INTERNATIONAL CIVIL AVIATION ORGANIZATION

THIRD MEETING OF THE AFI CNS/ATM IMPLEMENTATION COORDINATION SUB-GROUP (CNS/ATM/IC/SG/3)

(Nairobi, 27 - 30 March 2001)

REPORT

Prepared by the ESAF Office March 2001

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Glossary of Terms

ACAS	Airborne Collision Avoidance System
ACC	Area Control Centre
ADS	Automatic Dependent Surveillance
AFI	Africa - Indian Ocean
AFS	Aeronautical Fixed Service
AFTN	Aeronautical Fixed Telecommunication Network
AIC	Aeronautical Information Circular
ALLPIRG	All Planning and Implementation Groups
AMS(R)S	Aeronautical Mobile-Satellite (R) Service
AMSS	Aeronautical Mobile-Satellite Service
APIRG	AFI Planning and Implementation Regional Group
APR	Automatic position reporting
APV	Approach with vertical guidance
AR	Area of Routing
ASECNA	Agency for the Security of Aerial Navigation in Africa and Madagascar
ATC	Air Traffic Control
ATM	Air Traffic Management
ATN	Aeronautical Telecommunication Network
ATS	Air Traffic Services
CEMAC	Economic and Monetary Community of Central African States
CIDIN	Common ICAO Data Interchange Network
CNS	Communications, Navigation, and Surveillance
CPDLC	Controller pilot data link communications
DME	Distance Measuring Equipment
ECA	Economic Commission for Africa
ECAC	European Civil Aviation Conference
ECOWAS	Economic Community of West African States
EGNOS	European Geostationary Navigation Overlay System
ESAF	Eastern and Southern African
EUROCONTROL	European Organization for the Safety of Air Navigation
FAA	Federal Aviation Administration
FANS	Future air navigation system
FIR	Flight Information Region
GBAS	Ground-based augmentation system
GLONASS	Global Orbiting Navigation Satellite System (Russian Federation)
GNSS	Global Navigation Satellite System
GPS	Global Positioning System (United States)
HF	High Frequency
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
ICG	Implementation Coordination Group
IFR	Instrument Flight Rules
ILS	Instrument Landing System
IMO	International Maritime Organization
INMARSAT	International Mobile Satellite Communications Organization
IORRA	Indian Ocean Random Routing Area
ITU	International Telecommunication Union
MODE S	Mode S - SSR Data Link
MSAW	Minimum Safe Altitude Warning System
MTSAT	Multi-Functional Transport Satellite (Japan)
NPA	Non precision approach
RAIM	Receiver Autonomous Integrity Monitoring
RNAV	Area Navigation
RNP	Required Navigation Performance
RVSM	Reduced vertical separation minima
SADC	Southern Africa Development Community
SARPs	Standards and Recommended Practices
SAT/9	Nineth Meeting for the Improvement of Air Traffic Services over the South Atlantic

SATCOM	Satellite Communication
SATMA	South Atlantic Monitoring Agency
SITA	Société Internationale de Télécommunications Aéronautiques
SSR	Secondary Surveillance Radar
TMA	Terminal Control Area
VDL	VHF data link
VFR	Visual Flight Rules
VHF	Very High Frequency
VOR	VHF Omnidirectional Radio Range
WAAS	Wide Area Augmentation System
WACAF	Western and central African
WGS-84	World Geodetic Reference System 1984

PART ONE: HISTORY OF THE MEETING

1. Duration and Site

1.1 The Third meeting of the CNS/ATM Implementation Co-ordination Sub-group (CNS/ATM/IC/SG/3) of the AFI Planning and Implementation Regional Group (APIRG) was held in the conference room of the ICAO Eastern and Southern Africa Office, Nairobi, from 27 to 30 March 2001

2. Officers and Secretariat

2.1 The Meeting was chaired by the Second Vice-Chairman of the Sub-group, Mr. Barsoum Mikhail of Egypt.

2.2 Mr. Amadou Sene, RO/CNS, ESAF, was the Secretary of the Meeting. He was assisted by:

Mr. Prosper Zo'o-Minto'o	RO/CNS, WACAF
Mr. Marcel Munyakazi	RO/ATM, ESAF
Mr. Tharcisse Masabarakiza	RO/CNS, ESAF

2.3 Mr. Lot Mollel, ICAO Regional Director for Eastern and Southern Africa, opened the meeting. In his address he emphasized the expectations of APIRG from the work of the Sub-group, the need to find solutions to the shortcomings and deficiencies in the air navigation field and the continuous development of a coherent AFI CNS/ATM Implementation Plan in harmony with ICAO Global Plan, and advised of the results of the Fourth Meeting of ALLPIRG.

3. Attendance

3.1 The meeting was attended by 53 delegates from 19 States (15 of which are members of the Sub-group) and 4 International Organizations (3 of which are members of the Sub-group).

3.2 The list of participants is at page ii-5.

4. Working Languages

4.1 English and French were used as working languages and the documentation was issued in both languages.

4.2 Simultaneous interpretation was provided free-lance interpreters.

5. Agenda and conduct of the Meeting

5.1 The Meeting adopted the following Agenda:

Agenda Item 1: Terms of reference and work programme as defined by APIRG/12

Agenda Item 2: Review of the status of implementation of Conclusions/Decisions of the previous meeting

Agenda Item 3: Review of the reports of ICGs and Status of implementation of the AFI CNS/ATM Plan

Agenda Item 4: Development of the Surveillance Plan for the AFI Region

Agenda Item 5: Review of the report of the GNSS Study Group

Agenda Item 6: Review and update of the AFI CNS/ATM Implementation Plan

Agenda Item 7: Briefing on CNS/ATM trials in the AFI Region

Agenda Item 8: Future work programme

Agenda Item 9: Any Other Business

6. **Draft Conclusions and Decisions**

6.1 The Sub-group records its action in the form of Draft Conclusions and Decisions with the following significance:

6.2 **Draft Conclusions**

6.2.1 Draft Conclusions, when approved by APIRG, deal with matters which in accordance with the APIRG terms of reference, directly merit the attention of States, or on which further action will be initiated by ICAO in accordance with established procedures.

6.3 **Draft Decisions**

6.3.1 Draft Decisions, when approved by APIRG, deal with matters of concern to the APIRG and its contributory bodies.

6.4. **List of Draft Conclusions**

No.	Title	Page
3/1	Data for the categorisation of TMAs and aerodromes	2-1
3/2	Implementation of WGS-84 airspace coordinates	2-2
3/3	Coordination between ATS providers and users in the implementation of CNS/ATM	2-2
3/4	Amendment to AFI SUPPs (Doc 7030)	2-3
3/5	Step by step approach in the CNS/ATM implementation	2-3
3/6	Early benefits to approved/certified operations	2-3
3/7	Establishment of national CNS/ATM bodies and designation of focal points of contact	2-3
3/8	Implementation of CNS/ATM within Areas of Routing AR-6 and AR-7	2-3
3/10	Promulgation of national airborne collision avoidance system (ACAS) policies	2-4
3/11	En route (FIR) Aeronautical Surveillance Plan for the AFI Region	2-5
3/12	AFI/EUR GNSS Test bed Working Group	2-6
3/13	AFI Test bed project document	2-6
3/14	Involvement of multimodal transport organizations in the AFI GNSS test bed trials	2-6
3/15	Contact with flight calibration organizations	2-6
3/16	Assistance for GNSS procedures design	2-6
3/17	Documentation for States	2-7
3/18	AFI GNSS Strategy	2-8

3/19	Adoption of a uniform format for the reporting of WGS-84 implementation	2-9
3/20	Initial implementation of RVSM in the AFI Region	2-10
3/22	Seminars/Workshops on RVSM and RNAV/RNP	2-10
3/23	Amendment of the AFI CNS/ATM Implementation Plan (Doc 003)	2-10

6.5 **List of Draft Decisions:**

No.	Title	Page
3/9	Coordination of ICGs	2-3
3/21	Establishment of a Task Force on RVSM and RNAV/RNP implementation	2-10
3/24	Egypt membership in the AFI GNSS Study Group	2-11
3/25	Egyptian NAVISAT Initiative	2-11
3/26	Information on the AFI GNSS Study Group's Meetings	2-11
3/27	Future work programme of the CNS/ATM/IC Sub-group	2-11

List of Participants/Liste des Participants
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PART TWO: REPORT ON THE AGENDA

2.1 Agenda Item 1: Terms of reference and work programme as defined by APIRG/12

2.1.1 Under this agenda item, the CNS/ATM/IC Sub-group noted its terms of reference and work programme as adopted by APIRG/12. The terms of reference and work programme are shown at **Appendix A** to the report. Angola was welcomed as a new member of the Sub-group.

2.1.2 The Meeting took also note of the AFI/7 RAN Conclusions 10/6, 13/1, 13/5 and Recommendation 11/1 which were forwarded by the APIRG.

2.2 Agenda Item 2: Review of the status of implementation of Conclusions/Decisions of the previous meeting

2.2.1 The Sub-group reviewed the status of implementation of the conclusions and decisions adopted at its second meeting, as shown in **Appendix B** to the report. It noted that most of them were either implemented or in progress.

2.2.2 With regard to APIRG Conclusion 12/45 - *National CNS/ATM bodies, Focal points of contact and ICG Co-ordinators*, the Meeting noted that little progress had been achieved and that the designated ICG Co-ordinators had not begun any work.

2.2.3 Algeria and Kenya presented papers on the organization and work programme of their national CNS/ATM bodies.

2.2.4 Concerning Decision 2/8- *Amendment to categorization of TMAs and Aerodromes in Doc 003, Appendix D*, the Meeting was informed that the task had not started because of lack of data required from States.

2.2.5 The Meeting then adopted the following draft conclusion.

Draft Conclusion 3/1: Data for the categorisation of TMAs and aerodromes

That States be urged to provide, before end of May 2001, the data shown at **Appendix C** to the report, in order to facilitate work on the categorisation of TMAs and aerodromes.

2.3 Agenda Item 3: Review of the reports of ICGs and Status of implementation of the AFI CNS/ATM Plan

2.3.1 Under this agenda item, the CNS/ATM/IC Sub-group reviewed the reports of the Implementation Co-ordination Groups (ICGs) for areas of routing (AR), AR1, AR2, AR4, AR5, AR6, AR7, AR9 and AR10 of the CNS/ATM Plan.

2.3.2 The Meeting noted that in AR1, intensive work was being carried out for the implementation of RNP 10 (in a 50 NM lateral route spacing environment) and RVSM. The target date for implementation is in 2002, pending the conclusive results of the safety assessment being carried out by Spain, the South Atlantic Monitoring Agency (SATMA), and the approval by ICAO of the amendment to the Regional Supplementary Procedures (Doc 7030).

2.3.3 With regard to AR4 the Meeting noted that significant progress was achieved with the implementation of fixed RNAV routes in FIRs Algiers, Brazzaville, N'Djamena and Niamey. FIR Johannesburg plans to implement the fixed RNAV routes in July 2001, and FIRs Gaborone and Luanda would implement later during 2001, after co-ordination.

2.3.4 Regarding extension of VHF coverage and provision of ATC, plans are underway in FIRs

Brazzaville, N'Djamena and Niamey for their progressive implementation from April 2001 to April 2002.

2.3.5 The Meeting was updated on plans to provide SSR and ADS/CPDLC based surveillance in N'Djamena FIR.

2.3.6 Regarding the AR10, the CNS/ATM/IC Sub-group meeting noted that in order to accommodate the introduction of flexible tracks between Johannesburg and Singapore, there was a necessity to amend the limits of the existing Indian Ocean Random Routing Area (IORRA). A draft AIP Supplement had been developed, which concerned States were to publish, after approval, on the AIRAC date of 22 March 2001 to be effective on 17 May 2001. Two concerned AFI States advised that they would publish on time and a third State indicated that they would publish the AIP with a delay of one AIRAC cycle. The Sub-group requested that the Secretariat follow the matter with all concerned FIRs.

2.3.7 The Meeting was informed that ADS/CPDLC was implemented in FIRs Antananarivo and Johannesburg Oceanic. FIR Mauritius planned to implement ADS/CPDLC during 2001.

2.3.8 The Meeting was informed that the Third EUR/AFI Interface Meeting held in Paris from 14 to 16 February 2001 reviewed developments in Europe concerning the implementation of RVSM, ACAS and 8.33 kHz VHF channel spacing. Regarding ACAS, the EUR/AFI Interface Meeting urged States concerned to promulgate national ACAS policies since no exemptions would be applicable in the EUR Region after 31 March 2001.

2.3.9 The CNS/ATM/IC Sub-group was informed that the EUR/AFI Interface Meeting, which had so far acted as the ICG for AR7, adopted a conclusion calling for the establishment of an Implementation Co-ordination Group specifically dedicated to the implementation of CNS/ATM in area of routing 7 (AR7). Following discussions, the Sub-group agreed to re-iterate its conclusion that APIRG entrust to the EUR/AFI Interface Meeting with the functions of ICG for AR7.

2.3.10 In discussing the role of ICG Co-ordinators, the Sub-group agreed that implementation of APIRG Conclusion 12/45 - *National CNS/ATM bodies, Focal points of contact and ICG Co-ordinators* was a pre-requisite before the ICG Co-ordinators could start their functions. It was agreed that ICAO, pending full implementation of Conclusion 12/45, would co-ordinate ICG activities in lieu of the ICG Co-ordinators.

2.3.11 The Meeting discussed ways to foster CNS/ATM implementation in the AFI Region. It was agreed to adopt a step by step approach giving priority to full implementation of VHF coverage, AFTN and ATS/DS circuits, area control service and 10 minute longitudinal separation. It was also agreed to provide early benefits to long haul operators which are adequately certified or approved in adjacent Regions by initially allocating them dedicated/segregated airspace without penalizing regional and domestic operators..

2.3.12 Taking into account the above discussions and information, the Meeting adopted the following draft Conclusions and Decision.

Draft Conclusion 3/2: Implementation of WGS-84 airspace coordinates

That States implement, as a matter of urgency, WGS-84 airspace coordinates to enable the use of GNSS as a primary means of navigation for en route in the AFI Region.

Draft Conclusion 3/3: Coordination between ATS providers and users in the implementation of CNS/ATM

That ATS providers and users coordinate before any decision to implement CNS/ATM systems which have a bearing on equipage is taken.

Draft Conclusion 3/4: Amendment to AFI SUPPs (Doc 7030)

That the AFI SUPPs (Doc 7030) be amended as follows:

a) Reduce longitudinal separation minima from 20 minutes to 10 minutes

b) Reduce Lateral separation from 100 NM (as is the case in the EUR/SAM corridor) to 50 NM (in RNP 10 environment), and eventually to 25/30 NM as appropriate (in RNP 5 environment)

c) Introduction of Longitudinal RNAV/RNP separation minima of 10 minutes and/or 80 NM RNAV derived distance in selected airspaces

Draft Conclusion 3/5: Step by step approach in the CNS/ATM implementation

That in the implementation of the new CNS/ATM concept in the region, a step by step approach be adopted starting with the ATM objectives which can be achieved in the short term with minimum CNS requirements or relatively low cost. In this regard, the following ATM objectives and CNS requirements should be given priority over the emerging concepts:

- VHF coverage;
- ATS/DS and AFTN circuits;
- area control service; and
- 10 minute longitudinal separation.

Draft Conclusion 3/6: Early benefits to approved/certified operations

That taking into account the equipage approval of transcontinental operators, early benefits be given to such operators as soon as possible by initially allocating them dedicated/segregated airspace, without penalizing regional and domestic operations.

Draft Conclusion 3/7: Establishment of national CNS/ATM bodies and designation of focal points of contact

That, as a matter of urgency, States which have not done so be requested to implement APIRG Conclusion 12/45 on the establishment of national CNS/ATM bodies and designation of focal points of contact, and notify ICAO Regional Offices of action taken in this respect. In doing so, they should refer to guidance provided by ICAO *(Circular 278-AN/164 - National Plan for CNS/ATM)*.

Draft Conclusion 3/8: Implementation of CNS/ATM within Areas of Routing AR-6 and AR-7

That:

a) the implementation of CNS/ATM within Area of Routing AR-6 be co-ordinated by the SAT Informal Group Meetings; and

b) the implementation of CNS/ATM within Area of Routing AR-7 be co-ordinated by the AFI/EUR Interface Meetings

Decision 3/9: Coordination of ICGs

That:

a) pending the implementation of APIRG Conclusion 12/45 by States, the ICAO Regional Offices be tasked with the coordination of ICGs; and

b) ICGs meetings continue to be combined as follows, taking into account affinities between Areas of Routing :

a) AR-1, AR-2, AR-6 (SAT Informal Meetings)
b) AR-3
c) AR-4
d) AR-5 and AR-9
e) AR-7 (AFI/EUR Interface Meetings)
f) AR-8 (SADC)
g) AR-10 (ICG10 Meetings)

Draft Conclusion 3/10: Promulgation of national airborne collision avoidance system (ACAS) policies

That all AFI/EUR Interface States promulgate without delay an AIC clearly stating their national ACAS II exemption policy, including Minimum Equipment List (MEL) exemptions

RVSM implementation in Tunis FIR

2.3.13 The Meeting was informed that Tunisia had joined the European RVSM programme since May 2000 and that the transition area was now in Tunis FIR instead of Rome FIR. Tunisia has already published two national regulations related to airspace and RVSM approval for airspace managers and national airlines. The target date for implementation is 24 January 2002.

Implementation of RNAV routes in Algiers FIR

2.3.14 The meeting noted that Algeria has implemented RNAV routes UM114; UM608; UM725; UM998 and UV508 in accordance with the provisions of he AFI and EUR Plans. It was pointed out that for the time being RNAV routes UM999; UA293; UA865 and UG979 could not be implemented.

Implementation of ADS/CPDLC in Antananarivo FIR

2.3.15 ASECNA informed the meeting of the implementation in January 2001 of a ADS/CPDLC system at Antananarivo. The system has a flight plan processing capability and will be used to process and display flextracks.

2.4 Agenda Item 4: Development of the Surveillance Plan for the AFI Region

2.4.1 The Sub-group recalled that at its second meeting it had reviewed and adopted a draft Aeronautical Surveillance Plan (ASP) for the AFI Region and requested that it be circulated to States before the APIRG/12 meeting. However many States did not received the ASP in time for comments. This led the APIRG/12 meeting to ask for further consultations.

2.4.2 The Meeting was informed that the ASP was re-circulated to States in May 2000 with a target date for replies by 29 September 2000. A total of 20 States had replied.

2.4.3 The Meeting noted the operational requirements for surveillance provided by the Fifth Meeting of the ATS/AIS/SAR Sub-group (Nairobi, 5 - 9 October 1998). It was agreed that surveillance requirements in TMAs needed to be reconfirmed with the results of the study on categorization of TMAs and Aerodromes (Decision 3/1 above refers).

2.4.4 The Meeting agreed to develop a first issue of the aeronautical surveillance plan based on the

en route requirements, which is composed of a table of surveillance systems and of a table of ATS automation systems. The following draft conclusion was adopted.

Draft Conclusion 3/11: En route (FIR) Aeronautical Surveillance Plan for the AFI Region

That:

a) the first issue of the Aeronautical Surveillance Plan (ASP) for the AFI Region comprise: the en route aeronautical surveillance systems table at **Appendix D** and of the ATS automation systems table at **Appendix E** ; and

b) the ASP be included in the AFI FASID.

Surveillance in Algiers FIR

2.4.5 Algeria updated the meeting on its surveillance plan. The northern par of its FIR from 32° to 39° North would be covered by 5 radars planned to be implemented between April and December 2001 and located at Algiers (MSSR and PSR), Annaba (MSSR), Oran (MSSR), El Bayadh (MSSR) and El Oued (MSSR). The southern part of the FIR is planned to be covered by ADS scheduled for implementation in 2003.

Tunisian radar system

2.4.6 Tunisia updated the meeting on its radar system. An additional SSR radar has been installed at Akouda to extend coverage and provide redundancy.

Statement by Ethiopia

2.4.7 Ethiopia made a statement which is reproduced at **Appendix F** to the report.

2.5 **Agenda Item 5: Review of the report of the GNSS Study Group**

2.5.1 Under this agenda item, the Meeting reviewed the report of AFI GNSS Study group on its activities. The Meeting reviewed WGS-84 implementation and adopted a format for reporting WGS-84 implementation status.

GNSS test bed

2.5.2 The Sub-group was briefed on activities of the Study Group relating to implementation of the GNSS test bed in the AFI Region. The Meeting was informed that there was the need to establish an AFI-EUR SBAS Working Group for the preparation of the test bed activities. The AFI and EUR partners had developed a preliminary work plan for the implementation of Phase I of the AFI GNSS strategy, which encompassed the deployment of an EGNOS test bed, the conduct of the trials and preparatory work for the definition of activities leading to the implementation of Phase II of the AFI GNSS strategy. Among the urgent tasks is the preparation of a project document to be submitted in June 2001 to the European Commission for the funding of the test bed.

2.5.3 The meeting was advised that, in order to enhance the usefulness and impact of GNSS test bed, activities should be extended to other modes of transport in the AFI region. Furthermore, with regard to trials in the AFI Region, the Sub-group identified the need to seek the participation of States and navigation service providers for the provision of test-bed resources (on-site facilities and services, flight calibration, design of GNSS-based approach procedures at locations where tests would be conducted, communications services, etc…).

2.5.4 In view of the above, the Meeting adopted the following draft conclusions.

Draft Conclusion 3/12 - AFI/EUR GNSS Test bed Working Group

That:

a) South Africa and ASECNA be the representatives of the AFI GNSS Study Group in the AFI/EUR GNSS test bed Working Group; and

b) States or navigation services providers , which want to support GNSS test bed activities, be invited to join the AFI/EUR GNSS test bed Working Group.

Draft Conclusion 3/13: AFI Test bed project document

That South Africa and ASECNA prepare a draft AFI test bed project document to be submitted by ASECNA in June 2001 to the European Commission for funding.

Draft Conclusion 3/14: Involvement of multimodal transport organizations in the AFI GNSS test bed trials

That contact be established with multimodal transport organizations in the AFI Region for their participation in the AFI GNSS test bed trials, as follows:

a) ICAO with IMO, ECA;
b) ATNS with SASAR (South African SAR Organization); and
c) ASECNA with ECOWAS and CEMAC.

Draft Conclusion 3/15: Contact with flight calibration organizations

That ICAO contact the operators of flight calibration aircraft in the AFI Region for their participation in the AFI GNSS test bed trials.

Draft Conclusion 3/16: Assistance for GNSS procedures design

That ICAO contact the following organizations to assist in designing GNSS-based approach procedures (NPA, APV-1, APV-2) at locations where trials will be conducted: Eurocontrol, FAA, French DGCA, ASECNA, ATNS, Dutch RLD.

Documentation on criteria for State approval of aircraft operations using GNSS

2.5.5 The Meeting recalled that the AFI/7 RAN Meeting adopted Conclusion 13/5, which, inter alia, requested that APIRG "*develop criteria for the approval of aircraft operations using GNSS, giving consideration to the needs of all phases of flight, for en route navigation in oceanic areas and continental areas and for terminal area navigation*". This task has been assigned to the GNSS Study Group for follow up.

2.5.6 The Meeting recognized that in order to implement GNSS, it will be necessary for all States to introduce any legislative and/or regulatory changes which may be needed in order to authorize the use of GNSS as a means of navigation within their airspace. There could be considerable variation in the nature of the amendments required, depending on the structure of the legislation and regulations in each State. For example, amendments could potentially be required to legislation or regulations relating to:

a) navigation of aircraft;

b) requirements for flight under IFR;

c) operations at night by VFR aircraft; and

d) operations by VFR aircraft on top of cloud.

2.5.7 This list is presented only as an example. Each State will have to make its own assessment of the areas where changes are needed.

Airworthiness and operational approval

2.5.8 The Meeting was aware that development and implementation of procedures for airworthiness and operational approval of GNSS is a State responsibility. It was noted that there is no ICAO guidance material available for these approval procedures.

2.5.9 There are a number of airworthiness and operational approval examples available from States which have already implemented GNSS procedures.

2.5.10 The FAA has published Advisory Circular AC 20-130 *Airworthiness Approval of GPS Navigation Equipment for use as VFR and IFR Supplemental Navigation System*. All GPS receivers used for IFR operations must be certified to FAA TSO C129a.

2.5.11 The FAA has published a very useful manual as a *Guide for the Approval of GPS receiver Installation and Operation"*. This document contains instructions for airworthiness and operations approval of GPS installations onboard aircraft. This document has been at several times distributed to participants at ICAO GNSS seminars.

2.5.12 In approving the use of GPS as a primary means long range navigation system (LRNS) in the NAT, the North Atlantic Systems Planning Group (NATSPG) recommended that States use FAA Notice 8110.60, *GPS as a primary means of navigation for oceanic/remote operations*, and the FAA Air Transportation Handbook Bulletin HBAT 95-09, *Guidelines for Operational Approval of Global Positioning System (GPS) to Provide the Primary Means of Class II Navigation in Oceanic and Remote Areas of Operation*, as reference material for developing their approval procedures.

2.5.13 The European Commission has published a *Manual for the Validation of GNSS in Civil Aviation* (MUSST). The document describes a methodology for a formal validation procedure for the entire GNSS from signal generation to signal processing including the use of the resulting information for navigation purposes.

2.5.14 The Meeting agreed that some of these documents could be made available to States. It was agreed that States would be provided with the Internet address of the bulky documents and be invited to request from the originators those available in hard copy form. In discussing the main impediments to AFI States in authorizing use of GNSS, the Group identified the lack of expertise in GNSS airworthiness and operational approval. The Meeting adopted the following draft conclusion.

Draft Conclusion 3/17: Documentation for States

That, further to AFI/7 RAN Conclusion 13/5, :

a) the following documentation be sent to States for their studies and use as appropriate for criteria on approving aircraft operations using GNSS:

- FAA N8110.60
- FAA Advisory Circular (AC No.20-130)

- FAA TSO-C129a

b) The European Commission *Manual for the Validation of GNSS in Civil Aviation* (MUSST) be made available on the ICAO web site; and

c) ICAO conduct workshops in AFI Region to sensitize States on the need and importance of airworthiness and operational certifications of on board equipment for GNSS operations.

Update of the AFI GNSS Strategy

2.5.15 The Meeting was aware that the augmentation systems being developed (EGNOS and WAAS) will not achieve the requirements for sole-means navigation. Furthermore, both systems are experiencing delays in their implementation schedules. WAAS is expected to be operational in 2002 over the continental USA and EGNOS will be available in late 2003 over the ECAC area. In addition, Europe is developing a civil satellite navigation constellation, Galileo, which will be available in the ECAC, at the earliest, around 2008, and about 2010 in the AFI Region.

2.5.16 In view of the above developments, the Meeting undertook a review and update of the AFI GNSS strategy. A three-phase approach was agreed:

Phase I (up to 2004)

- GNSS as a primary-means of navigation for en route
- GNSS as a supplemental-means for TMA and NPA
- Implementation of a test bed (up to 2003)
- Implementation and validation of SBAS to be operational at the end of Phase I (2004). This will allow APV-I to be available at the beginning of Phase II.

Phase II (from 2005 to 2011)

- APV-I, 20 m vertical accuracy available over the AFI Region
- GNSS sole-means for en route
- Decommissioning of en route Navaids
- GNSS sole-means for terminal areas
- Decommissioning of terminal Navaids (VOR/DME and NDB)
- ILS maintained at airports
- Development of Long term GNSS

Phase III (2012 onwards)

- Two GNSS constellations are available
- GNSS sole-means from en route to CAT-I landing
- Decommissioning of ILS Cat I
- CAT II/III requirements implemented by GBAS or SBAS.

2.5.17 The Meeting formulated amendments to the AFI GNSS strategy as shown in **Appendix G** to the report. The following draft conclusion was adopted.

Draft Conclusion 3/18: AFI GNSS Strategy

The AFI GNSS strategy be amended as shown in **Appendix G** to the report.

Uniform format for reporting WGS-84 implementation

2.5.18 The Meeting reviewed the status of implementation of WGS-84 in the AFI Region. It was noted that not all States had published the results of their surveys. The Meeting reviewed a format for the reporting of WGS-84 implementation by States adopted by the ALLPIRG/4 meeting for use

by Regional Planning Groups. The Meeting adopted the following draft conclusion.

Draft Conclusion 3/19: Adoption of a uniform format for the reporting of WGS-84 implementation

That the table available at **Appendix H** to the report be adopted as a uniform format for the reporting of WGS-84 implementation by States in the AFI Region.

2.5.19 ASECNA provided the Meeting with information on its WGS-84 geodetic reference network.
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2.6 Agenda Item 6: Review and update of the AFI CNS/ATM Implementation Plan

SITA AIRCOM and ATN services.

2.6.1 SITA made a presentation on its AIRCOM and ATN services. The Meeting expressed its appreciation for the information provided and noted that VDL Mode 2 deployment in the AFI Region would start in 2005 at two locations.

CNS/ATM Implementation activities in the EUR/SAM Corridor

2.6.2 Spain presented a number of papers relating to CNS/ATM implementation in the EUR/SAM corridor (AR1). They concerned the annual air traffic statistics collection for safety assessment studies for the implementation of RNP10 and RVSM in AR1, the South Atlantic Monitoring Agency (SATMA) which is conducting the safety assessment for RNP10 and RVSM, the CAFSAT VSAT network being implemented and which is being used for ADS/CPDLC data sharing trials between FIRs Canarias and Sal.

CNS/ATM Implementation in Algeria

2.6.3 Algeria informed the Meeting that in view of the implementation of RVSM in the EUR Region, it had signed Letters of agreement with adjacent FIRs (Barcelone, Marseille and Seville). RVSM is planned to be implemented in 2003 in Algiers FIR. Improvements to the communications facilities are planned during 2001, notably with the upgrading of ATS/DS circuits Algiers/Dakar and Alger/Niamey, the renewal of the AFTN switch.. Longitudinal separation has been reduced to 15 min as a step towards implementation of 10 min longitudinal separation. Letters of agreements had been signed with Dakar and Niamey centres. RNP 5 introduction on selected routes is foreseen for 2003, following implementation of radar coverage.

ATM improvements in Tunis FIR

2.6.4 Tunisia informed the Meeting of its implementation of RNAV routes, RNAV approach procedures and of GPS NPA procedures. The meeting was apprised of upgrades to the aeronautical data processing system applications (on-line data interchange (OLDI), RVSM, 8.33 kHz VHF channel spacing and RNAV).

Task Force on RVSM and RNP Implementation

2.6.5 The Meeting reviewed proposals to amend the AFI CNS/ATM plan (Doc 003). These concerned RVSM and RNP. It was agreed that initial implementation of RVSM should be between FL350 and FL390 in the AFI Region, in order to provide more economic flight profiles to transcontinental operators. It was also agreed that RNP 5 should initially be introduced above FL350. During the debates the need for seminars and workshops was identified. The Meeting recalled ATS/AIS/SAR Sub-group draft Conclusion 6/43 recommending that the Airspace Management Task Force established by APIRG (Decision 12/24) be tasked with RNP and RVSM implementation related activities. The Sub-group then discussed at length and finally

agreed to a proposal for the establishment of a Task Force on RVSM and RNP implementation. It was agreed that Spain would be the rapporteur of the Task Force. The following draft conclusions and decision were adopted.

Draft Conclusion 3/20: Initial implementation of RVSM in the AFI Region

That RVSM be implemented in the AFI region coincidently or soon after its implementation in the EUR Region, and initially between FL350 and FL390.

Draft Decision 3/21: Establishment of a Task Force on RVSM and RNAV/RNP implementation

That a Task Force dedicated to RVSM and RNAV/RNP implementation be established, with the terms of reference shown at **Appendix I** to the report.

Composition: Algeria, Cape Verde, Egypt, Ethiopia, Kenya, Morocco, Nigeria, South Africa, Tunisia, Senegal, Spain (Rapporteur), ASECNA and IATA

Note 1: The Task Force should maintain close coordination with the ATS/AIS/SAR/SG ASM Task Force, and its terms of reference should be harmonized with those of the ASM Task Force.

Note 2: SATMA and Eurocontrol should be invited to assist the Task Force.

Draft Conclusion 3/22: Seminars/Workshops on RVSM and RNAV/RNP

That ICAO and international organizations in a position to do so organize Seminars/Workshops on RVSM and RNAV/RNP in the AFI Region.

Amendment to Doc 003

2.6.5 The Meeting, taking into account the reports of the ICGs under Agenda Item3 and proposals formulated by the participants and the ATS/AIS/SAR Sub-group, adopted amendments to the AFI CNS/ATM Implementation Plan (Doc 003), and formulated the following draft conclusion.

Draft Conclusion 3/23: Amendment of the AFI CNS/ATM Implementation Plan (Doc 003)

That the AFI CNS/ATM Implementation Plan (Doc 003) be amended as shown at **Appendix J**.

2.7 Agenda Item 7: Briefing on CNS/ATM trials in the AFI Region

2.7.1 Under this Agenda item, Egypt updated the meeting on the proposal concerning a multi-mission satellite system for CNS/ATM implementation, called NAVISAT. The system is based on a dual mission concept:

a) an aeronautical mission which will provide air/ground voice/data communications, voice/data fixed communications and a geo-stationary augmentation to GPS and possibly GLONASS; and
b) a telecommunication mission for non-aeronautical users.

2.7.2 The Meeting expressed its satisfaction with the presentation and raised several questions relating to timescale, institutional issues, cost/benefit. The Sub-group decided to task the AFI GNSS Study group to give further consideration to the proposal. In this regard, it was decided that Egypt would be a member of the GNSS Study Group. It was also agreed that members of the GNSS Task Force would be informed of the meetings of the AFI GNSS Study group. The following decisions were adopted.

Decision 3/24: Egypt membership in the AFI GNSS Study Group

That Egypt be a member of the AFI GNSS Study Group.

Decision 3/25: Egyptian NAVISAT Initiative

That the Egyptian NAVISAT Initiative be given further consideration by the AFI GNSS Study Group**.**

Decision 3/26: Information on the AFI GNSS Study Group's Meetings

That all the GNSS/TF members be informed of meetings of the AFI GNSS Study Group.

2.8 Agenda Item 8: Future work programme

2.8.1 The Meeting reviewed its future work programme and adopted the following draft decision.

Draft Decision 3/27: Future work programme of the CNS/ATM/IC Sub-group

That the future work programme of the CNS/ATM/IC Sub-group be as shown at **Appendix K** to the report**.**

2.9 Agenda Item 9: Any Other Business

2.9.1 NIL.

TERMS OF REFERENCE, WORK PROGRAMME AND COMPOSITION OF THE AFI CNS/ATM IMPLEMENTATION CO-ORDINATION SUB-GROUP

1. Terms of reference

a) Ensure the continuing and coherent development of the AFI Regional Implementation Plan for CNS/ATM systems in the light of new developments, in harmony with the Global Plan Air Navigation Plan for CNS/ATM Systems (Global Plan) and the plans of adjacent regions;

b) Prepare cost/benefit analyses for CNS/ATM Implementation options;

c) Study institutional arrangements for the implementation of CNS/ATM systems in the AFI Region.

2. Work Programme

Item	Task description	Priority	Target date
1	Continue the evolutionary development of the AFI CNS/ATM Implementation Plan (AFI/7 Concl. 13/1)	A	Continuing
2	Identify requirements for digital flight information service (D-FIS) and develop appropriate implementation worksheets for the concerned areas of routing (AFI/7 Concl. 13/1)	A	APIRG/13
3	Develop comprehensive business cases for competing CNS/ATM Implementation options for the Routing Areas.	A	Continuing
4	Co-ordinate plans developed by States, international organizations, airlines, and industry for the implementation of the regional CNS/ATM systems implementation plan	A	Continuing
5	Update on a regular basis, Chapter 2 and the tables of Volume II of the Global Plan	B	Continuing
6	Advise on the Egyptian initiative for a multi mission satellite based system dedicated to CNS/ATM services.	B	APIRG/13
7	Monitor the research and development, trials and demonstrations within the AFI Region and information from other regions	B	Continuing
8	Give further consideration to the concept of “Multinational ICAO AFI Air Navigation Facility/Service” addressed in the AFI/7 Report under Agenda Item 14; (AFI/7, Concl. 10/6c)	C	

Item	Task description	Priority	Target date
9	Identify and address as appropriate, possible sources of funding to facilitate GNSS implementation in the Africa-Indian Ocean Region (AFI/7, Concl. 10/6d)	B	APIRG/13
10	Develop criteria for the approval of aircraft operations using GNSS, giving consideration to the needs of all phases of flight, for en route navigation in oceanic areas and continental areas and for terminal area navigation (AFI/7, Concl. 13/5c)	A	APIRG/13
11	Establish and maintain current a data base on CNS/ATM planning and implementation in the AFI Region	B	
12	Examine the planning of early implementation of local differential status to augment GNSS so as to provide precision approach capability, (AFI7 Concl. 13/5e)	B	
13	Continue the development of the draft AFI Aeronautical Surveillance Plan	A	APIRG/13
14	Identify and address, to the extent possible, institutional and legal matters related to the GNSS implementation in the Region (AFI/7, Concl. 10/6 e)	B	APIRG/13

Priority:

A High priority tasks on which work should be speeded up;

B Medium priority tasks, on which work should be undertaken as soon as possible, but without detriment to priority A tasks;

C Lesser priority tasks, on which work should be undertaken as time and resources permit, but without detriment to priority A and B tasks.

Composition: Angola, Algeria, Botswana, Cameroon, Cape Verde, Côte d'Ivoire, Congo, D.R. of Congo, Egypt, Ethiopia, Gabon, Gambia, Ghana, Guinea, Kenya, Lesotho, Mali, Mauritania, Morocco, Nigeria, Niger, Senegal, Seychelles, South Africa, Spain, Tunisia, Tanzania, Zambia, Arab Civil Aviation Commission (ACAC), ASECNA, IATA, IFALPA, IFATCA.

Follow up on the conclusions and decisions of the previous meeting

Concl/Dec. Number	Text	Follow up by	Status	Remarks
Concl. 2/1	**Draft Conclusion 2/1: Participation of Australia, India and Maldives in the activities of the AR10 ICG** That Australia, India and Maldives be invited to participate in the activities of the AR10 Implementation Coordination Group (AR10-ICG) for coordination purposes of the AFI and ASIA/PAC CNS/ATM plans.	Secretariat (Adopted by APIRG as Decision 12/43)	The three States were invited to participate in the AR-10 ICG. They have been invited to the ICG10/2 meeting. However they did not attend.	
Concl. 2/2	**Draft Conclusion 2/2: Implementation of area control service** That States which have not done so, implement area control service in upper airspace between FL 245 and FL 460 at the AIRAC date of 09 September 1999.	(Adopted by APIRG as Conclusion 12/20)	Implemented in 19 States	
Concl. 2/3	**Draft Conclusion 2/3: Longitudinal separation** That States take all necessary steps so that uniform 10 minute longitudinal separation minima be applied at the AIRAC date of 02 December 1999.	(Adopted by APIRG as Conclusion 12/44) States	Implemented in 22 States	

Concl/Dec. Number	Text	Follow up by	Status	Remarks
Concl. 2/4	**Draft Conclusion 2/4: Assignment of activities of AR6 to SAT Group** That in view of close relationship between SAT activities on Area 1 and Area 6, APIRG be requested to assign the activities relating to AR6 to the SAT Group.	Secretariat	Implemented. The SAT Group has acted as ICG for AR6	
Concl. 2/5	**Draft Conclusion 2/5: Assignment of activities of AR7 to EUR/AFI Interface Informal Meeting** That APIRG be requested to assign the activities relating to AR7 to the EUR/AFI Interface Informal Meeting.	Secretariat	Implemented. The EUR/AFI Interface Meeting has acted as ICG for AR7. It has held two meetings	
Concl. 2/6	**Draft Conclusion 2/6:National CNS/ATM bodies, Focal Points of contact and ICG Coordinators** That : a) State air navigation service providers, which have not yet done so, establish a National CNS/ATM body; b) The head of this body be designated as the focal point of contact for purposes of coordination with the relevant ICG coordinators;	Secretariat and States (Adopted by APIRG as Conclusion 12/45)	States have informed of the Conclusion. 15 States have replied and provided the contacts of their National CNS/ATM point of contact	

Concl/Dec. Number	Text	Follow up by	Status	Remarks
Concl. 2/6	c) If a State is elected as ICG Coordinator of one of the 10 areas of routing in the AFI Region, the National focal point of contact referred to in (b) above be designated as the ICG Coordinator or appoints a suitable person to act as Area of Routing coordinator; and	States	Same as above	
Concl. 2/6	d) ICAO provide to States and international organizations concerned with the list of Coordinators and their contacts.	Secretariat	The list available is not yet large to allow dissemination. More replies needed.	
Concl. 2/7	**Draft Conclusion 2/7: Amendment to the AFI CNS/ATM Implementation Plan Doc 003** That the amended AFI CNS/ATM Implementation plan (Doc.003) shown at Appendix A to the report on Agenda Item 4 be presented to APIRG /12 Meeting for their consideration and subsequent approval.	Secretariat (Adopted by APIRG as Conclusion 12/46	Implemented. Version 5.0 of Doc 003 published in 2000.	

Concl/Dec. Number	Text	Follow up by	Status	Remarks
Dec. 2/8	**Draft Decision 2/8: Amendment to categorization of TMA's and Aerodromes in Doc. 003 Appendix-D** a) That IATA and ASECNA jointly continue their efforts to update AFI criteria for categorization of AFI TMA's and Aerodromes; and b) Based on that criteria, update AFI CNS/ATM Implementation Plan (Doc. 003) Appendix D and subsequently submit the list for consideration by the CNS/ATM/IC Sub-Group.	ASECNA and IATA	Work has not yet started. Data is required from States, as shown in ICG4/2 report.	This task has a bearing on the development of the AFI Surveillance Plan.

Concl/Dec. Number	Text	Follow up by	Status	Remarks
Concl. 2/9	**Draft Conclusion 2/9: Aeronautical Surveillance Plan (ASP) for the AFI Region** That the AFI Surveillance Plan be adopted and included in the AFI Air Navigation Plan (FASID): a) Operational requirements (Appendix A to the report on Agenda Item 5). b) Table CNS-4A - Surveillance Systems (Appendix B to the report on Agenda Item 5). c) Table CNS-4B - ATS Automation Systems (Appendix C to the report on Agenda Item 5).	Secretariat	Draft Plan was presented to APIRG/12. However the meeting did not act on it, in order to allow for further consultation of States.	See Remark on Decision 2/8 above.
Concl. 2/10	**Draft Conclusion 2/10 Consultation on the Aeronautical Surveillance Plan (ASP)** That the AFI Surveillance Plan be circulated to States and International Organizations for comments and review before APIRG/12.	Secretariat and States	Plan circulated to States. In toto 20 States have commented on the Plan.	

Concl/Dec. Number	Text	Follow up by	Status	Remarks
Concl. 2/11	**Draft Conclusion 2/11: Support of ICAO Position on spectrum issues at ITU WRC-2000** That ICAO and AFCAC take steps to obtain the support of AFI States to the ICAO position on spectrum issues at ITU WRC 2000.	ICAO and AFCAC	Implemented. The ICAO position was adopted almost in its entirety by the ITU WRC-2000.	
Concl. 2/12	**Draft Conclusion 2/12: Frequency assignments in the GNSS band (1559 - 1610 MHz)** That States concerned which have not yet done so, reply to the ICAO survey of fixed service assignments in the band 1559-1610 MHz.	Secretariat and States concerned	Implemented. Replies analysed by COM/SG/5 Meeting.	
Dec. 2/13	**Draft Decision 2/13: Future work programme of the CNS/ATM/IC Sub-group** That the future work programme of the CNS/ATM/IC Sub-group be that at Appendix A to the report on Agenda Item 8.	Secretariat	Approved by APIRG/12	

APPENDIX C

Data to be provided for the task on
Categorisation of TMAs and aerodromes

1. **Aerodromes**:

- total number of movements during the year 2000 for each of the following types of traffic: commercial, military and general aviation.
- IFR and VFR traffic numbers.

2. **TMAs**: for each TMA:

- number of civil and military airports within the TMA;
- total number of movements during 2000 at each type of airport
- vertical and lateral limits of the TMA
- IFR and VFR traffic numbers
- restricted, prohibited and danger areas.

Table CNS 4A - SURVEILLANCE **APPENDIX D**

EXPLANATION OR THE TABLE

Column

1	Name of country and location of radar head facility or FIR
2	Area of routing
3	Air Traffic Services Unit served by the facility or FIR
4	PSR - Primary Surveillance Radar
5	Coverage of Primary Surveillance Radar in nautical miles
6	SSR - Secondary Surveillance Radar and Modes implemented will be indicated within brackets, namely Modes A, C and S
7	Coverage of Secondary Surveillance Radar in nautical miles
8	ADS-B - Automatic Dependent Surveillance Broadcast *
9	ADS-C - Automatic Dependent Surveillance Contract
10	Remarks

Note:
The following codes are used in columns 4, 6, 8-10

I - Required and implemented. For column 6,
- I stands for implementation using conventional SSR, while
- MI stands for implementation using Monopulse SSR.

X - Required but implementation status not determined

N - Required but not implemented

A - existing facility provided to supplement or substitute the requirement

F - Future Plan

< - Year: planned commissioning year to be used as appropriate in conjunction with “F” and “N”

> - Year: planned commissioning year to be used as appropriate in conjunction with “A” and “I”

* Under development

State/Location Etat/Emplacement	AR	ATS unit served Organe ATS desservi	PSR	Coverage/ Couverture of/du PSR (NM)	SSR (A/C/S)	Coverage/ Couverture of/du SSR (NM)	ADS-B*	ADS-C	Remarks/ Remarques
1	2	3	4	5	6	7	8	9	10
ALGERIA Alger	AR4 AR7	Alger ACC	F<-2003		F<-2003			F<-2003	MSSR planned/prévu
Annaba		Alger ACC			F<-2003				
El Bayad		Alger ACC			F<-2003				
El Oued		Alger ACC			F<-2003				
Oran		Alger ACC			F<-2003				
ANGOLA Luanda	AR2 AR4 AR8	Luanda ACC			N			N	
BOTSWANA Gaborone	AR4 AR8	Gaborone ACC			A<-2001	250		N	
Maun		Gaborone ACC			A<-2001	250			

State/Location Etat/Emplacement	AR	ATS unit served Organe ATS desservi	PSR	Coverage/ Couverture of/du PSR (NM)	SSR (A/C/S)	Coverage/ Couverture of/du SSR (NM)	ADS-B*	ADS-C	Remarks/ Remarques
1	2	3	4	5	6	7	8	9	10
CAPE VERDE Sal	AR1	Sal ACC						F<- 2004	
CHAD/TCHAD N'Djamena	AR4 AR9	N'Djamena ACC			N<- 2002			N<- 2002	
CONGO Brazzaville	AR4 AR5	Brazzaville ACC			F<- 2003			F<- 2003	
CONGO (Dem. Rep. of) Kinshasa	AR4	Kinshasa ACC			N			N	
COTE D'IVOIRE Abidjan	AR5	Abidjan ACC			X			N	
EGYPT Cairo 300715N 312354E 300621N 312439E 300621N 312439E	AR3 AR7	Cairo ACC Cairo APP Cairo APP/TMA	I I F<2002	200 70 60	MI(A/C) I(A/C) MF(A/C)	250 100 250		I	

State/Location Etat/Emplacement	AR	ATS unit served Organe ATS desservi	PSR	Coverage/ Couverture of/du PSR (NM)	SSR (A/C/S)	Coverage/ Couverture of/du SSR (NM)	ADS-B*	ADS-C	Remarks/ Remarques
1	2	3	4	5	6	7	8	9	10
Hurghada 270319N 335025E	AR3	Cairo ACC	I		MI(A/C)	250			
Mersa Matruh 311810N 270831E		Cairo ACC			MI(A/C)	250			
Aswan 235830N 324636E		Cairo ACC			MI(A/C)	250			
Asyut 270332N 310108E		Cairo ACC	I	200	MI(A/C)	2550			
Luxor		Luxor APP/TMA	I	60	MI(A/C)	250			
Sharm El Sheikh		Sharm El Sheikh APP/TMA	I	60	MI(A/C)	250			
ERITREA Asmara 151702N 385340E	AR3 AR9	Asmara ACC			A/C/S	250		N	
ETHIOPIA Addis Ababa	AR3	Addis Ababa ACC			F<- 2005			F<- 2002	
GHANA Accra	AR5	Accra ACC	A	60	I(A/C)	250		N	
Tamale		Accra ACC			I(A/C)	250			

State/Location Etat/Emplacement	AR	ATS unit served Organe ATS desservi	PSR	Coverage/ Couverture of/du PSR (NM)	SSR (A/C/S)	Coverage/ Couverture of/du SSR (NM)	ADS-B*	ADS-C	Remarks/ Remarques
1	2	3	4	5	6	7	8	9	10
GUINEA/ LIBERIA/ SIERRA LEONE Robertsfield	AR5	Roberts FIC/ACC						N	
KENYA Mombasa Nairobi	AR3	Mombasa APP Nairobi ACC Nairobi APP	A A		I(A/C)	200 200 200		N	
LIBYAN ARAB JAMAHIRIYA Tripoli	AR3 AR4 AR7	Tripoli ACC						N	
MADAGASCAR Antananarivo	AR3 AR10	Antananarivo ACC						I-- 2001	
MALAWI Lilongwe	AR8	Lilongwe ACC						N	
MAURITIUS Mauritius	AR3 AR10	Mauritius ACC						N<- 2001	

State/Location Etat/Emplacement	AR	ATS unit served Organe ATS desservi	PSR	Coverage/ Couverture of/du PSR (NM)	SSR (A/C/S)	Coverage/ Couverture of/du SSR (NM)	ADS-B*	ADS-C	Remarks/ Remarques
1	2	3	4	5	6	7	8	9	10
MOROCCO Casablanca 332124.12N 073642.99W Agadir 301908.96N 092440.75W Ifrane 333151.87N 050926.95W Safi 321904.94N 091444.078W	AR1 AR6 AR7	Casablanca ACC Casablanca APP	I	60	MI(A/C)	250		N	
MOZAMBIQUE Beira	AR8	Beira ACC						N	
NAMIBIA Windhoek	AR4 AR8	Windhoek ACC						N	
NIGER Niamey	AR4 AR9	Niamey ACC						F<-2004	
NIGERIA Kano	AR4 AR9 AR5	Kano ACC Kano APP			F(A/C) I(A/C)	250 150		F<-2005	

State/Location Etat/Emplacement	AR	ATS unit served Organe ATS desservi	PSR	Coverage/ Couverture of/du PSR (NM)	SSR (A/C/S)	Coverage/ Couverture of/du SSR (NM)	ADS-B*	ADS-C	Remarks/ Remarques
1	2	3	4	5	6	7	8	9	10
Lagos		Lagos ACC Lagos APP	I	100	F<2003 I(A/C)	250 150		F<-2005	
SENEGAL Dakar	AR1 AR9	Dakar ACC						F<-2002	
SEYCHELLES Seychelles	AR3 AR10	Seychelles ACC						N	
SOMALIA Mogadishu	AR3	Mogadishu FIC						N	
SOUTH AFRICA Cape Town	AR2 AR4 AR8 AR10	Cape Town ACC Cape Town APP	I		I(A/C)			N	
Johannesburg		Johannesburg ACC Johannesburg APP Johannesburg Oceanic	I		I(A/C)			I	
SPAIN (Canarias) Gran Canaria	AR1 AR6	Canarias ACC	I		I(A/C)	200		I	5 radars on multi radar system

State/Location Etat/Emplacement	AR	ATS unit served Organe ATS desservi	PSR	Coverage/ Couverture of/du PSR (NM)	SSR (A/C/S)	Coverage/ Couverture of/du SSR (NM)	ADS-B*	ADS-C	Remarks/ Remarques
1	2	3	4	5	6	7	8	9	10
Lanzarote		Canarias ACC (GCFV/GCRR APP)			I(A/C)	220		N	
Las Palmas		Canarias ACC (GC APP)	I	60	I(A/C)	150			
La Palma		Canarias ACC			I(A/C)	170*			**Between/Entre* 005°-210°
Tenerife		Canarias ACC Tenerife APP	I	60	I(A/C)	120		N	
SUDAN Khartoum	AR3 AR9	Khartoum ACC			MI(A/C)	250		N	
Dongola		Khartoum ACC			F<2002	250			MSSR
El Fasher		Khartoum ACC			F<2002	250			
El Obeid		Khartoum ACC	A	100	F<2002	250			
Juba		Khartoum ACC	A	100	F<2002	250			
Malakal		Khartoum ACC			F<2002	250			
Port Sudan		Khartoum ACC	A	100	F<2002	250			

State/Location Etat/Emplacement	AR	ATS unit served Organe ATS desservi	PSR	Coverage/ Couverture of/du PSR (NM)	SSR (A/C/S)	Coverage/ Couverture of/du SSR (NM)	ADS-B*	ADS-C	Remarks/ Remarques
1	2	3	4	5	6	7	8	9	10
TUNISIA Tunis PSR: 365135.417N 0101428.9293E Sidi Zid: 362829.0381N 0101929.0568E	AR4 AR7	Tunis ACC Tunis APP Monastir APP	I	60	MI(A/C)	250		N	
Akouda 035 53 37N 010 33 46E		Tunis ACC Monastir APP			MI(A/C)	250			
UGANDA Entebbe	AR3	Entebbe ACC						N	
UNITED REP. OF TANZANIA Dar Es Salaam	AR3 AR8							N	
ZAMBIA Lusaka	AR4 AR8	Lusaka ACC						N	
ZIMBABWE Harare	AR8	Harare ACC			I(A/C)			N	

Table CNS 4B - ATS AUTOMATION SYSTEMS **APPENDIX E**

EXPLANATION OR THE TABLE

Column

1	Name of country and location of radar head facility or FIR
2	Area of routing
3	Air Traffic Services Unit served by the ATS automation systems. The abbreviations for this column are: ACC-Area Control AACC-Area/Approach Control Centre APP-Approach Control EC-Enroute Centre FIS-Flight Information Service SMC-Surface Movement Control TCU-Terminal Control Unit TMA-Terminal Control Area TWR-Tower Control
4	Surveillance sensor linked to the ATS Automation Systems, 4-letter FIR Identifier, enclosed in brackets, shall be shown for sensors outside the FIR
5	RDPS - Radar Data Processing System
6	FDPS - Fight Data Processing System
7	MSAW - Minimum Safe Altitude Warning System
8	ADS - Automatic Dependent Surveillance
9	CPDLC - Controller-Pilot Data Link Communications
10	AIDC - ATS inter-facility Data Link Communications
11	PA/RDPS - Processing area of the radar Data Processing System in (nautical miles)^2
12	Npos - Number of ATS positions
13	Remarks

Note:
The following codes are used in columns 5 to12:

I - Required and implemented.

X - Required but implementation status not determined

N - Required but not implemented

A - existing facility provided to supplement or substitute the requirement

F - Future Plan

The number of systems provided for each type of process and the yaer of commissioning and decommissioning:

< - Year: planned commissioning year to be used as appropriate in conjunction with “F” and “N”

> - Year: planned decommissioning year to be used as appropriate in conjunction with “A” and “I”

State/Location Etat/Emplacement	AR	ATS unit served Organe ATS desservi	Data Source Source de données	RDPS	FDPS	MSAW	ADS	CPDLC	AIDC	PA/RDPS (NM)[2]	Npos	Remarks/ Remarques
1	2	3	4	5	6	7	8	9	10	11	12	13
ALGERIA Alger	AR4 AR7	Alger ACC		N	N	N	N	N	N			
ANGOLA Luanda	AR2 AR4 AR8	Luanda ACC		N	N	N	N	N	N			
BOTSWANA Gaborone	AR4 AR8	Gaborone ACC		A<-2001	F<-2001	A<-2001	N	N	N			
CAPE VERDE Sal	AR1	Sal ACC			N		N	N	N			
CHAD/TCHAD N'Djamena	AR4 AR9	N'Djamena ACC		N	N	N	N<-2002	N<-2002	N			
CONGO Brazzaville	AR4 AR5	Brazzaville ACC		N	N	N	N	N	N			
CONGO (Dem. Rep. of) Kinshasa	AR4	Kinshasa ACC		N	N	N	N	N	N			
COTE D'IVOIRE Abidjan	AR5	Abidjan ACC		N	N	N	N	N	N			

State/Location Etat/Emplacement	AR	ATS unit served Organe ATS desservi	Data Source Source de données	RDPS	FDPS	MSAW	ADS	CPDLC	AIDC	PA/RDPS (NM)[2]	Npos	Remarks/ Remarques
1	2	3	4	5	6	7	8	9	10	11	12	13
EGYPT Cairo	AR3 AR7	Cairo ACC		I	I	N	I	I	N			
ERITREA Asmara	AR3 AR9	Asmara ACC		N	N	N	N	N	N			
ETHIOPIA Addis Ababa	AR3	Addis Ababa ACC		N	I	N	F<- 2002	F<- 2002	N			
GHANA Accra	AR5	Accra ACC		I	I	I	N	N	N			
GUINEA/LIBERIA /SIERRA LEONE Robertsfield	AR5	Robertsfield ACC			N		N	N	N			
KENYA Mombasa	AR3	Mombasa APP	Mombasa	I	I	N					2	
Nairobi	AR3	Nairobi APP	JKIA									
		Nairobi ACC	Mua Hills Eldoret Poror Wajir Mombasa	I	I	N	N	N	N		4	

State/Location Etat/Emplacement	AR	ATS unit served Organe ATS desservi	Data Source Source de données	RDPS	FDPS	MSAW	ADS	CPDLC	AIDC	PA/RDPS (NM)[2]	Npos	Remarks/ Remarques
1	2	3	4	5	6	7	8	9	10	11	12	13
LIBYAN ARAB JAMAHIRIYA Tripoli	AR3 AR4 AR7	Tripoli ACC			N		N	N	N			
MADAGASCAR Antananarivo	AR3 AR1 0	Antananarivo ACC			I-2001		I-2001	I-2001	N			
MALAWI Lilongwe	AR8	Lilongwe ACC					N	N	N			
MAURITIUS Mauritius	AR3 AR1 0	Mauritius ACC			N		N<- 2001	N<- 2001	N			
MOROCCO Casablanca Rabat	AR1 AR6 AR7	Mohamed V Radar Casablanca Radar	Casablanca Agadir Ifrane Safi	I I	I I	I I	N	N	N	11310[2] 375330[2]	1 5	
MOZAMBIQUE Beira	AR8	Beira ACC			N		N	N	N			
NAMIBIA Windhoek	AR4 AR8	Windhoek ACC			N		N	N	N			
NIGER Niamey	AR4 AR9				F<- 2004		F<- 2004	F<- 2004	N			

State/Location Etat/Emplacement	AR	ATS unit served Organe ATS desservi	Data Source Source de données	RDPS	FDPS	MSAW	ADS	CPDLC	AIDC	PA/RDPS (NM)[2]	Npos	Remarks/ Remarques
1	2	3	4	5	6	7	8	9	10	11	12	13
NIGERIA Kano	AR4 AR5 AR9	Kano ACC		N	N	N	N	N	N			
Lagos		Lagos ACC		N	N	N	N	N	N			
SENEGAL Dakar	AR1 AR9	Dakar ACC			F<- 2002		F<- 2002	F<- 2002	N			
SEYCHELLES Seychelles	AR3 AR1 0	Seychelles ACC			N		N	N	N			
SOMALIA Mogadishu	AR3	Mogadishu ACC			N		N	N	N			
SOUTH AFRICA Cape Town	AR2 AR4 AR8 AR1 0	Cape Town ACC		I	I	N	N	N	N			
Johannesburg		Johannesburg ACC		I	I	N	I	I	N			
SPAIN (CANARIAS) Gran Canaria	AR1 AR6	Canarias ACC		I	I	N	I	I	N	200	ACC-8	
Lanzarote		Canarias ACC (GCFV/GCRR APP)		I	I	N	N	N	N	220		

State/Location Etat/Emplacement	AR	ATS unit served Organe ATS desservi	Data Source Source de données	RDPS	FDPS	MSAW	ADS	CPDLC	AIDC	PA/RDPS (NM)[2]	Npos	Remarks/ Remarques
1	2	3	4	5	6	7	8	9	10	11	12	13
Las Palmas		Canarias ACC (GC APP)		I	I	I	N	N	N	150		
La Palma		Canarias ACC		I	I	N	I	I	N	170*		**Between/Entre* 005°-210°
Tenerife		Canarias ACC Tenerife APP		I	I	I	N	N	N	120	GCTS-1	
SUDAN Khartoum	AR3 AR9	Khartoum ACC		F<- 2001	F<- 2001	F<- 2001	N	N	N			
TUNISIA Tunis	AR4 AR7	Tunis ACC Tunis APP Monastir APP		I I	I I	I I	N N	N N	N N		4 3 3	
UGANDA Entebbe	AR3	Entebbe ACC			N		N	N	N			
UNITED REP. OF TANZANIA Dar Es Salaam	AR3 AR8	Dar Es Salaam ACC			N		N	N	N			
ZAMBIA Lusaka	AR4 AR8	Lusaka ACC			N		N	N	N			
ZIMBABWE Harare	AR4 AR8	Harare ACC		N	N	N	N	N	N			

~~INITIAL~~ CONCEPT OF THE GNSS STRATEGY FOR THE AFI REGION (Rev. 1)

Introduction

1. The purpose of the AFI GNSS strategy is to define an evolution path for replacement of ground-based navigation aids, i.e. VOR/DME/ILS/NDB, ensuring that operational and other concerns such as positive cost-benefit are fully taken into account.
2. The AFI GNSS strategy assumes availability of a GNSS meeting the specified parameters at every phase of deployment. It does not analyse GNSS systems configuration per se nor the advantages and disadvantages of various deployment strategies.

General Considerations

By necessity, satellite-based and ground-based navigation systems will co-exist for a period of time. Considering that the operation of a dual system is detrimental to a positive cost-benefit, users and providers will co-operate with the view of reducing the duration of the transition period as much as possible, having due regard for the following principles:

- The level of safety will not be downgraded during the transition
- GNSS-based service must, before the end of the transition period, fully meet the required parameters of accuracy, availability, integrity and continuity for all phases of flight;
- During the transition, gradually evolving levels of functionality will be available.
- Operational advantage shall be taken of the available capabilities at every step of deployment.
- Methods of application will take into full consideration safety considerations of any functional limitations;
- Users must be given sufficient advance notice to re-equip before ground-based systems are decommissioned.

Evolving functionality*

Phase I (Short term), up to 2004 ~~2003~~: *Additional ranging and health information on GPS constellation provided via GEO satellites*

- This phase will allow the use of GNSS as a primary-means of navigation for en-route, and for NPA and as a supplemental-means navigation system for TMA. Existing ground infrastructure remains intact.

Phase I-A (up to 2003)

- An AFI GNSS test bed will be implemented to validate the objectives and differential correction algorithms ~~of Phase II and Phase III~~ of the operational EGNOS system to be implemented during Phase I.

Phase I-B (up to 2004): This phase will be achieved by the deployment of a network of RIM stations through the AFI Region.

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*Dates are indicative

- To prepare EGNOS implementation, numerous activities must be carried out: final system definition, specifications development, cost/benefit analysis (CBA) and funding, preparation of the institutional and operational framework and programmatic issues will be carried out.
- This phase will end with EGNOS validation in the AFI Region.

Phase II (Medium term) 2005-2011 ~~2003-2008~~: *APV-I ~~NPV~~-I, 20m vertical accuracy, will be available everywhere in the AFI Region*

1. This phase will allow for:
   - En-route phase: sufficient capability to meet en-route navigation requirements everywhere in the AFI Region; GNSS is approved as a sole-means system for en-route navigation, taking into account technical and legal developments, and institutional aspects. En-route navigation aids will be progressively withdrawn accordingly in consultation with users.
   - Terminal areas: sufficient capability to meet TMA navigation requirements everywhere in the AFI region; GNSS is approved as sole-means for TMAs, taking into account technical and legal developments, and institutional aspects.
   - Terminal area VOR/DME/NDB, and Locators not associated with ILS, will be progressively withdrawn in consultation with users during Phase II.
   - Approach and landing phase: sufficient capability for APV-1 ~~non-precision approach and landing~~ in the whole AFI Region.
   - ILS will continue to be provided at aerodromes[1].

   Note 1: Where the requirements for approach and landing can be met by APV-1, the withdrawal of ILS CAT I should be considered.

2. During Phase II, the implementation of Long term GNSS will be developed. ~~a satellite-based augmentation system (SBAS) ground infrastructure will be put in place in the AFI Region; en-route navigation aids will be progressively withdrawn. VOR/DME and ILS will continue to be provided in terminal areas and at aerodromes.~~

Phase III (Long term) ~~2008~~ 2012 onwards: It is ~~also~~ assumed that at least two constellations of navigation satellites will be available. *Sole-means navigation services from en-route to CAT I operations. CAT I* by *SBAS or GBAS ~~CAT I~~ will be available in those locations where analysis of historical MET data or traffic characteristics justifies the requirement. Other requirements will be met by ground-based augmentation system (GBAS).* ~~This will require the deployment of additional RIMS in the AFI~~.

a) During Phase III, ILS CAT I will be withdrawn in consultation with users.

b) Where CAT II/III ILS requirements have been confirmed, these facilities will remain unless technical evolution then demonstrates that the requirement can be supported by GBAS or SBAS

~~GNSS~~.

~~c) The plan of withdrawal of ILS should ensure availability of an ILS at least within 500 NM. This reduced back-up network of ILS will remain in place as long as necessary and until sufficient level of confidence has been built on GNSS as sole-means navigation system for CAT I approach and landing operations.~~

~~3. Terminal area VOR/DME will also be progressively withdrawn during Phase III in a co-ordinated ILS/VOR/DME withdrawal plan, catering for the alternate availability of the two sets of facilities at different locations.~~

Institutional issues

a) Phases II and III of the AFI GNSS strategy will require the deployment of AFI specific GNSS components. In order to minimize costs associated with the deployment and operation of these components, AFI should seek cooperation agreements with systems providers in adjacent regions with a view to the joint use of GNSS components where feasible and cost-effective.

b) Meanwhile the modalities of installation and cost-recovery of multinational facilities, essentially RIMS, in some AFI States, must be addressed without delay so that deployment can be initiated as soon as technically possible.

AFI GNSS Strategy ~~SBAS APV-1~~				
	Phase I		**Phase II**	**Phase III**
Time scale	2000 - 2004		2005 - 2011	2012 - 2017
Certification	Supplemental	Primary	Sole-means from en route to APV-1	Sole means from en route to CAT I
Oceanic/En route		GPS	~~GNSS-1~~ GPS with EGNOS	Long term GNSS ~~GNSS-2~~
Continental/En route		GPS	~~GNSS-1~~ GPS with EGNOS	Long term GNSS ~~GNSS-2~~
Terminal	GPS		~~GNSS-1~~ GPS with EGNOS	Long term GNSS ~~GNSS-2~~
Approach and landing	(GPS/Baro) NPA		APV-1 SBAS ~~CAT I GBAS~~	SBAS CAT I CAT I GBAS CAT II/III GBAS

APPENDIX H

STATUS OF WGS-84 IMPLEMENTATION

EXPLANATION OF THE TABLE

Column

1 Name of the State, territory or aerodrome for which WGS-84 coordinates are required with the designation of the aerodrome use:

RS — international scheduled air transport, regular use
RNS — international non-scheduled air transport, regular use
RG — international general aviation, regular use
AS — international scheduled air transport, alternate use

2 Runway designation numbers

3 Type of each of the runways to be provided. The types of runways, as defined in Annex 14, Volume 1, Chapter I, are:

NINST — non-instrument runway;
NPA — non-precision approach runway
PA1 — precision approach runway, Category I;
PA2 — precision approach runway, Category II;
PA3 — precision approach runway, Category III.

4 Requirement for the WGS-84 coordinates for FIR, indicated by the expected date of implementation or an "X" if already implemented.

5 Requirement for the WGS-84 coordinates for Enroute points, indicated by the expected date of implementation or an "X" if already implemented.

6 Requirement for the WGS-84 coordinates for the Terminal Area, indicated by the expected date of implementation or an "X" if already implemented..

7 Requirement for the WGS-84 coordinates for the Approach points, indicated by the expected date of implementation or an "X" if already implemented.

8 Requirement for the WGS-84 coordinates for runways, indicated by the expected date of implementation or an X if already implemented.

9 Requirement for the WGS-84 coordinates for Aerodrome/Heliport points (e.g. aerodrome/heliport reference point, taxiway, parking position, etc.), indicated by the

expected date of implementation or an “X” if already implemented.

10 Requirement for geoid undulation indicated by the expected date of implementation or an “X” if already implemented.

11 Requirement for the WGS-84 Quality System, indicated by the expected date of implementation or an “X” if already implemented.

12 Requirement for publication of WGS-84 coordinates in the AIP indicated by the expected date of publication or an “X” if already published.

13 Remarks

STATE, TERRITORY OR AERODROME FOR WHICH WGS-84 IS REQUIRED			WGS-84 IMPLEMENTATION									REMARKS
CITY/AERODROME/	RWY No	RWY TYPE	FIR	ENR	TMA CTA CTZ	APP	RWY	AD/ HEL	GUND	QUALITY SYSTEM	AIP	
1	2	3	4	5	6	7	8	9	10	11	12	13

APPENDIX I

Terms of reference, work programme and composition of the task force for the study the implementation of 1000Ft reduced vertical separation minimum (RVSM) and RNAV/RNP in the AFI Region – RVSM/RNAV/RNP/TF

1. **Terms of reference**

a) To study and recommend ways and means of implementing the RVSM in terms of safety and efficiency in AFI Region, initially starting between FL 350 and FL 390;

b) To study and recommend ways and means of implementing in terms of safety and efficiency the RNAV/RNP in AFI Region;

c) To develop a reference document aimed at establishing RVSM and RNAV/RNP certification of aircraft and operators in the AFI Region;

d) To analyse the impact of RVSM and RNAV/RNP implementation on ATC systems and ATS network in AFI Region;

e) To prepare the necessary documents for the RVSM and RNAV/RNP implementation in AFI Region, taking into account RVSM and RNAV/RNP programmes in other ICAO Regions;

f) To define practical provisions in order to implement the RVSM in AFI Region;

2. **Work Programme**

Item	Task description	Priority	Date
1	To establish the type of certification for aircraft and operators in the region following FAA and JAA experiences	A	July 2001
2	To develop a RVSM standard training programme model for aircraft operators and air traffic controllers	A	July 2001
3	To develop a standard application form model for aircraft certification	A	July 2001
4	To develop the RVSM relevant procedures to be included in the air traffic manual	A	October 2001
5	To assess the impact of RVSM implementation along ATS network in AFI Region	A	First quarter of

Item	Task description	Priority	Date
			2002
6	To develop a standard document for aircraft and operators RNAV/RNP certification	A	Third quarter of 2002
7	To conduct a study on necessary CNS capabilities for RNAV implementation in AFI Region	B	Before the end of 2002
8	Assess the possibility of applying PANS-OPS design criteria for the implementation of RNAV procedures in the terminal areas of States of the AFI Region	B	End of 2002
9	To develop a reference document to validate RNAV approach procedures	B	End of 2002

3. **Composition**

Algeria, Cape Verde, Egypt, Ethiopia, Kenya, Morocco, Nigeria, South Africa, Tunisia, Senegal, Spain (Rapporteur), ASECNA and IATA

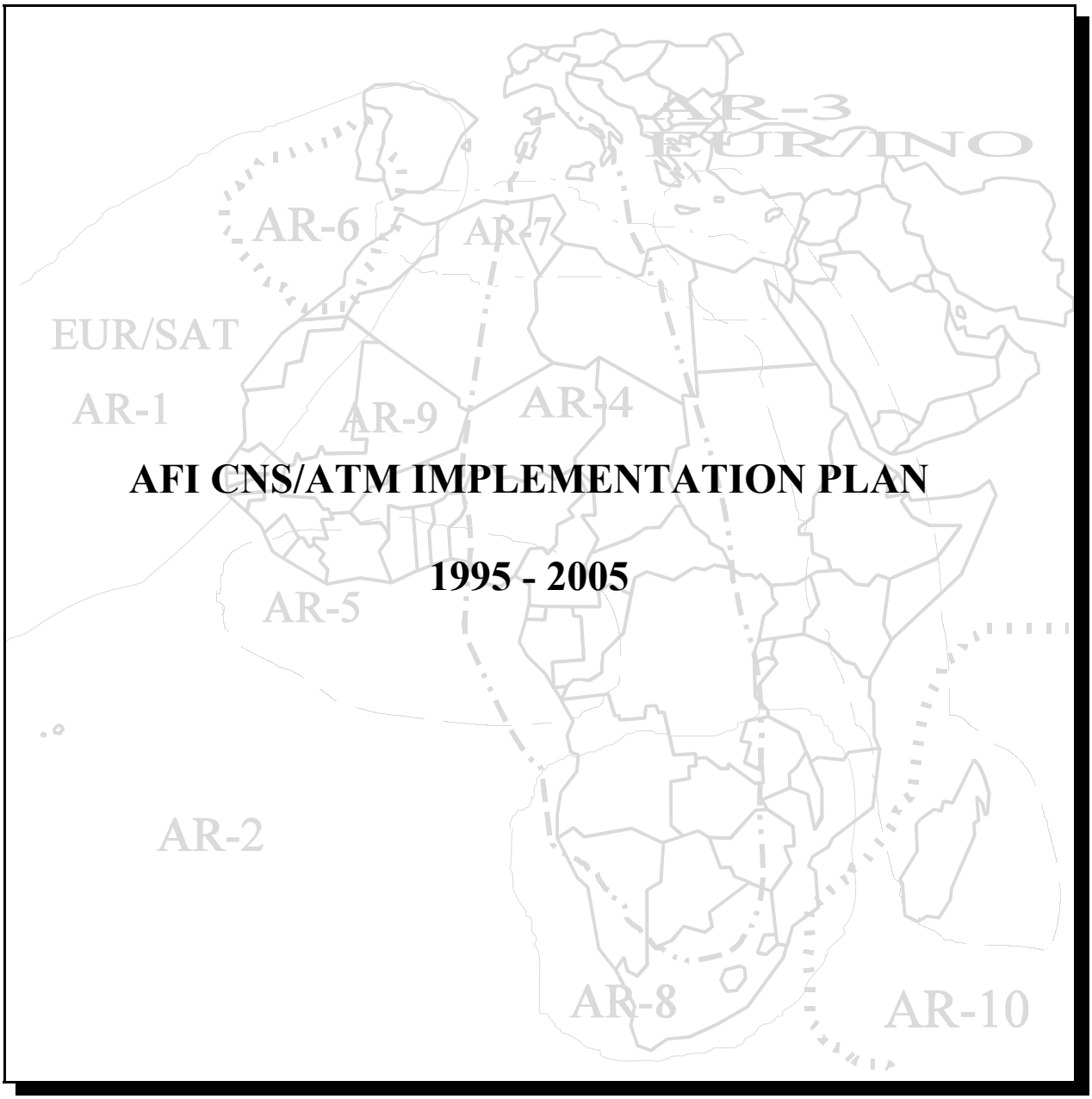
4. **Rapporteur**

Spain

APPENDIX J

AFI Doc 003

INTERNATIONAL CIVIL AVIATION ORGANIZATION



AFI CNS/ATM IMPLEMENTATION PLAN

1995 - 2005

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

DOCUMENT CHANGE RECORD

VERSION	DATE	REASON FOR CHANGE	SECTIONS PARAGRAPHS AFFECTED
5.0	15/11/99	Adoption by APIRG/12 of CNS/ATM/SG/2 Report and of the Initial AFI GNSS strategy.	Section II: 2.1.4, 2.2.1.6, 2.2.1.12 (new), 2.2.1.13 (new), 2.2.3.1.4 (new), 2.2.4.1.5 Section III: 3.3.4.2 Appendices A, B, F, G, H (new), I (new)
5.0	15/5/00	Amendment No. 1: Inclusion of Asmara FIR	Appendices A (pages A1, A2), B (pages B3, B9), G (pages G14-G22, G61-G66)

History of the versions

- Version 1 was drafted in October 1994 by the second meeting of the CNS/ATM Task Force. It contained Sections I and II.

- Version 2 was drafted in November 1995 by the first meeting of the CNS/ATM Sub-group. It contained Sections I, II and III.

- Version 3 was published in June 1996 consecutive to the adoption of Doc 003 by the Tenth meeting of the AFI Planning and Implementation Regional Group (APIRG) for presentation to the Seventh AFI Regional Air Navigation (AFI/7 RAN) Meeting.

- Version 4 was published in January 1998 following the review and adoption of Doc 003 by the AFI/7 RAN meeting.

– Version 5.0 was published in January 2000 following the adoption by the Twelfth Meeting of the APIRG (Tunis, 21 -25 June 1999) of amendments formulated by the Second meeting of the CNS/ATM/IC/SG.

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Glossary of Terms

AAIM	Aircraft autonomous integrity monitoring
ACC	Area Control Centre
ADS	Automatic Dependent Surveillance
ADS-B	Automatic Dependent Surveillance broadcast mode
ADSP	Automatic Dependent Surveillance Panel
AFI	Africa - Indian ocean area
AFS	Aeronautical Fixed Service
AFTN	Aeronautical Fixed Telecommunication Network
AIDC	ATS Inter-facility data communications
AIREP	Air Report
AIS	Aeronautical Information Service
AMCP	Aeronautical Mobile Communications Panel
AMS(R)S	Aeronautical Mobile-Satellite (R) Service
AMSS	Aeronautical Mobile-Satellite Service
APIRG	AFI Planning and Implementation Regional Group
APR	Automatic Position Reporting
AR	Area of routing
ASECNA	Agency for the Security of Aerial Navigation in Africa and Madagascar
ASM	Airspace Management
ATC	Air Traffic Control
ATFM	Air Traffic Flow Management
ATM	Air Traffic Management
ATN	Aeronautical Telecommunication Network
ATS	Air Traffic Services
ATS/DS	Air Traffic Services Direct Speech
CNS	Communications, Navigation, and Surveillance
CNS/ATM	Communications, Navigation, and Surveillance / Air Traffic Management
COM/MET/OPS	Communications/Meteorology/Operations
CPDLC	Controller pilot data link communications
DARPs	Dynamic user preferred re-routes
DCPC	Direct Controller Pilot Communications (voice/data)
DFIS	Data Link Flight Information Services
DGNSS	Differential Global Navigation Satellite System
DME	Distance Measuring Equipment
EUR	European Region
FIR	Flight Information Region
FDPS	Flight Data Processing System
FL	Flight Level
FMS	Flight Management System
GES	Ground Earth Station
GIC	GNSS Integrity Channel
GLONASS	Global Orbiting Navigation Satellite System (Russian Federation)
GNSS	Global Navigation Satellite System
GPS	Global Positioning System (United States)
HF	High Frequency
HFDL	High Frequency Data Link
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
ILS	Instrument Landing System

INS	Inertial navigation system
ITU	International Telecommunication Union
MASPS	Minimum Aviation System Performance Standards
MET	Meteorological services for air navigation
METAR	Aviation routine weather report
MLS	Microwave Landing System
MMR	Multimode receiver
MNPS	Minimum Navigation Performance Specifications
MNT	Mach Number Technique
MODE S	Mode S - SSR Data Link
MSAW	Minimum Safe Altitude Warning System
NDB	Non-directional beacon
NPA	Non-precision approach
PANS-OPS	Procedures for Air Navigation Services — Aircraft Operations
RAIM	Receiver Autonomous Integrity Monitoring
RNAV	Area Navigation
RNP	Required Navigation Performance
R/T	Radiotelephony
RVR	Runway visual range
RVSM	Reduced Vertical Separation Minimum
SAM	South American Region
SARPs	Standards and Recommended Practices
SAT	South Atlantic
SATCOM	Satellite Communication
SBAS	Satellite-based augmentation system
SIGMET	Information concerning en-route phenomena which may affect the safety of aircraft operations
SIGWX	Significant weather
SITA	Société Internationale de Télécommunications Aéronautiques
SSR	Secondary Surveillance Radar
TAF	Terminal area forecast
TBD	To be determined
TMA	Terminal Control Area
VFR	Visual flight rules
VHF	Very High Frequency
VOR	VHF Omnidirectional Radio Range
WGS-84	World Geodetic Reference System 1984

DOC.003

SECTION I : INTRODUCTION

1.1 GENERAL

1.1.1 The AFI Plan for the implementation of the new ICAO Communications Navigation and Surveillance and Air Traffic Management (CNS/ATM) Concept ~~is~~ was initially contained in three documents, namely:

Doc 001 - Executive Summary
Doc 002 - System Concept Description
Doc 003 - AFI Implementation Plan

1.1.2 Doc 001 and Doc 002 are no longer in publication. The reader should refer to ICAO *Global Air Navigation Plan for CNS/ATM Systems* (Doc 9750) for a complete description of the CNS/ATM concept.

1.1.~~2~~3 The present document, Doc.003 - AFI Implementation Plan, specifies implementation time-frames for the various systems and concepts, gives an operational overview of systems configuration during the transition, and lists activities required for an evolutionary and co-ordinated implementation towards the final objectives as contained in Doc 9750. ~~002 the System Concept Description. The reader should refer to Doc.002 for a global overview.~~

1.2 DOCUMENT OVERVIEW

1.2.1 The scope of this document is:

a) To present the implementation strategy for the Future AFI CNS/ATM concept. This consists of overlapping terms during the time-frame 1995 to 2015 namely: mid-term (1995-2005) and long term (2000 to 2015).

b) To present the implementation plan which will enable the national administrations and airspace users to develop their plans so as to meet the conditions and pre-requisites laid down in the ICAO *Global Air Navigation Plan for CNS/ATM Systems* (Doc 9750), ~~future AFI CNS/ATM system concept description (Doc 002)~~ and which takes account of the need to harmonize with plans currently being developed by the regions which interface with the AFI Region. The implementation plan takes into account present facilities which meet the reliability expected in the future CNS/ATM systems.

c) This implementation plan will at the direction of the AFI Planning and Implementation Regional Group (APIRG) progressively address the planning process into long term.

1.2.2 Document 003 is organised in three distinctive sections:

Section I: Introduction

Section II: Implementation Strategy and System Configuration
Details the objectives to be achieved during the planning time-frame;
For each system (Communications, Navigation and Surveillance and ATM), specifies which system components (both of the old and of the new concept) must be in place to support the required level of service in each phase.

Section III: Implementation Plan:
Contains Implementation Sheets detailing:
- objectives;
- actions required to achieve implementation;
- required ground and airborne capabilities;
- provider and user States and Organisations concerned;
- and the target dates for implementation.

1.3 PLANNING CONCEPT

1.3.1 The AFI Implementation Plan is conceived as a rolling ten years Plan towards the full implementation of the ICAO CNS/ATM Concept throughout the AFI Region and in the interface with adjacent regions, in order to achieve a coherent regional Air Traffic Management (ATM) system fully responsive to the regional needs in a timely and cost-effective manner and adequately integrated with the world-wide air navigation system.

1.3.2 The AFI Implementation Plan will be reviewed and updated periodically by APIRG, based on input from States and International Organisations concerned, in order to ensure it is kept responsive to changing requirements and abreast with world-wide developments.

1.3.3 The implementation, monitoring and co-ordination methodology contained in this document has been adopted by the AFI States.

1.4 GUIDING PRINCIPLES

1.4.1 In defining time-frames in the systems' evolution Tables and for the implementation activities due account was taken of the following general guidelines on transition ~~contained in System Concept Description (Doc 002), specifically of the following~~:

"a) Careful planning will be necessary to ensure that aircraft of the future are not unnecessarily required to carry a multiplicity of existing and new CNS equipment. In addition, as already referred to, there is a close relationship between the required CNS services and the desired level of ATM and, finally, there is, for reasons of both economy and efficiency, a need to ensure that differences in the pace of development around the world do not lead to incompatibility between elements of the system. Particularly, because of the wide coverage of satellite CNS systems, the above considerations call for conscientious world-wide co-ordination of the planning and implementation if such systems are to be optimized.

b) In developing guidelines for the transition it is useful to consider the type of system (C, N, or S), and the specific problems, or issues affecting its transition to full operational use in a particular type of airspace or phase of flight."

c) *Ideally, the transition to new CNS systems should be based in improvements in ATM and accompanied by procedural and structural changes that will provide benefits to ATM and to users. The transition should be carefully planned so as to avoid degradation in system performance."*

d) *The priority structure of system elements and areas of applicability with regard to implementation has to be established. The priorities in terms of time-scales are then established in response to identified constraints and the perceived view of States as to the systems and areas of applicability providing the most immediate benefits, or for which early implementation may be most likely."*

SECTION II - IMPLEMENTATION STRATEGY

AND SYSTEM CONFIGURATION

2.1 IMPLEMENTATION STRATEGY

2.1.1 Introduction

a) The provider, user States and Organizations concerned acknowledge that the AFI Region stands to derive great benefits from the introduction of the new integrated ICAO CNS/ATM System. It is recognized that it is only with the full coordination of implementation activities that the complete benefits of CNS/ATM will be realized.

b) Consequently, and in order to ensure a coherent, timely, co-ordinated, cost-effective, operationally oriented implementation of the integrated ICAO CNS/ATM system in the AFI Region, the approach and strategy contained in this document are adopted at the AFI Regional level for use and compliance by provider and user States and Organisations concerned.

c) In deciding the possible introduction at regional level of new elements of the integrated CNS/ATM system requiring the carriage of additional equipment on-board aircraft, APIRG will take into consideration the need of airspace users to be given adequate advance notice for major new equipment fittings.

2.1.2 General Principles

2.1.2.1 The AFI Region shall aim at taking advantage in a timely manner, of those individual elements of the CNS/ATM systems for which positive benefit in relation to overall cost has been demonstrated or recognized by those concerned.

2.1.2.2 It is recognized that the full implementation of all ATM objectives with their CNS requirements will take time. The AFI Region, therefore, will adopt a step by step approach starting with the ATM objectives which can be achieved with in the short term with minimum CNS requirements or relatively low cost.

2.1.2.~~2~~3 The introduction of individual elements of the new integrated CNS/ATM concept in the AFI Region shall be carried out in a co-ordinated and coherent manner, under the aegis of the AFI Planning and Implementation Regional Group (APIRG). In this context it is essential to ensure that:

a) adjacent systems shall interface in such a way that airspace boundaries between control sectors, Flight Information Regions, or Air Navigation Regions, are transparent.

b) systems must remain responsive to operational requirements at every step of development, avoiding to the extent possible, discontinuities in evolution likely to cause disturbances to the operational environment.

2.1.2.4 At least in the short and medium term, the difference in equipage between the domestic and regional operators on the one hand, and the transcontinental operators on the other hand, will be significant. The transcontinental operators will be fully equipped to operate

in regions such as Europe and will certainly value taking advantage of their capabilities to obtain more economic flight profiles. As far as the domestic and regional operators are concerned, because they would not operate in other regions with the new CNS/ATM requirements for equipage/approval, they may not derive a positive cost/benefit from equipping. In light of the foregoing, long haul operators which are adequately certified and/or approved should be given timely full benefit and the domestic and regional operators be allowed to choose either to equip (approved or certified) or to fly segregated airspace.

2.1.2.5 The seamless airspace, which is indispensable for total benefit, will not be achieved without close co-ordination among providers and between providers and users. It is then more and more necessary and important that providers and users agree before any decision on implementation is taken. In this regard the following should be kept in mind:

- Communications
  The objective of the region is full deployment of an ATN environment with the possibility to accommodate FANS1/A and the highest degree of functionality possible.

- Navigation
  The ultimate objective of the Region is a navigation system based on satellite as a sole means of navigation for all phases of flight. As far as augmentation is concerned, any deployment should be in line with the regional policy as defined and approved by APIRG.

- Surveillance
  Even if the Region is recognized as a valid candidate for ADS, enough caution is necessary at all levels in order to avoid ground equipage with prototypes and/or systems without operational benefits.

2.1.2.~~3~~ 6 All planned operations, including domestic, civil and military operations to the extent that they may influence the ATS system, should be taken into account when system capacity is defined to meet the requirements.

2.1.3 The objectives

2.1.3.1 The future system must evolve from the present system so as to meet user needs to the maximum extent possible while taking the potential benefits from the application of new system technologies. This evolution should be guided by the principle of maintaining an optimum separation assurance.

2.1.3.2 Of the overall goals of the future ATM system, the following are specially of relevance in the AFI context:

a) maintenance of, or increase in, the existing level of safety;

b) increased system capacity and full utilisation of capacity resources as required to meet traffic demand;

c) dynamic accommodation of user-preferred three-dimensional and four-dimensional flight trajectories;

d) accommodation of full range of aircraft types and airborne capabilities;

e) improved provision of information to the users such as weather conditions, traffic situation, availability of facilities;

f) improved navigation and landing capabilities to support advanced approach and departure procedures;

g) increased user involvement in ATM decision making including air-ground computer dialogue for flight negotiation;

h) create, to the maximum extent possible, a single continuum of airspace, where boundaries are transparent to users; and

i) organize airspace in accordance with ATM provision and procedures.

2.1.3.3 Priority should be given to the implementation of systems or functions specifically aimed at the attainment of any of these stated objectives.

2.1.4 Planning Targets

2.1.4.1 Under Section III the Implementation Plan identifies target dates, by which individual tasks are required to be accomplished. These are in line with the following milestones:

1999 Uniform application of 10 minutes longitudinal separation in the upper airspace;
1999 Provision of area control service in upper airspaces
1999 Pursue the implementation of fixed RNAV routes contained in the AFI ANP
1999 Implementation of WGS-84;
1999 Data exchange between Flight Data Processing Systems in selected Air Traffic Control Centres;
1999 Progressive introduction of Controller pilot data link communications (CPDLC) with full capacity in 2005;
1999 Complete implementation of all AFTN and ATS/DS circuits
1999 Extension of VHF coverage at all operationally significant altitudes
1999 Progressive provision of SSR in selected airspaces
2000 Progressive reduction of lateral separation minima in selected airspaces from 100 NM to 50 NM (in RNP 10 environment) and eventually to 30 or 25 NM (in RNP 5 environment) as dictated by operational requirements;
2000 Progressive introduction of Automatic Dependent Surveillance Service with full ground capability by 2005 ;
2000 Continuation of introduction of Random RNAV routes in oceanic airspaces;
2000 Progressive introduction of random RNAV routes above FL 350 in continental airspaces
2000 Progressive introduction of GNSS-based procedures
2000 Progressive introduction of RNP 5 in selected upper airspaces
2001 Progressive introduction of Longitudinal RNAV/RNP separation minima of 10 minutes and / or 80NM RNAV derived distance in selected airspaces
2001 Progressive introduction of AIDC with completion by 2005.
2001-2 Progressive Implementation of 1000 FT Vertical Separation Minima (RVSM) between FL290 and FL410 in selected airspaces.[1]

Note 1: In accordance with para. 2.2.1.9 of this Document, implementation of RVSM should be pursued within APIRG. In areas of routing adjacent to the EUR Region, the planning target date should be harmonized with the selected date in that Region (i.e. 2002).

2.1.5 Institutional Arrangements

2.1.5.1 Many of the technical and operational aspects of the implementation of the integrated CNS/ATM system are still under development. It is not possible, or probably even wise, at this stage to establish detailed institutional arrangements which, in many ways, will be strongly influenced by the options to be retained.

2.1.5.2 APIRG will closely monitor world-wide developments relating to Global Communications and Navigation Satellite systems and address the issue in due course.

2.1.5.3 Meanwhile, it would appear to be in the best interest of cost-effectiveness and efficiency of the overall system if an open, competitive environment was finally retained for the provision of individual elements of the new concept.

2.1.6 Trials and Demonstrations

2.1.6.1 It is anticipated that many contenders for the provision of individual elements of the integrated CNS/ATM system will emerge. It is also to be anticipated that such contenders will need partners at the level of provider and user States and Organisations, so that technical solutions can be tested in the operational environment.

2.1.6.2 As a matter of priority for the AFI Region, trials and demonstrations should be:

a) operationally oriented;

b) aimed at providing familiarisation with the new technologies and concepts;

c) aimed at assisting States with the transition; and

d) aimed at demonstrating cost-effectiveness.

2.1.6.3 It is also anticipated that the results of trials are also likely to provide useful information to assist the regional planning bodies in their work. In this context trials are encouraged and supported.

2.1.6.4 Providers and User States and Organisations are encouraged to co-operate in the conduct of trials. In order to minimize redundancy, the objectives and scope for specific trials and the results of such trials should be co-ordinated and disseminated through APIRG or its designated subsidiary body.

2.2 SYSTEM CONFIGURATION

STAGE A (1995/2005)

2.2.1 Airspace and Traffic Management

2.2.1.1 Airspace planning is to be carried out in close co-ordination between civil and military users, with a view to achieving an efficient joint utilization of available airspace to the greatest benefit of all users.

2.2.1.2 The ideal objective of airspace management should be to maximise the utilization of available airspace, by dynamic accommodation of all short-term requirements within a single system.

2.2.1.3 Where a single system is not established, a dynamic time-sharing of specific volumes of airspace should be considered; permanent segregation of airspace among various categories of users should be avoided. In this case airspace management should be oriented by the following principles:

a) airspaces reserved for individual classes of users shall be released as soon as the respective operational need ceases;

b) specific reserved airspace should be released for limited periods or at specific altitudes;

c) alternative routes should be established in order to facilitate traffic management when specific airspaces are intended for alternative civil and military use;

d) specific reserved airspaces may be relocated when required and possible.

2.2.1.4 Air traffic management in AFI should evolve progressively from the present route system to a system of area navigation (RNAV) routes.

2.2.1.5 Random RNAV areas should be established whenever feasible. Where implementation of random RNAV areas may not be feasible due to traffic densities or constraints of the present CNS/ATM system, priority should be given to the implementation of those elements of the new CNS/ATM concept aimed at eliminating such constraints.

2.2.1.6 The RNP values to be used in the AFI Region should be selected from the following ones:

1) RNP 5, with consequential route spacing of 25NM or 30NM as appropriate, on continental RNAV routes or RNAV areas, and in those non-RNAV ATS routes where ground-based navigation aids permit frequent determination of position and the requirement for full VHF coverage is satisfied;

2) RNP 10, with consequential route spacing of 50 NM, on oceanic RNAV routes where there is limited navaids coverage and in continental airspaces.

Note: Transition areas, namely between continental and oceanic airspaces, between pure RNAV and VOR/DME environments will be assessed case by case.

2.2.1.7 Optimum longitudinal separation minima must be applied on an internationally co-ordinated manner. The aim will be to apply not more than 10 minutes longitudinal separation progressively in the Region. However, in selected airspaces where navigation aids are not available

to permit frequent determination of aircraft's position, use of Mach Number Technique (MNT) shall be applied. Lower minima may be required in specific areas of the Region, and in this case will be based upon the availability of positive surveillance to ATC. The introduction of longitudinal separation minima based on RNAV Route criteria of 10 minutes/80NM should be pursued through APIRG.

2.2.1.8 In order to increase airspace capacity, implementation of Reduced Vertical Separation minima (RVSM 1000ft) for subsonic aircraft between FL290 and FL410 inclusive, should be pursued through APIRG.

2.2.1.9 There will be a progressive introduction of automated flight data processing systems (FDPS) by Air Traffic Control Units. The main objectives of ATC automation should be, by priority:

a) assistance to ATC co-ordination, especially between adjacent FIRs and between control sectors within busy ATS units;

b) code-call sign correlation in radar units;

c) assistance in monitoring adherence to flight plan;

d) computer assisted conflict prediction;

e) computer assisted conflict resolution.

2.2.1.10 Automated preparation of flight progress strips is a desirable by-product of automated flight plan processing, but not an objective in itself in most of the ATS units in the Region.

2.2.1.11 ATC automation should also aim at simplifying the interface between the air traffic controller and the communication and information systems, namely AFTN, AIS, MET.

2.2.1.12 In view of the recognized potential of the enhancement of flight safety of the Minimum Safe Altitude Warning System (MSAW), States are encouraged to implement this system as soon as possible. APIRG will monitor the progress of implementation.

2.2.1.13 In order to enhance ATM benefits in an RNP/RNAV environment, States are advised to refer to the material in **Appendix H** relating to ATM operational requirements in an RNP/RNAV environment.

2.2.2 Surveillance

2.2.2.1 Terminal areas (TMAs)

2.2.2.1.1 Secondary Surveillance Radar (SSR) should be used to provide surveillance within busy TMAs meeting criteria to be defined by APIRG; SSR Mode S data link will gradually be introduced in selected busy TMAs to be confirmed by APIRG. Introduction of VDL Mode 4 which is being standardized will be considered in due course.

2.2.2.1.2 Primary radars may continue to be used in those TMAs where there is a mix of transponder equipped and non transponder equipped aircraft and the number of non-transponder equipped aircraft is sufficiently large to justify the requirement.

2.2.2.1.3 ADS may be introduced, initially on a trial basis and eventually in broadcast mode (ADS-B) which is still under development.

2.2.2.2 En-route

2.2.2.2.1 En-route surveillance will mostly continue to be based on present procedural methods, but with improved pilot-controller communications in terms of reliability and transit times. This improvement will come about mostly as a result of enhanced mobile communications and of fixed communications between adjacent ACCs.

2.2.2.2.2 Where a requirement for en-route surveillance has been identified, this shall rely essentially on SSR, and on ADS particularly for low density, remote and oceanic airspaces outside SSR coverage.

2.2.2.2.3 Automatic Position Reporting will be initiated on a cooperative basis in selected airspaces.

2.2.2.2.4 ADS will be introduced, initially on a trial basis.

2.2.2.2.5 There is no requirement for primary radars for en route surveillance in the Region. Those already in place should be progressively phased-out.

2.2.3 **Navigation**

2.2.3.1 Approach and landing

2.2.3.1.1 The AFI strategy for transition from ILS to new precision approach and landing systems is based on the worldwide strategy developed by the Special Communications/Operations Divisional Meeting (1995) (SP COM/OPS/95) for the introduction and application of non-visual aids to approach and landing which enables each region to develop an implementation plan for future systems. The AFI strategy, which will be kept under constant review states as follows:

a) continue ILS operations to the highest level of service as long as operationally acceptable and economically beneficial.

Note: To co-ordinate with the users any withdrawal of ILS and provide at least a five-year notice for the withdrawal of any ILS ground-based equipment.

b) promote the use of MMR or equivalent airborne capability to maintain aircraft interoperability;

c) validate the use of GNSS, with such augmentations as required, to support approach and departure operations, including Category I operations, and implement GNSS for such operations as appropriate; and

d) complete feasibility studies for Category II and III operations, based on GNSS technology, with such augmentations as required. If feasible, implement GNSS for Category II and III operations where operationally acceptable and economically beneficial.

2.2.3.1.2 Although it is anticipated that Global Navigation Satellite system (GNSS) will provide the capability for precision approaches, these shall not be taken into consideration in the formulation of the requirements of the regional air navigation plan for the time being.

2.2.3.1.3 GNSS may be used as an approach and landing guidance system initially as an overlay to conventional systems.

2.2.3.1.4 The initial AFI GNSS implementation strategy was adopted by the APIRG/12 Meeting (Tunis, 21 - 25 June 1999). It details an evolutionary path from existing constellations through a minimal satellite-based augmentation system (SBAS) providing over the whole AFI Region a non-precision approach capability with vertical guidance at 20 m accuracy (APV-I). The initial strategy is shown at **Appendix I** to this document.

2.2.3.2 Terminal areas (TMAs)

2.2.3.2.1 As a general principle, navigation facilities in TMAs must allow for navigation during departure, holding and approach with the required degree of accuracy. For the time-frame encompassed by this first Stage, the standard navigation aid in TMAs is envisaged to remain the VOR/DME.

2.2.3.2.2 Whenever feasible, VORs must be so located as to serve both terminal and en-route requirements.

2.2.3.2.3 NDBs may continue to be used on a case by case basis when there is an agreed requirement to be confirmed by APIRG.

2.2.3.2.4 Global Navigation Satellite systems may initially be used as supplemental navigation means in the TMAs.

2.2.3.3 **En-route**

2.2.3.3.1 Area Navigation (RNAV) will progressively be extended throughout the AFI Region, based on the criteria contained in the ICAO Manual on Required Navigation Performance (RNP) (Doc 9613 - AN/937) and within the terms and conditions defined by the AFI Planning and Implementation Regional Group (APIRG).

2.2.3.3.2 VOR will continue to be the agreed en-route navigation aid in the AFI Region along conventional ATS routes. In case a requirement exists for a new route or for a higher level of navigation performance along an existing route, primary consideration should be given to meet the requirement by the implementation of an RNAV route.

2.2.3.3.3 NDBs will not normally be provided for en-route navigation unless there is an operational requirement which cannot be satisfied by any other means, this will be confirmed through APIRG.

2.2.3.3.4 Global Navigation Satellite Systems will be used as supplemental en-route navigation means and as primary en-route means in designated airspaces.

2.2.3.3.5 It is foreseen that GNSS will eventually become the sole means of radio navigation and that the present radionavigation systems will be progressively withdrawn. The timing of such withdrawal will depend on many factors, among which the level of implementation and the quality of the new systems will be prominent. Withdrawal will only be undertaken in line with a plan to be developed by APIRG.

2.2.4 Communications

2.2.4.1 Mobile communications

2.2.4.1.1 Aeronautical mobile communications should provide for static-free, direct pilot-controller communications throughout the Region, at least at operationally significant altitudes.

2.2.4.1.2 Voice, will remain the main form of pilot-controller communications throughout the region within the time-frame encompassed by this first Stage. Meanwhile, the early introduction of data links is supported and encouraged with the initial main objective of reducing R/T workload.

2.2.4.1.3 In view of the remoteness of large areas of the AFI region, satellite links offer one of the best method of achieving the above objectives. However, the number of users equipped for this type of communications may not be significant for several years, and therefore efforts should continue on the implementation of remote and extended range VHF.

2.2.4.1.4 HF voice stations could be phased out as VHF and satellite communications become available in a given FIR or in a given portion of the airspace; for the time being, however, increased traffic on HF will have to be accommodated and it will be necessary to ensure the integrity, reliability and availability of the system.

2.2.4.1.5 Although high frequency (HF) data link was not addressed in the original CNS/ATM concept, ICAO has now adopted SARPs for HF data link (HFDL). HF data link is ATN compliant. APIRG will closely monitor these developments.

2.2.4.2 Fixed Communications

2.2.4.2.1 The aeronautical fixed telecommunications system must provide for the exchange of messages between end-users with a very high degree of reliability within the specified transit times; in case this cannot be achieved within the current configuration of the AFTN Plan or the ATS/DS switched network plan, these must be re-planned as necessary and without delay in order to meet those objectives.

2.2.4.2.2 As a step towards the ATN the mutual support between aeronautical networks should be reinforced by the automatic interchange of messages, at least at the level of AFTN main centres, and ideally at the level of all tributary centres.

2.2.4.3 Data communications

2.2.4.3.1 It is anticipated that the mobile element of the integrated ATN may be developed at a slower pace than the end-user requirements for fixed communications; it is essential to ensure that the implementation of the necessary improvements to the ground network does not suffer delays as it is a pre-requisite for the development of the air-ground network as well.

2.2.4.3.2 In those circumstances in AFI, where only satellite links will be capable of supporting the implementation of the ground elements of the ATN with the required degree of reliability, considerations concerning costs of circuits, should not therefore delay the implementation of specific links by satellite whenever such requirement has been identified.

2.2.4.3.3 Notwithstanding the above, and considering the regional objective of inter-operability between sub-networks, the decision on which carrier to use to connect specific centres must be taken based on cost-benefit and operational efficiency only. The final aim is for a global ATN ensuring that the routing over the various sub-networks is predominantly based on choice.

2.2.4.3.4 There will be a progressive introduction of Gate data-links at the busiest airports in the Region. This consists of a physical link between aircraft on the apron and ATC. The main purpose of this type of data-link, in so far as ATC is concerned, is to allow for ATC clearance delivery by data instead of voice, thus reducing communications work-load and the risk of misinterpretation.

2.2.4.3.5 Data link flight information services (DFIS) applications, like the two other ATM

data link applications (ADS, CPDLC) have been standardized and validated by the Automatic Dependent Surveillance Panel (ADSP). These services will make it possible to improve both aeronautical and meteorological air-ground communications as well as the availability of meteorological information (METAR, WINDSHEAR, RVR, TAF, SIGMET, AIREP, SIGWX, etc.). In particular, DFIS will make it possible for aircraft operating on Europe-Africa and Gulf of Guinea routes to obtain meteorological and aeronautical information by a reliable and relatively un-congested data link.

Note: *This Document may eventually include the AGA, AIS/MAP, MET and SAR elements of the CNS/ATM system.*

SECTION III - AFI CNS/ATM IMPLEMENTATION PLAN

3.1. INTRODUCTION:

3.1.1. The present section gives a detailed presentation of the implementation activities of the AFI CNS/ATM Implementation Plan and information on the programme of activities to be carried out by concerned States and users to implement specific system components of the Plan.

3.2. PLANNING METHODOLOGY

3.2.1 En route airspace

3.2.1.1 Taking into account the global nature of the CNS/ATM Systems, the AFI Region has been divided into ten homogeneous areas of routing corresponding to the major traffic flow patterns of the Region. The ten areas of routing (AR) are:

AR-1: the Europe - South Atlantic (EUR/SAT) oceanic routes;

AR-2: the Atlantic Ocean interface between the AFI, NAT and SAM Regions (AFI/NAT/SAM interface);

AR-3: the Europe to Eastern Africa routes including the area of the Indian Ocean (EUR/AFI-East);

AR-4: the Europe to Southern Africa routes (EUR/AFI-South);

AR-5: the coastal routes over the Gulf of Guinea;

AR-6: the Iberian peninsula to Canaries routes;

AR-7: the North AFI coastal area (EUR/AFI interface);

AR-8: the Continental Southern Africa routes;

AR-9: the Trans-Sahelian routes; and

AR-10: the Trans-Indian Ocean area interfacing with the ASIA/PAC Region.

3.2.1.2. Chart CNS/ATM-1 in **Appendix A** shows the areas of routing.

3.2.1.3. For each area of routing a set of air traffic management (ATM) objectives has been defined. Then the required communications, navigation, surveillance (CNS) systems are derived taking into account the nature (oceanic, continental) of the area, the existing CNS systems and the improvements which could be introduced during the time frame of the plan (1995 - 2005).

3.2.2 Terminal airspace and Aerodromes

3.2.2.1 The AFI CNS/ATM Plan defines three types of terminal airspaces based on the traffic density and the complexity of the traffic pattern. The three types of TMA's are:

a) TMA Type 1: characterised by multiple airports within the single TMA, a complex traffic pattern and a high density traffic;

b) TMA Type 2: characterized by multiple airports within the TMA, a complex traffic

pattern and a medium density traffic; and

c) TMA Type 3: low density traffic TMA's.

3.2.2.2 Likewise, three types of aerodromes are defined based on traffic density (high, medium and low).

3.2.2.3 The TMA's and aerodromes of the AFI Region will be type-designated by the AFI Planning and Implementation Regional Group (APIRG) based on the proposals by provider and user States and organizations concerned.

3.3. AFI CNS/ATM IMPLEMENTATION PLAN (1995 - 2005)

3.3.1. The first phase of the AFI CNS/ATM Implementation Plan is intended to cover the 1995 - 2005 time period.

3.3.2 En route

3.3.2.1 The major en route ATM objectives are:

- extension of random routing in oceanic areas;
- reduction of separation minima in oceanic and high traffic density continental areas;
- progressive extension of fixed and random RNAV routes; and
- definition of Required Navigation Performance (RNP) values for specific itineraries.

3.3.2.2 To support the above ATM objectives, it is proposed in the plan to:

- improve and extend VHF coverage in continental area;
- progressive introduction of data links;
- improve the AFTN network and implement ATS/DS circuits;
- improve SSR surveillance in certain continental areas;
- introduce automatic position reporting as a first step toward automatic dependent surveillance (ADS); and
- progressive introduction of ATC automation.

3.3.2.3 The en-route AFI CNS/ATM Plan is shown at **Appendix B**.

3.3.3 TMAs and Aerodromes

3.3.3.1 In terminal airspace and aerodromes, VHF coverage will be extended to at least 150 NM, while VHF data link is to progressively be introduced in high and medium traffic density areas.

3.3.3.2 For navigation in terminal areas, GNSS ~~overlay~~ is to be introduced during the planning period.

3.3.3.3 For approach and landing at aerodromes, ILS will remain the standard aid. GNSS based approach procedures will be progressively introduced as follows:

a) overlay to ILS procedures;

b) non-instrument runways; and

c) non-precision runways.

3.3.3.4 For surveillance, voice position reports will remain the dominant procedure. However in high and medium traffic density terminal and approach area, SSR will be required while ADS will be progressively introduced.

3.3.3.5 The AFI CNS/ATM Plan for TMA's and aerodromes is at **Appendix C**. The list of TMA's and Aerodromes is at **Appendix D**.

3.3.4 GNSS Applications

3.3.4.1 For en route navigation, GNSS will be used, initially as a supplemental-means of navigation. States are recommended to make use of the guidance material contained in ICAO Circular 267 - AN/159 - "*Guidelines for the introduction and operational use of the Global Navigation Satellite System (GNSS)*" when drafting their GNSS Plan. Particular attention should be given to the following:

a) procedures development;

b) aeronautical coordinates referenced to the WGS-84 coordinate system;

c) data base creation and maintenance;

d) certification and operational approvals;

e) ground and flight inspection;

f) trials and demonstrations;

g) GNSS planning and organization;

h) GNSS training;

i) information of users by NOTAM and Aeronautical Information Circular;

j) legal issues; and

k) implementation assistance through ICAO.

3.3.4.2 A sample Aeronautical Information Circular (AIC) for the approval of GPS as a

supplemental means of navigation for en route and terminal operations and overlay non-precision approaches (NPA) was adopted by the AFI/7 RAN Meeting and is shown as **Appendix E**. In due course, a similar AIC for approval of GNSS-based precision approach and landing applications shall be developed and included in this document.

3.4 IMPLEMENTATION PROGRAMME (1995 - 2005)

3.4.1 This part of Section III defines in more detail, the actions to be undertaken by States and users in each area of routings or in the terminal and approach areas for the actual co-ordinated implementation of the Plan.

3.4.2 Timelines Reference Sheets (TRS)

3.4.2.1 The Timelines Reference Sheets (TRS) which reflect the actual plans of States, the status of implementation is at **Appendix F**.

3.4.3 Implementation worksheets

3.4.3.1 The implementation worksheets have been developed for each operational and technical element. The area concerned, the FIRs involved, the specific activity that must be carried out, the system that must be in place, by whom, and in which time-frames are identified. The implementation worksheets are aimed at providing to all concerned clear guidance to ensure uniformity of approach, compatibility of implemented systems and procedures and training. They will be used by Implementation Co-ordination Groups (ICGs) which are recommended to be set-up for each area of routing.

3.4.3.2 The implementation worksheets are at **Appendix G**.

3.4.4 Implementation Co-ordination Groups (ICGs)

3.4.4.1 The achievement of the intended benefits along each routing or within each area of affinity is entirely dependent on the coordinated implementation of the required elements by all concerned, provider and users alike. This part of Section III introduces the three pillars on which the attainment of that objective will rely: the Implementation Worksheets, the Implementation Co-ordination Groups (ICG's), and the Time-lines Reference Sheets (TRS).

3.4.4.2 The Implementation Worksheets (IWS) detail, for each traffic flow and for each area of affinity, and for every CNS element, the systems that must be put in place, by whom, and within which time-frames. Thus, the IWS will provide to all concerned a clear indication of what is required from each one of them, and will provide the basis to ensure coordinated and harmonized systems deployment.

3.4.4.3 Implementation Coordination Groups (ICGs) should be established for each routing and for each area of affinity. Members will be all those providers and users alike, required to implement systems either on the ground or airborne on the area of routing concerned, i.e., States and or Organizations responsible for the provision of services in the FIRs concerned, and the Users Organizations.

3.4.4.4 On their implementation role, the ICGs are independent of the Regional Planning machinery. They will nevertheless be guided by the IWS, on which they are free to improve and detail as necessary. However, any substantive modification either of objectives or time frames must be submitted to APIRG through the CNS/ATM Sub-Group in order to ensure overall conformity at the Regional level. The ICGs will, in their work, give due regard to the maintenance of, or increase in, the existing level of safety.

3.4.4.5 The ICAO Secretariat will co-ordinate the establishment and activities of ICGs. The ICGs will appoint a coordinator for each element (i.e. for each IWS). The coordinator will be responsible to initiate and co-ordinate actions required to carry out implementation and among all concerned. The coordinator will also be responsible to report to the CNS/ATM Sub-group on progress, on eventual constraints being experienced, or on any other matters of concern. These will be mostly reflected in the TRS as detailed below.

3.4.4.6 The Timelines Reference Sheets at Appendix F are intended to ensure timeliness of implementation and to identify deviations so that corrective action can be initiated on a timely manner. They show, again for each element and for each area of affinity, the planned date of implementation and the FIRs and States concerned. Against each FIR, they will show the date on which the responsible authority has declared it can meet the requirement. This will allow for immediate identification of any significant deviation where corrective action may be required.

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LIST OF APPENDICES

A - Areas of routing

B - AFI CNS/ATM Implementation Plan: Table I En route

C- AFI CNS/ATM Implementation Plan: Table II TMA's and Aerodromes

D - List of TMA's and Aerodromes

E - Sample Aeronautical Information Circular on the use of GPS as supplemental means of navigation

F - Timelines

G - Implementation worksheets

H - ATM operational requirements in an RNP/RNAV environment

I - Initial Concept of the GNSS Strategy for the AFI Region

Table 1- En-route

Area of Routing	FIRs	Systems Evolution 1995-2005				
		Airspace and Traffic Management	Communications		Navigation	Surveillance
			Mobile Service	Fixed Service		
1	2	3	4	5	6	7
Europe - South Atlantic (Oceanic routes) **AR-1**	Canarias Casablanca Dakar Oceanic Recife[1] Sal	Progressive evolution towards a random RNAV environment from West to East (2000 - 2005; Reduction of longitudinal separation to 10 minutes using Mach Number Technique (1998); extension to route UA302 (1999); Distance based separation 80 NM (1998 - 2002) 50NM (2002 - onwards); Reduction of lateral separation to 50 NM (1999- 2004). Further reduction of lateral separation to 25 NM/30NM (2004 - onwards); RVSM (2000 -2005): progressive evolution towards RVSM FL290/410	DCPC (data) by participating aircraft (Bpa) (2000); ~~Extension of VHF voice (1999)~~ Full VHF coverage on all ATS routes above FL300, and 150 NM from international airports (2000)	Gradual introduction of ATN compatible bit-oriented procedures (BOP) between AFTN main centres (1999-onwards)	RNP 5: Casablanca and Canarias FIRs (1998); RNP 10: Other FIRs (1999-2004); RNP 5: (2004 - onwards) Other FIRs GNSS as primary-means	Automatic Position Reporting (APR) Bpa trials (2000); Automatic Dependent Surveillance (ADS) on RNP airspace Bpa (from 2000)

Note: 1: Outside AFI. Indicated for coordination.

Table 1- En-route

Area of Routing	FIRs	Systems Evolution 1995-2005				
		Airspace and Traffic Management	Communications		Navigation	Surveillance
			Mobile Service	Fixed Service		
1	2	3	4	5	6	7
Atlantic Ocean (AFI-NAT/SAM interface) **AR-2**	Accra Dakar Oceanic Johannesburg Oceanic Luanda Sal	Random routing; Reduction of longitudinal separation to 10 minutes (2000)	DCPC (data) by participating aircraft (Bpa) (1998); ~~Extension of VHF voice (1999)~~ Full VHF coverage on all ATS routes above FL300, and 150 NM from international airports (2000)	Gradual introduction of ATN compatible bit-oriented procedures (BOP) between main AFTN Centres (1998-onwards); AFTN and ATS/DS (1999)	RNP 10 (2000) GNSS as primary-means	Automatic Position Reporting (APR) Bpa trials (2000); ADS (2000)

Table 1- En-route

Area of Routing	FIRs	Systems Evolution 1995-2005				
		Airspace and Traffic Management	Communications		Navigation	Surveillance
			Mobile Service	Fixed Service		
1	2	3	4	5	6	7
Europe - Eastern Africa (including oceanic areas) **AR-3**	Addis Ababa Antananarivo Asmara Cairo Dar es Salaam Entebbe Khartoum Mauritius Mogadishu Nairobi Seychelles Tripoli	Fixed RNAV routes coexisting with conventional routes (1999); Longitudinal separation 10 minutes (2000); Lateral separation: progressive introduction of 25 NM or 30 NM in line with RNP 5 in the upper airspace (2001); Vertical Separation: introduction of RVSM initially between FL ~~330~~ 350 and FL ~~370~~ 390 (2001-onwards) and extension to FL 290 - FL 410 by 2005; Area Control service in all FIRs (1999); RNAV: Gradual implementation of Random RNAV initially above FL 350 from 2001.	~~Extension of VHF voice (1999);~~ Full VHF coverage on all ATS routes above FL300, and 150 NM from international airports (2000) DCPC (data) Bpa (2000).	Gradual introduction of ATN compatible bit-oriented procedures (BOP) between AFTN main centres (1999-onwards); Full interface between aeronautical networks (2001); AFTN and ATS/DS (1999); Introduction of ATS inter-facility data communications (AIDC) starting in 2002 to be completed by 2005	RNP 10: (2000); RNP 5: from 2001 onwards GNSS as primary-means	Procedural; ADS 2001 onwards with full ground capability in 2005; SSR in selected airspaces (1999); Automation: progressive introduction of computer assisted conflict detection and resolution from 2000

Table 1- En-route

Area of Routing	FIRs	Systems Evolution 1995-2005				
		Airspace and Traffic Management	Communications		Navigation	Surveillance
			Mobile Service	Fixed Service		
1	2	3	4	5	6	7
Europe - Southern Africa **AR-4**	Algiers Brazzaville Gaborone ~~Harare~~ Johannesburg Kano Kinshasa Luanda Lusaka N'Djamena Niamey Tunis Tripoli Windhoek	Fixed RNAV routes coexisting with conventional routes from 1995 to 2000; Longitudinal separation 10 minutes from (2000) Lateral separation minima; Gradual introduction of ~~50~~ 25 NM or 30 NM (2000); RVSM: Introduction initially between FL ~~330~~ 350 and ~~370~~ 390 (~~2001~~ 2002-onwards), evolving towards FL 290/410 from 2005; Full ATC service on all ATS routes above FL 245 and 150NM from international airports. Random RNAV initially above FL350	~~Extension of VHF voice (1999~~); Full VHF coverage on all ATS routes above FL300, and 150 NM from international airports DCPC (data) Bpa (From 2001)	Implementation of all ATS/DS circuits. AFTN and ATS/DS links upgraded; full interface between aeronautical networks (from,2001); Gradual introduction of ATN compatible bit-oriented procedures (BOP) between AFTN main centres (1999 - onwards); Gradual introduction of AIDC to be completed by (2005)	RNP 5: Initially above FL350 ~~and FL370~~ (from 2000) WGS 84 GNSS as primary-means	Procedural (on account of traffic diversity); ADS (2000 onwards); SSR at Brazzaville, Kinshasa, Luanda and N'Djamena from (2000); RADAR and ADS integration from (2000)

Table 1- En-route

Area of Routing	FIRs	Systems Evolution 1995-2005				
		Airspace and Traffic Management	Communications		Navigation	Surveillance
			Mobile Service	Fixed Service		
1	2	3	4	5	6	7
Gulf of Guinea (Coastal routes) **AR-5**	Accra Brazzaville Dakar Kano Roberts	Longitudinal separation 10 minutes (2000); Full ATC service on all ATS routes above FL 245 and 150NM from international airports. Lateral separation 25NM or 30 NM in an RNP 5 environment (2001 - onwards); RVSM initially between (FL~~330~~ 350-FL~~370~~ 390) (2001 -onwards); Random routing initially above FL350 (2001 - onwards)	~~Full VHF voice coverage (2000);~~ Full VHF coverage on all ATS routes above FL300, and 150 NM from international airports (2000) Progressive introduction of DCPC (data) from 1999 onwards	AFTN and ATS/DS links upgraded (June 1999); Gradual introduction of ATN compatible bit-oriented procedures (BOP) between AFTN main Centres (1999-onwards); Full interface between aeronautical networks 2001 - onwards	VOR/DME (TMAs); RNP 5 environment (2001) GNSS as primary-means	SSR along itinerary Abidjan/Accra/Lagos (2000); ADS/CPDLC from 2001 with full ground capability by 2005

Table 1- En-route

Area of Routing	FIRs	Systems Evolution 1995-2005				
		Airspace and Traffic Management	Communications		Navigation	Surveillance
			Mobile Service	Fixed Service		
1	2	3	4	5	6	7
Iberian Peninsula-Canaries **AR-6**	Canarias Casablanca Lisbon[1]	Fixed RNAV routes (1995); Longitudinal separation 30 NM (2001). Lateral separation 25 NM (2001) both with radar surveillance; RVSM (2002 - onwards)	DCPC 2005 - onwards	Gradual introduction of ATN compatible bit-oriented procedures (BOP) between main AFTN centres (2002)	RNP 5 (1998) GNSS as primary-means	APR Bpa (1998); Mode S (2000); ADS Bpa - 1999 onwards

Note: 1: Outside AFI. Indicated for coordination.

Table 1- En-route

Area of Routing	FIRs	Systems Evolution 1995-2005				
		Airspace and Traffic Management	Communications		Navigation	Surveillance
			Mobile Service	Fixed Service		
1	2	3	4	5	6	7
North AFI/Coastal and EUR/AFI Interface routes **AR-7**	Algiers Cairo Casablanca Tripoli Tunis	Reduction of longitudinal separation to 10 minutes along specific itineraries (2000) ; Fixed RNAV coexisting with conventional routes (1999); RVSM (2002 - onwards)	DCPC 2005 onwards; ~~Extension of VHF voice 1999~~ Full VHF coverage on all ATS routes above FL300, and 150 NM from international airports (2000)	Gradual introduction of ATN between selected ACCs (1999); ATS/DS (1999)	VOR/DME (TMAs); RNP 5 2000 onwards in selected upper airspaces GNSS as primary-means	SSR (high density airspaces) (2000); Mode S (where justified) (2000).

Table 1- En-route

Area of Routing	FIRs	Systems Evolution 1995-2005				
		Airspace and Traffic Management	Communications		Navigation	Surveillance
			Mobile Service	Fixed Service		
1	2	3	4	5	6	7
Continental Southern Africa **AR-8**	Beira Gaborone Harare Bloemfontein Capetown Dar es Salaam Durban Johannesburg Lilongwe Luanda Lusaka Port Elizabeth Windhoek	Fixed RNAV routes coexisting with conventional routes (2000); Longitudinal separation 10 minutes (2000); Full ATC on all ATS routes above FL 245 and 150NM from international airports.(2000); Lateral separation (TBD); Random routing initially above FL 350 (TBD); RVSM initially between FL350 ~~330~~ and FL390 ~~370~~ (TBD)	~~Full VHF voice coverage (2000);~~ Full VHF coverage on all ATS routes above FL300, and 150 NM from international airports (2000) DCPC (data) from 2000	AFTN implemented (1999); Gradual introduction of ATN compatible bit-oriented procedures (BOP) between AFTN main centres (1999); ATS/DS (1999); AIDC (2001-2005)	VOR/DME (TMAs); RNP 10 (2000); RNP 5: (from 2000), and evolution to RNP 4 in selected airspaces GNSS as primary-means	SSR (high density airspaces) (1996); ADS/CPDLC Bpa (2000); SSR (Luanda, 2000)

Table 1- En-route

Area of Routing	FIRs	Systems Evolution 1995-2005				
		Airspace and Traffic Management	Communications		Navigation	Surveillance
			Mobile Service	Fixed Service		
1	2	3	4	5	6	7
Trans-Sahelian **AR-9**	Asmara Dakar Kano Khartoum N'Djamena Niamey	Fixed RNAV routes co-existing with conventional routes (1999) evolving to random routing; Full ATC service on all ATS routes above FL 245 and 150NM from international airports. Longitudinal separation of 10 minutes (2000); Lateral separation 25 NM or 30 NM in an RNP 5 environment (2001 - onwards); RVSM- initially between FL350 ~~330~~ -390 ~~370~~ (2001 - 2005)	~~Extension of VHF voice (2000);~~ Full VHF coverage on all ATS routes above FL300, and 150 NM from international airports (2000) DCPC (data) (2000 - 2005).	AFTN and ATS/DS links upgraded (1999); Full Interface between aeronautical networks 2001 - onwards; Gradual introduction of ATN compatible bit-oriented procedures (BOP) between AFTN main centres (1999-onwards)	RNP 10: (2000); RNP 5: 2000- onwards evolving towards RNP5 GNSS as primary-means	APR Bpa (1998); ADS/DCPC (2001 - onwards) with full ground capability by 2005; SSR coverage at N'Djamena sector

Table 1- En-route

Area of Routing	FIRs	Systems Evolution 1995-2005				
		Airspace and Traffic Management	Communications		Navigation	Surveillance
			Mobile Service	Fixed Service		
1	2	3	4	5	6	7
Trans-Indian Ocean **AR-10**	Antananarivo Bombay[1] Johannesburg Oceanic Male[1] Mauritius Perth[1] Seychelles	Reduction of longitudinal separation to 10 minutes (2000); Random routing in selected portions of the airspace (1999); RNP itineraries (2000); Upper airspace control in 1999; Reduction of lateral separation to 50 NM coinciding with RNP 10 from 2000 onwards; RVSM along selected itineraries initially between FL 310-FL370 (2001-onwards) evolving towards FL 290-FL 410 from 2005 onwards.	DCPC (data) from 1999); ~~Extension of VHF voice (1999)~~ Full VHF coverage on all ATS routes above FL300, and 150 NM from international airports (2000)	AFTN and ATS/DS links upgraded (1999); Interface between aeronautical networks (1999); AIDC (2002) with full capability in 2005	RNP 10: (2000) GNSS as primary-means	APR Bpa (1999); ADS Bpa (2000)

Note: 1: Outside AFI. Indicated for coordination.

TERMS OF REFERENCE, WORK PROGRAMME AND COMPOSITION OF THE AFI CNS/ATM IMPLEMENTATION CO-ORDINATION SUB-GROUP

1. Terms of reference

a) Ensure the continuing and coherent development of the AFI Regional Implementation Plan for CNS/ATM systems in the light of new developments, in harmony with the Global Plan Air Navigation Plan for CNS/ATM Systems (Global Plan) and the plans of adjacent regions;

b) Prepare cost/benefit analyses for CNS/ATM Implementation options;

c) Study institutional arrangements for the implementation of CNS/ATM systems in the AFI Region.

2. Work Programme

Item	Task description	Priority	Target date
1	Continue the evolutionary development of the AFI CNS/ATM Implementation Plan (AFI/7 Concl. 13/1)	A	Continuing
2	Identify requirements for digital flight information service (D-FIS) and develop appropriate implementation worksheets for the concerned areas of routing (AFI/7 Concl. 13/1)	B	APIRG/15
3	Develop comprehensive business cases for competing CNS/ATM Implementation options for the Routing Areas.	A	Continuing
4	Co-ordinate plans developed by States, international organizations, airlines, and industry for the implementation of the regional CNS/ATM systems implementation plan	A	Continuing
5	Update on a regular basis, Chapter 2 and the tables of Volume II of the Global Plan	B	Continuing
6	Advise on the Egyptian initiative for a multi mission satellite based system dedicated to CNS/ATM services.	B	APIRG/14
7	Monitor the research and development, trials and demonstrations within the AFI Region and information from other regions	B	Continuing
8	Give further consideration to the concept of “Multinational ICAO AFI Air Navigation Facility/Service” addressed in the AFI/7 Report under Agenda Item 14; (AFI/7, Concl. 10/6c)	C	Continuing

Item	Task description	Priority	Target date
9	Identify and address as appropriate, possible sources of funding to facilitate GNSS implementation in the Africa-Indian Ocean Region (AFI/7, Concl. 10/6d)	B	APIRG/14
10	Review the report of the RVSM/RNAV/RNP Task Force	A	APIRG/14
11	Establish and maintain current a data base on CNS/ATM planning and implementation in the AFI Region	B	
12	Examine the planning of early implementation of SBAS to augment GNSS so as to provide precision approach capability	B	
13	Review the report on categorization of TMAs and airports for further devlopment of the surveillance plan and GNSS plan.	A	APIRG/14
14	Continue the development of the draft AFI Aeronautical Surveillance Plan	A	APIRG/14
15	Identify and address, to the extent possible, institutional and legal matters related to the GNSS implementation in the Region (AFI/7, Concl. 10/6 e)	B	APIRG/14
16	Review, in due course, the requirements for the implementation of GBAS at identified locations, in accordance with the AFI GNSS strategy	C	

Priority:

A High priority tasks on which work should be speeded up;

B Medium priority tasks, on which work should be undertaken as soon as possible, but without detriment to priority A tasks;

C Lesser priority tasks, on which work should be undertaken as time and resources permit, but without detriment to priority A and B tasks.

Composition: Angola, Algeria, Botswana, Cameroon, Cape Verde, Côte d'Ivoire, Congo, D.R. of Congo, Egypt, Ethiopia, Gabon, Gambia, Ghana, Guinea, Kenya, Lesotho, Mali, Mauritania, Morocco, Nigeria, Niger, Senegal, Seychelles, South Africa, Spain, Tunisia, Tanzania, Zambia, Arab Civil Aviation Commission (ACAC), ASECNA, IATA, IFALPA, IFATCA.
