Report of GTS Expert Team missions to African countries

L Zerbib (RSMC/Reunion) & H Karanja (KMD)

09/21/2005 to 10/05/2005

REPORT OF THE WMO EXPERT TEAM MISSION FOR ON-SITE ASSESSMENT FOR UPGRADING/STRENGTHENING NATIONAL GTS COMPONENTS OF KENYA NMC

A. TECHNICAL SURVEY OF THE CURRENT IMPLEMENTATION AND OPERATION STATUS OF THE NATIONAL GTS COMPONENTS INCLUDING:

1. Message Switching System and/or Workstation:

i. Description of the System :

Hardware :
The system is composed of 5 computers :

- 2 computers based on Motorola MVME are in charged of the switching of the messages One is being operational and the other standby at any given time.
Each computer has 64 Mbytes RAM and 2 X 1.2 Gbytes hard disks.
Each computer is able to manage eight X.25 (level 3) lines and 36 asynchronous lines. It can handle up to 64 Kbps and is capable of processing both alphanumeric and binary data. It can receive, store and re-transmit Coded Digital Facsimile (CDF) messages.

- 3 SUN computers are dedicated to Message Switch supervisory tasks.

Software :
UNIX System V
MSS Application programs (mainly C-language)
Oracle 6 RDMS (to manage configuration tables)
SunOS 4.1.2 and X-Windows for supervision workstations

Communications Protocols:
TCP/IP (ftp, telnet)
X25 Level 3 (PVCs and SVCs)
Asynchronous

Chart Codes Supported:
T4
CIFAX
BITMAP

ii***. Current Status of the System:***
The system is very old since it was put in operation **in July 1993.**

The Motorola Computers

For a long time now, the AMSS **has only one operational chain**. The standby chain developed software problems and efforts to reload the oracle software from the streamer tapes were not successful. At times when the operational chains have some problems, the processor and memory boards have been taken from the standby chain. Since there are no spare memory and processor boards, it is difficult to repair the standby chain.

Uninterruptible power supply (UPS)

At present, only one UPS chain is in use. The other UPS developed problems and efforts to repair it have not yet been successful.

The sun workstations

Out of the three workstations for the supervisory positions, **only one is now operational**. The other two have developed boot failure due to memory and hard disk problems. This makes work difficult for the operators. Due to the age of the workstations, the CD drives and tape streamer are not operational and therefore impossible to reload the SunOS 4.1.2 and X-Windows software.

2. **GTS links**

i. Technical specifications:

NAME OF CIRCUIT	*CIRCUIT TYPE*	*SPEED*	*STATUS*	*MONTHLY ACCESS FEE US $*
MAIN TRUNK LINKS				
OFFENBACH	*DIGITAL LEASED LINE TCP/IP*	*64 KBPS*	*OPERATIONAL*	*7635*
TOULOUSE	*DIGITAL LEASED LINE TCP/IP*	*64 KBPS*	*OPERATIONAL*	*7515*
REGIONAL LINKS				
ENTEBBE	*VSAT TCP/IP*	*64 KBPS*	*OPERATIONAL*	*642*
DAR-ES-SALAAM	*ANALOGUE LEASED LINE TCP/IP*	*9.6 KBPS*	*OPERATIONAl*	*690*
ADDIS ABABA	*ANALOGUE LEASED LINE TCP/IP*	*9.6 KBPS*	*NOT IN SERVICE*	*2869*
CAIRO	*ANALOGUE LEASED LINE X25*	*9.6 KBPS*	*OPERATIONAL*	*1328*
PRETORIA	*ANALOGUE LEASED LINE TCP/IP*	*9.6 KBPS*	*CCT IS GOOD BUT THERE IS A PROBLEM OF PROTOCOL*	*1328*

ii. Contract with telecom carriers

- Contract with ASNK (Alldean Satellite Networks Kenya ltd) concerning VSAT Network.
- No contract with the National Telecommunication services exists (no contract of service level agreement)

iii. **Recurrent costs**:

The recurrent costs of the links are presented in the table above. Reading the figures, we can easily notice the extreme cheapness of the VSAT links in comparison of the leased lines

3. GTS related satellite-based components

- The use of the Meteorological Data Dissemination (MDD) system has been replaced by the Eumetcast dissemination system (MSG).
- A VSAT network has been installed in order to improve the national collection of meteorological data. As shown on the diagram in annex 1, 4 stations are in charge of the collection of the regional data by radio-telephone and transmit the information to KMD by VSAT.

4. GTS operation

i. Number of operators and their working system

- Five operators per shift for five shifts totalling to 25 operators.
- One supervisor for every shift for five shits totalling 5 supervisors
- One overall in charge of communications operations.

ii. Technical skill

Structure of the telecommunications division with the functions and skills of the agents is shown in Annex 2

iii. Tools for link watch and logging

All of the tools are included in the TRANSMET AMSS software:
The software offers:

- Real time and non real time data reception monitoring.
- Scanning of weather charts
- Real time links supervision

5. National communication interfaces with national entities:

The table on the next page shows the details of the national communication network.

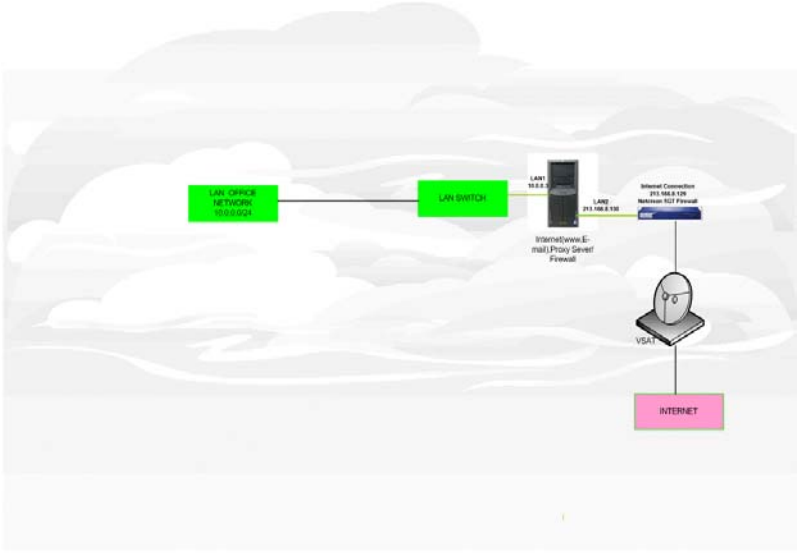
NATIONAL TELECOMMUNICATION NETWORK	*CIRCUIT TYPE*	*SPEE*	*STATUS*	***MONTHLY ACCESS FEE***
KISUMU (DATA COLLECTION PLATFORM)	*VSAT TCP/IP*	*64KBPS*	*OPERATIONAL*	*642*
MOMBASA (DATA COLLECTION PLATFORM)	*VSAT TCP/IP*	*64KBPS*	*OPERATIONAL*	*642*
JOMO KENYATTA INTERNATIONAL AIRPORT (JKIA) (DATA COLLECTION PLATFORM)	*VSAT TCP/IP*	*64KBPS*	*OPERATIONAL*	*642*
ELDORET INTERNATIONAL AIRPORT	*VSAT TCP/IP*	*64KBPS*	*OPERATIONAL*	*642*
GARISSA (DATA COLLECTION PLATFORM)	*VSAT TCP/IP*	*64KBPS*	*OPERATIONAL*	*642*
WILSON AIRPORT	*VSAT TCP/IP*	*64KBPS*	*OPERATIONAL*	*642*
NANYUKI	*LEASED TELEGRAPHIC LINE*	*75 bauds*	*OPERATIONAL*	*338*
MOI AIR BASE	*LEASED TELEGRAPHIC LINE*	*75 bauds*	*OPERATIONAL*	*338*

6. Internet availability

i. Connection capability

The use of the leased line with Toulouse for Internet access was discontinued to provide an efficient GTS link.

A solution based on VSAT system shown on the diagram exposed bellow now offers a 512 kbits/s internet access with guaranteed band width.



ii. Firewall

A firewall filters all the Internet access. Output access is controlled by a Proxy Wingate. Input access is restricted to the following ports 80 (Web Server) , 8383 (Webmail) ,53 (DNS) .
For the mail Symantec Imail antivirus is in charge of the security.

iii. IP address allocation

Two public IP address has been assigned by the service provider.

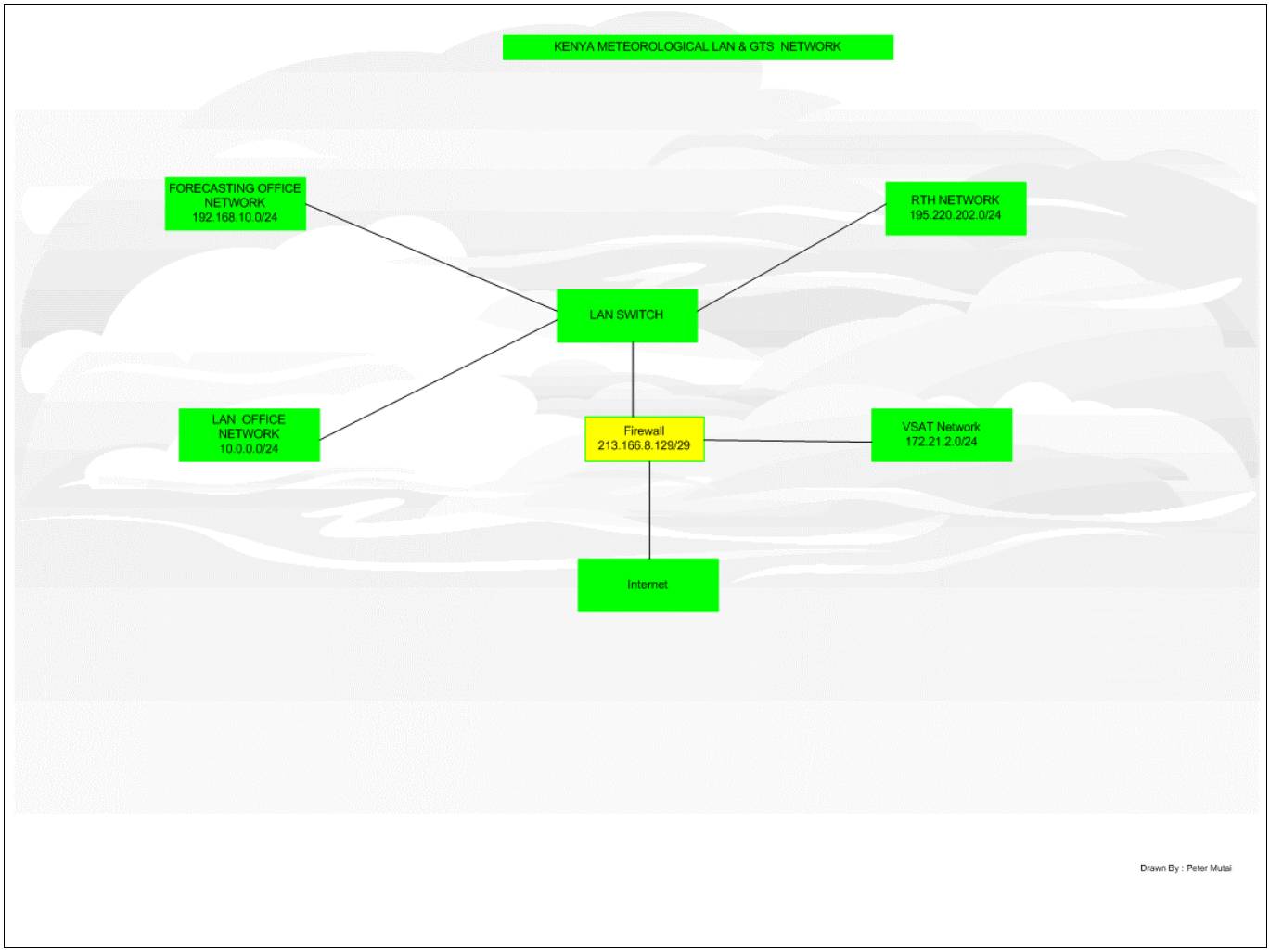
iv. Segregation from the GTS

The present version of the AMSS is too old to use Internet access for sending or receiving messages.

7. In-house network

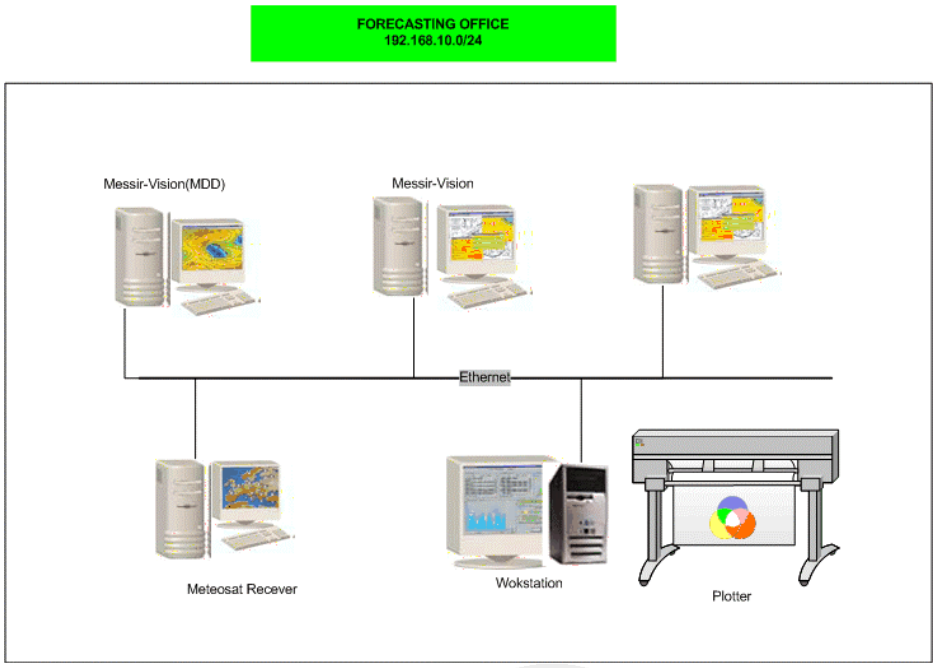
i. Configuration with the IP addressing scheme:

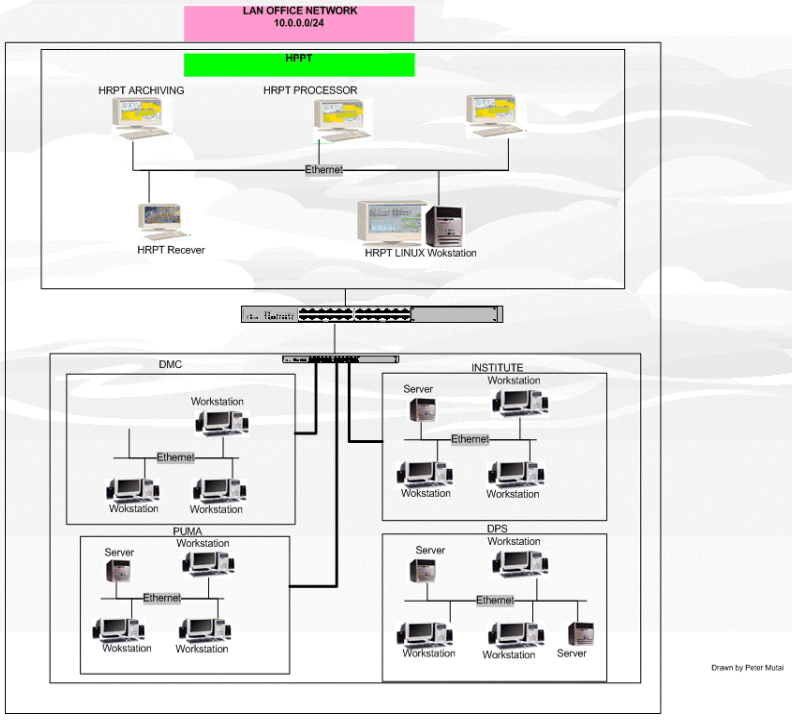
The following diagram shows the architecture and the IP scheme of KMD LAN.



ii. Security policy

As shown on the diagram above the in-house network is segmented in 4 local independent networks i.e. RTH , Forecasting , VSAT and office Network .





8. GTS and ICT maintenance :

i. Number of technicians and/or outsourced support (e.g. contracts)

The maintenance in the RTH and ICT is done by Two (2) KMD Engineers and 14 Technicians. No technical assistance through contracts is done. The diagram on Annex 3 shows the maintenance personnel structure.

ii. Technical skill

The Diagram on Annex 4 shows the technical skills of the maintenance personnel.

9. CURRENT RELATION BETWEEN GTS-MSS AND TSUNAMI WARNING SYSTEM

In accordance with TWI routing tables the messages of headers WEIO23 PHEB and WEIO40 RJTD are received from Offenbach and Toulouse. However, on checking of the routing tables of the AMSS, it was revealed that the header WEIO40 RJTD is not relayed to Dar-es -Salaam and Pretoria as planned. It was also noticed that these messages are not relayed to the coastal stations like Mombassa.

10. EVALUATION OF RESULTS OF TWI DISTRIBUTION TEST ON 7, 8 APRIL 2005

The warnings messages were received by fax and by email but not through GTS due to a breakdown of the AMSS at that time. The messages were not been received from Toulouse and Offenbach. Consequently they were not sent to Dar-es-Salaam, Pretoria, etc....

11. INFRASTRUCTURE

i. Electrical supply condition

For continuous operation of the AMSS and its peripherals, a two chain UPS of 15KVA is each used to supply power in case of failure of the power supply from the mains. An automatic startup generator is used to charge up the batteries and also to supply other areas not on UPS.

ii. Telephone network, cellular phone network and data network providers

Telephone network is provided by Telkom Kenya as the only provider. There are however two main service providers of cellular phone networks:

1. Celtel
2. Safaricom

iii. ISPs;

Many ISPs exist in Kenya with always the same problem: The cost very high but the band width is not dedicated but shared. In most cases, one has a lower bandwidth than subscribed.

B. IDENTIFICATION OF AND SPECIFICATIONS FOR HIGHEST PRIORITY UPGRADES NEEDED FOR URGENT STRENGTHENING OF NATIONAL GTS COMPONENTS TO MEET IO-TWS INTERIM PHASE REQUIREMENTS, I.E. RECEPTION AND USE OF IO-TSUNAMI WATCH MESSAGES AND RELATED-INFORMATION;

Highest priority needs for the AMSS

- Correction of the routing tables on the AMSS for the warning messages as planned.
- To finalize the replacement of the old AMSS at the RTH planned for a long time. The status of this system is so bad that its replacement has now become an absolute necessity. It has been operating without any standby which could cause of a lot of transmission problems in the region.

C. CONSOLIDATION OF THE NATIONAL DATA EXCHANGE REQUIREMENTS RELATED TO MULTI-HAZARD EARLY WARNING, ESPECIALLY IO-TWS, INCLUDING:

12. Reception and handling of IO-TWS warnings and information

There are requirements to improve the interface for production and the method of dissemination of the Tsunami warning information to the NOC as explained by the Tsunami Focal Point division in KMD. This message is at present redacted and sent manually to this organisation.

13. Reception and handling of related data, as required (e.g. tidal gauges data, seismic data)

Kenya operates 2 tidal gauges stations; one in Mombasa (operating since 1986), and a second station in Lamu (operating since 1996). Both are principal stations in the GLOSS network. The Mombasa station records data on a diskette that needs to be collected monthly. The Lamu station transmits its data by satellite directly to the University of Hawaii. The sampling frequency is 1 minute and the transmission frequency is 15 minutes.

14. National data collection and retransmission

As shown on the diagram in Annex 2 , a VSAT network has been installed in order to improve the national collection of meteorological data . As shown on the diagram in annex 1 , 4 stations are in charge of the collection of the regional data by radio-telephone and transmit the information to KMD headquarters by VSAT.

Only two stations JK Airport and Mombassa has at present the possibility to process and visualize the information sent by KMD. They use for this purpose the MESSIR vision systems installed previously with others projects (PUMA, Aero)

D. Development of the technical requirements, technical specifications and cost estimates for the full project for upgrading/ strengthening GTS components of NMS

15. RTH Message Switching System and Workstations

Duplicated MSS (PC based) with automatic changeover. The system should have the following specifications:

1 TCP/IP ftp communication software to RTH Nairobi.

ii. Forwarding and receiving messages in the form of email and fax

iii. Forwarding messages to at least five terminals through leased line, dial-up, FAX and SMS.

iv. Forwarding messages to two local printers.

v. Message switching software, including

- Automatic relay of messages to connected circuits/terminals/printers selectively according to a routing table which can be easily updated,
- Manual relay of messages to connected circuits/terminals/printers selectively,
- Compilation of observational reports according to fixed lists of stations at scheduled times,
- Input of a message on key board and sending it to selected circuits.

vi. Audio/visual alarm on reception of any messages identified by their abbreviated headings.

vii. Data storage should be available for at least one week.

viii. UPS for thirty minutes at least in case of power failure.

ix. A router with two WAN interfaces.

Estimated COST FOR PURCHASE AND INSTALLATION OF MSS FOR THE RTH INCLUDING TRAINING IS AROUND USD 220000

16. NMC GTS links

The analogue leased lines for Pretoria and Dar es Salaam should be replaced by VSAT links. This would reduce the KMD recurrent costs for the lines by about 800 $US per month with a substantial increase of the speed from 9.6 kbits/s to 64 kbits/s.

17. NMC GTS related satellite-based components

Installation of a system of visualization of the data received by VSAT in Garissa, Eldoret, Kisumu and Malindi. It is also recommended that a VSAT terminal be installed at Lamu. This reflects to an estimated recurrent cost of $US 640 per month. The visualisation system presently installed at Mombasa be relocated to Malindi once the proposed installation of transmet RETIM is realized in Mombasa.

18. **Possible national data-communication components (e.g. provincial centres)**

Moi international airport Mombasa as one of the data collection centres receives data from Voi, Lamu, Makindu via radio telephone. Data also received from Mombasa port station, Msabaha, Matuga and Mombasa through telephone.

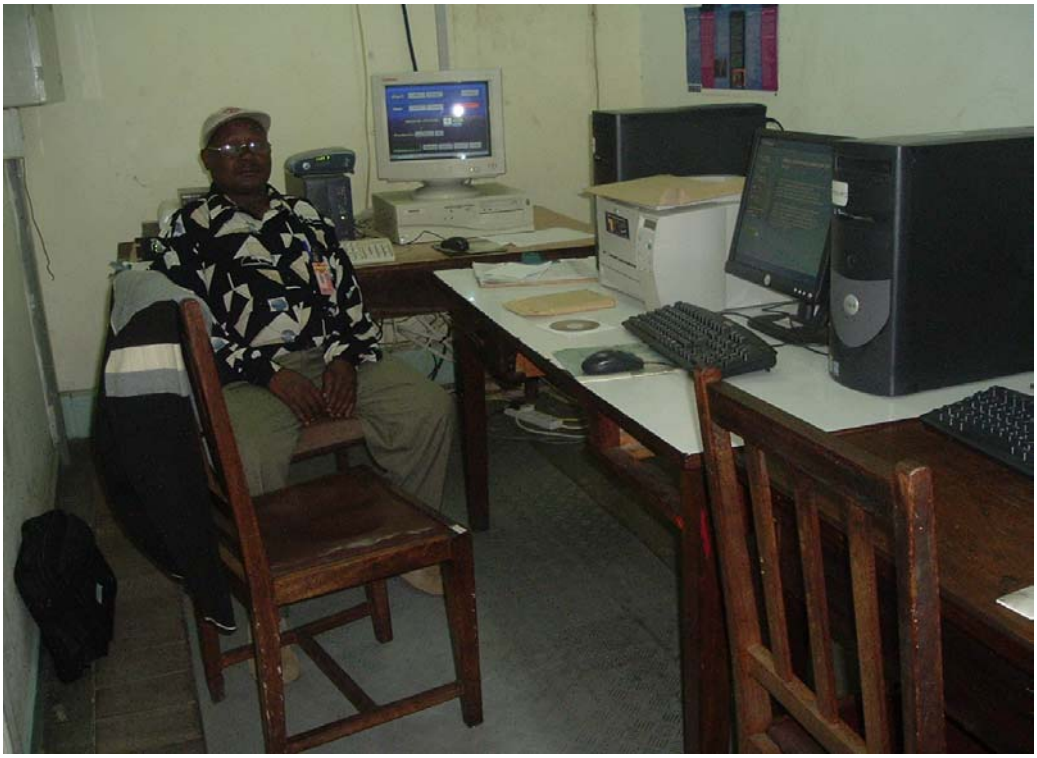
Due to the breakdown of nearly all the radio telephone systems in coastal region, the collection of the data is done by public telephone. It is strongly recommended that the radio telephones be repaired urgently to reduce the recurrent costs of the national data collection.

The centre relays this data to the RTH via VSAT link. The centre has problems of transmission of data to the RTH at times. This problem will be investigated and a solution realised.

There is a SADIS and a MSG station. These stations are on an independent network. A telegraphic link exists between the meteorological office and the Aviation office for AFTN data. The following recommendations are made for the Mombasa Meteorological office.

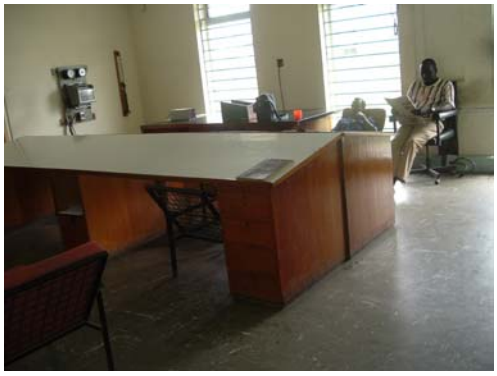
- An AMSS system should be installed.
- The SADIS, MSG and AMSS when installed should be in one network.
- The Local Area Network should be reorganised.
- There should be Internet connectivity to facilitate remote access for maintenance.
- The AMSS should be in the communications room, the visualization system and the synergy systems should be in forecasting office while the MSG and SADIS systems in the room where they are presently installed.
- The AFTN should be connected directly on the AMSS to the Aviation AMSS.
- The technical staff and operators should be well trained on all new systems.

Estimated COST FOR PURCHASE AND INSTALLATION OF MSS+SYNERGIE+RETIM SYSTEMS INCLUDING TRAINING AT MOMBASSA METEOROLOGICAL SERVICE IS AROUND USD 190000



Mombasa MSG and SADIS installation room

Mombasa data communication room. The old teleprinter (commonly refered to as “TX20) is used to transmit AFTN data to aviation office. This old technology will be replaced once the MSS is installed.



This is the forecast room in Mombasa. There is need to improve the furniture in line with the proposed new installations.

National communication interfaces with national entities involved in Early Warning and Emergencies

There is a requirement to automatically forward Tsunami Warning messages and related information to several national authorities concerned. It is recommended that the forecast office improve the projection of the message. The forecast office should interpret the Tsunami warning messages and derives the correct information concerning the message. This information is then to be automatically injected into the AMSS with the correct headers for distribution to the National Disaster Operation Centre (NOC), office of the President. It is also disseminated to the coastal stations of Lamu and Malindi and Mombasa. For the dissemination to the NOC, it is important that the information is sent directly from the AMSS through fax. The system of alert concerning the warning should be improved and also be implemented in the new AMSS. The warning messages should be archived and a warning transmission log generated for reference. Routing dictionary should be updated in Toulouse to send information on tidal gauges in real time. Software for processing of tidal gauge should be added to the visualisation software.

19. Training and capacity building;

Training and capacity building are needed to fulfil requirements for operating and maintaining MSS and related equipment. It is recommended that training be arranged on UNIX, Linux, AMSS hardware and software and operation of the system for the system engineers/technicians and operators.

E. When developing the project, special attention should be given to the impact on recurrent costs in order to facilitate sustainable operation, e.g. priority given to satellite-based components (such as RETIM-Africa, EUMETCast);

F. Preliminary administrative coordination with a view to the implementation of the project.

Focal point for KMD

Dr. Joseph R. Mukabana
Director, KMD,
P.O. Box 30259-00100, GPO, Nairobi
Email: mukabana@meteo.go.ke
Tel: 254 20 3867880
Fax:254 20 3876955

Assistet by:

Mr. Ali Juma Mafimbo
Tel: Mobile- 254 720 773982

Office – 254 20 3867880/5
Email: mafimbo@meteo.go.ke or mafimbo@yahoo.com

Telecom carriers and vendors who was contacted on this mission to seek suggestions for possible upgrade of telecommunication capabilities of the Met. Department and for cost estimates:

Alldean satellite Networks Kenya ltd:
Mr. Kadosh
Tel:254 20 344276
Fax:
Email: support@alldeanKenya.com

MSS vendors:

Mr Michel Pousse
Meteo France International (M.F.I.)
Park Avenue
9 rue Michel Labrousse
31100 TOULOUSE
Tel: +335 6143 2940
Fax: +335 6143 2941
Email : Michel.Pousse@mfi.fr

Mr. Erick Nuwendam
Corobor Systèmes, Vitry, France
Tel: +33 1 45 73 60 60
Email: erick.nuwendam@corobor.com

Mr. Vlado Klimovsky
IBL Software Engineering, Bad Soden a. Ts., Germany
Tel: +49 69 8062 2573
Fax: +49 61 9623 176
klimovsky@iblsoft.com

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