

**INTERNATIONAL CIVIL AVIATION ORGANIZATION**



**FOURTH MEETING OF THE APIRG GLOBAL  
NAVIGATION SATELLITE SYSTEM (GNSS)  
IMPLEMENTATION TASK FORCE (GNSS/I/TF/4)  
REPORT**

**(Nairobi, Kenya, 8 – 9 December 2008)**

**Prepared by the GNSS Implementation Task Force**

**The GNSS Implementation Task Force is a Task Force of the AFI Planning and Implementation Regional Group (APIRG).**

**Its Reports are therefore submitted to APIRG through the CNS Sub-Group for review and action.**

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**TABLE OF CONTENTS**

	<b>Page</b>
<b>PART I - HISTORY OF THE MEETING.....</b>	<b>4</b>
Introduction.....	4
Officers and Secretariat.....	4
Attendance .....	4
Working Language.....	6
Agenda .....	6
Conclusions and Decisions .....	7
 <b>PART II – REPORT ON AGENDA ITEMS.....</b>	 <b>9</b>
Agenda Item 1: Adoption of the Agenda .....	9
Agenda Item 2: Follow up on APIRG/16 Conclusions and decisions related to GNSS .....	9
Agenda Item 3: The Report of AFI GNSS Test bed .....	12
Agenda Item 4: Status of GNSS implementation in AFI .....	12
Agenda Item 5: Status of SBAS - RNP 0.1 and 0.3 coverage over AFI .....	13
Agenda Item 6: The Update on ISA Cost-Benefit Analysis .....	15
Agenda Item 7: The effect of GNSS on PBN, RVSM and Surveillance .....	17
Agenda Item 8: Updating of AFI GNSS Strategy .....	22
 <b><u>APPENDICES</u></b>	
Appendix A: List of Participants. ....	5
Appendix 2A: The Follow-up on Conclusions of APIRG/16 .....	10
Appendix 5A: Statistics of ASECNA Traffic – 2003 .....	14
Appendix 6A: EGNOS RNP 0.1 and 0.3 coverage over AFI .....	16
Appendix 7A: A36-23: Performance based navigation global goals .....	18
Appendix 7B: Navigation Specifications Applicable in the AFI Region as Defined in the AFI PBN Regional Plan .....	21
Appendix 8A: Draft GNSS Strategy .....	23
Appendix 8B: Proposed Terms of Reference for Combined APIRG/ PBN/GNSS Task Force .....	25

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

### **1. INTRODUCTION**

1.1 The Fourth Meeting of APIRG GNSS Implementation Task Force (GNSS/I/TF/4) was convened pursuant to APIRG/16 Meeting Decision 16/23 by the ICAO ESAF Office Nairobi, from 8 to 9 December 2008.

1.2 The meeting of GNSS Task Force was opened by Mr. Geoffrey Moshabesha Regional Director, ICAO ESAF Office.

1.3 The meeting nominated Mr. Leon Nel from South Africa, as the Chairman of the meeting. He thanked the participants for the confidence given to him and appealed for their full cooperation to come up with the expected conclusions and decisions.

### **2. OFFICERS AND SECRETARIAT**

2.1 Mrs. Mary Obeng, Regional Officer, Communications, Navigation and Surveillance (CNS) from the ICAO ESAF Office, Nairobi, was the Secretary of the meeting. Mr. Claude Gnassou from the ICAO AFI Comprehensive Implementation Plan for Safety (ACIP) also attended the meeting.

### **3. ATTENDANCE**

3.1 The meeting was attended by 10 participants from two States, three International Organizations namely Agence pour la Securite de la Navigation Aerienn en Afrique et a Madagascar (ASECNA), International Air Transport Association (IATA) and European Space Agency (ESA), and one Observer from the Durban University of Technology, South Africa.. The list of participants is given at **Appendix A** to this report.

**GNSS TASK FORCE FOURTH MEETING (GNSS/TF/4)  
(Nairobi, 8-9 December 2008)**

**LIST OF PARTICIPANTS**

<b>NO.</b>	<b>STATE/ORGANISATION</b>	<b>NAME OF PARTICIPANT</b>	<b>E-MAIL</b>	<b>TELEPHONE/FAX</b>
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2.		Mr. E. Kamau		
3.		Ms. Charity Muthoni		
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9.	<b>EU/ESA</b>	Ms. Nina.Costa	<a href="mailto:Nina.Costa@NDConsult.eu">Nina.Costa@NDConsult.eu</a>	Tel/Fax: +39 011 912 406
10.	<b>ICAO/OBSERVER</b>	Mr. G. Nassou	<a href="mailto:gnassou@yahoo.fr">gnassou@yahoo.fr</a>	



**4. WORKING LANGUAGE**

4.1 The meeting was conducted in the English language.

**5. AGENDA**

**5.1 The following Agenda was adopted:**

Agenda Item	Subjects
1.	Adoption of the Agenda
2.	Follow up on APIRG/16 Conclusions and decisions related to GNSS
3.	The Report of AFI GNSS Test bed
4.	Status of GNSS implementation in AFI
5.	Status of SBAS - RNP 0.1 and 0.3 coverage over AFI
6.	The Update on ISA Cost-Benefit Analysis
7.	The effect of GNSS on PBN, RVSM and Surveillance
8.	Updating of AFI GNSS Strategy
9.	Any other business

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**DRAFT LIST OF CONCLUSIONS/DECISIONS**

Number	Title	Action by	Target date
Conclusion 4/1	<p>a): Aeronautical Information on GNSS –Daily Advisory.</p> <p>That States should register at :- <a href="http://www.navcen.uscg.gov">http://www.navcen.uscg.gov</a> for the daily GPS advisory</p> <p>(b): The need for AIS Seminar/Workshop</p> <p>That ICAO conducts Seminar/Workshop on GPS advisory for AFI States.</p>	<p>States</p> <p>ICAO</p>	<p>State Letter by January 2009</p>
Conclusion 4/2	<p>Report on AFI Test Bed</p> <p>That, ESA, in cooperation with ASECNA, ATNS South Africa and Kenya provide the ICAO Secretariat with a consolidated final report on AFI GNSS Test Bed, covering Zone A, Zone B and Zone C.</p>	<p>ESA ASECNA ATNS Kenya ICAO</p>	<p>March 2009</p>
Conclusion 4/3	<p>Need for ICAO assistance to States</p> <p>That the Regional Office carry out a survey on States' needs for assistance in implementing APIRG conclusions concerning Phase I of the AFI GNSS Strategy as defined by APIRG/15, including GNSS operational requirements (such as legislation/regulations, design and/or publication of procedures, etc.)</p>	<p>ICAO</p>	<p>State Letter by January 2009</p>
Conclusion 4/4	<p>Deletion of Footnotes in ITU Radio Regulations</p> <p>That CAAs which have not yet done so should liaise with telecommunication regulatory authorities to delete the existing footnotes in the ITU RR.</p>	<p>ICAO AFI States</p>	<p>State Letter by January 2009</p>
Decision 4/1	<p>ISA Cost Benefit Analysis:- That:-</p> <p>a) ICAO Secretariat ensure that the inputs to the Cost Benefit analysis related to ISA are properly coordinated, and include comprehensive statistical data, fleet data and equipage, industry trends, etc.,</p> <p>b) When finalized, the ISA Cost Benefit Analysis presented to GNSS/I/TF/4 be circulated to all AFI GNSS TASK FORCE members for comments and feed- back to the Secretariat</p>	<p>ESA ICAO</p>	<p>GNSS/I/TF/4</p>
Conclusion 4/5	<p>Navigation Specifications to be supported by AFI GNSS Implementation</p> <p>That the AFI GNSS operational requirements should be based on the navigation specifications provided in</p>	<p>APIRG States</p>	<p>2008-2016</p>



Number	Title	Action by	Target date
	Appendix 8A to this report, in accordance with the AFI PBN Regional Plan.		
Conclusion 4/6	<p><b>Implementation of Approach with Vertical Guidance (APV)</b></p> <p>That APIRG should coordinate and specify the applicable approach with vertical guidance (APV) type (Baro-VNAV versus SBAS) in view of ICAO Assembly Resolution A36-23 to achieve implementation of approach procedures with vertical guidance (APV) (Baro-VNAV and/or augmented GNSS) for all instrument runway ends, either as the primary approach or as a back-up for precision approaches by 2016 with intermediate milestones as follows: 30 per cent by 2010, 70 per cent by 2014.</p> <p><i>Note: An APIRG decision is required no later than 2010 in order to meet the above date.</i></p>	APIRG	2010
Conclusion 4/6	<p><b>Proposed amendments to AFI GNSS Strategy</b></p> <p>That the AFI GNSS Strategy be updated as proposed in Appendix xxx to this report.</p>	APIRG	2009
Decision 4/2	<p><b>Finalization of draft amendments to AFI GNSS Strategy as part of AFI CNS/ATM Implementation Plan (Doc 003)</b></p> <p>That a joint meeting of APIRG PBN and GNSS Implementation Task Force be held in order to finalize draft amendments to AFI GNSS Strategy as part of AFI CNS/ATM Implementation Plan (Doc 003), based on the AFI Regional PBN Plan (Roadmap) and related performance objectives and action plan for en – route, terminal and approach flight phases.</p>	ICAO	May 2009
Conclusion 4/7	<p><b>Establishment of a combined APIRG PBN/GNSS Task Force</b></p> <p>That APIRG establish a combined PBN/GNSS Task Force to ensure consistency in the planning and implementation of AFI requirements for Performance Based Navigation concept and the Navigation element of CNS/ATM, with the Terms of reference shown in Appendix 8B to this report.</p>	APIRG	APIRG/17

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## **PART II: REPORT ON AGENDA ITEMS**

### **REPORT ON AGENDA ITEM 1: ADOPTION OF THE PROVISIONAL AGENDA**

1.1 The meeting was presented with the provisional Agenda for the GNSSTF/4 attached to the invitation letter. The proposed Agenda was adopted by the meeting, as amended.

### **REPORT ON AGENDA ITEM 2: FOLLOW-UP ACTION ON APIRG /16 CONCLUSIONS AND DECISIONS RELATED TO GNSS**

2.1 The meeting was presented with the list of Conclusions and decisions adopted by APIRG/16 Rubavu, Rwanda 19-23 November 2007. Due to the ANC decisions on APIRG/15 Report, implementation of SBAS related conclusions and decisions from GNSS TF/3 was not part of the meeting. **Appendix 2A** attached to the report on Agenda Item 2 gives the status of the follow –up actions taken.

**STATUS OF THE FOLLOW-UP ON CONCLUSIONS OF APIRG/16**

Conclusions	Action to be taken	Action taken	Status
16/21	<p><b>IMPLEMENTATION OF GNSS EN-ROUTE AND NON-PRECISION APPROACHES</b></p> <p>That AFI States continue their efforts to implement GNSS applications for en-route and non-precision approach operations as part of Phase 1 of AFI GNSS Strategy. In so doing, particular attention should be accorded to meeting all GNSS implementation requirements, including establishment of GNSS legislation, regulatory framework, and approval and monitoring procedures.</p>	States were informed on 23 April 2008.	On going TCB & others to design a project for AFI
16/22	<p><b>RECORDING OF GNSS PARAMETERS</b></p> <p>That AFI States that approve GNSS-based operations ensure that GNSS data relevant to those operations are recorded as recommended in ICAO Annex 10, Volume I, Chapter 2, para. 2.4.3. Particularly, for GNSS core systems, the following monitored items should be recorded for all satellites in view:</p> <ul style="list-style-type: none"> <li>a) observed satellite carrier-to-noise density;</li> <li>b) observed satellite raw pseudo-range code and carrier phase measurements;</li> </ul>	States were informed on 23 April 2008	ICAO to give guidance Seminar and workshops for AFI

Conclusions	Action to be taken	Action taken	Status
	<p>c) broadcast satellite navigation messages, for all satellites in view; and</p> <p>d) relevant recording receiver status information.</p>		
16/23	<p><b>AERONAUTICAL INFORMATION RELATED TO GNSS</b></p> <p>That when implementing GNSS-based operations, AFI States ensure that the relevant aeronautical information is provided to the users as appropriate.</p>	States were informed on 23 April 2008	On going Part of GNSS/TF meeting
16/24	<p><b>AFI GNSS IMPLEMENTATION STRATEGY</b></p> <p>That the action taken by the Commission on APIRG/15, Conclusions 15/18, 15/19 and 15/20 be referred to the AFI GNSS Implementation Task Force for updating the AFI GNSS Strategy and progressing its work accordingly.</p>		On-going agenda of this meeting

2.2 The meeting noted the appropriate actions which had been taken by the secretariat.

2.3 In reviewing the APIRG Conclusion 16/23<sup>1</sup>: *that when implementing GNSS- based operations, AFI States ensure that the relevant aeronautical information is provided to the users as appropriate*, the meeting was of the view that, there was no need for States to acquire receivers to monitor the status of the GPS. Instead States should register at the GPS daily advisory website to enable daily GPS advisory to be issue to them. The following conclusion was adopted by the meeting:-

**CONCLUSION 4/1 A): AERONAUTICAL INFORMATION ON GNSS –DAILY ADVISORY.**

**That States should register at: - <http://www.navcen.uscg.gov> for the daily GPS advisory.**

2.4 After examination of the sample of the advisory information format the meeting agreed that further training was needed for States to be able to issue the GPS NOTAMs and requested ICAO to hold a Seminar/workshop on AIS information on GPS for States guidance. The meeting therefore adopted the following Conclusion:

**CONCLUSION 4/1(B): THE NEED FOR AIS SEMINAR/WORKSHOP**

**That ICAO conducts Seminar/Workshop on GPS advisory for AFI States.**

**THE REPORT ON AGENDA ITEM 3: AFI GNSS TEST BEDS**

3.1 The meeting was informed that a comprehensive consolidated report on the Test beds result was not available and that individual reports were given to the partners involved in the test bed. The meeting appealed to ASECNA, ESA, ATNS (South Africa) and Kenya to coordinate with ICAO Secretariat for the consolidated final report to be produced on AFI test bed similar to the one produced for South America. The following Conclusion was adopted by the meeting:-

**CONCLUSION 4/2: REPORT ON AFI TEST BED**

**That, ESA, in cooperation with ASECNA, ATNS South Africa and Kenya provide the ICAO Secretariat with a consolidated final report on AFI GNSS Test Bed, covering Zone A, Zone B and Zone C.**

**REPORT ON AGENDA ITEM 4: IMPLEMENTATION OF GNSS IN AFI**

4.1 The meeting recalled that, the Special AFIRAN meeting discussed at length the non-implementation of the basic GNSS en-route. The meeting also noted that AFI States are in different stages of implementation. The meeting tasked the ICAO secretariat to conduct a survey to identify the assistance needed by States.

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<sup>1</sup> *“That when implementing GNSS- based operations, AFI States ensure that the relevant aeronautical information is provided to the users as appropriate.”*

4.2 The meeting also noted that some AFI States have footnotes (5.362B and 5.362C) at GNSS frequency band. For interference-free operation of the GNSS, these foot notes must be deleted. The following Conclusions were adopted by the meeting

**CONCLUSION 4/3: NEED FOR ICAO ASSISTANCE TO STATES**

**That the ICAO Regional office carry out a survey on States` need for assistance in implementing APIRG conclusion concerning phase 1 of AFI GNSS Strategy as defined by APIRG /15 including GNSS operation requirements (such as legislation/regulations, design and /or publication of procedures)**

**CONCLUSION 4/4: DELETION OF FOOTNOTES IN ITU RADIO REGULATIONS**

**That CAAs which have not yet done so, should liaise with telecommunication regulatory authorities to delete the existing footnotes in the ITU RR.**

**REPORT ON AGENDA ITEM 5: ISA COST BENEFIT ANALYSIS**

5.1 The meeting recalled that one of the factors that lead to the suspension of the implementation of EGNOS extension in AFI was the cost benefit analysis. ESA presented the meeting with updated Cost benefit analysis. However the meeting observed that the input statistical data was from only ASECNA member States Airport attached to this report as **Appendix 5A**. The meeting requested ESA to produce an updated version taking into account all airports in AFI. The following Decision was taken:

**DECISION 4/1: ISA COST BENEFIT ANALYSIS**

**That:-**

- a) **ICAO Secretariat ensure that the input to the Cost Benefit analysis related to ESA are properly coordinated, and, include statistical data, fleet data and equipage, industry trends, etc., and**
- b) **When finalized, the ISA Cost Benefit Analysis presented to GNSS/I/TF/4 be circulated to all AFI GNSS TASK FORCE members for comments and feed- back to the Secretariat.**

Statistiques de trafic ASECNA – 2003

Aéroports	Mouvements commerciaux	Mouvements non commerciaux	Mouvements Totaux	Passagers commerciaux	Passagers non commerciaux	Passagers en transit	Passagers Totaux	Fret (en tonnes)
ABIDJAN	15 058	5 899	20 957	640 568	12 742	113 088	766 398	15 449
ANTANANARIVO	10 617	11 356	21 973	544 367	9	9 253	553 629	14 439
BAMAKO	14 113	1 735	15 848	355 453	156	39 835	395 444	4 491
BANGUI	2 307	2 691	4 998	39 074	1 530	4 155	44 759	1 066
BOBO DIOULASSO	696	1 407	2 103	19 789	n.d.	6 593	26 382	138
BRAZZAVILLE	15 906	1 620	17 526	486 624	2 411	n.d.	489 035	21 735
COTONOU	7 492	960	8 452	278 643	56	42 137	320 836	2 906
DAKAR	19 832	14 426	34 258	1 374 377	57	29 158	1 403 592	16 715
DOUALA	17 969	1 731	19 700	406 312	n.d.	84 928	491 240	13 536
GAO	118	104	222	2 257	397	2	2 656	23
GAROUA	874	282	1 156	48 474	90	7 901	56 465	671
LIBREVILLE	30 154	4 825	34 979	635 870	24 777	236	660 883	n.d.
LOME	5 670	3 758	9 428	172 292	416	41 149	213 857	3 600
MAHAJANGA	2 607	3 586	6 193	42 916	758	1 722	45 396	67
MALABO	16 851	1 345	18 196	313 725	13 831	25 687	353 243	3 133
NDJAMENA	3 280	3 696	6 976	102 202	n.d.	n.d.	102 202	4 785
NIAMEY	3 439	990	4 429	100 606	13	190	100 809	2 101
NOUADHIBOU	2 594	97	2 691	47 217	n.d.	45	47 262	289
NOUAKCHOTT	5 609	534	6 143	179 115	46	1 495	180 656	577
OUAGADOUGOU	4 756	3 672	8 428	204 633	6	11 053	215 692	3 142
POINTE NOIRE	17 928	141	18 069	410 884	n.d.	n.d.	410 884	24 130
PORT GENTIL	14 164	1 736	15 900	264 813	9 526	16 594	290 933	951
SARH	48	176	224	31	n.d.	n.d.	31	n.d.
TOAMASINA	3 331	1 185	4 516	61 069	151	12 381	73 601	135
<b>Total</b>	<b>215 413</b>	<b>67 952</b>	<b>283 365</b>	<b>6 731 311</b>	<b>66 972</b>	<b>447 602</b>	<b>7 245 885</b>	<b>134 078</b>

**REPORT ON AGENDA ITEM 6: STATUS OF SBAS, RNP 0.1 AND 0.3 COVERAGE  
OVER AFI**

6.1 The meeting was briefed on EGNOS activities Certification for avionics operations using EGNOS will be completed in 2009. At present without any extra RIMS RNP 0.1 and 0.3 would be achieved in most AFI States. Additional 4 RIMS were needed for complete coverage of AFI (see Appendix 6A) to this report. ESA appealed to the Task force to take this into consideration when updating the GNSS strategy.



## EGNOS RNP 0.1 AND 0.3 COVERAGE OVER AFI



APPENDIX 6A.ppt

**REPORT ON AGENDA ITEM 7: THE EFFECT OF GNSS ON PBN RVSM AND SURVEILLANCE IMPLEMENTATION.**

**7.1** The meeting took cognizance of Resolution A36-23 on Performance based navigation global goals adopted by the 36<sup>th</sup> Session of the ICAO Assembly held in Montreal 18-28 September 2007, had adopted Resolution A36-23: Performance based navigation global goals, urging contracting States to implement RNAV and RNP at air traffic service routes and implement in accordance with ICAO PBN concept as stated in Performance Based Navigation Manual (Doc 9613).

**7.2** The meeting also noted that the Resolution called upon States and Planning and Implementation Regional Groups to develop PBN implementation plans by 2009 to ensure globally harmonized and coordinated implementation of the PBN concept. See **Appendix 7A** attached to this report.

**A36-23: Performance based navigation global goals**

*Whereas* a primary objective of ICAO is that of ensuring the safe and efficient performance of the global Air Navigation System;

*Whereas* the improvement of the performance of the Air Navigation System on a harmonized, worldwide basis requires the active collaboration of all stakeholders;

*Whereas* the Eleventh Air Navigation Conference recommended that ICAO, as a matter of urgency, address and progress the issues associated with the introduction of area navigation (RNAV) and required navigation performance (RNP);

*Whereas* the Eleventh Air Navigation Conference recommended that ICAO develop RNAV procedures supported by global navigation satellite system (GNSS) for fixed wing aircraft, providing high track and velocity-keeping accuracy to maintain separation through curves and enable flexible approach line-ups;

*Whereas* the Eleventh Air Navigation Conference recommended that ICAO develop RNAV procedures supported by GNSS for both fixed and rotary wing aircraft, enabling lower operating minima in obstacle rich or otherwise constrained environments;

*Whereas* Resolution A33-16 requested the Council to develop a programme to encourage States to implement approach procedures with vertical guidance (APV) utilizing such inputs as GNSS or distance measuring equipment (DME)/DME, in accordance with ICAO provisions;

*Recognizing* that implementation of approach with vertical guidance (APV) is still not widespread;

*Recognizing* that the Global Aviation Safety Plan has identified Global Safety Initiatives (GSIs) to concentrate on developing a safety strategy for the future that includes the effective use of technology to enhance safety, consistent adoption of industry best practices, alignment of global industry safety strategies and consistent regulatory oversight;

*Recognizing* that the Global Air Navigation Plan has identified Global Plan Initiatives (GPIs) to concentrate on the incorporation of advanced aircraft navigation capabilities into the air navigation system infrastructure, the optimization of the terminal control area through improved design and management techniques, the optimization of the terminal control area through implementation of RNP and RNAV SIDs and STARs and the optimization of terminal control area to provide for more fuel efficient aircraft operations through FMS-based arrival procedures; and

*Recognizing* that the continuing development of diverging navigation specifications would result in safety and efficiency impacts and penalties to States and industry;

*The Assembly:*

1. *Urges* all States to implement RNAV and RNP air traffic services (ATS) routes and approach procedures in accordance with the ICAO PBN concept laid down in the *Performance Based Navigation Manual* (Doc 9613);

2. *Resolves* that:

a) States and planning and implementation regional groups (PIRGs) complete a PBN implementation plan by 2009 to achieve:

1) implementation of RNAV and RNP operations (where required) for en route and terminal areas according to established timelines and intermediate milestones; and

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

b) ICAO develop a coordinated action plan to assist States in the implementation of PBN and to ensure development and/or maintenance of globally harmonized SARPs, Procedures for Air Navigation Services (PANS) and guidance material including a global harmonized safety assessment methodology to keep pace with operational demands ;

3. *Urges* that States include in their PBN implementation plan provisions for implementation of approach procedures with vertical guidance (APV) to all runway ends serving aircraft with a maximum certificated take-off mass of 5700 kg or more, according to established timelines and intermediate milestones.

4. *Instructs* the Council to provide a progress report on PBN implementation to the next ordinary session of the Assembly; and

5. *Requests* the Planning and Implementation Regional Groups (PIRG) to include in their work programme the review of status of implementation of PBN by States according to the defined implementation plans and report to ICAO any deficiencies that may occur.

7.3 The PBN manual discusses in details the ATS communications and Nav aids supporting infrastructure supporting the associated with Navigation specifications (see the table below).

	GNSS	IRU	D/D	D/D/IRU	D/VOR
RNAV 10	✓	✓			
RNAV5	✓	✓	✓	✓	✓
RNAV2/1	✓		✓	✓	
RNP 4	✓				
Basic- RNP 1	✓				
RNP APCH	✓				

*Overview of Navigation specifications and supporting infrastructure*

The AFI GNSS strategy was accordingly updated based on the navigation specifications applicable to the Region, as defined in the AFI PBN Regional Plan adopted by the Second Meeting of APIRG PBN Task Force(PBN/TF/2, Nairobi, 4-6 December 2008).

The meeting adopted the following Conclusion:

**CONCLUSION 4/5: NAVIGATION SPECIFICATIONS TO BE SUPPORTED BY AFI GNSS IMPLEMENTATION.**

**That the AFI GNSS operational requirements should be based on the navigation specifications provided in Appendix 7B to this report in accordance with the AFI PBN Regional Plan.**

**NAVIGATION SPECIFICATIONS APPLICABLE IN THE AFI  
REGION AS DEFINED IN THE AFI PBN REGIONAL PLAN**

**Short – Term and Mid – Term Navigation Specifications**

<b>Short – Term (2008-2012) Navigation Specifications</b>		
Airspace	Nav. Specifications	Nav. Specifications where Operationally Required
En-Route Oceanic	RNAV-10	RNP-4
En-Route Remote Continental	RNAV-10	RNP-4
En-Route Continental	RNAV-5	RNAV-1
TMA Arrival/Departure	RNAV-1 in a surveillance environment	
	Basic RNP-1 in non-surveillance environment	
Approach	RNP APCH with Baro-VNAV or RNP AR APCH if required	

<b>Mid – Term (2013-2016) Navigation Specifications</b>		
Airspace	Nav. Specifications	Nav. Specifications where Operationally Required
En-Route Oceanic	RNAV-10,	RNP-4
En-Route Remote Continental	RNAV-10,	RNP-4
En-Route Continental	RNAV-2, RNAV-5	RNAV-1
TMA Arrival/Departure	Expand RNAV-1, or RNP-1 application  Mandate RNAV-1, or RNP-1 in high density TMAs	
Approach	Expand RNP APCH with (Baro-VNAV) and APV  Expand RNP AR APCH where there are operational benefits	

## REPORT ON AGENDA ITEM 8: UPDATING OF AFI GNSS STRATEGY

8.1 Taking in to consideration the ICAO Assemble Resolution A32-23 and the draft AFI PBN operational requirements, the draft AFI GNSS strategy was updated as proposed in Appendix 8A to this report.

8.2 The meeting noted that for long term (2017 and beyond), the next APIRG meeting (i.e. APIRG/17), would have to clarify, whether approach with. The meeting adopted the following Conclusion:

### CONCLUSION 4/6: - IMPLEMENTATION OF APPROACH AND VERTICAL GUIDANCE (APV)

**That APIRG should coordinate and specify the applicable approach with vertical guidance (APV) type (Baro –VNAV versus SBAS) in view of Assembly resolution A36-23 to achieve implementation of approach procedures with vertical guidance (APV) (Baro-VNAV and /or augmented GNSS) for all instrument runway ends, either as the primary approach or as a back-up for precision approaches by 2016 with intermediate milestones as follows: 30 per cent by 2010, 70 per cent by 2014.**

*Note: An APIRG decision is required no later than 2010 in order to meet the above.*

8.3 For the finalization of the draft amendments to the AFI GNSS Strategy, the meeting decided that there should be a joint meeting between the Task Force and the PBN task force to ensure that all the operational objectives have been catered for. The meeting adopted the following decision:

### DECISION 4/2: FINALIZATION OF DRAFT AMENDMENTS TO AFI GNSS STRATEGY AS PART OF AFI CNS/ATM IMPLEMENTATION PLAN (DOC 003)

**That a joint meeting of APIRG PBN and GNSS Implementation Task Force be held in order to finalize draft amendments to AFI GNSS Strategy as part of AFI CNS/ATM Implementation Plan (Doc 003), based on the AFI Regional PBN Plan (Roadmap) and related performance objectives and action plan for en – route, terminal and approach flight phases.**

8.4 In order to ensure consistence in the development of the PBN Implementation the meeting concluded that the two Task force should merge with terms of reference as attached in **Appendix 8B**. The meeting adopted the following conclusion:

### CONCLUSION 4/7: ESTABLISHMENT OF A COMBINED APIRG PBN/GNSS TASK FORCE

**That APIRG establish a combined PBN/GNSS Task Force to ensure consistency in the planning and implementation of AFI requirements for Performance Based Navigation concept and the Navigation element of CNS/ATM, with the Terms of reference shown in Appendix 8B to this report.**

2008-2013			2013-2016		
Airspace	Navigation Specifications	Navigation Specifications where operationally required	Airspace	Navigation Specifications	Navigation Specifications where operationally required
	<b>Basic GNSS</b>			<b>Basic GNSS</b>	
• En-Route Oceanic	• RNAV-10	• RNP-4	• En-Route Oceanic	• RNAV-10,	• RNP-4
• En-Route Remote Continental	• RNAV-10	• RNP-4	• En-Route Remote Continental	• RNAV-10,	• RNP-4
• En-Route Continental	• RNAV-5	• RNAV-1	• En-Route Continental	• RNAV-2, RNAV-5	• RNAV-1
• TMA Arrival/Departure	• RNAV-1 in a surveillance environment • Basic RNP-1 in non-surveillance environment		• TMA Arrival/Departure	• Expand RNAV-1, or RNP-1 application • Mandate RNAV-1, or RNP-1 in high density TMAs	
	<b>Basic GNSS</b>			<b>ABAS or SBAS</b>	
• Approach	• RNP APCH with Baro-VNAV or • RNP AR APCH if required		• Approach	• Expand RNP APCH with (Baro-VNAV) and APV (ABAS or SBAS) • Expand RNP AR APCH where there are operational benefits	



<b>2017 – and beyond</b>		
<b>Airspace</b>	<b>Navigation Specifications</b>	<b>Navigation Specifications where operationally required</b>
	<b>Long term GNSS</b>	
<ul style="list-style-type: none"> <li>• En-Route Oceanic</li> </ul>	<ul style="list-style-type: none"> <li>• RNAV-10</li> </ul>	<ul style="list-style-type: none"> <li>• RNP-4</li> </ul>
<ul style="list-style-type: none"> <li>• En-Route Remote Continental</li> </ul>	<ul style="list-style-type: none"> <li>• RNAV-10</li> </ul>	<ul style="list-style-type: none"> <li>•</li> <li>• RNP-4</li> </ul>
<ul style="list-style-type: none"> <li>• En-Route Continental</li> </ul>	<ul style="list-style-type: none"> <li>• RNAV-5</li> </ul>	<ul style="list-style-type: none"> <li>• RNAV-1</li> </ul>
<ul style="list-style-type: none"> <li>• TMA Arrival/Departure</li> </ul>	<ul style="list-style-type: none"> <li>• RNAV-1 in a surveillance environment</li> <li>• Basic RNP-1 in non-surveillance environment</li> </ul>	
	<b>SBAS, GBAS</b>	
<ul style="list-style-type: none"> <li>• Approach</li> </ul>	<ul style="list-style-type: none"> <li>• RNP APCH with Baro-VNAV</li> <li>• RNP AR APCH if required</li> <li>• CAT I (SBAS)</li> <li>• CAT I/II/III/ (GBAS) as required</li> </ul>	

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

**1. Terms of Reference**

- a) Carry out specific studies in support of the implementation of Performance Based Navigation (PBN) in the AFI Region, according to the ICAO Strategic Objectives and Global Plan Initiative (GPI) 5 and related GPIs (GPIs 7, 10, 11, 12, 20, 21)
- b) Identify other issues/action items arising from the work of ICAO or for consideration by ICAO in order to facilitate regional and global harmonization of existing applications as well as future implementation of Performance Based Navigation operations
- c) Determine and recommend, on the basis of the study, the PBN strategy and Implementation Plan for the AFI Region, based on the ICAO PBN Implementation goals as reflected in assembly resolution 36-23.
- d) Assist States that may require support in the implementation of PBN.

**2. Work Programme**

- a) Study and assess the Regional RNAV and RNP requirements
- b) Initially focus assistance to States that may require support on development of the State PBN implementation plans.
- c) Identify priority routes and terminal areas where RNAV and RNP should be implemented
- d) Identify priority runways for Approach Procedures with Vertical Guidance (APV) to be implemented based on the ICAO RNP APCH navigation specification (APV/Baro-VNAV).
- e) Develop an amendment proposal to the AFI Regional Supplementary Procedures concerning the implementation of PBN in the Region.
- f) Identify guidance material and training needs
- g) Follow up on the developments in ICAO affecting the Global Plan and PBN in particular, in order to update the Regional plans accordingly
- h) Coordinate with other ICAO Regions as necessary to address implementation interface issues
- i) Undertake other functions relevant to implementation of PBN as assigned by APIRG
- j) Develop and update (as necessary) the Regional PBN Implementation Strategy and Plan
- k) Develop the PBN performance objectives and related action plans for en – route, terminal and approach phases of flight; and
- l) Report to APIRG through its ATM and CNS Sub-groups.

**3. The Task Force shall in its work be guided by the following principles:**

- a) Implementation of PBN shall follow the ICAO PBN goals and milestones
- b) Avoid undue equipage of multiple on board equipment and/or ground-based systems.
- c) Avoid the need for multiple airworthiness and operational approvals for intra- and interregional operations.
- d) Continue application of conventional air navigation procedures during the transition period, to guarantee the operations by users that are not RNAV- and/or RNP-equipped
- e) The first regional PBN Implementation Strategy and Plan should address the short term (2008-2012), medium term (2013-2016) and take into account long term global planning issues.
- f) Cognizance that the primary objective of ICAO is that of ensuring the safe and efficient performance of the global Air Navigation System, ensure that pre- and post-implementation safety assessments will be conducted to ensure the application and maintenance of the established target levels of safety
- g) Take into account the introduction of new technologies, encourage implementation and development in GNSS
- h) Coordinated implementation with other relevant Regional Plans
- i) Apply ICAO guidance material and information as may be applicable to the Region to facilitate the implementation of PBN.

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**REPORT ON AGENDA ITEM 9: ANY OTHER BUSINESS**

9.1 The meeting was briefed by Prof Ilcev of Durban University of Technology on an augmentation project taking place in the Durban University of Technology. The presentation was followed by an A\$Q session for further clarification as required.

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