INTERNATIONAL CIVIL AVIATION ORGANIZATION

WESTERN AND CENTRAL AFRICAN OFFICE

Eighteenth Meeting of the AFI Satellite Network Management Committee (SNMC/18)
(Ouagadougou, Burkina Faso, 1-4 June 2010)

Agenda Item 7: AFISNET modernization and re-engineering

(Presented by the secretariat)

SUMMARY

The purpose of this paper is to review and analyze the report of the Joint Technical Evaluation and Re-Engineering Team and call for a roadmap for AFISNET Modernization and Re-engineering exercise.

Reference:

Report of APIRG 16 meeting
Report of SP AFI RAN meeting
Report of SNMC 17 Meeting
Conclusion of the first meeting of the Joint Technical evaluation and re-engineering

Action by the meeting in paragraph 3

Introduction

The regional SPI AFI/ RAN meeting **Conclusion 6/18:** AFISNET Technical Evaluation and re-engineering recommended that AFISNET States execute the joint technical evaluation and re-engineering of AFISNET. Consequently, at the SNMC/17 meeting concerned States took the commitment to complete this task by the end of October 2009. As stated in WP-07 the ICAO WACAF Office coordinated the process of implementing this Conclusion and Leaders were nominated and a coordinating meeting held from 13 to 14 April 2010.

1. Discussion

2.1 *Planning and performing the AFISNET Joint Technical Evaluation and Re-engineering exercise*

The first coordinating meeting of the Joint Technical Evaluation and Re engineering Team planned the sites assessment by mixed experts from NAMA, GCAA, Roberts FIR and ASECNA (see planning in **Annex A**).

Experts' disposal and financial consideration were taken into account in the process of distributing the experts for the sites to be investigated so that to ensure the best participation of all the stakeholders in this exercise.

The assessment were conducted in the following site Abidjan, Accra, Brazzaville, Dakar, Lagos, Kano, Libreville, Niamey, Monrovia and Ouagadougou in order to cover the various types of AFISNET nodes (B, F2 and F1 types dishes).

2.2 Report of the Joint Technical Team for AFISNET Evaluation and Re-engineering evaluation exercise

The first meeting of the Team leaders developed all the suitable guidelines for the teams to perform a harmonized report for each site assessment and compile all the reports to a consolidated report reflecting the global technical and operational status of AFISNET to therefore allow technical conclusion and pertinent proposals for AFISNET modernization and re engineering (**See Annex B**).
Due to lack of time and keeping in mind the financial concerns the meeting in Dakar planned to finalize the assessment report was postponed and the report is to be directly submitted to the approval of this current SNMC/18 meeting.
The frame of the report of AFISNET Joint Technical Evaluation and Re-engineering exercise is attached in **Annex C** to this Working Paper and the report will be presented by ASECNA and Roberts FIR committed to issue the final report.

3. Action by the meeting

The meeting is invited to:

a) Take note of the information here given above

b) Analyze the report of the AFISNET Joint Technical Evaluation and Re- engineering Team and;

c) Develop a roadmap for the AFISNET global Modernization and Re- engineering based on the results and the proposal of the Joint Technical Team.

Annex A

A.1 Chart of AFISNET Nodes to be evaluated

Centre	Responsibilities			Team Leader
	Area Control Centre/ Flight Information Centre	AFTN Main Centre	Network Control Centre	
1. Abidjan	**X**			**Roberts FIR**
2. Accra	**X**			**ASECNA**
3. Brazzaville	**X**	**X**		**GCAA Ghana**
4. Roberts	**X**			**ASECNA**
5. Dakar	**X**	**X**	**X**	**Roberts FIR**
6. Douala	**X**			**NAMA Nigeria**
7. Kano	**X**			**ASECNA**
8. Lagos	**X**			**ASECNA**
9. Libreville	**X**			**GCAA Ghana**
10. Ndjamena	**X**			**NAMA Nigeria**
11. Niamey	**X**	**X**		**GCAA Ghana**
12. Ouagadougou	**X**			**NAMA Nigeria**
13. Maiduguri	**X**			**ASECNA**

A.2 Planning for AFISNET Joint Technical Evaluation and Re –engineering

WEEK	***17***			***18***							***19***							***20***	
DAY	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Group1						ROB	ROB	ROB	ABJ	ABJ	ABJ	ABJ	DKR	DKR	DKR	DKR*	DKR*	Report to WACAF(17-18 Mai)	
Group2		LOS	LOS	KNO	KNO	MDG	MDG	ACC	ACC	NIM	NIM	NIM	OUA	OUA	OUA	DKR*	DKR*	Rport to WACAF(17-18 Mai)	
Group3				LBV	LBV	LBV	BZV	BZV	BZV	DLA	DLA	DLA	NDJ	NDJ	NDJ	DKR*	DKR*	Report to WACAF(17-18 Mai)	

Annex B: Template for the Evaluation of AFISNET

OPERATIONAL EVALUATION

1. EVALUTION OF AFISNET SERVICES

1.1 AFTN

Centre:
Evaluation Team
Date /

Country	Terminal 1	Terminal II	Support	COM Protocol	Speed	Transit Time	Routing	Availability 2005-2010						Observations
								05	06	07	08	09	10	
CONGO	BRAZZAVILLE	ACCRA	AFISNET											

1.2 AFTN MESSAGES AVAILABILITY

Centre:
Evaluation Team
Date /

Country	Terminal 1	Terminal II	Availability of AFTN messages three months						Observations
			01		02		03		
			TX	RX	TX	RX	TX	RX	
CONGO	BRAZZAVILLE	ACCRA							

1.3 OPMET AVAILABILITY

Centre:
Evaluation Team
Date /

Country	Terminal 1	Terminal II	Support	COM Protocol	Speed	Transit Time	Routing	Availability (OPMET)						Observations
								05	06	07	08	09	10	
CONGO	BRAZZAVILLE	ACCRA	AFISNET											

1.4 ATS/DS TEMPLATE

Centre :
Evaluation Team:
Date /

Country	Terminal 1	Terminal II	Support	Connection Time	Nb of attempts	Failure rate	Voice Quality (1 to 5)	Call Type (Direct/Indirect)	Availability						Remarks
									05	06	07	08	09	10	
CONGO	BRAZZAVILLE	ACCRA	AFISNET												

1.5 Future CNS Services

Country	Terminal 1	Terminal II	Support	Provided Service	COM Protocol	Speed	Transit Time	Routing	Availability 2005-2010						Observations
									05	06	07	08	09	10	
CONGO	BRAZZAVILLE	ACCRA	AFISNET	AIDC											
Liberia	Roberts	Abidjan	AFISNET	AMHS											

1.5 REMOTE VHF

Identification		Record 1									Record 2								
Type	Flight Number	Freq. (MHZ)	Flight Level	Route	Position	Time	Reception Quality				Freq. (MHZ)	Flight Level	Route	Position	Time	Reception Quality			
							Ground		Air							Ground		Air	
							Clarity	Strength	Clarity	Strength						Clarity	Strength	Clarity	Strength

2. TECHNICAL EVALUATION

Appendix A

2.1 AFTN TABLE

STATE	STATE	AFTN Address Indicator	Message switching type	TYPE OF LINK	Synchronization system type	Multiplexer ID	PROTOCOL	TRANSMISSION SPEED	Remarks
MAIN CENTRE									
Abidjan									
	Accra			AFISNET					
	Dakar			AFISNET					
	Niamey			AFISNET					
	Casablanca			AFISNET					
Accra									
	Abidjan			AFISNET					
	Cotonou			AFISNET					
	Kano			AFISNET					
	Lagos			AFISNET					
	Lome			AFISNET					

Appendix B

2.2 ATS/DS TABLE

STATE	STATE	VCSS Type	Call type (Direct/Indirect)	TYPE OF LINK	Synchronization system type	Multiplexer ID	PROTOCOL	TRANSMISSION SPEED	Remarks
MAIN CENTRE									
Abidjan									
	Accra			AFISNET					
	Dakar			AFISNET					
	Niamey			AFISNET					
	Casablanca			AFISNET					
Accra									
	Abidjan			AFISNET					
	Cotonnou			AFISNET					
	Kano			AFISNET					
	Lagos			AFISNET					
	Lome			AFISNET					

Appendix C

Subject : AFISNET Network Joint Technical Evaluation

Ref : Draft Conclusion 17/02 – SNMC/17
(Monrovia, Liberia 23-25 June 2009)

Site: ABIDJAN EARTH STATION NETWORK
(REPRESENTATION ASECNA/COTE D'IVOIRE)

Satellite Provider
Registration Name:
Station coordinates (WGS 84):
Provider link Name: IS 10-02 @359°E
Transponder Number: 20/20, 23/23
Starting service date:

A. Satellite Earth Station

Names	Parameters Values	Date of installation	Redundancy	Expected life span	Remarks
Pointing Coordinates	AZ = 255,348 EL = 82,346				
Antenna Type and Size	ANDREW 7m3				
Antenna Gain	Tx : 51,15 ± 0,2 dBi Rx : 48,5 ± 0,2 dBi				
Tracking Antenna System	Automatic				
SSPA	ALCATEL 9705 HC				20 W
Up Converter	ALCATEL ADVANTECH				
Down Converter	ALCATEL ADVANTECH				
Up Converter Frequency	ALCATEL : 5890 MHz				
Down Converter Frequency	ALCATEL : 3665 MHz				
LNA/LNB					
Type of access to the satellite					

Appendix D

B. Base Band Equipment

TYPE	Equipment ID	Redundancy	LINK (Terminals)	Type of SERVICE	Available PROTOCOLS	Currently used Protocol	SPEED	Date of Installation	Expected Life Span	MTBF	MTTR	Availability	Remarks

Appendix E

C. MODEM

Parameters	Abidjan/ Dakar	Abidjan/Accra	Abidjan/Niamey	Abidjan/Roberts	Remarks
User access					
Modem Type	DATUM PSM 500	DATUM PSM 500L	DATUM PSM 4900	IBS	
Modem Redundancy					
Modem MTBF					
Modem MTTR					
Modem Availability					
Center frequency of Modem	140 MHz	L Band	140 MHz	140 MHz	
Transmit Intermediate frequency (TX-IF)	128.435 MHz	974.425 MHz	128.255 MHz	125.51 MHz	
Receive Intermediate frequency (RX-IF)	125.78 MHz	1199.455 MHz	127.738 MHz	128.098 MHz	
Modulation Technique	QPSK	QPSK	QPSK	QPSK	
Data rate					
Differential encoder					
Differential /decoder					
Data Transmit Protocol	Viterbi	TPC	Viterbi		
FEC	3/4	3/4	3/4	1/2	
Transmit Power Level	- 12 dBm	- 15.5 dBm	-7 dBm	- 0.4 dBm	
Receive Signal Strength	-32.6 dBm	-69.1 dBm	-28.0 dBm		
Input/output Interface					

Appendix F

D. Test Equipments

Name	Type	Acquisition date	Last calibration date	Expected life Span	Remarks
Spectrum analyzer					
Protocol analyzer					
Power meter					
Multimeter					
LF Générator					
HF Generator					
Noise Generator					
Cable Tester					

Appendix G

E. Spare parts

Name	Type	Availability	Quantity	Turnaround time	Expected life Span	Remarks
Multiplexer		yes	3	8	2	

Appendix H

F. Power Supply (UPS)

SITES	ONDULEURS				BATTERIES			
	TYPE	Normal/Back up	Capacity	Date of Installation	TYPE	Number of Batteries	Capacity	Date of Installation
Number Air conditioning systems: **Air conditioning systems status :** **Thermomeeter : OK or NOK** **Hygromeeter: OK or NOK**								
Remarks :								

3. EVALUATION OF HUMANS FACTORS

Centre:

Name & Surname	Qualification	Date	Complementary Qualification required	Observations

Annex C
Report Frame

JOINT TECHNICAL **EVALUATION OF AFISNET**

REPORT

CONTENTS

- **Proposals and Recommendations**
- **Description and evaluation of the architecture and hardware**
    - **Satellite :**
        - ✓ **Coverage**
        - ✓ **Parameters**
        - ✓ **Satellite Access Mode**
        - ✓ **Resources**
            - o **Bandwidth**
            - o **Satellite provider 'services**
    - **Earth stations**
        - ✓ **Layout, inventory and list of Stations (antenna, RF, converters, modems….)**
        - ✓ **Findings**
    - **Links : Topology, equipments and protocols**
        - ✓ **Principles regarding implementation of operational fixed services (AFTN, ATS/DS, …) and network layout : WAN/LAN**
        - ✓ **Principles regarding implementation of other services (Intranet and administrative applications.. Electronics Mails, File transfer) : WAN/LAN**
        - ✓ **Principles regarding implementation of Aeronautical Mobile Service (remote VHF)**
        - ✓ **Inventory and functions of base band equipments (router, switches, multiplexer, Hub…)**
        - ✓ **Protocols (FR, X25, IP et asynchronous) and Configurations**
        - ✓ **Findings**
    - **summary tables**
    - **Proposals and recommendations**

- **Interconnection to other Networks**
    - ✓ **Services**
    - ✓ **Equipments**
    - ✓ **Findings**
    - ✓ **Proposal and recommendations**
- **Description of management tools**
    - **Monitoring**
    - **Supervision**
    - **Statistics**
        - ✓ **Operational**
        - ✓ **Technical**
    - **Findings**

- **Proposals and Recommendations**

▪ **<u>Human factors Organisation</u>**

- **Maintenance (staff and training)**
- **Operational (staff and training)**
- **Internal and inter procedures**
- **Working environment**
- **Coordination**
- **Findings**
- **Proposals and recommendations**

▪ **<u>Financial aspects and investments planning</u>**

- **Implemented and ongoing projects**
- **Budgets for Spares parts**
- **Budgets for Training**
- **Budgets for Bandwidth**
- **Cost Benefits Analysis(CBA)**
  - ✓ **Fixed Service**
  - ✓ **Mobile Service**
  - ✓ **Other services**
- **Findings**
- **Proposals and recommendations**

III/ SUMMARY OF THE EVALUATIONS

▪ **<u>Capability of the network to meet</u>**

- **Current and future operational requirements**
- **Other services requirement**

▪ **<u>Network security</u>**

- **hardware security (Annex X)**
- **services security**

▪ **<u>Organisational aspects</u>**

- **Maintenance**
- **Operation**
- **Financial Resources**
- **Human Factors**

▪ **<u>Improvement</u>**

IV/ PROPOSALS

- **Eliminations of the current deficiencies (short term) (Planning)**
- **New requirements (Medium and long term)**
- **Optimisation solution : Topology , Access Mode, Protocol, Security, Services, Quality of Services (QoS) …(Medium and long term)**