ICAO

Twenty-Second Meeting of the AFI Planning and Implementation Regional Group (APIRG/22)

(Accra, Ghana, 29 July – 2 August 2019)

Agenda Item 4: Initiatives by States & Industry and other air navigation issues

4.5: Regional and Interregional Activities

Implementation of Communications, Navigation and Surveillance Services in ASECNA area

(Presented by ASECNA)

EXECUTIVE SUMMERY

This paper presents the status of Communications, Navigation and Surveillance Services in ASECNA area and rises some challenges to be talked in cooperation with the other ANSP in order to migrate smoothly and harmoniously towards the new aeronautical telecommunications services to improve the provision the Air Navigation Services in the AFI. Region.

Action by the meeting: Refer to Paragraph 3

Strategic Objectives:	This working paper relates to the Safety and Air Navigation Capacity and Efficiency
Financial implications:	N/A
References:	- APIRG/18 conclusion 18/19; - APIRG/20 conclusions 20/20, 20/22, 20/23; - APIRG/21 conclusions 21/26, 21/34.

1. INTRODUCTION

1.1. The continuous improvement of the Aeronautical Telecommunications Services is for ASECNA an ongoing concern in order to ensure the provision of quality air navigation services.

1.2. In the framework of regional and interregional cooperation and in accordance with the recommendations, conclusions and decisions of SNMC, APIRG, and RAN/AFI Meetings as well as the Global Air Navigation Plan, and the concept of Aviation System Blocks Upgrade (ASBU), ASECNA is progressing in improving the aeronautical telecommunications services including the upgrade of AFISNET network, the balanced interconnection of AFISNET to the other VSAT networks , the modernization of the end systems, the surveillance data sharing and the implementation of radio and satellite navigation means.

1.3. This paper reports the progress in the implementation of aeronautical telecommunication services and highlights on the actions required at the regional level to sustain the harmonized implementation of CNS Services.

2. **DISCUSSION**

2.1. Status of implementation of Communications, Navigation and Surveillance Services

2.1.1. As part of the provision of Air Navigation Services, ASECNA designs, plans, implements, and operates Communication, Navigation, Surveillance and Air Traffic Management systems as well as aeronautical Meteorology systems, in accordance with the ICAO standards. Appendix 1 shows the status of implementation of the CNS infrastructure.

2.1.2. In terms of Aeronautical Fixed Services (AFS), 100% of the AFI AFTN rationalized plan circuits (51) are implemented including sixteen (16) circuits operating as full AMHS circuits. Sixty-seven (67) bilateral circuits are implemented out of which twenty-one (21) circuits are operating in full AMHS. All these circuits operate satisfactory. The appendices 2, 3 and 4 shows the status of operational implementation of the AMHS in the ASECNA area.

2.1.3. In accordance with APIRG/18 conclusion 18/19, and to date, ten (10) ASECNA COM centers including the main COM centers of Dakar, Brazzaville and Niamey are equipped and operate in full AMHS between the various centers. The AMHS project in order to equip the remaining COM centers (7) is ongoing and will be completed in 2020.

2.1.4. The ATS/DS implementation status is very satisfactory with a implementation rate above 96%. The remaining circuits to be implement are related to other AFI centers. ATM systems with AIDC capability are installed in all the centers and ASECNA is implementing AIDC with the involved neighboring centers for the automation of coordination. The table in appendix 5 details the status of operational implementation and the planning of AIDC.

2.1.5. Concerning the Aeronautical Mobile Service (AMS), ASECNA continues the VHF coverage extension and densification programme in the various FIR, using VSAT technology. So far more than eighty (80) remote VHF stations are implemented in various environmental and climate conditions sometimes very difficult.

2.1.6. According to APIRG /17 conclusions 17/25 and 17/31, ASECNA pursue the implementation and the extension of Controller- Pilot Data Link Communications (CPDLC) for En-Route oceanic and remote continental airspace. In order to improve the availability of the service, ASECNA developed and implemented in cooperation with SITA a gateway between AFISNET and SITA networks. Since 2016 this gateway is operating satisfactory and provides FANS services to all the centers CPDLC capable in accordance with the requirements. The architecture of the gateway is provided in appendix 7.

2.1.7. In terms of Navigation, ASECNA is continuing the renewal and modernization of conventional radionavigation equipment in line with the ASBU strategy. As part of its Global Navigation Satellite System (GNSS) programme, ASECNA is developing and implementing a SBAS project to provide GNSS services. Implementation of PBN, continuous climb approach (CCO) and continuous descent (CDO) procedures are ongoing.

2.1.8. With regard to Surveillance, ASECNA is continuing its improvement program in this area. Seventeen (17) SSR Mode S radars are implemented in each main center and operate satisfactory. About thirty (30) terrestrial ADS B stations are installed in the various FIRs to extend the reinforce the surveillance coverage. These surveillance means are interconnected and provide a very good coverage. In addition, a surveillance data sharing project is underway to improve surveillance coverage in the Gulf of Guinea as part of the cooperation between the ANSP members of the SNMC.

2.1.9. ASECNA also signed a contract with AIREON for the implementation of ADS-B satellite based. This major project, whose implementation is planned for 2020, will contribute to enhance the safety of air navigation. The Service Delivery Point (SPD) and a VPN link are installed and the data received satisfactorily. The tests on the transport and the quality of data to the various centers via the AFISNET network have been successfully conducted.

2.1.10. In terms of meteorological assistance to the air navigation services, ASECNA is implementing several projects for the improvement of meteorological services, including

- the SAAPI project, currently ongoing, to enable the Forecaster to have added value products and improve the quality of service.
  The procurement of the Automatic Systems for Upper Wind (PILOT) Measuring to improve the performance of altitude measurements:
- The implementation of Digital Barometer, Control Kits and Calibration Benchmarks project which enabled:
  - the replacement of mercury barometers in accordance with the WMO recommendation;
  - improved monitoring of the barometric fleet;
  - the calibration of all digital barometers used in the stations.

2.2. Challenges for implementing new aeronautical telecommunication services

In order to take advantage of cooperation between ANSPs and the various significant investments, some challenges have to be taken into account and addressed, including:

2.2.1. Infrastructure upgrade.

In the AFI region, most of COM centers are equipped with systems AMHS capable, however the AMHS are often operated at the local level, or national level only. As the first ATN ground-to-ground application, it is necessary to upgrade the aeronautical telecommunications infrastructure to enable the operational implementation of the AMHS, based on the TCP / IP protocol.

2.2.2. Cyber Safety & Resilience

The issue of cyber security impacts the implementation of new aeronautical telecommunications services, operating under TCP / IP protocol (AMHS, AIDC, VoIP, ADS,) due to potential cyber-attacks. AFI States / Organizations are should be encouraged to include in their national regulatory framework (Regulatory, Strategy and Policy Plan) provisions to address the safety and resilience of air navigation.

2.2.3. Training for on implementation and operation of new services.

In accordance with ICAO letter ref AN 7 / 49.1-09 / 34 dated 14th April, 2009, it is required that designated AMC users register with the ATS Messaging Management Center (AMC) as external COM center operators after a successful AMC training in order to be able to access to AMC. A first AMC training was organized in July 2016 in coordination between ASECNA, ICAO and AMC. In order to support the implementation of the AMHS, it is necessary to organize, at the AFI Region level, an AMC training, for the AMHS centers operators.

2.2.4. VSAT Spectrum protection

The protection of the VSAT frequency spectrum remains an important major issue, in order to ensure the availability of Communication, Navigation and Surveillance services. States / Organizations should therefore take the necessary actions to ensure the protection of the C - band frequency spectrum.

3. ACTION BY THE MEETING

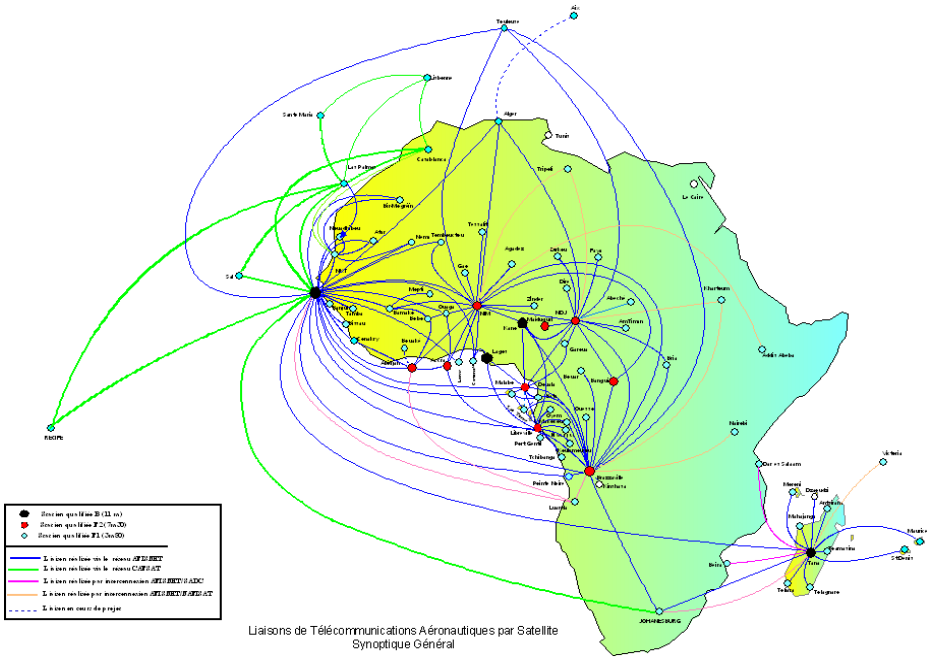
The Meeting is invited to: take note of the information provided in this paper;

- Call ANSPs to expedite upgrading of infrastructure and the implementation of new aeronautical telecommunications services;
- Recommend organization of training (seminars/workshops) to support the harmonious implementation of services;
- Encourage States/organizations to undertake appropriate actions to support the protection of VSAT C-band frequency spectrum in particular in the framework of the preparatory meetings to the WRC-19.

Appendix 1

CNS – MET Infrastructures

Communication	Navigation	Surveillance	Meteorology
128 **VSAT Station**	**55** **C-VOR &** **D-VOR**	**17** **Mode S/ SSR**	**30** **SAAPI (SADIS –** **FTP ; MSG)**
80 **Remote VHF**	**40** **Navigation** **DME**	**17** **ATM systems**	**30** **AWOS**
14 **HF System**	**31** **Landing** **DME**	**32** **ADS-B ground based** **station**	**26** **SADIS- FTP**
3 **IP-POP for CPDLC** **application**	**31** **Glide**	**1 SDP+1 VPN +1 IP** **VSAT Network** **ADS-B Satellite Based**	**42** **Sounding system** **(PILOT/TEMP)**
11 **AMHS Systems**	**31** **Localizer**		**23** **Sounding System** **(TEMP)**
			35 **Surface observations**



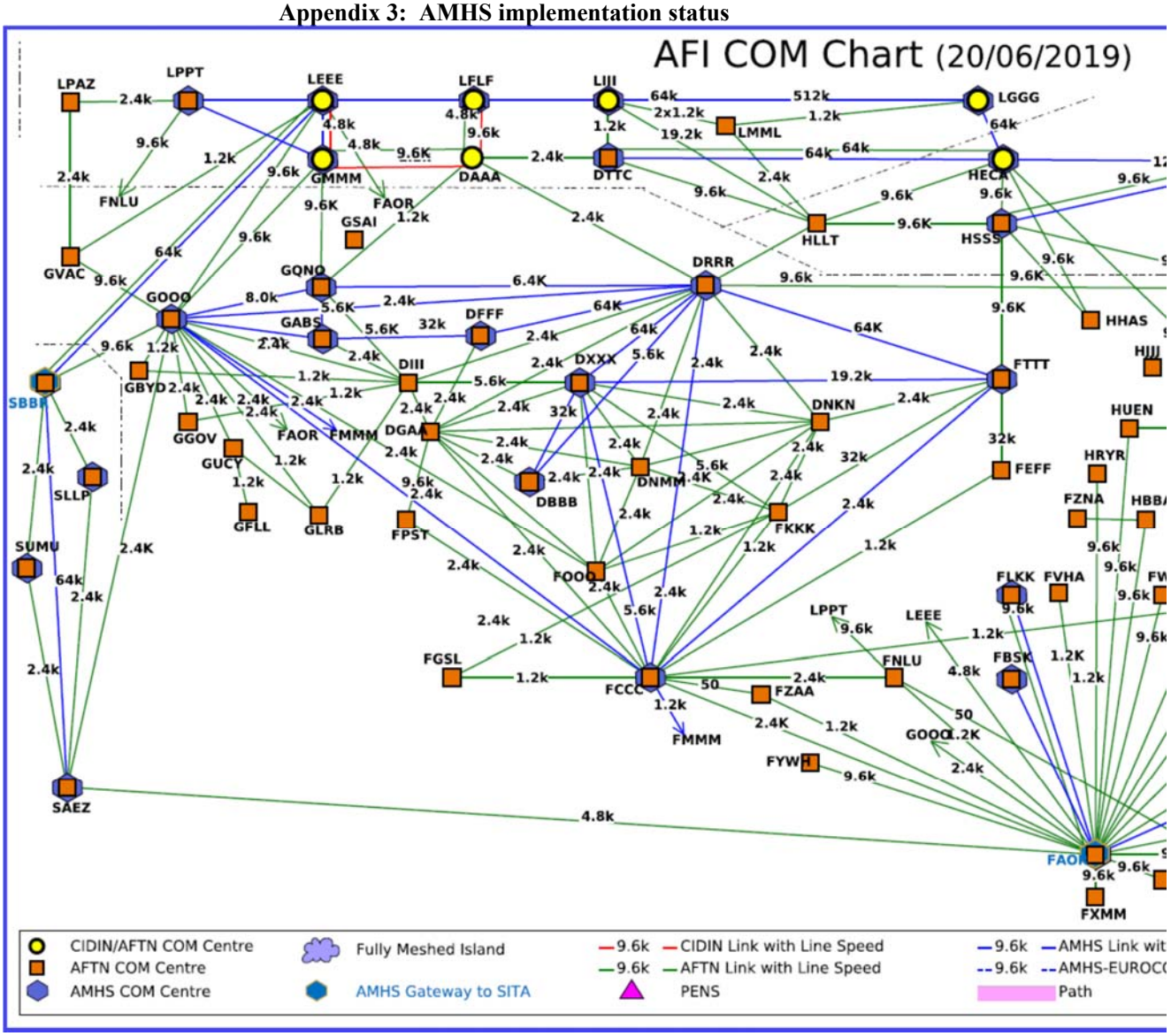
Liaisons de Télécommunications Aéronautiques par Satellite
Synoptique Général

Appendix2: Implementation status of AFTN rationalized AFI Plan

te	COM Centre	Required Circuits		Implemented Circuits		Implemented AMHS Circuits		Implemented bilateral Circuits		Implem bilateral Circu
	COTONOU	2	ACCRA, LAGOS	2	100%			2		NIAMEY
A	OUAGA	1	NIAMEY	1	100%	1	NIAMEY	2	ACCRA	BAMAKO
OUN	DOUALA	2	BRAZZAVILLE - MALABO	2	100%			5	KANO LIBREVILLE LAGOS NDJAMENA LOME	
FRIQUE	BANGUI	1	BRAZZA	1	100%			1	NDJAMENA	
ES	MORONI	1	ANTANANARIVO	1	100%			1	BRAZZAVILLE	
	BRAZZAVILLE	11	BANGUI DAKAR DOUALA JOBURG KINSHASA LIBREVILLE LUANDA NDJAMENA NAIROBI NIAMEY SAO TOME	11	100%	3	DAKAR NDJAMENA NIAMEY	6	MALABO KANO ACCRA MORONI	TANA LC
VOIRE	ABIDJAN	1	DAKAR	1	100%			6	NIAMEY ACCRA BAMAKO LOME BISSAU ROBERTS	
	LIBREVILLE	1	BRAZZAVILLE	1	100%			6	DAKAR KANO LAGOS ACCRA DOUALA LOME	
BISSAU	BISSAU	1	DAKAR	1	100%			1	ABIDJAN	
EQUAT.	MALABO	1	DOUALA	1	100%			1	BRAZZAVILLE	
ASCAR	ANTANANARIVO	4	DZAOUDZI JOBURG MORONI PLAISANCE	4	100%			3	ST-DENIS	BRAZZAV
	BAMAKO	1	DAKAR	1	100%	1	DAKAR	4	ABIDJAN	OUAGAI NIAMEY, NOUAKCH
ANIE	NOUAKCHOTT	1	DAKAR	1	100%	1	DAKAR	4	ALGER, CASABLANCA,	BAMAKO
	NIAMEY	8	ACCRA ADDIS ALGER BRAZZA DAKAR KANO NDJAMENA OUAGA	8	100%	4	BRAZZA DAKAR NDJAMENA OUAGA	6	ABIDJAN LAGOS TRIPOLI	COTONO NOUAKCH
L	DAKAR	12	ABIDJAN BAMAKO BANJUL BISSAU BRAZZA CASA CONAKRY JOBURG NIAMEY NOUAKCHOTT RIO SAL	12	100%	4	BAMAKO BRAZZA NIAMEY NOUAKCHOTT	3	MADRID LIBREVILLE	TANA
	NDJAMENA	2	BRAZZAVILLE NIAMEY	2	100%	2	BRAZZAVILLE NIAMEY	7	BANGUI KANO MAIDUGURI DOUALA, TRIPOLI KHARTOUM	LOME

	LOME	1	ACCRA	1	100%			9	ABIDJAN LIBREVILLE LAGOS KANO DOUALA	C NIAMEY BRAZZAV NDJAMEN
		51		**51**	**100%**	**16**		**67**		

Appendix 3: AMHS implementation status



Appendix 4: AMHS implementation and planning status

PAYS	Site	Nb Circuit	Correspondant	Circuit	Mise en œuvre prévue du circuit AMHS	OBSERVATIONS
	COTONOU	4	ACCRA	RSFTA	Fin 2019	Requis : liaison en IP AFISN
			NIAMEY	AMHS		
			LOME	AMHS		

			LAGOS	RSFTA	Fin 2019	Requis : liaison en IP AFISN
BURKINA	OUAGA	3	NIAMEY	AMHS		
			BAMAKO	AMHS		
			ACCRA	RSFTA	Fin 2019	Requis : liaison en IP AFISN
CONGO	BRAZZA	16	BANGUI	RSFTA	2020	Attente acquisition système A prévue 2019
			DAKAR	AMHS		
			DOUALA	RSFTA	2020	Attente acquisition système A prévue 2019
			KINSHASA	RSFTA	Fin 2019	
			JOHANNESBOURG	RSFTA	Fin 2019	Requis : liaison en IP AFISN
			LIBREVILLE	RSFTA	2020	Attente acquisition système A prévue 2019
			LUANDA	RSFTA	Fin 2019	
			NAIROBI	RSFTA	Fin 2019	Requis : liaison en IP NAFIS
			N'DJAMENA	AMHS		
			NIAMEY	AMHS		
			SAOTOME	RSFTA	Fin 2019	
			MALABO	RSFTA	2020	Attente acquisition système A prévue 2019
			KANO	RSFTA	Fin 2019	Requis : liaison en IP AFISN
			ACCRA	RSFTA	Fin 2019	Requis : liaison en IP AFISN
			TANA	AMHS		
			LOME	AMHS		
MADAGASCAR	TANA	7	JOHANNESBOURG	RSFTA	Fin 2019	Requis : liaison en IP AFISN
			MORONI	RSFTA	2020	Attente acquisition système A prévue 2019
			DZAOUDZI	RSFTA	2020	
			MAURICE	RSFTA	Fin 2019	Requis : liaison en IP AFISN
			ST DENIS	RSFTA	2020	
			BRAZZA	AMHS		
			DAKAR	AMHS		
MALI	BAMAKO	4	DAKAR	AMHS		
			OUAGA	AMHS		
			ABIDJAN	RSFTA	2020	Attente acquisition système A prévue 2019
			NOUAKCHOTT	AMHS		
MAURITANIE	NOUAKCHOTT	6	DAKAR	AMHS		
			LAS PALMAS	RSFTA	2020	Requis : liaison en IP et à me AFISNET
			BAMAKO	AMHS		
			CASABLANCA	RSFTA	Fin 2019	Requis : liaison en IP CAFSA
			ABIDJAN	RSFTA	2020	Attente acquisition système A prévue 2019
			NIAMEY	AMHS		

NIGER	NIAMEY	13	ALGER	RSFTA	2020	
			ADDIS	RSFTA	Fin 2019	Requis : liaison en IP NAFIS
			N'DJAMENA	AMHS		
			KANO	RSFTA	Fin 2019	Requis : liaison en IP AFISN
			BRAZZA	AMHS		
			ACCRA	RSFTA	Fin 2019	Requis : liaison en IP AFISN
			OUAGA	AMHS		
			DAKAR	AMHS		
			COTONOU	AMHS		
			LOME	AMHS		
			ABIDJAN	RSFTA	2020	Attente acquisition système A prévue 2019
			NOUAKCHOTT	AMHS		
			BAMAKO	AMHS		
SENEGAL	DAKAR	15	CASA	RSFTA	Fin 2019	Requis : liaison en IP AFISN
			NOUAKCHOTT	AMHS		
			SAL	RSFTA	2020	Requis : liaison en IP AFISN
			BANJUL	RSFTA	2020	Requis : liaison en IP AFISN
			BISSAU	RSFTA	2020	Attente acquisition système A prévue 2019
			ROBERTS	RSFTA	Fin 2019	
			BRAZZA	AMHS		
			ABIDJAN	RSFTA	2020	Attente acquisition système A prévue 2019
			BAMAKO	AMHS		
			NIAMEY	AMHS		
			RIO	RSFTA	Fin 2019	Requis : liaison en IP AFISN
			JOHANNESBOURG	RSFTA	Fin 2019	Requis : liaison en IP AFISN
			MADRID	RSFTA	Fin 2019	Requis : liaison en IP AFISN
			TANA	AMHS		
			LIBREVILLE	RSFTA	2020	Attente acquisition système A prévue 2019
TCHAD	N'DJAMENA	9	NIAMEY	AMHS		
			BRAZZA	AMHS		
			MAIDUGURI	RSFTA		
			KANO	RSFTA	Fin 2019	Requis : liaison en IP AFISN
			BANGUI	RSFTA	2020	
			DOUALA	RSFTA	2020	
			KHARTOUM	RSFTA	Fin 2019	Requis : liaison en IP NAFIS
			TRIPOLI	RSFTA		
			LOME	AMHS		
TOGO	LOME	10	ACCRA	RSFTA	Fin 2019	Requis : liaison en IP AFISN

			COTONOU	AMHS		
			NIAMEY	AMHS		
			ABIDJAN	RSFTA	2020	Attente acquisition système A prévue 2019
			LIBREVILLE	RSFTA	2020	Attente acquisition système A prévue 2019
			LAGOS	RSFTA	Fin 2019	Requis : liaison en IP AFISN
			KANO	RSFTA	Fin 2019	Requis : liaison en IP AFISN
			DOUALA	RSFTA	2020	Attente acquisition système A prévue 2019
			BRAZZAVILLE	AMHS		
			NDJAMENA	AMHS		
CAMEROUN	DOUALA				2020	Projet remplacement en AI
CENTRAFRIQUE	BANGUI					
COMORES	MORONI					
COTE D'IVOIRE	ABIDJAN					
GABON	LIBREVILLE					
GUINEE EQUAT	MALABO					
GUINEE BISSAU	BISSAU					

Appendix 5: AIDC implementation and planning status

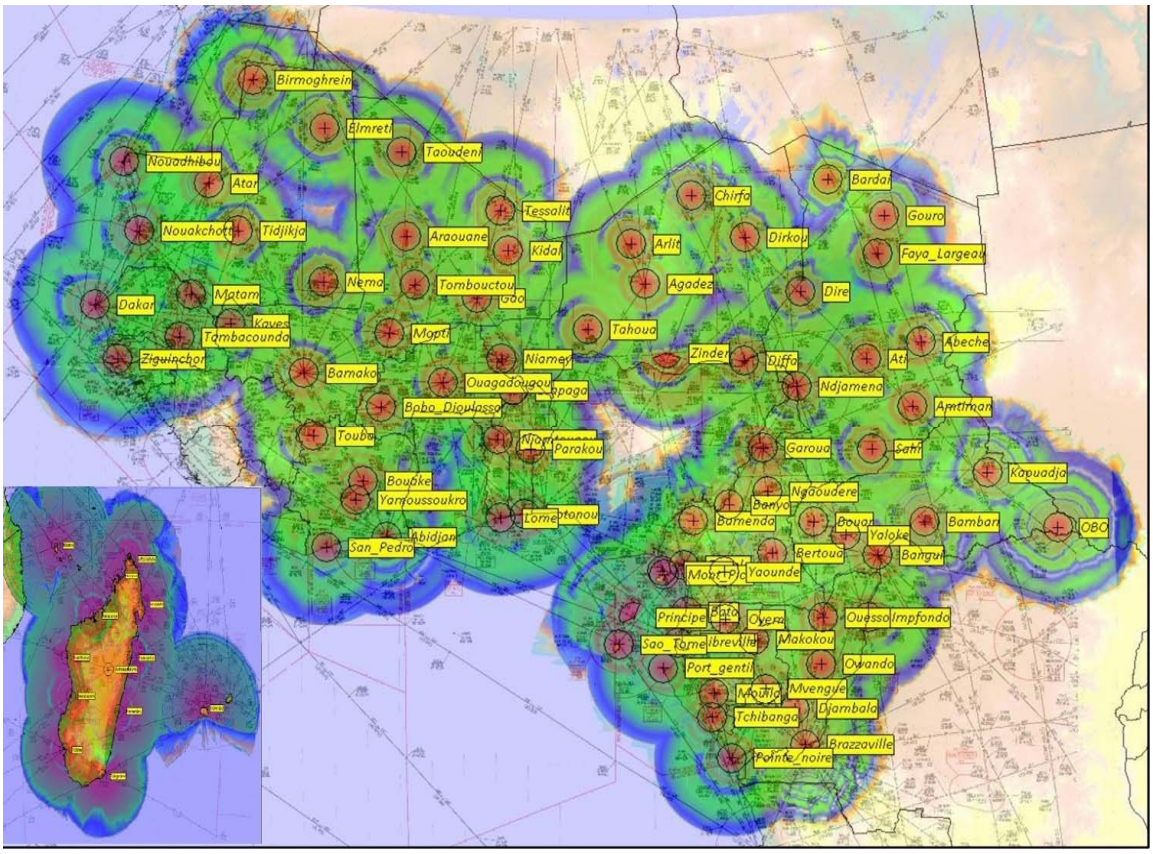
PAYS	CENTRE		Situation Actuelle				Mise œuvr prévu
	Site	Existence d'un système ATM	Nb de circuits	Correspondants	Système ATM opérationnel	AIDC	
BENIN	COTONOU	Oui	4	ACCRA	Oui		Fin 201
				LAGOS	Oui		Fin 201

				LOME	Oui	Oui	
				NIAMEY	Oui		Fin 201
				OUAGADOUGOU	Oui		Fin 201
BURKINA	OUAGA	Oui	6	ABIDJAN	Oui		Fin 201
				ACCRA	Oui	Oui	
				BAMAKO	Oui	Oui	
				NIAMEY	Oui	Oui	
				LOME	Oui		Fin 201
				COTONOU	Oui		Fin 201
CAMEROUN	DOUALA	Oui	8	BRAZZA	Oui	Oui	
				KANO	Oui		Fin 201
				LAGOS	Oui		Fin 201
				LIBREVILLE	Non		
				MALABO	Non		
				NDJAMENA	Oui		Fin 201
				LOME	Oui		
CONGO	BRAZZA	Oui	15	ACCRA	Oui		Fin 201
				BANGUI	Non		
				DOUALA	Oui		Fin 201
				KANO	Oui		Fin 201
				KHARTOUM	Oui	Oui	
				KINSHASA	Oui	Oui	
				LIBREVILLE	Non		Fin 201
				LUANDA	Oui		Fin 201
				NDJAMENA	Oui	Oui	
				SAOTOME			
				MALABO	Non		
				BATA	Non		
				GAROUA	Non		
				YAOUNDE	Non		
				LOME	Oui		
COTE D'IVOIRE	ABIDJAN	Oui	13	ACCRA	Oui	Oui	
				BAMAKO	Oui		jui
				BOBO	Non		
				DAKAR	Oui	Oui	
				NIAMEY	Oui		
				OUAGA	Oui		jui
				ROBERTS			
				ATLANTICO	Oui		jui
				LUANDA	Oui		jui
				COTONOU	Oui		

				LOME	Oui		
				NOUAKCHOTT	Oui		
				BISSAU	Oui		
MADAGASCAR	TANA	Oui	8	BEIRA			
				DARESSALAAM			
				DZAOUDZI			
				JOHANNESBOURG	Oui		Fin 201
				MAURICE	Oui	Oui	
				MORONI			
				STDENIS			
				SEYCHELLES	Oui		Fin 201
MALI	BAMAKO	Oui	7	ABIDJAN	Oui	Oui	
				BOBO			
				DAKAR	Oui	Oui	
				OUAGA	Oui	Oui	
				ROBERTS			
				NOUAKCHOTT	Oui		Fin 201
				NIAMEY	Oui		Fin 201
MAURITANIE	NOUAKCHOTT	Oui	7	DAKAR	Oui		
				DAKHLA			
				ABIDJAN	Oui		
				BAMAKO	Oui		Fin 201
				NIAMEY	Oui		Fin 201
				ALGER	Oui		Fin 201
				CASA	Oui		Fin 201
NIGER	NIAMEY	Oui	14	ABIDJAN	Oui		Fin 201
				ACCRA	Oui		Fin 201
				ALGER	Oui		Fin 201
				DAKAR	Oui		
				GAO	Non		
				KANO	Oui		
				NDJAMENA	Oui	Oui	
				OUAGA	Oui	Oui	
				TRIPOLI			
				BAMAKO	Oui	Oui	
				NOUAKCHOTT	Oui	Oui	
				LAGOS			Fin 201
				COTONOU	Oui		Fin 201
				LOME	Oui	Oui	
SENEGAL	DAKAR	Oui	17	ABIDJAN	Oui	Oui	
				ALGER	Oui		

				BAMAKO	Oui		Fin 201
				BANJUL			
				BISSAU			
				CASA	Oui		Fin 201
				LASPALMAS	Oui		Fin 201
				NIAMEY	Oui		
				NOUADHIBOU	Non		
				NOUAKCHOTT	Oui		Fin 201
				RECIFE	Oui		Fin 201
				CONAKRY			
				ROBERTS			
				SAL	Oui		Fin 201
				ROCHAMBEAU	Oui		Fin 201
				LUANDA	Oui		
				PIARCO	Oui		2
TCHAD	N'DJAMENA	Oui	9	BANGUI			
				BRAZZA	Oui	Oui	
				DOUALA	Oui		Fin 201
				GAROUA			
				KANO			Fin 201
				KHARTOUM	Oui	Oui	
				MAIDUGURI			
				NIAMEY	Oui	Oui	
				TRIPOLI			
TOGO	LOME	Oui	8	ACCRA	Oui	Oui	
				COTONOU	Oui	Oui	
				LIBREVILLE			
				DOUALA	Oui		
				BRAZZAVILLE	Oui		
				LAGOS	Oui		Fin 201
				KANO	Oui		Fin 201
				NIAMEY	Oui	Oui	
				OUAGADOUGOU	Oui		Fin 201

Appendix 6: Remote VHF planning statuts



Appendix 7 : AFISNET-SITA gateway architecture