



**First Meeting of the AFI VSAT Networks Managers  
(AFI VSAT/1)  
(Kwa-Zulu Natal, South Africa, 13 to 15 June 2011)**

***AFISNET : Up to date Technology and news  
Equipments for Air Navigation***

Presented by : ASECNA

# Summary

- **AFISNET Network**
  - AFISNET Members
  - VSAT & Earth Stations
  - Global System Architecture
  - AMS
  - AFS
- **Architecture Network Evolution**
  - Modernization (Since 2007)
  - TWO Architecture Network
  - Equipment and Systems
- **IP Network and Supervision**
- **Backup Consideration**
- **Action by the Meeting**



# AFISNET Members

- **ASECNA**
  - 18 countries
  - 6 FIRs
- **NAMA**
  - 1 country
  - 1 FIR
- **GCAA**
  - 1 country
  - 1 FIR
- **ROBERTS**
  - 3 countries
  - 1 FIR



# AFISNET VSAT & Earth Stations Status

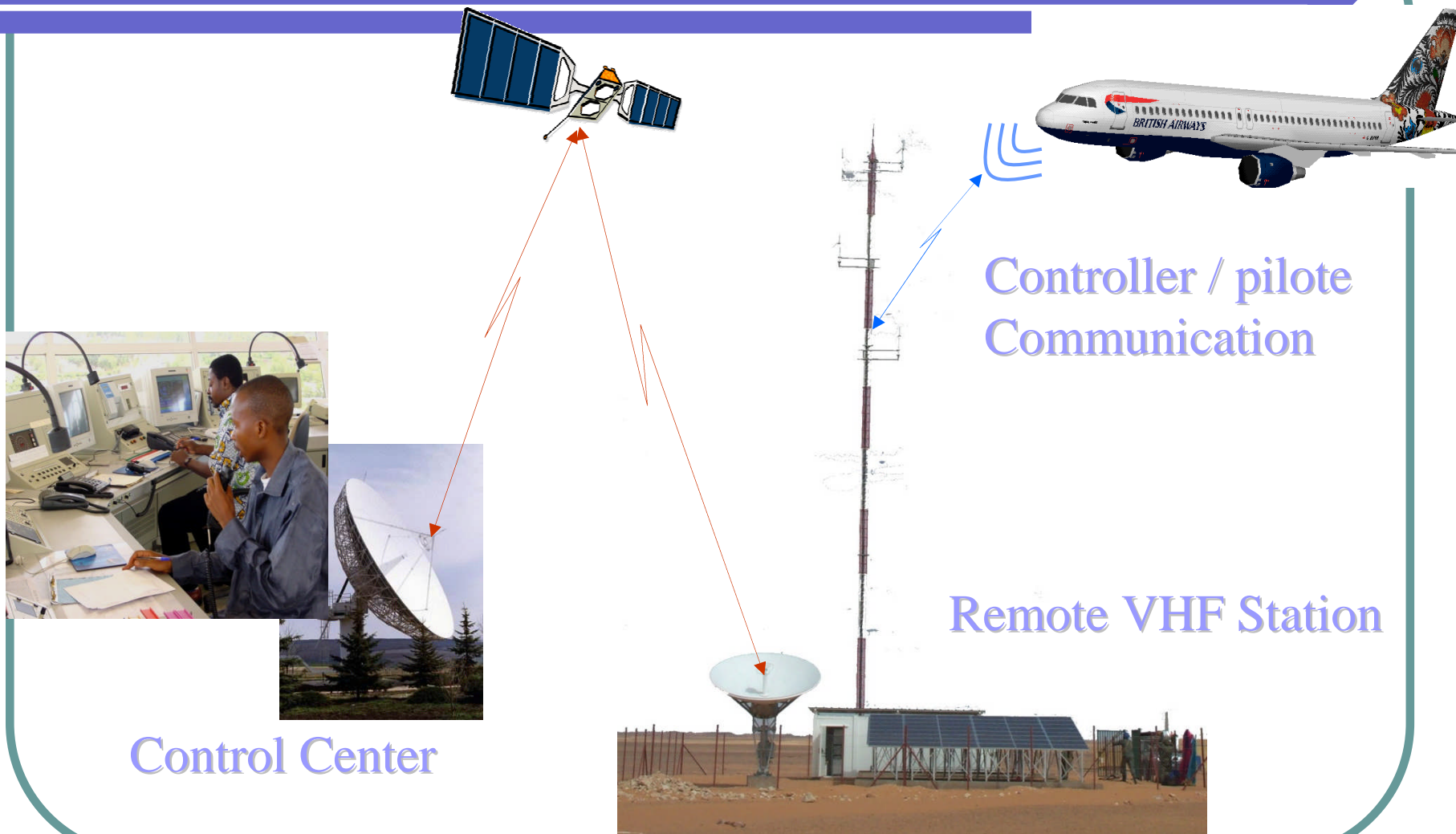
STANDARDS (TYPE) <b>DIAMETER</b>	SERVICES SUPPORTED (TYPE) <b>AFS / AMS</b>	QUANTITY	OWNERS
F1 (3,7m and 3.8m)	AFS and AMS	61	ASECNA
F1 (4,5m)	AFS and AMS	5	
F2 (7,3m)	AFS and AMS	7	
B (11m)	AFS and AMS	2	
F2 (7,3m)	AFS	8	NAMA
F2 (7,3m)	AFS	1	GCAA
F1 (4,5 m)	AFS	1	ROBERTS (Monrovia)
F1 (3,8 m)	AFS	1	ENNA (Algiers)
F1 (3,8 m)	AFS	1	ATNS (Johannesburg)
F1 (3.8m)	AFS	1	Las Palmas
F1 (4.5 m)	AFS	1	GCAA (Banjul)
<b>TOTAL AFISNET VSATs</b>		<b>89</b>	

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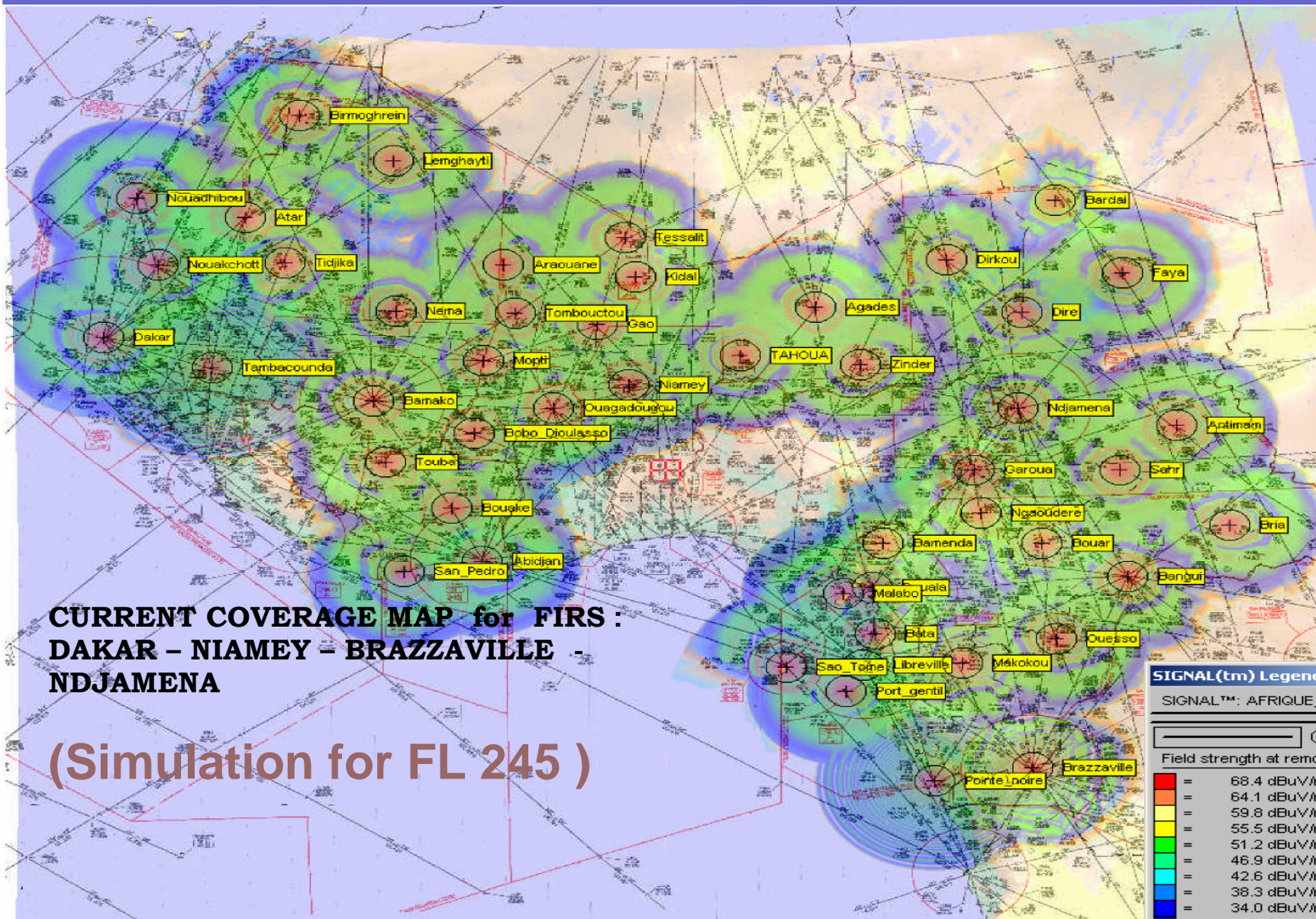
# AMS – «Remote VHF Coverage – Principle »



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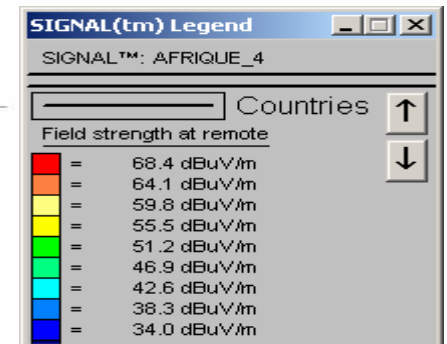
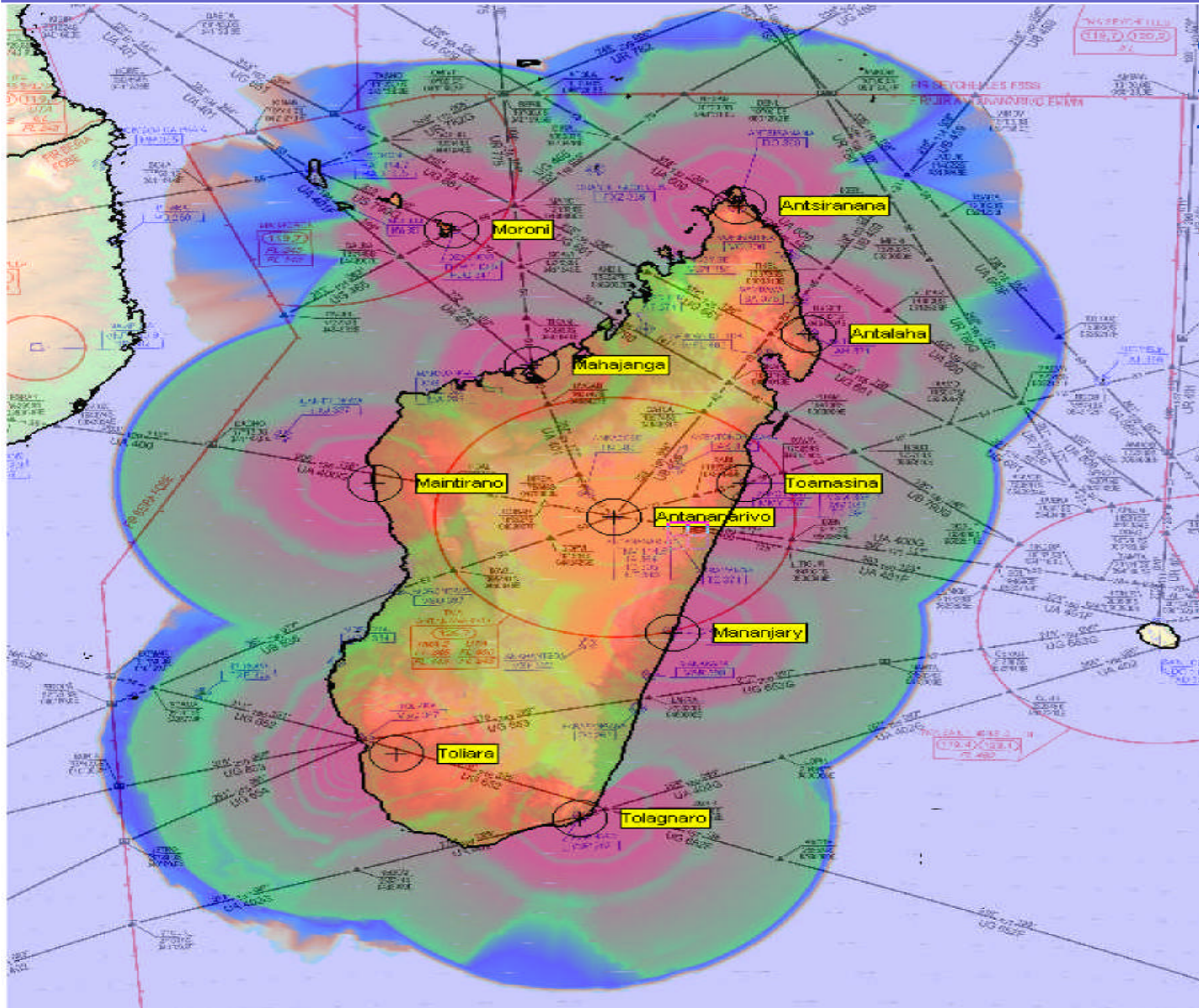
# Aeronautical Mobile Service – MAP (Current)



# Aeronautical Mobile Service – MAP (Current)

**CURRENT COVERAGE  
MAP FOR  
ANTANANARIVO FIR**

**(Simulation for  
FL 245 )**



# Aeronautical Fixed Service – AFS (AFTN – 2010 /2011)

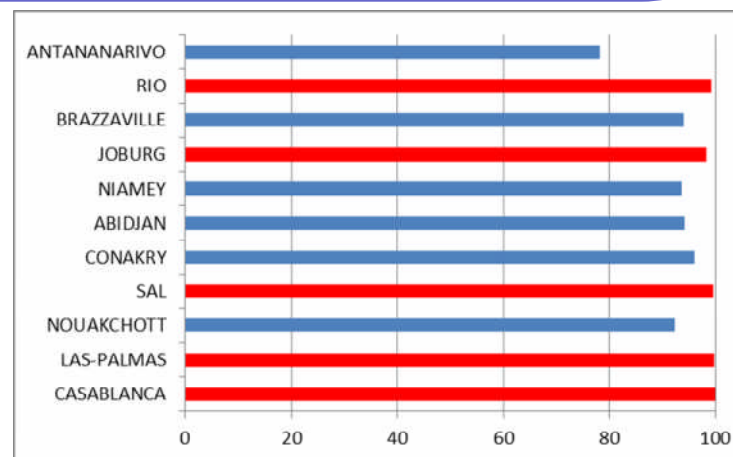
Many bilateral AFTN circuits are implemented with the VSAT Network facilities;

Global good availability, but upgrade required for some links

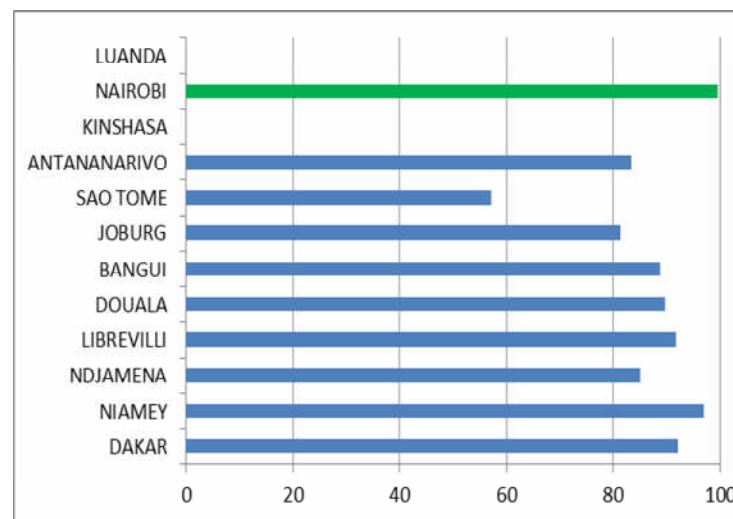
BRAZZAVILLE / KINSHASA AFTN circuit to be implemented via the interconnection between AFISNET and SADC 2 (APIRG 17 Conclusion 17/13)

BRAZZAVILLE/LUANDA AFTN to be restored (coordination ENANA, ASECNA, ATNS)

DKR



BZV



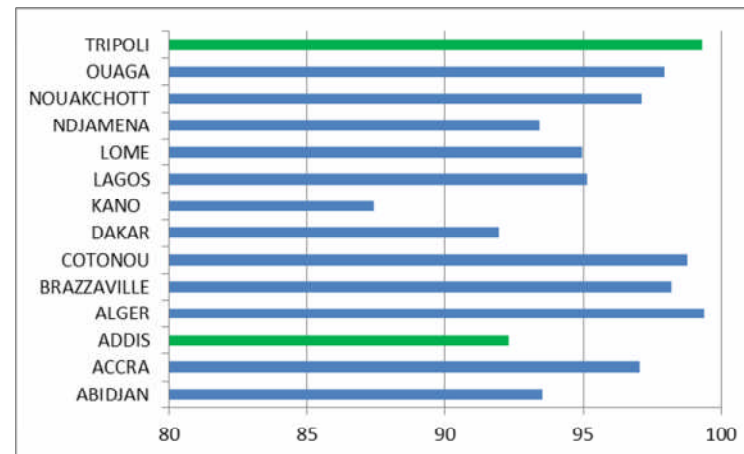
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# Aeronautical Fixed Service – AFS (2) (AFTN – 2010 /2011)

Global good availability, but  
upgrade required for some links  
as  
NIANEY / KANO  
NIAMEY/ACCRA

NIM



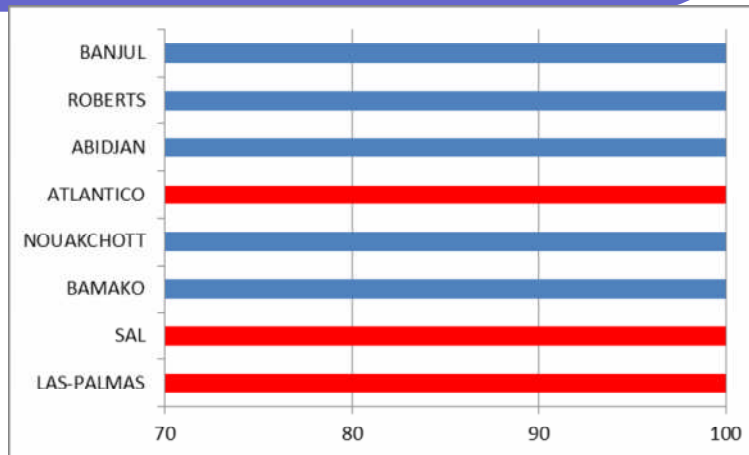
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# Aeronautical Fixed Service – AFS (3) (ATS/DS – 2010 /2011)

With regard to AFISNET, CAFSAT and AFISNET&NAFISAT& SADC-2 interconnection, ATS/DS perform globally satisfactory.

DKR

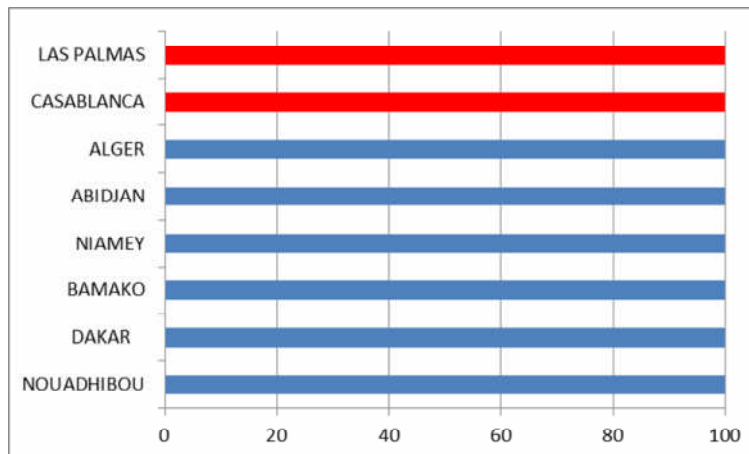


Nevertheless the performances of some circuits require particular attention :

- Accra/Brazzaville & Accra/Niamey
- Kano/N'djamena
- N'djamena/Khartoum

Most of the time the unavailability includes :

NKC



- terminal equipments failure or
- compatibility (VCSS protocol)
- Network components failure and
- Human factors (training, language

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# Aeronautical Fixed Service – AFS(4) (AFTN – 2010 /2011)

Intra and inter VSAT networks inter close coordination must be improved to allow all the circuits to meet the minimum requirement of availability of 97%.

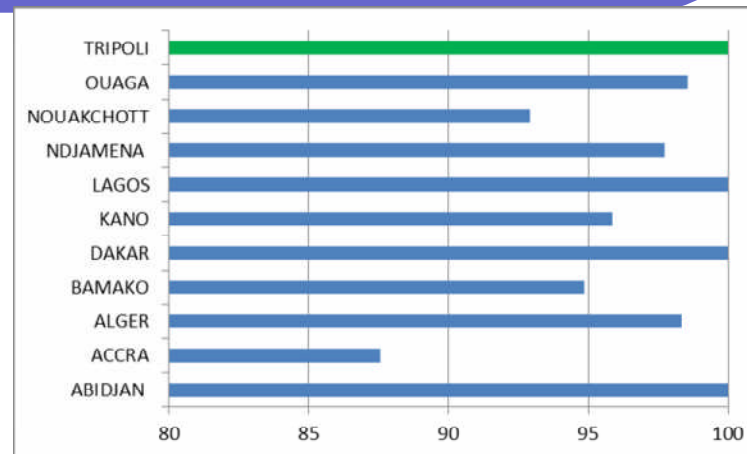
### Intra network coordination

- ASECNA/NAMA
  - ASECNA/GCAA

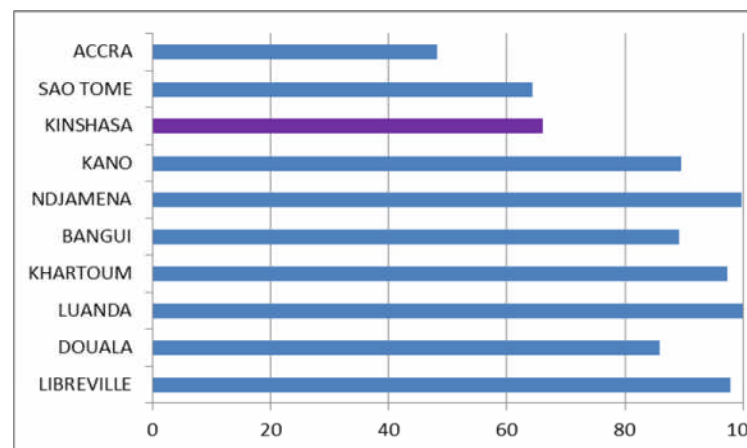
### Inter networks coordination

- ASECNA/ENANA (Angola)
  - ASECNA/ATNS
  - ASECNA/Sudan
  - ASECNA/AENA

NIM



BZV



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# Aeronautical Fixed Service – AFS(5) (ATS/DS – 2010 /2011)

Intra and inter VSAT networks inter close coordination must be improved to allow all the circuits to meet the minimum requirement of availability of 97%.

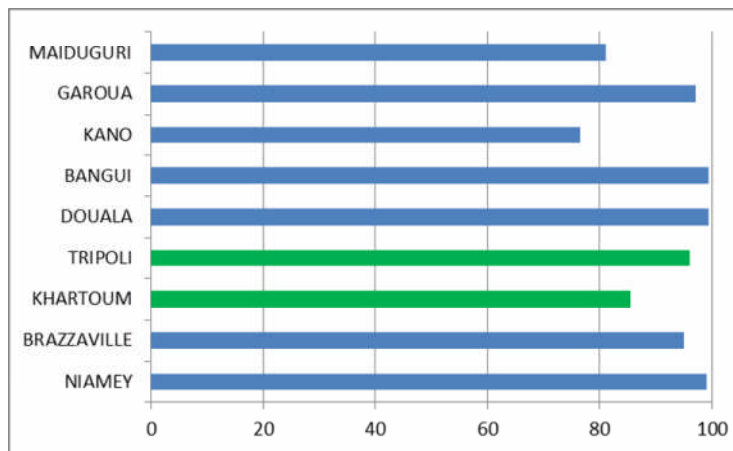
### Intra network coordination

- ASECNA/NAMA
  - ASECNA/GCAA

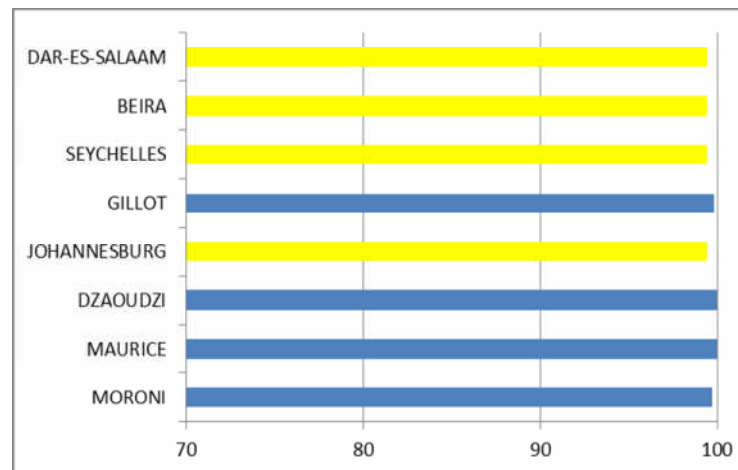
### Inter networks coordination

- ASECNA/ENANA (Angola)
  - ASECNA/ATNS
  - ASECNA/Sudan
  - ASECNA/AENA

NDJ



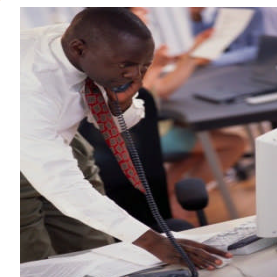
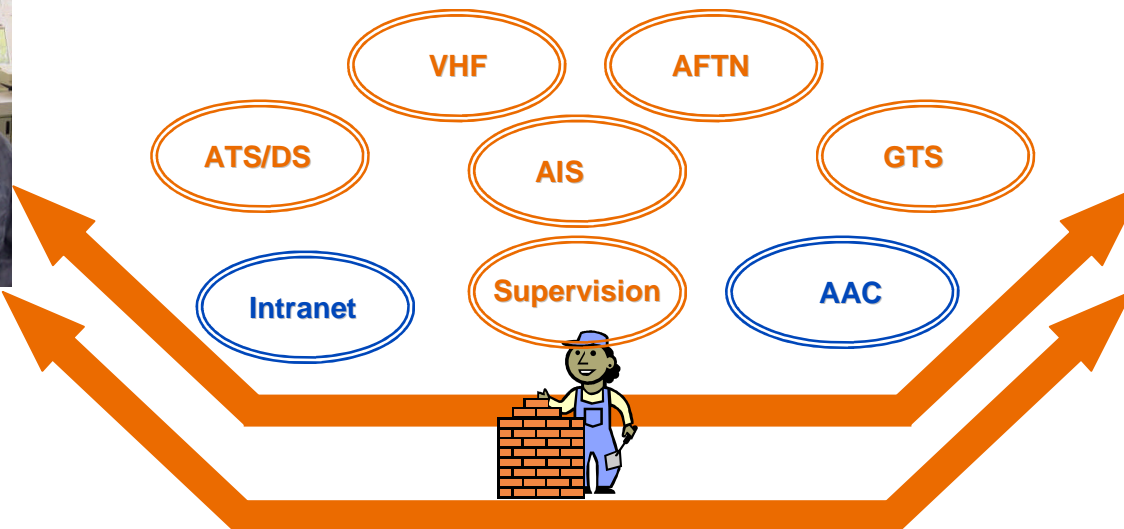
TNR



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# Architecture NetWork Evolution (One Network Architecture for all services)



**Before 2007**

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# Architecture NetWork Evolution (One Network Architecture for all services)

- Satellite AccessTechnics
  - FDMA on satellite **IS 10-02 Transponder 20EHA/20EHA**
  - Carriers Type
  - SCPC/MCPC
- Equipments
  - Radio : **Single-Transponder**
  - Base Band : Frame Relay **Multiplexor**
- Services
  - Voice : Voice over Frame Relay (G729) – **ATS/DS/ VHF**
  - Data : X25 over Frame Relay, Asynchronous – **AFTN , GTS**
  - IT : IP over Frame Relay – **SUPERVISION, ACC**



# Architecture NetWork Evolution

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## Operational Network Modernization since 2007

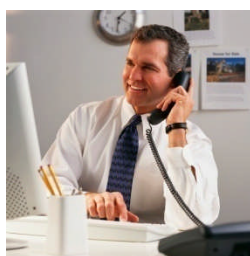
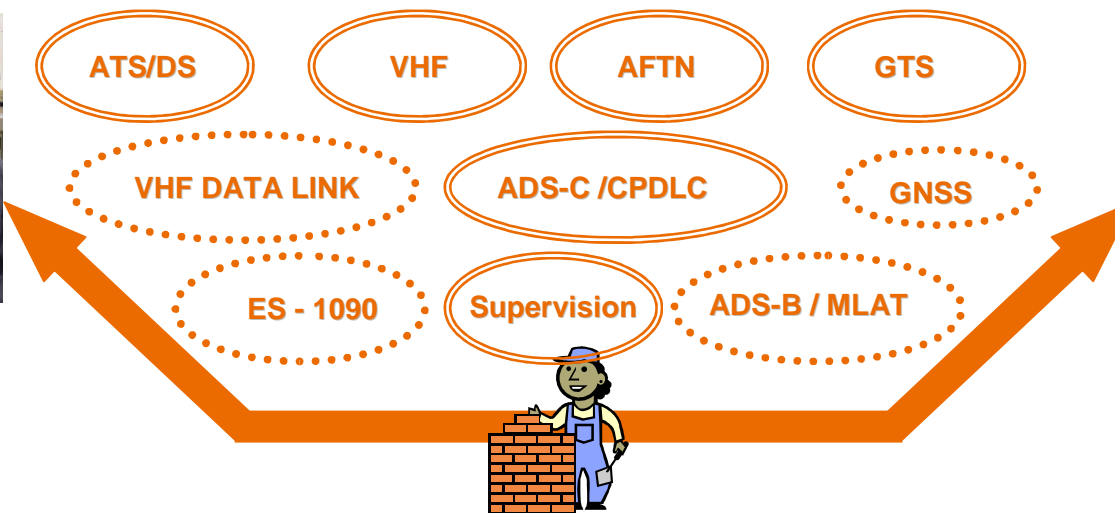
- Satellite Access Technics
  - FDMA on satellite **IS 10-02 20EHA/20EHA and 23EHA/23EHA**
- Carriers Type
  - **SCPC** (Full Connection) with **TPC** (Turbo Coding) and **FEC Optimization**
- Equipement
  - Radio : **Multiple-Transponders** – **LBand With Personnal Satellite Modem**
  - Base band : **FR Switching**
- Services
  - Voice : Voice over FR : **VHF , ATS**
  - Data : **VHF Data Link, ADS-B, CPDLC, GNSS, MLAT**
  - Backup of Operational Services

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# Architecture Network Operational & Non-Operational Services Since 2008 (In ASECNA Area)



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# New Architecture on MF-TDMA Access (IP Network)

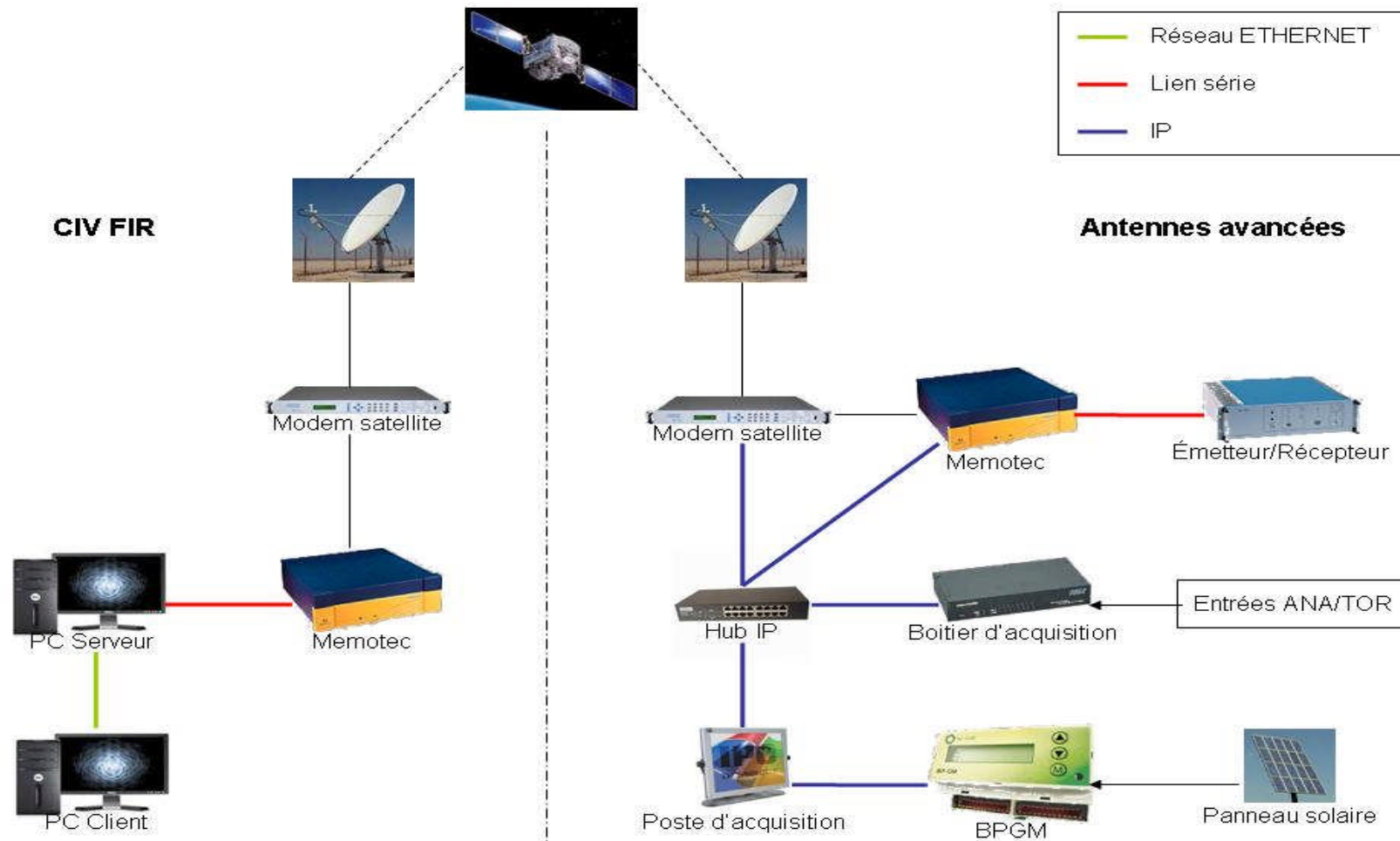
- Satellite Access Technics
  - MF-TDMA on satellite **IS 10-02 Transponder 23EHA/23EHA**
- Carriers Type
  - TDMA / TDMA (Full Mesh) with 2 synchronisation stations
  - 720 Kbits/s < Data Rate < 1270 Kibts/s
- Equipement
  - Radio : Multiple-Transponders – LBand
  - Base band : Modem/Router IP
- Services
  - Voice : Voice over IP
  - Data : TCP-IP - Intranet
  - Video / Visioconference
  - Telediagnostic / Telemaintenance / Supervision
  - Data and pictures transfert
  - Backup of Operationals Services(ATIS/DS, AFTN, GTS)

# Equipments and Systems on AFISNET today

- **RFs**
  - IBUC (Terrassat)
  - CODAN / ANACOM (Anasat)
  - Advantech (UP/DW) / DATENO
- **IF**
  - Lband
  - 70 Mhz and 140 Mhz
- **Base Band Equipement**
  - Skywan IDU 2500 and 5000
  - Memotec CX series 900s, 950e
- **Modems**
  - Datum PSM 500 series
  - Skywan IDU 2500 and 5000
- **Switch AFTN and VCCS**
  - MESSIR (Corrobor)
  - SCHMITZ, SITTI, CONCERTO and CD 30



# Supervision Architecture for remote stations



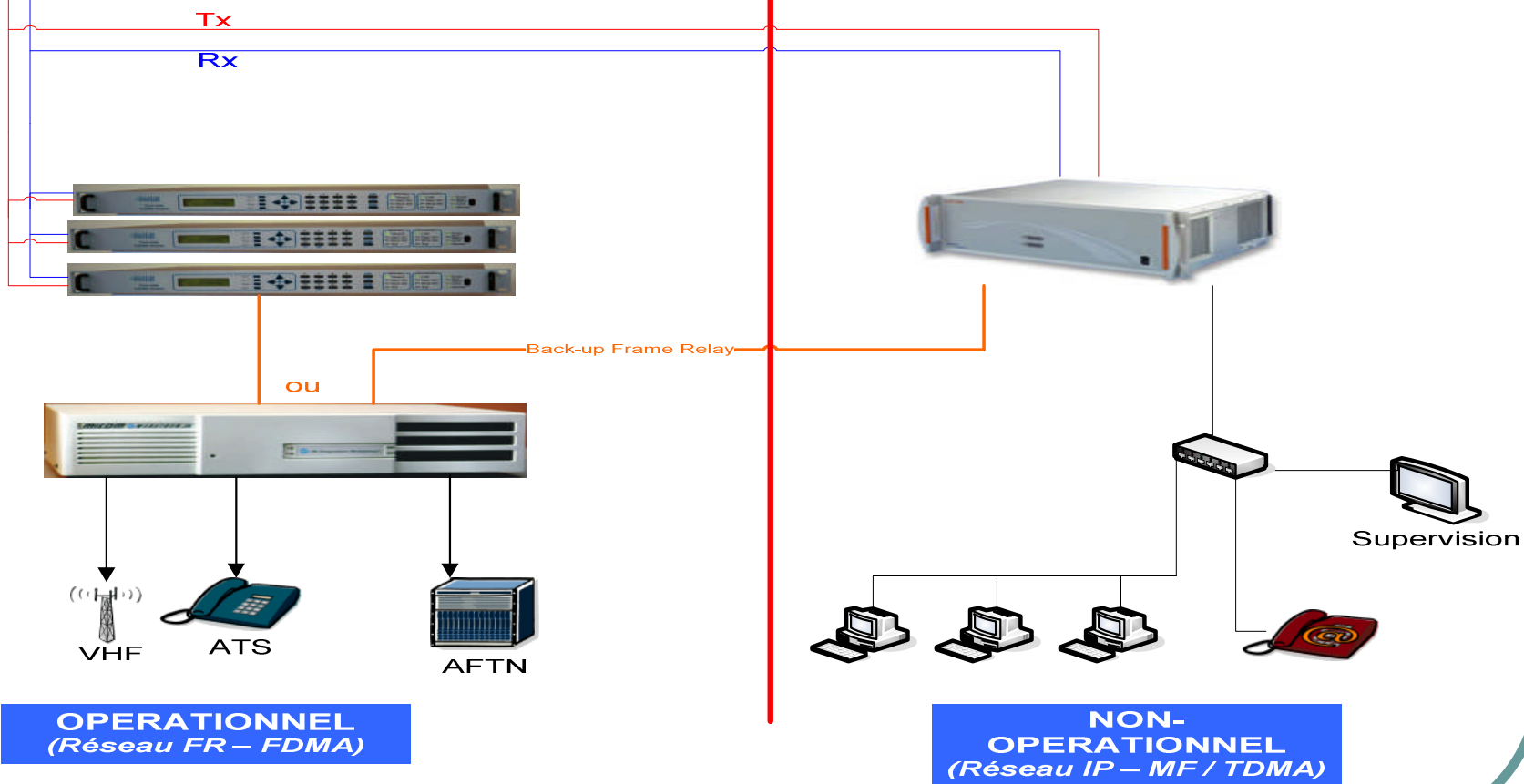
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# Backup Consideration (IP Network to Backup FR Network)

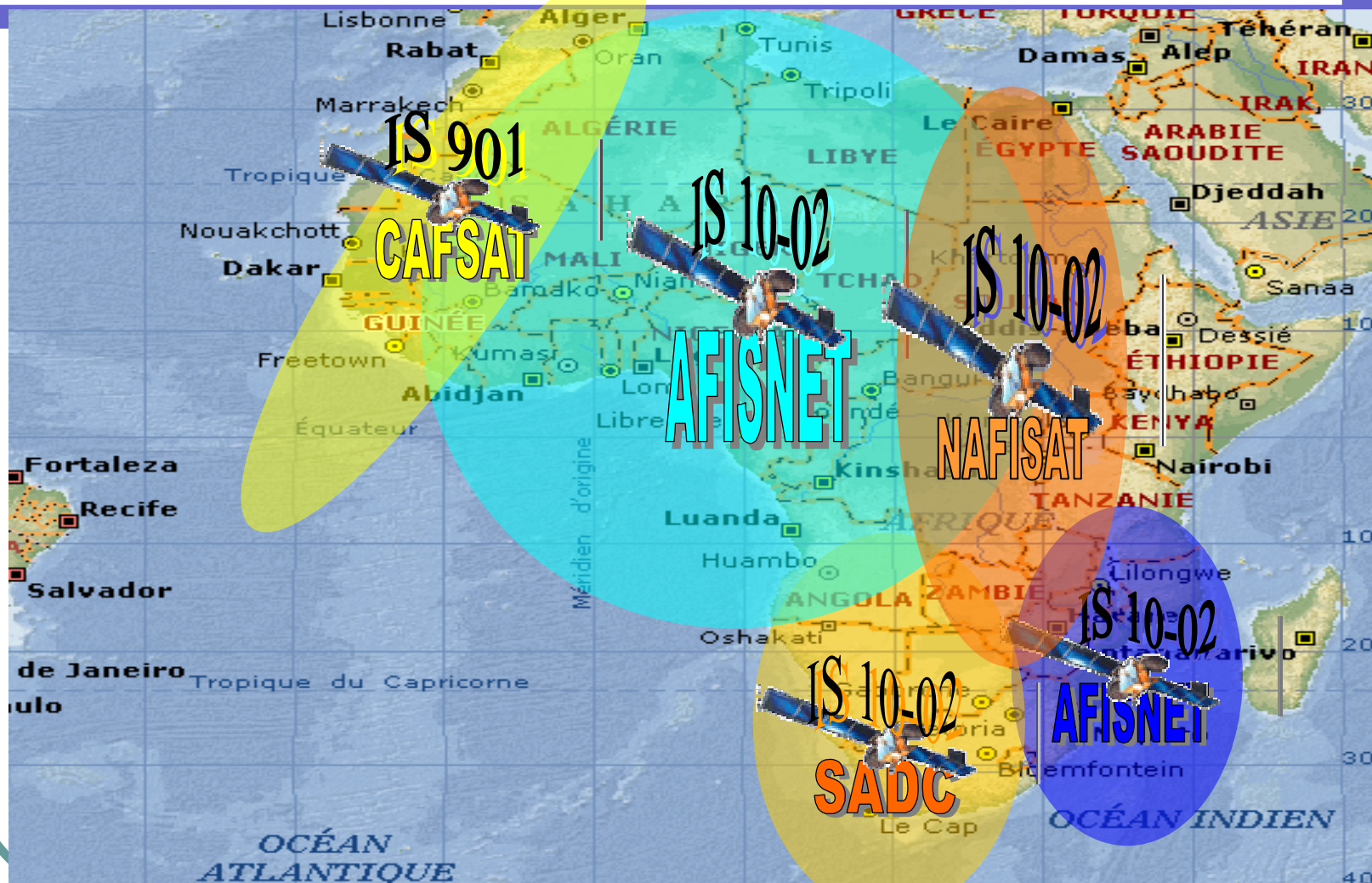
Vers antenne VSAT / STR



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# Interconnexion With Others Network



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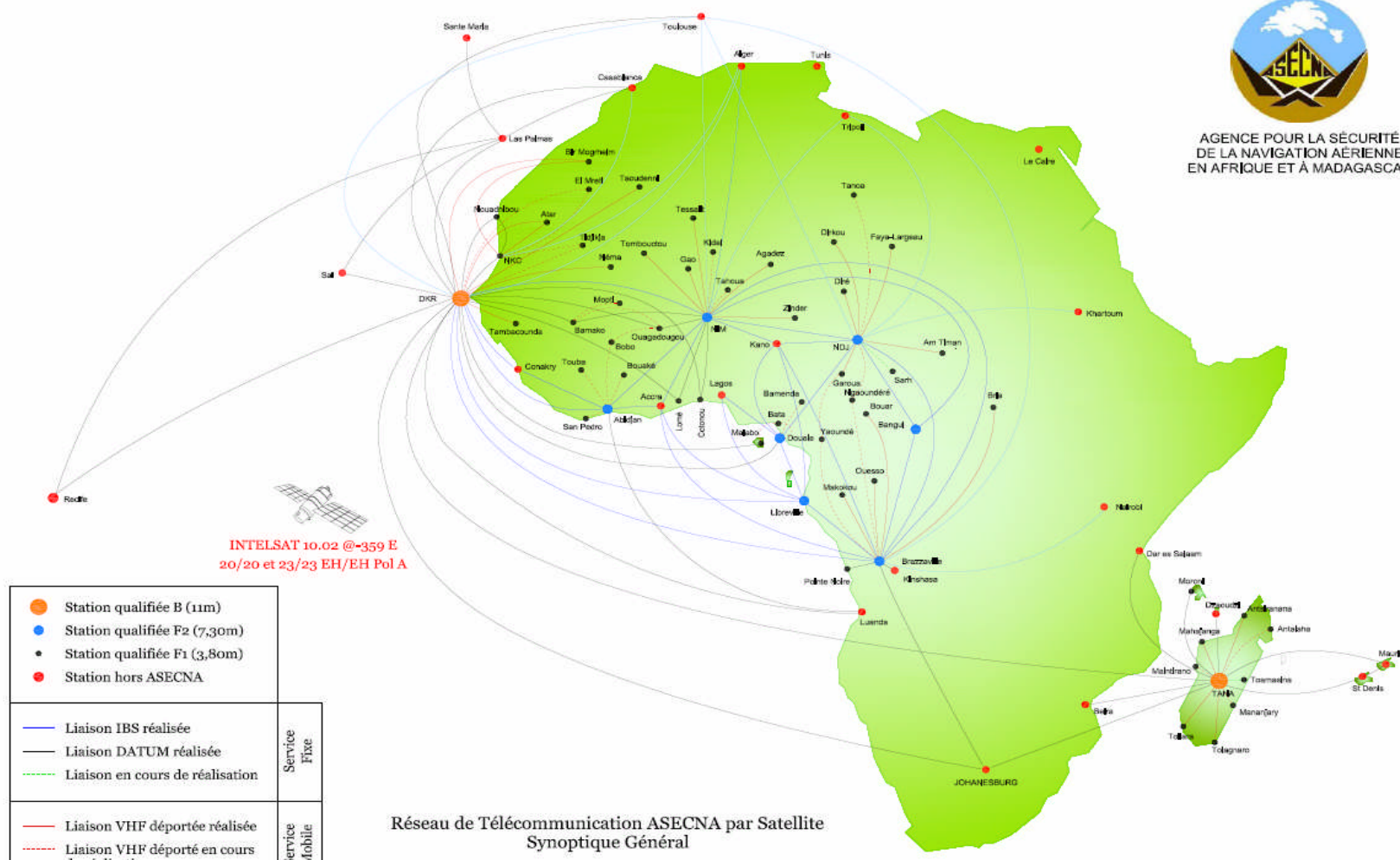


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# AFISNET With others AFI Network



AGENCE POUR LA SÉCURITÉ DE LA NAVIGATION AÉRIENNE EN AFRIQUE ET À MADAGASCAR



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# Interconnexion With Others Network

- **Advantages**
  - Same satellite **IS 10-02 Transponder 23EHA/23EHA** for **AFISNET, NAFISAT and SADC2**
  - Same Base band equipment : **SkyWan, Memotec CX series**
- **Limits**
  - Lack of coordination
  - Multiple technologies (**FDMA, TDMA, MF-TDMA, DAMA**)
  - Non-compatibility protocols
- **Opportunities**
  - Joint Technical Group (*SNMC, CNMC,...*) **under ICAO Coordination for AFI Network**



## Action by the meeting

- **The meeting is invited to :**
  - Take note that AFISNET Satellite Network is up to date with new equipments;
  - Take note that it is very important to set up for all AFI Network a Joint Tehnical Group under ICAO Coordination to achieve the single sky concept;