Annex 1: Status on implementation and operation of the Western Africa Centers meteorological telecommunication means

The western Africa meteorological centers communication means are composed of the World Weather Watch (WWW) Global Telecommunication System/Global Data Processing and Forecast (GTS/GDPF) centers (RTHs, RSMCs and NMCs) computer systems (Message switching system and Data processing systems), Point to point circuits, satellite based systems and Internet services.

1. GTS Centers and point to point circuits

The GTS/GDPS Plans for the western part of Region I (Africa) are composed of following centers:

1.1 Centers:

The sub region is composed of following GTS/GDPF centers:

. RTH Dakar on the GTS Main Telecommunication Network (MTN) and RTH Niamey on the GTS Regional Main Telecommunication Network (RMTN);

. The Dakar Regional Specialized Main Center (RSMC) in charge of the western and central parts of the region, for weather analysis and forecasting;

. Ten (10) NMCs associated to RTH Dakar: Nouakchott, Banjul, Sal, Abidjan, Bamako, Bissau, Monrovia, Conakry, Freetown and Dakar,

. Six (6) NMCs associated to RTH Niamey: Accra, Cotonou, Lome, Lagos, Ouagadougou and Niamey.

1.2 GTS Point to point links

1.2.1 Circuits characteristics

The twenty (20) point to point circuits which compose the GTS plan for the western sub part of Region I (Africa) have following characteristics:

POINT TO POINT CIRCUITS		**Present status**		**Current plans for upgrade and/or introducing/use of TCP/IP**	
		Connection Type Capacity	**Procedure**	**Capacity**	**Procedure**
Main Telecommunication Circuits					
Dakar	Toulouse	VSAT 28.8 kps	FTP	VSAT-64kps	TCP/IP-FR

Dakar	Toulouse	Internet (As backup)	TCP/IP	VPN via Internet	TCP/IP
Interregional Circuits					
Niamey	Toulouse	VSAT 9.6 kbps	FTP	VSAT-64kps	TCP/IP
Main Regional Circuits					
Dakar	Algiers	NO	NO	Internet (VPN)	TCP/IP
Niamey	Algiers	VSAT 2.4 kbps	X25 AFTN GTS channel not been implemented	Internet (VPN) for GTS	TCP/IP
Dakar	Niamey	VSAT 19.2 kbps	V24	VSAT-64 kps	TCP/IP/FR
Regional Circuits					
Niamey	Ouagadougou	VSAT 19.2 Kps	X25	VSAT 64 Kps	TCP/IP
Niamey	Accra	VSAT 1.2 Kps	X25	VSAT 64 Kps	TCP/IP/FR
Niamey	Cotonou	VSAT 1.2 Kps	X25	VSAT 64 Kps	TCP/IP
Niamey	Lagos	VSAT 1.2 Kps AFTN	X25	Internet(VPN) With Toulouse	TCP/IP
Niamey	Lome	VSAT 1.2 Kps	X25	VSAT 64 Kps	TCP/IP
Dakar	Bamako	VSAT 1 9.2 Kps	X25	VSAT 64 Kps	TCP/IP/FR
Dakar	Abidjan	VSAT 1 9.2 Kps	X25	VSAT 64 Kps	TCP/IP/FR
Dakar	Nouakchott	VSAT 1 9.2 Kps	X25	VSAT 64 Kps	TCP/IP/FR
Dakar	Sal	VSAT 9.6 Kps (AFTN)	X25	Coordination on going for GTS channel	
Dakar	Banjul	VSAT 1.2 Kps (from March 2010)	X25	-VSAT 64 Kps -Coordination on going for GTS channel implementation	TCP/IP
Dakar	Bissau	VSAT 1.2 Kps	X25	VSAT 64 Kps	TCP/IP
Dakar	Conakry	VSAT 2.4 Kps (No transm. on the GTS channel at Conakry side)	X25	No coordination	
Dakar	Freetown	VSAT 2.4kps Via Conakry AFTN	X25	No coordinación	
Dakar	Monrovia	VSAT 2.4kps Via Conakry AFTN	X25	No coordinación	
Dakar	Las Palmas	VSAT (CAFSAT CAFSAT NETWORT) 9.6 Kps AFTN	X25	VPN between AEMET and ANAMS for WIS exchange	

1.2.2 Circuits plan

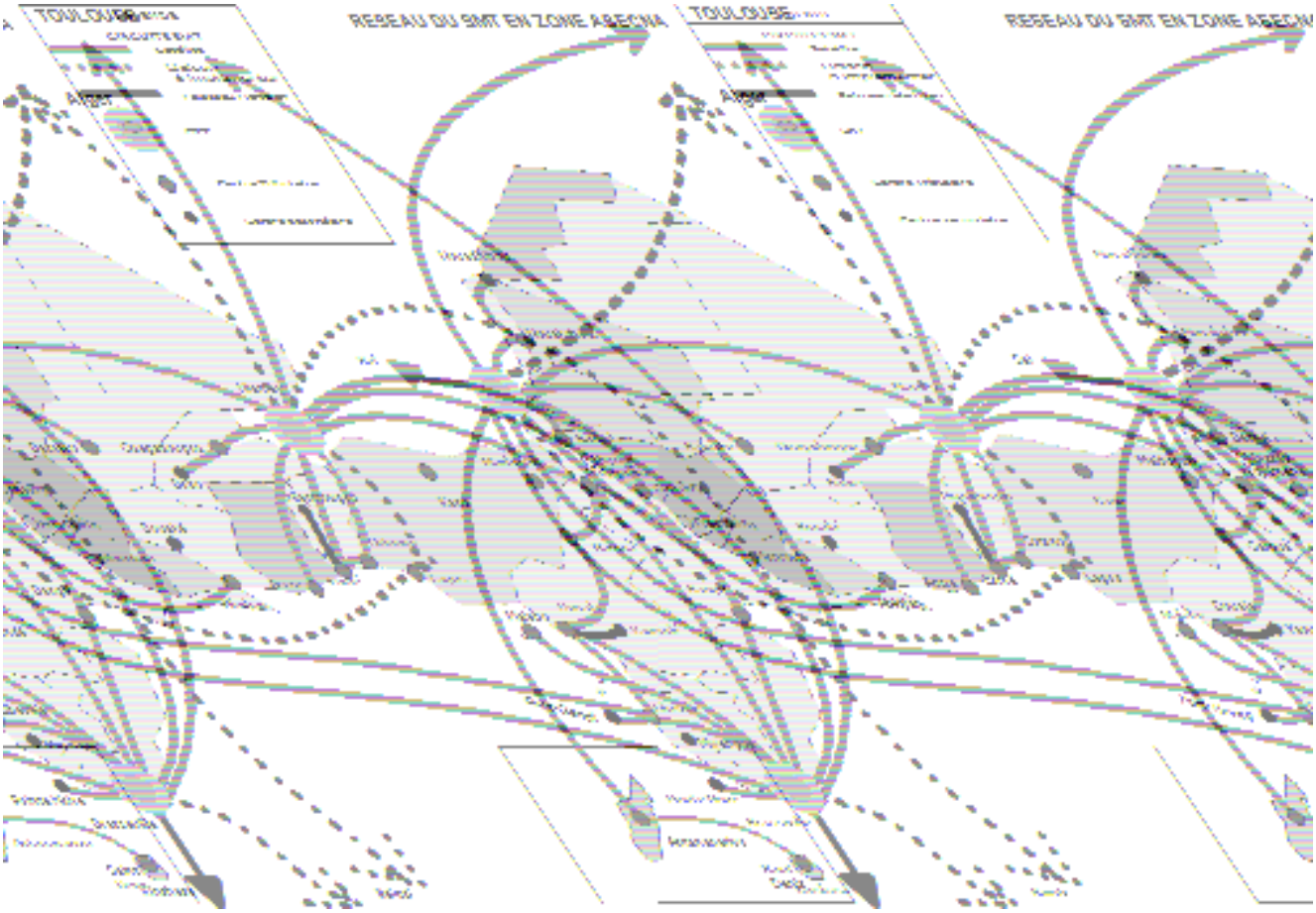

Figure: The western Africa meteorological GTS centres point to point circuits plan

1.2.3 Information on the status on implementation/operation and capacity of circuits:

As for observational data from the western Africa WMO member countries to be worldly distributed, it is noted with great concern that data availability from the NMCs of the area is less than 60% for SYNOP, 30 % for TEMP and 20% for CLIMAT because of the use of non appropriate means for national stations data collection and GTS links of the plan not implemented or in interruption for operation. Concerning maritime meteorological stations, they can be considered as not available in term of implementation.

Link Dakar/Toulouse:

AS from July 2010, the link Toulouse/Dakar implemented via satellite (VSAT) has been upgraded with the replacement of the X25 protocol by FTP and the implementation of an Internet link between Toulouse and Dakar for back up. As from that date the capacity of the link has been improved to exchange great volumes of data and products in alphanumeric, graphical and binary codes. RTH Dakar can receive all kind of data and

products from the MTN for distribution to all centers in the western part of the region which observational data are now quickly distributed worldly. More than 30% of bulletins received from Toulouse are in binary codes (BUFR, GRIB). Many oceanographic data (from sea level stations, i.e. from sea level radars installed) in alphanumeric codes (Bathy/Tesac) are received at RTH Dakar

Link Dakar/Niamey:

The two (2) RTHs of the sub region are linked by satellite (VSAT system) for exchange to associated NMCs of data and products in alphanumeric codes collected from the MTN centers. But a very limited volume of data and products in graphical and binary codes can be exchanged because of the protocol used (V24 which replaced X25 very obsolete) as from June 2010. Migration from V24 to TCP/IP is strongly recommended, to have the capacity to handle all required binary code data (BUFR, GRIB, etc.) bulletins for RTH Niamey associated NMCs operation.

95 % of Niger synoptic (SYNOP, PILOT and TEMP) reports are received, 80 % of CLIMAT reports but 0% of maritime observation reports.

NMCs in RTH Niamey area of responsibility

. **NMC Cotonou (Benin):** Very limited capacity to handle binary coded data and product (BUFR, GRIB, etc.) because of the use of protocol X25 which is obsolete and is a big source of lost of alphanumeric bulletins. It is strongly recommended to replace X25 by TCP/IP. 90 % of Benin synoptic (SYNOP and PILOT) with 0% of TEMP) reports are received, 60 % of CLIMAT reports but 0% of maritime observation report.

. **NMC Lome:** Very limited capacity to handle binary coded data and product (BUFR, GRIB, etc) because of the use of protocol X25 which is obsolete and is a big source of lost of alphanumeric bulletins. It is strongly recommended to replace X25 by TCP/IP. 90 % of Togo synoptic (SYNOP and PILOT) reports are received, 60 % of CLIMAT reports but 0% of maritime observation report. There is no local link in Cotonou connecting the national hydrological meteorological Service in town distant of 2 km from the NMC to the airport at ASECNA technical headquarter.

. **NMC Lagos**: The GTS channel is not in operation because of failure at Lagos side. AFTN is used to transmit Nigeria observational data in alphanumeric bulletins; also there is no GTS point to point transmission from Niamey to Lagos. It is strongly recommended to implement a GTS link using TCP/IP with associated RTHs (Niamey and Dakar). Only 40 % of Nigeria synoptic (SYNOP) reports are received, 0 % of CLIMAT reports, TEMP reports and maritime observation reports. There is no local connection between Nigeria meteorological agency in town and the NMC distant of 5 km from the airport.

. **NMC Accra:** Very limited capacity to handle binary coded data and product (BUFR, GRIB, etc) because of the use of protocol X25 which is obsolete and is a big source of lost of alphanumeric bulletins. It is strongly recommended to replace X25 by TCP/IP. 70 % of Ghana synoptic (SYNOP) reports are received, 30 % of CLIMAT reports and 0 % of maritime observation reports.

. **NMC Ouagadougou:** Very limited capacity to handle binary coded data and product (BUFR, GRIB, etc) because of the use of protocol X25 which is obsolete and is a

big source of lost of alphanumeric bulletins. It is strongly recommended to replace X25 by TCP/IP. 90 % of Burkina Faso synoptic (SYNOP, PILOT and TEMP) reports are received, 90 % of CLIMAT reports and 0% of maritime observation. There is no local link in Ouagadougou connecting the national hydrological meteorological Service distant of 5km from the NMC to the airport at ASECNA technical headquarter.

RTH Dakar links with associated NMCs:

. NMC Banjul: Satellite circuit (VAST system) with the GTS channel implemented in March 2010. Very limited capacity to handle binary coded data and product (BUFR, GRIB, etc) because of no automation of NMC Banjul, the use of protocol X25 which is obsolete and is a big source of lost of alphanumeric bulletins. It is strongly recommended to replace X25 by TCP/IP. 20 % of Gambia synoptic (SYNOP) reports are received, 0 % of CLIMAT reports and 0% of maritime observation report. There is no local link in Banjul connecting the national hydrological meteorological Service (DWR) in town distant of 5km from the NMC to the airport at ASECNA technical headquarter.

. NMC Sal: Satellite circuit (VSAT system) but only the channel AFTN is implemented because NMC Sal is not automated for GTS channel implementation. Through the AFTN, 75% of Mauritania Verde synoptic reports (SYNOP and TEMP) are available, 20% of CLIMAT reports and 0% of maritime reports transmitted.

. NMC Nouakchott: Very limited capacity to handle binary coded data and product (BUFR, GRIB, etc.) because of the use of protocol X25 which is obsolete and is a big source of lost of alphanumeric bulletins. It is strongly recommended to replace X25 by TCP/IP. 90 % of Benin synoptic (SYNOP, PILOT and TEMP) reports are received, 60 % of CLIMAT reports but no maritime observation. The reports of Nouakchott port tide gauge are received into GTS from the GLOSS network. There is no local link in Nouakchott connecting the national hydrological meteorological Service (ONM) in town distant of 2 km from the NMC to the airport at ASECNA technical headquarter.

. NMC Abidjan: Very limited capacity to handle binary coded data and product (BUFR, GRIB, etc) because of the use of protocol X25 which is obsolete and is a big source many alphanumeric bulletins lost. It is strongly recommended to replace X25 by TCP/IP. There is no local link in Abidjan connecting the national hydrological meteorological Service to the airport distant of 500 meters from the NMC to the airport at ASECNA technical headquarter.

. NMC Bamako: Very limited capacity to handle binary coded data and product (BUFR, GRIB, etc) because of the use of protocol X25 which is obsolete and is a big source of lost of alphanumeric bulletins. It is strongly recommended to replace X25 by TCP/IP. There is no local link in Bamako connecting the national hydrological meteorological Service in town distant of 5 km from the NMC to the airport at ASECNA technical headquarter.

. NMC Conakry: The GTS channel of the satellite link (VSAT system) is not in operation as from 2007 due to equipment failure at NMC Conakry. Guinea synoptic data bulletins are transmitted to RTH Dakar using an X25 AFTN channel. There is no GTS transmission from RTH Dakar to NMC Conakry. Through the AFTN, 30% of Guinea synoptic reports (SYNOP) are available, 0% of CLIMAT reports and 0% of maritime

reports received. It is strongly recommended to reestablish the GTS link using TCP/IP. There is no local link in Conakry connecting the national hydrological meteorological Service in town distant of 1.5 km from the NMC to the airport at ANA (Agence nationale de l'aviation) technical headquarter.

. NMC Bissau: Very limited capacity to handle binary coded data and product (BUFR, GRIB, etc) because of the use of protocol X25 which is obsolete and is a big source of alphanumeric bulletins lost. It is strongly recommended to replace X25 by TCP/IP. 50% of Guinea Bissau synoptic reports (SYNOP) are available, 0% of CLIMAT reports and 0% of maritime reports received. It is strongly recommended to replace X25 by TCP/IP. There is no local link in Bissau from the national meteorological service in town far from 3 km from the NMC to the airport at ASECNA technical headquarter.

. NMC Freetown: Satellite circuit (VSAT system) with only the channel AFTN is implemented via Conakry because NMC Freetown is not automated for GTS channel implementation. Through the AFTN, 40% of Sierra Leone synoptic reports (SYNOP) are available, 0% of CLIMAT reports and 0% of maritime reports received.

. NMC Monrovia: Satellite circuit (VSAT system) with only the channel AFTN is implemented via Conakry because NMC Monrovia is not automated for GTS channel implementation. Through the AFTN, 40% of Liberia synoptic reports (SYNOP) are available, 0% of CLIMAT reports and 0% of maritime reports received.

1.3 Satellite based systems

The Meteosat Second Generation (MSG, the ICAO Satellite Distribution System 2nd Generation (SADIS 2G) and/or the Meteo France Satellite distribution system for Africa (RETIM-Africa) receiving stations have been installed already in all the western African meteorological centers, in the framework of the PUMA (Preparation of the use of Meteosat in Africa) project and/or in the ASECNA specific project for five countries. The status on implementation and operation in the western Africa countries is the following:

Senegal:

. One MSG receiving station in the ANAMS operational centre (RSMC in Dakar) in the framework of the PUMA project, another receiving station provided and installed by ASECNA in 2007 is installed in its operational centre (NMC, RTH Dakar);

. One SADIS 2G receiving station is in operation in the ASECNA centre (NMC, RTH Dakar

. One RETIM-Africa receiving station in ANAMS operational centre. The telecom technology for RETIM-Africa uses the satellite-based Digital Video Broadcast (DVD-S) technology, which was designed for digital TV broadcast, with low cost receiving. DVB, as a digital high capacity transmission system, can transmit data files and supports standard procedures (IP, FTP) that are recommended for the GTS.

.Technical staffs (system engineering) and operational staffs (forecasting) training have been done, but need to be improved.

Niger:
.Three (3) MSG stations: 2 at the DMN and at ACMAD in the framework o the PUMA project, and 1 station bought by ASECNA in 2007 installed to the NMC to the airport;
. One SADIS2G receiving station is in operation in the NMC;
. Technical staffs (system engineering) and operational staffs (forecasting) training have been done, but need to be improved by capacity building programmes.

Benin:
.One MSG station in the unique DMN/ASECNA centre in the framework of the PUMA project; the system is in operation with some maintenance problems;
.One SADIS 2G receiving station is in operation in the NMC;
.Technical staffs (system engineering) and operational staffs (forecasting) training have been done, but need to be improved by capacity building programmes.

Togo:
.One MSG station in the DMN/ASECNA centre in the framework of the PUMA project;
.One SADIS 2G receiving station is in operation in the NMC; the system is in operation with some maintenance problems;
.Technical staffs (system engineering) and operational staffs (forecasting) training have been done, but need to be improved by capacity building programmes.

Burkina Faso:

.One MSG station at the DMN in the framework o the PUMA project of responsibility, and a second station bought by ASECNA in 2007 installed to the NMC;
. One SADIS2G receiving station is in operation in the NMC;
. Technical staffs (system engineering) and operational staffs (forecasting) training have been done, but need to be improved by capacity building programmes.

Ghana:
.One MSG station at the DMN in the framework of the PUMA project; the system is in operation with some maintenance problems;
.One SADIS 2G receiving station is in operation at the NMC;
.Technical staffs (system engineering) and operational staffs (forecasting) training have been done, but need to be improved by capacity building programmes.

Côte d'Ivoire:
.One MSG station in the National Agency of Meteorology in framework of PUMA project by the ASECNA specific project in 2007 installed at the NMC;
. One SADIS2G receiving station is in operation in the NMC;
. Technical staffs (system engineering) and operational staffs (forecasting) training have been done, but need to be improved by capacity building programmes.

Mauritania:
.One MSG station in the ONM operational centre in the framework o the PUMA project of responsibility, and a second station bought by ASECNA in 2007 installed to the NMC;
. One SADIS2G receiving station is in operation in the NMC;
. Technical staffs (system engineering) and operational staffs (forecasting) training have been done, but need to be improved by capacity building programmes.

Cape Verde:
. One MSG station installed to the NMC (the INMG operational centre in the Sal Airport Authority Agency) in the framework of the PUMA project of responsibility.
. Technical staffs (system engineering) and operational staffs (forecasting) training have been done, but need to be improved.

Gambia:
. One MSG station installed to the NMC at Yundum Airport in the framework of the PUMA project.
. One SADIS 2G receiving station is in operation to the NMC;
. Technical staffs (system engineering) and operational staffs (forecasting) training have been done, but need to be improved.

Sierra Leone:
.One MSG station at the NMHS (NMC) in the framework of the PUMA project; the system is in operation with some maintenance problems;
.One SADIS 2G receiving station is in operation at NMC freetown;
.Technical staffs (system engineering) and operational staffs (forecasting) training have been done, but need to be improved by capacity building programmes.

Liberia:
.One MSG station at the NMHS (NMC) in the framework of the PUMA project; the system is in operation with some maintenance problems;
.One SADIS 2G receiving station is in operation at NMC Monrovia;
.Technical staffs (system engineering) and operational staffs (forecasting) training have been done, but need to be improved by capacity building programmes.

Guinea:
.One MSG station at the NMC in the framework of the PUMA project; the system is not in operation because of some problems;
.One SADIS 2G receiving station is not also in operation at NMC Conakry.
.Technical staffs (system engineering) and operational staffs (forecasting) training have been done, but need to be improved by capacity building programmes. There also technical staff availability lacks.

Guinea Bissau:
.One MSG stations at the NMC in ASECNA technical headquarter at the airport in the framework of the PUMA project; the system is in operation with some maintenance problems;
.One SADIS 2G receiving station is in operation at the NMC;
.Technical staffs (system engineering) and operational staffs (forecasting) training have been done, but need to be improved by capacity building programmes.

Nigeria:
.Two MSG stations at NMC Lagos to the airport and at Nigeria Meteorological agency headquarter in town, in the framework of the PUMA project; the system is in operation with some maintenance problems;
.One SADIS 2G receiving station is in operation in the NMC to the Airport;
.Technical staffs (system engineering) and operational staffs (forecasting) training have been done, but need to be improved by capacity building programmes.

1.4. Use of Internet services

All the western Africa meteorological services have Internet access, but not developed web server and/or VPN services, etc. The situation is as following:

Senegal:
. Leased line / 512 K, ADSL 2 Mbytes at ANAMS (LAN scurried by antivirus MC AFEE, anti Spam MC AFEE and Firewall);
. E-mail: at ANAMS (NMS, RSMC) and at ASECNA (NMC, RSMC, RTH).
. Web server: at ANAMS (NMS, RSMC);
. Web site: at ASECNA (RTH) with address http://www.asecnarep.com
. FTP: used at RTH, as back up for the GTS link Dakar-Toulouse
. VPN: in experimentation at ANAMS for national synoptic data collection
. Intranet at ASECNA (NMC, RSMC and RTH with ASECNA Headquarter in Dakar).

Niger:
. E-mail: at DMN (NMHS) and at ASECNA (NMC and RTH).
. Web site: at DMN (NMHS) in town in Niamey;
. Intranet at ASECNA (NMC and RTH connected with ASECNA Headquarter in Dakar (Senegal)
. VPN: NO

Benin:
E-mail: at the NMHS and at the NMC in ASECNA technical headquarter.
. Website: NO
. VPN: NO
. Intranet at ASECNA to the airport (NMC connected with ASECNA Headquarter in Dakar).

Togo:
E-mail: at DNM in town and at the NMC at ASECNA in ASECNA technical headquarter to the Airport.
. Web site: NO
. Intranet at the NMC at ASECNA technical headquarter (NMC with ASECNA Headquarter in Dakar)

Burkina Faso:
.Email: at DNM in town and at the NMC at ASECNA technical headquarter to the Airport
. ADSL: fast connection at DMN
. Web site: Available at DMN
. Intranet at the NMC (NMC with ASECNA Headquarter in Dakar) and at DMN.
VPN: No

Ghana;
E-mail: at Ghana national meteorological hydrological Service in town at Accra and at the NMC to the airport.
. ADSL: fast connection at Ghana meteorological agency
. Web site: at Ghana meteorological agency

. Intranet at Ghana meteorological agency
VPN: NO

Nigeria:
E-mail: at Nigeria meteorological agency in town at Lagos and at the NMC to the airport.
. ADSL: fast connection at Nigeria meteorological agency
. Web site: at Nigeria meteorological agency
. Intranet at Nigeria meteorological agency
VPN: NO

Mauritania:
. E-mail: at ONM in town in Nouakchott and at the NMC in ASECNA technical headquarter to the airport.
. ADSL: fast connection at ONM
. Web site: at ONM
. LAN: at ONM and ASECNA
. Intranet at ASECNA (NMC, with ASECNA Headquarter in Dakar)
. VPN: NO

Gambia:
. E-mail: at DWR (NMHS in Banjul: dwr@gamtel.gm) and at the NMC (at YUNDUM Airport, without an official address). At the NMC, an old PC with a low speed Internet connection
. Web server: at DWR
. Intranet: NO
. VPN: NO

Cape Verde:
. E-mail: at INMG (NMHS in Sal) and at NMC (Sal Airport NMC).
. ADSL 2048 KPS
. Web site: at INMG (temporarily out of operation)
. GPRS (mobile phone communication protocole)use
. VPN: NO

1.5 Centers automation:

1.5.1 RTHs Dakar and Niamey

The two RTHs are equipped, as from September 2007, of a same new type of message switching system (MSS) named MESSIR-COM, consisting of two powerful duplicated servers (one is operating as PILOT=hot standby and the other as standby) is in operation since September 2007 for GTS use exclusively. It is used for the automatic reception and retransmission of the GTS bulletins presented in alphanumeric, binary (BUFR, GRIB, etc.) and graphical forms. From Corobor Systems which is ISO 9001 certified, it uses a Windows operating system, in full compliance with WMO standards.

The system is fully compliant with the Manuals on the GTS:

. Ready for the Table Driven Code Forms (TDCF) and WIS migration: full support of migration from Traditional Alphanumeric Codes(TAC) to Table data code form (TDCF) including support for Cat1, Cat2, Cat3 codes and WMO – DR&C templates.

.Reception and switching of incoming TDCF (BUFR, CREX) messages

.Conversion from TDCF form to TAC form

.Conversion from TAC form to TDCF form

.Compilation of bulletins using TDCF form

.Support of IMTN protocols: VPN, MPLS, etc.

. File distribution (push/pull), client/server web access

. High availability / Hot stand-by: the MESSIR-COM exclusive software-driven hot stand-by configuration with automatic change-over guarantees a site-proven 100% availability.

. Unequalled power

.Proven switching power of 500 messages par second

.More than 2000 circuits can be connected

.TAC including SYNOP, TEMP, METAR, TAF, etc.

.TDCF

.Files in WMO format-Satellite and radar image

. Binary products such as GRIB, -DFAX, BURF

.Export data into various formats: text, image, XML

.WMO Monitoring

. Integrated Web Server

. All data and products received or generated locally can be automatically made available to internet or Intranet users via the MESSIR-NET module (for automatic reception and retransmission of internet dedicated meteorological bulletins/files).

. MESSIR-NET is automatically updated in real-time with fresh

MET data received via the MESSIR-COMM AMSS

- Internet users can view on line all this fresh data including text observation and forecasts, GRIB-coded NWP models, satellite
- and radar images, home-made charts, pilot briefing, etc.

. Great ease of use

. Remote administration from a PC connect to the LAN or from the Internet using standard web browser

. Powerful circuits and messages monitoring and statistics

. All data for the last 90 days immediately on screen

. Easy menu-driven set-up and administration

. On-line help

. Intranet: ANAMS (RSMC) and ASECNA (RTH)

. Connection ANAMS (RSMC) and ASECNA (RTH) by fiber optique

1.5.2 NMCs in RTHs Dakar and Niamey areas of responsibility

(a) NMC Abidjan:

The NMC is equipped of the same new type of MSS like RTHs Dakar and Niamey but, called MESSIR-COM, with a small capacity in term of hard disk and memory ram capacities. The systems are in compliance with the GTS requirements.

(b) **NMCs Bamako, Nouakchott, Cotonou, Lome and Ouagadougou**:

The current MSSs installed in 2000 are of the same type called AMS1500 from Sagem consisting of two identical UNIX software AMS1500 servers (one is operating as PILOT= hot standby and the other as standby) in operation for both the GTS and AFTN purposes; it is not in full compliance with the Manual on the GTS.

. AMS1500 can handle only alphanumerical messages and GTS bulletins;

. AMS1500 is not full compliant with the Manual on the GTS: handle only telegraphic and X25 protocols;

. Not ready for the Table Driven Code Form (TDCF) and WIS migration: no support of migration from TAC to TDCF including support for CAT1, CAT2, CAT3 codes and WMO DR & C templates;

.Web server at ONM (Mauritania) and DMN (Burkina Faso) but not at the meteorological services in Lome, Cotonou ;

.Intranet: NMC (ASECNA side) and ONM

. No point to point connection between ONM and ASECNA

NMC SAL:

The current MSS is a dedicated AFTN one. It consists of two identical UNIX software servers (one is operating as PILOT= hot standby and the other as standby) in operation since 2002 for the AFTN messages standards exchange purposes.
The NMC operated by the Sal Airport Agency Authority is connected to the MSS with a telegraphic terminal for alphanumerical message (operational meteorological data= METAR/SPECI, TAF, SIGMET, etc. and SYNOP and TEMP bulletins) transmission and reception.

NMC BANJUL:
NMC Banjul is automated as from march 2010 to exchange with RTH Dakar alphanumeric bulletins on the satellite (VSAT) GTS channel. One PC with GST software has been installed to receive and transmit only alphanumeric bulletins.

NMCs Conakry, Freetown and Monrovia

The 3 NMCs are not automated (not MSS).
NMC Conakry is using a PC with AFTN connection to transmit to RTH Dakar its SYNOP data bulletins and operational meteorological data (METAR, TAF, etc.) and to receive only operational meteorological data from Dakar, since the failure of its MESSIR-VISION system and GTS channel.
NMCs Freetown and Monrovia have no PC with GTS software for alphanumeric bulletins exchange; they use only AFTN terminals to exchange operational meteorological data and their national observational data on a non regular basis.

Note:

(i) In most of the western Africa member counties meteorological centers, in particular in ASECNA member countries, the NMC at ASECNA technical headquarter has no point to point connection with the NMHS headquarter or is not in operation like in Senegal.

(ii) The use of Internet (VPN, etc.) is not very made to implement link for exchange between RTHs, RTHs and NMCs and/or for the national data collection

(iii) The lack of coordination between RTHs, RTHs and NMCs in particular for the GTS plan implementation or links upgrade or resume during failure, constitute a big deficiency in the area.

(iv) The lack of sufficient operational and technical staffs well trained doesn't facilitate the operation, the coordination, the implementation and the maintenance.

(v) The use of AFTN is limiting the improvement of data exchange in the area, both for national collection and regional observational bulletins exchange from NMCs to associated RTHs.

2. National Meteorological Telecommunication Networks

2.1. Data exchange monitoring results

2.1.1 Any improvement has been noted for the availability in GTS centres, during several years, of observational data from the western (Africa) area; that situation has

been reconfirmed by the results of the annual global monitoring (AGM) of the operation of the WWW carried out from 1 to 15 October 2009 indicating that only 54 % of SYNOP reports, 25 % of TEMP reports, 20 % of PILOT report and 15% of CLIMAT messages are received. The same results indicated that no SYNOP or TEMP reports were received from more than 40 synoptic stations implemented included in the Regional Basic Synoptic Network (RBSN). Still near 50 % of the western region countries have significant deficiencies in the implementation, operation and maintenance of their NMTN facilities.

2.1.2 In general, some very serious gab persists in term of data collection at national level, as revealed by results of the last GTS monitoring activities (AGM 2009 and SMM of July 2010). The reasons for the telecommunication problems are as following:

. Total or partial lack of the equipment needed for the national data collection;
. Use of inefficient techniques;
. No automation of NMC;
. Ineffective connection or no connection between NMCs and the relevant RTH;
. Failure up to adhere strictly to the GTS operating procedures at NMCs

Information about means implemented and results for national data collection in the western Africa WMO member countries are the following:

Senegal:

. Public switched telephone network: 100 % data collected from the 12 synoptic stations;

. Radio HF (SSB transceiver/receiver): 0% data collected of the 10 stations equipped with because of antenna / power supply problems;

. Eumetcast Data collection / Data retransmission system (DCS): It can be noted that the Dakar Port tide gauge station (in operation) data are collected via the GLOSS programme and retransmitted into the GTS centers with the WMO heading SXXX33 EUMS; and available in the Tsunami Sea Level Station Monitoring Facility web site (http://www.vliz.be/vmdcdata/iode)and the HawaiiUniversitySeaLevelCentersitehttp://www.vliz.be/gauges/station.php?code=palm1)
.

. Radio HF (SSB numeric transmitter/receiver): Not implemented

. Communication satellite system: VSAT system is used for 100 % TEMP reports collected from the unique synoptic station equipped (Tambacounda);

. Internet services (VPN, E-mail, web site, etc.): 0 % of data collected from the 10 synoptic stations equipped with because of administrative problems to use the VPN system yet installed.

Note: The Dakar Port Authority is consulting measurements sometimes with a portable computer as the station equipment and every time they pass to collect the limnimetry measurements.

Mauritania:

. Mobile telephone network: 50 % of the 14 synoptic stations data collected;

. Radio HF (SSB transmitter/receiver): 0 % of the 8 stations equipped with SSB data collected because of Transceiver/antenna / power supply problems.

. Eumetcast Data collection / Data retransmission system (DCS): It can be noted that a tide gauge station installed in Nouakchott Port is in operation; data are collected via the GLOSS programme and retransmitted into the GTS, is also available in the Tsunami Sea Level Station Monitoring Facility web site (http://www.vliz.be/vmdcdata/iode). Data is available in the ONM web site and also in the GTS centers with the WMO heading SXXX33 EUMS. ONM has never requested the transmission of these data to NMC Nouakchott.
oceanographic observational data done by other Administrations in Cape

. Radio HF (SSB numeric transmitter/receiver): Not implemented
. Internet: (VPN, E-mail, web): e-mail not used for data collection;
. Communication satellite system: Not implemented;
. VSAT: 100 % of the three (3) synoptic stations data collected;

Cape Verde:

. Public switched telephone / Mobile telephone networks: 80 % data of the 3 synoptic stations collected;

. Eumetcast Data collection / Data retransmission system (DCS): It can be noted that a tide gauge station is installed and in operation in Palmeira and data collected through the GLOSS programme is also available in the GTS centers with the WMO heading SXXX33 EUMS. INMG has never requested the transmission of these data to NMC Sal. INMG was not able to give in time information about many oceanographic observational data done by other Administrations in Cape

. Radio HF (SSB numeric transmitter/receiver): Not implemented
. Internet: (VPN, E-mail, web): e-mail not used for data collection;
. Communication satellite system: Not implemented

Gambia:

. Public switched telephone/Mobile telephone network: 40 % data of the11 synoptic stations (equipped with) collected;

. Radio HF (SSB analogue transmitter/receiver): 10 % of data (Transceiver/antenna / power supply problems.
. Eumetcast Data collection / Data retransmission system (DCS): Not implemented
. Radio HF (SSB numeric transmitter/receiver): Not implemented
. Internet: (VPN, E-mail, web): e-mail not used for data collection;
. Communication satellite system: Not implemented

Note:- New AWS received but not yet installed
- No marine meteorology station installed.

Mali:

. Public switched telephone/Mobile telephone network: 60 % of data from the 8 synoptic stations (equipped with) collected;

. Radio HF (SSB analogue transmitter/receiver): 20 % of data from the 3 stations equipped collected because of Transceiver/antenna / power supply problems.

. Eumetcast Data collection / Data retransmission system (DCS):40 % of data from the 2 stations equipped (frequent interruptions in the system)
. Radio HF (SSB numeric transmitter/receiver): NO

. Internet: (VPN, E-mail, web): e-mail and web site used for hydrological data;
. Communication satellite systems: ARGOS system used for hydrological network reports but not retransmitted into the GTS.

Guinea Bissau:
. Public switched telephone/Mobile telephone network: 40 % of data from 2 of the 3 synoptic stations (stations opened from 7 to 19 UTC);

. Radio HF (SSB analogue transmitter/receiver): Not implemented

. Eumetcast Data collection / Data retransmission system (DCS): Not implemented
. Radio HF (SSB numeric transmitter/receiver): Not implemented
. Internet: (VPN, E-mail, web): e-mail used by DMN for CLIMAT message transmission to RTH Dakar;
. Communication satellite system: Not implemented

Côte d'Ivoire:
. Public switched telephone/Mobile telephone network: 40 % of data from 8 of the 13 synoptic stations;

. Radio HF (SSB analogue transmitter/receiver): 40% of data from 7of the 13 synoptic stations;

. Eumetcast Data collection / Data retransmission system (DCS): Not implemented

. Radio HF (SSB numeric transmitter/receiver): Not implemented
. Internet: (VPN, E-mail, web): Not used for national data collection;
. Communication satellite system: Not implemented

Sierra Leone:
. Public switched telephone/Mobile telephone network: 40 % of data from the 3 synoptic stations;

. Radio HF (SSB analogue transmitter/receiver): Not implemented;

. Eumetcast Data collection / Data retransmission system (DCS): Not implemented

. Radio HF (SSB numeric transmitter/receiver): Not implemented
. Internet: (VPN, E-mail, web): E-mail available but not used for national data collection;
. Communication satellite system: Not implemented

Liberia:
. Public switched telephone/Mobile telephone network: 40 % of data from the 1 synoptic station;

. Radio HF (SSB analogue transmitter/receiver): Not implemented;

. Eumetcast Data collection / Data retransmission system (DCS): Not implemented

. Radio HF (SSB numeric transmitter/receiver): Not implemented
. Internet: (VPN, E-mail, web): E-mail available but not used for national data collection;
. Communication satellite system: Not implemented

Guinea:

. Public switched telephone/Mobile telephone network: 30 % of data from the 14 synoptic stations;

. Radio HF (SSB analogue transmitter/receiver): Not implemented;

. Eumetcast Data collection / Data retransmission system (DCS): Not implemented

. Radio HF (SSB numeric transmitter/receiver): Not implemented

. Internet: (VPN, E-mail, web): E-mail available but not used for national data collection;

. Communication satellite system: Not implemented

Niger:

. Mobile telephone network: 70 % of data from the 14 synoptic stations;

. Radio HF (SSB analogue transmitter/receiver): 20% of data;

. Eumetcast Data collection / Data retransmission system (DCS): Not implemented

. Radio HF (SSB numeric transmitter/receiver): Not implemented

. Internet: (VPN, E-mail, web): E-mail available but not used for national data collection;

. Communication satellite system: ARGOS system used by Aghrymet Cente.

Burkina Faso:

. Public switched telephone/Mobile telephone network: 40 % of data from the 9 synoptic stations;

. Radio HF (SSB analogue transmitter/receiver): 60% of data;

. Eumetcast Data collection / Data retransmission system (DCS): implemented but in failure;

. Radio HF (SSB numeric transmitter/receiver): Not implemented

. Internet: (VPN, E-mail, web): E-mail available but not used for national data collection;

. Communication satellite system: ARGOS system used for hydrological data collection but not retransmitted into the GTS.

Benin:

. Public switched telephone/Mobile telephone network: 30 % of data from the 8 synoptic stations;

. Radio HF (SSB analogue transmitter/receiver): 70% of data;

. Eumetcast Data collection / Data retransmission system (DCS): implemented but in failure;

. Radio HF (SSB numeric transmitter/receiver): Not implemented

. Internet: (VPN, E-mail, web): E-mail available but not used for national data collection;

. Communication satellite system: Not implemented

Togo:

. Public switched telephone/Mobile telephone network: 30 % of data from the 6 synoptic stations;

. Radio HF (SSB analogue transmitter/receiver): 70% of data;

. Eumetcast Data collection / Data retransmission system (DCS): Not implemented

. Radio HF (SSB numeric transmitter/receiver): Not implemented
. Internet: (VPN, E-mail, web): E-mail available but not used for national data collection;
. Communication satellite system: Not implemented

Ghana:
. Public switched telephone/Mobile telephone network: 60 % of data from the 16 synoptic stations;

. Radio HF (SSB analogue transmitter/receiver): 20 % of stations collected by;

. Eumetcast Data collection / Data retransmission system (DCS): implemented but in failure;

. Radio HF (SSB numeric transmitter/receiver): Not implemented
. Internet: (VPN, E-mail, web): 10 % of station collected by e-mail;
. Communication satellite system: Not implemented

Nigeria:
. Public switched telephone/Mobile telephone network: 25 % of data from the 60 synoptic stations;

. Radio HF (SSB analogue transmitter/receiver): 20% of stations;

. Eumetcast Data collection / Data retransmission system (DCS): 10 % of stations

. Radio HF (SSB numeric transmitter/receiver): Not implemented
. Internet: (VPN, E-mail, web): 10 % of station by e-mail;;
. Communication satellite system: Not implemented.

3. Status of the Exchange of observational data and products

3.1 The World weather watch programme data and products exchange in the western Africa project WMO members countries is done by the following systems:

- MSG, SADIS 2G, RETIM-Africa, Internet Services, for Senegal, Nigeria, Mauritania and Cape Verde

- GTS point to point circuits, for Niger, Gambia, Mali, Burkina Faso, Benin, Togo, Côte d'Ivoire, Bissau, Ghana, Senegal and Mauritania (in alphanumerical format);

- GTS point to point links for Côte d'Ivoire, Niger and Senegal in alphanumerical, binary and graphical formats.

- MSG for all NMCs except in Conakry (failure);

- MSG and SADIS 2G for all NMCs except in Conakry, Liberia and Monrovia (failure)

3.2 The area countries meteorological observational data bulletins transmission into GTS (for global exchange to the WMC, WAFC, RSMCs, etc.) is done via:

-The MTN circuit Dakar to Toulouse (NMC Madrid receives these bulletins from Toulouse via the RMDCN of Region 6= Europe);

-The GTS regional circuits from NMC in RTH Dakar area and RTH Niamey area, except from NMCs Sal, Freetown, Liberia, Nigeria and Conakry using AFTN channels procedures.

- An automatic transfer system of alphanumerical messages from AFTN to GTS is in operation in the RTHs Dakar and Niamey MSS.

3.3 There is no exchange between the NMC and the NMHS because of no existing of point to point link in most of countries, even between the RTH Dakar (at ASECNA headquarter) and RSMC Dakar 'at ANAMS headquarter), and no marine meteorology observing network in operation by the western Africa countries and the most of their products served to users have to be validated.

4. Use of WMO Information System.

4.1 Most of the western Africa WMO members do not apply correctly the procedure to update their parts of the WMO Volumes A and C and to provide the catalogue of bulletins or the routing catalogue of their centers (NMC or RTH).

4.2 That situation has a negative impact on the data bulletins exchange (bulletins not correctly compiled, etc.) and the AGM, SMM results not correctly analyzed even by the WMO Secretariat and responsible centers (RTHs, etc.).

5. Migration to Table Driven Code Form (TDCF)

No activity has been done in the western Africa countries as from the ASECNA and WMO joined seminar in 2007 in LOME (Togo), ASECNA has designated a Working Group on migration to TDCF and a SYNOP template proposed.

6. Conclusion and Recommendation

6.1 There is no appropriate exchange of observational data bulletins and products between RTH Dakar and NMCs Nouakchott, Sal and Banjul, not also between RSMC Dakar and the associated NMHS, ONM in Mauritania, INMG in Cape Verde and DWR in Gambia. The national telecommunication network is not adequate in more than two countries where many systems are in use without good results particularly during from 0000 to 0600 UTC observing time. Concerning the maritime meteorology products in particular, there is no exchange between NMHS in the area.

6.2 The implementation of new means is strongly recommended to i*mprove data and products gathering and exchange, both at national and international levels.*

7. Example of a report of Dakar tide gauge

An example of reports from Dakar tide gauge (address indicator=360916B8) collected by GLOSS network and retransmitted into the GTS.

SXXX33 EUMS 220831 RRX
360916B8
:PRS 1 /1 1873 1856 1852 1850 1849 1843 1829 1817 1817 1846 1849 1804 1802 1797 1782 1774 1762 1756 1766 1764 1751 1755 1742 1765 1762 1729 1703 1709 1705 1695 :RAD 2 /3 3282 3265 3245 3224 3204 3186 3171 3156 3140 3127 3113 3095 3071 3045 3030 3016 3000 2985 2969 2955 :SW1 32 /60 60 :SW2 2 /60 60 :BAT 14 /15 12.9 :NAME 360916B8