International Civil Aviation Organization

MIDANPIRG CNS/ATM/IC Sub-Group (CNS/ATM/IC SG)

Sixth Meeting
(Cairo, Egypt, 31 January – 02 February 2012)

Agenda Item 5: Regional Air Navigation Planning and Implementation Issues

STATUS OF PBN IMPLEMENTATION IN THE MID REGION

(Presented by the Secretariat)

SUMMARY

This paper presents the Status of PBN implementation in the MID Region.

Action by the meeting is at paragraph 3.

REFERENCE

- MIDANPIRG/12 Report
- PBN/GNSS TF/3 Report
- PBN/GNSS TF/4 Report

1. INTRODUCTION

1.1 The MIDANPIRG/12 meeting, held in Amman, 9-13 October 2010 was attended by a total of seventy six (76) participants, which included experts from twelve (12) States (Bahrain, Egypt, Iraq, Iran (Islamic Republic of), Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia and U.A.E.) and four (4) International Organizations (CANSO, IATA, IFALPA and Jeppesen)..

1.2 The PBN GNSS TF/3 meeting held in Cairo, Egypt, 30 November - 02 December 2010, was attended by 35 participants, which included experts from eight (8) States (Bahrain, Egypt, Iraq, Jordan, Kuwait, Qatar, Saudi Arabia and U.A.E.) and two (4) International Organizations (IATA, and IFALPA). The meeting developed 5 Conclusions and decisions.

1.3 The PBN/GNSS TF/4 Meeting was held at the ICAO MID Regional Office in Cairo, Egypt, 02 – 04 October 2011, was attended by twenty-six (26) participants from eight (8) States (Bahrain, Egypt, Jordan, Kuwait, Oman, Qatar, Saudi Arabia, and United Arab Emirates) and one (1) International Organization (IATA).

2. DISCUSSION

2.1 The meeting may wish to note that a PBN Airspace Planning Workshop was successfully held by the Syrian Civil Aviation Authority (SCAA) in Sydnaia (Damascus), from 25 to 28 October 2010. The Workshop presentations were conducted by experts from EUROCONTROL and the FAA that introduced an Airspace Concept Handbook for PBN Implementation which was developed by EUROCONTROL and contains the sixteen (16) activities that formed the basis of the workshop.

2.2 The meeting may wish to recall the ICAO 36th General Assembly Resolution A36-23: *Performance based navigation global goals*, urges Planning and Implementation Regional Groups (PIRGs) and States, inter alia, to complete a States PBN implementation plan by 2009 to achieve specific implementation goals starting with 2010. Accordingly, the first version of the MID Regional PBN Implementation Strategy and Plan were developed in October 2008 and were adopted by MIDANPIRG/11 in February 2009 in order to allow sufficient time for the MID States to complete the development of their States PBN Implementation plans by December 2009. The meeting may wish to note that the above ICAO 36th General Assembly Resolution A36-23 was superseded by Assembly Resolution A37-11.

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

2.4 MIDANPIRG/12 urged MID States, ANSP's, aircraft operators, user communities to continue providing support to States and ICAO PBN Programme, for fulfilling the above and any other challenges for PBN implementation in the MID Region.

2.5 The meeting may wish to note that the ICAO Continuous Descent Operations (CDO) Manual Doc 9931 is now available on ICAONET. The Manual contains guidance material on the airspace design, instrument flight procedures, ATC facilitation and flight techniques necessary to enable Continuous Descent (CD) profiles.

2.6 In light of the completion of the ICAO CDO Manual which Standardized the development and implementations of CD operations, States are encouraged to consult the CDO Manual during their STAR implementations. Recognizing the efficiency, environmental and other benefits of Continuous Descent Operations and the need to harmonize these operations in the interest of safety, the meeting may wish to note that MIDANPIRG/12 agreed to the following Conclusion:

CONCLUSION 12/61: IMPLEMENTATION OF CONTINUOUS DESCENT OPERATIONS

That, recognizing the efficiency and environmental benefits of Continuous Descent Operations (CDO), and the need to harmonize these operations in the interest of safety, MID States be encouraged to include implementation of CDO as part of their PBN implementation plans and to implement CDO in accordance with the ICAO CDO Manual Doc 9931.

2.7 The meeting may wish to note that the above Conclusion is of general nature and should be included in the MID Regional PBN Implementation Strategy and Plan. Accordingly, the meeting revised the MID Regional PBN Implementation Plan and Strategy to include the new requirement as per Assembly Resolution A37/11. The meeting is requested endorse the following Draft Conclusion emanating from PBN/GNSS TF/4 meeting:

DRAFT CONCLUSION 4/1: MID REGIONAL PBN IMPLEMENTATION STRATEGY AND PLAN

*That, the MID Regional PBN Implementation Strategy and Plan be updated as at **Appendix A** to this working paper.*

2.8 The meeting may wish to further note that the Global PBN Task Force formed Go Team that would assist in developing knowledge and expertise in various States in the Regions. Accordingly, MIDANPIRG/12 meeting encouraged MID States willing to take advantage of the services offered by the GO-Team to communicate with the ICAO MID Regional Office in order to coordinate with ICAO HQ, and facilitate the Go Team visit.

2.9 Based on the above, the meeting may wish to note that UAE had requested Go Team visit which was hosted from 16-20 January 2011, the team was composed of ICAO, IATA, aircraft manufacturers, UAE regulators and services provider were also part of the Go Team.

2.10 The meeting may wish to further note that among the Global PBN Task Force activities is the development of guidelines for PBN Operational Approval which will be incorporated in the ICAO PBN Manual Doc 9613 as this has been tasked to a group of industry stakeholders including IATA, manufacturers, airlines, and regulators. In this regard, the meeting may wish to note that updates will be incorporated into the current version of the PBN manual relating to Operational Approval but the core part will remain in the new manual.

2.11 The meeting may wish to agree with IATA views that prompt action by the Region and by States is required to accelerate PBN planning, development and implementation to a pace of at least achieving closure to the ICAO Resolution implementation targets.

2.12 Based on the above, the PBN/GNSS TF/4 meeting was of the view that a comprehensive Regional Support Strategy is required and should include the following objectives;

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

2.13 The meeting may wish to agree to the establishment of MID PBN Support Team (MPST) as this will be considered a step towards fulfilling these objectives.The meeting may further agree on three areas of work for the MPST (1) promote PBN and convince Stakeholders to support PBN (2) Gap Analysis and States PBN Implementation Plan update/improvement (3) Implementation of PBN. This would require engagement at a working level to coordinate and provide assistance to States in many areas as defined in the TOR of the MPST.

2.14 The PBN/GNSS TF/4 meeting agreed that UAE be the champion of MPST, and IATA to fully support the MPST. It is also required that MID States that are advanced in PBN implementation be encouraged to participate in the work of the MPST.

2.15 Based on the above, the PBN/GNSS TF/4 meeting developed draft MPST Terms Of Reference (TOR) as **Appendix B** to this working paper. The meeting is requested to endorse the following Draft Decision emanating from PBN/GNSS TF/4 meeting:

DRAFT DECISION 4/2: ESTABLISHMENT OF MID PBN SUPPORT TEAM (MPST)

*That, MPST be established with TOR as at **Appendix B** to this working paper.*

2.16 The meeting may wish to recall that CANSO had formed CANSO Middle East ANSP, Airspace Users & Stakeholder Engagement WG (MEAUSE WG), the work of which include PBN, in this regard the PBN/GNSS TF/4 meeting agreed that close coordination with these WGs should exists, in order to avoid any duplication of efforts. The PBN/GNSS TF/4 meeting also agreed that ICAO MID Regional Office coordinate with CANSO, where CANSO can play the role of assisting States in the implementation of PBN.

2.17 Based on the above, ICAO MID Regional office requested CANSO to provide the survey data and CANSO sent the first MEAUSE annual report and the ANSP questionnaire as at **Appendices C and D** to this working paper. Accordingly the meeting may wish to agree on development of common data bases, in order to have the required information for planning purposes.

2.18 The PBN/GNSS TF/4 meeting reviewed the status of the MID Region State PBN implementation plan and was of the view that it needs to be revised to include more information on the implementation status at least for the short term. Accordingly, the PBN GNSS TF/4 meeting developed a revised version as at **Appendix E** to this working paper.

2.19 The PBN/GNSS TF/4 meeting reviewed and updated the list of PBN Implementation focal points, as at **Appendix F** to this working paper and was of the view that focal points should have official emails.

2.20 MIDANPIRG/12 meeting approved the following conclusion 12/58 *PBN IMPLEMENTATION PROGRESS REPORT*, urging all MID States to keep the ICAO MID Regional office updated using the spreadsheet and the progress report, in this regard the PBN/GNSS TF/4 meeting received the progress reports from the following States (Bahrain, Egypt, Jordan, Qatar and Saudi Arabia) which were not according to the agreed format. However, UAE provided the updated reports in the agreed format during the meeting as at **Appendix G** to this working paper.

2.21 Furthermore, the PBN/GNSS TF/4 meeting was of the view that MIDANPIRG/12 Conclusion 12/58 be amended in para (b) in order that States send their report every six months and whenever major progress is achieved. Accordingly, the PBN/GNSS TF/4 meeting agreed to PBN/GNSS TF/3 meeting Draft Conclusion 3/2 with minor correction as follows:

DRAFT CONCLUSION 4/3: PBN IMPLEMENTATION PROGRESS REPORT

That, for future reporting on the status of PBN implementation, MID States be urged to:

*a) use the excel sheet as at **Appendix H** to this working paper,and PBN Implementation Progress Report Template as at **Appendix I** to this working paper; and*
b) submit progress reports to ICAO MID Regional Office every six months and whenever major progress is achieved starting January 2012

2.22 The meeting may wish to note that the Global Performance based Navigation Task Force (GPBN TF) was created on 16 December 2008, with the objective to build on the global and regional structures, which have already been put in place for PBN implementation, and to produce tools and enablers to facilitate and expedite the work.

2.23 It was identified that direct technical assistance to States would be required. In this regard, the Global PBN TF agreed to the formation of “Go Teams” as a key means of providing expertise from a pool of service provider, regulator, and industry subject matter experts to assist States with PBN implementation.

2.24 The meeting may wish to note that a PBN Go Team visit was carried out to UAE, General Civil Aviation Authority from 16 – 20 January 2011, which was conducted by the International Civil Aviation Organization (ICAO)/International Air Transport (IATA) Global Performance Based Navigation Task Force. Where the Go Team performed an assessment on specific working areas and, in agreement with the representatives of UAE aviation community (General Civil Aviation Authority, air navigation service providers, airport authorities, airlines, military and general aviation representatives) and developed a set of recommendations.

2.25 The meeting may further wish to note that the objective of the Go Team, in close cooperation with States aviation stakeholders, is to assess the areas identified by the State in the PBN gap analysis and to provide a list of recommendations to further support PBN implementation activities.

2.26 The meeting may wish to be informed that in order to accomplish these tasks and better manage the available expertise within the Go Team, a phased approach process would be followed as at **Appendix J** to this working paper.

2.27 The meeting may wish to note that for preparatory phases of the PBN Go Team process that several conference calls would be conducted in order that States National PBN implementation Plans will be revised and a high level Gap Analysis are to be completed by States PBN POC (Point of Contact). Based on the analyses of the collected data a Statement Of Work (SOW) will be developed and agreed by the State as at **Appendix K** to this working paper

2.28 The meeting may also wish to note that there are four main working areas that the PBN Go-Team looks into as follows:

a) assessment of the existing PBN operational approval process;
b) assessment of existing airspace concept aiming to accommodate projected traffic increase and further improve safety, capacity and efficiency;
c) assessment of current approach procedures Implementation and design; and
d) assessment of existing PBN training.

2.29 Based on the above, and under the SOW for the assessment of existing PBN operational approval process the PBN Go Team and States Participants will go through the following:

a) analyze operational approval processes currently in place;
b) assess existing approval processes against Best Practices; and
c) Identify potential gaps and develop a list of recommended actions.

2.30 Based on the above, the PBN/GNSS TF/4 meeting noted the Go Team Recommended that each ICAO Region develops the Go Team capabilities within the Region. Furthermore, it was recommended that General Civil Aviation Authority (GCAA) be in a position of the PBN Champion in the MID Region in order to be able to assist MID States in the Implementation of PBN. The meeting is requested endorse the following Draft Conclusion emanating from PBN/GNSS TF/4 meeting:

DRAFT CONCLUSION 4/4: MID PBN SUPPORT TEAM (MPST)

That,

a) ICAO MID Regional Office provide the leadership;
b) UAE be the champion for the MPST;

c) IATA fully commit and support the MPST; and

d) MID States assign members to MPST and allocate necessary resources.

2.31 The PBN/GNSS TF/4 meeting noted that Egypt has requested a Go Team visit. However, it was not possible due to the limitation of resources. Based on the above, the meeting recommended that Egypt consider the support from the MPST.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) endorse draft conclusions and decision in paras 2.7 and 2.15, 2.21, 2.30 and agree to present the conclusion and decisions to MIDANPIRG/13; and

b) agree on the development of common data bases for the PBN Implementation benefits paragraph 2.17.

c) provide updates to **Appendices E** and **F** to this working paper.

d) Review and provide comments to **Appendices J** and **K** to this working paper.

APPENDIX A

MID REGIONAL PERFORMANCE-BASED NAVIGATION IMPLEMENTATION STRATEGY AND PLAN

1. EXECUTIVE SUMMARY

1.1 The MID Regional Performance Based Navigation (PBN) Implementation Strategy and Plan has been produced in line with Resolution A 36/23 adopted by ICAO Assembly in its 36th Session held in September 2007.

1.2 This version of the MID Regional PBN implementation strategy and plan include the modification of assembly resolution A36/23 by the 37th assembly which is now A37-11. The modification of resolution A36/23 by A 37/11 means that even for those runways that are not served with APV aircraft there has to be at least a GNSS procedure with LNAV only. The Regional Plan addresses the strategic objectives of PBN implementation based on clearly established operational requirements, avoiding equipage of multiple on-board or ground based equipment, avoidance of multiple airworthiness and operational approvals and explains in detail contents relating to potential navigation applications.

1.3 The plan envisages pre- and post-implementation safety assessments and continued availability of conventional air navigation procedures during transition. The plan discusses issues related to implementation which include traffic forecasts, aircraft fleet readiness, adequacy of ground-based CNS infrastructure etc. Implementation targets for various categories of airspace for the short term (2008 – 2012) and for the medium term (2013 – 2016) have been projected in tabular forms to facilitate easy reference. For the long term (2016 and beyond) it has been envisaged that GNSS will be the primary navigation infrastructure. It is also envisaged that precision approach capability using GNSS and its augmentation system will become available in the long term.

2. EXPLANATION OF TERMS

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

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

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

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

3. ACRONYMS

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

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

4. INTRODUCTION

Need for the roadmap

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

4.2 The implementation of RVSM on 27 NOV 2003 in the MID Region brought significant airspace and operational benefits to the Region. However, the realization of new benefits from RVSM have reached a point of diminishing returns. The main tool for optimizing the airspace structure is the implementation of PBN, which will foster the necessary conditions for the utilization of RNAV and RNP capabilities by a significant portion of airspace users in the MID region.

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

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

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

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

Benefits of Performance-Based Navigation

a) Reduces need to maintain sensor- specific routes and procedures, and their associated costs.

b) Avoids need for development of sensor- specific operations with each new evolution of navigation systems; the present requirement of developing procedures with each new introduction is often very costly.

c) Allows more efficient use of airspace (route placement, fuel efficiency, noise abatement).

d) In true harmony with the way in which RNAV systems are used.

e) Facilitates the operational approval process for operators by providing a limited set of navigation specification intended for global use.

f) Improved airport and airspace arrival paths in all weather conditions, and the possibility of meeting critical obstacle clearance and environmental requirements through the application of optimized RNAV or RNP paths.

g) Reduced delays in high-density airspaces and airports through the implementation of additional parallel routes and additional arrival and departure points in terminal areas.

h) For the pilots, the main advantage of using this system is that the navigation function is performed by highly accurate and sophisticated onboard equipment and thus allowing reduction in cockpit workload, with increase in safety.

i) For Air Traffic Controllers, the main advantage of aircraft using a RNAV system is that ATS routes can be straightened as it is not necessary for the routes to pass over locations marked by conventional NAVAIDS.

j) RNAV based arrival and departure routes can complement and even replace radar vectoring, thereby reducing approach and departure controllers' workload.

k) Increase of predictability of the flight path.

Goals and Objectives of PBN Implementation

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

(a) To ensure that implementation of the navigation element of the MID CNS/ATM system is based on clearly established operational requirement.

(b) To avoid unnecessarily imposing the mandate for multiple equipment on board or multiple systems on ground.

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

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

(e) To explain in detail the contents of the MID air navigation plan and of the MID CNS/ATM plan, describing potential navigation application.

4.8 Furthermore, the MID PBN roadmap will provide a high-level strategy for the evolution of the navigation applications to be implemented in the MID region in the short term (2008-2012), medium term (2013-2016). This strategy is based on the coverage of area navigation (RNAV) and required navigation performance (RNP), which will be applied to aircraft operations involving instrument approaches, standard departure (SID) routes, standard arrival (STAR) routes, and ATS routes in oceanic and continental areas.

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

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

4.10 The plan is intended to assist the main stakeholders of the aviation community to plan the future transition and their investment strategies. For example, airlines and operators can use this Regional Plan to plan future equipage and additional navigation capability investment; air navigation service providers can plan a gradual transition for the evolving ground infrastructure, Regulating agencies will be able to anticipate and plan for the criteria that will be needed in the future.

Planning principles

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

(a) develop strategic objectives and airspace concepts as described in the PBN manual (Doc 9613) to justify the implementation of the RNAV and/or RNP concepts in each particular airspace;

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

(c) development of airspace concept, applying airspace modelling tools as well as real-time and accelerated simulations, which identify the navigation applications that are compatible with the aforementioned concept; and

(d) continued application of conventional air navigation procedures during the transition period, to guarantee the operation by users that are not RNAV- and/or RNP–equipped.

(e) operational requirement and Stake holder consultation

(f) early implementation is encouraged based on operational requirements and States readiness.

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

5. PBN OPERATIONAL REQUIREMENTS AND IMPLEMENTATION STRATEGY

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

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

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

En-route

5.4 Considering the traffic characteristic and CNS/ATM capability of the region, the en-route operation can be classified as Oceanic, Remote continental, Continental, and local/domestic. In principle, each classification of the en-route operations should adopt, but not be limited to single RNAV or RNP navigation specification. This implementation strategy will be applied by the States and international organizations themselves, as coordinated at regional level to ensure harmonization.

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

Terminal

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

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

Approaches

5.8 During early implementation of PBN, IFR Approaches based on PBN should be designed to accommodate mixed-equipage (PBN and non-PBN) environment. ATC workload should be taken into account while developing approach procedures. One possible way to accomplish this is to co-locate the Initial Approach Waypoint for both PBN and conventional approaches. States should phase-out conventional non-precision approach procedures at a certain point when deemed operationally suitable and taking in consideration GNSS integrity requirements, and planning for CDO implementation.

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

Implementation Strategy

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

a) Implementation of any RNAV or RNP application shall be in compliance with ICAO PBN Manual (Doc 9613).

b) Implementation of RNAV5/RNAV1 depending on operational requirements for continental en-route and local/domestic en-route applications at least until 2016.

c) Implementation of RNAV1/Basic-RNP-1 depending on operational requirements for terminal applications at least until 2016.

d) Implementation of RNAV-10 for oceanic/remote continental until at least 2016.

e) The use of RNAV 5 / RNAV 1 specification by RNP specifications (e.g. advanced-RNP-1) for the use in the en-route and terminal airspace to commence by 2016.

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

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

h) The use of NDB for approach operations shall be terminated not later than 2012.

i) The operation of CDO to commence 2013;

j) The RNP AR Approaches to commence depending on States operational requirement starting 2012.

6. CURRENT STATUS AND FORECAST

MID Traffic Forecast

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

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

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

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

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

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

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

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

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

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

TABLE 1

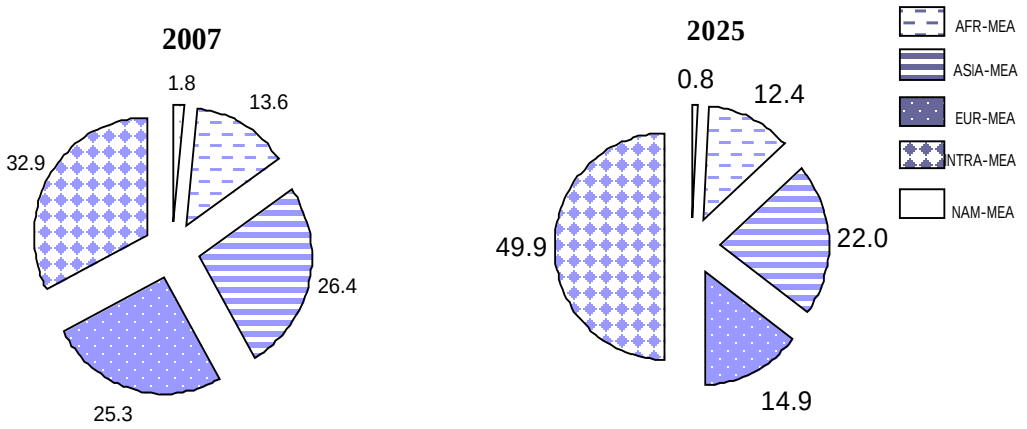
AIRCRAFT MOVEMENTS FORECAST TO THE YEAR 2025

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

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

FIGURE 1

SHARES OF SELECTED ROUTE GROUPS IN AIRCRAFT MOVEMENTS



Aircraft Fleet Readiness

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

CNS Infrastructure

Navigation infrastructure

Global Navigation Satellite System (GNSS)

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

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

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

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

Other PBN Infrastructure

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

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

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

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

Note.- The conventional Navaid infrastructure should be maintained to support non-equipped aircraft during a transition period until at least 2016.

Surveillance Infrastructure

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

Communication Infrastructure

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

7. IMPLEMENTATION ROADMAP OF PBN

ATM Operational Requirements

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

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

a) Traffic and cost benefit analyses
b) Necessary updates on automation
c) Operational simulations in different scenarios
d) ATC personnel training
e) Flight plan processing
f) Flight procedure design training to include PBN concepts and ARINC-424 coding standard

g) Enhanced electronic data and processes to ensure appropriate level of AIS data accuracy, integrity and timeliness
h) WGS-84 implementation in accordance with ICAO Annex 15
i) Uniform classification of adjacent and regional airspaces, where practicable
j) RNAV/RNP applications for SIDs and STARs
k) Coordinated RNAV/RNP routes implementation
l) RNP approach with vertical guidance
m) Establish PBN approval database

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

Short Term (2008-2012)

En-route

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

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

7.6 For Continental routes, the applications of RNAV 5 and RNAV 1 navigation specifications are expected. Before the PBN concept was established , the MID Region adopted the Regional implementation of RNP 5. Under the PBN concept it is now required that RNP 5 will change into RNAV 5. Based on operational requirements, States may choose to implement RNAV 1 routes to enhance efficiency of airspace usages and support closer route spacing, noting that appropriate communication and surveillance coverage is provided. Details of these requirements are provided in the PBN manual (Doc 9613) and PANS-ATM (Doc 4444).

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

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

Terminal

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

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

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

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

Approach

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

7.13

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

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

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

SUMMARY TABLE AND IMPLEMENTATION TARGETS

SHORT TERM (2008-2012)		
Airspace	***Navigation Specification Preferred***	***Navigation Specification Acceptable***
En-route – Oceanic	RNAV 10	RNAV 10
En-route - Remote continental	RNAV 5, RNAV 10	RNAV 10
En-route – Continental	RNAV 5, RNAV 1	
En-route - Local / Domestic	RNAV 5, RNAV 1	
TMA – Arrival	RNAV 1 in surveillance environment and with adequate navigation infrastructure. Basic RNP 1 in non-surveillance environment	
TMA – Departure	RNAV 1 in surveillance environment and with adequate navigation infrastructure. Basic RNP 1 in non- surveillance environment	
Approach	RNP APCH with Baro VNAV in all possible airports; RNP AR APCH in airport where there are obvious operational benefits. Implementation of straight-in LNAV only procedures, as an exception	

Implementation Targets

- Implementation of approach procedures with vertical guidance (APV) (Baro-VNAV and/or augmented GNSS), including LNAV only minima, for all instrument runway ends, either as the primary approach or as a back-up for precision approaches by 2016 with intermediate milestones

as follows: 30% by 2010, and 50 % by 2012; and priority should be given to airports with most significant operational benefits

- RNAV 1 SIDs/STARs for 30% of international airports by 2010 and 50% by 2012 and priority should be given to airports with RNP Approach

Medium Term (2013-2016)

En-route

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

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

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

Terminal

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

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

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

Approach

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

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

7.24 The introduction of application of landing capability using GNSS is expected to guarantee a smooth transition toward high-performance approach and landing capability.

7.25 **Operational approval requirements**. Operators are required to have operational approval for RNP APCH with VNAV operations (Baro VNAV). Depending on operations, aircraft shall also meet RNP AR specification.

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

SUMMARY TABLE AND IMPLEMENTATION TARGETS

MEDIUM TERM (2013-2016)		
Airspace	***Navigation Specification (preferred)***	***Navigation Specification (/acceptable)***
En-route – Oceanic	RNAV 10	RNAV 10
En-route - Remote continental	NIL	RNAV 10
En-route – Continental	RNAV 1, RNAV 5	RNAV 1, RNAV 5
En-route - Local / Domestic	RNAV 1 , RNAV 5	RNAV 1, RNAV 5
TMA – (Arrival, Departure)	RNAV1 or RNP 1 application	RNAV 1 or RNP 1 application
Approach	RNP APCH (with Baro VNAV) and APV Expansion of RNP AR APCH where there are operational benefits Introduction of landing capability using GNSS and its augmentations	RNP APCH (with Baro VNAV) and APV Expansion of RNP AR APCH where there are operational benefits Introduction of landing capability using GNSS and its augmentations
Implementation Targets ▪ RNP APCH with Baro VNAV or APV or LNAV in 100% of instrument runways by 2016 ▪ RNAV 1 or RNP 1 SID/STAR for 100% of international airports by 2016 ▪ RNAV 1 or Basic RNP 1 SID/STAR at busy domestic airports where there are operational benefits ▪ Implementation additional RNAV/RNP routes ▪ CDO Implementation will commence in this term		

Long Term (2016 and Beyond)

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

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

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

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

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

7.32 Implementation of CDO in all International Airports is recommended.

8. TRANSITIONAL STRATEGIES

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

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

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

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

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

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

8.7 States should have PBN operational approval process.

8.8 Early Implementation of PBN are encouraged.

9. SAFETY ASSESSMENT AND MONITORS

Methodology

Need for Safety Assessment

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

Roles and Responsibilities

9.2 To demonstrate that the system is safe, it will be necessary that the implementing agency – a State or group of States - ensures that a safety assessment and, where required, ongoing monitoring of the PBN en-route implementation are undertaken. The implementing agency may have the capability to undertake such activities or may seek assistance from the Middle East Regional Monitoring Agency (MID RMA). The latter course of action is preferred as the MID RMA would be in a position to establish the necessary monitoring and data collection activity in an effective manner. Furthermore, the MIDANPIRG/10 meeting in April 2007 adopted the revised terms of reference of the MID RMA, whose scope includes safety monitoring of RNP/RNAV.

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

(a) Establish and maintain a database of PBN approvals;

(b) Monitor aircraft horizontal-plane navigation performance and the occurrence of large navigation errors and report results appropriately to the MID RMA;

(c) Conduct safety and readiness assessments and report results appropriately to the MID RMA;

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

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

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

10. PERIODIC REVIEW OF IMPLEMENTATION ACTIVITIES

Procedures to Modify the Regional Plan

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

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

Appendix A – Practical Examples of tangible benefits (living document)

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

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

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

- Provision of runway-aligned final approach path which may not be possible from conventional navigation;

- Reduced aircraft flight time due to the implementation of optimal flight paths, with the resulting savings in fuel, noise reduction, and enhanced environmental protection;

- Improved airport and airspace arrival paths in all weather conditions, and the possibility of meeting critical obstacle clearance and environmental requirements through the application of optimized RNAV or RNP paths;

- Implementation of more precise approach, departure, and arrival paths that will reduce dispersion and will foster smoother traffic flows;

- Reduced delays in high-density airspaces and airports through the implementation of additional parallel routes and additional arrival and departure points in terminal areas;

- Reduction of lateral and longitudinal separation between aircraft to accommodate more traffic;
- Decrease ATC and pilot workload by utilizing RNAV/RNP procedures and airborne capability and reduce the needs for ATC-Pilot communications and radar vectoring;

- Increase of predictability of the flight path; and

- Reduction of maintenance and flight inspection costs associated with conventional navigation aids

Appendix B – Reference documentation for developing operational and airworthiness approval regulations/procedures

General Guidelines for Obtaining Airworthiness and Operational Approvals for PBN Navigation Specifications, Version 1.0, International Air Transport Association, August 2008. (URL - http://www2.icao.int/en/pbn/ICAO%20Documentation/ICAO%20Documentation/State%20letter%2007.22%20Guidance%20material%20for%20the%20issuance%20of%20performance%20based%20navigation%20(PBN)%20operational%20approvals.pdf

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APPENDIX B

PROPOSED TERMS OF REFERENCE FOR *MID PBN SUPPORT TEAM (MPST)*

1. TERMS OF REFERENCE

a) promote PBN and convince Stakeholders to support PBN;

b) gap Analysis and PBN Implementation Plan update/improvement; and

c) implementation of PBN. This would result in the engagement at a working level to coordinate and provide assistance to States.

2. WORK PROGRAMME

a) promotion of PBN by increasing awareness and education to motivate States to invest and implement

b) make use of the PBN Go Team Visit to the UAE, and adapt this to provide the support at a greater frequency

c) Collection of required data and practices to maintain data integrity

d) Conducting safety assessments

e) Completion and improvement of PBN implementation plans

f) Guidance to establish the regulatory framework, approvals process and other mechanisms necessary for implementation and sustainment of PBN capabilities

g) Provide guidance and assistance to operators in obtaining operational approval for utilising RNP and other PBN procedures

h) assist in operational approval

i) Providing guidance to States in PBN en-route implementation, airspace route design and harmonization across FIRs

j) Undertake other functions relevant to implementation of PBN as assigned by the PBN/GNSS TF and report to PBN/GNSS TF

3. COMPOSITION OF THE TASK FORCE

Experts from MID Region States, UAE as champion, IATA support and representative from Industry, International/Regional Organizations may be invited when required.

CANSO Middle East ANSP, Airspace Users & Stakeholder Engagement (MEAUSE)

MEAUSE Annual Report

Final Version

20 November 2011

We want to thank all the members for their on-going contribution since the foundation of the MEAUSE WG in November 2010:

1. **CANSO**
2. **IATA**
3. **CARC Jordan**
4. **Royal Jordanian Air Force**
5. **Saudi Airlines**
6. **Emirates**
7. **GACA, KSA**
8. **GCAA, UAE**
9. **NANSC, Egypt**
10. **DFS Deutsche Flugsicherung GmbH**
11. **Dubai Airports**
12. **Abu Dhabi Airport Company (ADAC)**
13. **Serco Middle East**
14. **Airbus**

It is our great pleasure to welcome new members who joined our regional initiative in September 2011;

1. **Airways New Zealand**
2. **Project Boost**
3. **Air Arabia**

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1 Introduction to MEAUSE: ME ANSPs, Airspace Users & Stakeholder Engagement

1.1 Brief history

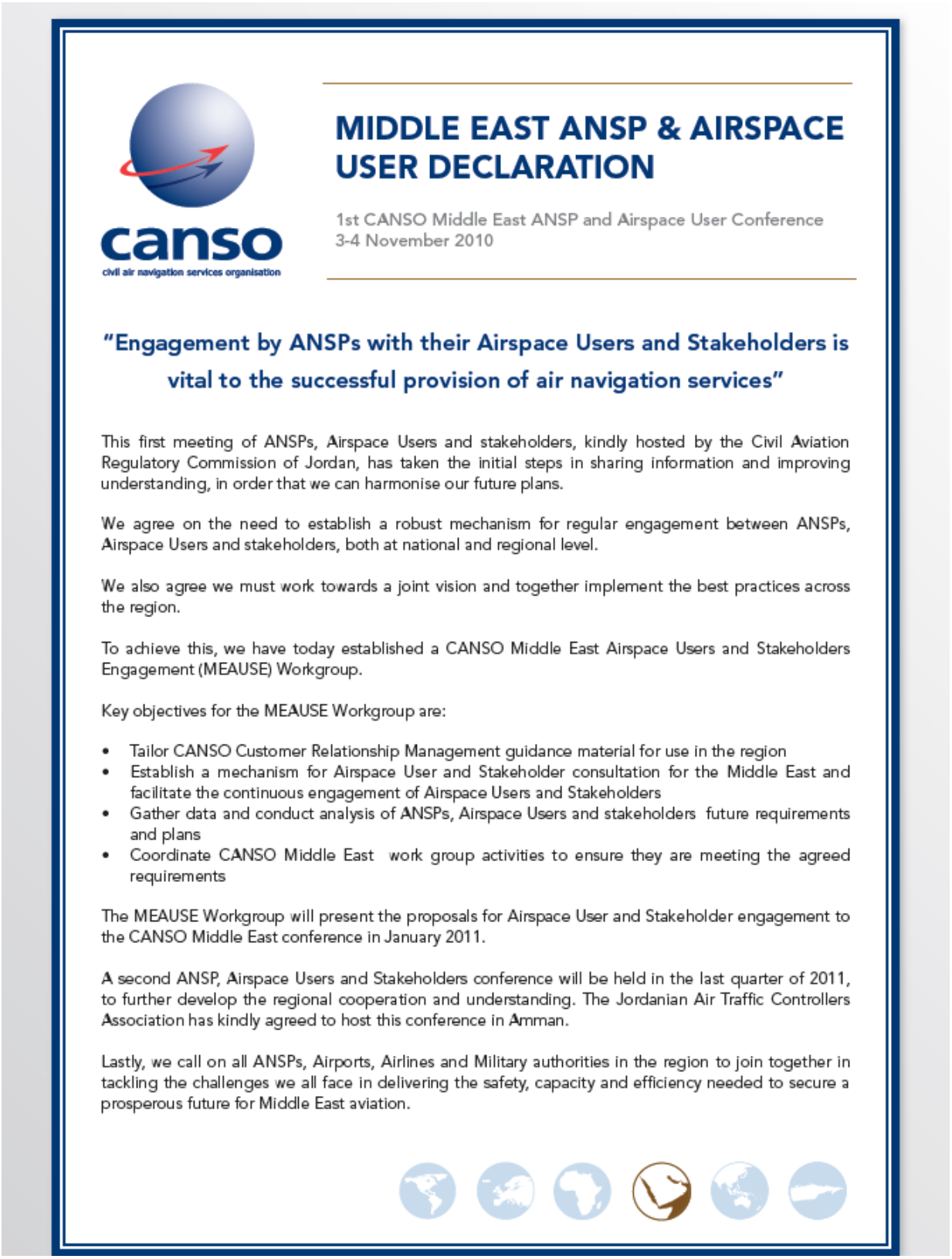
The ME Air Navigation Service Providers (ANSP), Airspace Users & Stakeholder Engagement (MEAUSE) Initiative was founded after the 1st MEAUSE Conference, which was held 3 – 4 November 2010 in Amman, kindly hosted by CARC Jordan.

In the press release following the Conference it was stated, that

"*Customer consultation is vital for the provision of safe, efficient air navigation services, and is a key pillar of our Middle East High Level Strategy. By establishing the Middle East ANSP, Airspace User and Stakeholder Engagement Workgroup, CANSO's Middle East Members and industry partners have taken the first steps in sharing information, improving understanding, and harmonising future plans. The Workgroup will provide a platform to discuss priority issues at both regional and national level, and work together to implement best practice in the region. In doing so, participants will play an important role in helping the region to achieve its 'RED SEA' Vision to Realise, Enhance and Develop Seamless Efficient Airspace."*
The Conference concluded with a declaration on ANSPs' and stakeholders' commitment to improving customer relations, and an outline of the ***key activities*** *of the MEAUSE Workgroup. These include:*

- *Establishing a mechanism for Airspace User and Stakeholders consultation for the Middle East and facilitating the continuous engagement of Airspace Users and Stakeholders when developing the region's future plan*
- *Tailoring CANSO Customer Relationship Management guidance material for use by ANSPs the Middle East region*
- *Gathering data and conducting analyses of ANSPs, Airspace Users and stakeholders future requirements and plans*
- *Coordinating MEAUSE activities with other CANSO Middle East Workgroups as part of a work plan, ensuring they meet agreed requirements*

"We call on all Middle East ANSPs, airports, airlines, suppliers and military authorities in the region to join together to address the challenges we all face in delivering the safe, efficient airspace needed to secure the prosperous future of Middle East aviation," added Mr Jahdli.
For further information please see the MEAUSE declaration and visit the ME section of the CANSO website: www.canso.org/cms/showpage.aspx?id=1898



canso
civil air navigation services organisation

MIDDLE EAST ANSP & AIRSPACE USER DECLARATION

1st CANSO Middle East ANSP and Airspace User Conference
3-4 November 2010

"Engagement by ANSPs with their Airspace Users and Stakeholders is vital to the successful provision of air navigation services"

This first meeting of ANSPs, Airspace Users and stakeholders, kindly hosted by the Civil Aviation Regulatory Commission of Jordan, has taken the initial steps in sharing information and improving understanding, in order that we can harmonise our future plans.

We agree on the need to establish a robust mechanism for regular engagement between ANSPs, Airspace Users and stakeholders, both at national and regional level.

We also agree we must work towards a joint vision and together implement the best practices across the region.

To achieve this, we have today established a CANSO Middle East Airspace Users and Stakeholders Engagement (MEAUSE) Workgroup.

Key objectives for the MEAUSE Workgroup are:

- Tailor CANSO Customer Relationship Management guidance material for use in the region
- Establish a mechanism for Airspace User and Stakeholder consultation for the Middle East and facilitate the continuous engagement of Airspace Users and Stakeholders
- Gather data and conduct analysis of ANSPs, Airspace Users and stakeholders future requirements and plans
- Coordinate CANSO Middle East work group activities to ensure they are meeting the agreed requirements

The MEAUSE Workgroup will present the proposals for Airspace User and Stakeholder engagement to the CANSO Middle East conference in January 2011.

A second ANSP, Airspace Users and Stakeholders conference will be held in the last quarter of 2011, to further develop the regional cooperation and understanding. The Jordanian Air Traffic Controllers Association has kindly agreed to host this conference in Amman.

Lastly, we call on all ANSPs, Airports, Airlines and Military authorities in the region to join together in tackling the challenges we all face in delivering the safety, capacity and efficiency needed to secure a prosperous future for Middle East aviation.

The consistent collaborative approach supported by CANSO ME and IATA MENA has led to an excellent working relationship of the MEAUSE members:

The members of the MEAUSE Initiative are:
CANSO ME, IATA MENA, CARC Jordan, GACA of KSA, GCAA of UAE, NANSC of Egypt, Serco ME, DFS Deutsche Flugsicherung GmbH, Airways NZ, Dubai Airports, Abu Dhabi Airport Company, Emirates Airlines, Abu Dhabi Department of Transport (DoT), Etihad Airlines, Airbus, Saudi Airlines, Royal Jordanian Air Force (RJA), Project Boost, Air Arabia.

MEAUSE Chairman: Gudrun Held, DFS Deutsche Flugsicherung GmbH.
Vice-Chairman: to be elected

1.2 MEAUSE Objectives

Based on the objectives agreed at the MEAUSE Conference, the members of the MEAUSE Initiative further developed these at their 3 meetings in 2010 and 2011as follows:

- Conduct coordinated activities that are in service of the Middle East RED SEA (**R**ealise, **E**nhance, **D**evelop **S**eamless, **E**fficient **A**NS) Vision and its 7-Pillar Strategy
- Establish a **platform for stakeholder engagement**, the exchange of best practice and learning in the Middle East
- Establish a **mechanism for stakeholder consultation** in the Middle East to better align visions and future plans of ANSPs and their stakeholders, in particular the Airspace Users.
- **Conduct surveys**, analyse responses and develop reports to match ANSPs and Airspace User requirements and expectations
- Develop and promote **guidance material** and tools that supports ANSPs in their efforts to improve their relationship with their stakeholders such as the 'ME Guide to Customer Relationship'.
- Develop and promote **customer relationship management tools** that contribute to better understanding and performance improvement

1.3 MEAUSE key activities

1.3.1 Establishing a mechanism for consultation

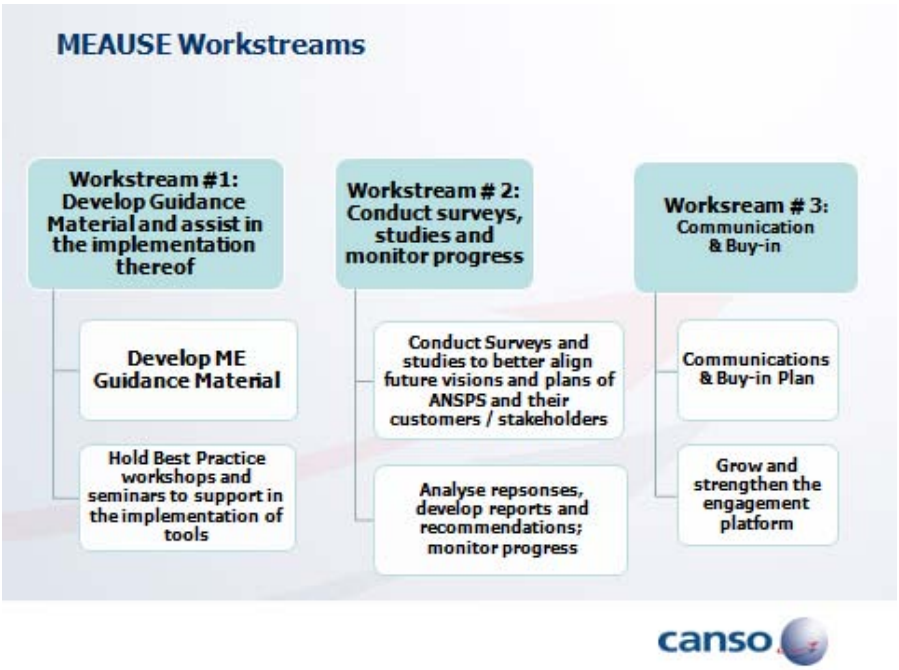
It was agreed at the Conference,

Establishing a mechanism for Airspace User and Stakeholders consultation for the Middle East and facilitating the continuous engagement of Airspace Users and Stakeholders when developing the region's future plan.

To achieve this target, it was proposed to use the MEAUSE initiative as the regional platform (or mechanism) for Stakeholder Engagement and Exchange of Best Practice.
Whilst workstream1 'ME Guide to Customer Relationship describes the process for consultation, workstream2 focuses on the implementation of a mechanism for consultation, which includes: processes and activities, conducting surveys to compare and match ANSPs and Airspace User expectations and plans to move towards harmonisation.

1.3.2 Develop and agree a workplan

The illustration below gives an overview of the workplan and workstreams agreed by the members of the MEAUSE initiative. The workstream leads are also identified:



Workstream #1: Gudrun Held, DFS

Workstream #2: Ruby Sayyed, IATA

Workstream #3: Sylvie Sureda-Perez, Airbus

1.3.3 Harmonization of ANSP and Airspace Users Future Plans

In its presentation at the MEAUSE Conference in 2010, Dubai Airports demonstrated the importance and need to work together and harmonize future plans.

The surveys conducted by MEAUSE were a first step towards harmonizing the future plans of ANSPs and Airspace Users. Due to the crucial role that airports play in the Region, airports were also included in the surveys.

Please refer to Chapter 3 for the detailed analysis of the survey responses and the recommendations.

1.3.4 ME Guide to Customer Relationship Management

Tailoring CANSO Customer Relationship Management guidance material for use by ANSPs the Middle East Region

as agreed by the participants of the MEAUSE Conference.

Please refer to Chapter 4 for more detailed information on the ME Guide to Customer Relationship Management which was developed jointly by CANSO and IATA.

1.3.5 Coordination of MEAUSE activities with other ME Workgroups

The MEC3 decided in 2010 to focus on MEAUSE and MIDRAR until the agreed objectives are achieved.

The MIDRAR project was asked to coordinate project support with the ME WG Safety, CNS/ATM and Airspace Management.

MEAUSE invited the WG Chairs to meetings and coordinated MEAUSE activities with the other WG through the CANSO Director ME Affairs.

1.4 MEAUSE Tools

The MEAUSE members agreed to develop and use the following tools to promote and strengthen stakeholder engagement in the ME with a view to contribute to regional objectives, such as improve performance, enhance capacity and harmonize future plans:

- WG Meetings and telephone conferences
- Information material
- Guidance material
- MEAUSE surveys, analyses and reports
- MEAUSE Workshops & Seminars

2 General developments and achievements

2.1 Progress: MEAUSE Conference Objectives

MEAUSE Conference target	Status	Benefit
Establishing a mechanism for Airspace User and Stakeholders consultation for the Middle East and facilitating the continuous engagement of Airspace Users and Stakeholders when developing the region's future plan	**In Progress**	ANSPs and Airspace exchange crucial information on a regular basis; consultation supports the harmonization of future plans; Increased efficiency and customer satisfaction
Tailoring CANSO Customer Relationship Management guidance material for use by ANSPs the Middle East region	**Achieved** Initial draft available in November 2011 Final document available at Regional Conference in January 2012	Provide ME ANSPs with process tailored to the ME and best practice examples that they can use to establish / improve CRM
Gathering data and conducting analyses of ANSPs, Airspace Users and stakeholders future requirements and plans	**Achieved** MEAUSE survey was conducted (ANSPs – Airspace User CRM, Military, ANSPs CNS-ATM to match User expectations) Report will be presented at MEAUSE Conference in November	Build a database that can be used for projects such as MIDRAR; can also be the basis of benchmarking activities (to compare and improve performance)
Coordinating MEAUSE activities with other CANSO Middle East Workgroups as part of a work plan, ensuring they meet agreed requirements	**Achieved**	Make best use of existing skills, competencies and resources for the benefit of all stakeholders

The main achievements can be summarized as follows:

- Strengthening the relationship between CANSO and IATA
- Building a solid basis of trust through open working relationships
- Maintaining a strong and continuous 'regional and stakeholder' focus
- Creating effective, efficient working structures
- Planning for joint activities through collaboration and engagement
- Established internal growth, stability and continuity
- Conducting surveys, analysed results and made recommendations - notably an ANSP, CNS-ATM survey, and benchmarked with the Avionics Survey launched in 2010 by IATA and Eurocontrol.

- Formulating the Joint CANSO – IATA Middle East Guide to Customer Relationship Management

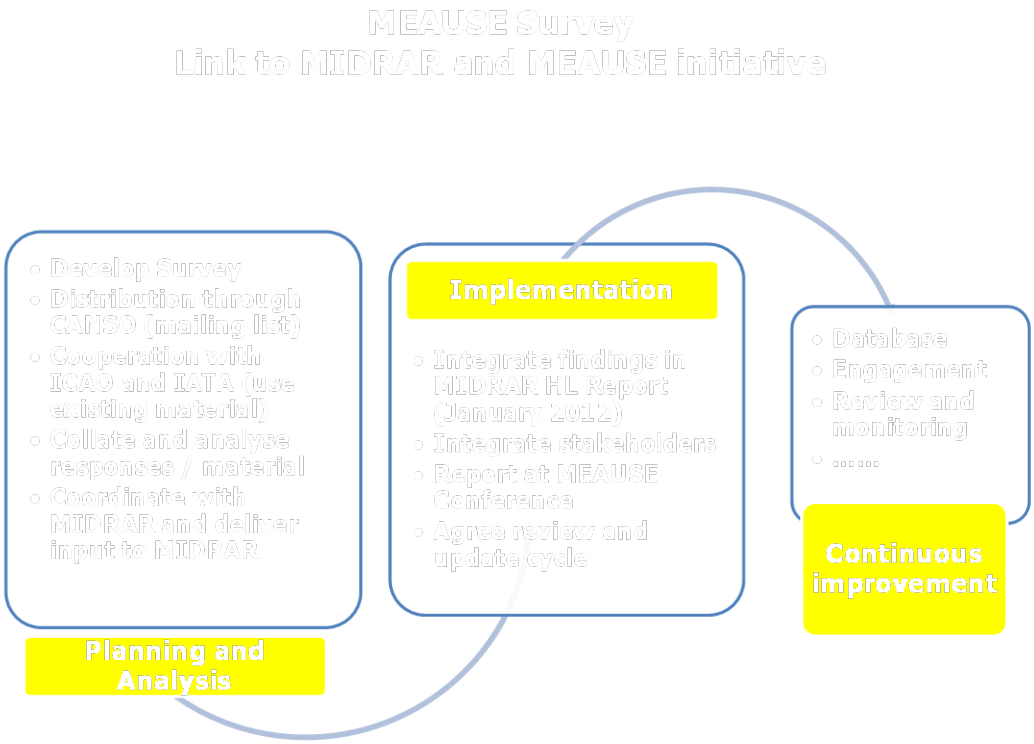
2.2 Progress: MEAUSE Workplan activities

MEAUSE workplan target	Activities	Status
Workstream I	• **Draft ME Guide to CRM** • **MEAUSE Flyer** • **Blogs**	On track
Workstream II	• **Preparation of survey** • **Distribution & data collection** • **Analysis**	On track
Workstream III	• **Communication & Buy – in strategy** • **Distribution of buy- in letter**	On track

Activities	Location / Date / Host / Organiser	Objectives	Participants
3 Meetings	Dec 2010, Cairo July 2011, Jeddah Sep 2011, Amman	• Agree workplan, timeline, deliverables • Establish working structures / elect chair – vice chair • Agree Conference input • Review / agree buy-in letter and Communication & Buy-in plan • Review / agree questionnaires for surveys • Reports of survey analyses • Review / agree 'ME Guide to Customer Relationship Mgt' • Coordinate input to MIDRAR • Agree structure / contents of MEAUSE Annual Report	CARC, GACA, GCAA, NANSC, Serco ME, Emirates, DFS Deutsche Flugsicherung GmbH, IATA MENA, CANSO ME, Dubai Airports, Abu Dhabi Airport Company,
13 Telephone Conferences	CANSO ME DFS	• Vehicle to built rapport and cohesion among WG members • Regular progress reports of workstreams / work packages • Discuss questionnaires and survey responses • WG meeting and conference preparations	

2.3 Providing support for MIDRAR

The MEAUSE surveys were coordinated with MIDRAR. MIDRAR members were invited to all MEAUSE meetings to discuss survey responses as well as survey results and recommendations.



2.4 Delivering co-ordinated input to ICAO Meetings

In 2011 MEAUSE developed coordinated papers for ICAO Meetings to promote the stake-holder engagement and obtain support for the MEAUSE surveys.

States are the owner of airspace. In their role as the regulator they are responsible for setting the normative framework and they are the ultimate decision maker.

Therefore, ICAO ME was asked to nominate a representative to MEAUSE to ensure the continuous coordination and –consequently- support of all activities undertaken by MEAUSE.

3 Surveys

3.1 Military

3.1.1 Background: The MEAUSE WG activities included conducting surveys that will help learn more about the needs and expectations of the Military Airspace Users. Accordingly, a regional Military Survey was launched, in order to show the differences among States, and reflect the current situation of the region, the intention to implement Flexible Use of Airspace in the overall context of civil/military cooperation in aviation matters.

The military survey was designed to identify gaps and align future plans, with the main objective of promoting regional collaboration and finding regional solutions that create long-term value.

3.1.2 Methodology: The Survey consisted of a multitude of Yes/No questions supported by qualitative appraisal. This questionnaire was designed in a simple way intended to provide basic and general direction to those who are tasked to undertake corrective actions.

3.1.3 General statistics of responses: The Survey was sent via e-mail to the regional ASNPs with a request to forward the same to their military units.

3.1.4 Military survey analysis: Military involvement in the survey is important in order to collect comprehensive information on the varied ways in which militaries use airspace across the Middle East region to take their needs into account and have a positive impact on outstanding issues, the greatest challenge is improving the safety and efficiency of the operating environment as skies become more congested. The outcome of the military survey will develop a new ways of addressing airspace challenges, the finding of the survey is summarised in the following points:

a. Grand level of maturity reached by the military community and they are aware of civil aviation demands.

b. More than 45 percent of the region airspace is dedicated to military aviation; however, we work with civilians on a 24x7x365 basis to ensure our system has the flexibility to meet both civil and military requirements and to move as many aircraft as possible, efficiently and safely.

c. Special Use of Airspace (Restricted Areas, Military training Areas, Firing Areas, Prohibited Areas, danger areas and etc..) used by the armed forces left a small portion of airspace to civil air traffic to use.

d. The military aviation of the region has two main missions:

(1) Air policing for national security reasons.

(2) Training (with or without segregated airspace)

e. The main issue for Air Forces of the region is not only the common usage of airspace, but the cost of airborne and ground CNS equipment.

f. The military are ready to contribute to the harmonized FUA seeking the highest possible level of cooperation and coordination for airspace and traffic management.

g. Each military aviation operator (air force, army, navy) owing a specific requirement to be considered. We need to recognize that different military authorities use different national standards.

h. Joint work for common rules of the Air available in some states, to Support harmonization of rules for military Aerodromes open to civilian traffic.

i. Despite years of efforts, military still in need to speed up progress, to keep up with current developments in the aviation sector and not underestimate the rigidity of the system, in parts, relying too much on regulation.

j. Route restrictions due to military restricted airspace in the Middle East result in airlines having to fly detours that can affect state airspace capacity, safety, cost, more noise and more fuel burn translates into emissions.

k. There are some positive signs, such as removing routing restrictions and implementing free-route airspace.

l. The survey showed main obstacles are not technological but institutional and working together as stakeholders in a single value chain will help.

m. Civil/Military Aviation, Two different Worlds, from analyzing the needs of the two stakeholders it is just a short span to the conclusion that both share a large common ground of requirements.

n. Direct link between civil/military controllers to exchange real-time knowledge and data, the majority of regional states having two trials in progress:

(1) On automated. (Flight tracking and monitoring system)

(2) On direct contact by phone.

o. From analyzing the survey we did notice that, sectors and routes are designed according to national borders rather than traffic flows.

p. Under current situation, airspace managers are depending on lower-echelons, for negotiations. This prevents airspace issues from move up the chain of command until they become a real problem, this delays effort to correct airspace deficiencies and generally resulted in a less than optimal solution.

q. Combat aircraft Avionics aimed to perform warfare functions not to meet civil Air Traffic Management requirement, also this type of aircraft having a limited cockpit space for additional avionics fit or modify. But military large transport-type aircraft accept equipage solutions that cope with civil and military requirements.

r. The survey showed many regional states, military authorities are responsible for SAR operations, SAR flights are given the highest priority, and the types of aircraft used in SAR indicate they are normally performed at lower and medium altitudes to keep radio contact with scene SAR coordinator / commander.

s. The civil-military coordination and cooperation differs in the region from one State to another, so, the FUA concept is implemented differently.

t. The absence of formal mechanisms and the lack of effective working relationships for coordinating airspace requirements is the main obstacle for negotiating conflicting requirements.

u. The survey done according to normal peace time, civil and military aviation activity, but in war time, military authorities evaluate their airspace needs from a different perspective.

v. The survey found that in many regional states evaluation and modification of the national airspace structure or design is not done in a systematic way, it is done in a reactive way (calamity management).

3.1.5 Conclusions & Recommendations:

Small differences among States, leave potential for conflict, and not addressing these conflicts or ignoring them may lead to a serious disruption of the civil/military and block channels of communication between the two echelons. The military involvement in the MEAUSE WG is a good way to form one aviation community. From a military perspective, compromise can be found with the understanding of each other's requirements and needs, and exchanging views in one platform..

There are still many roadblocks that do not allow airlines to benefit from the existing airborne capability, and each state comes with its own set of challenges, which are different in times of peace, war, conflict, or tension.

The MEAUSE WG aspires to see "Single Civil Military Sky" fit all users, overcoming obstacles, and consolidating efforts is still lacking.

This aspiration serves as a long-term goal, while at present, we need to improve civil-military co-operation at all. Military airspace requirements are not static; they are dynamic, and adaptable, therefore to meet the requirements of all airspace users the following recommendations are to be executed:

a. The states of the region have to develop 'Joint and Integrated' approach, which brings together civil and military ATM and ensures teamwork.

b. More work is needed on how to handle the costs for deploying any additional new equipment or innovative for some airspace users of common use.

c. We have to change the way of approach to civil/military coordination committees (Bottom-Up-Approach) and try a new approach (Top-Down-Approach).

d. States do not have to wait for new generations of technology, use what you already have to start FUA now, without requiring additional resources.

e. Most of the regional states require re-assessment of current State airspace and route structures.

f. Encouraging coordination of training programs and encouraging the development of programs of training institutes to meet the current and future staff working in civil

and military aviation, this in turn increases the degree of awareness among civil controllers and military tactical controllers about airspace management.

g. Different systems should be merged for harmonization and to identify civil military operational requirements.

h. Better understanding, shared knowledge, and value of individual limitations of civil/military airspace users must begin, to balance and accommodate the aspects of economy and commerce, with defense and security, the result should cope with the national interest.

i. A search and rescue operation requires a single SAR Authority to have overall coordination for a SAR event; to utilize the available national resources in effective and expeditious search and/or rescue operations can be assured the general direction of SAR operations, according to this some states of the region required to:
    I. Develop search or rescue action plans.
    II. Develop Search and Rescue Agreements between neighboring States
    III. Develop National Search and Rescue Manual to be used as standard reference document, to meet domestic needs and international commitments, and to document related basic national policies.

J. Military can't cancel the use of assigned training areas, but can be converted into (Military Variable Profile Areas) as a part of airspace management solution.

3.2 ANSPs

3.2.1 Background on surveys

As part of the activities of the MEAUSE WG, an ANSP survey was launched to help to better align visions and plans of ANSPs and Airspace Users and integrate them into an overall ME Roadmap.

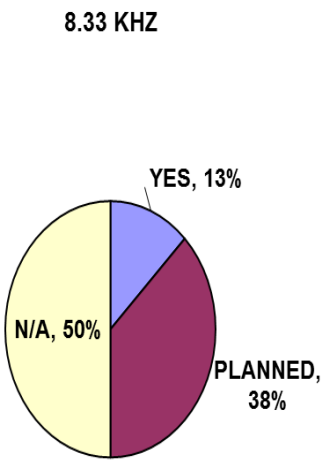
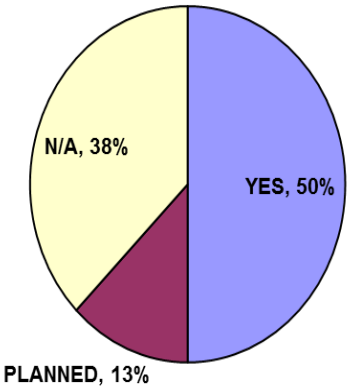
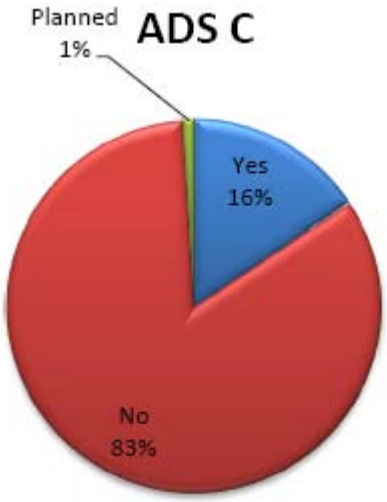
3.2.2 Methodology

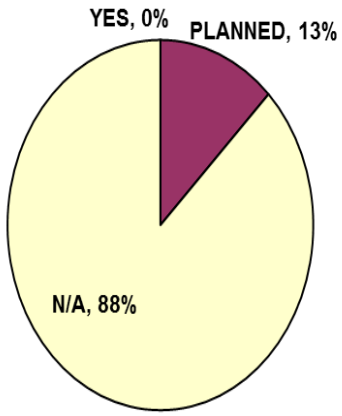
To better align ANSPs and Airspace Users future plans, the launched survey was based on a study on User expectations conducted by IATA in 2010. The chosen methodology allows performing direct comparisons and gap analyses with a view to derive conclusions and recommendations.

3.2.3 General statistics of responses

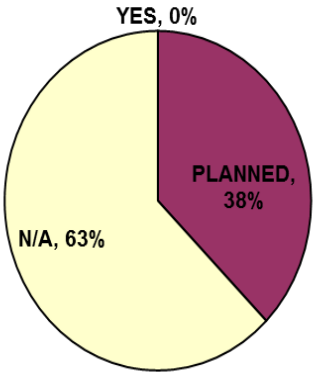
We received responses from 8 ANSPS that enable us to run basic analyses, recognize trends and draw first conclusions.

3.2.4 Analysis

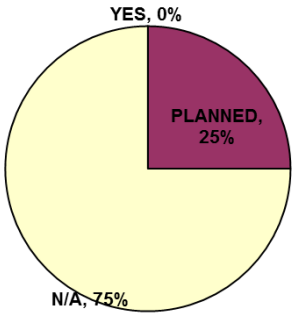
ANSPS RESPONSE (CANSO SURVEY)	USERS RESPONSE (IATA SURVEY)
	
	


YES, 0%
PLANNED, 13%
N/A, 88%

ADS-B OUT
Planned 11%
Yes 35%
No 54%


YES, 0%
PLANNED, 38%
N/A, 63%

GBAS
Yes 1%
No 99%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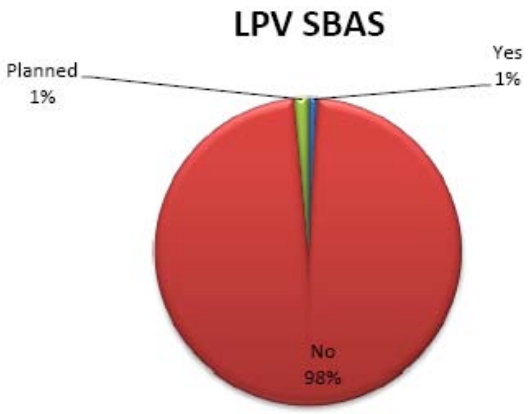
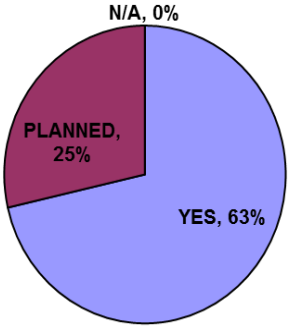
N/A, 75%


LPV SBAS
Planned 1%
Yes 1%
No 98%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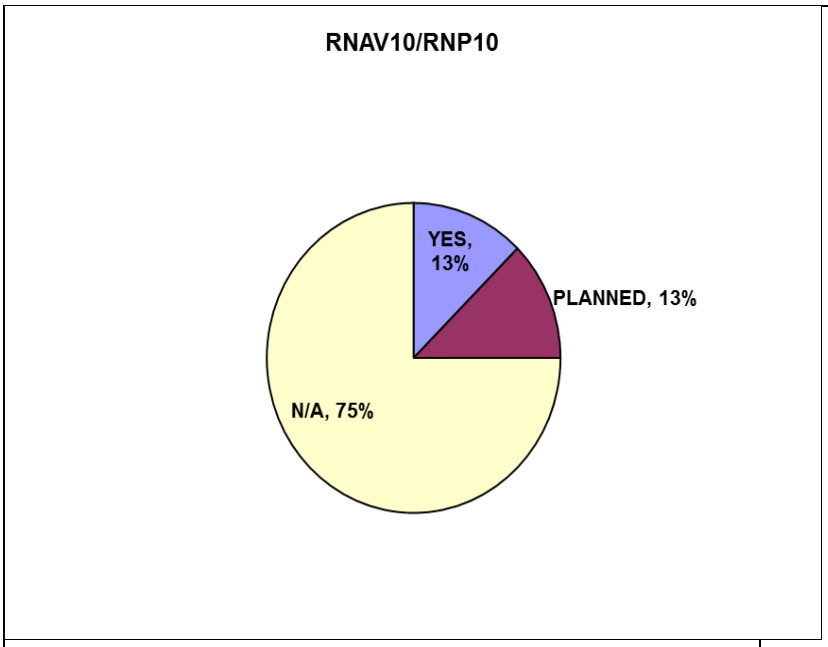
PLANNED, 25%
YES, 63%

Mode S
No 6%
Yes 94%


RNAV10/RNP10
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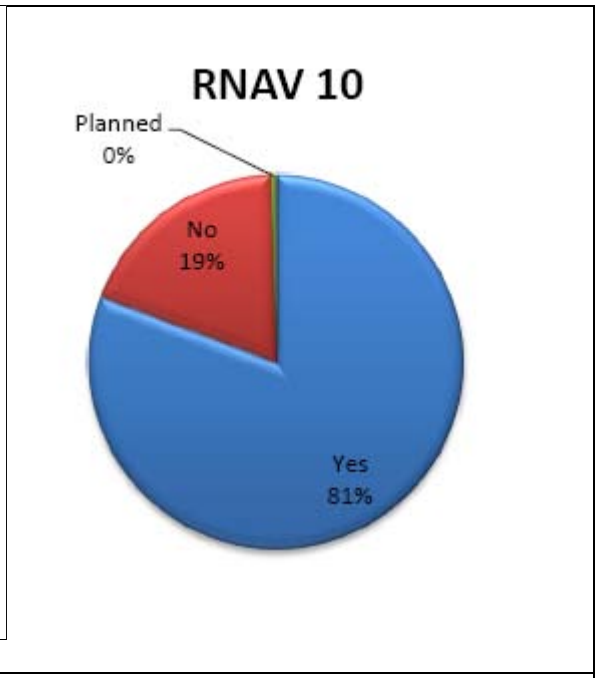
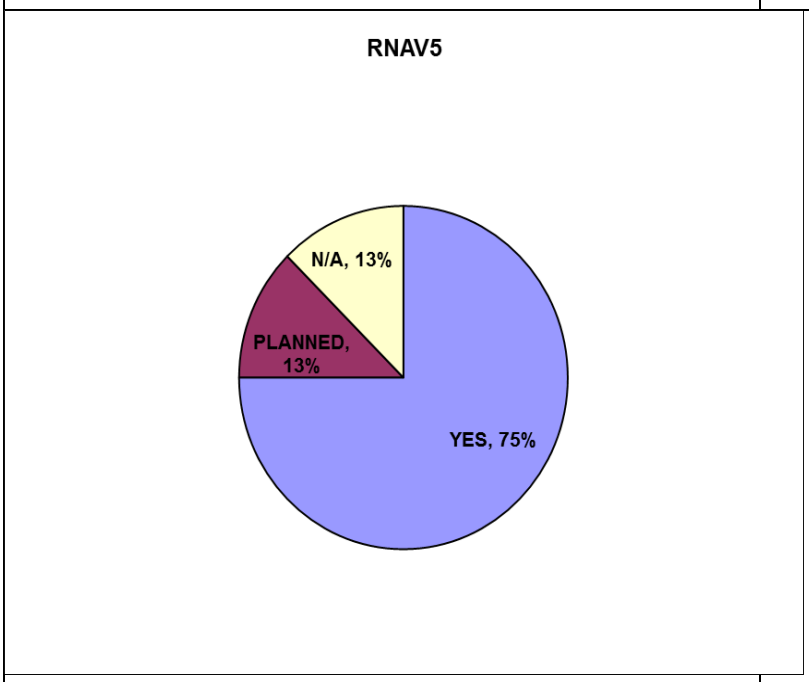

RNAV 10
Planned 0%
No 19%
Yes 81%


RNAV5
N/A, 13%
PLANNED, 13%
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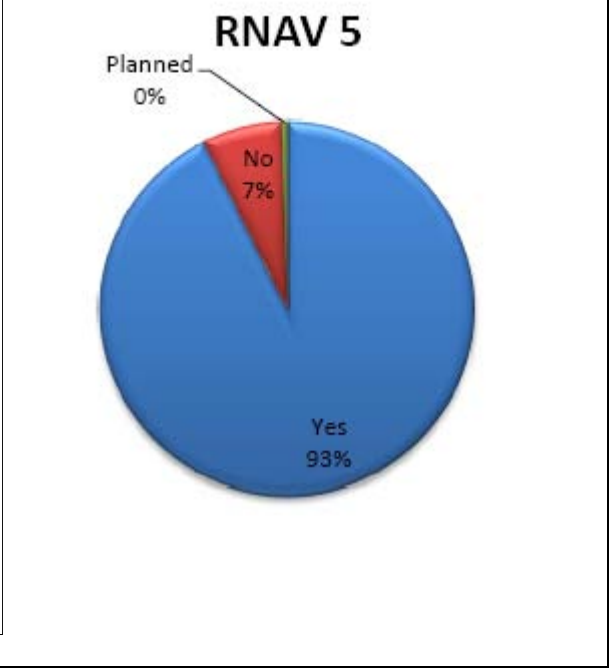
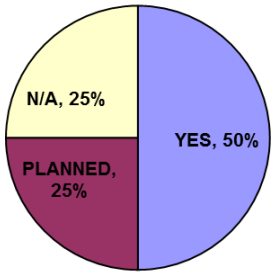
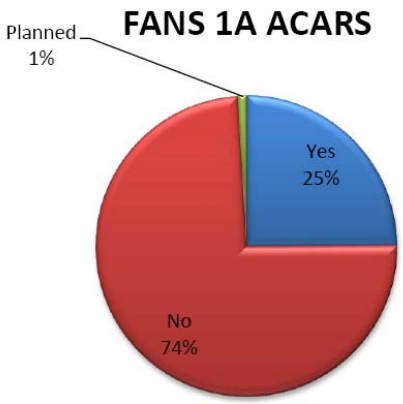
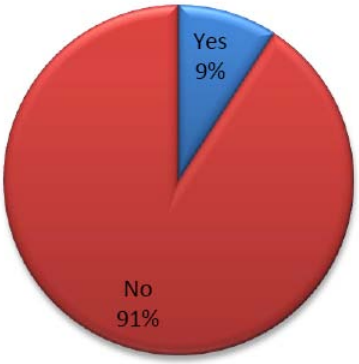
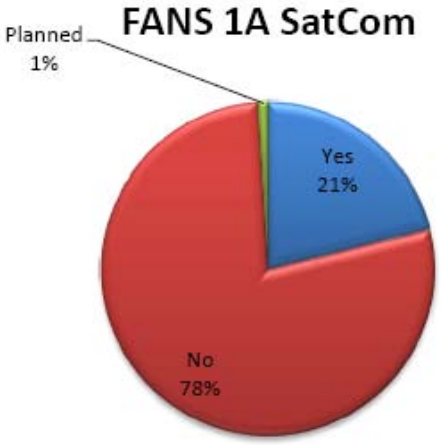
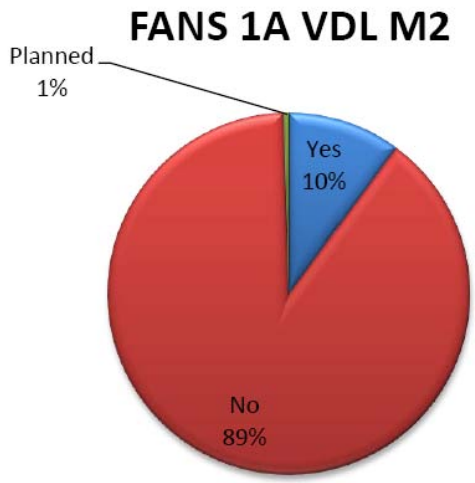

RNAV 5
Planned 0%
No 7%
Yes 93%


CPDLC
N/A, 25%
YES, 50%
PLANNED, 25%


FANS 1A ACARS
Planned 1%
Yes 25%
No 74%


FANS 1A HFDL
Yes 9%
No 91%


FANS 1A SatCom
Planned 1%
Yes 21%
No 78%



A more detailed analysis will be presented during the Annual CANSO Conference in 23-25 January 2012, which will be held in Cairo.

3.2.5 Conclusions & Recommendations

The survey results showed gaps between airlines and ANSPs plans, and also within the plans of ANSPs.

- Airline-ANSP Gaps:

1. GBAS
2. ADS-B
3. ADS-C/CPDLC

The surveys' results show gaps in terms of readiness, preparedness, and plans between the airlines, and the ANSPs.

It is the aim of the MEAUSE to provide a platform for airlines and ANSPs to have better engagement and consultation to align their plans.

- ANSP-ANSP Gaps:

1. AIDC/OLDI
2. IP Network
3. AMHS
4. ATN

The gaps among the ANSPs in their intra network and communication constitute a concern related to the lack of harmonization and coordination between the adjacent FIRs.

In summary, it is apparent that consultation with the airspace users is not being done in an effective manner that will ensure alignment of plans, and neighbouring ANSPs need to come together for a region-wide approach in terms of implementation of various technologies.

ANSPs should have a system in place that is implemented for;

- Information exchange and management
  - Regularly inform customers about operational topics
  - Technological changes
  - Strategy
  - Policy changes
  - Economic changes (charges)

  Such information exchange should be done regularly, proactively, and in the early stage.
- Handling complaints
- Measuring Customer satisfaction

The CRM Guide established under the MEAUSE will provide best practices, and tools that can be utilized to ensure continued and effective consultation and engagement takes place.

3.3 CRM: ANSPs and Customer

3.3.1 Background and methodology

This survey was conducted on the basis of the Global CANSO Customer Relationship Model. However, whereas the Global CANSO CRM Model recommends to start with a joint meeting in which the model will be explained to ensure that completed questionnaires will deliver the answers that are needed to perform a proper comparative analysis, it was decided to only include the questions in the first ANSP questionnaire and send a separate CRM survey, which contained the same questions, to the Airlines.

The CANSO ANSP – Customer – CRM survey is very comprehensive. Following the section on general information, it explores the status of the ANSP / Customer in the following areas:

1. (General Information)
2. Customer Orientation
3. Policy & Strategy

4. Corporate resources
5. Processes
6. Type of relations
7. Open questions

One of the conclusions that we can draw from this exercise is that it only delivers the desired outcome if the methodology is applied as recommended:

- Conduct a joint workshop with the ANSP and the customers
- Introduce the model, process and benefits of the exercise
- Ask the ANSP and their customer/s to complete the questionnaire separately
- Analyse and compare the answers as a joint team – draw conclusions and jointly discuss vehicles to fill the gaps and improve the relationship.

Under MEAUSE, a CRM survey was launched for the users only, while the ANSPs received the same CRM survey embedded in the first ANSP questionnaire, which was replaced by a more technology-based questionnaire during the second quarter of 2011. Therefore, the results reflected herein are indicative of airlines perspective only.

We will review the CRM Survey and re-launch in the region for airlines and ANSPs in 2012 following above guidelines.

3.3.2 General statistics of responses

We received 4 airline responses to this survey, which can give us an indication at this stage. However in order to develop a report which will benefit the entire ME Region, we need the responses from all Airspace Users and we encourage ANSPs to integrate this CRM survey into their regular processes to continuously have feedback from their customers.

3.3.3 Analysis

- 75% of the respondents indicated that their ANSP's Board of Directors is developing a network of contacts in the aviation sector. The board is aware of the roll of the ANSP in the value-chain. Customer requirements are actively investigated. The Board of Directors discusses the proposed development of the ATM system and the ATM product with the customers. The board inspires a customer oriented culture throughout the organisation.
- 50% indicated that Staff is familiar with the product of the ANSP and its processes. Staff has little contact with customers and there is little understanding of the customer processes.
- While 50% indicated that there is a clear vision on to future of the ANSP. External drivers are systematically investigated and used as input. Policy and strategy are discussed with customers. Customer requirements are translated to performance indicators for the development of the ATM system. Policy and strategy are aimed at improving the organisation, the other 50% stated that Policy of the ANSP is primarily aimed at improving the

safety of the ATM product and is technology driven, and that there are no or few external drivers taken in to account in the policy.

- 25% indicated that Processes and knowledge are documented in the organisation. Knowledge development is aimed at reducing the number of system interruptions.
- 50% indicated that information is not shared, or if shared that it is unidirectional.
- 75% indicated that customer satisfaction is not measured.
- 50% reported that there are no formal arrangements related to customer relations.

3.3.4 Conclusions & Recommendations

Effective Customer Relationship Management is a powerful vehicle to improve overall performance. An effective Customer Relations and customer consultation should be founded on the following fundamental principles:

• Mutual trust & understanding

• Early involvement of customers

• True consultation

• Clear & focused agenda

• Clarity of proposals, the rationale and their impact

• Clear communication

• Tailored processes

• Constructive participation

• Convincing rationale shared following final decisions

The CRM survey is an excellent tool to support ANSPs and their Customers to assess their relationship, identify gaps and differences in perceptions, clarify expectations and jointly develop solutions that help them to achieve the desired objectives.

The global CANSO Guide to CRM was tailored to fit the needs of the ME Region. In 2012 we will conduct CRM seminars and workshops for ANSPS and their customers in which we will introduce the methodology.

3.4 Future Plan Areas that require harmonization

The conducted surveys showed that there is a need to align and harmonize the plans among airlines, ANSPs, and the military. Together with the other partners (ICAO, ACAC, ACI) we can establish a vehicle or platform to provide continued engagement

and discussions on implementation of new technologies, change of procedures/policy, and adopting new standards.

True to the principle; ICAO is the WHAT and CANSO is the HOW, the MEAUSE and MIDRAR Workgroups have made a commitment to actively participate in ICAO forums to report progress on initiatives in order to achieve harmonization in future plans, and provide input into region-wide strategies established under ICAO.

3.5 Conclusions / recommendations

The following conclusions were derived from the MEAUSE surveys:

- The need to conduct joint workshops among stakeholders; to increase awareness, to share information, and align future plans.
- The need to establish one regional database for all information related to users, ANSPs, military, and airport. Such collection of data should use sources under ICAO, CANSO, IATA, ACI, and the individual ANSPs, and users. The whole region will benefit from such a database, because we can use historical data, assess the current situation, and predict trends, with a view to develop regional solutions to meet the capacity challenges.
- Future surveys should follow the guidelines;
  1. Have benefit and add value to the region, with clearly defined targets
  2. Be precise
  3. Be coordinated
  4. Be supported by all stakeholders, with their buy-in to discuss and implement recommendations
  5. Have visualized answers, recommendations, and conclusions

  Participating partners in the launch of surveys should avail the required resources to ensure the success of the exercise, and the fair distribution of work load among partners.

- There is a need for a regular regional surveys exercise with reports submitted at ICAO, CANSO, and IATA's regional meetings, to track and assess progress, and jointly agree on any measures for improvements (regional benchmarking).

4 MEAUSE Information and Guidance Material

4.1 MEAUSE Flyer

The MEAUSE Flyer is the first promotional material of MEAUSE. It was developed in 2011:

- to introduce this initiative and provide basic information on membership and contact details
- to present an overview of the current and potential future MEAUSE activities a
- to give an outlook of the potential development of MEAUSE

The Middle East, ANSP, Airspace User and Stakeholder Engagement (MEAUSE) Initiative

BACKGROUND

The MEAUSE Initiative was founded after the first Middle East Air Navigation Service Provider (ANSP), Airspace User & Stakeholder Conference, which was held in November 2010 in Amman, Jordan (see picture below).

The founding members were CANSO and IATA and representatives from all the stakeholders in the Aviation Value Chain who shared the common objective to transform air traffic management in the Middle East for the benefit of all customers and the entire system. These stakeholders all agree that the optimisation of Middle Eastern airspace is a vital goal that requires unprecedented effort and coordination from all stakeholders - as stated in the **Middle East ANSP and Airspace User Declaration** (right).

WHO ARE WE?

Members and Permanent Guests: Abu Dhabi Airports Company (ADAC), Airbus, Air Arabia, Airways New Zealand, Civil Aviation Regulatory Commission (CARC), DFS Deutsche Flugsicherung GmbH, Dubai Airports, Emirates Airlines, Etihad, General Authority of Civil Aviation (GACA), General Civil Aviation Authority (GCAA), International Air Transport Association (IATA), National Air Navigation Services Company (NANSC), Project Boost, Royal Jordanian Military, Saudia Arabian Airlines, Serco.

The following organisations have a permanent open invitation to take part in the MEAUSE initiative: the International Civil Aviation Organization (ICAO), Arab Air Carriers Organization (AACO), Airports Company International (ACI) and the Middle East Business Aviation Association (MEBAA). The Workgroup furthermore extends an invitation to all ANSPs, Civil and Military Airspace Users, Airports and other aviation stakeholders to join this initiative and take an active role in shaping ATM performance in the Middle East.

Chair: Gudrun Held, DFS

Representatives of the founding members at the first Middle East Airspace User and Stakeholder Engagement conference in November 2010 in Amman, Jordan

OBJECTIVES

- Establish a mechanism for Airspace User and Stakeholders consultation in the Middle East
- Facilitate the continuous engagement of Airspace Users and Stakeholders to support the development of the region's future plan
- Tailor CANSO Customer Relationship Management guidance material for use by ANSPs the Middle East region
- Gather data and conducting analyses of ANSPs, Airspace Users and stakeholders' future requirements and plans
- Coordinate MEAUSE activities with other CANSO Middle East Workgroups as part of a work plan, ensuring they meet agreed requirements

4.2 ME Guide to Customer Relationship Management

The first ME Guidance Material, which was developed by the MEAUSE Initiative, is the joint CANSO – IATA MENA Guide to Customer Relationship Management.

The ME Guide to CRM is based on CANSO / IATA global guidance material and tailored to meet the regional needs. The final draft will be presented and discussed at the MEAUSE Conference in November. Any comments will be taken into consideration in the final versions which will be available for distribution at the ME Regional Conference in January 2012.

The individual chapters of the ME Guide cover the principles and benefits of CRM, the CRM Process, the application of the CRM Process and CRM tools. Further it features best practice examples of effective and successful Customer Relationship Management form within and outside the Region.

5 Exchange of best practice

- Customer Relationship Management
- Stakeholder Relationship Management
- Civil – military Cooperation and Flexible Use of Airspace
- Airport Collaborative Decision Making (A-CDM)
- Creating value through collaboration

Above best practice examples are among those that were presented at the 2010 and 2011 MEAUSE Conferences by stakeholders from and outside the region**.**

MEAUSE will continue to serve as a platform for the exchange of best practice and learning. As of 2012 we will slightly change the format of the MEAUSE meetings and hold more Workshop and Seminar style meetings with a view to

- Promote the guidance material developed by the MEAUSE members
- Share experience on the application of the ME guidance material
- Ask stakeholders to present their examples
- Jointly decide what kind of further guidance material is required
- Present surveys results and recommendations

6 Potential next steps

6.1 Developing MEAUSE into a regional platform

MEAUSE is an excellent example for 'SYNERGY' – as the sum of its results is more than the sum of its members. By 'engaging all parties or members' of the Aviation Value Chain, it could be developed into a regional platform to discuss all subjects that are of concern and significance to all stakeholders alike.

Two key issues that were agreed at the MEAUSE Conference in November 2011, 'harmonization of future visions and plans' or 'Customer Relationship Management' entail not only ANSPs and Airspace Users, they are also important for airports, supplier and last but not least, the States as the ultimate decision makers.

6.2 Monitoring the CRM progress in ME

Following the principle 'If you can't measure it – you can't fix it', the members of MEAUSE also discussed to use the MEAUSE platform to 'monitor' CRM progress in the ME.

6.3 Integrating the MEAUSE Conference in the CANSO Regional Conference

If the decision maker shall approve that MEAUSE will be developed into a regional initiative and platform, it may also be a good idea to integrate a 'MEAUSE' session in the Regional Conference and hold Workshops and Seminars instead of an annual Conference.

6.4 Including MEAUSE on the agenda of ICAO, IATA and ACI ME Events

If decision makers approve to further develop MEAUSE into a regional platform, it would also be an option to add MEAUSE session on the agenda of those ICAO, IATA and ACI ME to promote progress and best practice exchange.

CANSO Middle East ANSP Questionnaire
- Follow-up to CNS / ATM Survey-

Dear ……..

The ME ANSP, Airspace User & Stakeholder WG is currently conducting surveys inviting States, ANSPs, civil and military Airspace Users and Airports to provide the data and information that is urgently needed to develop regional harmonized future plan in the MID Region with full involvement of all the Stakeholders.

In order to better match ANSPs with Airspace Users' requirements and future plans, we kindly ask you to fill in the brief questionnaire. This survey is complementary to the 'IATA User Requirements for ATS' document which lists all technology from the perspective of the Airspace Users. In addition to the information that we have already received, your answers will help us to concretize our analyses and strengthen our efforts to support the ATM industry in the Middle East to better align future plans of ANSP and Airspace Users. For your convenience we kept the questions short and focused.

We would like to confirm that intermediary results will be presented at the MEAUSE Conference, which will be held on 21-22 November in Amman. Final results and High level recommendations will be presented at the 4th CANSO ME Conference in January 2012.

We thank you very much for filling in the questionnaire and for returning it by email to Salem.Jahdli@CANSO.org **by 1 September 2011.**

Your responses will be treated with due confidentiality. If you have any queries, please contact Mr. Salem Al Jahdli at above email address.

Contact information
Name and address of Organization
Contact
Last and first name
Job title
Email address
Telephone
Facsimile

CANSO Middle East ANSP Questionnaire
- Follow-up to CNS / ATM Survey-

No	Question	Implemented Yes / No	Planned (year)	Comment
	Communication			
	AMHS			
	AIDC			
	VHF Voice 8.33 KHz Channel Spacing			
	SatCom(Air-to –Ground)			
	VDL Mode 2			
	VDL Mode 3			
	VDL Mode 4			
	CPDLC			
	DCL			
	D-ATIS			
	ATN			
	IP Nework			
	OLDI			
	Navigation			
	PBN			
	RNAV10/RNP10			
	RNAV5			
	RNAV2			
	RNAV1 (SID/STAR)			
	RNAV <1			
	Basic RNP1			
	RNP APCH			
	RNP AR APCH			
	WGS-84			
	GNSS(NPA/Enrout)			
	GNSS mointring/recording/alerting			
	APV			

CANSO Middle East ANSP Questionnaire
- Follow-up to CNS / ATM Survey-

	SBAS			
	GBAS			
No	**Question**	**Implemented Yes / No**	**Planned (year)**	**Comment**
	<u>Surveillance</u>			
	Mode S			
	ADS-B OUT			
	ADS-B IN			
	ADS-C			
	TIS-B			
	FIS-B			
	MLAT			
	WAM			
	1090 ES			
	UAT			

APPENDIX E

STATUS OF MID STATES PBN IMPLEMETATION PLAN

State	**Plan Submission**	**Plan Status**	**Percentage of Implementation Short term (2012)**		**Remark**
			En route %	TMA %	
Bahrain	Submitted		10	40	
Egypt	Submitted	Draft	100	80	need user input
Iran	Not submitted				Only PBN approach and Terminal implementation status received
Iraq	Not submitted				
Jordan	Submitted		100		Restriction on levels
Kuwait	Submitted				
Lebanon	Not submitted				Only PBN approach and Terminal implementation status received
Oman	submitted		100	7	
Qatar	Submitted		10	40	
Saudi Arabia	submitted				
Syria	Submitted	Draft			
UAE	submitted		100	60	
Yemen	Submitted	Draft			

APPENDIX F

PBN IMPLEMENTATION FOCAL POINT

STATE	NAME	TITLE	ADDRESS	EMAIL	FAX	TEL	MOBILE
Bahrain	Fareed Abdullah Al Alawi	Head, air Traffic Operations	Civil Aviation Affairs P.O. Box 586	falalawi@caa.gov.bh	+973 17321992	+973 17321158	+97339651596
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	Badr Mohamed Shouman	General Director HCAA	Ministry of Civil Aviation Egyptian Civil Aviation Authority Cairo International Airport Road Cairo - EGYPT	badrshoman@yahoo.com	+202 2268 0627	+202 2265 7849	+20100 601 3603
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	Adel Mohammed Al Yagout	Superintendent of Air Navigation Department	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
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

STATE	NAME	TITLE	ADDRESS	EMAIL	FAX	TEL	MOBILE
Qatar	Ahmed Al-Eshaq	Director Air Navigation	Civil Aviation Authority P.O. Box 3000 Doha – QATAR	ahmed@caa.gov.qa	(974) 465 6554	(974) 462 2300	(974) 555 0440
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
Saudi Arabia	Ali H. Hakami	Navigational Aids Systems Planner	General Authority of Civil Aviation P.O. Box 21444 Jeddah 21444	yaro123@yahoo.com	+966 2 671 7717 Ext 1594	+966 2 671 7717 Ext 1593	+966 59 840 2598
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 G

PBN IMPLEMENTATION PROGRESS REPORT

State: UNITED ARAB EMIRATE Date: 11 October 2011

Designation of PBN Focal Point

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

Status: Nominated
Focal Point: Talal Al Hammadi, Head - Airspace Coordination, PO Box 666, Abu Dhabi,
thammadi@szc.gcaa.ae
M: +971 50 8180783 | T: +971 2 599 6890 | F: +971 2 599 6836

State PBN Implementation Plan

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

Status: Approved by GCAA, Adopted by NASAC and reviewed by ICAO GNSS TF
Note(s):
The UAE PBN Implementation plan was submitted to ICAO in March 2011 and will be reviewed on an annual basis.

Approach Operations

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

Implementation Targets (# of RWY Ends)						Completed (# of RWY Ends)				In Progress (# of RWY Ends)			
Y2010		**Y2014**		**Y2016**		**LNAV**		**LNAV/VNAV**		**LNAV**		**LNAV/VNAV**	
OMAA	13L											OMAA 13L	Y
OMAA	13R											OMAA 13R	Y
OMAA	31L											OMAA 31L	Y
OMAA	31R											OMAA 31R	Y
OMAD	31					OMAD 31	Y					OMAD 31	Y
OMAD	13					OMAD 13	Y					OMAD 13	Y
		OMAL	01										
		OMAL	19										
OMDB	12L					OMDB 12L	Y					OMDB 12L	Y
OMDB	12R					OMDB 12R	Y	OMDB 12R	Y				
OMDB	30L					OMDB 30L	Y	OMDB 30L	Y				
OMDB	30R					OMDB 30R	Y					OMDB 30R	Y
OMDW	12											OMDW 12	Y
OMDW	30											OMDW 30	Y
		OMFJ	11										
		OMFJ	29										
		OMRK	16									OMRK 16	Y
		OMRK	34									OMRK 34	Y
OMSJ	12					OMSJ 12	Y	OMSJ 12	Y				
OMSJ	30					OMSJ 30	Y	OMSJ 30	Y				

Note(s):
OMAA and OMAD are busy with projects to implement RNP-AR procedures – scheduled for implementation in April 2012.
OMRK is busy with a project to implement RNPAPCH-VNAV – scheduled for implementation Q2 2012.

Arrival and Departure Operations

Reference: 1) ICAO Assembly Resolution A36-23

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

2) MID PBN Regional Implementation Plan and Strategy

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

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

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

Note(s):

OMAA and OMAD are busy with projects to implement RNAV-1 STAR procedures – scheduled for implementation in April 2012.

OMDB and OMSJ are busy with projects to implement RNAV-1 SID/STAR procedures - scheduled for implementation Q2 2012).

See the attached spreadsheet for further detail.

APPENDIX H

<STATE> PBN APPROACH and TERMINAL IMPLEMENTATION STATUS

UPDATED: 29/02/2008

NO	ICAO REGION	ICAO DESIG	AIRPORT NAME[5]	COUNTRY	INTL (Y/N)[1]	RUNWAY	INST RWY Y/N	RESTRICTIONS	APPROACH LNAV/VNAV[2]	APPR EFF DATE[6]	RNAV/RNP SID[3]	SID EFF DATE[6]	RNAV/RNP STAR[4]	STAR EFF DATE[6]	COMMENTS
1	MID	OOMS	MUSCAT	OMAN	Y	08	Y		LNAV	May-07	RNAV-1	Dec-10	RNAV-1	Dec-10	
2	MID	OOMS	MUSCAT	OMAN	Y	26	Y		LNAV/VNAV	May-07	RNAV-1	Dec-10	RNAV	May-07	

ABOVE IS ONLY AN EXAMPLE. IT IS NOT MEANT TO SHOW THE ACTUAL IMPLEMENTATION AT THAT AIRPORT

Notes:

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

UPDATED 1/23/2012

<STATE> PBN APPROACH AND TERMINAL IMPLEMENTATION STATUS

NO	ICAO REGION	ICAO DESIG	AIRPORT NAME[5]	COUNTRY	INTL (Y/N)[1]	RUNWAY	INST RWY Y/N	RESTRICTIONS IF ANY	APPROACH LNAV/VNAV[2]	APPR EFF DATE[6]	RNAV/RNP SID[3]	SID EFF DATE[6]	RNAV/RNP STAR[4]	STAR EFF DATE[6]	COMMENTS
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
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48															
49															
50															

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

APPENDIX I

PBN IMPLEMENTATION PROGRESS REPORT

State: (Name of State) Date: (DD/MM/YY)

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

Status: (Nominated/ To be Nominated)
Focal Point: (Name, Designation, Mailing Address, Email, Phone, Fax)

State PBN Implementation Plan
Reference: ICAO Assembly Resolution 37/11: Performance-based navigation global goals

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

Status: (Adopted / To be adopted) by (name of a national body) and (Reviewed / To be reviewed) by ICAO *PBN/GNSS* TF

Approach Operations
Reference: ICAO Assembly Resolution A37/11

"*States complete a PBN implementation plan to achieve:* implementation of approach procedures with vertical guidance (APV) (Baro-VNAV and/or augmented GNSS), including LNAV only minima, for all instrument runway ends, either as the primary approach or as a back-up for precision approaches by 2016 with intermediate milestones as follows: 30 per cent by 2010, 70 per cent by 2014 and implementation of straight-in LNAV only procedures, as an exception, for instrument runways at aerodromes where there is no local altimeter setting available and where there are no aircraft suitably equipped for APV operations with a maximum certificated take-off mass of 5 700 kg or more.

Implementation Targets (# of RWY Ends)			**Completed** (# of RWY Ends)		**On Progress** (# of RWY Ends)	
Y2012	Y2014	Y2016	LNAV	LNAV/VNAV	LNAV	LNAV/VNAV
10			8			

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

Arrival and Departure Operations
Reference: ICAO Assembly Resolution A37/11

Implementation Targets (# of Int'l Airports)			**Completed** (# of Int'l Airports)		**On Progress** (# of Int'l Airports)	
Y2012	Y2014	Y2016	Arrival	Departure	Arrival	Departure

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

APPENDIX J

GLOBAL PBN TASK FORCE – GO TEAM HIGH LEVEL PROCESS

PHASE I – SELECTION OF CANDIDATE STATE.

Key actions and considerations:

a) Coordinate with dates and locations of Airspace Design and Operational Approval workshops;
b) Go Team visit should be arranged only after it has been agreed that representatives from the State will participate in at least one of the FAA / Eurocontrol workshops;
c) Authorities to formally request a Go Team visit and list priority work areas; and
d) Details of Go Team visit to be communicated with the State.

PHASE II – DATA COLLECTION.

The following data will be collated and assessed before any visit is agreed:

a) State PBN implementation plan (must have been developed);
b) Assessment of current expertise (high level Gap Analyses). This includes a list of existing capabilities;
c) Review of current PBN implementation;
d) Identification of Airline user requirements; and
e) Teleconference to be conducted with a representative from the State. Interview conducted jointly by IATA and ICAO.

PHASE III – GO-TEAM COORDINATION

The following information will be provided to the Go Team:

a) High level summary of the States PBN capabilities;
b) Priority work areas to be identified to the Go Team members;
c) Go Team members to agree on which States to visit;
d) Work proposal to be presented to each Go-Team organization for their agreement;
e) Hosting State to provide data as required;
f) Hosting State to appoint a Point of Contact; and
g) IATA and ICAO to co-ordinate Go-Team visit.

PHASE IV – GO-TEAM VISIT.

Tasks will be made accordingly the identified priority work areas:

a) Develop a Statement of Work;
b) Establish teams based on specific knowledge areas;
c) IATA and ICAO to conduct a pre-meeting with POC;
d) Hosting State to ensure broad stakeholder participation;
e) Hosting State to provide facilities to support the visit; and
f) Hosting State to invite as deemed appropriate, state representatives from the ICAO Regional PBN Task Force.

APPENDIX K

STATEMENT OF WORK (SOW)

ICAO/IATA GLOBAL PBN TASK FORCE

1. Overview

1.1. Introduction

This Statement of Work (SOW) outlines the tasks envisaged for ICAO/IATA Global Task Force (GPBNTF) Go-Team on support of Performance Based Navigation (PBN) implementation to XYZ State for PBN Implementation.

1.2. Scope/Objective

The overall objective of this SOW is for GPBN TF to provide high-level guidance and recommendations to enhance the PBN implementation efforts.

Utilizing best practices and available ICAO provisions, the GBPNTF will assist with the following process:

1) Assessment of the existing PBN operational approval process:
    - Analyze operational approval processes currently in place;
    - Process to recognize PBN operational approval from foreign operators;
    - Assess existing approval processes against Best Practices; and
    - Indentify potential gaps and develop a list of recommended actions.
2) Assessment of existing airspace concept aiming to accommodate projected traffic increase and further improve safety, capacity and efficiency.
    - Assess current fleet;
        - identify existing aircraft area navigation capability; and
        - Identify Airworthiness an Operational Approvals status
    - Assess current traffic characteristics;
        - Assess available movement statistics;
            - Arrivals;
            - Departures;
            - Over flights; and
            - Sectors.
        - Identify bottlenecks and constraints.
    - Review Navigation Aid, Communication and Surveillance infrastructure;
        - Existing Navigation Aid, Communication and Surveillance infrastructure; and
        - Identify potential gaps and develop a list of recommended actions.
    - Air Traffic Management:
        - Assess current ATC SOPs (Data to be provided in advance by State);
        - Analyze existing sectorization (Data to be provided in advance by State);
        - Assess current Airspace development processes;

- Assess the interfaces procedures between CTAs (Mainly Airports and ACC);
- Assess SIDs & STARs; and
- Identify potential gaps and develop a list of recommended actions.

- Establishment of optimized climb and descent profiles (CDOs):
  - Analyze current arrival and departure procedures (Data to be provided in advance by State);
  - Identify potential constraints;
  - Identify CDO design options; and
  - Develop a list of recommended actions.

3) Depending on the available time, Assessment of current approach procedures Implementation and design:
   - Assess current procedure development process;
   - Assess airports for traffic conflicts, terrain and obstacles to determine the requirement for RNP implementation and associated benefits; and
   - Identify potential gaps and develop a list of recommended actions.
4) Assessment of existing PBN training:
   - Assess current training;
     - Familiarization training for pilots and air traffic controllers;
     - Airspace planning; and
     - Procedure Design
   - Identify potential gaps and develop a list of recommended actions.

2. <u>ICAO/IATA GPBNTF Responsibilities.</u>

The GPBNTF Go-Team will be composed by a combination of ICAO and IATA representatives with selected subject matter experts from States and Industry partners.

After completion of the visit, the GPBN TF will provide a report containing all the identified process and a list of best practices and provisions to support implementation.

3. <u>States Civil Aviation Authority Responsibilities.</u>

- Provide facilities to support the visit;
- Ensure that all stakeholders involved on the PBN implementation team are represented during the visit;
- Provide access to current processes and available documentation;
- Invite as deemed appropriate, state representatives from the ICAO Regional PBN Task Force; and
- Invite National Airlines representatives.

4. <u>Follow-up activities.</u>

The GPBNTF Go-Team will provide 30 days after the completion of the visit a report with a list of recommendations to enhance States PBN Implementation Plan.

After States PBN Implementation Plan has been updated accordingly, it is expected that a PBN Implementation project plan for the next three years be developed, within six months, including but not limited to the following elements:

- Timeframe;
- Resources;
- Stakeholder Management Plan; and
- Risk Management Plan.

The Global PBN TF Go-Team will be available to analyze States PBN implementation project plan and advise accordingly.

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