–implementation safety assessments to ensure the application and maintenance of the established target level of safety;

c) continued application of conventional air navigation procedures during the transition period, to guarantee the operation by users that are not PBN capable;

d) Users/operational requirements should be taken into consideration while planning for PBN implementation;

e) States should provide the ICAO MID Regional Office with their updated PBN implementation Plan on annual basis (before December);

f) the implementation of Advanced-RNP should start by January 2015;

g) implementation of approach procedures with vertical guidance (APV) (Baro-VNAV and/or augmented GNSS), including LNAV only minima, for all runway ends at international Aerodromes, either as the primary approach or as a back-up for precision approaches by 2017 with intermediate milestones as follows: 50 percent by 2015 and 70 per cent by 2016;

h) implementation of straight-in LNAV only procedures, as an exception to g) above, for instrument runways at aerodromes where there is no local altimeter setting available and where there are no aircraft suitably equipped for APV operations with a maximum certificated take-off mass of 5 700 kg or more.

5. PBN OPERATIONAL REQUIREMENTS AND IMPLEMENTATION STRATEGY

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

5.2. Continuous Climb and Descent Operations (CCO and CDO) are two of several tools available to aircraft operators and ANSPs that, through collaboration between stakeholders, will make it possible to increase efficiency, flight predictability and airspace capacity, while reducing fuel burn, emissions and controller-pilot communications, thereby enhancing safety.

En-route

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

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

Terminal

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

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

Approach

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

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

5.9. Sates are encouraged to plan for the implementation of RNP AR procedures, which can provide significant operational and safety advantages over other area navigation (RNAV) procedures by incorporating additional navigational accuracy, integrity and functional capabilities to permit operations using reduced obstacle clearance tolerances that enable approach and departure procedures to be implemented in circumstances where other types of approach and departure procedures are not operationally possible or satisfactory. Procedures implemented in accordance with RNP AR Procedure Design Manual (Doc 9905) allow the exploitation of high-quality, managed lateral and vertical navigation (VNAV) capabilities that provide improvements in operational safety and reduced Controlled Flight Into Terrain (CFIT) risks.

CHAPTER 2

CNS INFRASTRUCTURE

1. NAVIGATION INFRASTRUCTURE

Global Navigation Satellite System (GNSS)

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

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

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

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

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

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

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

2. OTHER NAVIGATION INFRASTRUCTURE SUPPORTING PBN

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

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

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

2.4. DME/DME and DME/DME/IRU may support PBN en-route and terminal area operations based on RNAV 5, and RNAV 1 navigation specifications. Validation of DME/DME

coverage area and appropriate DME/DME geometry should be conducted to identify possible DME/DME gaps, including identification of critical DMEs, and to ensure proper DME/DME service coverage.

Note.- The conventional Navaid infrastructure should be maintained to support non-equipped aircraft during a transition period until at least 2017.

3. SURVEILLANCE INFRASTRUCTURE

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

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

4. COMMUNICATION INFRASTRUCTURE

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

CHAPTER 3

IMPLEMENTATION OF PBN

1. ATM OPERATIONAL REQUIREMENTS

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

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

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

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

1.4. Table 2-1 shows the navigation specifications published in Parts B and C of PBN Manual (Doc 9613), Volume II. It demonstrates, for example, that navigation specifications extend over various phases of flight. It also contains the Navaids/Sensor associated with each PBN specification.

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

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

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

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

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

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

2. IMPLEMENTATION PHASES:

En-route

Short Term:

2.1. The current application of RNAV 10 will continue for Oceanic and Remote continental routes.

2.2. For Continental RNAV 5 specifications should be completed by December 2017. Before the PBN concept, the MID Region adopted the Regional implementation of RNP 5.Furtehr to application of the PBN concept it is now required that RNP 5 be changed 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).

Medium Term:

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

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

Terminal

Short Term:

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

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

Medium Term:

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

Approach

Short Term:

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

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

Medium Term:

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

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

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

Table 3-2. SUMMARY TABLE AND IMPLEMENTATION TARGETS

Airspace	Short term 2014-2017		Medium term 2018-2022	
	Navigation Specification Preferred	**Targets**	**Navigation Specification Acceptable**	**Targets**
En-route – Oceanic	RNAV 10	100 % by 2016	RNP 4* RNP 2* Defined airspace (A-RNP)	TBD
En-route - Remote continental	RNAV 5 RNAV 10	W/A 100% by 2016	RNP 4* RNP 2* Defined airspace (A-RNP)	TBD
En-route – Continental	RNAV 5 RNAV 1	100 % by 2017 W/A[1]	RNP 2* or 1* Defined airspace (A-RNP)	TBD
En-route - Local / Domestic	RNAV 5 RNAV 1	100 % by 2017 W/A	RNP 2 or 1 Defined airspace (A-RNP)	TBD
TMA – Arrival	RNAV 1 in surveillance environment and with adequate navigation infrastructure. Basic RNP 1 in non-surveillance environment	50% by December 2015 100% by 2017	RNP 1 and RNP 2 beyond 30 NM from ARP (A-RNP)	TBD
TMA – Departure	RNAV 1 in surveillance environment and with adequate navigation infrastructure. Basic RNP 1 in non- surveillance environment	50% by 2015 100% by 2017	RNP 1 and RNP 2 beyond 30 NM from ARP (A-RNP)	TBD
Approach	LNAV: for all RWY Ends at International Aerodromes LNAV/VNAV: for all RWY Ends at International Aerodromes	80 % by 2014. 100% by 2015 70% by 2015 100% by 2017	GLS (GBAS) For the defined RWY Ends	TBD
CCO and CDO	W/A	100% by 2017	W/A	TBD

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

Long Term (2023 and Beyond)

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

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

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

CHAPTER 4

SAFETY ASSESSMENT AND MONITORING

1. NEED FOR SAFETY ASSESSMENT

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

2. ROLES AND RESPONSIBILITIES

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

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

a) establish and maintain a database of PBN approvals;

b) monitor aircraft horizontal-plane navigation performance and the occurrence of large navigation errors and report results;

c) conduct safety and readiness assessments;

d) monitor operator compliance with State approval requirements after PBN implementation; and

e) initiate necessary remedial actions if PBN requirements are not met.

CHAPTER 5
OPERATIONAL APPROVAL

1. OPERATIONAL APPROVAL REQUIREMENTS

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

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

a) Aircraft eligibility and airworthiness compliance;

b) Operating procedures for the navigation systems used;

c) Control of operating procedures (documented in the OM);

d) Flight crew initial training and competency requirements and continuing competency requirements;

e) Dispatch training requirements;

f) control of navigation database procedures. Where a navigation database is required, operators need to have documented procedures for the management of such databases. These procedures will define the sourcing of navigation data from approved suppliers, data validation procedures for navigation databases and the installation of updates to databases into aircraft so that the databases remain current with the AIRAC cycle. (For RNP AR applications, the control of the terrain database used by TAWS must also be addressed.)

Aircraft eligibility

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

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

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

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

1.7. For recently manufactured aircraft, where the PBN capability is approved under the TC, there may be a statement in the AFM limitations section identifying the operations for which the

aircraft is approved. There is also usually a statement that the stated approval does not itself constitute an approval for an operator to conduct those operations. Alternate methods of achieving the airworthiness approval of the aircraft for PBN operations is for the aircraft to be modified in accordance with approved data. (e.g. STC, minor modification, etc.)

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

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

Table 5-1

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

Operating procedures

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

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

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

Control of operating procedures

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

Flight crew and dispatch training

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

Control of navigation database procedures

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

2. DOCUMENTATION OF OPERATIONAL APPROVAL

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

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

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

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

3. STATE REGULATORY MATERIAL

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

4. APPROVAL PROCESS

General

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

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

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

Phases of the approval process

Step 1 — Pre-application phase

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

Step 2 — Formal application phase

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

Step 3 — Document evaluation phase

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

Step 4 — Demonstration and inspection phase

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

Step 5 — Approval phase

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

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

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

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

5. FOREIGN OPERATIONS

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

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

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

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

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

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

- END -

CFIT Detailed Implementation Plan

April 2014

No	Safety Enhancement Action	GASP Safety Initiative (ICAO Doc 10004)	Best Practices Supporting GASP Safety Initiative (ICAO Doc 10004, Appendix 2)	Safety Impact	Changeability	Indicator	Priority	Time Frame
RAST-MID/CFIT/1	The implementation of PBN Approach procedures to all runways not currently served by precision approach procedures	Safety Management Standarzation: Implementation of risk-based standarization Safety Oversight Standarization: Promotion of Compliance with National Regulations and Adoption of Industry Best Practices	BP-GEN-1 BP-GEN-2 BP-GEN-4 BP-STD-S-12 BP-STD-S-13	High	Difficult	P3	1	Long-Term

Safety Enhancement Action (expanded)	Introduction of PBN approaches to ensure that the latest performance based navigation technology is utilized, at such airfields, to provide the highest level of safety during the conduct of an approach and landing towards the runway.
Statement of Work	In an attempt to mitigate the risks related to CFIT, States should ensure that approach procedures are adequate and provide sufficient altitude protection during the approach and landing phase especially at the identified Higher Risk Airports. Also ensure that pilots and controllers training and guidance in the use of PBN is adequate, current, uniformly conducted and supports the optimum utilization of automation resources so that individuals can take a monitoring role.
Champion Organization	IATA/CANSO
Human Resources	Regulators Operational Support Service Procedure Designers Air Navigation Service Providers (ANSP) CAA
Financial Resources	TBD

No	Safety Enhancement Action	GASP Safety Initiative (ICAO Doc 10004)	Best Practices Supporting GASP Safety Initiative (ICAO Doc 10004, Appendix 2)	Safety Impact	Changeability	Indicator	Priority	Time Frame
Relation with Current Aviation Community Initiative		IATA & ICAO are jointly developing a CFIT toolkit addressing the CFIT contributing AST safety enhancements addressing the CFIT contributing factors CAST safety enhancements addressing the CFIT contributing factors Partnership between airlines and Flight Procedures Design consulting firms such as Airbus (ProSky) & Etihad Airways for the creation of PBN approaches at specific airfields. These new technology approaches provide continuous descent operations and optimised trajectories. This will enhance flight safety which is at the heart of the PBN Implementation Plan effort.						
Performance Goal		Goal 1: Implementation Action Plans to be complete by 31 December 2014 Goal 2: Before year 2018, reduce CFIT accidents/incidents by 80% at the identified airfields Goal 3: Promote the implemention of APV						
Indicators		Number of CFIT related accidents as a percentage of all accidents Maintain CFIT related accidents below the global rate						
Key Milestones (Deliverables)		1. Identify and prioritize the airports/runways which require specific PBN approaches by 30 June 2014. *(Aircraft Operators FOQA programmes to monitor data (consistency and accuracy of the Operator's fleet for each selected "high risk/special airport) and provide a summary of stable/unstable approaches to MID-RAST each quarter commencing Q4 2013)* . 2. Concerned States, CANSO, IATA and ICAO to establsh a Work Force to develop an appropriate detailed action plan for the implementation of PBN approaches at the identified airports/runways by end of 2014. 3. implementation of PBN approach procedures at the identified airports/runways in accordamce with their associated action plans.						
Potential Blockers								
Responsible		Core Team: 1.						
DIP Notes								

- END -

APPENDIX 6A

PERFORMANCE BASED NAVIGATION SUB-GROUP (PBN SG)

1. Terms of Reference

1.1 The terms of reference of the PBN Sub-Group are:

a) ensure that the implementation of PBN in the MID Region is coherent and compatible with developments in adjacent regions, and is in line with the Global Air Navigation Plan (GANP), the Aviation System Block Upgrades (ASBU) methodology and the MID Region Air Navigation Strategy;

b) monitor the status of implementation of the MID Region PBN-related ASBU Modules included in the MID Region Air Navigation Strategy as well as other required PBN supporting infrastructure, identify the associated difficulties and deficiencies and provide progress reports, as required;

c) keep under review the MID Region PBN performance objectives/priorities, develop action plans to achieve the agreed performance targets and propose changes to the MID Region PBN plans/priorities, through the ANSIG, as appropriate;

d) seek to achieve common understanding and support from all stakeholders involved in or affected by the PBN and GNSS developments/activities in the MID Region;

e) provide a platform for harmonization of developments and deployments of PBN concentrating on PBN for approach and terminal areas;

f) monitor and review the latest developments in the area of PBN and procedure design, provide expert inputs for PBN-related issues; and propose solutions for meeting ATM operational requirements;

g) monitor and review the latest GNSS developments and activities;

h) carry out necessary studies for the establishment of a MID Flight Procedure Programme Office;

i) provide regular progress reports to the ANSIG and MIDANPIRG concerning its work programme; and

j) review periodically its Terms of Reference and propose amendments, as necessary.

1.2 In order to meet the Terms of Reference, the PBN Sub-Group shall:

a) provide necessary assistance and guidance to States to ensure harmonization and interoperability in line with the GANP, the MID ANP and ASBU methodology;

b) provide necessary inputs to the MID Air Navigation Strategy through the monitoring of the agreed Key Performance Indicators related to PBN;

c) identify and review those specific deficiencies and problems that constitute major obstacles to the provision of efficient PBN implementation, and recommend necessary remedial actions;

d) conduct study related to the establishment of the MID Flight Procedure Programme Office;

e) monitor the progress of studies, projects, trials and demonstrations by the MID Region States, and other ICAO Regions in PBN and GNSS;

f) study requirements for GNSS Augmentation Systems in the MID Region, and develop implementation plans; and

g) foster the implementation of PBN through proper training and qualification of the procedure design personnel and all other personnel involved in PBN implementation.

2. COMPOSITION

2.1 The Sub-Group is composed of:

a) MIDANPIRG Member States;

b) concerned International and Regional Organizations as observers; and

c) other representatives from provider States and Industry may be invited on ad hoc basis, as observers, when required.

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