

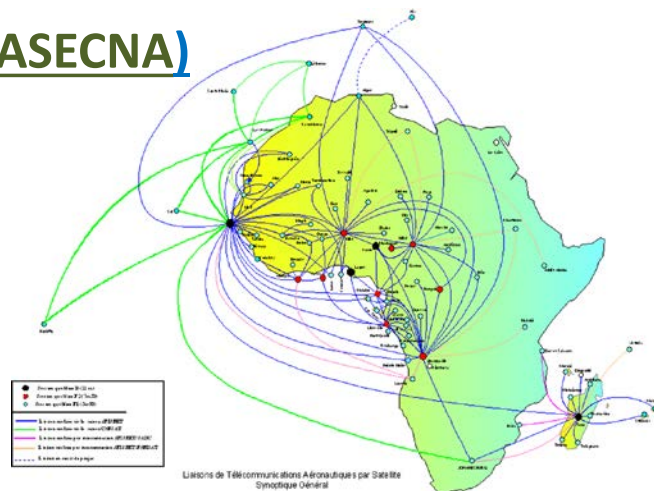


Interconnectivity of the AFISNET NAFISAT and SADC2 Networks

African ANSPs Meeting
Lomé, Togo, 28 March–1st April 2022

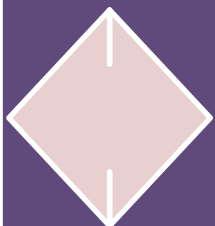
Agenda Item 4 : Air Navigation Services (ANS) and the COVID-19 pandemic

Presented by : Eric Armand DAMIBA (ASECNA)



Liaisons de Télécommunications Aéronautiques par Satellite
Synthèse Générale

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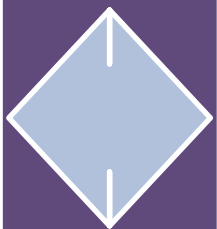




Introduction

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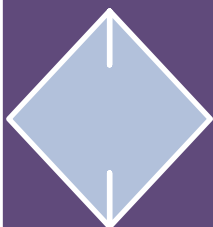
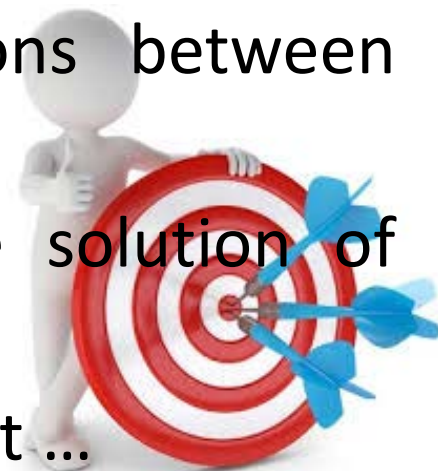
Outlines



In the framework of improvement and development, ASECNA and ATNS maintain fruitful relationship in the field of CNS/ATM since years 2000

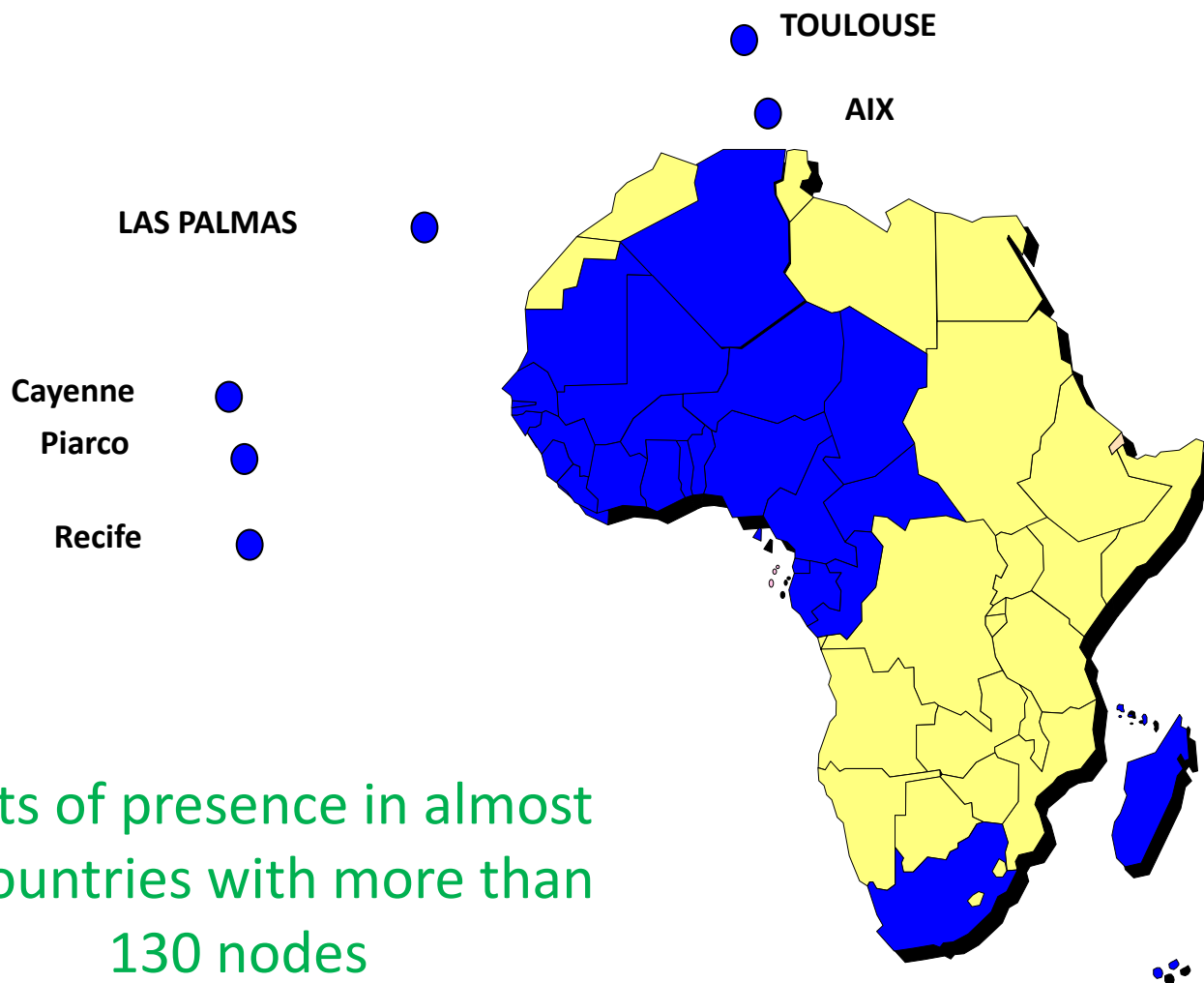
The areas of cooperation are :

- Exchange of personnel and expertise;
- AFTN/AMHS, AIDC, and ATS/DS interconnections between AFISNET NAFISAT and SADC2;
- improve Air Traffic Service operations between ATNS and ASECNA;
- best cost effective and maintenance solution of interconnection of networks;
- Ab-initio training and staff development ...



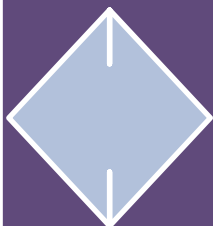


AFISNET Coverage



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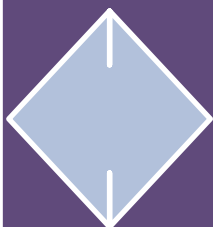




ASECNA CNS - infrastructure

Communication	Navigation	Surveillance
130 VSAT Station	55 C-VOR & D-VOR	17 Radar (SSR)
71 Remote VHF	40 On route DME	17 ATM system
14 HF System	31 Landing DME	24 ADS-B ground station
3 IP-POP for CPDLC application	31 / 31 Glide / Localizer	Space ADS-B
11 AMHS Systems	A-SBAS <i>(on going project)</i>	

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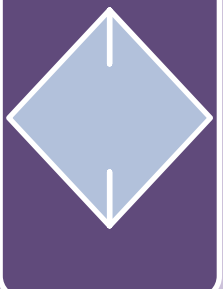




Discussion

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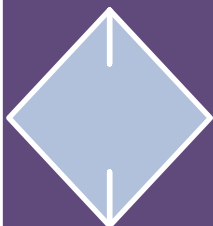


Discussion

1. Status of Upgrade of SADC VSAT, and NAFISAT Networks
2. Status and Future Plans for Upgrade of AFISNET
3. Co-operation between ATNS and ASECNA to Ensure the Interoperability between AFISNET and SADC VSAT & NAFISAT
4. Challenges with circuits connecting AFISNET and SADC VSAT & NAFISAT Networks
5. New circuits between AFISNET and SADC VSAT & NAFISAT
6. Planning and implementation of AMHS and AIDC circuits between ASECNA and ATNS COM centers

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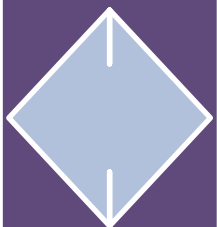


Status of Upgrade of SADC VSAT, and NAFISAT Networks

Objective : To improve satellite link with IP capabilities for news services (AHMS, AIDC,...)

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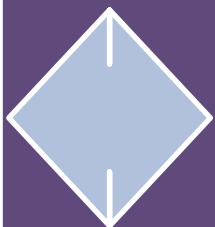


Current interconnections

Item	Interconnection	Applicable Networks	Services
1	Tripoli and Niamey	NAFISAT - AFISNET	ATS/DS - AFTN
2	Tripoli and N'djamena	NAFISAT - AFISNET	ATS/DS AFTN
3	Khartoum and N'djamena	NAFISAT - AFISNET	ATS/DS AFTN
4	Khartoum and Brazzaville	NAFISAT - AFISNET	ATS/
5	Addis Ababa and Niamey	NAFISAT - AFISNET	AFTN
6	Nairobi and Brazzaville	NAFISAT - AFISNET	AFTN
7	Luanda and Brazzaville	SADC2 - AFISNET	ATS/DS AFTN
8	Luanda and Abidjan	SADC2 - AFISNET	ATS/DS
	Luanda and Dakar	SADC2 - AFISNET	ATS/DS
9	Johannesburg and Brazzaville	SADC2 - AFISNET	AFTN
10	Johannesburg and Antananarivo	SADC2 - AFISNET	ATS/DS AFTN
11	Kinshasa and Brazzaville	SADC2 - AFISNET	ATS/DS AFTN

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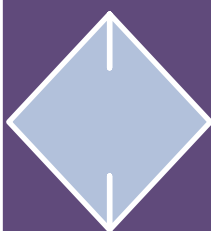




Upgrade interconnections

Sites		Services		New Equipment with IP capabilities			
AFISNET	SADC/NAFISAT	Currents	Futurs	Serial card (Qte)	FXS Card (Qte)	Multiplexor (Qte)	Modems (TX/RX)
Niamey	Tripoli	ATS/DS & AFTN	AIDC & AMHS	Two access port (1)	Four Access port (2)	NetPerformer 9230 (1)	DATUM M7 (TX/ RX)
	Addis Ababa	AFTN	AMHS				DATUM M7 (RX)
Ndaména	Tripoli	ATS/DS & AFTN	AIDC & AMHS	Two access port (1)	Four Access port (2)	NetPerformer 9230 (1)	DATUM M7 (TX/RX)
	Khartoum	ATS/DS & AFTN	AIDC & AMHS				DATUM M7 (RX)
Brazzaville	Nairobi	AFTN	AMHS		Four Access port (2)	NetPerformer 8400 (1) NetPerformer 9230 (1)	DATUM M7 (TX/RX)
	Khartoum	ATS/DS	AIDC				DATUM M7 (RX)
	Luanda	ATS/DS & AFTN	AIDC & AMHS				DATUM M7 (RX)
	Kinshasa	ATS/DS & AFTN	AIDC & AMHS				DATUM M7 (RX)
Johannesburg	AFTN	AMHS	DATUM M7 (RX)				
Abidjan	Luanda	ATS/DS	AMHS	Two access port (1)	Four Access port (2)	NetPerformer 9230 (1)	DATUM M7 (TX/RX)
Diass	Luanda	ATS/DS	AIDC		Four Access port (2)	NetPerformer 9230 (1) NetPerformer 8400 (1)	DATUM M7 (TX/RX)
	Johannesburg	AFTN	AMHS				DATUM M7 (RX)
Antananarivo (Station AFISNET)	Johannesburg	ATS/DS & AFTN	AIDC & AMHS	Two access port (1)	Four Access port (2)	NetPerformer 9230 (1)	DATUM M7 (TX/RX)
Johannesburg (Station AFISNET)	Brazzaville	AFTN	AMHS		Four Access port (2)	NetPerformer 8400 (1) NetPerformer 9230 (1)	DATUM M7 (TX/RX)
	Antananarivo	ATS/DS & AFTN	AIDC & AMHS				DATUM M7 (TX/RX)
Moroni	Seychelles	ATS/DS & AFTN	AIDC & AMHS		Four Access port (2)	NetPerformer 9230 (1) NetPerformer 8400 (1)	DATUM M7 (TX/RX)
	Dar Es Salam	ATS/DS	AIDC				DATUM M7 (TX/RX)
Pointe Noire	Beira	ATS/DS	AIDC		Four Access port (2)	NetPerformer 9230 (1) NetPerformer 8400 (1)	DATUM M7 (TX/RX)
	Cabinda	ATS/DS	AIDC				DATUM M7 (TX/RX)
	Luanda	ATS/DS	AIDC				DATUM M7 (TX/RX)
Bangui	Kinshasa	ATS/DS	AIDC	Two access port (1)	Four Access port (2)	NetPerformer 9230 (1)	DATUM M7 (TX/RX)

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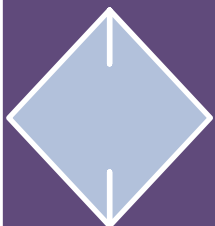


STATE OF UPGRADE CONNECTIONS ASECNA - NAFISAT / SADC2

ASECNA	NAFISAT SADC2	MODEM	MUX	DEBIT LIAISON	MODCOD	STATUS	SERVICE	DATE
BRAZZAVILLE	LUANDA	DATUM M7	NetPerf.	64	QPSK TPC 3/4	Operational	ATSDS/AFTN / AMHS	February 28 th 2022
BRAZZAVILLE	NAIROBI	DATUM M7	NetPerf.	19,2	QPSK TPC 3/4	Operational	AFTN / AMHS	March 9 th 2022
BRAZZAVILLE	KHARTOUM	DATUM M7	NetPerf.	128	QPSK TPC 3/4	Operational	ADSDS	February 14 th 2022
NDJAMENA	KHARTOUM	DATUM M7	NetPerf.	←128	QPSK TPC3/4	Operational	AFTN-ATS/DS	February 11 th 2022
ABIDJAN	LUANDA	DATUM M7	NetPerf.	19,2 → ←64	QPSK TPC 3/4	Operational	ATS/DS	February 28 th 2022
ANTANANARIVO	JOBURG	SKYWAN IDU 7000	FRAD NETPERFO RMER 9230	TDMA	TDMA	Operational	-ATS/DS with Jo'burg - ATS/DS with Beira, Dar es Salam Seychelles	

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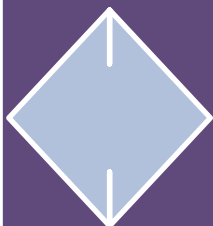
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Required Performance

Parameter	System	Comments
Availability	> 99.98%	ICAO recommends an end-user availability of 99.8%
One-way latency	< 400 ms	This implies a single hop for voice communication This figure includes delays due to voice compression and encoding.
Call blocking probability	< 2.5×10^{-3}	The ATS/DS voice communication for requires guaranteed availability of a voice circuit upon demand.
	or 1 in 400 attempts	
Call set-up time	< 2 s	

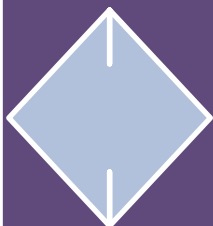




Required Performance

Each Party will endeavour :

- to maintain the equipment under their responsibility in an efficient manner to ensure a high availability of the applicable interconnections.
- to comply with the following minimum ICAO VSAT Guidelines

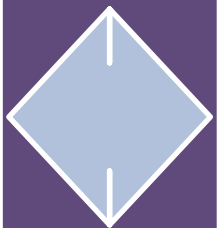




Status and Future Plans for Upgrade of AFISNET

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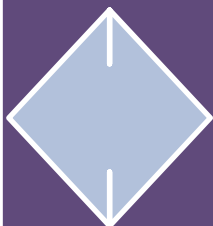
Challenges

The provision of air navigation service relies on available, reliable and integrated Communications, Navigation and Surveillance systems.

According LIM AFI and RAN AFI/7 conclusions and recommendations, the satellite technology has been adopted to implement aeronautical telecommunications services and meet the requirements of the International Civil Aviation Organization (ICAO).

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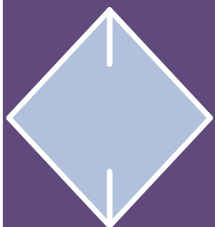
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Challenges

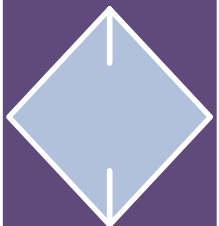
- Configure and implement AMHS and AIDC circuits.
- Implementation of ASBU modules (FICE, SWIM,...)
- Migration towards full IP network
- Interconnection, interoperability and integration with the neighbouring aeronautical VSAT network (African single sky)
- Cyber security issue
- VSAT band spectrum protection (IMT, 5G, Interferences,...)





Ongoing projects

- Re-engineering and modernization of AFISNET in coordination with SNMC members,
- Continue to improve upgrade of interconnections between AFISNET and neighboring VSAT networks
- Implementation of surveillance data sharing (regional project);
- VHF coverage extension and densification
- Full AMHS et AIDC implementation
- Performing CPDLC connexion via AFI networks

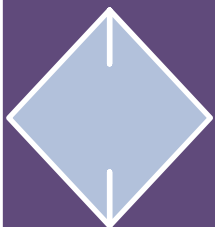




Conclusions and Way Forward

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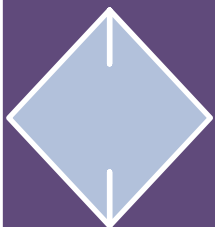


Way forward

- ASECNA and ATNS continue the quick coordination to finalize, the implementation of all AMHS and AIDC services
- Based on the same interconnection solution and experience from AFISNET , NAFISAT and SADC2, for all ANSP :
 - ✓ Perform interconnectivity for AFI VSAT Network with full IP capabilities to support new and future services.
 - ✓ Exchange of personnel and expertise,
 - ✓ Ab-initio training and staff development.

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Thank you for your kind attention



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