International Civil Aviation Organization

**Third Meeting of the APIRG Communications, Navigation and
Surveillance Sub-Group(CNS/SG/3)
[Nairobi, Kenya 26-30 April 2010]**

Agenda Item 3:   **Follow up on APIRG/16, CNS/SG/2 and SP AFI RAN Conclusions, Decisions
and Recommendations**

Review of AFI CNS/ATM Implementation Plan (Doc 003) Requirements

(Presented by IATA)

SUMMARY

This paper provides the ATM and CNS requirements contained in the AFI CNS/ATM
Implementation Plan (Doc 003) – Systems Evolution Tables for en-route, terminal and aerodrome
operations.

In accordance with ICAO SP AFI RAN 2008, Recommendation 6/1, the meeting is invited to
review and update the attached AFI CNS/ATM Systems Evolution Tables.

This paper also supports the merging of the existing ATS/AIS/SAR and CNS Sub-groups as a
single CNS/ATM Sub-group, in order to improve coordination and increase APIRG efficiency in
addressing its work programme pertaining to CNS/ATM.

References:

- ICAO Special AFI RAN 2008 Report
- APIRG/16 Report
- AFI CNS/ATM Implementation Plan (D0c 003)

INTRODUCTION

1.1.   The ICAO Special AFI RAN 2008 agreed that the performance objectives and the associated
performance framework forms (PFFs) should be integrated into Doc 003 which should then be
updated to serve as an integrated planning document *(Recommendation 6/1).*

2.   DISCUSSION

2.1.   **Appendices A and B** to this working paper provide AFI CNS/ATM Systems Evolution Tables
for En-route and TMA/Aerodromes operations respectively, as contained in the AFI Doc 003 –

CNS/ATM Implementation Plan. The same tables are reflected in the AFI Air Navigation Plan (ICAO Doc 7474).

2.2.   The meeting may wish to review the information provided therein for AFI ATM operational objectives and related supporting CNS infrastructure, and make proposals for their amendments as required.

2.3.   The meeting's attention is drawn to the multidisciplinary nature of CNS/ATM implementation activities, which requires close and permanent coordination. Accordingly, this working paper supports the merging of APIRG ATS/AIS/SAR and CNS Sub-groups as a single CNS/ATM Sub-group, in order to ensure better coordination and increase efficiency of CNS/ATM planning and implementation activities.

3.   ACTION BY THE MEETING

3.1.   In coordination with the APIRG ATS/AIS/SAR Sub-group, the meeting is invited to:

a) Review and update the requirements for communications, navigation and surveillance elements of the AFI CNS/ATM Systems as shown in **Appendices A** and **B** to this working paper;

b) Ensure that they are reflected in the CNS Performance Objectives shown in **Appendix C**;

c) Accordingly request the Secretariat to coordonnate related draft amendment proposals to both the AFI CNS/ATM Implementation Plan (Doc 003) and AFI Air Navigation Plan (Doc 7474).

d) Acknowledge the multidisciplinary nature of the related implementation tasks which were assigned to the previous APIRG CNS/ATM Sub-Group and Implementation Coordination Group (ICGs); and

e) Discuss the opportunity to create a single CNS/ATM Sub-group in replacement of the current ATS/AIS/SAR and CNS Sub-groups, with the objective to increase APIRG efficiency in addressing its assigned work programme in the performance-based approach context.

-END-

Appendix A

Area of Routing	FIRs	En-Route - Systems Evolution 1999-2010				
		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	Atlantico [1] Canarias Casablanca Dakar Oceanic Lisboa [1] Sal	Fixed RNAV routes (1995); Progressive evolution towards a random RNAV environment from West to East (Nov. 2005); Reduction of longitudinal separation to 10 minutes using Mach Number Technique (1998); In selected airspaces: Longitudinal separation 30 NM (2001). Lateral separation 25 NM (2001) both with radar surveillance; 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 30NM (2004 - onwards); RVSM (2002)	DCPC (data) by participating aircraft (Bpa) (2004); 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 (2004-onwards)	RNP 5: Casablanca and Canarias FIRs (1998); RNP 10: Other FIRs (2001); RNP 5: (2005 - onwards) Other FIRs GNSS as primary-means	Automatic Dependent Surveillance (ADS) on RNP airspace Bpa (from 2004)
Atlantic Ocean (AFI-NAT/SAM interface) AR-2	Accra Dakar Oceanic Johannesburg Oceanic Luanda	Random routing (2005); Reduction of longitudinal separation to 10 minutes (2000) RVSM (Jan. 2005)	DCPC (data) by participating aircraft (Bpa) (1998); HF (voice)	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	ADS (2000)

Area of Routing	FIRs	En-Route - Systems Evolution 1999-2010				
		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 30 NM in line with RNP 5 in the upper airspace (2001); Vertical Separation: introduction of RVSM initially between FL 350 and FL 390 (2003-onwards) and extension to FL 290 - FL 410 by 2005; Full ATC service on all ATS routes above FL 245 and 150NM from international airports (1999); RNAV: Gradual implementation of Random RNAV initially above FL 350 from 2001.	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); AFTN and ATS/DS (1999); Introduction of ATS inter-facility data communications (AIDC) starting in 2005 to be completed by 2008	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

Area of Routing	FIRs	En-Route - Systems Evolution 1999-2010				
		Airspace and Traffic Management	Communications		Navigation	Surveillance
			Mobile Service	Fixed Service		
1	2	3	4	5	6	7
Europe - Southern Africa including Continental Southern Africa routes AR-4	Algiers Beira Brazzaville Cape Town Gaborone Harare Johannesburg Kano Kinshasa Lilongwe Luanda Lusaka N'Djamena Niamey Tunis Tripoli Windhoek	Fixed RNAV routes coexisting with conventional routes from 1995; Longitudinal separation 10 minutes from (2000) Lateral separation minima; Gradual introduction of 30 NM in line with RNP 5 in the upper airspace (2001); RVSM: Introduction initially between FL 350 and 390 (2003-onwards), evolving towards FL 290/410 by 2005; Full ATC service on all ATS routes above FL 245 and 150NM from international airports (1999). Random RNAV initially above FL350 from 2001	Full VHF coverage on all ATS routes above FL300, and 150 NM from international airports (2000) DCPC (data) Bpa (From 2001)	Implementation of all ATS/DS circuits. AFTN and ATS/DS links upgraded; Gradual introduction of ATN compatible bit-oriented procedures (BOP) between AFTN main centres (1999 - onwards); Gradual introduction of AIDC from 2005 to be completed by (2008)	RNP 5: from 2001 onwards GNSS as primary-means	Procedural (on account of traffic diversity); ADS (2001 onwards with full ground capability in 2005; SSR at Brazzaville, Kinshasa, Luanda and N'Djamena from (2000);

Area of Routing	FIRs	En-Route - Systems Evolution 1999-2010				
		Airspace and Traffic Management	Communications		Navigation	Surveillance
			Mobile Service	Fixed Service		
1	2	3	4	5	6	7
Continental Western Africa routes including coastal areas AR-5	Accra Dakar Kano Niamey Ndjamena Roberts	Fixed RNAV routes coexisting with conventional routes from 1999; Longitudinal separation 10 minutes (2000); Full ATC service on all ATS routes above FL 245 and 150NM from international airports (1999). Lateral separation 30 NM in an RNP 5 environment (2001 - onwards); RVSM initially between (FL 350-FL 390) (2003 -onwards); Random routing initially above FL350 (2001 - onwards)	Full VHF coverage on all ATS routes above FL300, and 150 NM from international airports (2000) Progressive introduction of DCPC (data) from 2000 onwards	AFTN and ATS/DS links upgraded (1999); Gradual introduction of ATN compatible bit-oriented procedures (BOP) between AFTN main Centres (1999-onwards); Gradual introduction of AIDC from 2005 to be completed by (2008)	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

Area of Routing	FIRs	En-Route - Systems Evolution 1999-2010				
		Airspace and Traffic Management	Communications		Navigation	Surveillance
			Mobile Service	Fixed Service		
1	2	3	4	5	6	7
Continental Southern Africa AR-6	Antananarivo Bombay [1] Johannesburg Oceanic Male [1] Mauritius [1] Melbourne Seychelles	Reduction of longitudinal separation to 10 minutes (2000); Random routing in selected portions of the airspace (1999); RNP itineraries (2000); Full ATC service on all ATS routes above FL 245 and 150NM from international airports; Reduction of lateral separation to 50 NM coinciding with RNP 10 from 2000 onwards; RVSM along selected itineraries initially between FL 350-FL390 (2001-onwards) evolving towards FL 290-FL 410 from 2005 onwards.	DCPC (data) from 1999); Full VHF coverage on all ATS routes above FL300, and 150 NM from international airports (2000)	AFTN and ATS/DS links upgraded (1999); AIDC (2005) with full capability in 2008	RNP 10: (2000) GNSS as primary-means	ADS Bpa (2000)

Appendix B

Type of TMA or Aerodrome (See Note 1)	Characterisation	TMAs and Aerodromes - Systems Evolution 1995-2005			
		Communications		Navigation	Surveillance
		Voice	Data		
1	2	3	4	5	6
TMA Type 1	Multiple airports within TMA; Complex traffic patterns; High density traffic.	VHF voice coverage up to 150 NM from all international airports at operationally significant altitudes	VHF data-link by participating aircraft	VOR/DME; fixed RNAV routes; GNSS overlay	Voice position reports plus: - SSR; Mode S (See Note 2) - Automatic Dependent Surveillance (ADS) by participating aircraft.
TMA Type 2	Multiple airports within TMA with complex traffic patterns, or TMAs with medium density traffic.		VHF data-link by participating aircraft (the ground element of the system where justified only)		Voice position reports plus: - SSR Mode A/C (where justified) - ADS (where justified)
TMA Type 3	TMAs with low density traffic.		N/A		Voice position reports.
Aerodrome Type 1	High density traffic.	Independent ground and Tower high reliability VHF voice frequencies	VHF data-link by participating aircraft; Gate data-link by participating aircraft.	ILS; GNSS based approach procedures : 1. overlay to ILS procedures; 2. non-instrument runways; 3. non-precision runways.	Voice position reports. Visual surveillance plus: - Surface Movement Radar (where justified) - ADS by participating aircraft.
Aerodrome Type 2	Medium density traffic.		VHF data-link by participating aircraft; (the ground element of the system where justified only)		Voice position reports; Visual surveillance plus: - ADS by participating aircraft (where justified).
Aerodrome Type 3	Low density traffic.	Single ground/Tower high reliability VHF voice frequency	N/A		Voice position reports. Visual surveillance.

Note 1: *Those Airports and TMAs falling within each type will be designated by the AFI Planning and Implementation Regional Group (APIRG) based on suitable proposals by provider and user States and organizations concerned.*

Note 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.*

Appendix C

CNS PERFORMANCE OBJECTIVES

ELIMINATION OF IDENTIFIED CNS DEFICIENCIES				
Benefits				
Safety	**Implementation of AFI ANP** • enhanced safety in flight operations • uniform implementation of CNS/ATM systems (Doc 003) and relevant ICAO SARPs			
Efficiency	• TBD			
Environment	• TBD			
Strategy **Short term (2010)** *Medium term (2011 - 20015)*				
ATM OC COMPONENTS	**TASKS**	**TIMEFRAME START-END**	**RESPONSIBILITY**	**STATUS**
Communications	•			
AMS	• provision of VHF in FIRs Angola, Sudan, Somalia and Congo (RD)	2008 – 2009		Ongoing
AFS	• TBD			
Navigation	•			
~~**Navigational**~~	• implementation of navigational aids to increase safety at terminal areas	2008 – 2011		Ongoing
	• implementation of GNSS – carry out survey to determine the implementation status and identify the specific assistance needed if any	2009		ongoing (60% implementation)
Surveillance	• development of AFI surveillance plan	2008 – 2009		
	• development of State implementation action plan based on AFI surveillance plan	2009 – 2012		
Aeronautical spectrum	•			
~~**Safety**~~	• implementation of automation support tools to enhance frequency management	July 2008 – 2009		Ongoing

	• AFI to join ICARD	August 2008 – March 2009		
Linkage to GPIs	GPI/9: Situational awareness; GPI/10: Terminal area design and management; GPI/17: Implementation of data link applications; - GPI/21: Navigation systems; GPI/22: Communication network infrastructure; GPI/23 – Aeronautical spectrum			