



INTERNATIONAL CIVIL AVIATION ORGANIZATION

**REPORT OF THE SIXTH MEETING OF THE
MIDDLE EAST GNSS TASK FORCE**

(GNSS TF/6)

Cairo, 11 - 13 June 2007

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

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

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History of the Meeting

PART I - HISTORY OF THE MEETING

1. PLACE AND DURATION

1.1 The Sixth meeting of MIDANPIRG GNSS Task Force was held at the ICAO Middle East Regional Office, Cairo, 11 - 13 June 2007.

2. OPENING

2.1 Mr. Jihad Faqir, Deputy Regional Director, warmly welcomed all the participants to Cairo and to the GNSS TF/6 Meeting. He noted that the meeting is the first to be conducted after MIDANPIRG/10. He reminded the meeting about ICAO Global Air Navigation Plan which was approved by the Council on 30 November 2006 and advised the meeting on the 23 Global Plan Initiatives (GPIs) specially the GPIs related the MID Region project "Implementation of GNSS". Mr. Faqir also brought the attention of the meeting on the Performance Based Navigation (PBN) Concept and how PBN and GNSS are interrelated. Finally, he thanked Mr. Ali Al Adawi the Chairman of the Task Force for all his contributions and expressed the support of the ICAO MID Office Cairo to Oman during the Ghono hurricane tragic event and informed the meeting that a Chairman has to be elected due to the completion of the terms for Mr. Ali Al Adawi and wished the meeting every success in its deliberations.

3. ATTENDANCE

3.1 The meeting was attended by a total of 30 participants, which included experts from 7 States, 2 International Organization, and 2 Stakeholders. The list of participants is at **Attachment A**.

4. OFFICERS AND SECRETARIAT

4.1 Mr. R. A. Gulam, RO/CNS from the ICAO Middle East Regional Office acted as the Secretary of the meeting assisted by Mr. S. Mechobane RO/ATM.

5. LANGUAGE

5.1 The discussions were conducted in English. Documentation was issued in English.

6. AGENDA

6.1 The following Agenda was adopted:

Agenda item 1: Adoption of the Provisional Agenda and Election of Chairperson

Agenda item 2: Follow-up action on MIDANPIRG Conclusions and Decisions related to GNSS matters

Agenda item 3: GNSS Trials and Demonstrations in the MID Region

3.1 System engineering studies

3.2 Progress of demonstration in the MID Region

3.3 NAVISAT progress report

3.4 Update document improvement of Navigation Systems in the MID Region

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Agenda item 4: Recent developments and Researches

- 4.1 Global Air Navigation Plan
- 4.2 Other developments

Agenda item 5: GNSS and Navigation System Implementation in the MID Region

- 5.1 Review of GNSS and Navigation systems implementation in the MID Region
- 5.2 Strategy for GNSS implementation

Agenda item 6: Future Work Programme

Agenda item 7: Any other business

7. CONCLUSIONS AND DECISIONS – DEFINITION

7.1 The Sub-Group records its actions in the form of Draft Conclusions and Draft Decisions for further action and adoption by the MIDANPIRG as its Conclusions and Decisions with the following significance:

- a) **Conclusions** deal with matters which, in accordance with the Group's terms of reference, merit directly the attention of States on which further action will be initiated by ICAO in accordance with established procedures; and
- b) **Decisions** deal with matters of concern only to the MIDANPIRG and its contributory bodies.

7.2 In the same context, the Sub-Group can record its actions in the form of Conclusions and Decisions where no further action is required by the MIDANPIRG or already authorized by MIDANPIRG.

8. LIST OF DRAFT CONCLUSIONS AND DECISIONS

- DRAFT DECISION 6/1: MID CHECKLIST FOR GNSS BASED OPERATION
- DRAFT CONCLUSION 6/2: USE OF PROJECT MANAGEMENT METHODOLOGY FOR IMPLEMENTATION OF GNSS
- DRAFT CONCLUSION 6/3: PROLIFERATION OF OPERATIONAL APPROVAL REQUIREMENTS
- DRAFT CONCLUSION 6/4: GNSS COST ALLOCATION POLICY
- DRAFT CONCLUSION 6/5: REVISED STRATEGY FOR THE IMPLEMENTATION OF GNSS IN THE MID REGION
- DRAFT DECISION 6/6: REVISED TOR OF THE GNSS TASK FORCE

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Report on Agenda Item 1

PART II: REPORT ON AGENDA ITEMS

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

1.1 The Secretariat presented the meeting with the revised Provisional Agenda for the GNSS TF/6 meeting. The Provisional Agenda was adopted as shown in paragraph 6 of the history of the meeting.

1.2 In Accordance with MIDANPIRG procedural handbook 3rd edition April 2007 and Under part IV “Rules of Procedure for the conduct of meeting of the Contributory Bodies of MIDANPIRG”, Section 6 “Officers and Secretariat of Sub-Groups of the MIDANPIRG”, Para 6.2, the meeting elected Mr. Mohammed Hassan Al-Asfoor from Bahrain as Chairperson for the GNSS Task Force.

1.3 The meeting thanked Mr. Ali Al Adawi from Oman for his contributions and for chairing the previous Task Force meetings from second to the fifth meeting.

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Report on Agenda Item 2

REPORT ON AGENDA ITEM 2: FOLLOW-UP ACTION ON MIDANPIRG/10 CONCLUSIONS AND DECISIONS RELATED TO GNSS MATTER

2.1 Under this Agenda Item, the meeting was presented with the list of Conclusions adopted by MIDANPIRG/10, as at **Appendix 2A** to the Report on Agenda Item 2. The meeting noted that appropriate actions had been initiated in relation to most of the Conclusions. The follow-up of the different conclusions will be reviewed under the related Agenda Items.

2.2 In reviewing the MIDANPIRG Conclusions the meeting agreed that:

2.2.1 MIDANPIRG/10 Conclusion 10/8: *EGNOS Studies in the MID Region*. This will be raised under agenda 3.1 where, European Space Agency (ESA) and GNSS Supervisory Authority (GSA) had started the study which is composed of two main tasks.

2.2.2 MIDANPIRG/10 Conclusion 10/9: *Revised Strategy of the GNSS Implementation in the MID Region*. The strategy is to be reviewed taking into account Performance Based Navigation (PBN) concept and the outcome of the Worldwide Symposium on Performance of the Air Navigation System and ionosphere effects on GNSS along with users requirements and will be further discussed under Agenda Item 5.

2.2.3 MIDANPIRG/10 Conclusion 10/10: *Coordination of GNSS Activities* the meeting noted that State Letter was issued for the assignment of focal points and urged the participants to provide their inputs and work progress in order to update ICAO MID forum.

2.2.4 MIDANPIRG/10 Conclusion 10/11: *Revised Terms of Reference and Work Programme for the GNSS Task Force* will be addressed in details under Agenda Item 6.

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Appendix 2A to the Report on Agenda Item 2

FOLLOW-UP ACTION ON MIDANPIRG/10 CONCLUSIONS AND DECISIONS

CONCLUSIONS AND DECISIONS	FOLLOW-UP	REMARKS
<p>CONCLUSION 10/8: EGNOS STUDIES IN THE MID REGION</p> <p><i>That, European Space Agency (ESA) and GNSS Supervisory Authority (GSA) define the EGNOS architecture / feasibility of using additional Ranging Integrity Monitoring Stations (RIMS) for achieving APV and to support the regional cost benefits Analysis in the MID Region.</i></p>	Ongoing	
<p>CONCLUSION 10/9: REVISED STRATEGY FOR THE IMPLEMENTATION OF GNSS IN THE MID REGION</p> <p><i>That, the Revised Strategy for the Implementation of GNSS in the MID Region to be amended as shown at Appendix 5.1A to the report on Agenda Item 5.1</i></p>	Ongoing	
<p>CONCLUSION 10/10: COORDINATION OF GNSS ACTIVITIES</p> <p><i>That,</i></p> <ul style="list-style-type: none"> <i>a) all GNSS activities are to be coordinated in order to be inline with the MID Region GNSS Strategy;</i> <i>b) MID States;</i> <ul style="list-style-type: none"> <i>i) share experience gained during demos, test bed trials and implementation;</i> <i>ii) provide input to the GNSS Task Force;</i> <i>iii) are encouraged to participate in the GNSS Research and Development in a coordinated manner; and</i> <i>iv) designate GNSS focal points and send their contact details to the ICAO MID Regional Office prior to 31 May 2007.</i> 	<p>Action Taken</p> <p>Ongoing</p>	

CONCLUSIONS AND DECISIONS	FOLLOW-UP	REMARKS
<p>DECISION 10/11: REVISED TERMS OF REFERENCE AND WORK PROGRAMME FOR THE GNSS TASK FORCE</p> <p><i>That, the revised Terms of Reference and Work Programme of the GNSS Task Force is adopted as presented at Appendix 5.1B to the report on Agenda Item 5.1</i></p>	<p>Ongoing</p>	
<p>CONCLUSION 10/12: PARTICIPATION IN THE GNSS TASK FORCE MEETINGS</p> <p><i>That,</i></p> <ul style="list-style-type: none"> <i>a) MID States are urged to participate more actively in the work of the GNSS TF meeting; and</i> <i>b) ICAO MID Regional Office is to send invitation to Organizations that can support GNSS TF Work Programme.</i> 	<p>Ongoing</p>	

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Report on Agenda Item 3

REPORT ON AGENDA ITEM 3: GNSS TRIALS AND DEMONSTRATIONS IN THE MID REGION

3.1 Under this Agenda Item, European Space Agency (ESA) and European GNSS Supervisory Authority (GSA) provided the meeting with an updated status of the study launched by the Galileo Joint Undertaking (GJU) and now entrusted to the GSA with the technical assistance of the ESA for the extension of EGNOS Services over the Middle East. The meeting noted that the study will be running over one year, and it is composed of two main tasks which are the ACAC Regional GNSS (ARG) infrastructure implementation definition and the ARG service implementation definition.

3.2 The objective of task one (1) is to define the system infrastructure and the preferred implementation scenario integrating the ACAC SBAS Extension Module into the EGNOS Operational System V2.2 once implemented by Europe. This detailed study will be completed by December 2007 upon which the GNSS TF should be able to perform the cost benefit analysis.

3.3 The objective of task two (2) is to perform the preliminary activities needed for the implementation of the EGNOS services in the ACAC/Middle East Region. This task is broken down into three sub-parts:

- a) Definition of a preliminary operational and institutional framework.
- b) Definition of a GNSS application development, demonstration, training and awareness plan.
- c) Update of the ARG service implementation plan issued in May 2005 taking into account the results of the study.

3.4 Task 2 sets up an operational and institutional framework covering various aspects such as ownership, service provision, funding, standard/regulatory, liabilities and certification aspects. The main objectives of this on-going task are:

- a) to identify how the navigation infrastructure is operated in the ACAC/Middle East Region, and to identify the existing and future cooperation schemes; and
- b) to establish how the various European and Middle East actors may interact in order to provide the service to the end user.

3.5 The meeting was presented with a table that provides preliminary guidelines of a potential operational and institutional service framework to be further discussed and developed according to the type of architecture chosen (homogeneous or heterogeneous extension).

3.6 The meeting further noted that Task 2 of the study will define the work plan for civil aviation in order to smoothly introduce APV I in MID Region. **Appendix 3A** to the Report of Agenda Item 3 incorporates the key areas enablers for safety, cost-benefit analysis, legal aspects, operations, awareness and the architecture definition elements and their mappings.

3.7 The meeting was updated on SBAS APV demonstration to be performed in Egypt, Jordan and Turkey using EGNOS signal available on the region under the METIS (MEdiTerranean Introduction of GNSS Services) which is a project launched by GJU in the framework of the MEDA Euro-MED GNSS I Programme and now entrusted to GSA as of 1st January 2007.

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Report on Agenda Item 3

3.8 The demonstrations main objective is to perform flight trials using EGNOS signal available on the region, in order to evaluate and show the benefits of the operational scenarios in terminal area based upon EGNOS service, as compared to conventional scenarios. The Flight Trials will be carried out using a Cessna Citation II aircraft, owned by ENAV and operated by its Flight Inspection Department, the aircraft is adequately equipped with a dedicated Stand Alone Navigation Equipment (SANE) that will enable experimental SBAS procedures specifically designed for each selected airports. Such approaches will be carried out under VFR (Visual Flight Rules) conditions.

3.9 The meeting was further updated on the METIS activities (Activity A: GNSS Regional Plan, Activity B: Training and Awareness, Activity C: Demonstrations) and the importance of the cross feeding between each of these activities. MID States are urged to participate in these activities and gain the benefit and experience.

3.10 The meeting noted that the Mediterranean EGNOS Data Collection Network (MEDaCoN) to be performed in the frame of the METIS project in the MEDA Area, to collect data about the status of the EGNOS services in the area, and to provide a tool for demonstrations and application development. The main objective of MEDaCoN is to gather a continuous and real-time knowledge of the status of the EGNOS extension in the Mediterranean area.

3.11 The data collection station is composed of: a GPS/EGNOS antenna, with a good view of the sky and in a good multi path environment; a GPS/EGNOS receiver; a PC for data storage and communication management; an internet connection for remote monitoring, control and data collection. The data collection station will receive the GPS and EGNOS signals, store the data and perform the numerical analysis. These data will be remotely and periodically read from the data collection server, which will be deployed in Egypt. Data will be automatically sent and stored from the stations to the server, as done in the European data collection network.

3.12 Egypt provided the meeting with the Report of the NAVISAT WG/3 meeting held in Cairo on 10 June 2007 and an update on the NAVISAT project as at **Appendices 3B and 3C** respectively to the Report of Agenda Item 3. The meeting was of the view that Egypt should share the studies with all States and stressed on consulting with users to include their needs in the detailed study of NAVISAT which is planned to be completed by June 2008, furthermore States and stakeholders are encouraged to provide replies to the surveys initiated during the detailed study.

3.13 The meeting noted that CNS/ATM/IC SG3 (26-28 February 2007) asked the GNSS TF to work on the document (IMPROVEMENT OF NAVIGATION SYSTEMS IN THE MID REGION) to make it more efficient. A group of experts from the participant worked on this document and the content for the tables were updated and improvements were done. The improved version 2.1 (2007) along with updated table CNS-3 is at **Appendix 3D** to the Report on Agenda Item 3. Furthermore the meeting agreed that the secretariat will include the updates which will be received from the concerned states for all tables and charts in the document. The improvements on the document were mainly the following:

- addition of a map showing the implementation sites of navigation facilities.
- addition of a map of radar coverage.
- development of Iranian, Iraqi and Kuwait VSAT networks based on information received from States and IATA.
- summary changed according to updates in the Navigation mainly the Performance Based Navigation concept.
- updates concerning the EGNOS extension study presented by GSA/ESA.

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 Appendix 3A to the Report on Agenda Item 3

APPENDIX A – WORK PLAN FOR CIVIL AVIATION – LIST OF ENABLERS

Service enablers are identified in terms of content to be addressed, type of component and actors. The key areas cover safety, cost-benefit analysis, legal aspects, operations and awareness.

1.1 The Safety Area addresses following issues:

ENABLER	Component	Actor
Regulatory process for EGNOS deployment in ACAC/Middle East	Institutional	Regulator
LPV Application Safety Case	Institutional	Service Providers

1.2 The Cost-benefit Area addresses following issues:

ENABLER	Component	Actor
Business Model and Cost-Benefit Analysis	Institutional	Service Providers
Cost Allocation model for Aviation	Institutional	Service Providers
Rationalization Plan of ground Nav aids	Institutional	Service Providers

1.3 The Legal area encompasses:

ENABLER	Component	Actor
Legal framework with system performance guarantee and liability	Institutional	Regulator
Recording of GNSS Data	Institutional	Service Providers

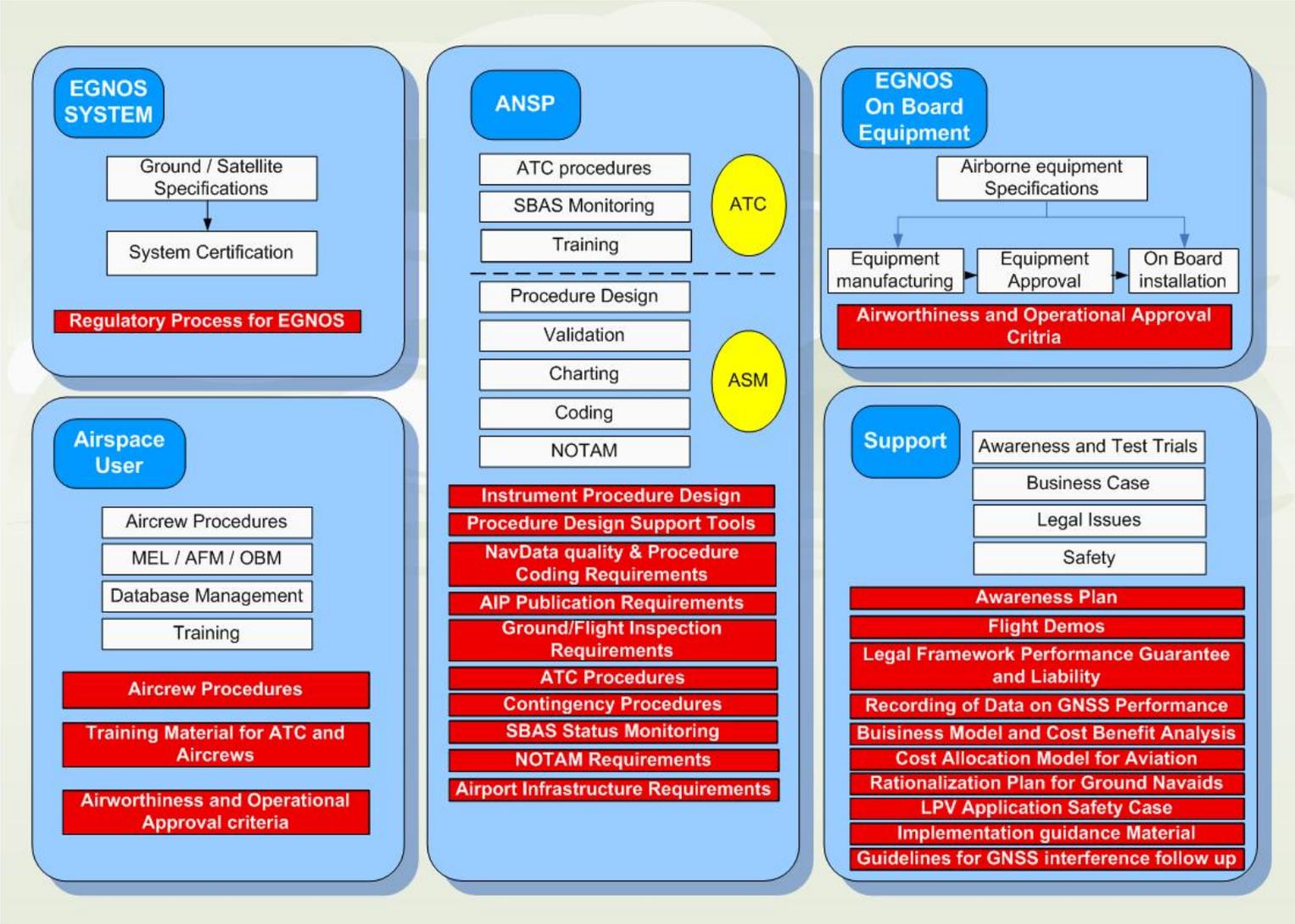
1.4 The Operation area addresses a large number of topics:

ENABLER	Component	Actor
Instrument Procedure Design	Procedural	Regulator Service Providers
Procedure Design Support Tools	System	Service Providers
Navigation Data Quality and Procedure Coding Requirements (ARINC 424)	System	Regulator
AIP Publication Requirements	Procedural	Regulator
Ground/flight Inspection Requirements	Procedural	Service Providers
ATC procedures	Procedural	Regulator Service Providers
ATC Contingency Procedures	Procedural	Regulator Service Providers
SBAS Status Monitoring Requirements	System	Regulator
NOTAM Requirements	System	Regulator
Aircrew Procedures	Procedural	Regulator
Airworthiness and Operational Approval Criteria	System Procedural	Regulator
Airport Infrastructure Requirements	System	Regulator
Guidelines for the follow up of GNSS interference	System Procedural	Service Providers

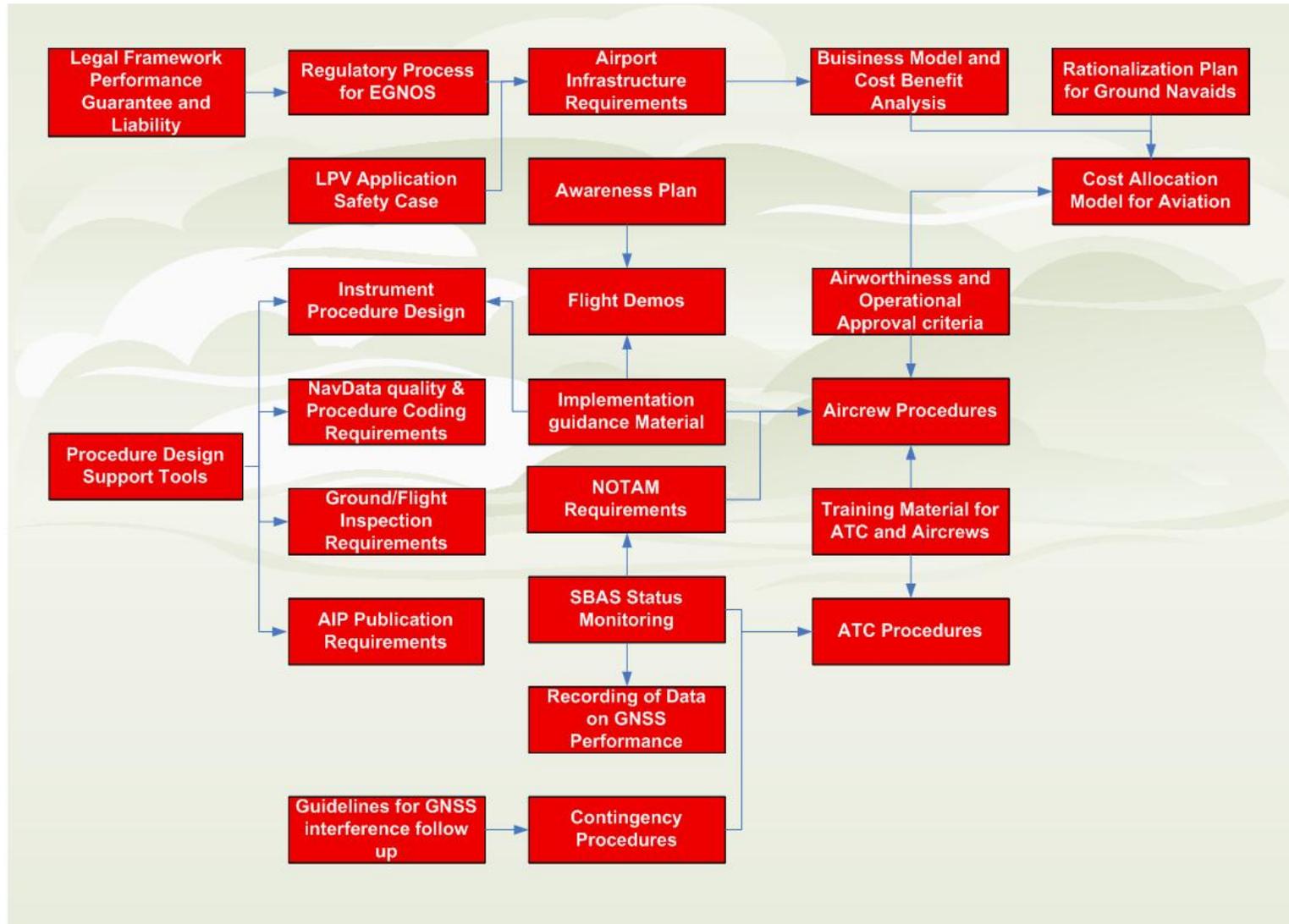
1.5 The Awareness area gathers all enablers related to the dissemination of guidance, materials for the implementation of APV procedures and demonstrations:

ENABLER	Component	Actor
Training material for ATC and Aircrews	Human aspects	Airspace Users Service Providers
Implementation Guidance Material	System	Service Providers
Awareness Plan	Institutional	Service providers
Flight Demonstrations	Institutional	Service providers Airspace users Manufacturers

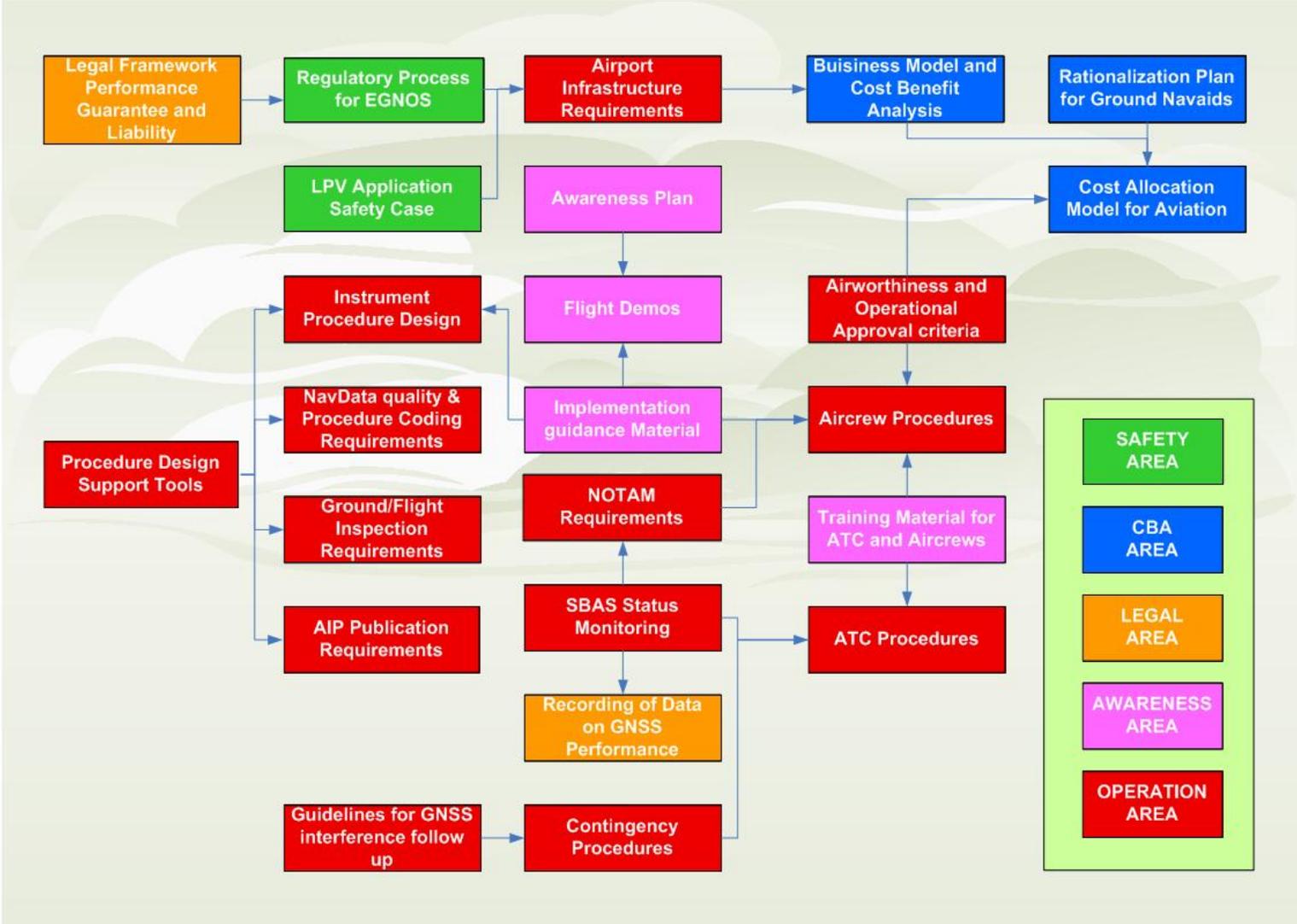
The following figures provide supporting materials:



ACTIONS, ACTORS AND ENABLERS



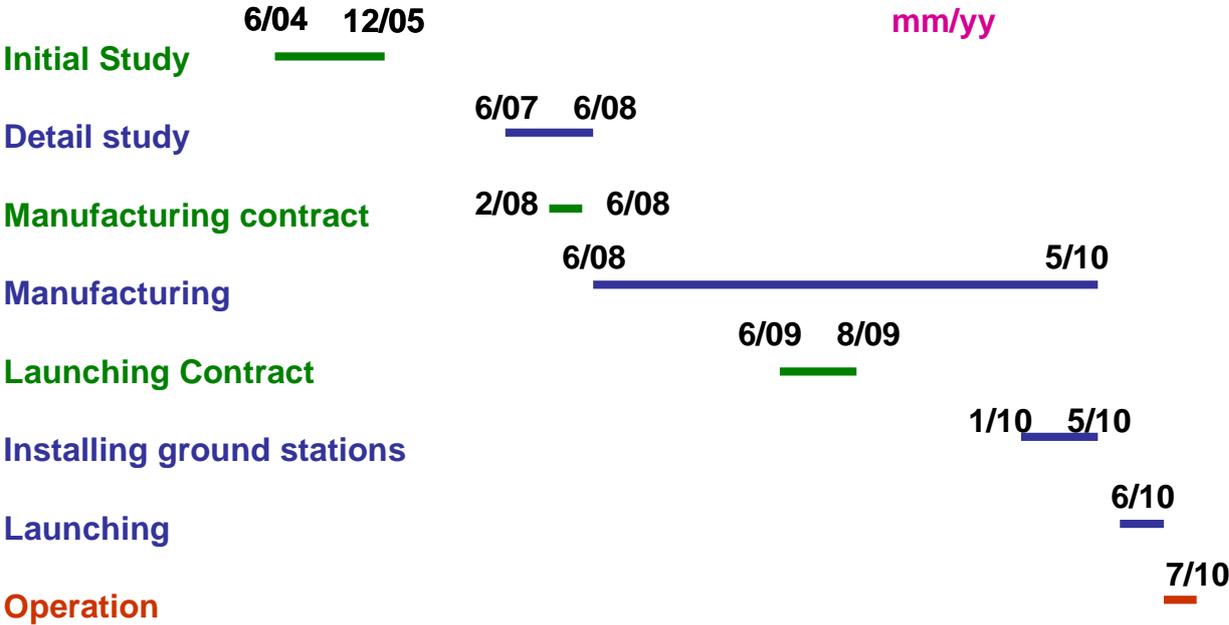
MAPPING OF ENABLERS



ENABLERS PER AREA

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Appendix 3B to the Report on Agenda Item 3

NAVISAT IMPLEMENTATION PLAN



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Appendix 3C to the Report on Agenda Item 3

Arab Republic of Egypt
Ministry of civil Aviation
Egyptian Holding Company for Air ports and Air Navigation
NAVISAT Middle East and Africa Company

MID NAVISAT working group – 3rd. meeting
Cairo, 10 June 2007

Minutes of Meeting

Part 1: History of the Meeting

- Place

MID NAVISAT working Group was held at the AVIT premises in Cairo, on 10th of June 2007.

- Opening

Eng. Ibrahiem Manna – Chairman of the Egyptian Holding Company for Air Ports and Air Navigation welcomed all the participants, as he stressed the importance of this meeting as a step towards NAVISAT project , in addition to addressing the members of the group with the progress achieved in the last years.

Eng. Maged El-masry – Chairman of "NAVISAT Middle East and Africa" company gave an overview of the NAVISAT feasibility Study as well as the implementation plan of the project., afterwards he presented the agenda item of the meeting.

- Attendance

The meeting was attended by a total of 17 participants from 3 states (Egypt – Bahrain – Saudi Arabia), in addition to ICAO and one European Company (FDC).

Ser.	Name	Organization/state
1	Mr. Mohammed Al Asfoor	Bahrain – CAA
2	Eng. Ibrahim Manaa	Egypt / EHCAAN
3	Mr. Maged el Masry	Egypt / AVIT
4	Mr. Hamdy El Taweel	Egypt / AVIT
5	Mr. Abo Al Magd Ahmad	Egypt / CAA
6	Dr. Kamel M. Mourad	Egypt / CAA
7	Mr. Mohammed Al Kady	Egypt / NANSC
8	Mr. Maged Abo Al Ela	Egypt / NANSC
9	Mr. Galal Mohamed Ibrahim	Egypt / NANSC

10	Eng. Adel Alaufi	Saudi Arabia
11	Mr. Modish A. Al Garni	of Saudi Arabia
12	Mr. Abdulshakur A. Qashqari	of Saudi Arabia
13	Mr. Khalid H. Al Matrafi	of Saudi Arabia
14	Mr. Jehad Faqir	ICAO MID office
15	Mr. Raza Gulam	ICAO MID office
16	Mr. Bruno Roussel	FDC
17	Ms Angeline Billot	FDC

- Language

The discussions were conducted in English and the documentation was issued in English as well.

- Agenda

The Agenda of the meeting included the following items:

- a) NAVISAT Project Status & Implementation Plan
- b) NAVISAT ITU Filing and Frequency coordination
- c) EGNOS & Galileo Overview
- d) NAVISAT study for EGNOS extension in MID & AFI regions

Part 2: Summary of the meeting

a) NAVISAT Project Status & Implementation Plan

In this agenda item the following points were presented

- NAVISAT high level Objectives
- Offered Services by the NAVISAT
 - Fixed aeronautical communications
 - Mobile aeronautical communications
 - Augmented navigation signal broadcast.
- Value Proposition of the NAVISAT in all areas of CNS/ATM
- Implementation Roadmap
- NAVISAT Project Status
 - The establishment of the "NAVISAT Middle East and Africa" company and its role in the current phase of the project was discussed.
- Implementation Plan
 - The NAVISAT system will be in operation at the second half of 2010
- Conclusion

ICAO representatives highlighted the benefits of SBAS to General Aviation (GA) and that big airlines have already the capability on board to achieve APV without reliance on SBAS signal .They suggested that NAVISAT launch a survey to determine the number of GA aircraft that would benefit from the SBAS augmentation. They also stressed on the importance of consulting with users (not States) to include their needs into detailed study.

b) NAVISAT ITU Filing and Frequency coordination

- NAVISAT system overview, the frequency bands and the orbital locations
- L-band aeronautical mobile communication mission description and the global beam with the different spots to cover AFI&MID regions
- The AMS(R)S prioritization for the safety issue and the support needed from ICAO in that regard and the recommendation needed from Telecommunications Regularity authorities to support this issue in the next WRC -07 to be included in the agenda of WRC -11
- Frequency coordination process and the Operation Review meeting (ORM) for the region R1&R3 in the frequency band 1545-1555 MHz&1646.5-1656.5MHz
- NAVISAT ITU fillings and the date OF API&CRC and the validity of these filling until June 2010

c) EGNOS & Galileo Overview

It has been presented on behalf of the GSA, on general overview of EGNOS & Galileo. It explained the core mission of the European GNSS Supervisory Authority including its role and responsibilities. It presented the European GNSS Implementation Plan, and the Phasing of the EGNOS & Galileo Programme. Many interested subjects have been given on the International Activities, EGNOS Extensions status and the generic Galileo Research and Development objectives. Also, it presented the foundations of the future use of GNSS through 6th and 7th Framework Program.

d) NAVISAT study for EGNOS extension in MID & AFI regions

On the presentation of the NAVISAT study for EGNOS extension in MID & AFI regions. It explained the NAVISAT missions, with more focusing on the navigational signal broadcasting. Also, it presented the elements of SBAS navigation system architecture (RIMS – CPF – NLES – Users – CCF), and the EGNOS deployment description including the EGNOS Final architecture in the following areas (ECAC – MEDA – MID (ACAC) – AFI), with its potential location and numbers of the RIMS stations.

The presentation was focusing on the NAVISAT study of deploying 9 RIMS on MID and its relations with the ECAC and MEDA RIMS.

e) Conclusion

The meeting had the following conclusion.

"The meeting supports the NAVISAT as a part of the CNS/ATM infrastructure in the Middle East & African regions to offer the aeronautical communication and navigation services according to the ICAO recommendations."

GNSS TF/6
Appendix 3D to the Report on Agenda Item 3



**Improvement of Navigation Systems in the
MID Region**

Document Reference:	MIDANPIRG GNSS – TF/AG
Author:	GNSS TF Action Group
Revision Number:	Version 2.1 / 2007
Date:	June 2007

Introduction

The objective of this document is to perform a review of the existing navigation systems and communication infrastructure, as well as their related development and implementation plan.

The analysis of the existing navigation infrastructure will show minimum constraints for the operational requirements and will contribute to the benefits provided by the satellite-based navigation regarding the cost benefit analysis.

The analysis of the existing communication infrastructure will allow defining what may be re-used for GNSS augmentation and what needs to be implemented. This will influence the system architecture and the cost benefit analysis.

The MID Region Air Navigation Systems Development and Implementation Plan might be used for the transition from the traditional navigation to GNSS-based navigation.

The Middle East Service implementation plan consists of three main activities, in order to achieve APV performance in the Middle East region:

- infrastructure scenarios definition and implementation plan;
- definition and establishment of an institutional framework;
- application development, demonstration, training and awareness

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Chapter 3	Infrastructure Scenarios Definition and Implementation Plan
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Chapter 5	Application Development, Demonstration, Training and Awareness
Chapter 6	Summary

CHAPTER 1

Evaluation of the existing facilities

1.1 Review of Flight Information Regions (FIRs)

1.1.1 The Middle East Region is organized into 14 Flight Information Regions that support the Air routes areas.

1.2 Review of existing navigation aids

1.2.1 The present radio-navigation aids infrastructure is composed of locators, NDBs, VOR/DME and ILS. Most of these requirements comply with the Middle East Air navigation Plan and the others are implemented by States for their own national needs.

1.2.2 The table CNS 3 of the MID FASID is at **Attachment A** which shows the detailed distribution of the approach radio navigation aids implemented in the Region.

En-route navigation Aids

1.2.3 The Middle East Region is well covered by en-route navigation aids, however improvement is expected in the northeast part where it is noted a low density of aids.

- 183 VOR are operational and 74 have not yet been implemented
- 188 DME are operational, 3 unserviceable and 72 have not yet been implemented
- 27 NDBs and 12 Locators are operational

Note: Radar Coverage of the MID Region is at **Attachment B**.

Precision Approach Aids

1.2.4 All countries have implemented at least one CAT I precision approach located at their international airports. Some of the States have at their disposal CAT II and CAT III precision approach equipments at their main airports.

1.2.5 There are currently 75 ILS installed out of 94 required for the Region. Out of these 75 ILS, 60 are serviceable. This means that 64 per cent of the requirement for precision approach capability is fulfilled.

1.2.6 In the meantime, 73 per cent of DME and 72 per cent of VOR are implemented.

Non Precision Approach Aids

1.2.7 The other airports of the Middle East Region have either instrument approach runways, allowing NPA approaches with the instruments, or non-instrument approach runways.

1.2.8 Out of the 207 runways of the 144 airports included in the table CNS 3, there are 94 instrument approach runways and 113 non-instrument runways. Most instrument approach runways are provided with a VOR/DME.

1.2.9 In consequence, NPA approaches are currently possible on 54 per cent of the runways.

Note: Implementation of Radio Navigation Facilities is at **Attachment C**.

1.3 Review of existing communication Infrastructures

1.3.1 The communication means provided by States, at national or international level, include the following services:

- The Aeronautical Mobile Service (AMS) which includes all communications with aircraft for air traffic control and airspace management. These services are mainly achieved by vocal communications either on VHF (continental area) or HF (remote and oceanic area).
Most of the continental area of the Middle East Region is covered by extended and improved VHF communications
- The Aeronautical Fixed Service (AFS) that includes all point-to-point communications for Air Traffic Control, Meteorology, Search and Rescue. These services are provided by vocal and data communications.

1.3.2 The major elements of the AFS are the AFTN (Aeronautical Fixed telecommunications Network) for data communications and the ATS/DS network (Air traffic Services Direct Speech) for voice communications. It is worth noting that many States have improved their AFTN systems by using reliable digital high-speed links.

Domestic satellite networks

1.3.3 Five VSAT domestic networks are operating in the Middle East Region and are aimed at extending VHF communications, improving AFTN and ATS/DS communications with secondary airports. The results gained from this experience have led the MID States to agree for the study of the so called the MID VSAT network intended to cover all Middle East Region and, at the same time, to ensure connectivity with the adjacent Regions (EUR, AFI and ASIA-PAC). Another domestic satellite network is operating in Sudan.

Egyptian satellite network

1.3.4 The domestic network has a star configuration and is composed of one hub station installed in Cairo and twelve VSAT remote stations spread over the Cairo FIR. These remote stations support the VHF extended coverage, AFTN, ATS/DS, Radar coverage, AIS and the maintenance communications.

1.3.5 The network is now congested and does not allow anymore any integration with other networks. The Egyptian Authorities are planning a new domestic VSAT network to solve this inadequacy.

Yemenite satellite network

1.3.6 The domestic network is composed of one hub station and six VSAT remote stations spread over the Sana'a FIR. These remote stations can support the VHF extended coverage, AFTN, ATS/DS, Radar coverage and the maintenance communications. The configuration of the network allows its extension and integration to other networks.

Sudanese satellite network

1.3.7 The Aeronautical Telecommunication Service is in the process of full restructuring with the implementation of nine VHF remote stations spread in the Khartoum FIR. These remote stations which are supported by a domestic VSAT network, are still under tests. The main objective of the network is to provide aeronautical fixed and aeronautical mobile services in Khartoum FIR.

1.3.8 Moreover, the current provisions allow the Ministry of Aviation to implement and to operate a VSAT network for safety purposes, as an usual telecommunications service provider.

Afghanistan satellite network

1.3.9 A VSAT Station will be installed between Afghanistan and Iran. Further updates to be provided by Afghanistan.

Iranian satellite network

1.3.10 A VSAT Station will be installed between Iran and Afghanistan that was supplied by IATA. Iran to provide updates on domestic VSAT network and on the operation of the VSAT network with Afghanistan.

Kuwait satellite network

1.3.11 A VSAT is installed between Kuwait and Iraq. The maintenance of the Station is still under the Iraq authorities, more information is to be provided by Kuwait and Iraq.

CHAPTER 2

Development Plans

2.1 Introduction

2.1.1 The Middle East Regional Navigation Plan provides the principles and the direction that shall be consistently followed by all States, services providers and users within the Region.

2.2 Directions

Communications

2.2.1 According to the global recommendations set by ICAO, the direction to follow is the evolution towards satellite communications means that will support both voice and data transmissions (including GNSS augmentation data transmissions).

2.2.2 During the long transition period, extended and VHF data communications means should be developed and deployed to allow a broader coverage and reliable data transmissions in the remote areas.

Navigation

2.2.3 The VOR equipment will remain the main navigation means on traditional ATS routes. The traffic shall be passed gradually from ATS routes to RNAV ones, and the airspace shall be consequently restructured as per the Performance Based Navigation (PBN) which brings together, under one umbrella, a number of diverse RNAV and RNP applications encompassing all regimes of flight, from enroute to approach.

2.2.4 The ILS equipment will be maintained at least until 2010, and any equipment withdrawal will be announced to the users several years in advance.

2.2.5 En route as well as approaches will be gradually supported by GNSS whose operational performances will be extensively demonstrated during various experimental campaigns.

Surveillance

2.2.6 The implementation and usage of SSRs and ADS should be broadened, the MID region developed the Strategy for the implementation of ADS-B which is evolutionary and consistent with the Global Air Navigation Plan taking into consideration associated MID Region priorities.

2.3 Near term development plans

Communications

2.3.1 The development plans for the communication infrastructures are part of the overall improvement plan for air traffic control and airspace management with future system technologies.

2.3.2 The main example of network project is the MID VSAT project. MIDANPIRG/8 meeting approved the feasibility study of the MID VSAT project that should be refined by updated information received from States.

MID VSAT Network

2.3.3 The planned MID VSAT network will cover all MID Region and ensure connectivity with the neighboring Regions (AFI, EUR and ASIA-PAC).

2.3.4 The F type stations could be used by States on the main airports, with the respective transmission rates of 64, 128 and 256 Kbps. Voice and data are transmitted over Frame Relay, where:

- the VHF and ATS/DS voice communications use 8 Kbps channel
- the AFTN data applications use 2.4 Kbps channel
- the radar and supervision data applications use 9.6 Kbps channel

2.3.5 Coordination has been made with other similar projects, especially with NAFISAT project (AFI Region) to operate TDMA technique over INTELSAT 1002.

Navigation

2.3.6 The existing nav aids infrastructure will continue to be used for a certain time in the future, as no alternative for its replacement is available yet. Improvement to the existing infrastructure is sought through replacement of very old facilities, better maintenance and regular flight checking.

2.3.7 Decommissioning of the VOR/DME and ILS equipments is not contemplated before 2015. Any equipment withdraw will be announced to its potential users several years in advance.

NAVISAT network

2.3.8 This network is based on a dual mission concept, namely Communication and Navigation. It is a regional project that will help in overriding the existing problems that impede the implementation of CNS/ATM system in the Region.

2.3.9 The Communication component includes mainly all safety-related communications for the purpose of ATM between aircraft and Air Traffic Control Centers. The portion of the ground-ground voice and data exchange between operational centers will supplement the MID VSAT network.

2.3.10 The Navigation component will support and complement the Space Based Augmentation Systems (SBAS) by using dedicated navigation transponders. The full utilization of the system can be achieved if the ground network is implemented over the Region through the extension of EGNOS or WAAS.

CHAPTER 3

Infrastructure scenarios definition and implementation plan

3.1 Already, ESA has performed preliminary analysis on candidate configurations of Reference Stations (RIMS) which would be required to cover the Middle East region through an extension of EGNOS. Two main scenarios have been identified:

- a centralized; and
- a decentralized approach

3.2 Both would imply the installation of an additional 7 to 9 RIMS. The Middle East RIMS data would then be transmitted in real time to the EGNOS facilities in Europe through suitable system interfaces. This data would in turn be integrated with all other EGNOS RIMS data, processed in real time and broadcast to all European and Middle East users through EGNOS GEO satellites.

3.3 The centralized approach is developed according to an architectural and operational model based on bilateral interfaces between the Europe system and the Middle East RIMS.

3.4 The decentralized approach is a model whereby a Regional Centre (RC) would act as a system hub for the Middle East region, in order to interface the European system. The major difference here is that the RC would be allocated a number of specific functionalities with respect to the overall monitoring, operations and validation.

3.5 The Middle East region falls outside the boundary of the European processing area and so would require a regional extension. This implies some very specific technical activities, such as extending the integrity of the satellites outside the nominal area and adding additional monitoring for the ionosphere.

Note: Different Satellite Coverage including Intelsat 904 in the MID Region is at **Attachment D**.

3.6 The timeline is as follows:

- a definition phase (step 0), currently in progress;
- the deployment of pre-operational RIMS, to be completed for the entire Middle East territories (step 1) by early 2007; and
- APV operational capability implementation (step 2), to be completed by the end of 2007.

3.7 A longer term scenario, to meet the ultimate goal of CAT-1 service capability for the entire Middle East region. A number of technical concepts are currently under detailed definition, which also capitalize on the EGNOS implementation, in order to provide integrity to Galileo and evolve towards the provision of both GPS and Galileo augmentation services.

CHAPTER 4

Definition and establishment of an institutional framework

4.1 An institutional framework must be developed and agreed upon between European entities and entities in the Middle East region. It must address matters regarding system operations, service provision, funding, ownership and other legal aspects (e.g. liabilities, certification).

4.2 An initial concept of an operational and institutional service framework should be developed, in co-ordination with all concerned Middle East and European partners. It is proposed that European and Middle East representatives work jointly to assess the different options to establish this framework during a definition phase lasting until end of 2007.

CHAPTER 5

Application development, demonstration, training and awareness

5.1 It is necessary to extend the MEDA demonstration, training and awareness activities over the full Middle East region, which should continue throughout the service implementation activity in order to stimulate all concerned actors.

5.2 Pre-operational and operational services should be used for additional demonstration activities addressing all application domains, including civil aviation. Application development based on GNSS, for the different user domains, should also be introduced. In aviation, this would include:

- preparation of the aeronautical environment for aviation certification (e.g., safety analysis, ATC interface, flight inspection,..);
- preparation of the operational APV procedures;
- on board receivers installation; and
- demonstration of the operational benefits.

5.3 This kind of activity will be initiated for the MEDA region in the fourth quarter of 2005 and could be extended to the rest of the Middle East region as additional budget becomes available.

CHAPTER 6

Summary

6.1 The existing satellite navigation systems can be used as supplemental means for en-route navigation, terminal and NPA for some airports.

6.2 In term of fixed communications, many Centers are already operating reliable digital high-speed circuits which are leased with PTT.

6.3 However, the Middle East Region must put all efforts in the implementation of a dedicated MID VSAT network which will be used for ground– ground data and voice communications and also serves as an important step in planning for transition to CNS/ATM systems.

6.4 The completion of the Middle East Regional GNSS service implementation plan is based on an on-going co-operation between Middle East region and international actors.

6.5 This document provides a general background on the Middle East Regional GNSS service implementation plan. Building on previous work, a number of activities have been identified for the short to medium term, including:

- the development of an infrastructure implementation plan
- the definition of an operational and institutional service framework
- application development, demonstration, training and awareness activities.

6.6 In coordination with the relevant MEDA and Middle East partners, ESA will proceed with the preparation of a detailed infrastructure implementation plan while the GSA will support all activities related to service implementation, i.e. the latter two. Both of these shall feed into ongoing actions by the ICAO partners as a study is running and will be by over one year, and it is composed of two main tasks which are the ACAC Regional GNSS (ARG) infrastructure implementation definition and the ARG service implementation definitions .

6.7 It has been assessed through this preliminary analysis that with 7 extra RIMS (Scenario 1) on top of the EGNOS system, it is possible to approve an APV service at 99% availability in a majority of the Middle East region, including the Red Sea, South Caspian Sea and The Persian Gulf.

6.8 It has been assessed through this preliminary analysis that with 9 extra RIMS (Scenario 2) on top of the EGNOS system, it is possible to provide an APV service at 99% availability in the whole Middle East region, including most of the Red Sea and the Persian Gulf.

6.9 The APV service introduction roadmap in MID region for EGNOS and Galileo is as follows:

- Permanent EGNOS test Bed 2006
- Pre-operational system 2007
- Operational system 2008
- Combined EGNOS & Galileo for CAT 1 service 2012

ATTACHMENT A

MID FASID – CNS-3

4-CNS 3-1

TABLE CNS 3 – RADIO NAVIGATION AIDS (MID REGION)

TABLA CNS 3 – AYUDAS PARA LA RADIONAVEGACIÓN (REGIÓN MID)

EXPLANATION OF THE TABLE

Column

- 1 Name of the country, city and aerodrome and, for en-route aids, the location of the installation.
- 2 The designator number and runway type:

NINST - non-instrument runway
NPA — non-precision approach
PA-1 — precision approach runway, Category I
PA-2 — precision approach runway, Category II
PA-3 — precision approach runway, Category III
- 3 The functions carried out by the aids appear in columns 4 to 8 and 10 to 12:

A/L — Approach and landing
T — Terminal
E — En-route
- 4 ILS — Instrument landing system. Roman numeral I and II indicate the acting category of the ILS, I, II or III. (I) indicates that the facility is implemented

The letter “D” indicates a DME requirement to serve as a substitute for a marker beacon component of an ILS

Note.— Indication of category refers to the standard of facility performance to be achieved and maintained in accordance with pertinent specifications in ICAO Annex 10 and not to the specifications of the ILS equipment itself, which are not necessarily the same.

An asterisk () indicates that the ILS requires a Category II signal quality, but without reliability and availability provided by redundant equipment and automatic changeover.*
- 5 Radio beacon localizer, be it associated with an ILS or to be used as an approach aid to an aerodrome.
- 6 Radiotelemetrical equipment. When an “X” appears in column 6 in line with the VOR in column 7, this indicates the need that the DME be installed at a common site with the VOR.
- 7 VOR VHF omnidirectional radio range.
- 8 NDB – Non Directional Beacon
- 9 The distance and altitude to which signal protection of the VOR or VOR/DME are required, indicated in nautical miles (NM) and in thousands of feet.
- 10, 11 GNSS-global navigation satellite system (includes GBAS and SBAS).

GBAS (ground-based augmentation system) implementation planned to be used in precision approach and landing CATI, CATII, CAT III.

SBAS (Satellite-based augmentation system) implementation planned to be used for route navigation, for terminal, for non precision approach and landing. An “X” indicates service availability,; exact location of installation will be determined.

Note.- GPS receiver is under standard rules and ABAS (aircraft-based augmentation system)

12

Remarks

Note.- Columns 5 to 12 use the following symbols:

X- Required but not implemented

XI- Required and implemented

EXPLICATION DU TABLEAU

(To be completed by HQ)

TABLE CNS 3

Station	RWY Type	Function	ILS	L	DME	VOR	NDB	Coverage	GNSS		REMARKS OBSERVACIONES
									GBAS	SBAS	
1	2	3	4	5	6	7	8	9	10	11	12
AFGHANISTAN											
GHAZNI		E				X		200/45			
KABUL/Kabul	11 NPA 29 PA 1	A/L A/L T E	I*	X	X X X X	X X X X		300/45			
KANDAHAR/Kandahar	05 NPA 23 NPA	A/L A/L T E		x		X X X X		300/45 300/45			
BAHRAIN											
BAHRAIN/Bahrain Intl	12R NPA 30L NPA				X I X I	X I X I					
	12L PA2 30R PA2	A/L A/L	II (I) II (I)	X	XI XI	XI XI		300/45			
EGYPT											
EL-ARISH/ El-Arish Int'l	16 NPA 34 NPA	A/L			XI	XI		150/45			
ASYUT/ Asyut Int'l	13 NPA 31 NPA	A/L E			XI	XI		200/45			
ALEXANDRIA/ Alexandria Intl	04 PA 1 22 NPA	A/L E	I*		XI XI	XI XI	XI	100/45 150/45			
ALEXANDRIA/ Borg El Arab Int'l	18 NPA 36 NPA 32 PA 1 14 NPA	A/L T	I* (I) D	X	XI	XI	XI	100/45			

Station	RWY Type	Function	ILS	L	DME	VOR	NDB	Coverage	GNSS		REMARKS OBSERVACIONES
									GBAS	SBAS	
1	2	3	4	5	6	7	8	9	10	11	12
ASWAN/ Aswan Intl	17 PA1 35 PA1	A/L T E	II	X	XI XI	XI XI		150/45			
TABA/ Taba Int'l	04 NPA 22 NPA	A/L T			X	XI	XI	150/45 100/45			
IRAN, ISLAMIC REPUBLIC OF											
ABADAN	32L PA 1	A/L E	I* (I)		XI	XI		200/45			
AHWAZ	30 PA 1	A/L E	I* (I)		XI	XI		300/45			
ARDABIL	34 33 PA 1	A/L E	I* (I)		XI	XI		200/45			
ASALOYEH	30 PA 1	A/L E	I*		XI	XI		300/45			
BANDAR ABBAS/Intl	21L PA1	A/L E	I* (I)		XI	XI		200/45			
BANDAR LENGEH	NPA	A/L E			XI	XI		200/45			
BANDAR MAHSHAHR / MAHSHAHR	NPA	A/L E			XI	XI		300/45			
BIRJAND		E			XI	XI		300/50			
BOJNORD	NINST	E			XI	XI		150/45			
BUSHEHR	NPA 30 PA2	A/L E	I*		XI	XI		300/45			
CHAH BAHAR / KONARAK	NPA	A/L E			XI	XI		200/45			
DARBAND		E			XI	XI		300/45			
DEH-NAMAK		E			XI	XI		300/45			

Station	RWY Type	Function	ILS	L	DME	VOR	NDB	Coverage	GNSS		REMARKS OBSERVACIONES
									GBAS	SBAS	
1	2	3	4	5	6	7	8	9	10	11	12
ESFAHAN / Shahid Beheshti Intl	26R PA 1	A/L E	I*(I)		XI	XI		300/45			
HAMADAN	NPA	A/L E			XI	XI		200/45			
ILAM	NPA	A/L E			XI	XI		300/45			
IRAN-SHAHR	NPA	A/L E			X	X		300/45			
JAM/TOHID	NPA	A/L			XI	XI		300/45			
KARAJ / PAYAM	NPA	A/L			XI	XI		200/45			
KERMAN	NPA 34 PA1	A/L E	I*(I)		XI	XI		200/45			
KERMANSHAH / Shahid Ashrafi Esfahani	29 PA1	A/L E	I* (I)		XI	XI		300/45			
KHARK ISLAND /Khark	NPA	A/L E			XI	XI		300/45			
KHORAM ABAD	29 PA 1	A/L E	I*		XI	XI		200/45			
KISH ISLAND	NPA	A/L E			XI	XI		200/45			
MALAYER		E			XI	XI		300/45			
MASHHAD / Shahid Hashemi Nejad Intl	31R PA1	A/L E	I* (I)		XI	XI		300/45			
NOSHAHR	NPA	A/L E			X	X		200/45			
OMIDIYEH	NPA	A/L			XI	XI		200/45			
RASHT	27 PA 1	A/L E	I* (I)		XI	XI		300/45			
SABZEVAR	NPA	A/L E			XI	XI		300/45			

Station	RWY Type	Function	ILS	L	DME	VOR	NDB	Coverage	GNSS		REMARKS OBSERVACIONES
									GBAS	SBAS	
1	2	3	4	5	6	7	8	9	10	11	12
ANARAK		E			XI	XI		300/45			
SANANDAJ	NPA	A/L E			XI	XI		200/45			
SARI/Dashte-Naz	NPA	A/L E			XI	XI		300/45			
SAVEH		E			XI	X		300/45			
SHIRAZ / Shahid Dastghaib Intl	29L PA 1	A/L E	I* (I)		XI	XI		300/45	X		
SIRJAN	NPA	A/L E			XI	XI		200/45			
TABRIZ Intl	30R PA 1	A/L E	I* (I)		XI	XI		200/45			
TEHRAN/Imam Khomains Intl	29R PA 2	A/L	II* (I)		XI	XI		300/45			
TEHRAN/Mehrabad Intl	29L PA 1	A/L E	I* (I)	XI	XI	XI		300/45	X		
UROMIYEH	NPA 21 PA1	A/L E	I* (I)		XI	XI		200/45			
YAZD / Shahid Sadooghi	NPA	A/L E			XI	XI		300/45			
ZAHEDAN	NPA 35 PA1	A/L E	I* (I)		XI	XI		200/45			
ZANJAN	NPA	E			XI	XI	XI	200/45			
IRAQ											
AIN ZALAH		E			X	X		100/50			

Station	RWY Type	Function	ILS	L	DME	VOR	NDB	Coverage	GNSS		REMARKS OBSERVACIONES
									GBAS	SBAS	
1	2	3	4	5	6	7	8	9	10	11	12
BAGHDAD/Saddam Baghdad Int'l	15R PA 2 -NINST 33L PA 2 -NINST 15L PA 2 -NINST 33R PA 2 -NINST	A/L A/L A/L A/L E	II (I) II (I) II (I) II (I)	X X X X	X X X X X	X X X X		200/45			
BASRAH/Intl	14 PA 2 32 PA 2	A/L A/L E	II (I) II (I)	X X	X X	X X		300/45			
HASHIMIYA		E			X	X		200/45			
(HADITHA)		E			X	X		100/50			
MANDALY		E									
MOSUL	PA 2 I	A/L		X	X	X					
SAMARA		E			X	X		200/45			
HAWIJA		E			X	X		100/50			
SHATRA		E			X	X		100/50			
ISRAEL											
ELAT/Elat	03 NPA 21 NINST	A/L E			XI XI X	XI XI X		300/45			
HAIFA/Haifa	16 NINST 34 NINST										
JERUSALEM/Atarot	12 NINST 30 PA 1	A/L A/L	I*								
METZADA		E			X	X		150/45			

Station	RWY Type	Function	ILS	L	DME	VOR	NDB	Coverage	GNSS		REMARKS OBSERVACIONES
									GBAS	SBAS	
1	2	3	4	5	6	7	8	9	10	11	12
NATANIA		E			X	X		150/45			
OVDA/Intl	20R NPA	A/L	I		X	X		150/50			
	02L NINST										
TEL AVIV/Ben Gurion	03 NPA				XI	XI					
	21 NINST	A/L			XI	XI					
	08 NINST	A/L	I* (I)	X	XI						
	26 PA 1	A/L	I* (I)	X	XI	XI					
	12 PA 1	E			XI	XI					
	30 NPA	E			XI	XI					
						X		150/50			
						X		200/50			
TEL AVIV/Sde-Dov	03 NINST	A/L									
	21 NINST	A/L									
ZOFAR		E			X	X		150/45			
JORDAN											
AMMAN/MARKA	24 PA 1	A/L	I (I)	XI	XI	XI	✘				
		E			X	XI		150/50	X		
AMMAN/Queen Alia	08R NPA	A/L			XI	XI					
	26L PA 2 1	A/L	I*	XI	XI	XI	✘			X	
	08L NPA 1	A/L			XI	XI	✘				
	26R NPA 1	A/L			XI	XI					
AQABA/Aqaba king Hussein	02 01 PA 1	A/L	I*	XI	XI	XI	✘	200/50			
		E			X	X		200/50	X		
METSA		E			X	X		150/50			
QATRANEH		E			X	X		100/50			

Station	RWY Type	Function	ILS	L	DME	VOR	NDB	Coverage	GNSS		REMARKS OBSERVACIONES
									GBAS	SBAS	
1	2	3	4	5	6	7	8	9	10	11	12
KUWAIT											
KUWAIT/Intl	15R PA 2 33L PA 2 15L PA 2 33R PA 2	A/L A/L A/L A/L T E	II (I) II (I) II (I) II (I)	XI XI	XI XI XI XI			300/50 300/50			
LEBANON											
BAYSUR											
BEIRUT/Beirut Intl	18 16 PA 1 24 17 PA 1 03 PA 1 21 PA 1	A/L A/L A/L E AL	I* (I) D I* (I) D I* (I) D I* (I) D	X X X X	X I X I X I X I	X I X I X I X I		180/40 150/45			
CHEKKA		E			X I	X I		80 150/50			
SAIDA KHALDE		E/T			X I	X I		150/50			
BOD		E/T					XI	150			
BAB		E/T					XI	150			
OMAN											
HAIMA		E			X I	X I		200/45			
IZKI		E			X I	X I		200/45			
MARMUL		E			X I	X I		200/45			
MUSCAT/Seeb Intl	08 PA 1 26 PA 1	A/L A/L E	I* (I) D I* (I) D		X I X I X I		X I	200/45			
SALALAH/Salalah	07 NPA 25 PA 1	A/L A/L E	I* (I) D		X I X I X I	X I X I X I		200/45			

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

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

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

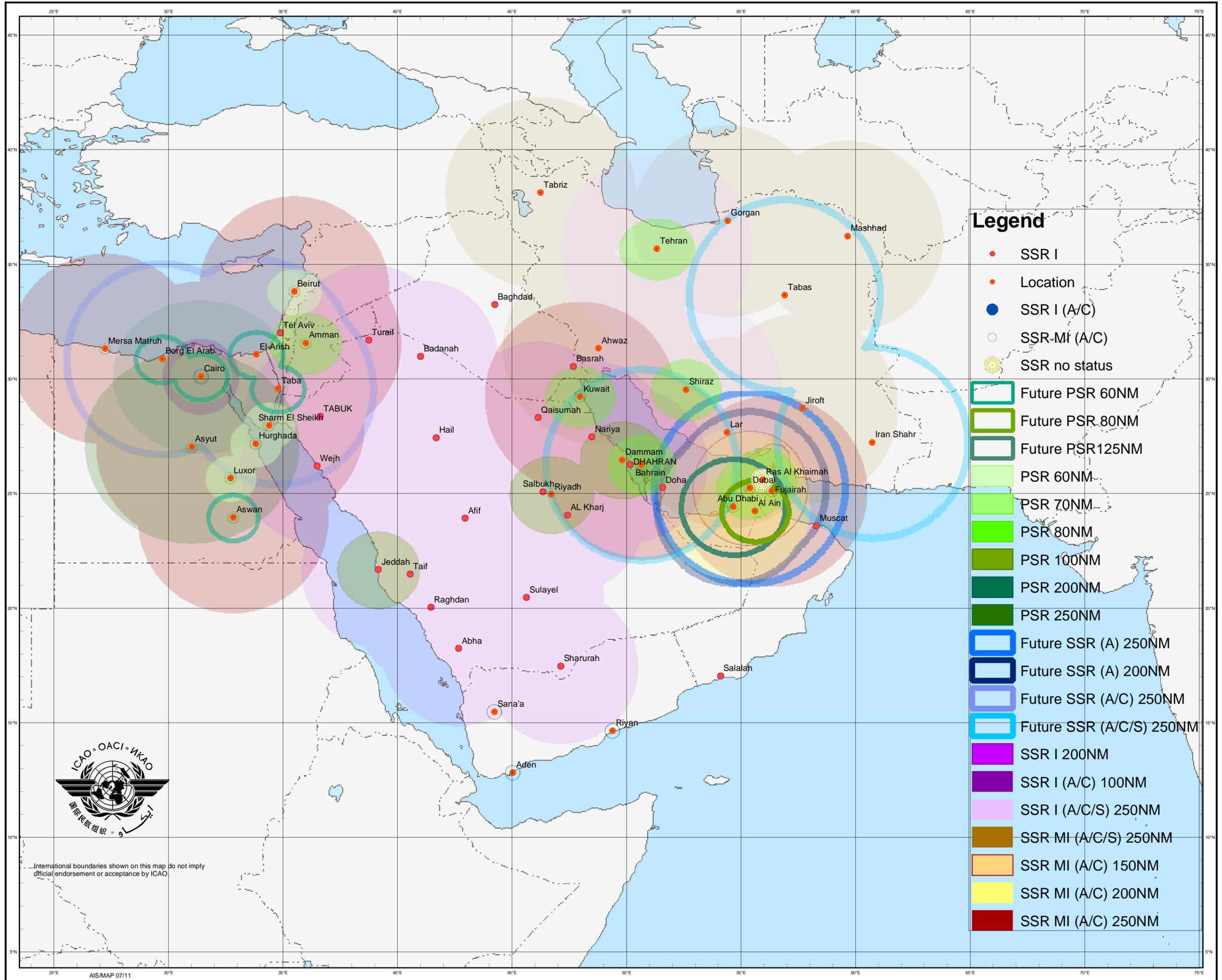
Station	RWY Type	Function	ILS	L	DME	VOR	NDB	Coverage	GNSS		REMARKS OBSERVACIONES
									GBAS	SBAS	
1	2	3	4	5	6	7	8	9	10	11	12
RIYADH/King Khalid Intl	15L PA 1	A/L	I* (I)		XI	XI		300/50			
	33R PA 1	A/L	I* (I)		XI	XI					
	15R PA 1	A/L	I* (I)		XI	XI					
	33L PA 1	A/L	I* (I)		XI	XI					
		T			XI	XI					
	E				XI	XI					
TURAIF	10 NPA	A/L			XI	XI		300/50			
	28 NPA	A/L			XI	XI					
		T			X	X					
		E			XI	XI					
WADI AL-DAWASIR	10 NPA	A/L			XI	XI		300/50			
	28 NPA	A/L			XI	XI					
	10 PA 1	A/L	I*		XI						
		T			X	X					
	E			XI	XI						
WEDJH	15 NPA	A/L			XI	XI		300/50			
	33 NPA	A/L			XI	XI					
	33 NPA	A/L		X							
	33 PA 1	A/L	I*								
		T			X	X					
	E				XI	XI					
YENBO	10 NPA	A/L			XI	XI		300/50			
	28 NPA	A/L			XI	XI					
	28 PA 1	A/L	I*		XI						
		T			X	X					
	E			XI	XI						
SYRIAN ARAB REPUBLIC											
ALEPPO/Neirab	27 N PA2	A/L		X		X		150/50			
		E				X					

Station	RWY Type	Function	ILS	L	DME	VOR	NDB	Coverage	GNSS		REMARKS OBSERVACIONES
									GBAS	SBAS	
1	2	3	4	5	6	7	8	9	10	11	12
DAMASCUS/Intl	05L NPA2 23R PA 4 2 05R NPA2	A/L A/L A/L E	I* (I)	X	X X X X	X X X X		150/50			
KARIATAIN		E			X	X		150/50			
LATAKIA/Bassel -Al- Assad	17 NPA	A/L		X	X	X					
TANF		E				X		160/40			
UNITED ARAB EMIRATES											
ABU DHABI/Abu Dhabi Intl	13 PA 1 31 PA 3	A/L A/L E	I* (I) III (I)		X I X I X I	X I X I X I		300/45			
AL AIN/Al Ain Intl	01 PA 1 19 NPA	A/L A/L E	I*		X I X I X I	X I X I X I		300/45			
DUBAI/Dubai Intl	12L PA 3 30R PA 3 12R PA 2 30L PA 2	A/L A/L A/L A/L E	III (I) III (I) II (I) II (I)		X I X I X I X I X I	X I X I X I X I X I		300/45			
FUJAIRAH/Fujairah Intl	11 NPA 29 PA 1	A/L A/L T	I* (I)		X I X I X I	X I X I X I		40/25			
RAS AL KHAIMAH/Ras al Khaimah Intl	16 NPA 34 PA 1	A/L A/L	I* (I)	X X	X I	X I					

Station	RWY Type	Function	ILS	L	DME	VOR	NDB	Coverage	GNSS		REMARKS OBSERVACIONES
									GBAS	SBAS	
1	2	3	4	5	6	7	8	9	10	11	12
SHARJAH/Sharjah Intl	12 NPA 30 PA 1	A/L A/L E	I* (I)	X I	X I X I	X X X I		300/45			
YEMEN											
ADEN/Intl	08 NPA 26 PA 1	A/L A/L E	I* (I)	X	X X X	X X X		300/50			
AL-GHAIDAH		E			X	X		300/50			
HODEIDAH	03 NPA 21 NPA	A/L A/L E		X X	X X X	X X X		200/45			
RIYAN/Intl	06 NPA 24 NPA	A/L A/L E			X X X	X X X		300/50			
SANA'A/Intl	18 PA 1 36 NPA	A/L A/L E	I* (I)	X	X X X	X I X I X I		200/45			
SIYUN		E			X	X		150/45			
TAIZ/Intl	01 NPA 19 NPA	A/L A/L E		X X	X X X	X X X		200/45			

ATTACHMENT B

Radar Coverage of the MID Region



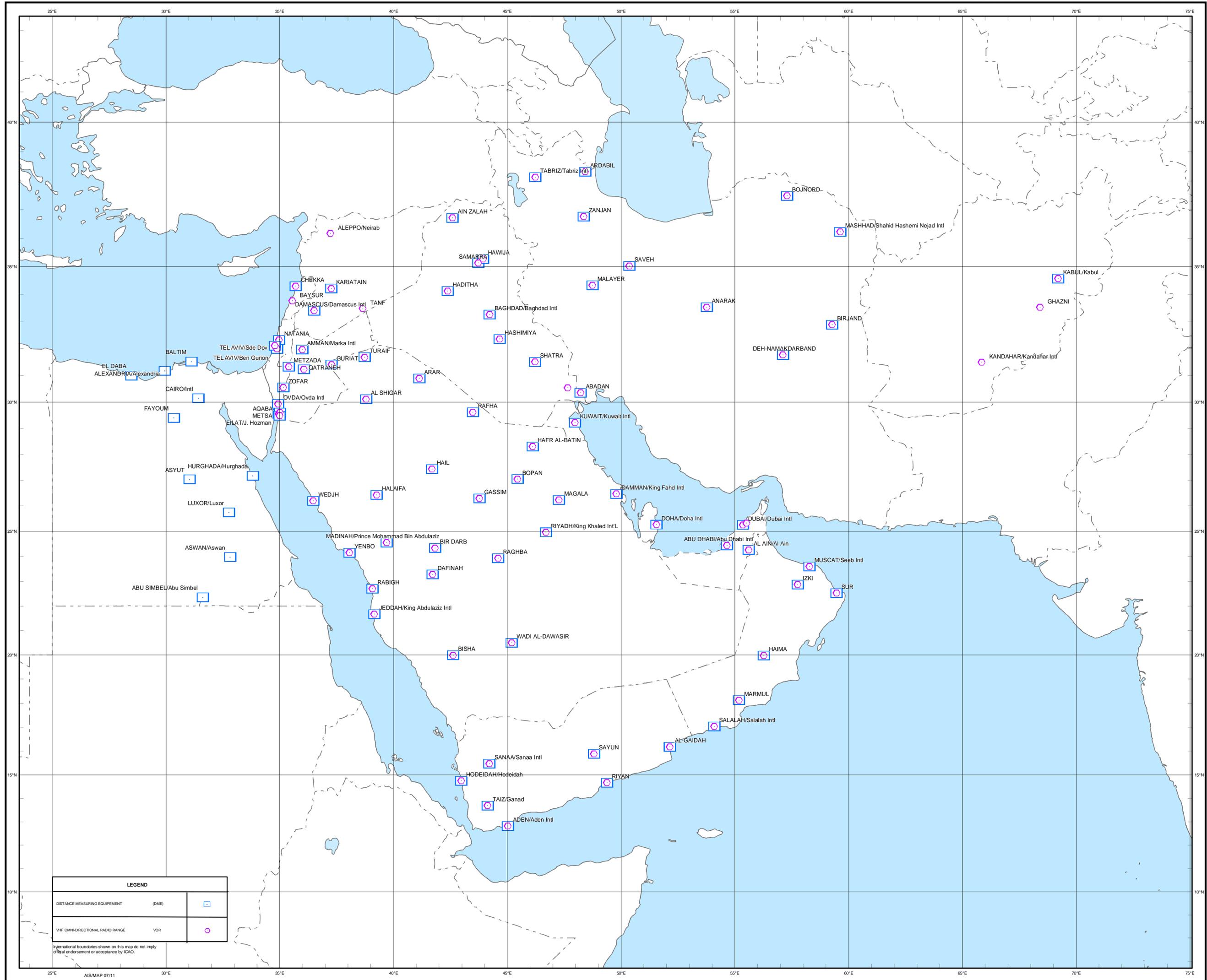
- ### Legend
- SSR I
 - Location
 - SSR I (A/C)
 - SSR-MI (A/C)
 - SSR no status
 - ▭ Future PSR 60NM
 - ▭ Future PSR 80NM
 - ▭ Future PSR 125NM
 - ▭ PSR 60NM
 - ▭ PSR 70NM
 - ▭ PSR 80NM
 - ▭ PSR 100NM
 - ▭ PSR 200NM
 - ▭ PSR 250NM
 - ▭ Future SSR (A) 250NM
 - ▭ Future SSR (A) 200NM
 - ▭ Future SSR (A/C) 250NM
 - ▭ Future SSR (A/C/S) 250NM
 - ▭ SSR I 200NM
 - ▭ SSR I (A/C) 100NM
 - ▭ SSR I (A/C/S) 250NM
 - ▭ SSR MI (A/C/S) 250NM
 - ▭ SSR MI (A/C) 150NM
 - ▭ SSR MI (A/C) 200NM
 - ▭ SSR MI (A/C) 250NM

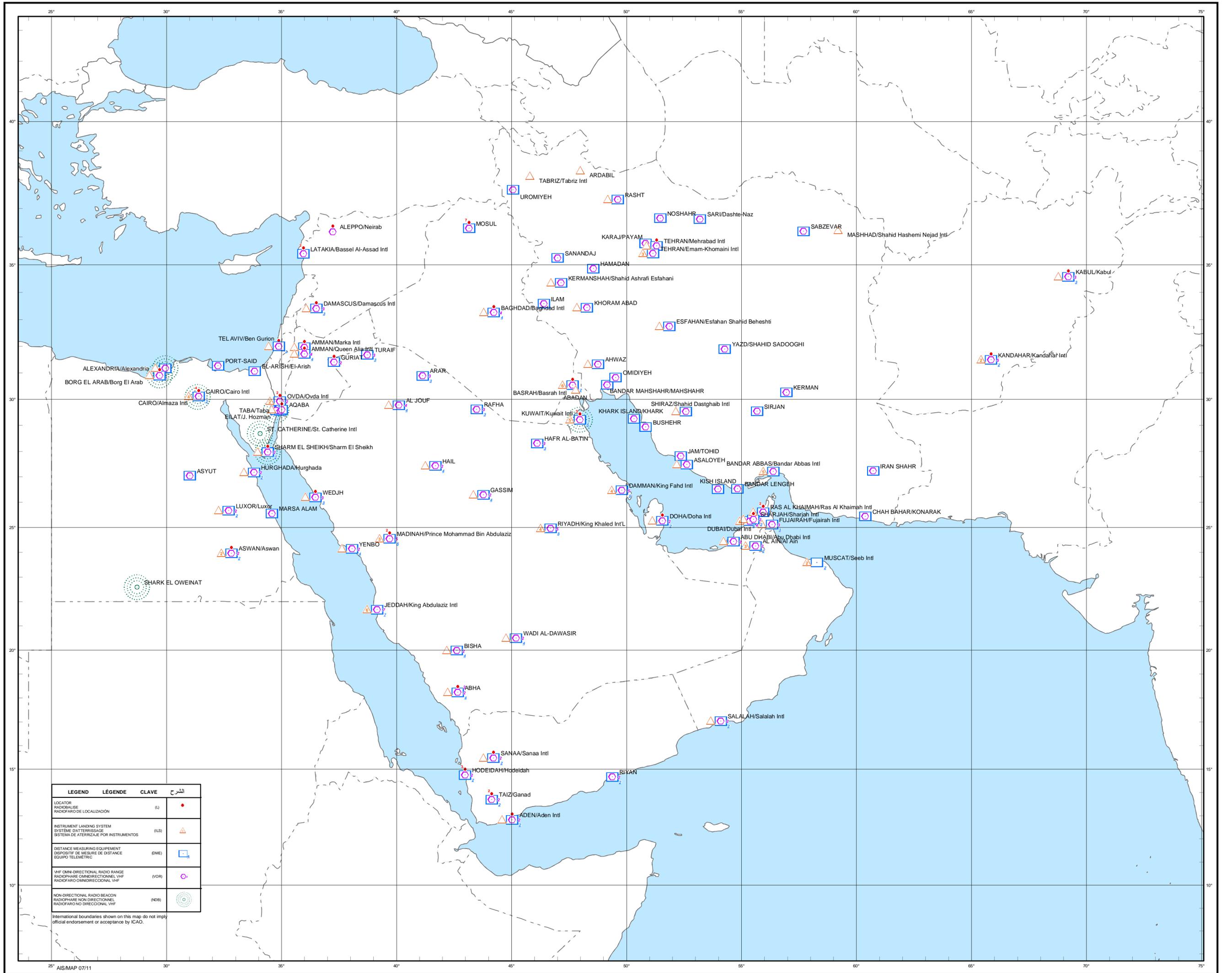


International boundaries shown on this map do not imply official endorsement or acceptance by ICAO.

ATTACHMENT C

Implementation of Radio Navigation Facilities

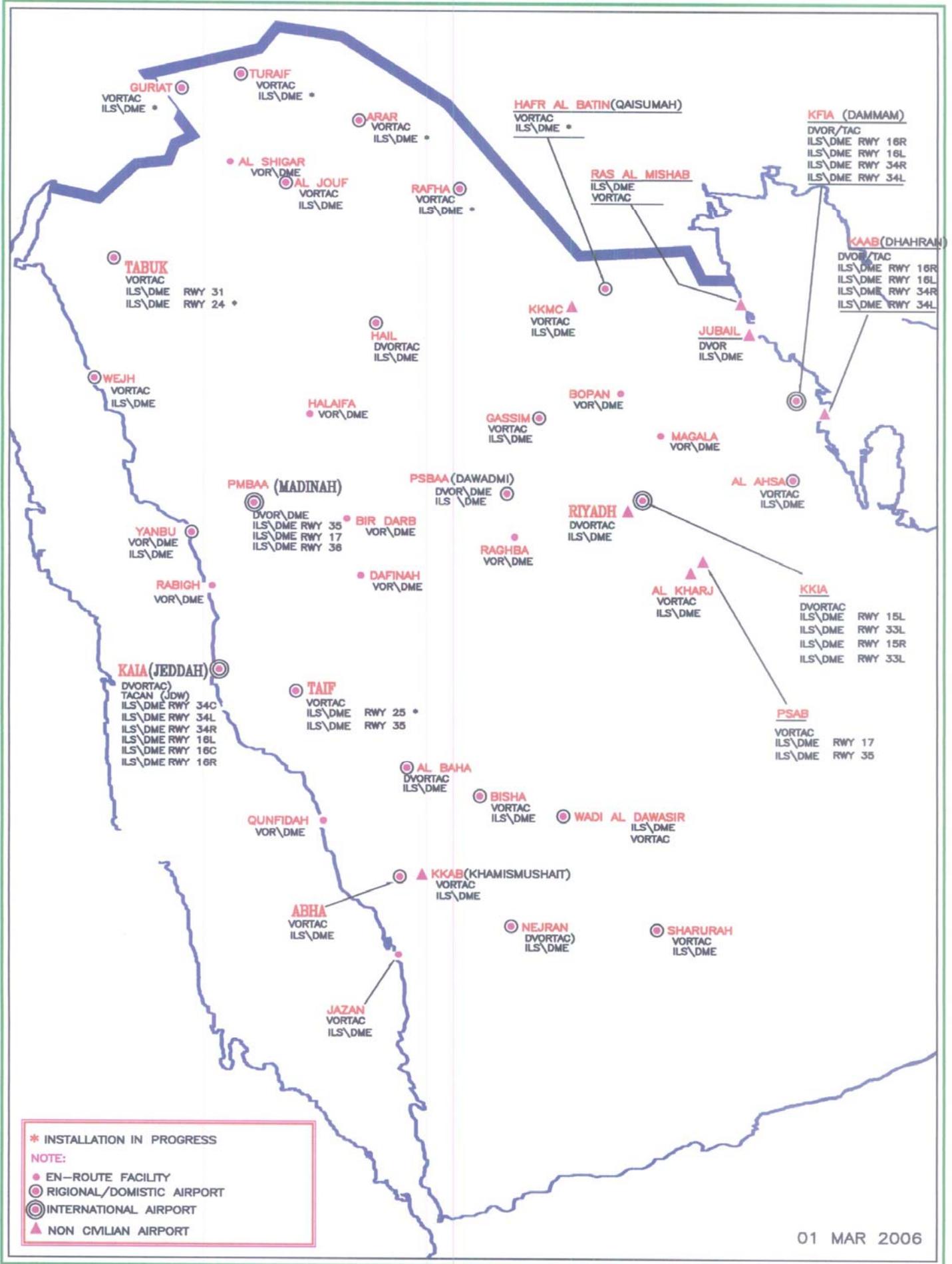




LEGEND	LÉGENDE	CLAVE	الشرح
LOCATOR RADIOCALE RADIOFARO DE LOCALIZACION		(L)	•
INSTRUMENT LANDING SYSTEM SYSTEME D'ATERRISSAGE SYSTEMA DE ATERRIZAJE POR INSTRUMENTOS		(ILS)	△
DISTANCE MEASURING EQUIPMENT DISPOSITIF DE MESURE DE DISTANCE EQUIPO TELEMETRICO		(DME)	□
VHF OMNI-DIRECTIONAL RADIO RANGE RADIOFARRE OMNIDIRECTIONNEL VHF RADIOFARO OMNIDIRECCIONAL VHF		(VOR)	○
NON-DIRECTIONAL RADIO BEACON RADIOFARRE NON DIRECTIONNEL RADIOFARO NO DIRECCIONAL VHF		(NDB)	⊙

International boundaries shown on this map do not imply official endorsement or acceptance by ICAO.

Fig. # 1 PRESENT NAVIGATION AIDS SYSTEMS IN KSA



ATTACHMENT D

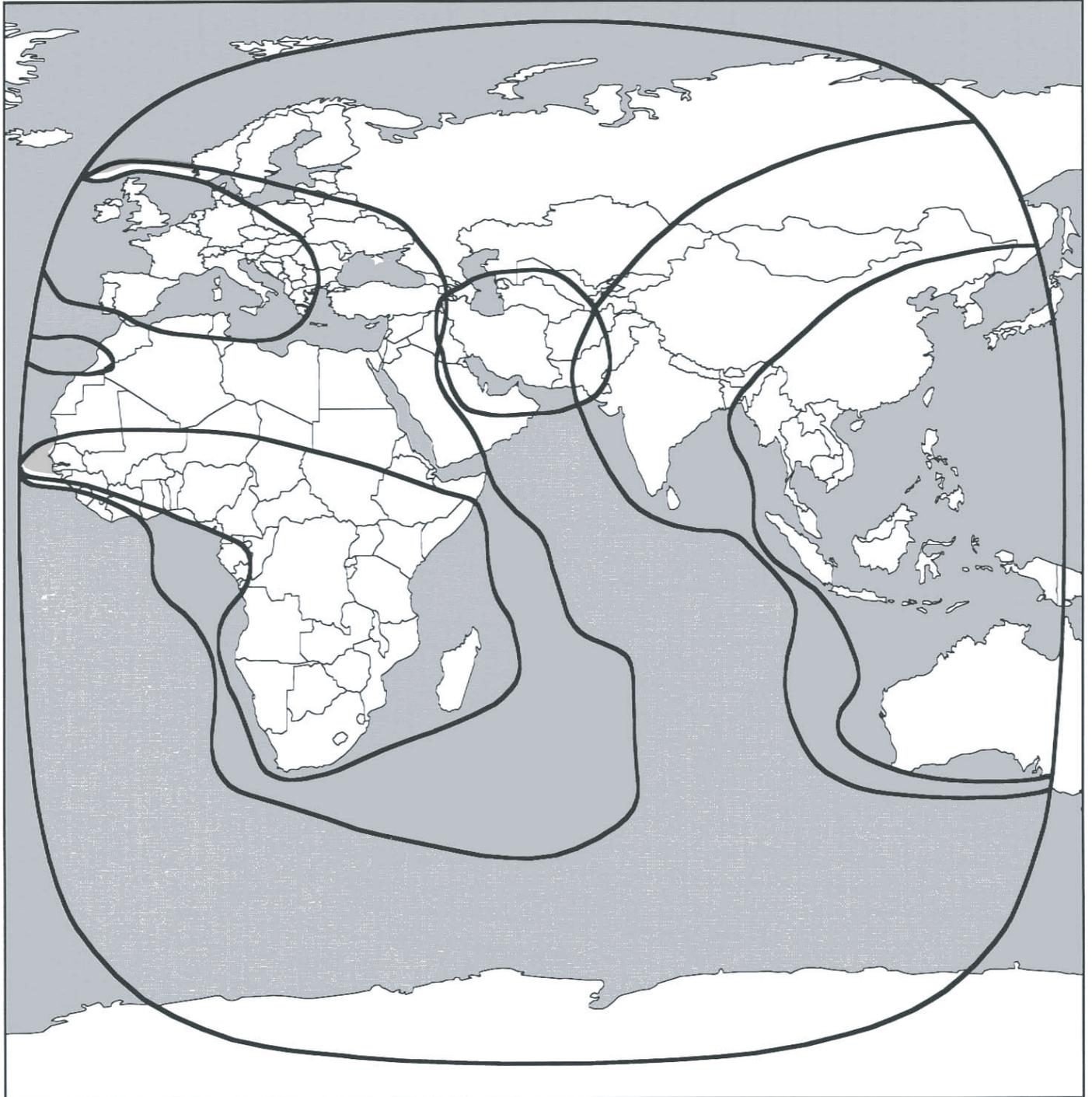
Satellite Coverage of the MID Region

COVERAGE OF THE SATELLITE DISTRIBUTION SYSTEM FOR WAFS PRODUCTS (SADIS) USING INTELSAT 904 AT 60° E
COUVERTURE DU SYSTÈME DE DIFFUSION PAR SATELLITE D'INFORMATIONS RELATIVES À LA NAVIGATION AÉRIENNE (SADIS)
POUR LES PRODUITS DU SMPZ AU MOYEN D'INTELSAT 904 À 60° E
COBERTURA DEL SISTEMA DE DISTRIBUCIÓN POR SATÉLITE (SADIS) PARA LA INFORMACIÓN
ELABORADA POR EL WAFS MEDIANTE INTELSAT 904 A 60°E

تغطية نظام توزيع معلومات الملاحة الجوية بالأقمار الصناعية للنظام العالمي لتنبؤات المنطقة باستخدام انتلسات ٦٠٤ على ٦٠ درجة شرقا

MID FASID

CHART CNS 1E



AMS/MAP 07/11

C-band

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REPORT ON AGENDA ITEM 4: RECENT DEVELOPMENTS AND RESEARCHES

4.1 Under this Agenda Item, the meeting was informed that in light of the outcome of the Eleventh Air Navigation Conference (AN-Conf/11) held in September 2003 and the meeting of the Air Navigation Commission in consultation with Industry in May 2004, the second amendment to the Global Plan was prepared in January 2006. Following the review and comments from the fifth meeting of ALLPIRG in March 2006 and the comments from States, which were reviewed by the Air Navigation Commission on 19 October 2006. The Council accepted the second amendment on 30 November 2006. The approved plan has been renamed as Global Air Navigation Plan (Doc.9750).

4.2 The meeting noted that the Global Plan focuses efforts on maintaining consistent global harmonization and improving implementation efficiencies by drawing on the existing capabilities of the air navigation infrastructure and successful regional implementation. The Planning and Implementation Regional Groups (PIRGs) are expected to follow up on matters as stated below:

- a) note that the Global Plan is a significant component in the development of regional and national plans and that, together with the global ATM operational concept, it provides an effective architecture for achieving a harmonized and seamless Global ATM system;
- b) identify Global Plan Initiatives (GPIs) that most closely align with the well established implementation plans of their respective regions;
- c) choose GPIs that would be most effective in achieving the objectives of the region while ensuring continuation of the work already accomplished;
- d) implement GPIs that take into account the initiatives across regions, to align work programmes and to develop national and regional plans that facilitate achieving a Global ATM system;
- e) utilize the planning tools as the common planning and implementation mechanism, thereby ensuring proper coordination and global integration; and
- f) review at each PIRG meeting, as a part of its regular agenda, the progress achieved and challenges identified in the implementation of GPIs using a common template.

4.3 The meeting was presented with the 23 GPIs which form part of the framework of the Global Plan and the MID Region Strategy for the implementation of these GPIs that was developed by CNS/ATM/IC SG/3 and adopted by MIDANPIRG/10 *Conclusion10/13: MID Region Strategy for the implementation of the Global Plan Initiatives (GPIs)*.

4.4 The meeting noted that the Strategy is a living document which to be updated on regular basis. In the process of reviewing of *GPI 20 – The objective of this GPI is the implementation of World Geodetic System – 1984 (WGS 84)* by all States as a fundamental to the implementation of GNSS is the use of a common geographical reference system. ICAO had adopted the WGS-84 Geodetic Reference System as reference datum. In this regard the meeting recalled MIDANPIRG/8 *Conclusion 8/36 – WGS-84 Implementation in the MID Region*, and noted that although the implementation of WGS-84 should have been completed since 1998, some MID States have still not completed part or all of the implementation and publication of the WGS-84 coordinates.

4.5 The updated Status of implementation of WGS-84 within the fifteenth MID Region States was summarized as in **Appendix 4A** to the Report on Agenda Item 4.

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4.6 The meeting focused specifically on *GPI-21 "Navigation systems"*. The initiative *GPI-21* is on enabling the introduction and evolution of Performance Based Navigation supported by a robust navigation infrastructure providing an accurate, reliable and seamless global positioning capability.

4.7 When updating the specific tasks related to the GNSS implementation in attachment 1 of the MID Region Strategy for the implementation of the GPIs the meeting was of the view that the tasks:

- Implement GNSS for En-route and
- Implement GNSS for NPAs

should be addressed under the task "introduce in an evolutionary manner the use of GNSS with appropriate augmentation system in the MID Region".

4.8 The meeting in order to facilitate the introduction of the GNSS in the MID Region developed a preliminary document as in **Appendix 4B** to the Report on Agenda Item 4 named *checklist for introduction of GNSS based operation* based on ICAO DOC 9849 (GNSS Manual), the meeting agreed that the check list is to be updated/improved during the next TF meeting if needed, and to be posted in e-documents section of the ICAO MID Regional Office website once adopted. Accordingly, the meeting agreed to the following Draft Conclusion:

DRAFT CONCLUSION 6/1: MID CHECK LIST FOR GNSS BASED OPERATIONS

*That, MID States introducing GNSS-based operations use the guidance checklist as shown at **Appendix 4B** to the Report on Agenda Item 4.*

4.9 Regarding the task *Carrying out GNSS trials, demonstrations and test beds*; the meeting noted that Egypt and Jordan are joining the METIS APV approach demonstrations and that the results will be shared with the rest of the MID States.

4.10 The meeting agreed that the cost benefit analysis could not be done since the necessary data was not yet available to carry out the task and asked ESA and GSA to provide the necessary data as per MIDANPIRG/10 Conclusion 10/10 which is expected to be available by December 2007. Further more the meeting agreed that the two tasks for introduction of GNSS and monitoring implementation should be carried out on regular basis during the GNSS TF Meetings.

4.11 The meeting put emphasis on the full advantage of future benefits accruing from using independent core satellite constellations, other GNSS elements and their combinations, and avoiding limitations on the use of specific systems elements.

4.12 The meeting agreed that the GNSS enabling regulations task be carried out and was of the view to develop a common guidance material that could be used by the States of the MID Region as a reference. In this regard it was also noted that support of other Regions and International Organizations could be sought in order to speed up the completion of the task.

4.13 The meeting noted that *GPI-23 (Aeronautical Radio Spectrum)* scopes the timely and continuing availability of adequate radio spectrum, on a global basis, to provide viable air navigation services (communication, navigation and surveillance), where as the framework of this initiative involves the support and dissemination by States of the ICAO position for ITU World Radio

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Conferences (WRC). The meeting urged the States to Support ICAO position for WRC-07, and encouraged States to provide effective spectrum management and protection of GNSS frequencies to reduce the possibility of unintentional interference and in order to protect GNSS from harmful interference.

4.14 The meeting stressed that the Civil Aviation experts are to follow up the issue related to the deletion of their States name from the footnotes 5.362B and 5.362C of the ITU WRC-2003. In this regard the meeting recalled MIDANPIRG/8 *Conclusion 8/52 – Protecting GNSS from harmful interference in the MID Region* and noted that the following States had not removed their names from the footnote : Egypt – Iraq – Israel – Jordan - Kuwait – Lebanon – Qatar – Saudi Arabia and Syria and still the band is not protected for the GNSS.

4.15 The meeting noted that in support of the evolution from system-based approach to a performance-based approach to planning and implementation of air navigation, MIDANPIRG/10 approved a list of projects under conclusion 10/14 which include project *Implementation of GNSS*. In this regard the meeting was of the view that all efforts has to be done for the implementation and that the “Project Management” methodology software should be used which will allow the proper and unified follow up of the projects. Accordingly, the meeting agreed to the following Draft Conclusion:

DRAFT CONCLUSION 6/2: USE OF PROJECT MANAGEMENT METHODOLOGY FOR IMPLEMENTATION OF GNSS

That, MID States are encouraged to use the “Project Management” methodology software for the follow-up and update of the tasks related to Implementation of GNSS in their States.

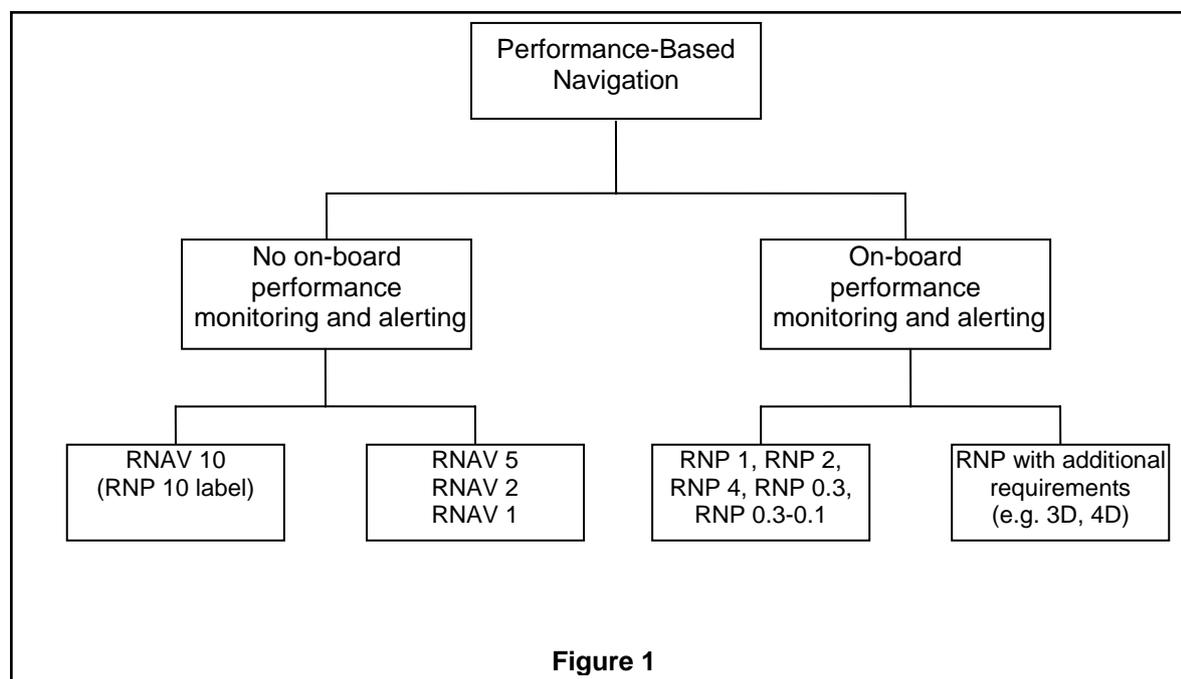
4.16 Based on the above, the meeting updated the various tasks and the target dates of the implementation of the GPIs pertaining to the implementation of the GNSS in the MID Region as in **Appendix 4C** to the Report on Agenda Item 4.

4.17 The meeting received a presentation on the concept Performance Based Navigation (PBN) and noted that PBN is an end-to-end system of requirements, in which aviation authorities specify the aircraft capabilities and performance requirements necessary to operate in a given airspace or on a given procedure.

4.18 The meeting noted that the concept of PBN includes two key “building block” elements: Area Navigation (RNAV) and Required Navigation Performance (RNP). PBN brings together, under one umbrella, a number of diverse RNAV and RNP applications encompassing all regimes of flight, from enroute to approach. PBN is expected to facilitate the transition to GNSS, by defining a number of navigation specifications.

4.19 The Required Navigation Performance Special Operational Requirements Study Group (RNP SORSG), established by ICAO addressed the divergence of implementation that resulted in lack of harmonization between RNP applications, and the significant confusion that had developed regarding concepts, terminology and definitions. All the navigation specification agreed on by the RNP SORSG including the existing and newly developed, as well as how they fit in the PBN concept is in the below in figure 1.

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4.20 The meeting was presented with the State letter AN 11/45-07/22, along with the attachment containing guidance material on implementing PBN, and was of the same views as the Symposium on Performance of the Air Navigation System (Montreal, 26 to 30 March 2007), that PBN should be implemented as soon as possible. The meeting expressed its appreciation to ICAO for the advance distribution of the guidance material in order to avoid another proliferation of operational approval requirements by States. Accordingly, the meeting agreed to the following Draft Conclusion:

DRAFT CONCLUSION 6/3: PROLIFERATION OF OPERATIONAL APPROVAL REQUIREMENTS

That, in order to avoid proliferation of operational approval requirements, MID States are urged to implement PBN using ICAO SARPs and guidance material.

4.21 The meeting further noted with appreciation that ICAO will be conducting series of PBN seminars and a task force for RVSM/PBN was already established by MIDANPIRG/10 and was of the view that the work in the implementation of the PBN is significant and requires a lot of dedicated efforts.

4.22 The meeting when discussing the cost allocation for the GNSS noted that civil aviation should pay only its fair share of the GNSS cost, since GNSS in addition to aviation is used in other modes of transportation and fields.

4.23 The meeting noted the ICAO provisional policy guidance which was issued on the assumptions and principles for the allocation of GNSS costs amongst all users, developed by Air Navigation Services Economics Panel (ANSEP), which summarized as follows: a) provision of basic services free of charge, b) cost allocation at the regional level, c) use of a requirements-driven method, and d) consultations with users before charging. In addition, to the already developed guidance on e) application of ICAO's policies on charges in the context of GNSS and f) methods on cost allocation amongst civil aviation users.

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4.24 The meeting reviewed the five conclusions in the Bulletin EC 2/84-EB/07/14 (Conclusions of the study on GNSS cost allocation) and noted that ICAO Council at its 180th session in February 2007 accepted the “provisional” policy guidance on the allocation of the incremental costs of more advanced GNSS services. Accordingly, the meeting agreed to the following Draft Conclusion:

DRAFT CONCLUSION 6/4: GNSS COST ALLOCATION POLICY

That, MID States consider ICAO provisional policy guidance on GNSS cost allocation in the course of discussions and negotiations with GNSS service providers.

4.25 The meeting was briefed on amendment 81 to Annex I0, which is effecting Standard and Recommended Practices (SARPs) for Global Navigation Satellite System (GNSS), and noted that this amendment concerning SARPs for GNSS introduces ground-based regional augmentation system (GRAS) SARPs as extension to the current ground-based augmentation system (GBAS) SARPs, enabling the support of an expanded service area which is complementing satellite-based augmentation system (SBAS) for areas that are outside, or at the edge of, SBAS coverage, became effective as of 23 November 2006.

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Appendix 4A to the Report on Agenda Item 4

STATUS OF IMPLEMENTATION OF WGS-84 IN THE MID REGION

	FIR	ENR	TMA/CTA/CTZ	APP	RWY	AD/HEL	GUND	QUALITY SYSTEM	AIP	REMARKS
AFGHANISTAN	N	N	N	N	N	N	N	N	N	Not reported using uniform format
BAHRAIN	F	F	F	F	F	F	F	F	F	
EGYPT	F	F	F	F	F	F	F	F	F	
IRAN	F	F	F	N	F	F	F	F	F	
IRAQ	N	N	N	N	N	N	N	N	N	Not reported using uniform format
ISRAEL	N	N	N	N	N	N	N	N	N	
JORDAN	F	F	F	F	F	F	F	F	F	
KUWAIT	F	F	F	F	F	F	F	N	F	
LEBANON	F	F	F	F	F	F	N	N	F	
OMAN	F	F	F	F	F	F	F	F	F	
QATAR	F	F	F	F	F	F	N	N	F	
SAUDI ARABIA	F	F	F	F	F	F	N	F	F	GUND implementation under process
SYRIA	N	F	P	P	P	P	N	N	N	
UNITED ARAB EMIRATES	F	F	F	F	F	F	F	F	F	
YEMEN	F	F	F	F	F	F	F	N	F	

Legend:

F: Fully implemented

P: Partly implemented

N: Not implemented

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Appendix 4B to the Report on Agenda Item 4

MID REGION Checklist for Introduction of GNSS based operations

No.	Items to check	Remarks
1.	Establish GNSS Implementation Team (GIT); Establish a GNSS Office and designation of program/project officers –normally from regulator/service provider -Funding -Staffing The Terms of Reference of GIT is provided in the Annex 1 to this Checklist.	GIT possible members include: -CAA; -Operations; -ATS; -Airworthiness; -Industry; -Airlines; -General Aviation; -Defense; -Maintenance provider; -Pilot training.
2.	State Plan – define and confirm State operational requirements and Regulation changes: -En-route, NPA/APV - PA at selected airports - Produce Orders, AIC, AIP SUPS, MATS amendments etc.	Draft and publish -Advisory Circulars -AIC -Aeronautical Information Circular; -AIP supplements.
3.	Define Operations and ATS requirements - Determine Operation Use Policy; -Separation Standard application; -Establish ATC GNSS Use Procedures;	
4.	Basic constellation augmentation requirements Determine Augmentation Policy.	ABAS; GRAS SBAS; GBAS.
5.	WGS-84 - Ensure WGS-84 compliant; - WGS-84 survey and publications; - Ensure database vendors provide WGS-84 data. Reference ICAO World Geodetic System-1984 (WGS-84) Manual Doc9674-AN/946	
6.	En route Domestic/Oceanic & Remote Standards -Define and publish borders between standards - Education on standards and differences	
7.	NPAs - Locations selection - Obstacle survey and database - Airfield status - Use NPA Procedure Design Criteria PANS/OPS; - Publish GNSS Arrival Procedures - Environmental considerations	Instrument Approach Procedure

No.	Items to check	Remarks
8.	Airport standard: - Upgrade to instrument runway; - Obstacle Limit Surface (OLS); - Maintenance of OLS; - Suitability for straight in approach; - Windsock and supporting requirements; - Altimeter setting availability; - Lighting. . Reference Annex 14	
9.	Determine and Implement Receiver Standard - Equipment installation Policy - Supplemental Type Certificate or equivalent; - Conduct Airworthiness Training and approvals; - Establish rule for GPS for terrestrial navigation aid substitution;	Alternate solution + Barometric aiding;
10.	Operation approval: - Primary means - Supplemental means	GNSS as a primary means of Navigation in Oceanic/remote Operations;
11.	Flight Inspection and validation; - Topography and obstacle assessment; - Flight Inspection; - Selection of suitable aircraft for inspection; - Transit times/low/slow flying capability; - Fuel reserves/Communications requirements; - Proper avionics	
12.	Crew training and approval - Pilot Endorsement - Aircraft equipment endorsement - Validation training - GNSS training and approval - Operation familiarization	
13.	Licensing: Pilot instrument rating requirements; -En route use; - NPAs.	
14.	GNSS signal monitoring and recording facilities in place.	For use in accident and incident investigations and may also support periodic confirmation that accuracy, integrity, continuity and availability are maintained.

No.	Items to check	Remarks
15.	Establish procedures for ensuring database consistency: - Approach Publication; - Implementation; - Operational Testing; - Training; - Flight Operations Inspectors; - Air Traffic Controllers; - Airworthiness; - Pilots and check pilots	Data Cards – to be integrated in Receivers. Responsibility for the correct data made by Jeppesen, Alternately can be got through Internet.
16.	Operational Training: - Procedure design - Air traffic controller	
17.	NOTAMs – For GPS, use Status message - RAIM Prediction System (RPS) (if applicable)	(Convert Message into operational NOTAMs for meeting the requirement)
18.	GNSS Incident or Anomaly Report	GPS Outage Query Form provided on the website: www.navcen.uscg.gov/gps
19.	Post Implementation Review - Procedures compliance; - Revision of Documentation; - Incorporation of AIP Supplements into AIP; - Maintenance of approach Obstacle Limit Surfaces, Airfield status; - Conventional Navigation Aid Policy; - Consolidation Policy – navigation aid withdrawal.	

ANNEX 1 TO THE GNSS CHECKLIST

GNSS IMPLEMENTATION TEAM TERMS OF REFERENCE

1. INTRODUCTION

1.1 This document sets out the Terms of Reference for the Global Navigation Satellite System (GNSS) Implementation Team, which includes members from regulatory and service provider organizations, and user representatives. It defines the roles of participants with respect to the implementation of GNSS operations.

1.2 A common goal of the regulator and service provider is to ensure that aircraft operators receive the benefits of GNSS technology in a timely and effective fashion while maintaining high standards of safety. The GNSS Implementation Team will support this goal by fostering a cooperative approach to developing the standards, systems, procedures and the terms and conditions of regulatory approvals that respond to the needs of the aviation community.

1.3 Regulating GNSS and providing GNSS related services require that various branches in the regulatory and service provider organizations allocate resources to specific tasks. A key goal of the GNSS Implementation Team is to identify resource requirements to allow managers to plan effectively. The GNSS related roles of branches and divisions in the two organizations are described in section 2.

1.4 Material developed by ICAO, including SARPs, Guidance Material and Manuals, form the basis for the actions taken by the GNSS Implementation Team. In the early stages, research sponsored by the Team will add to the body of knowledge needed to develop ICAO documentation. As GNSS evolves, the Team will be able to reply to a large extent on this documentation.

2. ROLES

2.1 Service Provider

2.1.1 Satellite Navigation Program Office (SNPO)

- a) act as the focal point for the development of satellite navigation technology for aviation purposes;
- b) complete trials and studies to prove GNSS concepts and test performance against safety standards;
- c) coordinate efforts internationally to avoid duplication of effort;
- d) provide guidance to the Member of the ICAO GNSS Panel, to ensure that international standards reflect national requirements, and participate in Panel working groups, as appropriate;
- e) coordinate the delivery of service based on satellite navigation technology to aircraft operators;
- f) develop performance requirements for GNSS augmentation systems, and specify augmentation system architecture to meet operational requirements;
- g) field and test prototype augmentation systems to minimize risk with operational systems;
- h) work with aircraft operators, aviation systems manufacturers, the academic community and users in other disciplines to ensure that augmentation systems meet requirements effectively and efficiently;

- i) maintain knowledge of aircraft, pilot and operator certification standards and work with certification staff to ensure approvals are consistent with GNSS performance;
- j) determine the economic viability of implementing augmentation systems, and develop appropriate strategies for fielding these systems and decommissioning traditional navigation aids;
- k) develop the necessary documents to obtain funding for operational augmentation systems;
- l) promote the use of satellite navigation technology, and assist aircraft operators to make informed decisions on equipment, through publications, presentations, other media and direct contact;
- m) encourage the safe use of GNSS by contributing to safety awareness programs;
- n) maintain detailed knowledge of satellite navigation avionics standards and performance, including pilot interface characteristics;
- o) recommend satellite navigation procedure design features to exploit the strengths of the technology while minimizing pilot workload and the possibility of pilot error;
- p) coordinate the development of survey standards to meet the accuracy requirements of satellite navigation approach procedures; and
- q) participate in the development of GNSS equipment standards.

2.1.2 National Flight Inspection Organization

- a) complete flight trials and system performance studies to support GNSS implementation;
- b) flight monitor GNSS performance; and
- c) complete necessary flight inspections for non-precision and precision approaches

2.1.3 Aeronautical Information Services

- a) develop approach and other GNSS procedures;
- b) complete in-flight checks of GNSS procedures to assess flyability and obstacles;
- c) coordinate airspace-related GNSS issues with ATS;
- d) verify GNSS instrument procedures submitted by designers;
- e) develop depiction standards for GNSS instrument procedures;
- f) develop standards for and control input to databases containing GNSS procedure coordinates, including participation in international standards bodies;
- g) provide aeronautical information on GNSS procedures to database suppliers and chart producers; and
- h) incorporate GNSS information in the NOTAM system.

2.1.4 Planning and International/Government Liaison

- a) incorporate GNSS material provided by SNPO in national and international planning documents; and
- b) incorporate the level of service criteria and planned decommissioning of traditional navigation aids into national and international planning documents.

2.1.5 Operational Requirements and Level of Service

- a) develop detailed operational requirements for decommissioning traditional navigation aids, based on strategy developed by the SNPO; and

- b) complete aeronautical studies associated with decommissioning traditional navigation aids.

2.1.6 Engineering

- a) develop technical specifications for augmentation systems;
- b) procure and field GNSS augmentations, including related communications systems;
- c) perform life cycle management of augmentation systems;
- d) develop hardware and software to support GNSS flight inspections, trials and studies;
- e) complete studies and investigations on the frequency interference aspects of GNSS performance;
- f) provide spectrum management to protect GNSS frequencies; and
- g) participate in the ICAO GNSS Panel to contribute to the development of international standards, recommended practices and guidance material.

2.1.7 Air Traffic Services

- a) develop procedures to support GNSS operations;
- b) provide air traffic services to support satellite navigation operations; and
- c) participate in the development of GNSS instrument procedures and in the development of the strategy and plans for decommissioning traditional navigation aids.

2.1.8 System Safety

- a) monitor the introduction of satellite navigation technology to identify potential hazards.

2.2 Regulator

2.2.1 ANS & Airspace

- a) monitor the service provider's research and development of GNSS technology, and consider the service provider's recommendations for operational approvals based on this technology;
- b) assist with development activities to maintain knowledge of technology and operational applications;
- c) develop GNSS instrument procedure design standards;
- d) oversee the certification of GNSS augmentation systems and related airspace procedures, and monitor compliance;
- e) introduce airspace procedures appropriate to the capabilities of satellite navigation technology;
- f) approve survey standards;
- g) approve database integrity standards and monitor for compliance;
- h) evaluate aeronautical studies completed by the service provider to assess the impact of decommissioning traditional aids;
- i) publish GNSS information, provided by the SNPO and other GNSS Implementation Team members, in various publications; and
- j) conduct ongoing safety oversight of the service provider's Safety Management Program with respect to the introduction of satellite navigation technology.

2.2.2 Aircraft Certification

- a) develop national standards and guidance material for the certification of GNSS equipment and its installation and certification in nationally-registered aircraft. Where necessary the development of standards and guidance may be accomplished as a joint effort with other Airworthiness Authorities to minimize duplication of effort and maximize harmonization;
- b) certify or oversee the certification, as applicable, of GNSS avionics equipment designed and manufactured nationally as well as the installation of all GNSS equipment installed in nationally registered aircraft; and
- c) participate in the development of GNSS avionics standards via bodies such as RTCA.

2.2.3 Commercial and Business Aviation

- a) develop crew training and certification standards for the use of GNSS avionics by commercial and business aircraft operators; and
- b) approve the operational use of GNSS technology by commercial and business aircraft operators.

2.2.4 General Aviation

- a) develop flight instructor guidelines & flight test standards for the use of GNSS avionics by general aviation aircraft operators; and
- b) in the course of Instrument Flight Tests and Commercial Pilot - Aeroplane Flight Tests, assess the ability of general aviation pilots to use GNSS avionics.

2.2.5 Aerodrome Safety

- a) develop standards for the physical characteristics and obstacle limitation requirements at aerodromes as they affect GNSS instrument approach operations; and
- b) assess the application of GNSS to Advanced Surface Movement Guidance and Control Systems (ASMGCS) at airports, and develop standards as appropriate, to support the “gate to gate” air traffic management concept.

2.3 Aircraft Services

- a) provide suitably-equipped aircraft and simulators to support GNSS trials and studies; and
- b) provide suitably-equipped aircraft and simulators to regulatory personnel to support their requirement for currency with GNSS operations.

2.4 System Safety

- a) monitor the introduction of GNSS technology to identify potential hazards.

2.5 User Representatives

- a) a wide cross section of users can provide strategic guidance and detailed recommendations on GNSS implementation; and
- b) specific users can participate in working groups assessing issues of significance to them.

GNSS TF/6
Appendix 4C to the Report on Agenda Item 4

MID REGION STRATEGY FOR THE IMPLEMENTATION OF THE GLOBAL PLAN INITIATIVES (GPIs)

Considering:

- a) the ICAO strategic objectives;
- b) the ICAO Business Plan;
- c) the Global Air Traffic Management Operational Concept;
- d) the revised Global Air Navigation Plan and associated GPIs; and
- e) the outcome of ALLPIRG/5 meeting; and

Recognizing that:

- i) the evolution continues from a systems-based to a performance-based approach to planning and implementation of the air navigation infrastructure; and
- ii) the Global Air Navigation Plan is a significant component in the development of regional and national plans and that, together with the global ATM operational concept, it provides an effective architecture for achieving a safe, harmonized, interoperable, and seamless Global ATM system;

The MID Region strategy for the implementation of the Global Plan Initiatives (GPIs) is detailed below:

- A) the MID Region implementation plan should:
 - 1) be evolutionary and consistent with the Global Air Navigation Plan taking into consideration the region priorities;
 - 2) cope with the development of an ATM Performance framework;
 - 3) satisfy performance needs just in time and at minimal cost;
 - 4) provide States with clearer objectives for the implementation of ATM and supporting CNS systems;
 - 5) identify the GPIs that would be most effective in achieving the objectives of the region while ensuring continuation of the work already accomplished;
 - 6) take into account the Initiatives across regions, to align work programmes and to develop national and regional plans that facilitate achieving a Global ATM system;
- B) the GPIs status of implementation in the MID Region is at **Attachment 1**;
- C) the progress achieved and the challenges identified in the implementation of GPIs should be monitored and reviewed on a regular basis; and
- D) taking into consideration the above, the implementation plan should be considered as a living document, which should be updated on a regular basis.

GLOBAL AIR NAVIGATION PLAN: GLOBAL INITIATIVES

Table 1. Global Plan Initiatives (GPIs) and their relationships to the major groupings

GPI		En-route	Terminal Area	Aerodrome	Supporting Infrastructure	Related Operational Concept Components
GPI-1	Flexible use of airspace	X	X			AOM, AUO
GPI-2	Reduced vertical separation minima	X				AOM, CM
GPI-3	Harmonization of level systems	X				AOM, CM, AUO
GPI-4	Alignment of upper airspace classifications	X				AOM, CM, AUO
GPI-5	RNAV and RNP (Performance-based navigation)	X	X	X		AOM, AO, TS, CM, AUO
GPI-6	Air traffic flow management	X	X	X		AOM, AO, DCB, TS, CM, AUO
GPI-7	Dynamic and flexible ATS route management	X	X			AOM, AUO
GPI-8	Collaborative airspace design and management	X	X			AOM, AUO
GPI-9	Situational awareness	X	X	X	X	AO, TS, CM, AUO
GPI-10	Terminal area design and management		X			AOM, AO, TS, CM, AUO
GPI-11	RNP and RNAV SIDs and STARs		X			AOM, AO, TS, CM, AUO
GPI-12	Functional integration of ground systems with airborne systems		X		X	AOM, AO, TS, CM, AUO
GPI-13	Aerodrome design and management			X		AO, CM, AUO
GPI-14	Runway operations			X		AO, TS, CM, AUO
GPI-15	Match IMC and VMC operating capacity		X	X	X	AO, CM, AUO
GPI-16	Decision support systems and alerting systems	X	X	X	X	DCB, TS, CM, AUO
GPI-17	Data link applications	X	X	X	X	DCB, AO, TS, CM, AUO, ATMSDM
GPI-18	Aeronautical information	X	X	X	X	AOM, DCB, AO, TS, CM, AUO, ATMSDM
GPI-19	Meteorological systems	X	X	X	X	AOM, DCB, AO, AUO
GPI-20	WGS-84	X	X	X	X	AO, CM, AUO
GPI-21	Navigation systems	X	X	X	X	AO, TS, CM, AUO
GPI-22	Communication infrastructure	X	X	X	X	AO, TS, CM, AUO
GPI-23	Aeronautical radio spectrum	X	X	X	X	AO, TS, CM, AUO, ATMSDM

ABBREVIATIONS:

Airspace Organization and Management

Demand and Capacity Balancing

Aerodrome Operations

Traffic Synchronization

Conflict Management

Airspace User Operations

ATM Service Delivery Management

AOM

DCB

AO

TS

CM

AUO

ATMSDM

IMPROVEMENT OF THE MID ATS ROUTE STRUCTURE

- GPI-1: FLEXIBLE USE OF AIRSPACE**
GPI-4: ALIGNMENT OF UPPER AIRSPACE CLASSIFICATIONS
GPI-5: RNAV AND RNP (PERFORMANCE-BASED NAVIGATION)
GPI-7: DYNAMIC AND FLEXIBLE ATS ROUTE MANAGEMENT
GPI-8: COLLABORATIVE AIRSPACE DESIGN AND MANAGEMENT

Strategic Objectives	Actions	Description/Tasks	Target Date	Initiated by	Benefits	Status
A, C, D	Improvement of MID ATS routes structure	<ul style="list-style-type: none"> – Analyse the en-route ATS route structure and implement identifiable improvements; – Increased accommodation of user-preferred flight profiles; – Monitor planning and implementation process. 	2009	ICAO, States, users	<ul style="list-style-type: none"> – Shorter routes/reduced travel times – Increased airspace capacity and efficiency – Reduced fuel consumption – Reduced environmental impact 	
A, C, D	Implement Flexible Use of Airspace (FUA) Concept	<ul style="list-style-type: none"> – Conduct Regional review of special use of airspace; – Remove large tracts of permanent restricted airspace; – Establish civil/military coordination bodies at national level; – Implement collaborative civil/military airspace planning at national level; – Increase role of civil/military coordination forums; – Implement dynamic and flexible ATS routes structure concept. – Monitor implementation 	2010	ICAO, States, users	<ul style="list-style-type: none"> – Improved safety – Shorter routes/reduced travel times – Increased airspace capacity and efficiency – Reduced fuel consumption – Reduced environmental impact 	

4C1-3

Strategic Objectives	Actions	Description/Tasks	Target Date	Initiated by	Benefits	Status
A, E	Implement Regional ATM contingency planning	<ul style="list-style-type: none"> – Define route schemes for contingency situations; – Promulgation of contingency plans. 	2008	States, ICAO, users	Ensure continuity and safety of air transport	
A, C, D	Collaborative airspace design and management	<ul style="list-style-type: none"> – Collaboration with users and adjacent airspaces on airspace design and management; – Extend the implementation of RNAV 5 areas to cover the whole airspace in the MID Region above FL 195; – Reorganize the MID airspace to ensure application of a common airspace classification in the upper airspace, above an agreed common level. 	2009	ICAO, States, users	<ul style="list-style-type: none"> – Improvement in safety; – Improved airspace capacity; – Improved interoperability and seamlessness; – Reduced fuel consumption; – Reduced environmental impact. 	

RVSM OPERATIONS IN THE MID REGION

GPI-2: REDUCED VERTICAL SEPARATION MINIMA

Strategic Objectives	Actions	Description/Tasks	Target Date	Initiated by	Benefits	Status
C, D	Ensure safe RVSM operations in the MID Region	<ul style="list-style-type: none"> – Monitor/follow-up RVSM operations in the MID Region; – Ensure MID RMA operations continuity; – Plan for the implementation of RVSM in Baghdad and Kabul FIRs; – Follow-up/coordinate RVSM implementation/operations in adjacent regions. 	2009	ICAO, States, MID-RMA	<ul style="list-style-type: none"> – Increased airspace capacity and efficiency; – Reduced fuel consumption; – Reduced environmental impact. 	

DECISION SUPPORT AND IMPROVEMENT OF SITUATIONAL AWARENESS

GPI-9: SITUATIONAL AWARENESS
GPI-16: DECISION SUPPORT AND ALERTING SYSTEMS
GPI-17: DATA LINK APPLICATIONS
GPI-19: METEOROLOGICAL SYSTEMS

Strategic Objectives	Actions	Description/Tasks	Target Date	Initiated by	Benefits	Status
A, D	Implement an IFPS in the MID Region	<ul style="list-style-type: none"> -Develop a feasibility study; - Define the legal framework for the MID IFPS; - Commitment of States through the signature of MOU; - Agreement on a funding mechanism; - Implementation and operation of the MID IFPS 	2010	Bahrain, States, ICAO	<ul style="list-style-type: none"> - Reduce the number of occurrences of non-receipt of FPLs and associated ATS messages; - Improved planning and coordination between adjacent Centres; - Improved safety and efficiency. 	
A, D	Improve surveillance and air/ground data link services	<ul style="list-style-type: none"> - Implement ATS data link surveillance technologies, ADS-B, CPDLC, etc., where applicable ; - Exchange of radar data between adjacent Centres, - Implement automation in coordination tasks between adjacent Centres/Sectors 	2010	ICAO, States, Users	<ul style="list-style-type: none"> - Improvement in safety; - Reduced workload for both pilots and controllers; - Improved efficiency. 	

A	Implement operations decision support and alerting systems	<ul style="list-style-type: none"> – Implement ground air electronic warnings, as needed for short and for long term conflict predictions: + ACAS II + MSAW + DAIW – Implement D-ATIS, where applicable. 	2009	ICAO, States	<ul style="list-style-type: none"> – Improved safety; – Reduction in risk of CFIT; 	
A	Provision of eTOD	<ul style="list-style-type: none"> – Promote the awareness about the requirements for the provision of electronic Terrain and Obstacle Data (eTOD); – Analyse eTOD requirements develop a common understanding of the requirements (needs in terms of data format, temporality, cross-border harmonisation, etc); – Develop a MID Region eTOD implementation strategy and action plan; – Harmonize, coordinate and support the eTOD implementation activities on a regional basis; – Provide eTOD. 	2009	ICAO, States	<ul style="list-style-type: none"> – Improved safety; – Reduction in risk of CFIT; 	
A, D	Provision of MET information	<ul style="list-style-type: none"> – Implement D-VOLMET, where applicable; – Provision of OPMET information from automated ground-based meteorological systems (automated low-level wind shear alerts and RWY wake vortex reports, hazardous weather phenomena). 	2010	States	<ul style="list-style-type: none"> – Improved safety; – Improved efficiency. 	

4C1-7

ENHANCEMENT OF MID STATES' TMA MANAGEMENT

- GPI-1: FLEXIBLE USE OF AIRSPACE**
- GPI-5: RNAV AND RNP (PERFORMANCE-BASED NAVIGATION)**
- GPI- 8: COLLABORATIVE AIRSPACE DESIGN AND MANAGEMENT**
- GPI-10: TERMINAL AREA DESIGN AND MANAGEMENT**
- GPI-11: RNP AND RNAV STANDARD INSTRUMENT DEPARTURES (SIDS) AND STANDARD TERMINAL ARRIVALS (STARS)**
- GPI-12: FUNCTIONAL INTEGRATION OF GROUND SYSTEMS WITH AIRBORNE SYSTEMS**
- GPI-20: WGS-84**
- GPI-21: NAVIGATION SYSTEMS**

Strategic Objectives	Actions	Description/Tasks	Target Date	Initiated by	Benefits	Status
A, C, D	Improve TMA capacity and efficiency	<ul style="list-style-type: none"> – Collaboration with users on TMA design and management; – Increased accommodation of user-preferred flight profiles; – Remove, as much as possible, permanent restricted airspace close to airports and carry out strategic coordination and dynamic interaction with the military to improve TMA capacity; – Finalize implementation of WGS-84; – Develop MID Region PBN Strategy; – Develop and implement optimized RNP and RNAV SIDs, STARS and approach procedures in accordance with the PBN concept, taking into consideration aircraft capabilities; – Develop and implement GNSS procedures for Non-Precision Approaches and approaches with vertical guidance (APV). 	2010	ICAO, States, Users	<ul style="list-style-type: none"> – Improvement in safety – Increased airspace capacity and efficiency; – Efficient flight trajectories; – Reduction in CFIT; – Reduced fuel consumption; – Reduced environmental impact. 	

Strategic Objectives	Actions	Description/Tasks	Target Date	Initiated by	Benefits	Status
C, D	Plan for the implementation of Continuous descent procedures and unrestricted climb departure procedures	<ul style="list-style-type: none"> – Enable optimal application of advanced technologies including FMS based arrival procedures; – Develop a plan for the implementation of continuous descent procedures; – Develop a plan for the implementation of unrestricted climb departure procedures. 	2011	States, Users, ICAO	<ul style="list-style-type: none"> – Efficient flight trajectories; – Increased airspace efficiency; – Reduced fuel consumption; – Reduced environmental impact. 	

ENHANCEMENT OF AERODROME INFRASTRUCTURE AND MANAGEMENT

GPI-13: AERODROME DESIGN AND MANAGEMENT
GPI-15: MATCH IMC AND VMC OPERATING CAPACITY

Strategic Objectives	Actions	Description/Tasks	Target Date	Initiated by	Benefits	Status
A, D	Implement collaborative aerodrome SARPs and safety management (13)	<ul style="list-style-type: none"> – Establish collaborative bodies with ATM, aircraft operators and aerodrome operators for developing plans to increase aerodrome capacity to meet the actual air traffic or forecast demand – Implement aerodrome ground infrastructure commensurate with operational expectations including operations of new larger aircrafts at existing aerodromes, – Implement, where warranted, precise surface guidance to and from a runway to improve capacity and efficiency, – Implement collaborative aerodrome operational procedures with ATM, ground services providers and associated operations support services – Develop, Implement and make available to ATM at aerodromes a positioning system for all vehicles and aircrafts operating on the movement area on a cost-benefit basis. – Implement advance surface movement guidance and control, associated procedures and implement electronic conflict alert systems, as required. – Implement safety management system at aerodromes 	2010	ICAO, States, Users	<ul style="list-style-type: none"> – Improvement in safety – more efficient use of aerodrome resources and ground handling – Increased aerodrome capacity and efficiency – allow minimal and precise ATFM measures to be applied – reduction in delays and higher predictability of flight schedules – increased ability to safely manoeuvre in all weather conditions 	

IMPROVEMENT OF STATE’S AERODROME OPERATIONS

GPI-14: RUNWAY OPERATIONS
GPI-15: MATCH IMC AND VMC OPERATING CAPACITY

Strategic Objectives	Actions	Description/Tasks	Target Date	Initiated by	Benefits	Status
A	Implement procedures and technologies to enhance the performance of runway operations and optimize runway capacity	<ul style="list-style-type: none"> – Undertake analysis to determine most favourable ATM factors and measures (procedures, management, etc) for runway capacity optimization – Establish collaborative bodies with ATM, aircraft operators and aerodrome operators for implementing plans and measures aimed at prevention of runway incursion – Develop and implement a runway physical characteristics maintenance programme – Implement, where warranted, precise surface guidance to and from a runway to improve capacity and efficiency 	2010	ICAO, States	<ul style="list-style-type: none"> – Improvement in safety – Reduction in runway incursion – reduce runway occupancy time and maximize runway capacity – Enhance the performance of runway operations – Increased aerodrome capacity and efficiency 	

**IMPROVEMENT OF THE QUALITY AND EFFICIENCY OF AERONAUTICAL INFORMATION SERVICES
 PROVIDED BY MID STATES**

GPI-18: AERONAUTICAL INFORMATION

Strategic Objectives	Actions	Description/Tasks	Target Date	Initiated by	Benefits	Status
A, D	Provide timely and quality assured aeronautical information to users	<ul style="list-style-type: none"> – Improve the compliance with the AIRAC system; – Advance posting of the AIRAC information on the web; – Use of email to enhance the communication between the AIS community in the MID Region; – Implement AIS automation in order to ensure availability, sharing and management of electronic aeronautical information; – Complete the implementation of Quality Management Systems (QMS); – Monitor implementation progress. 	2009	States, ICAO	<ul style="list-style-type: none"> – Improved safety; – Improved planning and management of flights; – Efficient use of airspace. 	

IMPLEMENTATION OF GNSS IN THE MID REGION

GPI-21: NAVIGATION SYSTEMS
GPI-23: AERONAUTICAL RADIO SPECTRUM

Strategic Objectives	Actions	Description/Tasks	Target Date	Action by	Benefits	Status
C, D	Implement GNSS	<ul style="list-style-type: none"> – Carry out GNSS trials, demonstrations and test beds; – Determine the most appropriate augmentation system for the MID Region based on cost-benefit analysis; <ul style="list-style-type: none"> a- Implement GNSS for En-route; b- Implement GNSS for NPAs; – Introduce, in an evolutionary manner, the use of GNSS with appropriate augmentation system in the MID Region; – Monitor implementation progress. 	2010	ICAO, States	<ul style="list-style-type: none"> – Optimal use of advanced technologies; – Operational Efficiency; – Reduction in environmental impact. 	
A, D	Implement Radio Spectrum Management and processes to protect the aeronautical spectrum	<ul style="list-style-type: none"> – Ensure Regional coordination for the protection of the aviation spectrum at WRC2007, and beyond – Disseminate ICAO policy statements of requirements for aeronautical radio frequency spectrum; – Implement frequency spectrum management. 	2009	ICAO, States	<ul style="list-style-type: none"> – Assurance of aviation spectrum – Administer the use of the allocated aviation spectrum 	

IMPROVEMENT OF COMMUNICATION INFRASTRUCTURE

GPI-17: DATA LINK APPLICATIONS
GPI-22: COMMUNICATION INFRASTRUCTURE

Strategic Objectives	Actions	Description/Tasks	Target Date	Action by	Benefits	Status
A, D	Implement communication infrastructure to support voice and data communication	<ul style="list-style-type: none"> – Follow up on the implementation of the Aeronautical Fixed Services (AFS) – Follow up the implementation on voice communications – Migrate from AFTN/CIDIN to AMHS – Implement high speed digital circuits between main centres – Monitor the implementations – Follow up the developments in the Panels – Implement harmonally the appropriate developments. 	2010	ICAO, States	<ul style="list-style-type: none"> – Improved safety – Improvement in operational efficiency – Better coordination 	
D	Implementation of ATN in the MID region	<ul style="list-style-type: none"> – Develop Regional ATN Planning document – Review of ATN implementation problems and develop coordinated solutions – Develop ATN Operation procedures – Develop conformance procedures and check list for AMHS and ATN routers 	2010	ICAO, States	<ul style="list-style-type: none"> – Optimal usage of advanced technologies – Increase the use of the data – Better cost effective integrations – Easier in maintenance and operation 	

		<ul style="list-style-type: none"> – Develop Information Security policy – Develop information Security Guidance – Coordinate and monitor implementation to be harmonized and interoperable globally; – Follow-up activities of panels and other regions. 				
	Implement advanced technologies to support data link services	<ul style="list-style-type: none"> – Identify & implement selected, harmonized data links to ensure interoperability between States and Regions; – Implement available technologies in support of and to facilitate ground and airborne applications (CPDLC, ADS, D-ATIS) 	2010	ICAO, States	<ul style="list-style-type: none"> – Reduce work load for pilot and controllers – Seamless interoperable operation – Efficient linkage between ground and airborne systems 	
A,D	Implement MID VSAT network	<ul style="list-style-type: none"> – Identify States requirement; – Signature of MOU by concerned States; – Explore technical cooperation for establishing a mechanism for progress; – Harmonize the implementation of VSAT Network; – Monitor the implementation. 	2010	ICAO, States	<ul style="list-style-type: none"> – Eliminate many communication deficiencies thus Increase safety – Robust network – Easier development and management – Support new CNS/ATM technologies 	

NOTE:

- **GPI-3:** Harmonization of Level Systems: Not Applicable to the MID Region
- **GPI-6:** Air Traffic Flow Management: Not reflected

GNSS TF/6
Report on Agenda Item 5

**REPORT ON AGENDA ITEM 5: GNSS AND NAVIGATION SYSTEM IMPLEMENTATION IN
THE MID REGION**

5.1 Under this Agenda Item the meeting noted that many GNSS activities are taking place in the MID Region. In this context, Saudi Arabia updated the meeting that a committee for all activities of the implementation of GNSS consists of System Engineers, Air Traffic Controllers, Aviation Safety Specialists, and Saudi Arabian Airlines was established and a strategy for the implementation of GNSS was prepared and approved by the executives in Civil Aviation. The GNSS (GPS) implementation steps in Saudi Arabia will be as follows:

1. Preparation for GNSS implementation
2. Implementation of GNSS for Non-Precision Approaches
3. Implementation of GNSS for En-route Navigation
4. Implementation of GNSS for Terminal Operations
5. Implementation of GNSS for Precision Approaches
6. Analyze and review the structure of Saudi Arabian Airspace based on GNSS

5.2 The meeting was advised that GNSS implementation in Saudi Arabia shall consider all the requirements of the GNSS implementation specially ICAO requirements i.e. the global plan and regional plans. It was highlighted that the project scope of work covers trainings, among the other essentials elements in the project. The meeting further noted that after the completion of the ongoing navigation aids projects there will be no installation/replacement project of any new conventional navigation aids facilities, in Saudi Arabia.

5.3 Saudi Arabia further updated the meeting that the implementation committee drafted the project's Request for Proposal which was announced as a public tender, the committee carried out the evaluation of the tenders and the contract was signed with the contractor. Kick off meeting was conducted with the contractor in which all activities were defined. The data collection and site surveys are to be done by the contractor for candidate airports along with the design of the GNSS Non Precision Approach (NPA) flight procedures.

5.4 The meeting was informed by IFALPA that they are willing to provide any assistance/participation to Saudi Arabia or other States in there projects when needed. IATA also informed the meeting on the possibility of providing the Air Traffic Controllers training.

5.5 The meeting noted that the CNS/ATM/IC SG3 held in Cairo 12- 14 Feb 2007 updated the GNSS strategy for the MID Region and the synopsis which defined the three implementation phases; Phase One (up to 2010), Phase Two (2011 to 2015) and Phase Three (2016 onwards) which was approved by MIDANPIRG/10 under Conclusion 10/9: *Revised Strategy for the implementation of GNSS in the MID Region.*

5.6 The meeting when reviewing the Strategy was of the view that it needs to be further improved to include the PBN concept, ionosphere effects on GNSS and other operational aspect for the transition period and agreed to the revised Strategy as at **Appendix 5A** to the Report on Agenda Item 5. Accordingly, the meeting agreed to the following Draft Conclusion:

***DRAFT CONCLUSION 6/5: REVISED STRATEGY FOR THE IMPLEMENTATION OF
GNSS IN THE MID REGION***

*That, the Revised Strategy for implementation of GNSS in the MID Region to be as at
Appendix 5A to the Report on Agenda Item 5.*

GNSS TF/6
Report on Agenda Item 5

5.7 The meeting agreed that the *Strategy for the implementation of the GNSS in the MID Region* and the *check list for the introduction of GNSS based operation* to be posted on the MID ICAO e-Document portal after approval and to be used as guidance the Region which will enhance the coordination and implementation procedures.

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

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

Considering:

- a) That safety is the highest priority.
- b) That elements of Global Air Navigation Plan on GNSS and requirements for the GNSS implementation will be incorporated into the CNS part of FASID.
- c) That GNSS Standards and Recommended Practices (SARPs), PANS and guidance material for GNSS implementation are available.
- d) That regional augmentation systems include both satellite-based and ground-based systems.
- e) That human, environmental and economic factors will affect the implementation.
- f) The availability of the level of user equipage.
- g) The development of GNSS systems including satellite constellations and improvement in system performance.
- h) The airworthiness and operational approvals allowing the current GNSS applied for en-route and non-precision approach phases of flight without the need for augmentation services external to the aircraft.
- i) The development status of aircraft-based augmentation systems.
- j) The effects of ionosphere
- k) The development of the PBN concept and the availability of PBN guidance material

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

- 1) There should be an examination of the extent to which the GNSS system accessible in the Region can meet the navigational requirements of ATM service providers and aircraft operators in the Region.
- 2) Evolutionary introduction of GNSS Navigation Capability should be consistent with the Global Air Navigation Plan.
- 3) Implementation should be in full compliance with ICAO Standards and Recommended Practices and PANS.
- 4) Introduce the use of GNSS for navigation in remote/oceanic areas.

- 5) Introduce the use of GNSS with appropriate augmentation systems, as required, for en-route navigation, non-precision approach, APV BaroVNAV, APV I and APV II.
States and airspace users take note of the available and upcoming SBAS navigation services providing for APV operations and take necessary steps towards installation and certification of SBAS capable avionics.
- 6) Any external augmentation system deemed necessary for the implementation of GNSS for a particular flight phase in an area under consideration (SBAS/GBAS including ground-based regional augmentation system) should be implemented in full compliance with ICAO SARPs.

States, in their planning and introduction of GNSS services, take full advantage of future benefits accrued from using independent core satellite constellations, other GNSS elements and their combinations, and avoid limitations on the use of specific system elements.
- 7) Introduction of GNSS for enroute, terminal, approach and departure navigation. States should coordinate to ensure that harmonized separation standards and procedures are developed and introduced concurrently in adjacent flight information regions along major traffic flows to allow for a seamless transition to GNSS based navigation.

States should to the extent possible work co-operatively on a multinational basis to implement GNSS in order to facilitate seamless and inter-operable systems and undertake coordinated R&D programmes on GNSS implementation and operation
- 8) States consider segregating traffic according to navigation capability and granting preferred routes to aircraft with better navigation performance with the exception to State aircraft.
- 9) States undertake a coordinated R & D program on GNSS implementation and operation.
- 10) ICAO and States should undertake education and training programs to provide necessary knowledge in GNSS theory and operational application.
- 11) States establish multidisciplinary GNSS implementation teams, using section 5.2.2 and Appendix C of ICAO Document 9849, GNSS Manual.
- 12) States, in their planning for implementation of GNSS services, provide effective spectrum management and protection of GNSS frequencies to reduce the possibility of unintentional interference.
- 13) A synopsis of the MID Strategy is in **Attachment 1**.

GNSS TF/6
Report on Agenda Item 6

REPORT ON AGENDA ITEM 6: FUTURE WORK PROGRAMME

6.1 Under this Agenda Item, the meeting recalled MIDANPIRG/10 *Decision 10/11 Revised Terms of Reference and Work Programme for the GNSS Task Force* which is in support of increasing the efficiency and effectiveness of ICAO including the Regional Air Navigation Planning and Implementation Groups (PIRGs). The meeting noted that ICAO initiated the development of a Business Plan along with performance measures for the Organization. The Business Plan is designed to translate the six Strategic Objectives of the Organization into action plans and ensure a link between planned activities, organizational cost and performance assessment.

6.2 The meeting noted that the Terms of Reference (TOR) of the Task Force needs to be updated as a result of the changing aviation environment and reviewed/updated its TOR as at **Appendix 6A** to the Report on Agenda Item 6. Accordingly, the meeting agreed to the following Draft Decision:

DRAFT DECISION 6/6: REVISED TOR OF THE GNSS TASK FORCE

That, the terms of reference and work programme of the GNSS TF be updated as at Appendix 6A to the Report on Agenda Item 6.

6.3 In accordance with the ICAO Business plan and the requirements for performance monitoring, the meeting developed a draft follow-up Action Plan as at **Appendix 6B** to the Report on Agenda Item 6.

6.4 In accordance with the MIDANPIRG Procedural Handbook and based on its TOR and Action Plan/Work Programme, the meeting agreed that the date of its next meeting be determined by the ICAO MID Regional Office in coordination with the Chairperson of the Task Force.

6.5 The meeting then agreed on the provisional agenda for the GNSS TF/7 Meeting as at **Appendix 6C** to the Report on Agenda Item 6.

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

**GLOBAL NAVIGATION SATELLITE SYSTEMS TASK FORCE
(GNSS TF)**

REVISED TERMS OF REFERENCE AND WORK PROGRAMME

1. TERMS OF REFERENCE

In accordance with the operational concept and general planning principles of the global air navigation plan for, the GNSS Task Force shall:

- 1) Monitor necessary studies, demonstrations, trials, test beds and cost benefit analyses related to the use of GNSS for all phases of flight in the MID region.
- 2) Monitor the progress of updated studies, projects, trials and demonstrations by the MID Region States, and information available from other Regions.
- 3) Develop a coordinated strategy/plan for the implementation of GNSS in the MID region in an evolutionary manner, taking into consideration the new CNS technologies and the requirements and expectations of the airspace users and ATM partners.
- 4) Provide a forum for active exchange of information between States related to the implementation of GNSS.
- 5) Identify deficiencies and constraints that would impede implementation of GNSS, and propose solutions that would facilitate the rectification of such problems.
- 6) Identify and address as appropriate, possible sources of funding to facilitate GNSS implementation in the MID Region.
- 7) Identify and address, to the extent possible, institutional financial and legal matters related to the GNSS implementation in the MID Region.
- 8) Develop a system of post-implementation reviews to ensure the effective and safe introduction of GNSS operation.
- 9) Develop guidance material and processes covering the operational approval of GNSS.

2. WORK PROGRAMME

Ref	Tasks	Priority	Target Completion Date
1	Monitor the progress achieved related to the feasibility study pertaining to the possible use of EGNOS as GNSS augmentation system in the MID Region.	A	2008
2	Monitor the study related to the possible use of WAAS as GNSS augmentation system in the MID Region.	B	2008
3	Monitor the progress of the NAVISAT study.	A	2008
4	Follow up the progress achieved in GNSS activities in adjacent regions.	B	2008
5	Review and identify intra and inter regional co-ordination issues related to the implementation of GNSS and where appropriate recommend actions to address those issues.	B	2008
6	Examine to what extent the GNSS system accessible in the Region can meet the navigational requirements of ATM service providers and aircraft operators in the Region.	B	Ongoing
7	Identify and co-ordinate GNSS implementation priorities in the MID Region.	A	2009
8	Provide assistance to States in planning and implementation of GNSS in the MID Region including the development of GNSS procedures.	B	2008
9	Suggest ways and means for rectifying the problems as they arise related to the implementation of GNSS.	B	2008
10	Provide necessary knowledge in GNSS operational application.	B	2009
11	Assist States to establish proper training and education programmes related to the implementation of GNSS.	B	2008

3. PRIORITIES

- A High priority tasks, on which work should be speeded up.
- B Medium priority tasks, on which work should begin as soon as possible, but without detriment to priority A tasks.

4. COMPOSITION

The GNSS Task Force is composed of the 15 MID Region Provider States, IATA, IFALPA, EUROCONTROL, and additional representative from International / regional organizations may be invited when required.

GNSS TF/6
 Appendix 6B to the Report on Agenda Item 6

**GNSS TASK FORCE
 DRAFT FOLLOW-UP ACTION PLAN**

DRAFT CONC/DEC NO. --- STRATEGIC OBJECTIVE	TITLE OF CONCLUSION/DECISION	TEXT OF CONCLUSION/DECISION	FOLLOW-UP ACTION	TO BE INITIATED BY	DELIVERABLE	TARGET DATE
Dec. 6/1 D and E	MID Checklist for GNSS Based Operation	That, MID States introducing GNSS-based operations use the guidance checklist as shown at Appendix 4B to the Report on Agenda Item 4.	Monitor Implement	States GNSS TF	GNSS Implementation Plan	June 2008
Conc. 6/2 D	Use of Project Management Methodology for Implementation of GNSS	That, MID States are encouraged to use the “Project Management” methodology software for the follow-up and update of the tasks related to implementation of GNSS in their States.	Updates to Project Plan	States GNSS TF	Project document (support when needed)	Ongoing
Conc. 6/3 A and D	Proliferation of Operational Approval Requirements	That, in order to avoid proliferation of operational approval requirements, MID States implement PBN using ICAO SARPs and guidance material.	Harmonized Implementation of PBN	States ICAO	PBN Plan Seminars	December 2009 November 2007
Conc. 6/4 D	GNSS Cost Allocation Policy	That, MID States consider ICAO provisional policy guidance on GNSS cost allocation in the course of discussions and negotiations with GNSS service providers.	Monitor	States GNSS TF	Fair Cost Allocation (support when needed)	Ongoing
Conc. 6/5 D and E	Revised Strategy for the Implementation of GNSS in the MID Region	That, the Revised Strategy for implementation of GNSS in the MID Region to be updated as at Appendix 5A to the Report on Agenda Item 5.	Monitor	ICAO States GNSS TF	Implement Strategy	June 2008

**GNSS TF/6-REPORT
APPENDIX 6B**

6B-2

DRAFT CONC/DEC NO. --- STRATEGIC OBJECTIVE	TITLE OF CONCLUSION/ DECISION	TEXT OF CONCLUSION/DECISION	FOLLOW-UP ACTION	TO BE INITIATED BY	DELIVERABLE	TARGET DATE
Dec. 6/6 D	Revised TOR of the GNSS Task Force	That, the terms of reference and work programme of the GNSS TF be updated as at Appendix 6A to the Report on Agenda Item 6.	Conduct tasks	GNSS TF	GNSS TF/7 Report	June 2008

GNSS TF/6
Appendix 6C to the Report on Agenda Item 6

**SEVENTH MEETING OF GNSS TASK FORCE
(GNSS TF/7)**

Cairo, June 2008

PROVISIONAL AGENDA

- Agenda Item 1: Adoption of the Provisional Agenda
- Agenda Item 2: Follow-up action on MIDANPIRG Conclusions and Decisions related to GNSS matters
- Agenda Item 3: GNSS Trials and Demonstrations in the MID Region
- 3.1 Progress of demonstration in the MID Region
 - 3.2 NAVISAT progress report
- Agenda Item 4: Recent Developments and Researches
- Agenda Item 5: GNSS and Navigation System Implementation in the MID Region
- 5.1 Review of GNSS and Navigation systems Implementation in the MID Region
 - 5.2 Strategy for GNSS implementation
- Agenda Item 6: Future Work Programme
- Agenda Item 7: Any other business

GNSS TF/6
Report on Agenda Item 7

REPORT ON AGENDA ITEM 7: ANY OTHER BUSINESS

7.1 The meeting wished the elected Chairperson all success in his new responsibilities and assured him that all support will be provided to enable him execute his duties smoothly.

GNSS TF/6
Attachment A to the Report

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