



**INTERNATIONAL CIVIL AVIATION ORGANIZATION
WESTERN AND CENTRAL AFRICA OFFICE**

**Twenty-fifth Meeting of the AFI Satellite Network Management Committee (SNMC/25)
(Freetown, Sierra Leone, 18-22 December 2017)**

**Agenda Item 4 -: Interconnection and interoperability of AFISNET with its
neighbouring networks (CAFSAT, NAFISAT, SADC2)**

Interoperability and interconnectivity between VSAT networks

(Presented by ATNS)

SUMMARY

This working paper discusses the performance of the NAFISAT and SADC network in relation to the Interconnectivity with the AFISNET network.

It also discusses the progress made to date in respect of the upgrade of the NAFISAT and SADC VSAT Network and certain implications that have been identified.

1. INTEROPERABILITY

Seamless operations, interoperability and interconnectivity between VSAT networks in the AFI Region remains crucial and ATNS remains committed to the best practices. At present co-operation between ATNS – ASECNA and other AFISNET member States ensures interoperability of the networks. The specification and design of the NAFISAT and SADC2 network provide continued connectivity with AFISNET and provision was made for the retention of the current technical interface solution with the AFISNET network.

Challenges were experienced with some of the connections, particularly in respect of the Brazzaville and lately the Accra circuits.

The obsolescence of the equipment is becoming a risk and this has been confirmed during previous SNMC meetings. During previous discussions with ASECNA, it was indicated that all their AFISNET MEMOTEC equipment will be replaced by NetPerformer devices.

1.1. Availabilities recorded

	Availability
NAFISAT - SADC interconnectivity	99.98%
NAFISAT - AFISNET interconnectivity	97.17%
SADC - AFISNET interconnectivity	99.96%



1.2. Four level reporting structure as proposed by ICAO

ATNS provides the level 4 statistics as required from ICAO on a monthly basis. This is a comprehensive document where space segment, IDU, ODU and end user equipment statistics are collected. Below is an extract of this document:

1.2.1. IDU and ODU

ES/NO Level	
Addis-Ababa	10
Asmara	10.9
Cairo	11.6
Djibouti	8.3
Entebbe	10.5
Jeddah	10.3
Khartoum	12
MMC	12.9
Mogadishu	11.2
Nairobi	10.9
Sana'a	11.3
Tripoli	12.6
Victoria	10.6

TX Level dBm	
Addis-Ababa	36
Asmara	35
Cairo	39
Djibouti	35
Entebbe	36
Jeddah	35
Khartoum	39
MMC	34
Mogadishu	34
Nairobi	35
Sana'a	36
Tripoli	35
Victoria	34



1.2.2. AFTN

AFTN CIRCUIT AVAILABILITY														
Name of circuit		Circuits	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Addis-Ababa	Djibouti	1	100,00%	100,00%	100,00%	98,50%	100,00%	100,00%	99,85%	99,85%	100,00%	100,00%	100,00%	100,00%
	Jeddah	1	99,95%	99,85%	100,00%	100,00%	100,00%	100,00%	100,00%	99,85%	100,00%	100,00%	99,95%	100,00%
	Khartoum	1	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	99,85%	99,85%	100,00%	100,00%	100,00%	100,00%
	Nairobi	1	100,00%	100,00%	100,00%	100,00%	100,00%	99,85%	100,00%	99,85%	100,00%	99,73%	98,50%	99,80%
	Niamey	1	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	99,85%	100,00%	100,00%	100,00%	100,00%
Asmara	Addis-Ababa	1	100,00%	100,00%	100,00%	100,00%	100,00%	99,85%	100,00%	99,85%	100,00%	100,00%	100,00%	100,00%
	Cairo	1	100,00%	100,00%	100,00%	100,00%	100,00%	99,85%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%
	Khartoum	1	100,00%	100,00%	100,00%	100,00%	100,00%	99,85%	99,85%	100,00%	100,00%	100,00%	100,00%	100,00%
Cairo	Asmara													
	Jeddah	1	100,00%	100,00%	100,00%	100,00%	100,00%	99,85%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%
	Khartoum	1	100,00%	100,00%	100,00%	100,00%	100,00%	99,85%	99,85%	100,00%	100,00%	100,00%	100,00%	100,00%
	Nairobi	1	100,00%	100,00%	100,00%	100,00%	100,00%	99,85%	100,00%	99,85%	100,00%	99,73%	98,50%	99,85%
	Tripoli	1	100,00%	100,00%	26,52%	90,32%	100,00%	99,85%	100,00%	100,00%	100,00%	100,00%	98,50%	100,00%
Djibouti	Addis-Ababa													
	Nairobi	1	100,00%	100,00%	100,00%	98,50%	100,00%	99,85%	99,85%	99,85%	100,00%	99,73%	98,50%	99,85%
Entebbe	Nairobi	1	100,00%	100,00%	98,50%	100,00%	99,85%	99,85%	100,00%	99,85%	100,00%	99,73%	98,50%	99,85%
	Jhb	1	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	99,85%	100,00%	100,00%	100,00%	100,00%
Jeddah	Addis-Ababa													
	Cairo													
	Khartoum	1	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	99,85%	100,00%	100,00%	100,00%	100,00%	100,00%
	Sanaa	1	100,00%	99,85%	98,50%	99,85%	100,00%	100,00%	100,00%	100,00%	99,88%	100,00%	100,00%	99,85%
Khartoum	Addis-Ababa													
	Asmara													
	Cairo													
	Jeddah													
	N'djamena	1	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	99,85%	100,00%	100,00%	100,00%	100,00%	100,00%
Mogadishu	Tripoli	1	100,00%	100,00%	26,52%	90,32%	100,00%	100,00%	99,85%	100,00%	100,00%	100,00%	98,50%	100,00%
	Nairobi	1	100,00%	100,00%	100,00%	100,00%	100,00%	99,85%	100,00%	99,85%	100,00%	99,73%	98,50%	98,50%
Nairobi	Addis-Ababa													
	Brazaville	1	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	99,85%	99,99%	99,73%	98,50%	99,85%
	Cairo													
	Dar-es-Salaam	1	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	99,85%	99,85%	99,73%	98,50%	98,50%
	Djibouti													
Jeddah	Entebbe													
	Jeddah	1												
	Johannesburg	1	100,00%	100,00%	100,00%	100,00%	99,85%	100,00%	100,00%	99,85%	100,00%	99,73%	98,50%	99,85%
	Mogadishu													
	N'djamena	1	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	99,85%	100,00%	99,73%	98,50%	99,85%
Plaisance	Plaisance	1	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	99,85%	100,00%	99,73%	98,50%	99,85%
	Sanaa	1									99,88%	99,73%	98,50%	99,85%
	Victoria	1	100,00%	100,00%	99,72%	98,50%	100,00%	99,85%	100,00%	99,85%	100,00%	99,73%	98,50%	99,85%
	Jeddah													
	Nairobi													
Sanaa	Jeddah													
	Nairobi													
	Cairo													
Tripoli	N'djamena	1	100,00%	100,00%	26,52%	90,32%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	98,50%	100,00%
	Niamey	1	100,00%	100,00%	26,52%	90,32%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	98,50%	100,00%
	Khartoum													
Victoria	Johannesburg	1	100,00%	100,00%	100,00%	98,50%	100,00%	99,85%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%
	Nairobi													
Average			100,00%	99,99%	89,75%	98,45%	99,99%	99,93%	99,96%	99,91%	99,99%	99,89%	99,20%	99,84%



1.2.3. ATS/DS

		cct	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Addis-Ababa	Asmara	1	100,00%	100,00%	100,00%	98,50%	100,00%	99,85%	100,00%	99,85%	100,00%	100,00%	100,00%	100,00%
	Djibouti	1	100,00%	100,00%	100,00%	98,50%	100,00%	100,00%	99,85%	99,85%	100,00%	100,00%	100,00%	100,00%
	Khartoum	1	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	99,85%	99,85%	100,00%	100,00%	100,00%	100,00%
	Mogadish	1	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	99,85%	100,00%	98,50%	100,00%	99,85%
	Nairobi	1	100,00%	100,00%	100,00%	100,00%	100,00%	99,85%	99,85%	100,00%	99,85%	100,00%	99,73%	98,50%
	Sanaa	1	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	99,85%	99,85%	98,50%	100,00%	100,00%	100,00%
Asmara	Addis-Ababa													
	Djibouti	1	100,00%	100,00%	100,00%	98,50%	100,00%	99,85%	99,85%	100,00%	100,00%	100,00%	100,00%	100,00%
	Jeddah	1	100,00%	100,00%	100,00%	98,50%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%
	Khartoum	1	100,00%	100,00%	100,00%	98,50%	100,00%	99,85%	99,85%	100,00%	100,00%	100,00%	100,00%	100,00%
	Sanaa	1	100,00%	100,00%	100,00%	98,50%	100,00%	99,85%	100,00%	100,00%	98,50%	100,00%	100,00%	100,00%
Cairo	Jeddah	1	100,00%	100,00%	100,00%	100,00%	100,00%	99,85%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%
	Khartoum	1	100,00%	100,00%	100,00%	100,00%	100,00%	99,85%	99,85%	100,00%	100,00%	100,00%	100,00%	100,00%
	Tripoli	1	100,00%	100,00%	26,52%	100,00%	100,00%	99,85%	100,00%	100,00%	100,00%	100,00%	98,50%	100,00%
Djibouti	Addis-Ababa													
	Asmara													
	Mogadish	1	100,00%	100,00%	100,00%	98,50%	100,00%	100,00%	99,85%	100,00%	100,00%	98,50%	100,00%	99,85%
	Sanaa	1	100,00%	100,00%	100,00%	98,50%	100,00%	100,00%	99,85%	100,00%	98,50%	100,00%	100,00%	100,00%
Entebbe	Dar-es-Salaam	1	99,85%	99,85%	99,85%	100,00%	100,00%	100,00%	100,00%	99,85%	100,00%	100,00%	100,00%	100,00%
	Khartoum	1	99,85%	100,00%	100,00%	100,00%	100,00%	100,00%	99,85%	99,85%	100,00%	100,00%	100,00%	100,00%
	Kigali	1	99,85%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	99,85%	100,00%	100,00%	100,00%	100,00%
	Kinshasa	1	99,85%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	99,85%	100,00%	100,00%	100,00%	100,00%
	Nairobi	1	99,85%	100,00%	99,85%	100,00%	99,85%	99,85%	100,00%	99,85%	99,90%	99,73%	98,50%	99,85%
Jeddah	Asmara													
	Cairo													
	Khartoum	1	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	99,85%	100,00%	100,00%	100,00%	100,00%	100,00%
	Sanaa	1	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	98,50%	100,00%	100,00%	100,00%
Khartoum	Addis-Ababa													
	Asmara													
	Brazzaville	1	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	99,85%	100,00%	100,00%	100,00%	100,00%	100,00%
	Cairo													
	Entebbe													
	Jeddah													
	Kinshasa	1	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	99,85%	100,00%	100,00%	100,00%	100,00%	100,00%
	Nairobi	1	100,00%	100,00%	100,00%	100,00%	99,85%	99,85%	99,85%	99,85%	100,00%	99,73%	98,50%	99,85%
	N'djamena	1	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	99,85%	100,00%	99,90%	100,00%	100,00%	100,00%
	Tripoli	1	100,00%	100,00%	26,52%	100,00%	100,00%	100,00%	99,85%	100,00%	100,00%	100,00%	100,00%	98,50%
Mogadish	Addis-Ababa													
	Djibouti													
	Nairobi	1	100,00%	100,00%	100,00%	100,00%	99,85%	99,85%	100,00%	99,85%	100,00%	98,50%	98,50%	99,85%
	Sanaa	1	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	98,50%	100,00%	100,00%	99,85%
	Victoria	1	100,00%	100,00%	100,00%	98,50%	100,00%	99,85%	100,00%	100,00%	100,00%	98,50%	100,00%	99,85%
Nairobi	Addis-Ababa													
	Dar-es-Salaam	1	100,00%	100,00%	100,00%	100,00%	99,85%	99,85%	100,00%	99,85%	100,00%	99,73%	98,50%	98,50%
	Entebbe													
	Khartoum													
	Mogadishu													
	Victoria	1	100,00%	100,00%	100,00%	98,50%	99,85%	99,85%	100,00%	99,85%	100,00%	99,73%	98,50%	99,85%
Sanaa	Addis-Ababa													
	Asmara													
	Djibouti													
	Jeddah													
	Mogadishu													
Tripoli	Cairo													
	Khartoum													
	N'djamena	1	100,00%	100,00%	26,52%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	98,50%	100,00%
	Niamey	1	100,00%	100,00%	26,52%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	98,50%	100,00%
Victoria	Antananan	1	100,00%	100,00%	100,00%	98,50%	100,00%	99,85%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%
	Dar-es-Salaam	1	100,00%	100,00%	100,00%	98,50%	100,00%	99,85%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%
	Mogadishu													
	Nairobi													
	Plaisance	1	100,00%	100,00%	100,00%	98,50%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%
	Average		99,98%	100,00%	92,05%	99,47%	99,98%	99,93%	99,94%	99,94%	99,79%	99,76%	99,59%	99,92%



2. SADC AND NAFISAT UPGRADE

2.1. Background

Both NAFISAT and SADC Supervisory Boards agreed that the state of art ND Satcom MF-TDMA technology will be used for the Network upgrade. The equipment can provide connectivity for existing legacy application as well as the planned ICAO IP based applications e.g. AMHS, AIDC etc.

2.2. Implementation

NAFISAT and SADC2 required to be upgraded at the same time because of the interconnectivity and the utilization of the main management centre in Johannesburg and the standby in Entebbe.

2.3. Installation and Commissioning

The installation work was completed during Calendar Week 10 (6 to 10 March 2017)

Transition from the old network was conducted on 16 March 2017. Both the NAFISAT and SADC2 networks were upgraded simultaneously so as to ensure interconnectivity between the two networks, particularly the following links, Khartoum, Nairobi, Entebbe and Victoria on the NAFISAT network and between Johannesburg, Dar es Salaam, Plaisance, Antananarivo, Kinshasa and Kigali on the SADC2 network.

NAFISAT & SADC VSAT2 Upgrade (Transfer of Operation)

SITE NAME	2016												2017																																											
	CW 28	CW 29	CW 30	CW 31	CW 32	CW 33	CW 34	CW 35	CW 36	CW 37	CW 38	CW 39	CW 40	CW 41	CW 42	CW 43	CW 44	CW 45	CW 46	CW 47	CW 48	CW 49	CW 50	CW 51	CW 52	CW 1	CW 2	CW 3	CW 4	CW 5	CW 6	CW 7	CW 8	CW 9	CW 10	CW 11	CW 12	CW 13	CW 14	CW 15	CW 16															
NAFISAT																																																								
DHIBOUTI																																																								
CAIRO																																																								
ASMARA																																																								
ADDIS ABABA																																																								
NAIROBI																																																								
TRIPOLI																																																								
MEKNAS (estimated: Dec 2017)																																																								
KHARTOUM																																																								
MOGADISHU																																																								
VICTORIA																																																								
ENTEBBE																																																								
MMC																																																								
SANA'A (estimated: 2018)																																																								
SADC VSAT2																																																								
DAR ES SALAAM																																																								
KIGALI																																																								
KINSHASA																																																								
ANTANANARIVO																																																								
BEIRA																																																								
BLUJUMBURA																																																								
LU SAKA																																																								
LUANDA																																																								
LILIONGWE																																																								
GABORONE																																																								
HRARE																																																								
JOHANNESBURG																																																								
MANZINI																																																								
MAPUTO																																																								
MASERU																																																								
MALURITHUS																																																								
WINDHOEK																																																								

Legend
 Completed
 Outstanding

Notes
 1) Shipment issue
 2) Return to finalise Snag List - does not affect operation
 3) Site access issue

Scenario 2 : Target Network Transfer
Transition
16 March 2017



2.4. Retention of interconnectivity with AFISNET

The 8 AFTN and 9 ATS/DS links to the AFISNET sites, were not upgraded to ensure continuity of services until the AFISNET network is upgraded.

The NAFISAT sites that interconnect with AFISNET are indicated below:

NAFISAT & SADC Terminals connected to AFISNET	AFTN	ATS/DS
Tripoli	Niamey N'Djamena	Niamey N'Djamena
Khartoum	N'Djamena	N'Djamena Brazzaville
Addis Ababa	Niamey	
Nairobi	Brazzaville	
Luanda	Brazzaville Accra	Brazzaville Accra Abidjan Dakar
Kinshasa	Brazzaville	Brazzaville

2.5. ATNS retained the MEMOTEC multiplexers from the NAFISAT and SADC Networks. This will give us the capacity to maintain the existing links with the AFISNET Network and insure connectivity from the NAFISAT and SADC Networks.

3. ACTION TO BE TAKEN BY THE MEETING

The meeting is invited to take note of the above information. More information on specifics will be made available upon request.