

FINAL REPORT

PROJECT TITLE: East and Southern African Network (ESANET)
 PROJECT FILE: 90-0068-00

SIGNED:

Anthony J. Rodrigues

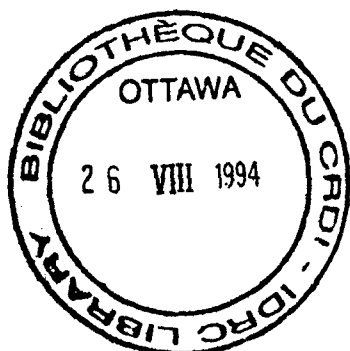
Prof. A.J. Rodrigues
 Project Leader

Reporting Period (Yr/Month/Date):

Final Report: From 1991-11-01 to 1993-11-31

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S E C T I O N

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ESANET PROJECT
FINAL REPORT (TECHNICAL)

RECOMMENDATIONS

The ESANET project has established that microcomputer-based electronic communication is a viable, sustainable technology appropriate to the context of the region in which it has operated for which there is proven demand both regionally and internationally. Therefore:

1. To the research community it is recommended that:

- (a) Relevant institutions be encouraged to consolidate and expand their user base.
- (b) Further research goes into improving and expanding the technologies used.
- (c) Manpower requirements for this activity be consolidated into the establishment of the institutions concerned.
- (d) Appropriate mechanisms be established for operational cost recovery and institutional funding to cover system operation and expansion.
- (e) Cognisance be taken of the ever improving nature of electronic communications worldwide and relevant upgrading be considered.

2. To the telecommunication authorities it is recommended:-

- (a) That further investment be made in improving regional telecommunication links to enhance further electronic communication in this expanding area, given that viability of using national telecommunication infrastructure for modem related activity has been established.
- (b) That special tariffs be applied to the academic and research communities for packet-switching and leased line facilities thus enabling greater access to computer based communications both regionally and internationally.
- (c) That the liberalization of user terminal equipment connected to national telecommunications networks be encouraged.
- (d) That pragmatic policies be established with regard to the licensing of alternative communication methodologies such as packet radio and low orbit satellite systems.

3. To the donor community:-

In view of the fact that national electronic communication networks are an indispensable component of national development, providing as they do for an efficient and effective information delivery system in diverse sectors; It is therefore recommended that continued funding be made available for establishing infrastructures related to computer

based communications for capacity building in order to facilitate transfer of technology.

4. To the regional governments we recommend:-

The recognition of the importance of national electronics communication networks for all aspects of development.

5. The final meeting of the ESANET project recognises the invaluable contribution that IDRC has made through this project in furthering the case of electronic communication within the academic, research, health and other related communities in the region.

Accordingly we request IDRC to:

- (a) Ensure that the ESANET nodes are covered by any forthcoming regional electronic network support program.
- (b) Share the findings of this project with other donors and development agencies.
- (c) Be receptive to future requests from the ESANET community to consolidate and expand what has been achieved so far.

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ESANET PROJECT
FINAL REPORT (TECHNICAL)
REPORT ON EVALUATION OF EXPERIMENTAL PHASE

The Esanet project has provided the participating institutions the opportunity to experiment with regional and international micro-computer based communication. The aim of the experimentation was to establish the viability of regional computer networking for data communications from the technical and management perspectives. Data and experience has been acquired from the experimentation phase of the project using Fidonet and packet satellite technologies. Based on this experience and data, the following specific observations on hardware, software, connectivity, network management and research activities can be made.

Hardware

For modems it has been observed that:

1. 9600 baud or higher modems (e.g. Telebit Worldblazer) perform better for international connections while 2400 baud modems (e.g. GVC 2400) are sufficient for local connections.
2. External modems perform better and are easier to handle than internal ones.
3. Modem power supply should be 220V AC.
4. Modems should be Hayes compatible.

For the node computer it has been observed that the following specifications are appropriate: 386 processor or higher, 4MB RAM,

120MB HD minimum (max 12ms cached), dual floppy, fast serial port, 220V AC supply and UPS with power stabilizer. There is need to have a backup computer.

Software

The following software is required for node operation:

Frontdoor 2.1+ - mailer

GEcho - conference mail processor

MsgTrack - mail tracker,

ReDir - for mail redirection

Gus, EchoVol - for conference tracking,

AC - for accounting and billing.

Connectivity

It has been observed that GNFido, Rhodes or WorkNet polling into Esanet nodes is cheaper and easier than direct polling between Esanet nodes. This has been the case for regional as well as international traffic.

User Base

It has been observed that:

1. Massive effort is required to develop and support a user base including advertising, workshops and maintenance visits.
2. There is need to clarify to the users what installation and support imply and discourage frivolous requests.

Network Management

1. To sustain the network it is important: a) to train system operators and establish post of system operator at the various

universities. b) to put in place efficient and effective cost recovery mechanisms.

2. Some management tools are available in the basic node software. Additional software has been developed during the project period to supplement these basic tools. Examples are AC (accounting) from the Zimbabwe node, MTMON and HISMON (monitoring) from the Zambia node. However there is still need to develop more tools.
3. Whereas there is sufficient documentation for point operation, there is need to develop documentation for node operation.

Research and Development

Technical innovations to improve the system needs to be encouraged and this can utilize student resources for projects. Technical innovation is required in the following areas:

- Terminal Node Controller (TNC)
- The packet satellite upload program (PG)
- modems and modem testing/evaluation
- mailer interfaces

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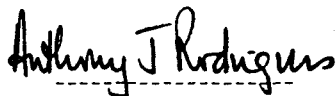
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FINANCIAL REPORT (FINAL)

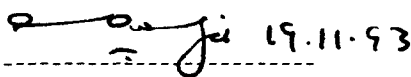
Project Title: East and Southern African Network (ESANET)

Project Title: 90-0068-00

Signatures:



Prof. A.J. Rodrigues
Project Leader

 19.11.93

Deputy Vice-Chancellor (A&F)
University of Nairobi

Reporting Periods (Year/Month/Date):

Actual Expenses:	From <u>1991-11-01</u> to <u>1993-11-30</u>
Committed Expenses:	From <u>1992-10-31</u> to <u>1993-11-30</u>

Payments Received (in Kenya Shillings):

<u>Date of Receipt</u>	<u>Amount</u>
B/F Balance	42,835.70
1992-03-23	100,111.07
Final payment (Expected)	86,362.50

	229,309.27

Financial Report (Line items/categories as per budget of contract):

1. Recipient Administered Portion (RAP) (in Kenya Shillings)

<u>Line Items/Categories</u>	<u>Expenses</u>	<u>Committed</u>
Publications	29,500.00	15,310.56
Support Services	24,000.00	13,226.34
Research Expenses (within Kenya)	140,582.97	20,408.33
	-----	-----
TOTAL	194,082.97	48,945.23
	=====	=====

2. Centre Administered Portion (CAP) (in CAD)

<u>Line Items/Categories</u>	<u>Expenses</u>	<u>Balance</u>
Consultants	3,677.00	7,486.00
Conference	32,084.03	(436.03)
Capital Equipment	14,246.00	9,269.00
Research Expenses (outside Kenya)	17,155.00	0.00
	-----	-----
TOTAL	67,162.03	16,318.97
	=====	=====

Explanations/Clarifications (i.e.: overruns, new line items)

Summaries of the RAP and CAP of the budget are appended. For summary RAP see page 3 and for CAP summary see page 4. RAP detailed accounts are also appended.

RAP (1) Research Expenses: Charges actually incurred for e-mail lines are well in excess of those posted due to Sysop negligence in controlling polling frequencies (January - April 1993) and hacking by an unauthorised Sysop (May - July 1993) see SECTION 6 Kenya Country Report, Terrestrial E-mail, Sub-section 6 Network Management/Financial Aspects: System Abuse and Audit, for details.

RAP (2) Expenses are committed for the ongoing Esanet Project Case Study that looks critically at Project Design, Management and Evaluation within the context of the perceptions of Donor, Recipients and End-users in relation to Project Research Objectives, Implementation Modalities and Actual Impact.

RAP (3) An overall overrun of Kshs. 13,718.93 is anticipated taking into account the Final Payment.

RAP (4) Final Payment of CAD 1,645 is hereby requested.

CAP (1) Balance of CAD 16,318.97 (estimated) is un-spent and in possession of IDRC as CAP.

ESANET FINANCIAL REPORT - 1st NOV 1991 -30th NOV 1993
 RECIPIENT ADMINSTERED PORTION (RAP) (IN K.Shs.)

=====							
	:		Support Services			:	Total :
	:	Research	Secretarial	Administrative	Report	:	Publications:
	:	Expenses	Services	Support	Preparation:	:	:
=====							
J. Gicheru	:	0.00	1,500.00	0.00	0.00	0.00	1,500.00
L. Mwombe	:	0.00	5,000.00	0.00	0.00	0.00	5,000.00
J. Mogere	:	0.00	1,500.00	0.00	0.00	0.00	1,500.00
M. Wasike	:	0.00	0.00	3,000.00	0.00	0.00	3,000.00
B. Gogo	:	0.00	0.00	3,000.00	0.00	0.00	3,000.00
S.Wakuze	:	0.00	5,000.00	0.00	0.00	0.00	5,000.00
S.Odeny	:	0.00	0.00	0.00	0.00	7,500.00	7,500.00
J.D.Mirie	:	0.00	0.00	5,000.00	0.00	0.00	5,000.00
R.P.S.Chana	:	0.00	0.00	0.00	0.00	6,000.00	6,000.00
A.Laloui	:	0.00	0.00	0.00	0.00	6,000.00	6,000.00
W.Okello-Odongo	:	0.00	0.00	0.00	0.00	10,000.00	10,000.00
G. Macharia	:	5,481.00	0.00	0.00	0.00	0.00	5,481.00
A. Rodrigues	:	10,044.00	0.00	0.00	0.00	0.00	10,044.00
S. Ochuodho	:	11,319.25	0.00	0.00	0.00	0.00	11,319.25
Telex	:	226.45	0.00	0.00	0.00	0.00	226.45
Lunch Meeting	:	7,180.30	0.00	0.00	0.00	0.00	7,180.30
KPT&C Charges	:	106,331.97	0.00	0.00	0.00	0.00	106,331.97
EXPENDITURE Sub Total	:	140,582.97	13,000.00	11,000.00	0.00	29,500.00	194,082.97
=====							
COMMITTED:Esanet	:						
Project Case Study	:						
being compiled	:	20,408.33		13,226.34		15,310.56	48,945.23
Balance b/f	:	45,121.75		(11,428.80)		9,142.75	42,835.70
Second Payment	:	41,742.57		27,052.75		31,315.76	100,111.07
FinalPayment(expected)	:	36,009.93		23,337.51		27,015.06	86,362.50
=====							
BALANCE	:	(38,117.05)		1,735.12		22,663.01	(13,718.93)
=====							

ESANET FINANCIAL REPORT - 1st NOV 1991 - 30th NOV 1993
CENTRE ADMINISTERED PORTION (CAP) (in CAD)

	Allocation + B/F Balance	Expenditure by item	Expenditure Total	Balance
Consultants				
ELCI		897.00		
M.JENSEN		780.00		
SATELLIFE		2,000.00		
	11,163.00		3,677.00	7,486.00
Conference				
Experimental Workshop:				
air-fares		5,027.07		
hotel + per diems		7,406.16		
+ local expenses				
Sub-Total		12,433.23		
Evaluation Workshop:				
air-fares		6,497.40		
hotel		3,432.00		
per diems + airport tax		4,456.40		
local expenses		5,265.00		
Sub-Total		19,650.80		
	31,648.00		32,084.03	(436.03)
Capital Equipment				
Modems for Lusaka		3,001.00		
Steerable antenna (Vita)		2,925.00		
Modems from Satellife		8,320.00		
	23,515.00		14,246.00	9,269.00
Research Expenses				
Uganda		2,350.00		
Zambia		2,350.00		
Zimbabwe		6,227.50		
Tanzania		6,227.50		
	17,155.00		17,155.00	0.00
TOTAL	83,481.00		67,162.03	16,318.97

Estimated Balance of CAD 16,318.97 is unspent and in the possession of IDRC as CAP

GENERAL LEDGER TRIAL BALANCE

As at 02/11/93

Page 1

ACCOUNT		DEBIT	CREDIT
1	DONOR		249831.57
2	P/L CONTROL		158469.60
3	P/L DISCOUNT		
4	P/L VAT		
5	P/L BANK	144750.67	
10	RESEARCH EXPENSES	47252.58	
15	SECRETARIAL SERVICES	13000.00	
16	ADMINISTRATIVE SUPP.	24226.34	
17	REPORT PREPARATION		
20	PUBLICATIONS	44810.56	
30	K.P.T & C CHARGES	127080.72	
35	LUNCHES	7180.30	
GRAND TOTAL		408301.17	408301.17

GENERAL LEDGER ACCOUNTS

Transaction details

To 02/11/93

ACCOUNT	DEBIT	CREDIT	AN	DESCRIPTION	DATE	JOURNAL
1 DONOR		118756.25	0	Allocation 1991	05/03/93	1
	55398.25		0	Payments 1991	05/03/93	2
		100111.07	0	Allocation 1992	05/03/93	3
		86362.50	0	FINAL PAYMENT	01/11/93	10
BALANCE		249831.57				
2 P/L CONTROL		105810.80	0	P/L Invoices	28/02/93	4
	51954.55		0	P/L Payments	28/02/93	5
		48772.17	0	P/L Invoices	01/11/93	6
	13626.35		0	P/L Payments	01/11/93	7
		39500.00	0	P/L Invoices	01/11/93	8
		48945.23	0	COMMITTED CASE STUDY	01/11/93	9
		20522.30	0	COMMITTED KENPAC	01/11/93	11
	39500.00		0	P/L Payments	02/11/93	12
BALANCE		158469.60				
5 P/L BANK	118756.25		0	Allocation 1991	05/03/93	1
		55398.25	0	Payments 1991	05/03/93	2
	100111.07		0	Allocation 1992	05/03/93	3
		51954.55	0	P/L Payments	28/02/93	5
		13626.35	0	P/L Payments	01/11/93	7
	86362.50		0	FINAL PAYMENT	01/11/93	10
		39500.00	0	P/L Payments	02/11/93	12
BALANCE	144750.67					
10 RESEARCH EXPENSES	26844.25		0	P/L Invoices	28/02/93	4
	20408.33		0	COMMITTED CASE STUDY	01/11/93	9
BALANCE	47252.58					
15 SECRETARIAL SERVICES	8000.00		0	P/L Invoices	28/02/93	4
	5000.00		0	P/L Invoices	01/11/93	8
BALANCE	13000.00					
16 ADMINISTRATIVE SUPP.	6000.00		0	P/L Invoices	28/02/93	4
	5000.00		0	P/L Invoices	01/11/93	8
	13226.34		0	COMMITTED CASE STUDY	01/11/93	9
BALANCE	24226.34					

ACCOUNT	DEBIT	CREDIT	AN	DESCRIPTION	DATE	JOURNAL
20 PUBLICATIONS	29500.00		0	P/L Invoices	01/11/93	8
	15310.56		0	COMMITTED CASE STUDY	01/11/93	9
BALANCE	44810.56					
30 K.P.T & C CHARGES	57786.25		0	P/L Invoices	28/02/93	4
	48772.17		0	P/L Invoices	01/11/93	6
	20522.30		0	COMMITTED KENPAC	01/11/93	11
BALANCE	127080.72					
35 LUNCHES	7180.30		0	P/L Invoices	28/02/93	4
BALANCE	7180.30					
GRAND TOTAL	729259.47	729259.47				

GENERAL LEDGER TRANSACTIONS

Posted Transactions

From 1 to 12

JOURNAL	DATE	TYPE	DR	CR	ACCOUNT NAME	AN	DR AMOUNT	CR AMOUNT	DESCRIPTION
1	05/03/93	Journ	5		P/L BANK	0	118756.25		Allocation 1991
				1	DONOR	0		118756.25	
2	05/03/93	Journ	1		DONOR	0	55398.25		Payments 1991
				5	P/L BANK	0		55398.25	
3	05/03/93	Journ	5		P/L BANK	0	100111.07		Allocation 1992
				1	DONOR	0		100111.07	
4	28/02/93	Journ	10		RESEARCH EXPENSES	0	26844.25		P/L Invoices
			15		SECRETARIAL SERVICES	0	8000.00		
			16		ADMINISTRATIVE SUPP.	0	6000.00		
			30		K.P.T & C CHARGES	0	57786.25		
			35		LUNCHES	0	7180.30		
				2	P/L CONTROL	0		105810.80	
5	28/02/93	Journ		5	P/L BANK	0		51954.55	P/L Payments
			2		P/L CONTROL	0	51954.55		
6	01/11/93	Journ	30		K.P.T & C CHARGES	0	48772.17		P/L Invoices
				2	P/L CONTROL	0		48772.17	
7	01/11/93	Journ		5	P/L BANK	0		13626.35	P/L Payments
			2		P/L CONTROL	0	13626.35		
8	01/11/93	Journ	15		SECRETARIAL SERVICES	0	5000.00		P/L Invoices
			16		ADMINISTRATIVE SUPP.	0	5000.00		
			20		PUBLICATIONS	0	29500.00		
				2	P/L CONTROL	0		39500.00	
9	01/11/93	Journ	10		RESEARCH EXPENSES	0	20408.33		COMMITTED CASE STUDY
			16		ADMINISTRATIVE SUPP.	0	13226.34		
			20		PUBLICATIONS	0	15310.56		
				2	P/L CONTROL	0		48945.23	
10	01/11/93	Journ	5		P/L BANK	0	86362.50		FINAL PAYMENT
				1	DONOR	0		86362.50	
11	01/11/93	Journ	30		K.P.T & C CHARGES	0	20522.30		COMMITTED KENPAC
				2	P/L CONTROL	0		20522.30	
12	02/11/93	Journ		5	P/L BANK	0		39500.00	P/L Payments

JOURNAL	DATE	TYPE	DR	CR	ACCOUNT NAME	AN	DR AMOUNT	CR AMOUNT	DESCRIPTION
12	02/11/93	Journ	2		P/L CONTROL	0	39500.00		P/L Payments
TOTALS							729259.47	729259.47	

A G E D A N A L Y S I S O F C R E D I T O R S

As at 02/11/93

Acc 1 to 200

Page

Supplier	Balance	Up to 30 days	over 30 days	over 60 days	over 90 days	Unassigned payments	Turnover	Credit limit	Date last
1 J.GICHERU	0.00	0.00	0.00	0.00	0.00	0.00	1500.00	0.00	28/0
2 L.MWOMBE	0.00	0.00	0.00	0.00	0.00	0.00	5000.00	0.00	28/0
3 J.MOGERE	0.00	0.00	0.00	0.00	0.00	0.00	1500.00	0.00	28/0
4 M.WASIKE	0.00	0.00	0.00	0.00	0.00	0.00	3000.00	0.00	28/0
5 B.GOGO	0.00	0.00	0.00	0.00	0.00	0.00	3000.00	0.00	28/0
6 G.MACHARIA	0.00	0.00	0.00	0.00	0.00	0.00	5481.00	0.00	28/0
7 A.RODRIGUES	0.00	0.00	0.00	0.00	0.00	0.00	10044.00	0.00	28/0
8 S.OCHUODHO	0.00	0.00	0.00	0.00	0.00	0.00	11319.25	0.00	28/0
9 S.WAKUZE	0.00	0.00	0.00	0.00	0.00	0.00	5000.00	0.00	02/11
10 S.ODENY	0.00	0.00	0.00	0.00	0.00	0.00	7500.00	0.00	02/11
11 J.D.MIRIE	0.00	0.00	0.00	0.00	0.00	0.00	5000.00	0.00	02/11
12 R.P.S.CHANA	0.00	0.00	0.00	0.00	0.00	0.00	6000.00	0.00	02/11
13 A.LALOUI	0.00	0.00	0.00	0.00	0.00	0.00	6000.00	0.00	02/11
14 W.OKELLO-ODONGO	0.00	0.00	0.00	0.00	0.00	0.00	10000.00	0.00	02/11
100 LUNCH MEETING	0.00	0.00	0.00	0.00	0.00	0.00	7180.30	0.00	28/02
110 K.P & T.C - KENPAC	0.00	0.00	0.00	0.00	0.00	0.00	6432.90	0.00	01/11
111 K.P & T.C - HEALTHNET	0.00	0.00	0.00	0.00	0.00	0.00	9314.00	0.00	01/11
112 K.P & T.C - Tel:444920	16926.91	12831.06	0.00	0.00	4095.85	0.00	17549.91	0.00 **	01/11

As at 02/11/93

Acc 1 to 200

Supplier	Balance	Up to 30 days	over 30 days	over 60 days	over 90 days	Unassigned payments	Turnover	Credit limit
113 K.P & T.C - Tel:444919	72075.16	35941.11	0.00	0.00	36134.05	0.00	72075.16	0.00 **
120 TELEX	0.00	0.00	0.00	0.00	0.00	0.00	226.45	0.00
121 ELCI	0.00	0.00	0.00	0.00	0.00	0.00	960.00	0.00
Totals	89002.07	48772.17	0.00	0.00	40229.90	0.00	194082.97	
Percentage		54.7%	0.0%	0.0%	45.2%			

S T A T E M E N T O F A C C O U N T

Supplier 1

Date 02/11/93

J.GICHERU

ESANET
P.O.BOX 30197
NAIROBI

Date	Type	Description	Ref	Debit	Credit	Balance
		Brought forward				0.00
15/04/92	Inv	SEC.SERVICES			1500.00	1500.00
28/02/93	Pay			1500.00		0.00
	Current	30 days	60 days	90 days		
	0.00	0.00	0.00	0.00	Amount due	0.00

S T A T E M E N T O F A C C O U N T

Supplier 2

Date 02/11/93

L.MWOMBE

ESANET
P.O.BOX 30197
NAIROBI

Date	Type	Description	Ref	Debit	Credit	Balance
		Brought forward				0.00
15/04/92	Inv	SEC.SERVICES			5000.00	5000.00
28/02/93	Pay			5000.00		0.00
	Current	30 days	60 days	90 days		
	0.00	0.00	0.00	0.00	Amount due	0.00

S T A T E M E N T O F A C C O U N T

Supplier 3

Date 02/11/93

J.MOGERE

ESANET
P.O.BOX 30197
NAIROBI

Date	Type	Description	Ref	Debit	Credit	Balance
		Brought forward				0.00
15/04/92	Inv	SEC.SERVICES			1500.00	1500.00
28/02/93	Pay			1500.00		0.00
	Current	30 days	60 days	90 days		
	0.00	0.00	0.00	0.00	Amount due	0.00

S T A T E M E N T O F A C C O U N T

Supplier 4

Date 02/11/93

M.WASIKE

ESANET
P.O.BOX 30197
NAIROBI

Date	Type	Description	Ref	Debit	Credit	Balance
		Brought forward				0.00
15/04/92	Inv	ADMIN. SUPPORT			3000.00	3000.00
28/02/93	Pay			3000.00		0.00
	Current	30 days	60 days	90 days		
	0.00	0.00	0.00	0.00	Amount due	0.00

S T A T E M E N T O F A C C O U N T

Supplier 5

Date 02/11/93

B.GOGO

ESANET
P.O.BOX 30197
NAIROBI

Date	Type	Description	Ref	Debit	Credit	Balance
		Brought forward				0.00
15/04/92	Inv	ADMIN. SUPPORT			3000.00	3000.00
28/02/93	Pay			3000.00		0.00
	Current	30 days	60 days	90 days		
	0.00	0.00	0.00	0.00	Amount due	0.00

S T A T E M E N T O F A C C O U N T

Supplier 6

Date 02/11/93

G.MACHARIA

ESANET
P.O.BOX 30197
NAIROBI

Date	Type	Description	Ref	Debit	Credit	Balance
		Brought forward				0.00
04/08/92	Inv	RESEARCH EXPENSES			5481.00	5481.00
28/02/93	Pay			5481.00		0.00
	Current	30 days	60 days	90 days		
	0.00	0.00	0.00	0.00	Amount due	0.00

S T A T E M E N T O F A C C O U N T

Supplier 7

Date 02/11/93

A.RODRIGUES

ESANET
P.O.BOX 30197
NAIROBI

Date	Type	Description	Ref	Debit	Credit	Balance
		Brought forward				0.00
02/03/92	Inv	RESEARCH EXPENSES			6100.00	6100.00
19/03/92	Inv	RESEARCH EXPENSES			3944.00	10044.00
28/02/93	Pay			6100.00		3944.00
28/02/93	Pay			3944.00		0.00
	Current	30 days	60 days	90 days		
	0.00	0.00	0.00	0.00	Amount due	0.00

S T A T E M E N T O F A C C O U N T

Supplier 8

Date 02/11/93

S.OCHUODHO

ESANET
P.O.BOX 30197
NAIROBI

Date	Type	Description	Ref	Debit	Credit	Balance
		Brought forward				0.00
05/02/92	Inv	RESEARCH EXPENSES			4270.10	4270.10
12/10/92	Inv	RESEARCH EXPENSES			350.00	4620.10
31/12/92	Inv	RESEARCH EXPENSES			3197.40	7817.50
06/01/93	Inv	RESEARCH EXPENSES			3501.75	11319.25
28/02/93	Pay			4270.00		7049.25
28/02/93	Pay			350.00		6699.25
28/02/93	Pay			3197.50		3501.75
28/02/93	Pay			3501.75		0.00
	Current	30 days	60 days	90 days		
	0.00	0.00	0.00	0.00	Amount due	0.00

S T A T E M E N T O F A C C O U N T

Supplier 9

Date 02/11/93

S.WAKUZE

ESANET
P.O.BOX 30197
NAIROBI

Date	Type	Description	Ref	Debit	Credit	Balance
		Brought forward				0.00
01/11/93	Inv	SECRETARIAL SERVICE			5000.00	5000.00
02/11/93	Pay			5000.00		0.00
	Current	30 days	60 days	90 days		
	0.00	0.00	0.00	0.00	Amount due	0.00

S T A T E M E N T O F A C C O U N T

Supplier 10

Date 02/11/93

S.ODENY

ESANET
P.O.BOX 30197
NAIROBI

Date	Type	Description	Ref	Debit	Credit	Balance
		Brought forward				0.00
01/11/93	Inv	PUBLICATIONS			7500.00	7500.00
02/11/93	Pay			7500.00		0.00
	Current	30 days	60 days	90 days		
	0.00	0.00	0.00	0.00	Amount due	0.00

S T A T E M E N T O F A C C O U N T

Supplier 11

Date 02/11/93

J.D.MIRIE

ESANET
P.O.BOX 30197
NAIROBI

Date	Type	Description	Ref	Debit	Credit	Balance
		Brought forward				0.00
01/11/93	Inv	ADMIN. SUPPORT			5000.00	5000.00
02/11/93	Pay			5000.00		0.00
	Current	30 days	60 days	90 days		
	0.00	0.00	0.00	0.00	Amount due	0.00

S T A T E M E N T O F A C C O U N T

Supplier 12

Date 02/11/93

R.P.S.CHANA

ESANET
P.O.BOX 30197
NAIROBI

Date	Type	Description	Ref	Debit	Credit	Balance
		Brought forward				0.00
01/11/93	Inv	PUBLICATIONS			6000.00	6000.00
02/11/93	Pay			6000.00		0.00
	Current	30 days	60 days	90 days		
	0.00	0.00	0.00	0.00	Amount due	0.00

S T A T E M E N T O F A C C O U N T

Supplier 13

Date 02/11/93

A.LALOUI

ESANET
P.O.BOX 30197
NAIROBI

Date	Type	Description	Ref	Debit	Credit	Balance
		Brought forward				0.00
01/11/93	Inv	PUBLICATIONS			6000.00	6000.00
02/11/93	Pay			6000.00		0.00
	Current	30 days	60 days	90 days		
	0.00	0.00	0.00	0.00	Amount due	0.00

S T A T E M E N T O F A C C O U N T

Supplier 14

Date 02/11/93

W.OKELLO-ODONGO

ESANET
P.O.BOX 30197
NAIROBI

Date	Type	Description	Ref	Debit	Credit	Balance
		Brought forward				0.00
01/11/93	Inv	PUBLICATIONS			10000.00	10000.00
02/11/93	Pay			10000.00		0.00
	Current	30 days	60 days	90 days		
	0.00	0.00	0.00	0.00	Amount due	0.00

S T A T E M E N T O F A C C O U N T

Supplier 100

Date 02/11/93

LUNCH MEETING

ESANET
P.O.BOX 30197
NAIROBI

Date	Type	Description	Ref	Debit	Credit	Balance
		Brought forward				0.00
21/01/92	Inv	LUNCH			910.00	910.00
21/08/92	Inv	LUNCH			2809.70	3719.70
02/10/92	Inv	LUNCH			3460.60	7180.30
28/02/93	Pay			910.00		6270.30
28/02/93	Pay			2809.70		3460.60
28/02/93	Pay			3460.60		0.00

Current	30 days	60 days	90 days		
0.00	0.00	0.00	0.00	Amount due	0.00

S T A T E M E N T O F A C C O U N T

Supplier 110

Date 02/11/93

K.P & T.C - KENPAC

ESANET
P.O.BOX 30197
NAIROBI

Date	Type	Description	Ref	Debit	Credit	Balance
		Brought forward				0.00
14/10/92	Inv	KENPAC			6432.90	6432.90
01/11/93	Pay			6432.90		0.00

Current	30 days	60 days	90 days		
0.00	0.00	0.00	0.00	Amount due	0.00

S T A T E M E N T O F A C C O U N T

Supplier 111

Date 02/11/93

K.P & T.C - HEALTHNET

ESANET
P.O.BOX 30197
NAIROBI

Date	Type	Description	Ref	Debit	Credit	Balance
		Brought forward				0.00
29/06/92	Inv	APPROVAL			2970.00	2970.00
23/07/92	Inv	ANNUAL LICENCE FEES			6344.00	9314.00
28/02/93	Pay			2970.00		6344.00
01/11/93	Pay			6344.00		0.00

	Current	30 days	60 days	90 days		
	0.00	0.00	0.00	0.00	Amount due	0.00

S T A T E M E N T O F A C C O U N T

Supplier 112

Date 02/11/93

K.P & T.C - Tel:444920

ESANET
P.O.BOX 30197
NAIROBI

Date	Type	Description	Ref	Debit	Credit	Balance
		Brought forward				0.00
24/07/92	Inv	TEL:444920			3125.90	3125.90
31/08/92	Inv	TEL:444920			625.40	3751.30
22/09/92	Inv	TEL:444920			363.40	4114.70
22/10/92	Inv	TEL:444920			259.60	4374.30
18/12/92	Inv	TEL:444920			344.55	4718.85
01/11/93	Inv	Tel: 444920	JAN93		2500.00	7218.85
01/11/93	Inv	Tel: 444920	FEB93		2500.00	9718.85
01/11/93	Inv	Tel: 444920	MAR93		2500.00	12218.85
01/11/93	Inv	Tel: 444920	APR93		2500.00	14718.85
01/11/93	Inv	Tel: 444920	MAY93		443.91	15162.76
01/11/93	Inv	Tel: 444920	JUN93		303.70	15466.46
01/11/93	Inv	Tel: 444920	JUL93		342.65	15809.11
01/11/93	Inv	Tel: 444920	AUG93		1304.70	17113.81
01/11/93	Inv	Tel: 444920	SEP93		436.10	17549.91
01/11/93	Pay			363.40		17186.51
01/11/93	Pay			259.60		16926.91

	Current	30 days	60 days	90 days		
	12831.06	0.00	0.00	4095.85	Amount due	16926.91

S T A T E M E N T O F A C C O U N T

Supplier 113
K.P & T.C - Tel:444919

Date 02/11/93
ESANET
P.O.BOX 30197,NAIROBI

Date	Type	Description	Ref	Debit	Credit	Balance
		Brought forward				0.00
21/07/92	Inv	TEL:444919			2714.35	2714.35
31/08/92	Inv	TEL:444919			181.70	2896.05
22/10/92	Inv	TEL:444919			14674.45	17570.50
27/10/92	Inv	TEL:444919			12688.00	30258.50
18/02/93	Inv	TEL:444919			5875.55	36134.05
01/11/93	Inv	Tel: 444919	JAN93		2500.00	38634.05
01/11/93	Inv	Tel: 444919	FEB93		2500.00	41134.05
01/11/93	Inv	Tel: 444919	MAR93		2500.00	43634.05
01/11/93	Inv	Tel: 444919	APR93		2500.00	46134.05
01/11/93	Inv	Tel: 444919	MAY93		545.60	46679.65
01/11/93	Inv	Tel: 444919	JUN93		3927.92	50607.57
01/11/93	Inv	Tel: 444919	JUL93		1819.04	52426.61
01/11/93	Inv	Tel: 444919	AUG93		17639.15	70065.76
01/11/93	Inv	Tel: 444919	SEP93		2009.40	72075.16
	Current	30 days	60 days	90 days		
	35941.11	0.00	0.00	36134.05	Amount due	72075.16

Supplier 120
TELEX

Date 02/11/93
ESANET
P.O.BOX 30197,NAIROBI

Date	Type	Description	Ref	Debit	Credit	Balance
		Brought forward				0.00
14/10/92	Inv	TELEX			226.45	226.45
01/11/93	Pay			226.45		0.00
	Current	30 days	60 days	90 days		
	0.00	0.00	0.00	0.00	Amount due	0.00

Supplier 121

Date 02/11/93
ESANET
P.O.BOX 30197,NAIROBI

Date	Type	Description	Ref	Debit	Credit	Balance
		Brought forward				0.00
31/08/92	Inv	EMAIL SUBSCRIPTION			960.00	960.00
28/02/93	Pay			960.00		0.00
	Current	30 days	60 days	90 days		
	0.00	0.00	0.00	0.00	Amount due	0.00

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4

EASTERN AND SOUTHERN AFRICA NETWORK (ESANET)

COMMUNICATIONS RESEARCH FOR DEVELOPMENT

EVALUATION AND WINDUP WORKSHOP

27TH-30TH SEPTEMBER 1993

MWEYA SAFARI LODGE, UGANDA.

KENYA COUNTRY REPORT - TERRESTRIAL EMAIL

*Prof. Anthony J. Rodrigues
Dr. William Okelo-Odongo
Mr. Solomon Odeny*

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1. PROJECT GOALS AND OBJECTIVES

The East and Southern African NETWORK (ESANET) is a research project, funded by the International Development Research Centre (IDRC) of Canada, aimed at investigating various microcomputer based methodologies for communications. The countries of the five participating institutions are all members of the Preferential Trade Agreement (PTA) region. These institutions are the Institutes of Computer Science at the University of Nairobi and Makerere University, and the Computing Centres at the University of Dar es Salaam, the University of Zambia and the University of Zimbabwe. The MEMORANDUM OF GRANT CONDITIONS Centre File No. 90-0068 dated 5th October 1990 is between the University of Nairobi and IDRC, with the Director, Institute of Computer Science designated Project Leader.

The general goals of the project are:-

- a. to experiment with microcomputer based communication networking in order to acquire the necessary technological capacity, and,
- b. to promote more effective and efficient communication within the research community in the region.

Within the scope of these general goals, the specific objectives of the project are :-

- i) to experiment with alternative modalities and techniques for data

communications among and within the five nodes (Nairobi, Dar es Salaam, Lusaka, Makerere and Harare).

- ii) to evaluate the technical, economic, sociological and management aspects of the communication network experiments;
- iii) to disseminate information to the research community within the region about the development and the results of the project with a view to increasing the awareness of possibilities, stimulating new and wider applications, and inviting feed-back on related topics; and
- iv) to make recommendations to the research community (users and institutions) and telecommunications authorities in the region on cost effective data communication modalities, and appropriate network models and policies for specific environments and applications.

The emphasis is on microcomputer based communications systems. Thus the project has no intention of offering private data communication network services in competition to any commercial services already offered by the respective Posts, Telegraph and Telecommunication (PTT) authorities in the participating countries. In fact one entire experimentation strategy uses dial-up modems and the public network, while only the Satellite/ground-station component of the other experimentation strategy is private, other linkages being public. The satellite based strategy was primarily intended to facilitate Medical Research. Its usage, the users and the data volumes available, are restricted, are not-for-profit and are non-commercial. It was important that the developmental impact in the field of Health Care and Communications be weighed positively against the perceived loss of revenue for the PTT authorities. A convenient and effective means to *monitor the usage of the network for security purposes* by the KP&TC has been identified.

The mailer used for terrestrial email, i.e. Frontdoor, is shareware whose usage is not-for-profit but service based communication.

2. HARDWARE/MODEM UPDATES

The hardware and software equipment specifications were defined at the start-up meeting held in Nairobi on 21-22nd November 1990. On advice from an expert based in ELCI, Nairobi, it was decided to procure the equipment from NIRVCENTRE, an NGO based in Toronto, Canada, due to the cheap prices offered. The order was duly placed with them on 5th April 1991. However, the project equipment was delayed for a number of months due to various reasons, the principal one being NIRVCENTRE's inability to provide the equipment exactly as specified; particularly with regard to input voltage ratings. To avert further delay, they were authorised by the Project Manager to ship the next best available alternatives. Nairobi received their consignment in September 1991. This delay in delivery of project equipment, ranging from five months to twelve months, correspondingly delayed the experimentation phase of the ESANET project. *Furthermore, the non-compliance with input voltage ratings, especially in the case of the external modems and printers, caused additional delays and unbudgeted expenses in commissioning the equipment. The reliability of the equipment for end-users bordered on the unacceptable. The cheap equipment prices obtained thus did not*

appear to compensate adequately for these operational delays.

The Nairobi node experienced a lot of installation glitches. The hardware supplied, specifically the 2400 baud modem component, was breaking down time and again. Being unable to guarantee that the system was on 24 hours a day, full node facilities were not offered to the user community until August 1992. Furthermore, the external modems were not usable as they were since they need a 240/110V transformer which was not provided by NIRVCENTRE. Thus providing these modems to the prospective user base entails additional unbudgeted outlays for stand-alone 220V/110V ac transformers. *This illustrates once again the trade-off between equipment cost and appropriateness.*

Towards the end of November, 1992 full node status was resumed and a 9600 baud Telebit Trailblazer modem installed to enhance line throughput.

As was agreed at the Lusaka meeting of November 1992, additional 15 modems were ordered on 16th November, 1992 for the Nairobi node amongst others for distribution on loan basis to potential points which could not afford modems. The consignment was received in the middle of July, 1993. The consignment was comprised of 10 Viva24 220v external modems and 5 Hook-Up 2400 internal modems. Four of the external modems have been installed. Users for five others have been identified and installations await site preparations.

3. MAILER UPDATES

Initially the mailer software installed at the Nairobi node was Frontdoor 1.99. This was upgared to Frontdoor 2.02 in November, 1992.

4. CONNECTIVITY/THROUGHPUT/INTERFACES

4.1 Connectivity

In Nairobi, the Institute of Computer Science was, until March 1992, connected to an old relay-type telephone exchange in Kileleshwa which led to severe line reliability and availability problems. However, the Institute is now connected to a modern digital exchange in Westlands which provides more efficient services. These services are expected to improve further, hopefully in the near future, once the few hundred trunk lines between this new exchange and the central switching office are increased to a more reasonable number.

The Nairobi node became a full node on 5th August 1992. The service was provided to the ICS staff and the few points mentioned above. This service was however stopped on 13th October 1992 when it was realised that the node could not sustain the costs incurred due to international calls. This period did generate some data on cost and time implications and statistics regarding international calls (refer to the worksheet in Appendix I). From 26th October 1992, the service was resumed, with the mail now routed via ELCI and GreenNet for reasons of exploiting the economies of scale inherent in two nodes combining their mail.

It has been found that making inter-node calls is difficult, primarily due to poor telecommunication infrastructure for calling between countries within the ESANET region. Making calls outside Africa

however, is relatively easy due to configurations of international communication satellites. Therefore it has proved expedient to set up electronic mail-boxes for each ESANET node on GREENNET in London, U.K. which is a node of the APC global network. These mail-boxes have facilitated communication between ESANET nodes. The original plan, yet to be implemented, called for upgrading of one of ESANET's nodes into a full APC node.

The Nairobi node's mailbox at GreenNet is UNICS and mail may be sent to the node via this mailbox using the following Internet type addresses.

unics@gn.apc.org
username@unics.gn.apc.org

Points off the Nairobi node are best addressed in the form

username@pPN.fFN.nNN.zZN.gnfido.fidonet.org

where PN is the fido point number, FN the bossnode,
NN network and ZN the zone

In also being able to send/forward mail to Internet addresses through the GreenNet gateway, the node has two way functional connectivity with Internet users including other Esanet nodes. Remote login and database access, however, are of course not possible due to Fidonet limitations.

4.2 Throughput

Owing to the deletion of the log file, node throughput data for January, February and March 1993 is not available. Data for the months of April, May, June and July 1993 are, however, provided (refer to Appendix II(a) to (d)) for comparison with data obtained with the 2400 baud modem installed earlier and referred to above.

Following is a summary of the performance for the three months.

	1992	<----- 1993 ----->			
	Aug/Sep	Apr	May	Jun	Jul
	-----	----	----	----	----
Total no. Polls	57	31	27	37	42
Number succ polls	24 (42%)	20 (65%)	20 (74%)	32 (86%)	39 (93%)
Mean transfer rate (bps)	210	491.96	584.80	586.52	645.82
Number unsucc polls	33 (58%)	11 (35%)	7 (26%)	5 (14%)	3 (7%)
Poll periods					
00:01 - 08:00	succ	1	0	2	0
	unsucc	3	0	2	0
08:01 - 18:00	succ	13	9	11	13
	unsucc	14	8	3	4
18:00 - 23:59	succ	9	11	7	19
	unsucc	16	3	2	1

Note that virtually all calls were international to the GreenNet gateway.

From the table we note that the average transmission rates for those months of August and September is 210 bps as compared to at least 492 bps for the months of April to July 1993. This is to be expected since the 9600 baud Telebit Trailblazer modem was installed towards the end of November 1992. Furthermore the rate of unsuccessful polls using the 2400 baud modem is 58% compared to the maximum of 35% in April with the 9600 baud modem. Even during low peak periods i.e. 18.00 to 24.00 hours, the unsuccessful poll rate for August/September 1992 is 64% which begs the question regarding the quality of the 2400 baud modem.

From the worksheet in Appendices I and II(a) to (d) it can be seen that the volume of traffic flow from the Nairobi node to the GreenNet gateway for the months of August/September 1992 and for the months of April, May, June and July 1993 is, 248kb, 405kb, 829kb, 951kb and 693kb respectively. The volume of traffic flow in the reverse direction over the same periods is 206kb, 333kb, 526kb, 601kb and 764kb respectively. The bulk of traffic is routed through the GreenNet gateway with only occasional calls to RSA and other Esanet nodes.

The Nairobi node now operates on 24 hour basis except for brief maintenance periods of approximately 1 hour per day. The points off the Nairobi node are therefore able to pickup and to deliver mail to the node almost 24 hours a day. Polls to GreenNet to pickup and to forward mail have, however, had to be reduced from once a day to twice a week due to financial constraints. The worksheets in Appendix III(a) shows the volume of traffic flowing between the various points (off the Unics node) and GreenNet, Healthnet groundstation and other points during the period between April and July, 1993. This data has been extracted directly from the mailer's log file.

The tables show, for each month,

1. the number of bytes received by the Unics node from each of GNFido, E. Station, and other points (combined) for forwarding to each of the specified points,
2. the number of bytes originated by each of the specified points for forwarding to each of GNFido, E. Station and other points.

Also indicated is the total number of bytes received from and sent to each of the specified points.

Appendix III(b) presents the same data differently and in summary form. The Unics to/from GNFido traffic is also included for comparison.

It is noted that the data detailing point-to-point traffic may have a high margin of error for two reasons. Firstly the log file does not always give a break down of mail contained in a sent/received packet and secondly some mail is mis-addressed by the endusers and are accordingly re-routed by the sysop. The discrepancies noted in the traffic volume received for forwarding (*) and that actually forwarded (**) is partially due to the above reasons. It is also pointed out that for some period over the four months Healthnet traffic was being transferred via diskettes due to one of the telephone lines being down.

What is clear from the data is that international traffic carried for

points is, on the average less, than 30% of international traffic for Unics itself. Suprisingly, the data also indicates that inter-point traffic is comparable in volume to the traffic between the points and GNFido.

4.3 Interfaces

The Healthnet groundstation at the Institute of Computer Science has, since July 1992, been connected as a point off the Nairobi node.

Between July and September, 1992 a postgraduate diploma project was undertaken with the objective of developing an interface between the Fido node running Frontdoor and the Healthnet groundstation running the Pacsat communication modules. The prototype developed by the student has since been refined and is in operation providing virtually automatic transfer of messages between Fidonet, and Pacsat.

The groundstation therefore can pick-up/deliver mail from/to the node at specified times within the 24 hours a day. Some operator intervention, specifically for the purpose of mail address verification/correction, is still required to transfer mail to/from Healthnet.

The University of Nairobi operates a VAX mainframe system running VMSmail. A postgraduate diploma student at ICS is currently undertaking, as his project, the specification and design leading to implementation of software to provide an interface between VMSmail and Fidonet. the project is examinable and the completion date is 30th September, 1993.

5. USER BASE

The Nairobi node currently has 19 legitimate Fido user points for which it forwards traffic (see the table in Appendix IV). Three of these points may be classified as heavy users and provide the bulk of traffic being forwarded by the node. The rest are relatively low volume users whose combined traffic is small compared to any one of the high volume users. Between January and August 1993, a number of unauthorized users, who have since been identified, were on the Unics points list and were routing their mail through the node. There were also Fido "pirate" points which were not in the Unics points list but were nevertheless forwarding and receiving their mail through the node. This was possible because the Unics node was setup to accept mail from and allow pickup of mail by unlisted points. The unauthorized points, which appear to have been individuals with no apparent institutional base, have since been removed from the list and the software setup to reject calls from unlisted systems.

The users are noted to fall into three categories, namely, those from NGOs, public univerities, health organisations, and private users.

6. NETWORK MANAGEMENT/FINANCIAL ASPECTS

6.1 Node Management Experience

On return from the Experimentation and Training Workshop in Lusaka, much pressure was put on the Project Leader regarding the ESANET Node operations. The key actors were a resident email expert (Ex.pert) and an ICS member of staff (A.user), both of whom claimed to have done an evaluation of the ESANET node. Their basic criticisms were that the node was inactive and full operational status should be restored immediately. The reasons for the shut down of the node i.e earlier unsustainable polling costs as high as Kshs.11,000/- per month were countered by the argument that these earlier high costs were due to the fact that the node operated a 2400 bps modem and that installation of the 9600 bps Telebit TrailBlazer would sort this out. As A.user was also a prolific user and networking enthusiast, the Project Leader decided to make him responsible for the node as the Sysop. and handed over to him the entire ESANET facility in December 1992 on the understanding that the maximum monthly expenditure for the lines (both inclusive) was KShs.5000/-. Costs incurred by both lines available for the node and Healthnet station are summarized below.

	EMAIL	HEALTHNET	TOTAL	EMAIL	REMARKS
	444919	444920		SYSOP	
	KSHS	KSHS			
December '92	5,875.55	344.55	6,220.10	A.user	
January '93	9,509.75	20,229.25	29,739.00	A.user	
February '93	7,232.20	2,621.30	9,853.50	A.user	
March '93	5,647.95	6,517.10	12,165.05	A.user	
April '93	2,002.20	14,598.65	16,600.85	A.user	
May '93	27,451.10	2,172.60	29,623.70	Odeny	Control
June '93	19,041.25	303.70	19,317.95	Odeny	Procedures
July '93	23,183.45	342.65	23,326.10	Odeny	Breached

System Abuse

Towards the end of April '93 it was realized that very large expenditures were incurred during January to March and this had not been reported to the Project Leader. The Sysop was changed and A.user was instructed to handover the facilities. A password protection system was installed to prevent unauthorized polling.

Authorized calls were logged by hand as the contents of the log file were not secure (deletion for the months January to March 1993 were noticed). Despite this it was later realized, albeit only in May 1993, that unauthorized polls were still being made by an unauthorized person. Further controls of the restricting physical access to the email facility by the restriction of keys to the laboratory housing the facilities were introduced in early June and violated soon after by A.user who continued to have access via duplication of keys.

Audit

In accordance with standing University procedures and inter-

alia, the Memorandum of Grant Conditions, in particular: Clause 3 Periodic Technical Report and Financial Statement (b) details of liabilities accrued, Clause 4 Compliance with National Laws, Clause 6 Centre Review, Clause 8 Maintenance and Insurance of Equipment and Clause 9 Final Report Certification, the Project Leader in his capacity as Director ICS requested the University on the 7th June 1993 to carry out an Audit on the Email Facility with regard to:

- 1) Over-expenditure incurred by the Email Facility located in the Graphics Laboratory during the months of January, February and March 1993. The telephone bills for direct line 444919 connected to the Email Facility and that for 444920 (normally connected to the Satellite Ground Station) incurred costs well in excess of the Email expenditure ceiling stipulated at Kshs.5,000/= at the 87th Academic Staff meeting held on 6th October 1992. The original telephone bills for these lines were given to A.user as the person in charge of the Email facility (minutes of 88th meeting held on 10th February 1993) during the period in question in accordance with certification procedures. To date neither the original bills for the purpose of certification nor a satisfactory explanation had been received. The April 1993 bills for both lines also needed to be scrutinized and reconciled.
- 2) Hand-over of keys to the telephone attached to line 444919, the cupboard containing Esanet equipment and manuals in the possession of A.user. The minutes of the 90th Academic Staff meeting held on 29th April 1993 refer to the hand-over. The hand-over needs to be reconciled viz a viz the original inventory.
- 3) Violation of contingency control measures by A.user regarding access to the Graphics Laboratory after office hours i.e. 5.00 p.m by unauthorized staff. These contingency measures set up on Friday 4th June 1993 were to control access to the Graphics Laboratory after working hours, when it was discovered that the pass word protection on the Email Facility was removed by an un-authorized person, as detailed in various memos from Ag. Snr. Systems Programmer and Computer Operator (regarding possession of Graphics Lab keys) dated 3/6/93 also the removal of Graphics Laboratory key from ICS Secretariat office witnessed by other staff on Friday 4th June at approximately 5 p.m.

in order to ensure a return to authorized utilization of University Equipment at the Institute and thereby responsibility and accountability for the same.

Consequent to the auditors report, and in view of the Memorandum of Grant Conditions under reference with attention to the Clauses delineated above, the Project Leader in his capacity as Director ICS brought to the attention of the University on 21st July 1993 that:

1. On failing to exercise reasonable care, as the person in charge and the Systems Operator (A.user), to ensure that the expenditure incurred by the e-mail facility in the Graphics Laboratory of the ICS funded by ESANET RESEARCH PROJECT, remained within the stipulated ceiling of KShs. 5000/= during the months of January, February, March and April 1993 as evidenced by but not limited to:

- i) failure to inform the Director of the precise over-expenditure for the said lines (444919 and 444920) over the stipulated months as and when these became apparent.
- ii) failure to provide Email reports to the 89th Academic Staff meeting of 10th March 1993 on Email Usage as per agreed minutes of the 88th Academic Staff meeting held on 10th Feb. 1993 both of which were attended by A.user
- iii) failure to-date to process the telephone bills for lines 444919 and 444920, passed to A.user for checking and verification as part of the certification procedure for the months January-March 1993.
- iv) deletion of the Log file on the email microcomputer containing valuable detailed information on each email event for the period January-March 1993 using both lines.
- v) excess expenditure actually incurred over the stipulated ceiling of KShs 5000/= as follows for both lines (444919 & 444920).

	<u>444919</u>	<u>Line 444920</u>	<u>Total(T)</u>	<u>Excess (T-5000)</u>
	<u>KShs.</u>	<u>KShs.</u>	<u>KShs.</u>	<u>KShs.</u>
January '93	9509.75	20,229.25	29,739.00	24,739.00
February '93	7232.20	2,621.30	9,853.50	4,853.50
March '93	5647.95	6,517.10	12,165.05	7,165.05
April '93	2002.20	14,598.65	16,600.85	11,600.85
Total Excess Chargeable			KShs.	<u>48,358.40</u>

A.user should show good cause as to why he should not be held responsible for the excess charges of KShs. 48,358.40 and loss of valuable email log file activity data pertaining to the ESANET RESEARCH PROJECT.

2. On the failure to handover keys to the telephone originally connected to 444919 and to the locker in the Graphics Laboratory, to facilitate re-conciliation of ESANET RESEARCH PROJECT equipment as per inventory produced by A.user and signed by him on 8/12/92.
A.user should show good cause why the cost of any ESANET RESEARCH PROJECT equipment or manuals in the said inventory not currently in the ICS or handed over as stipulated should not be charged to him.
3. On the Breach of Contingency Control measures with regard to the unauthorized use of the email facility after 29th April 1993, thereby incurring further costs reflected in May, June and July 1993 telephone bills for 444919 and 444920 shown below.

The official hard copy log of authorized calls made by Mr. S. Odeny since 29th April 1993 are only 8 as per schedule, the

rest of the calls are unauthorized. The actual expenditure as per invoices obtained from KPTC reconciled against official log shows that the unauthorized calls constitute the high expenditure summarized below:

	<u>444919</u> <u>KShs.</u>	<u>Line 444920</u> <u>KShs.</u>	<u>Total(T)</u> <u>KShs.</u>	<u>Less</u> <u>Official</u> <u>KShs.</u>	<u>Unauthorized Calls</u> <u>KShs. Estimated</u>
May '93	27,451.10	2,172.60	29,623.70	989.51	28,634.19
June '93	19,014.25	303.70	19,317.95	4,231.62	15,086.33
July '93	23,183.45	342.65	23,326.10	2,161.69	21,365.01
Minimum Chargeable Expenditure (to date) KShs.					65,085.53

A user should show good cause why he should not be responsible for all unauthorized calls made on or after 29th April 1993 to date and the costs thereof of KShs. 65,085.53.

6.2 Financial Aspects

Owing to the deletion of the log file, node operational cost data for January, February and March 1993 is not available. Data for the months of April, May, June and July 1993 are, however, available and the following is a summary of the operational costs for the three months. To facilitate comparison with operations involving the 2400 baud modem, corresponding data for August/September 1992 is also given below.

	1992 Aug/Sep	<----- 1993 ----->			
	-----	April	May	June	July
Charge per minute (USD)	2.30	4.60	4.60	4.60	4.60
Exchange rate (Ksh/USD)	60	60	60	60	60
Cost all polls (USD)*	178.37	140.07	202.86	209.85	184.97
Cost succ polls (USD)	94.13	115.09	177.70	202.95	172.87
Cost unsucc polls (USD)	108.00	24.98	25.16	6.90	12.10
Cost (USD/KB) successful	0.21	0.14	0.14	0.14	0.16
Total Cost (USD/KB)					
incl unsuccessful	0.45	0.17	0.16	0.14	0.17

Note: * excludes cost of un-correlated calls

From the above summary we note that for successful polls, the cost/kilobyte using the 2400 baud and the 9600 baud modems are 0.21 and 0.16 USD/Kb respectively. For all polls including unsuccessful ones, the corresponding figures for the respective modems are 0.45 and 0.17 USD/Kb. This implies a cost reduction per kilobyte of 62%. A minimum charge for mail transmission therefore appears to be 0.20 USD/Kb.

6.3 Node Management Tools

From the experience gained, as discussed above, it would be useful to have node management tools with the following functionality:

- (A) MONITORING: - track bi-directional traffic
- from:
 - node, user at
 - point, user at
 - point [off point], user at
 - to:
 - other nodes,
 - the node,
 - points off the node,
 - points [off points] of the node etc.

(B) CONTROL:
Safeguard against:

- 1) i) receipt of junk mail, specified conferences, bulletin boards, agency news etc for specified users at node, points or users off points and,
ii) receipt of junk mail, specified conferences, bulletin boards etc emanating from specified sources and/or list servers.
- 2) pirate networks - unauthorized use of the node by unlisted points or users off points.

(C). ACCOUNTING

- 1) based on usage and charge per kilo byte, the package should calculate the liability to users on points, or on the node or on points off points etc.
- 2) the package should be able to produce invoices at the end of the month for each user with relevant breakdown.
- 3) the package should also be able to do the following:
 - i) based on information in the Log-file on
 - a) duration of polls to other nodes both local and overseas
 - b) the PTT charge per minute for such destinations
 - ii) a) calculate on a daily basis the cumulative estimated cost to date after each call
b) make projections of the monthly cost using daily averages or weekly averages as appropriate.

6.4 Infrastructural Issues

The provision of an end-user service requires a legal contract that spells out the services offered by the node and terms thereof. Also required are the responsibilities and liabilities of the users and the

node.

Contractual Agreements should cover:

- 1) Installation Charges
- 2) Monthly Charges : per kilo byte
 Procedure for billing
 Procedure for payment,
- 3) Injunctions for non-compliance on
 - Payment
 - type of traffic
 - hacking or pirating
- 4) On-line Support
- 5) Hot-line Support
- 6) Documentation
- 7) Traffic Type
 - i) Encouraged
 - research,
 - technical information related to IT and Telematics
 - ii) Discouraged
 - idle chatter
 - junk mail
 - conferences for individual subscribers
 - bulletin boards for individual subscribers
 - flaming
 - politics
 - propaganda of any sort
 - agency news
 - advertizing or promotional blurb even if institutional or self

7. USER MANUAL AND DOCUMENTATION

For system documentation, the Nairobi node has relied mainly on the two documents distributed as text files with the Frontdoor software. These being:

- i) Frontdoor 1.99 Manual: A detailed user manual describing enduser and sysop commands.
- ii) Frontdoor Guide: A document that provides an overview of Frontdoor 2.02, Toscan, Imail and Golded

These manuals together provide a fairly comprehensive guide to operating the software. They, however, assume a relatively high level of computer and computer networking literacy. So whereas the system operator would find them valuable, they are quite unsuitable for the ordinary point user.

8. RELATED ACTIVITIES/RESEARCH AND DEVELOPMENT

Two Fidonet related projects (mentioned above in section 4.3) have been undertaken by postgraduate diploma students at the Institute of Computer Science over the last two years.

The first project undertaken between July and September 1992 had the objective of developing an interface between the Fido node running

Frontdoor and the Healthnet groundstation running the Pacsat communication modules. The prototype developed by the student has since been refined and is in operation providing virtually automatic transfer of messages between Fidonet and Pacsat.

Fidonet point endusers may prepare their messages using the Frontdoor editor in the usual way. The user may then route the message through Healthnet by simply specifying the destination in the format

username@callsign, 5:731/4.1

Callsign is the destination groundstation, eg. S.USA1. Username may be an ordinary user name, an Internet type address or a Fido type address. 5:731/4.1 is the local groundstations Fido address.

The second student project started in July 1993 and is due to be completed end of September 1993. This project addresses the design and implementation of a mail interface between the Fidonet node, running Frontdoor and the University of Nairobi Vaxcluster system, running VMSmail, via a local area network

It is envisaged that the software finally developed will provide VMSmail users with the capability of originating mail for Fidonet as well as vice-versa.

9. NODE EVALUATION USING LOG-FRAME

Attached as Appendix V(a)(b), is an evaluation of the Nairobi Node using the Logical framework approach. Appendix V(a) describes the structure and format while Appendix V(b) gives the details pertaining to the node.

10. FUTURE PLANS/DIRECTION

The Nairobi node plans to pursue the following:

I. Technical

- 1) Further research and development to refine the interfaces between the Frontdoor mailer, Pacsat mailer and the VMS mailer, with the view to integrating various communication resources.
- 2) A cost benefit analysis of connectivity to
 - i) Internet,
 - ii) Selected International Data Bases (for strategic research) through KP&TC's Packet Switching System KENPAC.

II. Management

- 1) Develop efficient and effective network management tools such as resource monitoring, control and billing to enhance user services in data communication.
- 2) Expand user base under careful screening and authorisation procedures including a formal contractual agreement.

III. Development

- 1) Build through training, technical and network management capacity of local staff and
- 2) Strengthen institutional and national infrastructure, both from the organizational and functional perspectives, in the field of telematics, thereby reducing dependancy, on a sliding scale, on external resources in the medium to long term.

AUGUST/SEPTEMBER 1992: KSANET EMAIL DATA.(TEL. 444919)

Polls terminated with error

DATE	TEL. NO.	COUNTRY	CHARGES (Labs)	CONNECT				SEND				RECEIVE				DURATION (minutes)	REMARK	
				TIME	TIME	TIME	TIME	SUCCESS	EFFECT	BYTES	CPS	SUCCESS	EFFECT	BYTES	CPS			
1 SEP 4	716081899	U.K.	471.25	07:25:22	07:28:37	No								No			2.95	
2 SEP 4	716081899	U.K.	83.15	07:29:54	07:30:18												0.30	H/S Fail
3 SEP 10	716081899	U.K.	83.15	07:44:45	07:45:18									Yes			0.40	
4 SEP 14	716081899	U.K.	110.90	08:05:27	08:06:05	Yes								INCOMP			0.58	
5 SEP 1	716081899	U.K.	106.00	08:14:08	08:14:36	Yes								Yes			0.42	
6 AUG 28	716081899	U.K.	900.90	08:33:15	08:39:39	No								No			6.27	
7 SEP 5	716081899	U.K.	471.25	09:46:33	09:49:49	No								No			3.13	
8 AUG 29	716081899	U.K.	138.60	09:49:36	09:50:28									INCOMP			0.80	
9 AUG 29	716081899	U.K.	124.75	09:52:03	09:52:21									Yes			0.33	
10 AUG 12	716081899	U.K.	70.70	11:55:06	11:56:35	Yes								Yes			0.55	
11 AUG 24	716081899	U.K.	124.75	11:55:20	11:56:02	Yes								Yes			0.62	
12 AUG 16	716081899	U.K.	200.25	12:24:40	12:26:15	Yes								Yes			1.48	
13 AUG 16	716081899	U.K.	117.80	13:01:32	13:02:24	Yes								Yes			0.78	
14 AUG 16	716081899	U.K.	58.90	16:20:54	16:21:16	Yes								No			0.27	
15 AUG 23	716081899	U.K.	424.10	16:44:07	16:47:37	No								No			3.40	
16 AUG 12	461311085	S.AFRICA	83.15	17:04:06	17:04:32	Yes											0.33	
17 AUG 7	461311085	S.AFRICA	152.45	17:38:06	17:39:00	Yes								Yes			0.77	
18 SEP 2	716081899	U.K.	166.30	18:06:30	18:07:14	Yes								Yes			0.65	
19 AUG 31	716081899	U.K.	82.45	18:31:32	18:32:06									INCOMP			0.50	
20 AUG 8	461311085	S.AFRICA	58.90	18:46:45	18:47:08	Yes											0.30	
21 AUG 8	461311085	S.AFRICA	70.70	18:58:57	18:59:30	Yes											0.47	
22 AUG 31	716081899	U.K.	129.60	18:59:05	18:59:59	Yes											0.82	
23 SEP 9	716081899	U.K.	117.80	19:02:20	19:03:01									Yes			0.72	
24 AUG 6	461311085	S.AFRICA	117.80	19:06:03	19:06:30	Yes											0.37	
25 AUG 12	716081899	U.K.	110.90	19:20:14	19:20:38	Yes											0.32	
26 AUG 31	716081899	U.K.	70.70	19:33:04	19:33:31	Yes											0.35	
27 SEP 25	716081899	U.K.	82.45	19:45:30	19:46:00	Yes											0.40	
28 AUG 13	461311085	S.AFRICA	58.90	20:04:59	20:05:22	Yes											0.30	
29 AUG 17	716081899	U.K.	70.70	20:31:47	20:32:14	Yes											0.35	
30 AUG 17	716081899	U.K.	129.60	20:51:35	20:52:30	Yes											0.83	
31 AUG 25	716081899	U.K.	1048.40	20:54:50	21:03:28	No								No			8.72	
32 AUG 20	716081899	U.K.	365.20	21:40:33	21:43:29	No								No			2.75	
33 AUG 20	716081899	U.K.	106.00	21:51:24	21:51:47	No								No			0.30	Unable to complete Transfer
			(TCO)	6508.45												(DU)	41.52	

AUGUST/SEPTEMBER 1992: KSANET XMAIL DATA (TEL. 444919)

Successful Polls

DATE	TEL. NO.	COUNTRY	CHARGES (Kshs)	CONNECT TIME	END TIME	SUCCESS	SEND		RECEIVE			REMARK		
							FFPCY	BYTES	CPS	SUCCESS	FFPCY		BYTES	CPS
1 SEP 3	716081899	U.K.	512.80			Yes	81%	26240	195	Yes	87%	11737	209	3.48
2 SEP 4	716081899	U.K.	249.50	07:31:59	07:33:39	Yes	99%	25280	238	Yes	53%	10090	129	1.57
3 SEP 14	716081899	U.K.	235.60	08:07:22	08:08:57	Yes				INCOMP				1.52
4 AUG 24	716081899	U.K.	221.75	08:49:08	08:50:36	Yes				Yes	38%	4864	93	1.38
5 AUG 19	716081899	U.K.	194.05	09:06:54	09:08:07	Yes	84%	14655	203	Yes	41%	6591	99	1.12
6 AUG 28	716081899	U.K.	304.90	09:18:34	09:20:39	Yes	88%	19091	212	INCOMP				2.00
7 SEP 6	716081899	U.K.	341.60	09:27:54	09:29:30	Yes	97%	24543	235	Yes	31%	5882	75	1.52
8 AUG 21	716081899	U.K.	263.35	09:43:25	09:45:12	Yes	87%	5020	209	Yes	70%	21091	170	1.68
9 AUG 18	716081899	U.K.	152.45	09:45:05	09:43:59	Yes	95%	7363	230					0.80
10 AUG 22	716081899	U.K.	180.20	10:11:03	10:12:12	Yes	91%	8346	219	Yes	91%	4385	219	1.07
11 SEP 26	716081899	U.K.	249.50	10:53:15	10:54:53	Yes	96%	19406	231	Yes	52%	12140	126	1.57 Unable to complete Transfer
12 AUG 22	716081899	U.K.	318.80	11:35:08	11:37:17	Yes				Yes	63%	12174	152	2.05
13 AUG 15	716081899	U.K.	152.45	14:01:24	14:02:23	Yes	80%	7779	194					0.88
14 AUG 22	716081899	U.K.	152.45	16:50:13	16:51:11	Yes	95%	8311	230					0.87
15 AUG 13	716081899	U.K.	304.90	17:53:23	17:55:28	Yes	82%	15811	197	INCOMP				1.98
16 SEP 17	716081899	U.K.	152.45	18:05:04	18:06:00	Yes	72%	6319	175	Yes				0.85
17 SEP 5	716081899	U.K.	318.80	18:06:00	18:08:09	Yes	92%	5809	223	Yes	54%	20079	130	2.07
18 AUG 28	716081899	U.K.	212.05	18:52:41	18:54:24	Yes	97%	25655	233	Yes	90%	4778	217	1.65
19 AUG 28	716081899	U.K.	306.30	18:55:56	18:58:14	No				Yes	34%	39403	82	2.33
20 AUG 31	716081899	U.K.	294.50	19:02:09	19:04:26	No				Yes	61%	52668	147	2.20
21 AUG 30	716081899	U.K.	141.35	19:50:42	19:51:43	Yes	74%	4659	179	NO				0.92
22 AUG 13	716081899	U.K.	129.60	20:30:55	20:31:53	Yes	97%	8481	235					0.87
23 AUG 26	716081899	U.K.	129.60	22:09:10	22:10:06	Yes	96%	7438	232	Yes				0.83
24 AUG 20	716081899	U.K.	129.60	22:22:47	22:23:45	Yes	94%	7700	226					0.83
			(TCS) 5648.55				(TBS) 247906				(TBR) 206082	(DS) 36.03		

AUGUST/SEPTEMBER 1992: KSANET XMAIL DATA ANALYSES (TEL. 444919)

1. FINANCIAL

Charge per minute = USD 2.3

Exchange Rate Kshs 60 to 1 USD

i) Overall Total Cost (DS+DU)*2.3 = 178.37 USD

 ii) Successful Transmissions
 Cost/Lb TCS/((TBS+TBR)/1000) = 12.44 Kshs/Lb 0.21 USD/Lb

 iii) % Overhead Cost including unsuccessful transmissions
 (TCO/(TCO+TCS))*100 = 53.54%

 iv) Actual Cost/Lb
 (TCO+TCS)/((TBS+TBR)/1000) = 26.78 Kshs/Lb 0.45 USD/Lb

2. STATISTICAL

i) Average bps (TBS+TBR)/(DS*60) = 209.99 bps

 ii) Number of Successful Polls (NS) = 24.00
 Number of Unsuccessful Polls (NU) = 33.00

iii) % Successful Polls (NS/(NS+NU))*100 = 42.11%

3. TIME CORRELATION

Bands of time		Frequency	
		Success	Fail
00:00:00	upto 08:00:00	1	3
08:00:01	upto 18:00:00	13	14
18:00:01	upto 23:59:59	9	16

APRIL 1993: KSANET EMAIL DATA (TEL. 444919)

Polls terminated with error

DATE	TEL. NO.	COUNTRY	CHARGES(US\$.)	CONNECT		SEND		RECEIVE		DURATION	REMARK
				TIME	TIME	SUCCESS	BYTES	CPS	SUCCESS		
1 APR 26	716081899	U.K	272.25	09:53:17	9:54:12					0.85	Receive incomplete
2 APR 11	716081899	U.K	102.00	11:51:43	11:52:07	N				0.40	Call Terminated
3 APR 12	716081899	U.K	136.00	14:55:12	14:56:01	N				0.75	Unable to complete Transfer
4 APR 10	716081899	U.K	20.95	15:37:28	15:37:29	N				0.02	Carrier lost
5 APR 10	716081899	U.K	20.95	16:47:36	16:47:37	N				0.02	Carrier lost
6 APR 10	716081899	U.K	20.95	16:54:11	16:54:12	N				0.02	Carrier lost
7 APR 10	716081899	U.K	83.75	17:02:13	17:02:14	N				0.02	Carrier lost
8 APR 10	716081899	U.K	102.00	17:08:57	17:08:58	N				0.02	Carrier lost
9 APR 12	716081899	U.K	20.95	19:16:03	19:16:28					0.38	Carrier lost
10 APR 11	716081899	U.K	340.05	20:02:38	20:04:19	N				1.63	Unable to complete Transfer
11 APR 11	716081899	U.K	289.05	20:09:03	20:10:28	N				1.33	Unable to complete Transfer
Total (TCO)			1,408.90			0		0	(DU)	5.43	

APRIL 1993: KSANET EMAIL DATA (TEL. 444919)

Successful Polls

DATE	TEL. NO.	COUNTRY	CHARGES(US\$.)	CONNECT		SEND		RECEIVE		DURATION	REMARK	
				TIME	TIME	SUCCESS	BYTES	CPS	SUCCESS			BYTES
1 APR 26	716081899	U.K	314.15	09:56:19	09:57:28					1.08		
2 APR 10	716081899	U.K	104.70	10:01:55	10:02:16	Y	573	286	47339	845	0.30	
3 APR 11	716081899	U.K	323.05	10:55:07	10:56:49			Y	7370	87	1.62	
4 APR 6	716081899	U.K	251.30	14:09:38	14:10:32	Y	8329	832	24703	823	0.83	
5 APR 12	716081899	U.K	670.15	14:59:22	15:02:13	Y	129332	948			2.80	Receive incomplete
6 APR 12	716081899	U.K	356.05	15:05:53	15:07:14			Y	16957	264	1.28	
7 APR 21	716081899	U.K	397.90	16:03:37	16:05:14			Y	73426	917	1.52	
8 APR 28	716081899	U.K	272.25	16:32:55	16:33:54	Y	4608	767	27097	848	0.88	
9 APR 10	716081899	U.K	774.90	17:14:05	17:17:39			Y	10073	57	3.50	
10 APR 4	716081899	U.K	153.00	18:17:25	18:17:58			Y	14693	816	0.47	
11 APR 10	716081899	U.K	272.05	18:17:26	18:18:52	Y	13449	216			1.37	
12 APR 12	716081899	U.K	374.05	19:17:29	19:19:19	Y	87471	930	1030	515	1.77	
13 APR 9	716081899	U.K	323.05	19:31:56	19:33:27	Y	23182	846	28650	622	1.45	
14 APR 5	716081899	U.K	119.00	19:56:22	19:56:41			Y	2607	651	0.25	
15 APR 13	461311085	S.A	85.00	20:11:07	20:11:34	Y	801	400	2305	576	0.33	
16 APR 11	716081899	U.K	306.05	20:14:45	20:16:14	Y	49778	777			1.45	
17 APR 11	716081899	U.K	306.05	20:26:55	20:28:26	Y	62821	951	831	207	1.45	
18 APR 14	716081899	U.K	374.05	21:32:08	21:34:02	Y	6799	849	76154	908	1.82	
19 APR 14	716081899	U.K	119.00	22:49:36	22:50:15	Y	16683	834			0.58	
20 APR 14	716081899	U.K	104.70	23:04:18	23:04:38	Y	1372	688			0.27	
(TCS)			6,000.45	(TBS)		405196	(TBR)		333235	(DS)	25.02	

APRIL 1993: ISARIT YMAIL DATA ANALYSIS (TEL. 444919)

1. FINANCIAL

Charge per minute = 4.60 USD

Exchange Rate 60Kshs to 1 USD

i) Overall Total Cost $(DS+DU)*4.60 = 140.07$ USD

ii) Successful Transmissions

Cost(Kshs)/Tb $TCS/((TBS+TBR)/1000) = 8.13$ Kshs/Tb - 0.14 USD/Tb

iii) % Overhead Cost including unsuccessful transmissions

 $(TCO/(TCO+TCS))*100 = 19.02\%$

iv) Actual Cost/Tb

 $(TCO+TCS)/((TBS+TBR)/1000) = 10.03$ Kshs/Tb - 0.17 USD/Tb

2. STATISTICAL

i) Average bps $(TBS+TBR)/(DS+60) = 491.96$ bps

ii) Number of Successful Polls (NS) = 20.00

Number of Unsuccessful Polls (NU) = 11.00

iii) % Successful Polls $(NS/(NS+NU))*100 = 64.52\%$

3. TIME CORRELATION

Bands of time			Frequency	
			success	fail
00:00:00	upto	08:00:00	0	0
08:00:01	upto	18:00:00	9	8
18:00:01	upto	23:59:59	11	3

MAY 1993: KSANET EMAIL DATA (TEL. 444919)

Polls terminated with error

DATE	TEL. NO.	COUNTRY	CHARGES(ISHS.)	CONNECT		SEND		RECEIVE		DURATION	REMARK
				TIME	TIME(TT)	SUCCESS	BYTES	CPS	SUCCESS		
1 MAY 28	716081899	U.I	257.45	07:40:02	07:40:47	N				1.23	Unable to send
2 MAY 21	716081899	U.I	491.55	07:55:54	07:57:37	N				0.68	Unable to complete transfer
3 MAY 19	716081899	U.I	257.45	08:56:33	08:57:16					0.18	Receive incomplete
4 MAY 20	5143758	TANZANIA		11:37:34	11:37:48	N				1.68	No transaction number
5 MAY 28	5143758	TANZANIA		11:49:20	11:49:38	N				0.72	No transaction number
6 MAY 23	716081899	U.I	257.45	18:41:46	18:12:31	N				0.70	Unable to send
7 MAY 1	716081899	U.I	397.90	22:01:30	22:02:49	N				0.27	Receive incomplete
			(TCO)	1,661.80						(DU)	5.47

MAY 1993: KSANET EMAIL DATA (TEL. 444919)

Successful Polls

DATE	TEL. NO.	COUNTRY	CHARGES(ISHS.)	CONNECT		SEND		RECEIVE		DURATION	REMARK		
				TIME	TIME(TT)	SUCCESS	BYTES	CPS	SUCCESS			BYTES	CPS (minutes)
1 MAY 28	716081899	U.I	1,661.90	07:41:48	07:48:34	Y	307934	895	Y	46454	819	1.98	
2 MAY 21	716081899	U.I	468.15	07:58:45	08:00:26	Y	55812	1198	Y	14051	780	0.48	
3 MAY 19	716081899	U.I	257.45	08:25:25	08:26:10	Y	3292	823	N			0.32	Receive incomplete
4 MAY 18	716081899	U.I	330.45	09:05:30	09:06:21	Y	12416	776	Y	9695	969	2.57	
5 MAY 20	716081899	U.I	468.15	09:21:48	09:23:08				Y	43586	681	0.75	
6 MAY 17	716081899	U.I	247.85	09:30:18	09:30:49	Y	573	286	Y	5286	660	1.18	
7 MAY 2	716081899	U.I	561.75	11:15:39	11:17:44				Y	91823	834	0.45	
8 MAY 31	716081899	U.I	110.15	12:09:09	12:10:01	Y	484	60	Y	22928	818	0.78	
9 MAY 21	716081899	U.I	798.60	13:09:40	13:21:11	Y	84322	741.75				0.70	
10 MAY 21	716081899	U.I	1,266.75	13:20:49	13:25:00	Y	124684			59531		0.37	
11 MAY 2	716081899	U.I	187.25	14:20:21	14:20:54	Y	2364	591	Y			1.27	
12 MAY 2	716081899	U.I	187.25	15:20:31	15:20:54	Y	3804	634				1.62	
13 MAY 19	5143758	TANZANIA		17:56:51	17:57:16				Y	1987	198	2.47	
14 MAY 28	716081899	U.I	2,065.35	18:20:39	18:27:49	Y	38666	130	Y	63050	534	4.12	
15 MAY 23	716081899	U.I	280.90	18:44:28	18:45:20	Y	5326	532	Y	22909	818	0.80	
16 MAY 26	716081899	U.I	936.30	18:46:49	18:49:51	Y	68881	930	Y	76804	834	6.70	
17 MAY 15	716081899	U.I	440.60	19:44:35	19:45:50	Y	6879	872	Y	45251	870	2.97	
18 MAY 28	716081899	U.I	440.60	20:52:41	20:53:58	Y	53270	918				7.10	
19 MAY 13	716081899	U.I	725.60	22:22:18	22:24:55	Y	60492	847				1.22	
20 MAY 13	716081899	U.I	46.80	22:27:54	22:28:43				Y	22916	881	0.80	
			(TCS)	11481.85		(TBS)		829299		(TBR)	526271	(DS)	38.63

MAY 1993: NSANT EMAIL DATA ANALYSIS (TEL. 444319)

1. FINANCIAL

Charge per minute = USD 4.60

Exchange Rate Lshs 60 to USD 1

i) Overall Total Cost (DS+DU)*4.60 = 202.86 USD

ii) Successful Transmissions
 Cost/Lb TCS/((TBS+TBR)/1000) = 8.47 Lshs/Lb - 0.14 USD/kB

iii) % Overhead Cost including unsuccessful transmissions
 (TCO/(TCO+TCS))*100 = 12.64%

iv) Actual Cost/Lb
 (TCO+TCS)/((TBS+TBR)/1000) 9.70 Lshs/Lb - 0.16 USD/kB

2. STATISTICAL

i) Average bps (TBS+TBR)/(DS+60) = 584.80 bps

ii) Number of Successful Polls (ES) = 20.00
 Number of Unsuccessful Polls (NU) = 7.00

iii) % Successful Polls (ES/(ES+NU))*100 = 74.07%

TIME CORRELATION

Bands of time		Frequency	
		Success	Fail
00:00:00	upto 08:00:00	2	2
08:00:01	upto 18:00:00	11	3
18:00:01	upto 23:59:59	7	2

JUNE 1993: ISATV EMAIL DATA ANALYSIS (TEL. 444919)

1. FINANCIAL

Charge per minute = USD 4.60

Exchange Rate Kshs60 to USD 1

i) Overall Total Cost $(DS+DU)*4.60 = 209.84$ USD

ii) Successful Transmissions

Cost/Tb TCS/ $((TBS+TBR)/1000) = 8.16$ Kshs/Tb - 0.14 USD/Tb

iii) % Overhead Cost including unsuccessful transmissions

 $(TCO/(TCO+TCS))*100 = 4.60\%$

iv) Actual Cost/Tb

 $(TCO+TCS)/((TBS+TBR)/1000) = 8.55$ Kshs/Tb - 0.14 USD/Tb

2. STATISTICAL

i) Average bps $(TBS+TBR)/(DS*60) = 586.52$ bps

ii) Number of Successful Polls (NS) = 32.00

Number of Unsuccessful Polls (NU) = 5.00

iii) % Successful Polls $(NS/(NS+NU))*100 = 86.49\%$

3. TIME CORRELATION

Bands of time		Frequency	
		Success	Fail
00:00:00	upto 08:00:00	0	0
08:00:01	upto 18:00:00	13	4
18:00:01	upto 23:59:59	19	1

JUNE 1993: KSANT EMAIL DATA (TEL. 444919)

Polls terminated with error

DATE	TEL. NO.	COUNTRY	CHARGES(KSHS.)	CONNECT		SEND		RECEIVE		DURATION	REMARK
				TIME	TIME	SUCCESS	BYTES	CPS	SUCCESS		
1 JUN 15	114843724	S.AFRICA		10:58:29	10:58:51					0.30	
2 JUN 11	716081899	U.K		17:14:15	17:14:29					0.18	No transaction number
3 JUN 11	716081899	U.K	174.35	17:27:59	17:28:11					0.20	Handshake failure
4 JUN 11	716081899	U.K	261.55	17:32:29	17:33:11					0.65	Unable to complete transfer
5 JUN 1	716081899	U.K	174.35	20:31:07	20:31:21					0.17	
				(TCO) 610.25				(DU) 1.50			

JUNE 1993: KSANT EMAIL DATA (TEL. 444919)

Successful polls

DATE	TEL. NO.	COUNTRY	CHARGES(KSHS.)	CONNECT		SEND		RECEIVE		DURATION	REMARK	
				TIME	TIME	SUCCESS	BYTES	CPS	SUCCESS			BYTES
1 JUN 26	716081899	U.K	765.80	08:28:17	8:31:01	Y	1607	401	Y	127117	882	2.67
2 JUN 5	716081899	U.K	639.35	10:11:09	10:12:59	Y	20198	841	Y	29984	535	1.77
3 JUN 21	716081899	U.K		10:16:56	10:19:01	Y	46775	935	Y	21873	405	2.02
4 JUN 18	114843724	S.AFRICA		10:42:00	10:42:55	Y	7582	282	Y	8	0	0.87
5 JUN 15	114843724	S.AFRICA		11:08:08	11:08:39				Y	944	236	0.50
6 JUN 4	5143758	TANZANIA		11:28:26	11:29:02				Y	3335	235	0.55
7 JUN 1	716081899	U.K	319.70	12:44:35	12:45:18				Y	19290	696.5	0.65
8 JUN 15	716081899	U.K	900.90	14:07:26	14:10:12	Y	40387	917	Y	80568	856	2.70
9 JUN 14	114843224	S.AFRICA		14:37:07	14:37:37				Y	780	97	0.43
10 JUN 23	716081899	U.K	581.25	16:46:35	16:48:12				Y	69971	853	1.55
11 JUN 23	716081899	U.K	232.50	16:51:37	16:52:09	Y	15551	863				0.47
12 JUN 11	716081899	U.K	203.45	17:10:00	17:10:34				Y	15956	797	0.50
13 JUN 30	716081899	U.K	726.55	17:35:08	17:37:20	Y	61534	961	Y	24021	480	2.13
14 JUN 6	716081899	U.K	889.30	18:28:36	18:31:51	Y	124967	743	Y	4652	465	3.18
15 JUN 28				18:57:48	18:58:07				Y	128	64	0.25
16 JUN 21	2022969790	U.S.A		19:03:15	19:03:51				Y	7914	791	0.53
17 JUN 7	716081899	U.K	222.30	19:05:07	19:05:49	Y	2622	655	Y	14355	897	0.63
18 JUN 27	716081899	U.K	172.90	19:42:39	19:42:59				Y	1493	373	0.25
19 JUN 1	716081899	U.K	639.35	20:06:43	20:08:33	Y	53228	595		5421	542	1.77
20 JUN 23	716081899	U.K	261.55	20:17:50	20:18:31	Y	22110	783.5				0.62
21 JUN 18	716081899	U.K	639.35	20:45:27	20:47:19	Y	17565	878	Y	62907	873	1.80
22 JUN 11	716081899	U.K	290.60	20:53:26	20:55:02	Y	20555	446	Y	5367	246.5	1.53
23 JUN 28	716081899	U.K	668.40	21:04:25	21:06:23	Y	63290	708		15535	863	1.90
24 JUN 19	716081899	U.K	321.15	22:02:08	22:03:06	Y	10508	875	Y	24373	812	0.90
25 JUN 1	716081899	U.K	1,828.00	22:15:11	22:22:14	Y	254234	629				6.98
26 JUN 9	716081899	U.K	765.80	22:24:07	22:26:49	Y	132389	959	Y	4396	732	2.63
27 JUN 7	716081899	U.K	172.90	22:32:25	22:33:09	Y	5298	883	Y	4932	822	0.50
28 JUN 6	716081899	U.K	98.80	22:40:04	22:40:31	Y	2961	740	Y	4033	672	0.38
29 JUN 21	716081899	U.K	222.30	23:09:19	23:09:50	Y	10004	833	Y	1490	372	0.45
30 JUN 21	2022969790	U.S.A	406.85	23:14:09	23:15:12	Y	9910	225				0.98
31 JUN 16	716081899	U.K	419.95	23:41:56	23:43:18	Y	23730	912	Y	28842	848	1.30
32 JUN 8	716081899	U.K	271.75	23:42:12	23:43:59	Y	4108	684	Y	21709	904	0.72
				(TCS) 12660.75		(TBS) 951113		(TBR) 601394		(DS) 44.12		

JULY 1993: ESANET EMAIL DATA (TEL. 444919)

Polls terminated with error

DATE	TEL. NO.	COUNTRY	CHARGES(US\$.)	CONNECT		SEND		RECEIVE		DURATION	REMARK
				TIME	TIME	SUCCESS	BYTES	CPS	SUCCESS		
1 JULY 28	716081899	U.K	668.05	08:53:38	8:58:12					2.28	
2 JULY 11	716081899	U.K	101.9	08:55:08	8:55:24					0.20	
3 JULY 14	1252892	ZAMBIA	140.5	18:21:24	18:21:37					0.15	No transaction number
			(TCC)	930.45				(DU)	2.63		

JULY 1993: ESANET EMAIL DATA (TEL. 444919)

Successful Polls

DATE	TEL. NO.	COUNTRY	CHARGES(US\$.)	CONNECT		SEND		RECEIVE		DURATION	REMARK		
				TIME	TIME	SUCCESS	BYTES	CPS	SUCCESS			BYTES	CPS
1 JULY 22	716081899	U.K	127.4	00:10:38	0:11:07			Y	128	0	0.23		
2 JULY 7	716081899	U.K	203.85	06:24:40	6:25:06			Y	1304	326	0.37		
3 JULY 30	716081899	U.K	458.7	08:01:52	8:03:18	Y	8070	807	48622	900	1.37		
4 JULY 9	716081899	U.K	254.8	08:07:43	8:08:23	Y	6590	659	4939	493	0.60		
5 JULY 18	716081899	U.K	101.9	08:59:49	8:55:28	Y	9356	467			0.58		
6 JULY 18	716081899	U.K	484.15	11:28:42	11:30:14	Y	39157	932	28528	891	1.47		
7 JULY 11	1252892	ZAMBIA	119.5	11:32:59	11:33:14	Y	507	0			0.18		
8 JULY 11	716081899	U.K	790	12:20:08	12:22:48	Y	84099	724	25908	809	2.63		
9 JULY 1	5175314	TANZANIA		12:34:28	15:34:42			Y	719	359	0.17		
10 JULY 11	716081899	U.K	611.6	12:54:21	12:56:22	Y	100277	946			1.95		
11 JULY 10	1252892	ZAMBIA		14:56:05	14:56:22			Y	395	0	0.22		
12 JULY 1	62751446	ITALY		15:17:40	15:17:40			Y	2867	716	0.40		
13 JULY 4	716081899	U.K	101.9	16:16:20	16:16:45	Y	9235	769			0.35		
14 JULY 31	716081899	U.K	809.5	16:38:13	16:40:34	Y	68951	957	25054	521	2.28		
15 JULY 3	716081899	U.K	329.75	17:40:09	17:40:56	Y	5256	657	20118	8838	0.72		
16 JULY 1	716081899	U.K	329.75	17:51:11	17:51:55			Y	16356	681	0.67		
17 JULY 31	716081899	U.K	209.85	18:24:00	18:24:47	Y	24089	658			0.72		
18 JULY 4	716081899	U.K	509.65	19:00:47	19:02:24	Y	77920	950			1.55		
19 JULY 6	716081899	U.K	449.7	19:18:30	19:19:38			Y	43545	837	0.07		
20 JULY 21	716081899	U.K	479.7	19:36:25	19:37:41			Y	54230	903	1.20		
21 JULY 6	716081899	U.K	449.7	19:50:23	19:51:31	Y	19192	872	20949	872	0.07		
22 JULY 17	716081899	U.K	419.7	19:51:39	19:51:42	Y	9343	778	26603	886	0.98		
23 JULY 13	716081899	U.K	299.8	20:01:01	20:01:37	Y	2427	606	14133	883	0.53		
24 JULY 18	716081899	U.K	203.85	20:40:46	20:41:34	Y	14756	922	7350	735	0.73		
25 JULY 12	716081899	U.K	539.65	20:46:16	20:47:42	Y	12936	924	43612	872	1.35		
26 JULY 1	716081899	U.K	269.8	20:51:17	20:51:50	Y	3007	751	4961	826	0.48		
27 JULY 20	716081899	U.K	179.9	20:54:17	20:55:04	Y	28960	905			0.75 Incomplete		
28 JULY 9	716081899	U.K	719.5	21:00:52	21:02:54	Y	23906	796	27060	520	1.97		
29 JULY 7	716081899	U.K	458.7	21:13:45	21:15:09	Y	4138	689	54735	882	1.33		
30 JULY 20	716081899	U.K	662.55	21:30:26	21:32:39	Y	24541	876	74840	890	2.15		
31 JULY 15	716081899	U.K	560.65	21:36:46	21:38:39	Y	12512	548	69108	886	1.82		
32 JULY 24	716081899	U.K	229.35	21:54:15	21:54:47	Y	3547	866	4969	828	0.47		
33 JULY 24	716081899	U.K	178.4	22:04:17	22:04:35	Y	1041	260			0.23		
34 JULY 26	716081899	U.K	509.65	22:11:54	22:13:35	Y	43878	914	16192	426	1.62		
35 JULY 22	716081899	U.K	101.9	22:11:56	22:12:27			Y	12364	883	0.45		
36 JULY 23	716081899	U.K	254.8	22:22:37	22:23:12	Y	1698	424	8872	739	0.52		
37 JULY 25	716081899	U.K	178.4	22:28:52	22:29:37	Y	7886	788	14375	718	0.68		
38 JULY 17	716081899	U.K	331.25	22:40:06	22:41:02	Y	27380	912	8431	702	0.87		
39 JULY 16	716081899	U.K	840.95	23:41:28	23:44:23	Y	17885	894	82523	723	2.87		
			(TCS)	13760.2				(TBS)	692540	(TBR)	763788	(DS)	37.58

JULY 1993: KSANTT EMAIL DATA ANALYSIS (TEL. 444919)

1. FINANCIAL

Charge per minute = USD 4.60

Exchange Rate Lshs 80 to USD 1

i) Overall Total Cost (DS+DH)*4.60 = 165.00 USD

ii) Successful Transmissions

Cost/Tb TCS/((TBS+TBR))/1000 = 9.45 Lshs/Tb - 0.16 USD/Tb

iii) % Overhead Cost including unsuccessful transmissions

(TCO/TCO+TCS)*100 = 6.33%

iv) Actual Cost/Tb

(TCO+TCS)/((TBS+TBR))/1000 = 10.09 Lshs/Tb - 0.17 USD/Tb

2. STATISTICAL

i) Average bps (TBS+TBR)/(DS*60) = 645.82 bps

ii) Number of Successful Polls (NS) = 39

Number of Unsuccessful Polls (NU) = 3

iii) % Successful Polls (NS/(NS+NU))*100 = 92.86%

3. TIME CORRELATION

Bands of time		Frequency	
		Success	Fail
00:00:00	upto 08:00:00	2	0
08:00:01	upto 18:00:00	14	2
18:00:01	upto 23:59:59	23	1

APRIL 93 POINT TRAFFIC (THROUGH NODE 5:731/4.0)

FOR/BY POINT

FOR/BY POINT		RECEIVED FROM (BYTES)			SENT TO (BYTES)			TOTAL	TOTAL
		----->			<-----				
No.	NAME	GNFIDO	R. STATION	POINT	GNFIDO	R. STATION	POINT	RECEIVED	SENT
		-----			-----			-----	-----
5:731/4.1	HealthNet	390		24236	4471		7157	24626	11628
5:731/4.2	WABESA				18731			0	18731
5:731/4.10	KU			377				377	0
5:731/4.21	KEMRI(KSH)	3294		127253	44691			130547	44691
5:731/4.30	PAYNES	30065			54474			30065	54474
5:731/4.33	WABREP				286			0	286
5:731/4.201	MAP	21072			359			21072	359
5:731/4.502	WHO_HLM	11763	11759		2382	250		23522	2632
5:731/4.503	APMS	5978			23804			5978	23804
5:731/4.504	unlisted	1185	780						
		-----			-----			-----	-----
Totals		73747	12539	151866	149198	250	7157	236187	156605
		-----			-----			-----	-----

MAY 93 POINT TRAFFIC (THROUGH NODE 5:731/4.0)

FOR/BY POINT

FOR/BY POINT		RECEIVED FROM (BYTES)			SENT TO (BYTES)			TOTAL	TOTAL
		----->			<-----				
No.	NAME	GNFIDO	R. STATION	POINT	GNFIDO	R. STATION	POINT	RECEIVED	SENT
-----		-----	-----	-----	-----	-----	-----	-----	-----
5:731/4.1	HealthNet	1682		25407	1230		21976	27089	23206
5:731/4.4	NUCLEAR	1118			1742			1118	1742
5:731/4.21	KEMRI(KSM)	3561					13483	3561	13483
5:731/4.22	KEMRI_LIB			15798			1034	15798	1034
5:731/4.23	unlisted	6252		226	335			6478	335
5:731/4.24	unlisted	3461		237				3698	0
5:731/4.25	unlisted			241				241	0
5:731/4.30	PAYNES	20016					22207	20016	22207
5:731/4.32	MARCIAP	3496			5524		62472	3496	67996
5:731/4.40	NCPD						6023	0	6023
5:731/4.100	unlisted			698				698	0
5:731/4.201	MAP			16285			562	16285	562
5:731/4.501	COMPU_NEWS	514		3276		2320	998	3790	3318
5:731/4.502	WHO_HLM		5507	4292				9799	0
5:731/4.503	APMS			7359			7954	7359	7954
5:731/4.600	KEMRI_KILIFI	50131			29431	792	10741	50131	40964
5:731/4.700	unlisted			236				236	0
-----		-----	-----	-----	-----	-----	-----	-----	-----
Totals		90231	5507	74055	38262	3112	147450	169793	188824
-----		-----	-----	-----	-----	-----	-----	-----	-----

JUNE 93 POINT TRAFFIC (THROUGH NODE 5:731/4.0)

FOR/BY POINT

RECEIVED FROM (BYTES)

SENT TO (BYTES)

TOTAL

TOTAL

No.	NAME	<----->			<----->			RECEIVED	SENT
		GNFIDO	E. STATION	POINT	GNFIDO	E. STATION	POINT		
5:731/4.1	HEALTHNET			79585			104364	79585	104364
5:731/4.2	BARESA			390				390	0
5:731/4.10	KU			1636			648	1636	648
5:731/4.21	KEMRI(KSM)	22827		916	4137		24466	23743	28603
5:731/4.22	KEMRI_LIB			5727			67679	5727	67679
5:731/4.25	unlisted	11525		5115	13466		12996	16640	26462
5:731/4.30	PAYNES	24738		914	1804		30330	25652	32134
5:731/4.32	MARCIAP	4056					93026	4056	93026
5:731/4.40	NCPD						4447	0	4447
5:731/4.100	unlisted	1202		9697			95926	10899	95926
5:731/4.300	UON_LIB	556					1198	556	1198
5:731/4.501	COMPURENS	27891		1745	16772		56817	29636	73589
5:731/4.502	WHO_HLM			7715			7203	7715	7203
5:731/4.503	APMS			1719			14082	1719	14082
5:731/4.600	KEMRI(KLF)	59152		5695	3274		83418	64847	86692
Totals		151947	0	120854	39453	0	596600	272801	636053

JULY 93 POINT TRAFFIC (THROUGH NODE 5:731/4.0)

FOR/BY POINT

RECEIVED FROM (BYTES)

SENT TO (BYTES)

TOTAL

TOTAL

No.	NAME	<----->			<----->			RECEIVED	SENT
		GNFIDO	E. STATION	POINT	GNFIDO	E. STATION	POINT		
5:731/4.1	HEALTHNET	3038		7403	9765		5485	10441	15250
5:731/4.11	UON_CHEM						711	0	711
5:731/4.21	KEMRI(KSM)			705			1463	705	1463
5:731/4.22	KEMRI_LIB			5156			4065	5156	4065
5:731/4.25	unlisted			7198			3074	7198	3074
5:731/4.28	unlisted		1310	4339			4399	5649	4399
5:731/4.30	PAYNES	45096					61559	45096	61559
5:731/4.33	ENABEP			19376			308275	19376	308275
5:731/4.34	LEVYK	1813		284				2097	0
5:731/4.102	unlisted			863				863	0
5:731/4.105	RYWNIERS			1613				1613	0
5:731/4.502	WHO_HLM			30345			110931	30345	110931
5:731/4.503	APMS			3975			1682	3975	1682
5:731/4.504	unlisted			5776				5776	0
5:731/4.600	KEMRI(KLF)	105555		17840	172476		104492	123395	276968
5:731/4.701	unlisted			219				219	0
5:731/4.900	YALE_UNI			640				640	0
Totals		155502	1310	105732	182241	0	606136	262544	788377

APPENDIX III(b)

Point-to-Point Traffic in Kilobytes

	FROM	TO			
		GNFido	UserPoints	Hnet	Unics
APRIL 1993	GNFido	-	73.3	0.4	259.0
	UserPoints	142.2	127.6* 0**	24.2* 0.3**	-
	Hnet	4.5	12.5* 7.2**	-	-
	Unics	256.0	-	-	-
MAY 1993	GNFido	-	88.6	1.7	435.8
	UserPoints	37.0	48.6* 125.5**	25.4* 3.1**	-
	Hnet	1.2	5.4* 22.0**	-	-
	Unics	790.7	-	-	-
JUNE 1993	GNFido	-	151.9	-	449.0
	UserPoints	39.5	41.3* 492.2**	79.6* 0**	-
	Hnet	-	0* 104.4**	-	-
	Unics	911.5	-	-	-
JULY 1993	GNFido	-	152.5	3.0	608.5
	UserPoints	172.5	99.3* 600.7**	7.4* 0**	-
	Hnet	9.8	1.3* 5.5**	-	-
	Unics	510.8	-	-	-

NODE UNICS points list as of September 1993

Boss, 5:731/4

,0,Solomon Odeny,Nairobi_KE,UNICS,254-2-444919,9600,PEP,CM,XA
,1,HealthNet_GSTN,Nairobi_KE,HealthNet.Kenya,254-2-444920,2400,XA
,2,Jaquiline Makhokha,Nairobi_KE,NARESA,-unpublished-,2400,XA,CM
,4,CNST,Nairobi_KE,Nuclear Centre UoNairobi,254-2-334244,2400,XA,CM
,5,Charles Miriakau,Nairobi_KE,UON_CHEM,-unpublished-,2400,XA,CM
,10,VC.KU,Nairobi_KE,Kenyatta University,254-2-810653,2400,XA
,11,Dr Chhabra,Nairobi_KE,Kenyatta University,-unpublished-,2400,XA
,20,Gladys Aleman,Nairobi_KE,KEMRI.Nairobi,254-2-729303,2400,XA
,21,Walter Weiss,Kisumu_Kenya,KEMRI.Kisumu,254-35-45282,2400,XA
,22,Nancy Kamau,Nairobi_KE,KEMRI_LIB,-unpublished-,2400,XA
,28,James Mutunga,Nairobi_KE,KEMRI,-unpublished-,2400,XA
,34,Karen levy,Nairobi_KE,LEVYK,-unpublished-,2400,XA
,201,Meredith Long,Nairobi_KE,MAP INTERNATIONAL,254-2-569513,2400,XA,CM
,300,Mary Kimani,Nairobi_KE,UON_LIB,-unpublished-,2400,XA,CM
,420,John McDermott,Nairobi_KE,UON PublicHealth,254-2-631325,2400,XA,CM
,430,Olewe Nyunya,Nairobi_KE,UON Diplomacy,-unpublished-,2400,XA
,440,George Kinoti,Nairobi_KE,UON ZOOLOGY,-unpublished-,2400,XA,CM
,500,Hedvig Pelle,Nairobi_KE,WHO_KNACP,-unpublished-,2400,XA,CM
,502,Carolyn van Wensen,Nairobi_KE,WHO_HLM,254-2-717029,2400,XA,CM
,503,Paul Saoke,Nairobi_KE,APMS,-unpublished-,2400,XA,CM
,600,Kemri_Kilifi,Kilifi_KE,KEMRI,-unpublished-,2400,XA

The Logical Framework Approach.

APPENDIX V(a)

GOAL The higher-level objectives towards which the project is expected to contribute (Mention target groups)	VERIFIABLE INDICATORS Measures (direct or indirect) to verify to what extent the Goal is fulfilled IF —————→ AND	MEANS OF VERIFICATION The sources of data necessary to verify status of Goal level indicators	ASSUMPTIONS (Goal to Super goal) Important events, conditions or decisions necessary for sustaining objectives in the long run
PURPOSE The effect which is expected to be achieved as the result of the project	VERIFIABLE INDICATOR Measures (direct or indirect) to verify to what extent the purpose is fulfilled IF —————→ AND	MEANS OF VERIFICATION The sources of data necessary to verify status of Purpose level indicators	ASSUMPTIONS (Purpose to Goal) Important events, conditions or decisions outside the control of the project which must prevail for the Goal to be obtained
OUTPUTS The results that the project management should be able to guarantee (Mention target groups)	VERIFIABLE INDICATOR Measures (direct or indirect) to verify to what extent the outputs are produced IF —————→ AND	MEANS OF VERIFICATION The sources of data necessary to verify status of Output level indicators	ASSUMPTIONS (Output to Purpose) Important events, conditions or decisions outside the control of the project necessary for the achievement of the Purpose
ACTIVITIES The Activities which have to be undertaken by the project in order to produce the outputs	VERIFIABLE INDICATOR Goods and services necessary to undertake Activities IF —————→ AND	MEANS OF VERIFICATION The sources of data necessary to verify status of Activity level indicators	ASSUMPTIONS (Activity to Output) Important events, conditions or decisions outside the control of the project necessary for the production of the Outputs

GOALS	VERIFIABLE INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS
1. Experiment with computer based networking 2. Promote more efficient and effective communication within the research community	1.1 Interfacing capability between PACSAT & FRONTDOOR MAILER. September 1992 1.2 Interfacing with University network. July to September 1993	Postgraduate Computer systems Project entitled; 1. "Message Routing System for ICS" Phase I 2. "Message Routing System for ICS" Phase II	1. Regulatory Policy with regard to PACSAT communication remains pragmatic 2. Liberalization of Modem type approvals
PURPOSE	VERIFIABLE INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS
1.1 Experiment with modalities and techniques 1.2 Evaluate following aspects - technical - economic - sociological - management 2.1 DISSEMINATE FINDINGS 2.2 RECOMMEND	1.1 Development and maintenance of interfaces 2. Staff capable of managing the project	1. Testing of interfaces in September 1992 via HealthNet 2. Chip level maintenance documented and disseminated on 3 April 1992	Purpose to goal 1. Research Perspectives and orientation in place 2. A methodological approach as opposed to laissez faire approach
RESULTS/OUTPUTS	VERIFIABLE INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS
1.1 Cost effective network 1.2 Pool of skilled manpower - provision - management - utilization 2.1 Project updates - status - technical specifications - documentation - evaluation - recommend 2.2 Co-operation among nodes	1. Implementation of high quality modems to achieve acceptable cost levels 2. Network management by staff 3. Dissemination of technical findings	1. Operational connectivity and throughput 2. Internet connectivity reported Jan/Feb 1993 (temporarily) but not documented 3. Chargeable framework for end users 4. Specification of network management tools 5. Contractual framework	Result to Purpose 1. Stable telephone charges 2. Staff interest in Project is sustained 3. Reliability of lines 4. Interest in communicating among nodes
ACTIVITIES	VERIFIABLE INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS
1.1 Hardware & Software - Assessment - Aquisition 1.2 Design workshop 1.3 Experimentation 2.1 Documentation 2.2 Evaluation Workshop	1. Active Sysop August '92 to November '92 January '93 to date 2. Active Healthnet Sysop	1. Certifiable level of expertise of staff 2. Consultancy status of skill base 3. Audit Trail 4. Control measures to limit abuse	Activity to output 1. Procurement lead times 1.1 Quality and reliability are not sacrificed for lower costs 1.2 Mailer standardization and version management 2.1 H/W and S/W in place 2.2 Experiments well defined and executed 3.1 Integrity of users and sysops 3.2 Time available from main duties

EASTERN AND SOUTHERN AFRICA NETWORK (ESANET)

COMMUNICATIONS RESEARCH FOR DEVELOPMENT

EVALUATION AND WIND-UP WORKSHOP

27TH-30TH SEPTEMBER 1993

MWEYA LODGE, UGANDA.

KENYA COUNTRY REPORT - HEALTHNET

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1. PROJECT GOALS AND OBJECTIVES

The East and Southern African NETWORK (ESANET) is a research project, funded by the International Development Research Centre (IDRC) of Canada, aimed at investigating various microcomputer based methodologies for communications. The countries of the five participating institutions are all members of the Preferential Trade Agreement (PTA) region. These institutions are the Institutes of Computer Science at the University of Nairobi and Makerere University, and the Computing Centres at the University of Dar es Salaam, the University of Zambia and the University of Zimbabwe. The MEMORANDUM OF GRANT CONDITIONS Centre File 90-0068 dated 5th October 1990 is between the University of Nairobi and IDRC, with the Director, Institute of Computer Science designated Project Leader.

The general goals of the project are:-

- a. to experiment with microcomputer based communication networking in order to acquire the necessary technological capacity, and,
- b. to promote more effective and efficient communication within the research community in the region.

Within the scope of these general goals, the specific objectives of the project are :-

- i) to experiment with alternative modalities and techniques for data communications among and within the five nodes (Nairobi, Dar es

Salaam, Lusaka, Makerere and Harare).

- ii) to evaluate the technical, economic, sociological and management aspects of the communication network experiments;
- iii) to disseminate information to the research community within the region about the development and the results of the project with a view to increasing the awareness of possibilities, stimulating new and wider applications, and inviting feed-back on related topics; and
- iv) to make recommendations to the research community (users and institutions) and telecommunications authorities in the region on cost effective data communication modalities, and appropriate network models and policies for specific environments and applications.

The emphasis was on microcomputer based communications systems. Thus the project had no intention of offering private data communication network services in competition to any commercial services already offered by the respective Posts, Telegraph and Telecommunication (PTT) authorities in the participating countries. In fact one entire experimentation strategy uses dial-up modems and the public network, while only the Satellite/ground-station component of the other experimentation strategy is private, other linkages being public. The satellite based strategy was primarily intended to facilitate Medical Research. Its usage, the users and the data volumes available, are restricted, are not-for-profit and are non-commercial. It was important that the developmental impact in the field of Health Care and Communications be weighed positively against the perceived loss of revenue for the PTT authorities. A convenient and effective means to monitor the usage of the network for security purposes by the KP&TC was identified.

2. HARDWARE UPDATES

In January 1991, a complete ground station was successfully installed in the ICS, Nairobi, for testing and demonstration purposes. This exercise not only enabled personnel to be trained in the installation and operation of a packet satellite ground station, but also facilitated in the application process with the KP&TC. Further to this a request was made, in August 1991, to the Government of Kenya by the University of Nairobi for authorisation for the use of the satellite communications system. This approval was granted in November 1991. A further application for approval and allocation of frequencies was made by the University to the KP&TC. *The approvals were granted in June 1992 subject to a type approval fee of Kshs. 2970 (US\$ 90) and an annual licence fee of Kshs. 6364 (US\$ 193).*

The approval is conditional on:

- i) the equipment being operated on the frequencies approved,
- ii) the system being operated on a "Secondary" basis, i.e. it may suffer interference from existing services and shall cease operation should it cause interference to other existing service,
- iii) the system being used for research purposes only and on a non-commercial basis.

The Nairobi Node's satellite groundstation first became operational on amateur frequencies in December 1991. It was initially configured by an engineer from satelife working with Satelife Director of Operations. In January 1992, after the non-amateur frequencies became available, the system was set-up for non-amateur by the system operator. The station operated well for a few weeks but developed hardware problems late in February. The hardware problem resulted in the system being in-operative for approximately four weeks. The fault, traced to the TNC component, was eventually diagnosed and repaired locally and the station became operational again around the middle of March 1993. The system hardware has been continuously operational to date.

The initial installation comprised standard Satelife equipment configuration consisting mainly of the 386sx IBM-PC compatible, the TNC, the Kenwood radio transceiver, and omni-directional turnstile antennas. The PC configuration included the tracker/tuner interface card and a serial interface for the TNC. In early August 1992 an internal fax-modem was installed and the ground station connected to the PSTN to enable it to operate as a Fido point (5:731/4.1) off the local Esanet node (5:731/4). In late August 1992 a steerable Yagi antenna system was installed. The antenna configuration is such that transceiver can be switched either the original turnstiles or the Yagi by means of a pair of switches located close to the transceiver radio. Considerable difference in performance (in favour of the steerable system) can be reported with upload rates of over 50K bytes per pass (as compared to less than 10K bytes) observed with the turnstile antennas.

The system has operated almost exclusively on the Yagi streerable antennas until recently (May 1993) when the pre-amp on the Yagi antennas developed a malfunction. Currently the uplink is maintained on the Yagi whereas the downlink is on the turnstile fixed antenna. Significant degradation in performance was noted as compared to when both the uplink and downlink were on the Yagi streerable antennas.

3. Software Updates

The initial Pacsat groundstation software was heavily operator bound virtually prohibiting un-attended operation except for message downloading. In August 1992 the automated software configuration became available to, and was installed on, the Nairobi groundstation. The software enabled the groundstation to be set-up to perform message upload, download, message text extraction and Keplerian elements updates using a batch file. On start of execution of the batch file the software would wait for a pass, attempt to upload any previously prepared OUT bound files after which it would switch to download messages. The text in downloaded messages would be automatically extracted by the software. Packet file header attachment and computation of ephemerics had to be done by the operator before starting the batch file.

Additional software has also been developed locally to facilitate automated message transfer between the Fido e-mail system and Pacsat. The Nairobi node has now been using this software since February 1993.

The current mode of operation is as follows:

The groundstation computer is normally running the Frontdoor mailer. At a specified time (currently 0100 GMT) the computer switches to the computation of the ephemerics for the day and returns to Frontdoor. At two other specified times (0730 and 1900GMT) the system first calls the bossnode to pick up any mail, then it attaches Pacsat headers to outbound messages, finally it switches to execute the upload/download batch file. Unless forced by the sysop to return earlier, it normally returns to Frontdoor within two hours. Just before returning to the Frontdoor mailer, any downloaded Pacsat messages are converted to Fido messages and will be available for reading using the Frontdoor editor.

Whereas the downloading program, PB, appears to operate quite reliably the same cannot be said of the uploader, PG. The version of this program operated at the Nairobi node, which is presumably the most recent one, is temperamental and appears to still have serious bugs in it. For example it seems to hang up when acknowledgements, especially the final handshake, from the satellite fails. In addition, if PG is executing at mid-night it appears to interfere with the system clock preventing the calendar date from updating.

4. CONNECTIVITY, THROUGHPUT AND INTERFACES

As initially installed, the packet satellite network Healthnet provided reasonably efficient and reliable connectivity between the various groundstations. Links between groundstations and local endusers were however not in place particularly at the Nairobi node.

With the implementation and installation of the Fido/Pacsat interface at the Nairobi node, reasonably efficient connectivity now exists between local Fido endusers and the Healthnet groundstation/satellite backbone. If a Fido user addresses his message to

```
username@callsign, 5:731/4.1  
or internetaddress@callsign, 5:731/4.1  
or fidoaddress@callsign, 5:731/4.1
```

The message is routed from his point to the destination groundstation (whose callsign is specified) without any operator intervention. How the destination station forwards it to the final destination is of course the latter's concern but it is guaranteed that the destination address will be inserted at the top of the message text by groundstation 5:731/4.1 (ie. S.KEN1).

There being no Healthnet universal addressing scheme, the reverse transfer is not as smooth. Whereas the software automatically transforms downloaded Pacsat messages into Fido messages addressed to sysop on 5:731/4.1, the sysop normally has to scan all messages downloaded (and passed to Frontdoor) to determine the appropriate final address and hence be able to forward the message.

While a log is not maintained of messages downloaded at the Nairobi station, appendix A, which is an extract from PG.LOG shows the mean uplink efficiency in bytes per second for a few months. It shows a mean 93.1 bps obtained with the turnstile antennas between December 1991 to August 1992, 185 bps obtained with the steerable antennas

(optimal antenna alignment, system clock accurate, etc.) between September 1992 and February 1993, 123 bps obtained with the uplink on the streerable antenna but the downlink on the turnstiles between April 1993 and August 1993.

5. USER BASE

The network configuration envisaged at the start-up was one in which the Esanet node, Unics, was to function as a network hub at the Institute of Computer Science. The Healthnet groundstation machine was to be configured as a point off the Unics node. Traffic coming into the Unics node from enduser points could then be either forwarded by terrestrial mail (eg. via the GreenNet gateway) or held for pickup by the Healthnet groundstation for forwarding via Healthsat. The enduser would have the capability of specifying which route to be used. The Unics sysop also of course is able to re-route traffic if necessary.

In this configuration, which is what is currently in place, there is no distinction between Healthnet and Esanet (terrestrial mail) points. Healthnet users are therefore Unics points which, perhaps with varying frequencies, choose to route their traffic through Healthnet.

The advantage of this configuration is that a single dedicated telephone line to ICS (dedicated to the Unics node) can be shared by Healthnet and terrestrial email users. The additional phone line to which the Healthnet machine is connected can then be shared with voice communications. The operation of Healthnet is therefore to a substantial extent dependent on the stability, from the availability point of view, of the Unics node.

Although there are a number of health related organizations connected as points off the Unics node, the level of usage of Healthnet in terms of traffic volume has remained lower than expectation. This is to some extent due to the fact that these users prefer using the terrestrial route which is more conventional particularly as far as mail addressing is concerned. For example a message from user at 5:731/4.420 may be replied to using the Internet address form user@p420.f4.n731.z5.gn.fido.fido.net. The reply address for the same address via Healthnet is rather confusing to the average user. Also to be noted is that Unics has been forwarding messages for its points essentially free of charge and has been polling GreenNet at least once a day. This enhances the preference for terrestrial email. With the introduction of charges for use of terrestrial email and the reduction of the frequency of polls to GreenNet it is expected that the volume of traffic routed via Healthnet will increase substantially.

Healthnet sends out to groundstations a number of bulletins including Healthnet News, Aids Bulletin, WHO Library Digest, African Medical Librarians Bulletin. All issues of these have been received at the Nairobi groundstation and are available to users. Three user points namely, WHO HLM, KEMRI Library, KEMRI Kilifi now receive these publications regularly. Hard copies of some issues of the four publications have been sent to the University of Nairobi Medical Library which unfortunately is not connected as a point.

The following users have used Healthnet with varying frequency over the last year.

1. University of Nairobi Dept of Public Health
2. University of Nairobi Medical Library
3. KEMRI Library (Nairobi)
4. KEMRI Kilifi
5. KEMRI Kisumu
6. WHO Health Learning Materials
7. African Association of Physiological Sciences (AAPS)

A number of other points have been connected specifically as Healthnet users but are currently not generating much traffic.

6. NETWORK MANAGEMENT ISSUES

In theory Healthnet activities in Kenya are supposed to be controlled by a Healthnet User Council. Healthnet is supposed to belong to the users. The Council is to be comprised of representatives of all approved and registered Healthnet user organisations. The Council is to appoint an executive Management Committee. This committee is to be comprised of approximately four Council members including the groundstation sysop who is an ex-officio member of the Council.

In May 1992 a group of potential users, the sysop and other interested parties (two from IDRC and an other a local email expert) met at the Institute of Computer. Under the chairmanship of a local IPPNW representative this group undertook to function as an interim User Council.

The Council agreed that their initial objective was to promote Healthnet by quickly establishing between 4 and 6 model satisfied users. It was however noted at that time that although the station was operational (albeit unlicensed), the required hardware and software linkages with local email were not in place. Also, with the exception of two potential users, in attendance, the others did not have the required equipment to connect to the local email.

In view of the above the sysop was charged with the responsibility of, in the long term, putting into place the required linkages (in the short term transfers between the email machine at ICS could be done using diskettes). The email expert, reportedly under contract from Satelife, was charged with the responsibility of connecting potential users to the local email. It was also understood that the expert in collaboration with the Unics sysop would upgrade Unics to full node status to enable users deliver/pickup mail from Unics (which is within a few feet from the groundstation). At that time the Unics node was operating as point 105 off ELCI but with an AKA of node 4. Also noted was that two other individuals, present at the meeting, had been contracted by Satelife to work on a bulletin board/CD-ROM interface.

A few weeks later, the email expert had connected the identified potential users. He however indicated that there were technical and operational problems preventing Unics from functioning as a full node. Some of these problems are documented in the Terrestrial email report. The result, nevertheless, is that for a long period potential users, whose expectations had been considerably raised, were unable to access Healthnet as their attempts to poll Unics resulted in failure. These first batch of users soon became somewhat frustrated with Healthnet.

Interest in Healthnet was waning and successive meetings of the interim Council aborted for lack of quorum. For all practical purposes the Council soon became dormant.

Unics eventually achieved node status in August 1992. About the same time the groundstation was configured as a point off the node. The node status was discontinued in October but restored, after the Lusaka meeting, in December 1992. At this time, however, the email expert, reportedly after consulting with Satellife representative(s), decided that Healthnet traffic be routed through ELCI due to "the instability" of Unics. The potential Healthnet users were then reconfigured as points off ELCI. Due to initial frustration with Healthnet they were convinced that Healthnet was not stable and they thus ended up routing their traffic through ELCI and GreenNet at a cost.

Eventually some users returned to Unics having realised that the latter was forwarding traffic virtually free of charge. They however continued to prefer the terrestrial route for reasons indicated in section 5 above.

From the above it may be summarised that Healthnet in Kenya has had to contend with (1) a shortfall in user confidence, which is a consequence of user frustrations in the earlier stages, and (2) the competition from free terrestrial email services available upto very recently, i.e mid August 1993, through Unics.

While it may be said that the state of Healthnet in Kenya, one and a half years after initiation, is short of the original expectations in terms of user base, it must also be recognised that there has been a significant achievement in the sense that we now have in place a fairly efficient and reliable communication link between Nairobi and the other Esanet nodes as well as between Nairobi and the West and at a very affordable cost.

GROUNDSTATION MANAGEMENT TOOLS

From the experience gained so far, it would be useful to have Healthnet management procedures and tools with the following functionality.

(A) MONITORING: - track bi-directional traffic
from:
 other groundstation,
 Healthnet user
to:
 other groundstation,
 Healthnet User

(B) CONTROL:
Safeguard against:

- 1) i) Forwarding of non-health related mail.
 ii) Forwarding of mail intended for commercial purposes or financial gain.
- 2) pirate networks - illicit routing of mail by unauthorized or unlisted users through Healthnet.

ACCOUNTING

- 1) based on usage and charge per kilo byte, the package should calculate the liability to users on points, or on the node or on points off points etc.
- 2) the package should be able to produce invoices at the end of the month for each user with relevant breakdown.
- 3) the level of subsidy from Satelife (ie the cost of satellite time) needs to be indicated.
- 4) the package should also be able to do the following:
 - i) based on information in the Log-file on
 - a) duration of polls to the Unics node
 - b) the PTT charge per minute for such polls
 - ii)
 - a) calculate on a daily basis the cumulative cost to date after each call
 - b) make projections of the monthly cost using daily averages or weekly averages as appropriate.

INFRASTRUCTURAL ISSUES

The provision of end-user service requires a legal contract that spells out the services offered by the groundstation and the terms thereof. Also required are the responsibilities and liabilities of the users and the groundstation.

Contractual Agreements

- 1) Installation Charges when applicable.
- 2) Monthly Charges : per kilo byte forwarded to/from a user
 - Procedure for billing
 - Procedure for payment,
- 3) Injunctions for non-compliance on
 - Payment
 - type of traffic
 - hacking or pirating
- 4) On-line Support
- 5) Hot-line Support
- 6) Documentation
- 7) Traffic type
 - 1) Encouraged
 - medical research,
 - information related to Healthcare
 - 2) Discouraged
 - idle chatter

- junk mail
- conferences for individual subscribers
- bulletin boards for individual subscribers
- flaming
- politics
- propaganda of any sort
- agency news
- advertizing or promotional blurb
even if institutional or self

7. MANUALS/DOCUMENTATION

Technical documentation has been availed to the groundstation sysop on both the hardware and software. The manuals, some of which are listed below, cover operational procedures as well as first level fault diagnosis and maintenance. They have been found to be fairly comprehensive in coverage and very useful to the system operators.

Since the endusers are expected to access Healthnet through Fidonet points running Frontdoor, the documentation they require are those on Frontdoor which have been discussed in the terrestrial email report. A supplemental four page document introducing Healthnet and detailing how messages may be routed through it from Kenya has been written by the sysop and is available to users and potential users. The document is available in electronic form.

8. RELATED ACTIVITIES/RESEARCH AND DEVELOPMENT

Two Packet Satellite related projects have been undertaken by postgraduate diploma students over the last two years. The first project, undertaken between July and September 1992, resulted in the development of a Fidonet/Pacsat mail interface (see Terrestrial email report). The second project, started in July 1993, addresses the interface between the University Vax Mail system with Fidonet (see Terrestrial email report) and hence, together with the first project, would provide Vax based users with access to Healthnet. The third project, which was undertaken between July and September 1992, had the objective of developing a versatile package for monitoring the performance of the groundstation in terms of throughput, utilisation, and message forwarding delay. Although substantial work was done in this project the implementation of the package was never completed to our satisfaction. It is envisaged that the implementation will be completed in the near future.

The Nairobi node has sent to S.ENG1 all .PBL files for the period December 1992 through July 1993. The data contained in these files is expected to be used in the analysis of the satellite downlink performance in terms of bytes succesfully received by the groundstation.

9. FUTURE PLANS

In collaboration with satelLife, improve connectivity and standardise the addressing scheme across Healthnet.

Expansion of Healthnet userbase.

In collaboration with Institute of Computer Science management ensure stability of the Unics node through which users will continue to access Healthnet.

Development of management tools as detailed above.

Encourage the revival/rejuvenation of a Healthnet user council with clear terms of reference.

ESANET PROJECT MEETING - UGANDA - 27TH to 30TH SEPTEMBER 1993

COUNTRY REPORT - ZAMBIA

TERRESTRIAL EMAIL ('FIDONET')

1. Hardware/Modem updates

The main host machine for the FidoNet system has remained the KSI 386 machine that was provided in 1991 by NirvCentre. It has been in service 24 hours a day, 7 days a week for some 2 years, and has given very few problems (albeit that the 3.5" disk drive has been inoperative for the last year).

A second KSI machine that had been provided under the NGONET project was installed in September 1992. This had been previously in use at ELCI and was intended for backup and for use in the ZangoNet NGO project. It developed a fault with the monitor 3 months ago which was repaired but the fault has subsequently recurred. The 5.25" disk is problematic and the 3.5" drive was inoperative and has been replaced. This computer has been used for Intermail software testing in advance of the provision of a new telephone line for the ZANGONet system.

Some 45 modems have been purchased or supplied using ESANET funds. Experience has shown that the GVC modems supplied by NirvCentre (after the initial faulty batch of 20 internals was replaced) have been far superior in durability than the cheaper Computer Peripherals and Viva modems supplied by SatelLife. Also it has been found that the external modems generally perform better on poor quality lines than internals.

The host machine continues to service two telephone lines, an internal (University) line and an external (PTT) line, using the line arbitrator commissioned and constructed by the University School of Engineering in 1991. This card switches between the two lines, depending on which rings first, feeding the signal through to a single modem.

The modem currently used is a Telebit Worldblazer which was supplied through a donation from CIDA and installed in December 1992. Up to that time the host had been working with 2400 baud GVC modems, although some unsuccessful experiments had been carried out with a high speed Dowty Trailblazer.

2. Mailer Updates

FrontDoor 1.99c was originally installed on the node in 1991 and has remained in operation ever since. All points were installed using FD 2.00 commercial as supplied by NirvCentre in 1991 along with the ESANET hardware. However, this version contained some bugs. Almost all points have now been changed to run FD2.02NC and this has proved satisfactory. Some testing of FD2.10 Commercial has also taken place.

Intermail (written by one of the authors of FD) has recently emerged as potential successor to FD and has the advantage of easily multitasking on one PC (with one common message base). It is thus able to look after up to 4 phone lines through 4 modems. This software has been tested in readiness for three new lines that are expected to be installed on the host machine.

Conferencing has been added to the host system. Originally this used Tosscon but later GEcho was installed. The latest version of GEcho is now running on the host.

A user menu has been added to all points to make the system more user-friendly. The following functions are offered at each point (installed with a 'home-built' installation disk):

- Edit (Read and Write) Messages
- Send and Receive Messages
- Maintain Conferences
- Help with E-mail
- Configure FrontDoor

(the help option invokes the PermaNet Synergy software).

At each point a batch file controls the menu system and this in turn calls other batch files. Additional software that has been written or incorporated includes:

i) Tosscan - used for conferencing and message decompression. This is gradually being replaced by GEcho (due to the difficulty which Tosscan has in handling Internet addresses).

ii) Automail - used for creating a null message (with no message body) addressed to the host whenever the user indicates he wants to send or receive mail. This removes the need to ever use Forced Polling, a concept which some users seemed to find difficult.

iii) Conference Notification - a small batch program has been written to create a message (using automail) to be read with incoming mail, and which notifies the user as to which conferences (if any) have had material received in them. An example output screen is shown at Appendix D.

iv) Automatic Conference Subscription - uses an in-house program, written as a combination of batch files and a C program, which allows users to select additional conferences they wish to subscribe to. An automatic message is then created which subscribes them to the conference, the relevant FrontDoor folder is created, and appropriate additions made to the Tosscan setup file. It does not yet handle un-subscribing.

3. Connectivity and Throughput and Interfaces

Since November 1991 all international connectivity has been done through Rhodes University in South Africa. They continue to poll Unza three times per day (06:15hrs; 13:15hrs; 21:15hrs) to collect and deliver mail bound for the Internet which is gatewayed through their machine.

Regrettably the modem at Rhodes appears to be incompatible with the UNZANET Worldblazer such that they are unable to poll Zambia successfully at any speed above 2400. High speed connections were equally unachievable using the earlier Dowty Trailblazer. Thus all incoming connections are made at 2400 baud and the modem is programmed to hold down that speed at times when the Rhodes University polls are expected. However it has proved possible (especially using another computer on a different exchange) to poll Rhodes at 9600 baud and hold the speed well. This is done when 'backup' calls need to be made for any reason.

Experimentation with GreenNet in London has proved that they can poll Unza and maintain a 19200 baud link.

Since November 1992 one (manually operated) poll has been received each weekday (at 17:10hrs) from WorkNet in Johannesburg. Line quality has been variable but, since Telebits are used at both ends, speeds of 9600 baud are usually used. WorkNet provides some incoming FidoNet conference feeds and carries some regional Fido traffic, including messages from Unza to Unzim, and, more recently, to Tanzania.

In June 1993 a series of experiments were carried out to attempt to poll direct to every other ESANET site. Polling to all sites proved possible as follows:

Country	Attempts	Busy Local	Busy/NA Remote	Silence	Failed H'shake	Connct 2400	Connct 9600
Kenya	11	2	2	6	0	0	1
Tanzania ¹ 9600/2400	14	4	2	6	2	0	0
	25	9	2	12	1	1	0
Uganda	29	8	0	19	1	1	0
Zimbabwe	27	11	9	5	0	1	1

¹ The first row of figures record attempts made at 9600 baud, the second after having forced the speed down to 2400.

It will be noted that these polls were carried out on a Saturday when the level of congestion on both the local exchange and international lines is considerably reduced over a normal working day. The telephone exchange to which the e-mail line is connected is an older electro-mechanical one and is congested. Making outgoing international calls through this exchange requires many more attempts than from more modern digital exchanges, and is also more difficult than receiving connections from incoming calls. The three new lines shortly to be installed are intended to be on a digital exchange.

It was significantly more difficult to connect to Uganda and Tanzania than with Kenya or Zimbabwe. It is also notable that once connections were established those with Kenya and Zimbabwe were also cleaner and able to support higher speeds. It is thought that some of the difficulty experienced in connecting to Zimbabwe might have been the result of some routine maintenance activity on the Mango host at the time that the polls were attempted (between 11 and 14 hours).

One poll has also been received each week day since November 1992 from the SAFIRE drought relief system in Washington DC. This connection has been at 9600 baud and, although manually operated in the US, has been relatively reliable. It is used to route all Fido mail for zone 1.

Since June of this year one user from an agricultural project in rural Malawi has been polling into the host computer apparently with little difficulty, although with a UUCP link having been established between Malawi and South Africa these calls have now ceased. More recently (in September) the University of Malawi began polls to the UNZANET host as a precursor to setting up their own fido network.

The attached charts and tables (at Appendix B) show the build up in the volume and flow of traffic, both international and local, for all UNZANET users, and then specifically for University (ESANET) users.

These statistics are based on activity recorded on the UNZANET host system using Message Track and the FrontDoor Inbound History, and processed using locally produced programs written in C and dBase. Neither is wholly reliable as a monitoring device for the following reasons:

- (i) MT (Message Track) is only run during scheduled X (exit) events before the three daily polls from Rhodes University, and on receipt of compressed mail from Rhodes, WorkNet and SAFIRE. Thus it may under-record local to local traffic passing in and out of the host computer between these events.

It should also be noted that some incoming international mail is echoed out from the host computer to a multitude of users and is thus misleadingly recorded as local to local traffic. Similarly some of the mail to and from address 5:761/1.22 (the satellite groundstation) is in fact international health traffic but is indistinguishable as such and thus is recorded as local to local.

- (ii) The Inbound History file has only been archived since February this year. It should be remembered that all international mail is compressed (by PKZIP at approximately 50%) and most local mail was compressed with effect from February 1993. However mail for points with unreliable telephone lines occasionally has to be left uncompressed so that it can be rerouted as necessary.

Within Zambia most users operate at 2400 baud, but this is due to the use of cheaper modems which are restricted to that speed. Phone calls within the country are anyway relatively cheap. Users with high speed modems, both in Lusaka and outside, successfully use speeds up to 19200, although some users on exceptionally poor quality lines have to force speed down and at least two points have found it necessary to use 1200 baud.

Inbound mail addressed to 'user@unza.gn.apc.org' is routed through Rhodes University. This was arranged through the IGC in California who hold the MX record for that domain, and map it onto the conventional fido domain in Internet form: fl.n761.z5.fidonet.org (most other '.gn.apc.org' mail would normally be routed to GreenNet). All Internet mail addressed in this latter way is routed through the Pacific Systems Group node (psg.com) in Portland, Oregon and from there directly to the fido-Internet gateway at Rhodes.

Recent minor experimentation with a UUCP link to Rhodes has also been carried out (at 2400 baud). Further more rigorous testing is planned.

4 User Base

A list of users is attached. Although academic and non-academic users are shown separately, at this stage they all use the same host computer (mainly due to the slowness that has been experienced in obtaining the required additional telephone lines). HealthNet users are listed in Appendix A of the HealthNet report, although there is inevitably some overlap between this list and the academic and non-academic users.

The non-academic user base has been encouraged on a selective basis, bearing in mind not only perceived need for communication, but also users who may have an expanding need for communication in the future and who will thus want to be part of a longer term more sustainable solution.

5. Network Management Tools

The host node machine runs a batch file (included as part of the boot process to ensure automated restart after any power failures) which includes the following additional programs as well as FrontDoor itself:

- i) UUpoint - this standard (but slightly locally modified) program deals with mail addressed to the Internet by moving the address from the 'To:' line into the message area, and re-addressing the message to 'UUCP' at the gateway machine in South Africa (the latter address being a parameter). For incoming mail it puts the Internet address in the 'From:' line.
- ii) ReDir - this standard software, under the control of a configuration file, can redirect messages when, for example, 'points' are out of order; users make temporary moves; or users are away.
- iii) Split / Unsplit - standard programs to split and unsplit large messages (over 20KB) which the Internet gateway cannot otherwise cope with.
- iv) Message Track - standard software which keeps a log of message movement and also directs mail addressed to users 'at the host' to their own specific points.
- iv) GEcho - standard software to deal with conference distribution and mail bundle compression (packing) and decompression.
- v) CCMgr - standard software used to 'carbon copy' a single message to more than one recipient, each copy being generated on the host computer rather than at the user's point.
- vi) Hisbckp - software written in C 'in-house' to archive 15 days (or optionally one month's) worth of the inbound or outbound history files on the 16th and 1st of each month.
- vii) Hismon - software written in C 'in-house' to produce comma delimited data from the inbound (and outbound) history files produced by FrontDoor. These are used for analysis purposes.
- viii) Mtbckp - software written in C 'in-house' to archive one month's worth of the message track log file on the 1st of each month.
- ix) Mtmon - software written in C 'in-house' to produce a comma delimited file from the message track log file. Again, used for analysis.
- x) Latest - A batch file which makes use of Hismon and dBase III+ to produce a list at the end of each day showing the latest date when all users of the system have called in. This list is then automatically put into a message (using automail) and sent to the System Operator. It is used to follow up on any potential problems in the user base. See Appendix C for sample output.

6. Financial Aspects (Sustainability)

At present there is no charge made to any user on the system for the use of the system. This is because all connections to the host are made through incoming calls and therefore there is no cost to Unza for actually moving the messages about, although on occasion when Rhodes has been unable to connect to UNZA for several days it has been necessary to make expensive 'backup' polls from the host.

For ZangoNet users an installation fee is charged, which includes a single basic training session. Further charges are then levied when other work is required.

However, the cost of running the system largely relates to the number of man hours required to keep it running, and that cost is borne exclusively by the University Computer Centre (and is thus somewhat hidden).

In the future (see below) it is intended to put the service on a commercial basis.

7. User Manual / Documentation

A user-manual (for points) was edited / written and this has been kept updated.

Under the HealthNet project (see separate report) a user manual has been re-written from scratch by the technician employed on the project. Since HealthNet also uses the same FrontDoor-based software system the manual can equally be used across the UnzaNet / ZangoNet user base.

8. Related Activities / Research and Development

Some work has been devoted to attempts to use an 'ftp-by-email' service, thus giving users access to the wealth of material that would normally only be available by ftp (file transfer protocol) on the Internet.

The gateway provided by DEC (ftpmail@decwrl.dec.com) was used and a number of texts retrieved from various hosts that were accessed. Also some useful software was retrieved. However, many of the files available by ftp are very large when considering shifting them at 2400 baud on an international dial-up line, and the system was regrettably thus not made widely available.

Details of Archie-by-email have also been recently obtained which help locate the various files that might be required from host sites around the world.

9. Node Evaluation

The objectives of the Zambian node are difficult to define outside of those of the overall project. If it is assumed that the objectives overall were to promote regional computer-based communication then, from a Zambian viewpoint, the project may be said to be only minimally successful: much stronger regional control and co-ordination might have been required.

It was quickly determined that the major channels of communication that were being used were to the Internet (for the academic and NGO users) and in-country (for the HealthNet users). The project can be said to have been most successful in establishing the interest in improved forms of communication and in establishing that the basic telecommunications and other relevant infrastructures in the country were strong enough to support more complex and widespread systems in the future.

In order to evaluate the overall project, however, it is necessary to look at some of the problems that were encountered. Among those established were as follows (in no particular order):

a) FrontDoor may be better (friendlier) software than some in the field but still takes a great deal of learning (compared to modern 'shrink-wrapped' software to which users are used). There are 'hidden' control files, there is little in the way of online help available, and it contains some unintuitive, confusing or irrelevant commands and messages.

b) In order to operate an effective e-mail host it is necessary to run a suite of separate programs which are not integrated nor necessarily fully compatible. Some programs are machine and environment dependent, and many do not behave well in the event of unexpected software failures.

c) The whole FidoNet system operates in an 'amateurists' (/hackers/techies) environment with very little appreciation of the needs of the sceptical 'computer unfamiliar' user for a reliable and easy-to-use system. The overall level of documentation is very low. Software is constantly being updated and thus has an inherent degree of instability. Numerous programs at various stages of development abound and consequently there are very few people operating in an environment quite like your own. Other users are not starting from the same place that you are and no two people appear to be trying to achieve quite the same objective.

d) Non-commercial software suffers from a lack of professional support or any obligation on others to assist. The same is true of non-commercial dependence (in the fido environment) on others for the transport service itself.

e) The fido software system has to operate with a software / modem/hardware environment which often varies widely. There is no attempt within FrontDoor (and related software) to assist with modem setup or problems (Intermail just begins to address this problem), let alone issues of clashes with other hardware (interrupts) or memory resident software.

f) Modem hardware is not yet 'mainstream' hardware in Africa. The standard of modems is very variable, and the command-set not always standardised or easy to learn. Modem manuals are notoriously obscure to the uninitiated. Modem handling is thus not easy to put into the hands of non-technical users.

g) Few locations have been found to have 'plug in' phone sockets for the modem lead. Most locations require 'hot wiring' directly into some convenient phone line, and this can provide problems with the PTT or private phone company operating PABX equipment if they are not aware of modem technology. Control files have to be amended to deal with dialling out through a PABX, or the insertion of relevant pauses for difficult exchanges.

h) Fault determination is not easy for non-technical users as, if a fault occurs, it may be with the PC hardware, the operating system software, the mailer software, the fossil driver, the modem, the telephone connection, the phone line itself, or the remote machine. Documentation in this area is minimal and not simple to write. Diagnosis is often a matter of trial and error, and success depends on considerable experience.

i) Constant liaison has been required with the PTT to make them aware of what was being done as the system expanded. However, individual users have had difficult experiences which include being cut-off inadvertently (or for non-payment of bills as the PTT became harsher); line-faults; problems during the rains; etc..

j) Some problems were experienced with lightning strikes during the 1992/3 rainy season with some modems (on both PTT and PABX lines) being damaged.

k) Modem availability is not widespread in Zambia: they cannot be obtained for a reasonable price within the country and this has led to a slower expansion in the user-base than might have been desired. Many potential users have approached the Computer Centre in search of modems. Spare parts are equally unavailable so modems which should be relatively easy to repair are left unusable.

l) The manpower requirement to establish a FidoNet based system with a reasonable base is high and may not be readily affordable unless a more professional approach is adopted and 'commercial' service provided. There is over-heavy reliance placed on a few individuals at this stage, both in-country and internationally on the 'African' fido scene.

m) Real expansion in the underfunded academic, health and local NGO communities will depend on the involvement of wealthier international and 'semi-commercial' clients who can pay for the expansion in dedicated staff (both technical and administrative) required.

n) Potentially very regular high volume communicators have expressed concern at the delays inherent in a dial up international transport facility over which they have no control.

o) Fax machines are very (too?) easy to understand and conceptualise, and already widespread in their distribution!

p) Transport availability has been something of a problem in servicing the fast growing and geographically widespread user base.

q) There is quite a high turnover of staff in some user organisations, and repeated training sessions are required to maintain impetus.

r) There appears insufficient coordination between the various project emerging in Africa on the communications scene, leading to the potential re-invention of the electronic wheel. Some donors (and governments) remain unconvinced that e-mail could or should work or be an infrastructural priority. Matters like pending X.25 networks can also obscure the issue. Some international organisations (e.g. the UN or World Bank) may also prefer to implement their own systems or connections rather than support a local network.

s) The lack of a worldwide 'directory of users' may discourage users and restrict growth at some points.

t) There is a need to identify a key enthusiastic user at each installation for electronic communication to catch on and develop at a site. Equally the need exists for users to appreciate the value and benefits of improved communication (where a need clearly exists, e.g. in the hospitals of Southern Province, use of the e-mail facility is growing rapidly).

Perceived benefits to have accrued from the project include:

a) Acceptability within the University and targeted non-academic users of the benefits of e-mail, and the awareness of potential improvements in the future.

b) Appreciation of the strengths (and weaknesses) of the service provided by the PTT and its potential use in a wider and more complex system.

c) Improved communication from the University academic base with colleagues outside Africa.

- * d) Improved communication flow within the country, particularly in the health and NGO sectors.
- e) Improved access to certain research material.
- f) Improvement of technical skills within the Computer Centre and an awareness of future trends and directions to be followed.

10. Future Plans / Direction

As a result of the significant stimulus provided by the concept of the ESANET project the University of Zambia is keen to get a full Internet connection as soon as possible.

It has basically been shown that the Zambian telecommunications system, for all its weaknesses, is sufficiently robust to expand the service. Also, the need for access to the very wide range of material (and computing services) available on the Internet is great, particularly in the context of a declining economy with a deteriorating base of academic materials available in conventional form.

Discussions have been held with those responsible for the UNINET system in South Africa to which it would be intended that the connection would be made via a leased 9600 baud line. Costings have been obtained and funding is now being sought.

The RINAF project has nominated Zambia to be one of its five regional nodes in Africa. It is thus in the process of supplying 4 Telebit Worldblazer modems; 1 386 PC (to act as a router); 1 486 PC (to act as a mail server connected to the newly installed fledgling UNIX network); 1 multiport I/O board; 8 VT100 terminals; UPS etc..

The remaining (and larger) costs relate to the leasing of the phone line and the UNINET subscription (a cost of some US\$50,000 pa). A proposal to establish a campus company which will then sell Internet / communication services to other academic and international users in Zambia (e.g. the UN bodies) has been written and a formal presentation of it is being made in mid-October. However, it is acknowledged that this is a new area of technology (in most of Africa) and that some donor support may be required to get the system going and prove its worth.

As a precursor to the full Internet system some testing work has gone on in connecting to Rhodes via a UUCP link (using SNUUPM from a DOS-based PC). The .ZM domain is being registered to provide a routing via SA for UUCP mail. (RINAF will also be attempting a similar link from Pisa as part of their testing, but it is not envisaged that this will prove a beneficial long-term route).

The Internet proposal envisages that four types of service would be offered to potential users:

- 1) A full leased line to the University, giving 24 hour Internet access.
- 2) SLIP access via a dial-up line which would remain open for the duration of the phone call and give full Internet access.
- 3) UUCP (e-mail only) access over a dial-up line.
- 4) A continued dial-up FidoNet service via a gateway running RFGATE.

APPENDIX A

ALPHABETICAL LIST OF ZAMBIAN UNZANET (UNIVERSITY) EMAIL USERS

Copperbelt University	5:761/1.149
Mark Bennett	5:761/1.17
University Computer Centre	5:761/1.24
University of Malawi	5:761/1.101
Unza Academic Office	5:761/1.20
Unza Bursar's Office	5:761/1.21
Unza Deputy Registrar (Admin)	5:761/1.27
Unza Institute for African Studies	5:761/1.2
Unza Main Library	5:761/1.23
Unza Medicine Tchng Resources	5:761/1.30
Unza Medicine (Paediatrics)	5:761/1.33
Unza MicroComputer Support	5:761/1.36
Unza Microcomputer Supp. II	5:761/1.180
Unza Registrar's Office	5:761/1.19
Unza Rural Development Studies Bur	5:761/1.12
Unza School of Agriculture	5:761/1.8
Unza School of Education	5:761/1.6
Unza School of Engineering	5:761/1.3
Unza School of Hum.& Soc.Sci.	5:761/1.4
Unza School of Medicine Library	5:761/1.1
Unza School of Mines	5:761/1.7
Unza School of Natural Sciences	5:761/1.5
Unza School of Veterinary Medicine	5:761/1.9
Unza Vice-Chancellor's Office	5:761/1.18

ALPHABETICAL LIST OF ZANGONET (NGO & OTHER) EMAIL USERS

Agro-Forestry Project - Mongu	5:761/1.144
British Council - Lusaka (Aug 93)	5:761/1.143
Care International Lusaka	5:761/1.110
Commonwealth Youth Programme	5:761/1.137
Director Curriculum Development (Aug 93)	5:761/1.221
GRZ Tsetse Control Prog(Bugs)	5:761/1.37
GRZ Tsetse Control Prog(Cows)	5:761/1.38
Internatl Union for Consvtn of Nature	5:761/1.93
International School of Lusaka	5:761/1.223
MAFF Early Warning Unit	5:761/1.131
Mennonite Central Committee Lusaka	5:761/1.146
Mfuwe South Luangwa	5:761/1.134
MoE Chief Inspector of Schools (Aug 93)	5:761/1.220
National Bulk Import Control	5:761/1.98
Northern Communications - Kasama	5:761/1.136
NRDC Lusaka	5:761/1.138
Oxfam Zambia	5:761/1.90
PTC Senior Engineer (Planning)	5:761/1.99
Regional Dev.& Prog.Planning-Siavonga	5:761/1.145
SADCC Mining Coordntn.Unit	5:761/1.26
Social Recovery Project	5:761/1.135
UN Economic Commn.for Africa	5:761/1.100
UNDP Zambia Administration	5:761/1.102
UNDP Zambia Programme	5:761/1.103
UNFPA Zambia	5:761/1.105
UNHCR Zambia	5:761/1.106
UNICEF Zambia	5:761/1.83
UNICEF Zambia Health	5:761/1.112
UNICEF Zambia Representative	5:761/1.111
UNICEF (Education Programme)	5:761/1.96
UNIDO Zambia Administration	5:761/1.104
UNIDO Zambia Programme	5:761/1.107
USAID Office (FEWS Project)	5:761/1.97
Voluntary Service Overseas	5:761/1.82
Wildlife Conservation Society of Zambia	5:761/1.91
World Bank Edn Project Lusaka (Aug 93)	5:761/1.222
World Food Programme (Lusaka)	5:761/1.95
World Meteorolgical Organisation	5:761/1.94
Worldwide Fund for Nature	5:761/1.92
Zambia Assocn.for Research&Development	5:761/1.87
Zambia Bureau of Standards	5:761/1.80
Zambia Christian Mission - Mongu	5:761/1.175
Zambia Privatisation Agency	5:761/1.148
ZNBC Director General	5:761/1.140

APPENDIX B

UNZANET MONTHLY ACTIVITY STATISTICS

i) Total Traffic (Number of Bytes) - All Users (source: message track log)

Year	Month	Int'l- Int'l	Int'l- Local	Local- Int'l	Local- Local	Total	Local %
1991	9	0	85659	101981	2992	190632	1.6
1991	10	0	32436	49817	246	82499	0.3
1991	11	0	81192	96253	0	177445	0.0
1991	12	0	89951	67285	0	157236	0.0
January & February 1992 - no data							
1992	3	0	604065	236067	46511	886643	5.2
1992	4	0	721519	374946	270461	1366926	19.8
1992	5	0	301580	276854	415581	994015	41.8
1992	6	0	320709	358955	358463	1038127	34.5
1992	7	0	825061	633218	626057	2084336	30.0
1992	8	0	694413	372317	1003209	2069939	48.5
1992	9	4196	1667608	1038265	4206305	6916374	60.8
1992	10	4843	1882291	1301766	1876819	5065719	37.0
1992	11	1531	2319455	1420710	1160523	4902219	23.7
1992	12	1254	1413769	756294	1205113	3376430	35.7
1993	1	6633	3624501	259558	1802109	5692801	31.7
1993	2	10228	1755306	1091212	6503628	9360374	69.5
1993	3	5118	3789588	1238376	8895629	13928711	63.9
1993	4	3992	2961212	502957	10641354	14109515	75.4
1993	5	14119	3020052	745128	15924222	19703521	80.8
1993	6	27005	3801861	831237	17100763	21760866	78.6
1993	7	56560	3216543	949458	15872410	20094971	79.0
1993	8	6619	2331811	607487	7055861	10001778	70.5
=====							
Total		142098	35540582	13310141	94968256	143961077	

ii) Total Traffic (Number of Messages) - All Users

Year	Month	Int'l- Int'l	Int'l- Local	Local- Int'l	Local- Local	Total	Local %
1991	9	0	47	51	8	106	7.5
1991	10	0	23	32	1	56	1.8
1991	11	0	42	52	0	94	0.0
1991	12	0	61	41	0	102	0.0
January & February 1992 - no data							
1992	3	0	190	134	35	359	9.7
1992	4	0	259	180	150	589	25.5
1992	5	0	123	156	132	411	32.1
1992	6	0	180	147	173	500	34.6
1992	7	0	266	235	195	696	28.0
1992	8	0	286	239	243	768	31.6
1992	9	1	586	424	456	1467	31.1
1992	10	5	756	643	452	1856	24.4
1992	11	1	912	780	369	2062	17.9
1992	12	1	618	423	364	1406	25.9
1993	1	3	2377	141	389	2910	13.4
1993	2	6	760	544	1047	2357	44.4
1993	3	2	1144	596	1610	3352	48.0
1993	4	3	905	306	1772	2986	59.3
1993	5	5	1010	395	2885	4295	67.2
1993	6	8	1140	477	2210	3835	57.6
1993	7	20	1117	453	2685	4275	62.8
1993	8	3	852	289	1426	2570	55.5
=====							
Total		58	13654	6738	16602	37052	

Notes:

a) A user from a rural agricultural project in Malawi began using the UNZANET system to transmit and receive international traffic in June 1993. Other international to international traffic appears to represent inbound mail that has been redirected locally.

b) The abnormally high international to local figure for January 1993 highlights the RINAF-L incident when all (approximately 100) UNZANET points received individual copies of several contributions to the RINAF-L echo.

c) The rapid growth of local to local traffic around February 1993 corresponds to the expansion of HealthNet and the distribution of literature to a growing number of HealthNet points (see HealthNet report).

d) The fall off in traffic for August 1993 reflects the impact of a breakage in the Internet link through Rhodes University for a total of 10 days.

iii) Calls & Total Volume Handled by Host - All Users.

(source: inbound history)

Year	Month	Int'l Calls	Local Calls	Total Calls	Calls per Day	Total Volume	Volume per Call	Volume per Day
1993	2	90	1000	1090	36	12517903	11484	417263
1993	3	120	1516	1636	55	21140177	12922	704673
1993	4	138	1449	1587	53	16659088	10497	555303
1993	5	153	1924	2077	69	18840074	9071	628002
1993	6	152	1838	1990	66	19750062	9925	658335
1993	7	131	1997	2128	71	18366089	8631	612203
1993	8	82	1793	1875	63	11181426	5963	372714
=====								
Total		866	11517	12383		118454819	9566	

iv) International & Local Volume Handled by Host - All Users.

Year	Month	Int'l Rec'd	Int'l Sent	Int'l Total	Local Rec'd	Local Sent	Local Total
1993	2	1004120	587985	1592105	1918967	9006831	10925798
1993	3	1894715	758645	2653360	2819467	15667350	18486817
1993	4	1561109	664799	2225908	2563710	11869470	14433180
1993	5	1726776	1025963	2752739	3456663	12630672	16087335
1993	6	2280595	1136213	3416808	3468723	12864531	16333254
1993	7	1429579	1113635	2543214	4235392	11587483	15822875
1993	8	899957	517298	1417255	2738173	7025998	9764171
=====							
Total		10796851	5804538	16601389	21201095	80652335	101853430

Notes:

i) Again the impact of HealthNet growth in March is noticeable.

ii) Discrepancies between the volume of traffic sent from and received by the host as recorded in the inbound history file, and the volume of mail monitored by message track log can be attributed to the facts that:

(a) one to one messages, which neither originate at nor are destined for the host computer, will be recorded twice by the inbound history but only once by message track;

(b) message track is not run after every inbound call and therefore may not be recording all messages passing through the host;

(c) in the event of breakages in the link to South Africa some international mail has been transmitted through outgoing calls either from the host or through a private computer - neither are recorded in the inbound history statistics;

(d) some of the traffic recorded by the inbound history is compressed;

(e) conference mail is not recorded by message track log;

(f) on 'fragile' telephone lines an incomplete transfer followed by a complete resend may lead to double counting on the inbound history file.

v) Host Activity (Calls & Bytes) - University (ESANET) Users.
(source: inbound history)

Year	Month	Calls	Calls per Day	Volume Rec'd	Volume Sent	Volume Total	Volume per Call	Volume per Day
1993	2	292	10	1208510	3013716	4222226	14460	140741
1993	3	340	11	1824896	5135226	6960122	20471	232004
1993	4	295	10	1218718	3353621	4572339	15499	152411
1993	5	688	23	1842476	4118798	5961274	8665	198709
1993	6	732	24	1510280	3829303	5339583	7295	177986
1993	7	770	26	2731706	2744346	5476052	7112	182535
1993	8	546	18	1148327	1809753	2958080	5418	98603
=====								
Total		3663		11484913	24004763	35489676	9689	

vi) Total Traffic (Number of Bytes) - University (ESANET) Users
(source: message track log)

Year	Month	Int'l- Local	Local- Int'l	Local- Local	Total	Local %
1991	9	85659	101981	2992	190632	1.6
1991	10	32436	49817	246	82499	0.3
1991	11	81192	96253	0	177445	0.0
1991	12	77752	67285	0	145037	0.0
January & February 1992 - no data						
1992	3	439882	78626	27128	545636	5.0
1992	4	636203	296981	206647	1139831	18.1
1992	5	247657	224908	385260	857825	44.9
1992	6	225353	253714	234463	713530	32.9
1992	7	526635	303651	274682	1104968	24.9
1992	8	437555	230443	360138	1028136	35.0
1992	9	1354757	548456	794182	2697395	29.4
1992	10	1474404	556039	967180	2997623	32.3
1992	11	1855120	356769	974394	3186283	30.6
1992	12	1181892	307930	880994	2370816	37.2
1993	1	715014	85035	655707	1455756	45.0
1993	2	1055033	301667	1448500	2805200	51.6
1993	3	2562431	606848	2485610	5654889	44.0
1993	4	1370134	347480	3026052	4743666	63.8
1993	5	1049891	542974	4837237	6430102	75.2
1993	6	2098224	569088	3907375	6574687	59.4
1993	7	1320343	783409	4098060	6201812	66.1
1993	8	1194761	193616	3126522	4514899	69.2
=====						
Total		20022328	6902970	28693369	55618667	

vii) Total Traffic (Number of Messages) - University (ESANET) Users
(source: message track log)

Year	Month	Int'l- Local	Local- Int'l	Local- Local	Total	Local %
1991	9	47	51	8	106	7.5
1991	10	23	32	1	56	1.8
1991	11	42	52	0	94	0.0
1991	12	52	41	0	93	0.0
January & February 1992 - no data						
1992	3	106	42	22	170	12.9
1992	4	212	142	125	479	26.1
1992	5	97	106	112	315	35.6
1992	6	136	107	137	380	36.1
1992	7	180	130	105	415	25.3
1992	8	189	167	130	486	26.7
1992	9	456	230	216	902	23.9
1992	10	566	229	304	1099	27.7
1992	11	665	182	288	1135	25.4
1992	12	513	115	277	905	30.6
1993	1	387	33	190	610	31.1
1993	2	527	108	385	1020	37.7
1993	3	757	203	659	1619	40.7
1993	4	570	183	685	1438	47.6
1993	5	557	253	1161	1971	58.9
1993	6	753	336	789	1878	42.0
1993	7	634	337	1116	2087	53.5
1993	8	545	118	736	1399	52.6
=====						
Total		8014	3197	7446	18657	

APPENDIX C

EXAMPLE OF MESSAGE PRODUCED BY THE LASTCALL PROGRAM:

(823) Sun 19 Sep 93 23:53 Rcvd: Mon 20 Sep 7:32
 By: UNZANET, UNZA (5:761/1)
 To: SysOp
 Re: Latest Call Log
 St: Pvt Rcvd

@TOPT 36

@MSGID: 5:761/1.0 0017e6ae

Page No. 1
 19/09/93

UNZANET :TABLE SHOWING MOST RECENT CALL PER USER

Point No. -----	Point / Dept. Name -----	Date of Latest Call -----
1:109/183	SAFIRE Project (Washington.DC)	15/09/93
5:7101/26	WorkNet (Johannesburg)	17/09/93
5:7104/4	InterNet Gateway (South Africa)	19/09/93
5:761/1.1	School of Medicine Library	17/09/93
5:761/1.100	UN Economic Commn.for Africa	13/09/93
5:761/1.102	UNDP Zambia Administration	17/09/93
5:761/1.107	UNIDO Zambia Programme	19/09/93
5:761/1.110	Care International Lusaka	18/09/93
5:761/1.111	UNICEF Zambia Representative	30/08/93
5:761/1.112	UNICEF Zambia Health	14/09/93
5:761/1.12	Rural Development Studies Bur	08/09/93
5:761/1.134	Mfuwe South Luangwa	29/08/93
5:761/1.136	Northern Communications - Kasama	19/09/93
5:761/1.137	Commonwealth Youth Programme	08/09/93
5:761/1.138	NRDC Lusaka	14/09/93
5:761/1.14	World Health Organisation	16/09/93
5:761/1.140	ZNBC Director General	16/09/93
5:761/1.141	ZCCM Hardware Support - Kitwe	13/09/93
5:761/1.142	ODA Health&Education Planner	19/09/93
5:761/1.144	Agro-Forestry Project - Mongu	17/09/93
5:761/1.145	Regional Development & Programme Plan'g	12/09/93
5:761/1.146	Mennonite Central Committee	19/09/93
5:761/1.147	Martin Doherty	19/09/93
5:761/1.148	Zambia Privatisation Agency	17/09/93
5:761/1.149	Copperbelt University	16/09/93
5:761/1.153	MoH Health Info Unit	15/09/93
5:761/1.155	MoH Epidemiologist	17/09/93
5:761/1.157	MoH Data Processing Manager	17/09/93
5:761/1.158	Medical Stores Limited	16/09/93
5:761/1.16	Trop.Diseases Rsrch.Cntr	18/09/93
5:761/1.160	MoH AIDS Coordinator	07/09/93
5:761/1.17	Mark Bennett	19/09/93
5:761/1.170	Jan Rixen	17/09/93
5:761/1.175	Zambia Christian Mission, Mongu	19/09/93
5:761/1.191	Unknown	17/09/93
5:761/1.200	HealthNet Support	18/09/93
5:761/1.21	Bursar's Office	09/09/93
5:761/1.22	HealthNet Satellite Groundstation	18/09/93
5:761/1.223	International School of Lusaka	19/09/93

{etc....}

APPENDIX D

EXAMPLE OF MESSAGE PRODUCED FOR CONFERENCE NOTIFICATION:

(203) 18 Sep 93 08:43:56 Rcvd: Sat 18 Sep 8:43
By: MBennett
To: MBennett
Re: Conference Notification
St: Pvt Hold Local Kill Rcvd

You have new material in the following conference folders:

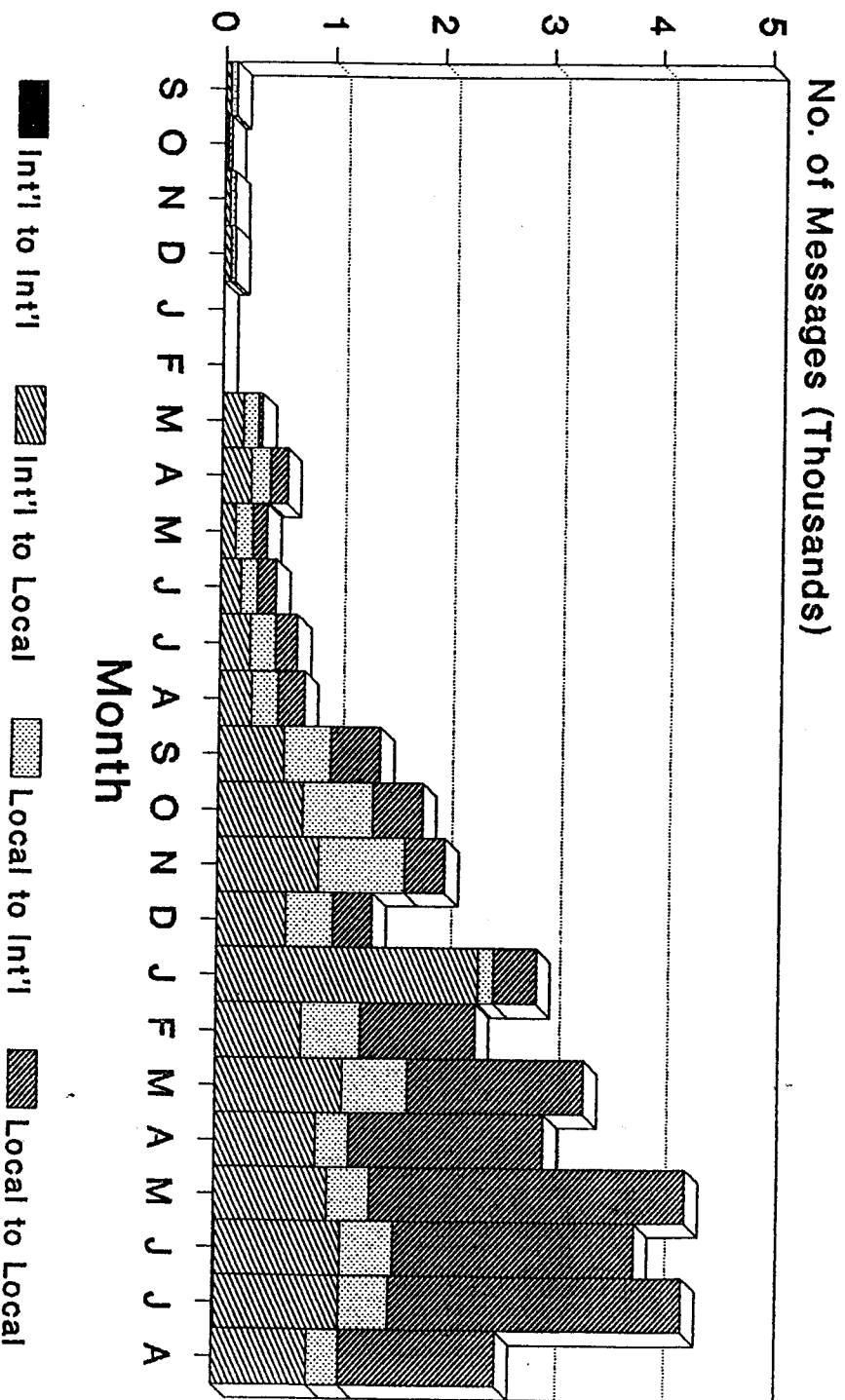
SCI.MED.AIDS
SAFRICA.DROUGHT
EXPZONE5

Use Alt-F to see the material in these folders.

Any new personal mail will be to the left of this message.

UNZANET Activity

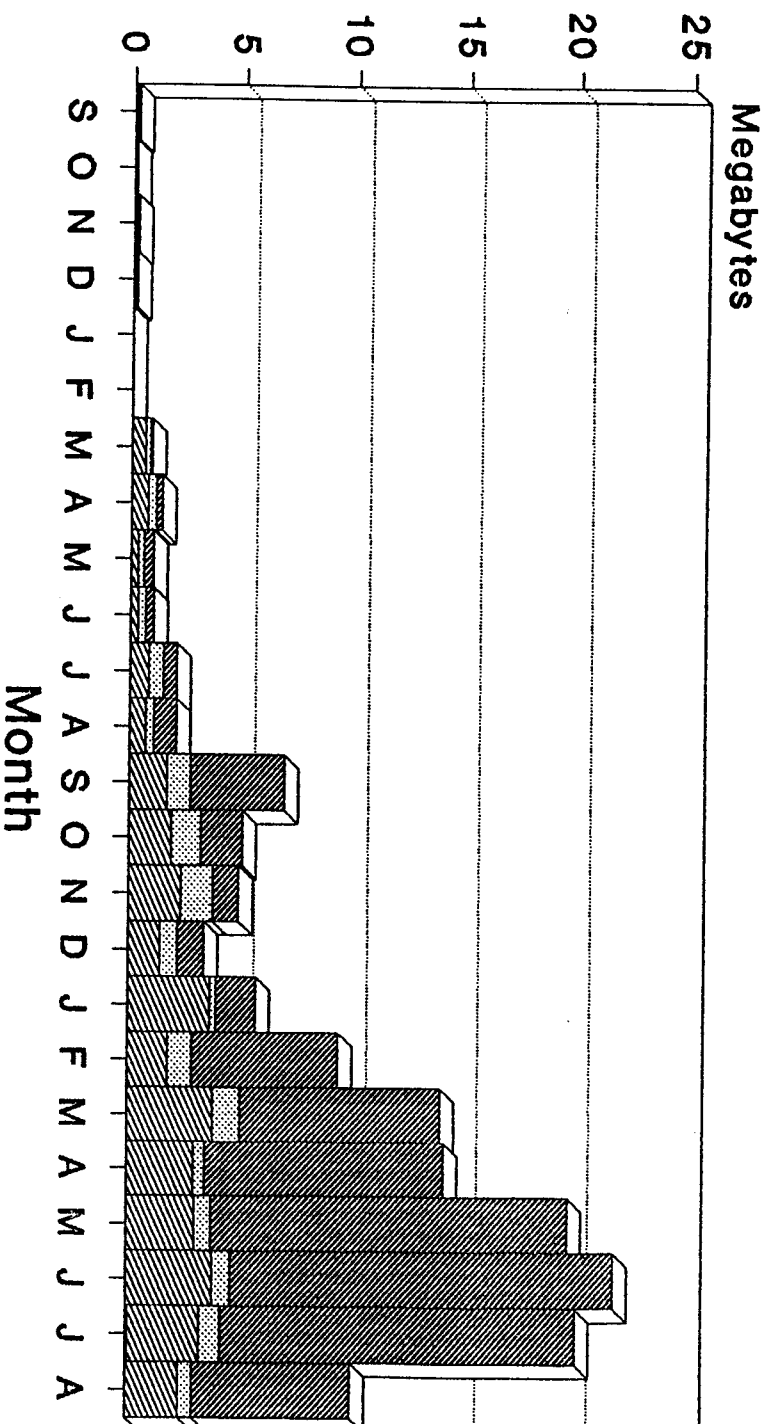
Total Traffic Flows in Messages (91-93)



source: message track log

UNZANET Activity

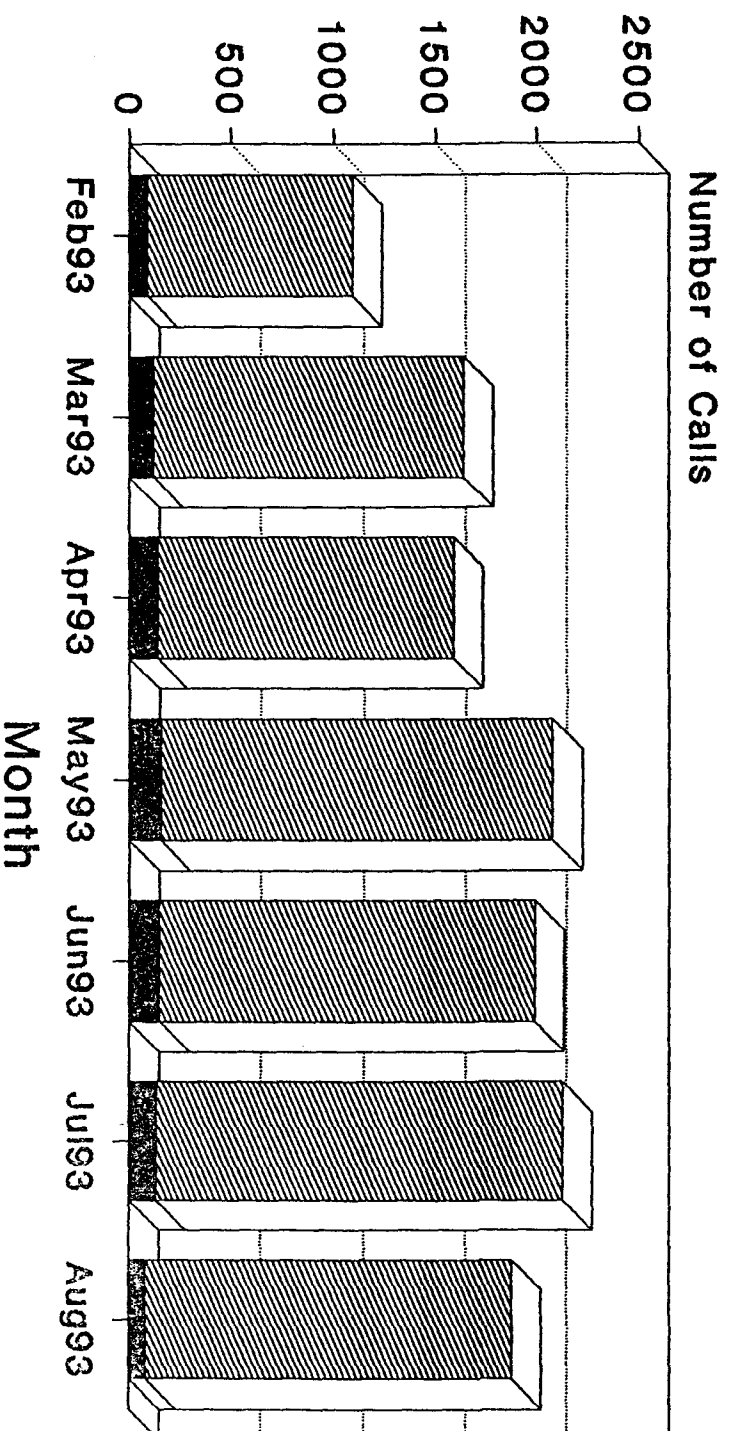
Total Traffic Flows in Bytes (91-93)



source: message track log

UNZANET Activity

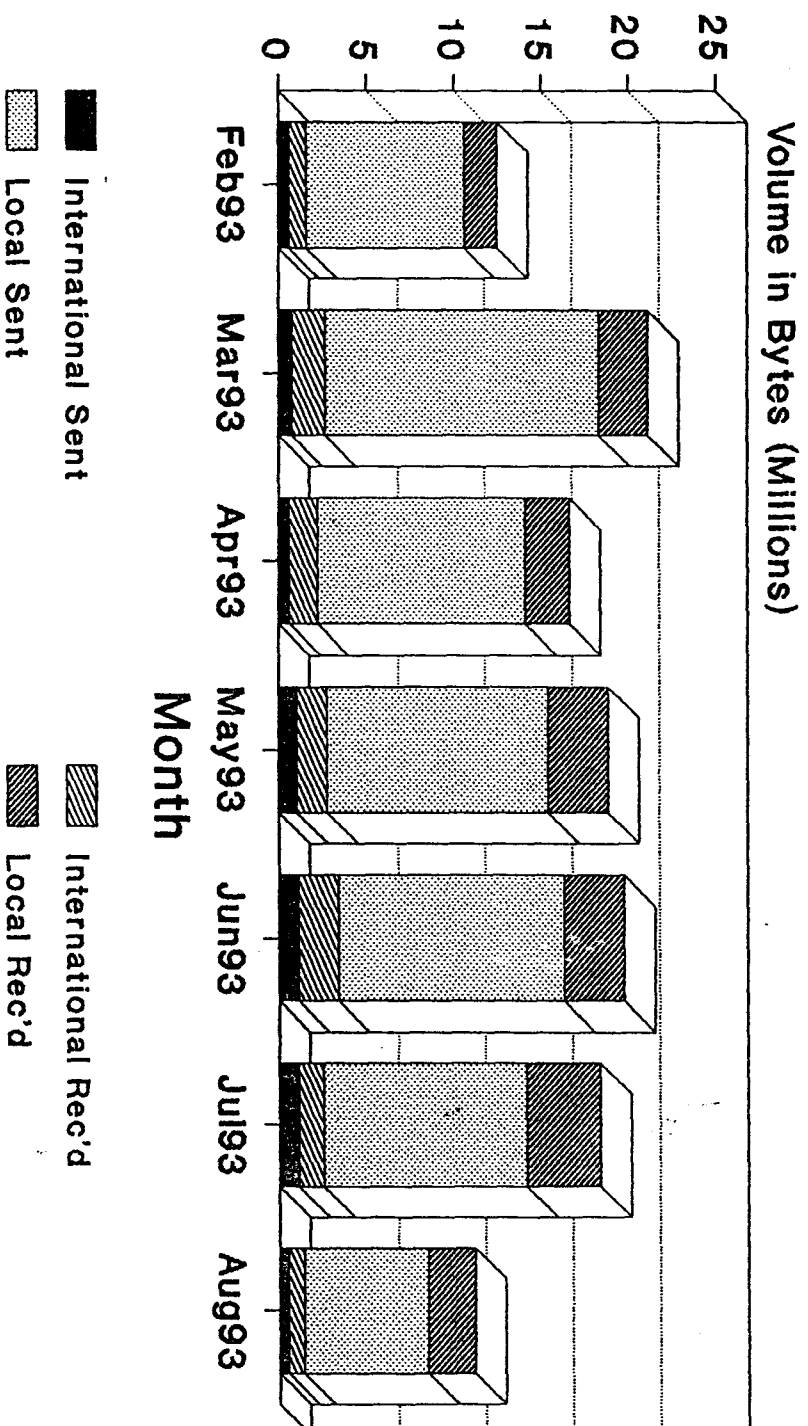
Calls to the Host



International Local

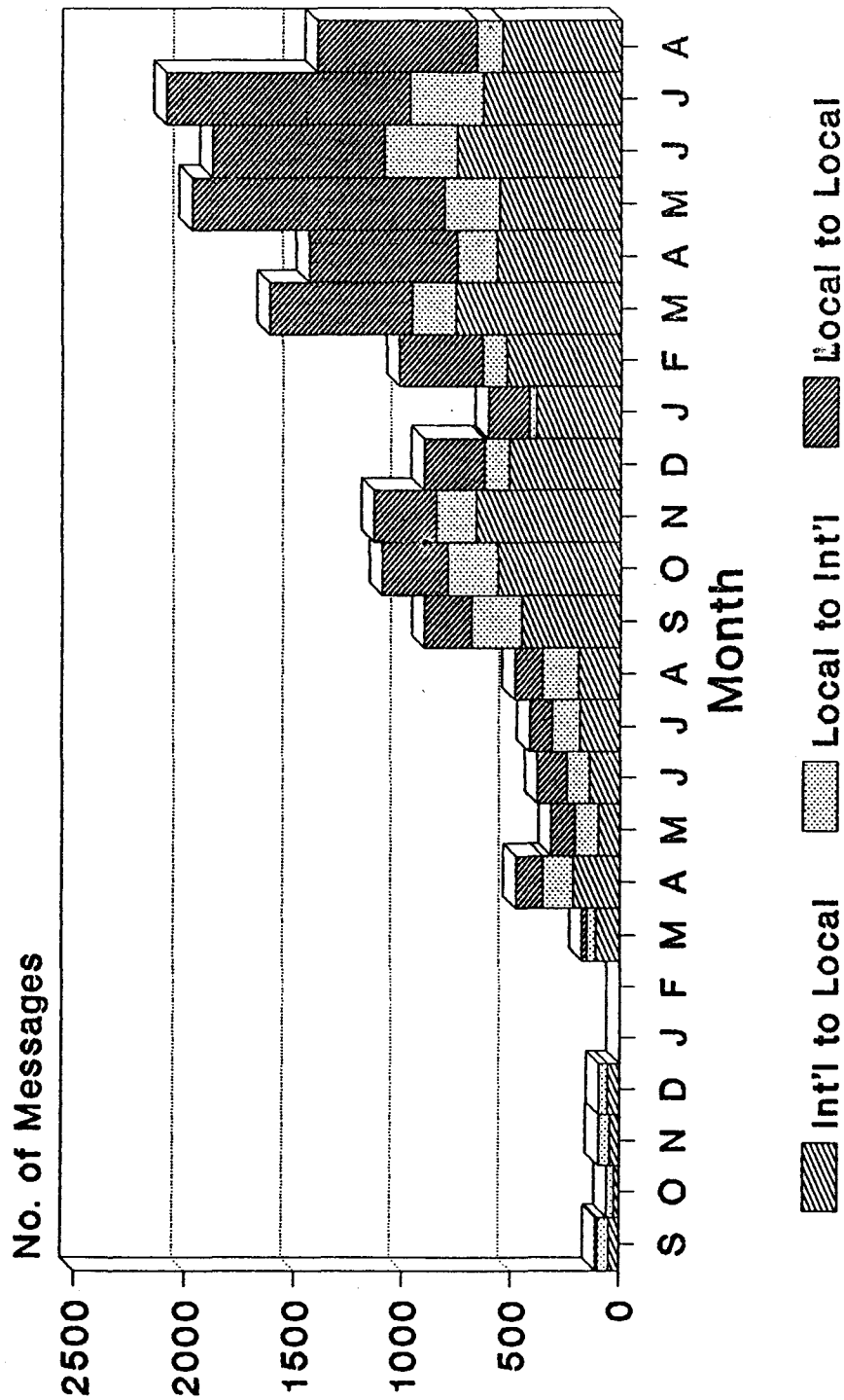
UNZANET Activity

Volume Handled by Host



UNZANET Activity

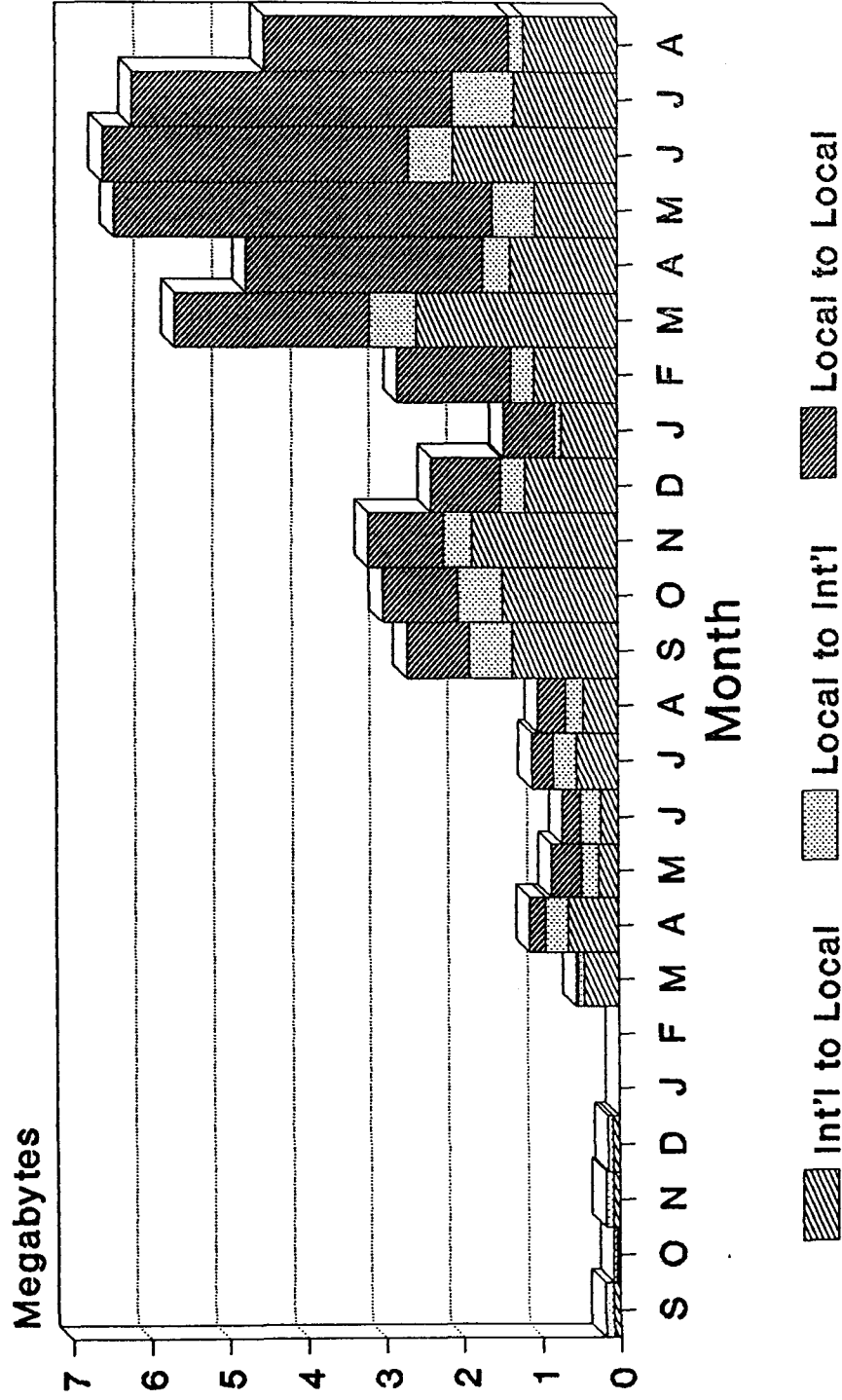
University Traffic in Messages (91-93)



source: message track log

UNZANET Activity

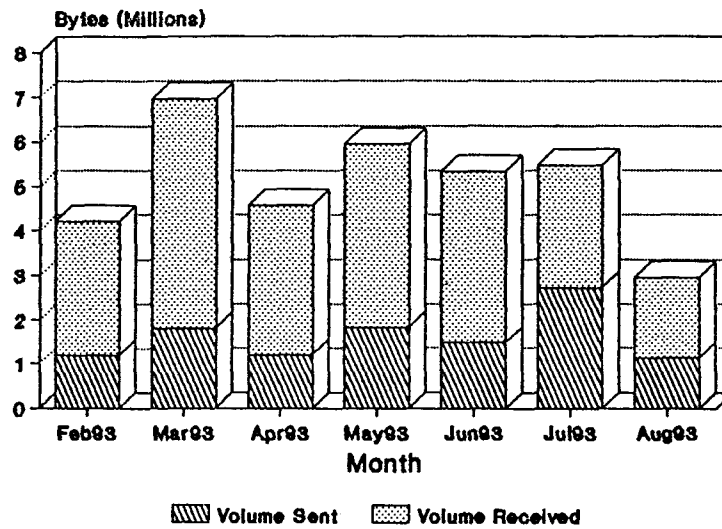
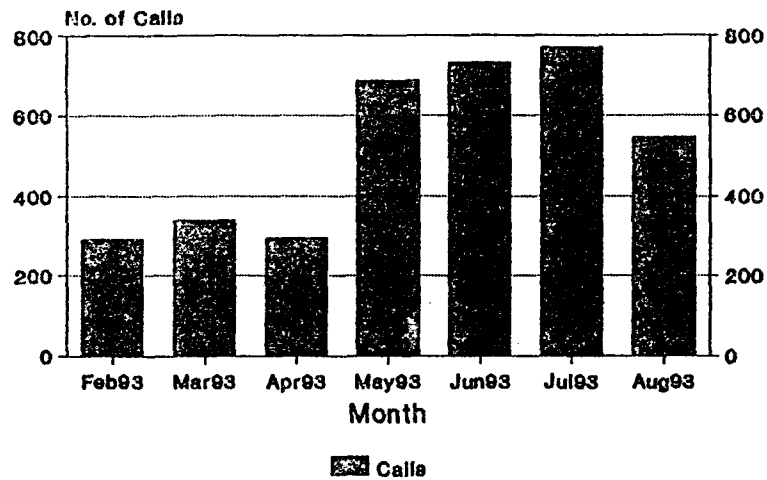
University Traffic in Bytes (91-93)



source: message track log

UNZANET Activity

Calls to the Host by University Points



source: inbound history

ESANET PROJECT MEETING - UGANDA - 27TH to 30TH SEPTEMBER 1993

COUNTRY REPORT - ZAMBIA

LEO SATELLITE ('HEALTHNET')

1. Hardware Updates

The groundstation has continued to run an NEC 386 PC provided by SatelLife. The original transceiver and TNC, commissioned in 1991, are also still in use. A new transceiver and TNC were received in November 1992 but these require an amplifier before they can be put into service, and assume the use of AFC on the satellite which is currently switched off.

The transmit antenna has remained throughout, but the receive antenna was replaced in November 1992 with a more modern double-helix design. Both are fixed omni-directional antennae.

SatelLife have indicated their intention to fit steerable antennae at Unza on 5th October 1993, and it is anticipated that this will greatly improve throughput, particularly on the transmit side where performance has not been fully satisfactory.

A new pilot project was begun in March 1993, with financial support from IDRC and hardware support from SatelLife to expand the use of the HealthNet system to more rural areas, and, in particular, to cover all hospitals in the Southern Province of Zambia. This was seen as an extension of the work covered by the ESANET project. It was officially launched publicly by the Deputy Minister of Health.

There are now some 50 health-related users on the system. These are based at: the main University Teaching Hospital in Lusaka; at the Ministry of Health; at WHO, UNICEF and related bodies; at Medical Stores; at a number of hospitals operated by the Copper Mines and supported by the ZCCM (Zambia Consolidated Copper Mines) Corporate Management Information Services section; as well as the target hospitals (and Provincial Medical Officer's Office) in Southern Province. Several other users throughout the country are connected up, partly to test the ability to communicate from different locations and on the understanding that support to such users will inevitably be limited. Seven of Zambia's nine Provinces have contacts, and all users are operating on a FidoNet basis.

The user-base in Southern Province was determined to be 15 sites. SatelLife originally provided 10 Emerson 286 desktop computers which were being sold at an attractively low-price. However, they soon proved inappropriate for use in the rural settings, and in a short time most had to be abandoned through hardware faults (many relating to intolerance of power supplies). Each machine was also found to have a different internal structure, thus making repair work difficult.

SatelLife then supplied NEC 386 luggable laptops sufficient for all sites, along with 15 Epson dot-matrix printers. These have proved more rugged and have so far been installed in all but 3 of the desired locations. Of the remaining 3 locations, one proved to have an unworkable phone line and has since had a 'radio extender' installed (at their cost) to take 3 additional phone lines over a 50km-distance radio link interfaced with the PTT. It should now be possible to install e-mail. One site, the most remote, has yet to be tackled (transport has been a problem); and one site has proved to have too weak a phone link. Alternatives here are still being investigated.

Voltage stabilisers have been provided at each site. A technician is employed for 9 months on the project who is able to service problems with the machines, although distances (it is some 600km from Lusaka to the south of the province) mean that trips are not always arranged quickly.

2. Software Updates

The software running on the groundstation machine is that installed in October 1992 by Dr Klein. Although it operates satisfactorily (and automatically updates the Keplerian elements) it still necessitates manual transfer of messages between the PG/PB software to communicate with the satellite, and the FrontDoor software for the terrestrial system. The new software which will automate this process is eagerly awaited. The groundstation machine also has a modem built in and acts as a point off the FidoNet host for reception and transmission of messages to the in-country system.

The HealthNet in-country Fido system shares the same host as the UnzaNet system at present, and thus the same software is used.

3. Connectivity Throughputs and Interfaces

Reception from the satellite is in broadcast mode, and speeds are acceptable. Since the satellite has been broadcasting continuous data for the past one year it has been possible to detect the amount of data that could be down-loaded in one pass. Some 120k is normally received in an average morning pass (of which there are two). The amount of requested data actually received during a pass would not normally be this high however, due to necessity to initiate and acknowledge packets in transmit mode.

Transmission has been more problematic, and, whilst it has coped with current (relatively small) loads, would not do so if they were significant. The problem appears to be partly a function of the difficulty of actually getting the satellite to recognise and acknowledge a transmission, and partly of some contention that has now been caused by the growing number of users of the same satellite sharing the footprint (the most recent of which is a VITA groundstation in southern Tanzania). There is a possibility that VITA may shortly install a number more groundstations which would also be in the footprint further degrading upload performance.

Most Zambian use of the satellite is for small volume intra-African traffic where transmission by other means is complex. This pattern would alter significantly if: a direct Internet link were available via the satellite; the software allowed automatic access from in-country users; more information were available on the satellite; and greater security could be provided on messages travelling via satellite. The number of messages will also increase as a function of the size of the user base in other countries.

4. User Base

As regards the in-country situation, health users account for very nearly half of the activity on the UNZANET Fido based e-mail system. This can be seen from the attached statistics at Appendix B. A list of current users is shown at Appendix A.

5. Network Management Issues

The groundstation based part of the system takes very little management, especially with the current low volume of satellite borne traffic.

However management of the in-country system requires considerable resources. There are two full-time employees during the course of the 9-month pilot project. The supervision of the Technician comes directly under the Computer Centre (as does part of that of the Social Scientist employed to do survey and analysis work on the project).

It is estimated that some 50 man hours per week is put into the human part of network management by staff in the Computer Centre (apart from the 2 direct employees), and much of that effort is directed towards HealthNet.

6. Manuals / Documentation

The UnzaNet user manual was used for HealthNet users until a new one was written specifically for the project. This has been distributed to all users, and is also available as a 'Word for Windows' file.

7. Related Activities / Research and Development

The objectives of the project includes the provision of communication facilities in the following areas:

Email communication (local and international); provision of literature; distance learning; administration; control of drug supply; consultations; early referral; collection of epidemiological data; and distribution of laboratory results.

Work during the pilot phase includes establishing which hardware is successful; which modems will operate under the very varying telephone conditions; how well staff adapt to the use of computers (being used for the first time in most hospitals outside Lusaka); what information is being transmitted and how communication channels change.

The provision of health care in Zambia is currently going through an 18 month period of decentralisation and improved communication is intended to prove an important part of this exercise.

At the end of the pilot phase it is intended to determine whether the project should be extended to all 84 of the country's hospitals (as the Minister has indicated he would wish) or whether it is too technically complex or otherwise undesirable.

8. Future Plans / Direction

The system has been put in place (technically) and operated by the University Computer Centre. The project is controlled through a steering committee chaired by a clinician in the School of Medicine, and with representatives from the Ministry of Health; mission hospitals; WHO; UNICEF; PTT; the Medical Library and the Computer Centre.

It has been recognised by the Office of the Minister of Health that it would have been impractical to run the project from the Ministry, much as that might have been the most logical place. (The two project staff are employed directly by the Office of the Deputy Minister to avoid bureaucracy, but even then they are paid through the University in an attempt to bypass administrative problems).

The project will be fully reviewed when the pilot phase is completed early in 1994. Both the Minister and Deputy have publicly declared their determination to have the system expand throughout the whole country, but there are many problems associated with this, not least the cost that would be involved. The number of full-time staff that would also be required is not inconsiderable, and this at a time of severe shortage of government funding.

Discussions are shortly to be held with the Ministry on how the project might proceed, and one suggestion will be the establishment of an independent company to provide such services which could then be 'sold' to either the Ministry or the districts.

Another donor agency is also looking at the possibility of putting radio links in to all hospitals (in connection with the rejuvenation of the Flying Doctor service) and discussions are being held as to whether it might be advisable to use digital radios over which packetised e-mail signals could be sent, thus linking the two services.

A proposal was put to the World AIDS Foundation to establish a National AIDS Resource Centre, which would have used HealthNet as a mode of information collection and distribution. The Foundation, while welcoming the concept of the proposal, rejected it on the grounds of its use of 'an electronic mail network in a country where the reliability of telephone service and power supply may be questioned'. It is intended that a formal response to this rejection will come from the Office of the Minister of Health, through whom it was submitted.

The future use of the satellite is heavily tied in to any plans that SatelLife may have. The in-country community, particularly those in Lusaka, might also gain considerably from any proposed Internet connectivity. The future for the rural hospitals is more difficult to predict. A week long seminar has been arranged for mid-October when users from all sites will come to Lusaka to discuss the further uses they might make of the system so that there is a greater degree of co-ordination. Further technical training will also be provided at that time.

APPENDIX A

ALPHABETICAL LIST OF ZAMBIAN HEALTHNET EMAIL USERS

Anti-AIDS Education Project	5:761/1.81
Anti-AIDS Project Kasama	5:761/1.139
Chainama College of Health Sciences	5:761/1.35
Chikankata Hospital (Sept 93)	5:761/1.42
Choma Hospital	5:761/1.43
Churches Med.Assoc of Zambia (CMAZ)	5:761/1.32
Depty.Minister of Health	5:761/1.15
Family Life Movement	5:761/1.84
Gwembe District Hospital	5:761/1.52
HealthNet Satellite Groundstation	5:761/1.22
HealthNet Support	5:761/1.200
Kabwe Mine Hospital	5:761/1.60
Kafue Gorge Hospital	5:761/1.47
Kalomo District Hospital	5:761/1.54
Kalulushi Mine Hospital	5:761/1.64
Kara Counselling (Hope Hse)	5:761/1.130
Kara House Counselling Service	5:761/1.88
Livingstone General Hospital	5:761/1.45
Luanshya Mine Hospital	5:761/1.61
Maamba Colliery Clinic	5:761/1.49
Mazabuka District Hospital	5:761/1.44
Medical Stores Limited	5:761/1.158
Minister of Health	5:761/1.150
Ministry of Health (Planning)	5:761/1.25
Min.of Health Child Immunistn (Aug 93)	5:761/1.31
MoH AIDS Coordinator	5:761/1.160
MoH Data Processing Manager	5:761/1.157
MoH Epidemiologist	5:761/1.155
MoH Health Info Officer	5:761/1.152
MoH Health Info Unit	5:761/1.153
MoH Permanent Secretary	5:761/1.151
MoH Pharmaceutical Services	5:761/1.159
MoH Primary Health Care (July 93)	5:761/1.156
MoH Senior Health Planner	5:761/1.154
Monze Hospital	5:761/1.41
Mtendere Mission Hospital	5:761/1.51
Mufulira Mine Hospital	5:761/1.62
Namwala District Hospital (Sept 93)	5:761/1.53
Nkana Mines Hospital (Kitwe)	5:761/1.28
ODA Health&Education Planner	5:761/1.142
Planned Parenthood Association	5:761/1.85
Siavonga District Hospital	5:761/1.50
Southern Province PMO	5:761/1.46
St.Francis Hospital Katete	5:761/1.55
Trop.Diseases Rsrch.Cntr	5:761/1.16
UNICEF Zambia Health	5:761/1.112
Univ.Texas/Zambia AIDS Proj.	5:761/1.69
Unza Medicine Tchng Resources	5:761/1.30
Unza Medicine (Paediatrics)	5:761/1.33
Unza School of Medicine Library	5:761/1.1
UTH Administration (Aug 93)	5:761/1.201
UTH Central Laboratories	5:761/1.39
World Health Organisation	5:761/1.14
Zambia AIDS Related TB Proj.	5:761/1.68
ZCCM CMIS Data Centre	5:761/1.67
ZCCM Hardware Support - Kitwe	5:761/1.141
ZCCM Medical Tech Directorate	5:761/1.66
Zimba Mission Hospital	5:761/1.48

APPENDIX B

HEALTHNET TRAFFIC

i) Total Traffic (Number of Bytes) - HealthNet Users

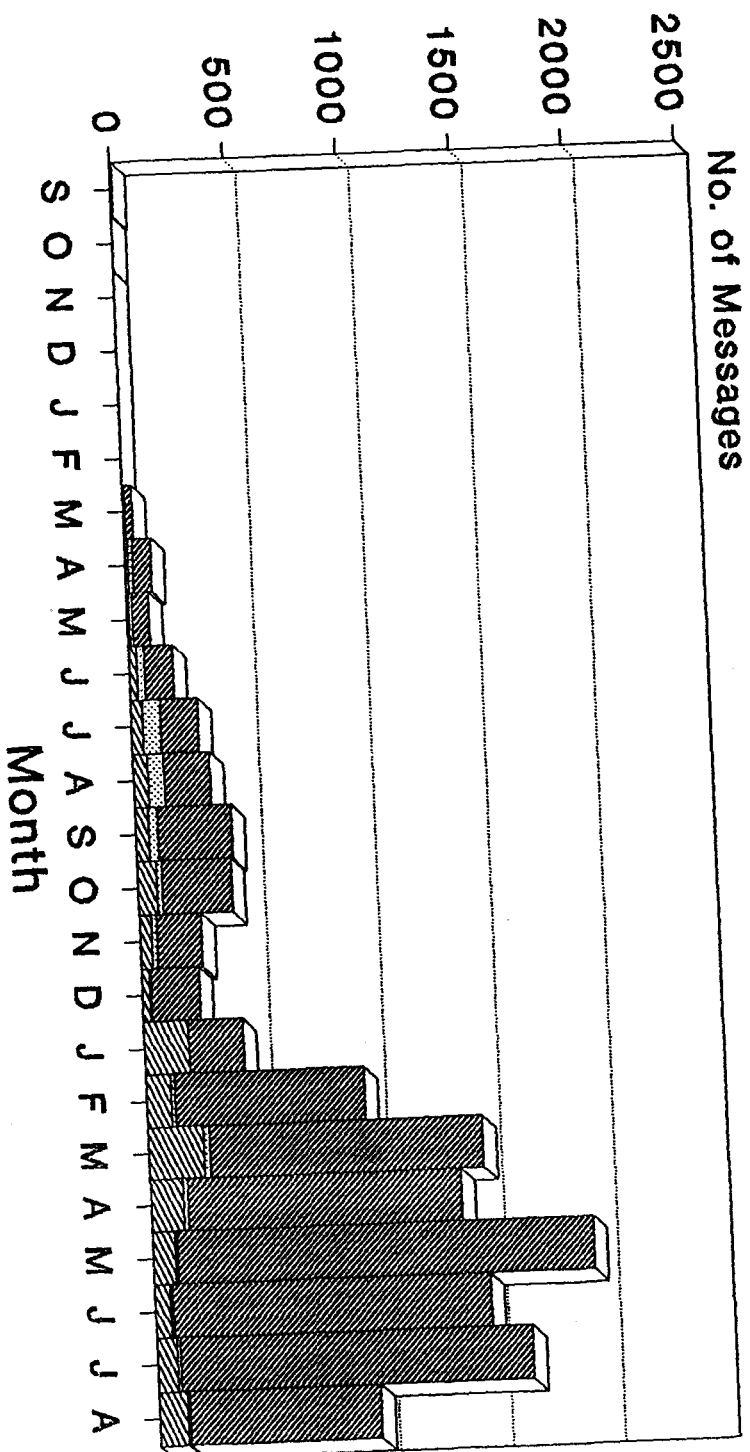
Year	Month	Int'l- Local	Local- Int'l	Local- Local	Total	Local %
1991	9	0	0	2992	2992	100.0
1991	10	0	0	246	246	100.0
1991	11	0	0	0	0	
1991	12	0	0	0	0	
January & February 1992 - no data						
1992	3	12447	1876	34571	48894	70.7
1992	4	30682	35651	149063	215396	69.2
1992	5	31423	14828	189618	235869	80.4
1992	6	71688	100951	265304	437943	60.6
1992	7	203193	342170	561924	1107287	50.7
1992	8	212864	141743	937310	1291917	72.6
1992	9	175839	201409	3347072	3724320	89.9
1992	10	318505	72794	1614944	2006243	80.5
1992	11	178841	42436	530392	751669	70.6
1992	12	78497	57248	903772	1039517	86.9
1993	1	382312	14262	1372519	1769093	77.6
1993	2	347177	43812	6029455	6420444	93.9
1993	3	1302518	53399	7620457	8976374	84.9
1993	4	588019	38113	8281834	8907966	93.0
1993	5	241653	21979	12401951	12665583	97.9
1993	6	153942	15556	12813084	12982582	98.7
1993	7	171969	16313	12047104	12235386	98.5
1993	8	513495	24431	5525239	6063165	91.1
=====						
Total		5015064	1238971	74628851	80882886	

ii) Total Traffic (Number of Messages) - HealthNet Users

Year	Month	Int'l- Local	Local- Int'l	Local- Local	Total	Local %
1991	9	0	0	8	8	100.0
1991	10	0	0	1	1	100.0
1991	11	0	0	0	0	
1992	12	0	0	0	0	
January & February 1992 - no data						
1992	3	7	2	29	38	76.3
1992	4	12	19	82	113	72.6
1992	5	9	13	75	97	77.3
1992	6	32	33	126	191	66.0
1992	7	49	77	167	293	57.0
1992	8	62	71	204	337	60.5
1992	9	57	40	326	423	77.1
1992	10	83	25	306	414	73.9
1992	11	51	21	198	270	73.3
1992	12	32	7	213	252	84.5
1993	1	196	3	237	436	54.4
1993	2	106	16	841	963	87.3
1993	3	242	27	1209	1478	81.8
1993	4	140	19	1214	1373	88.4
1993	5	97	11	1844	1952	94.5
1993	6	66	12	1408	1486	94.8
1993	7	88	12	1563	1663	94.0
1993	8	122	12	848	982	86.4
=====						
Total		1451	420	10899	12770	

UNZANET Activity

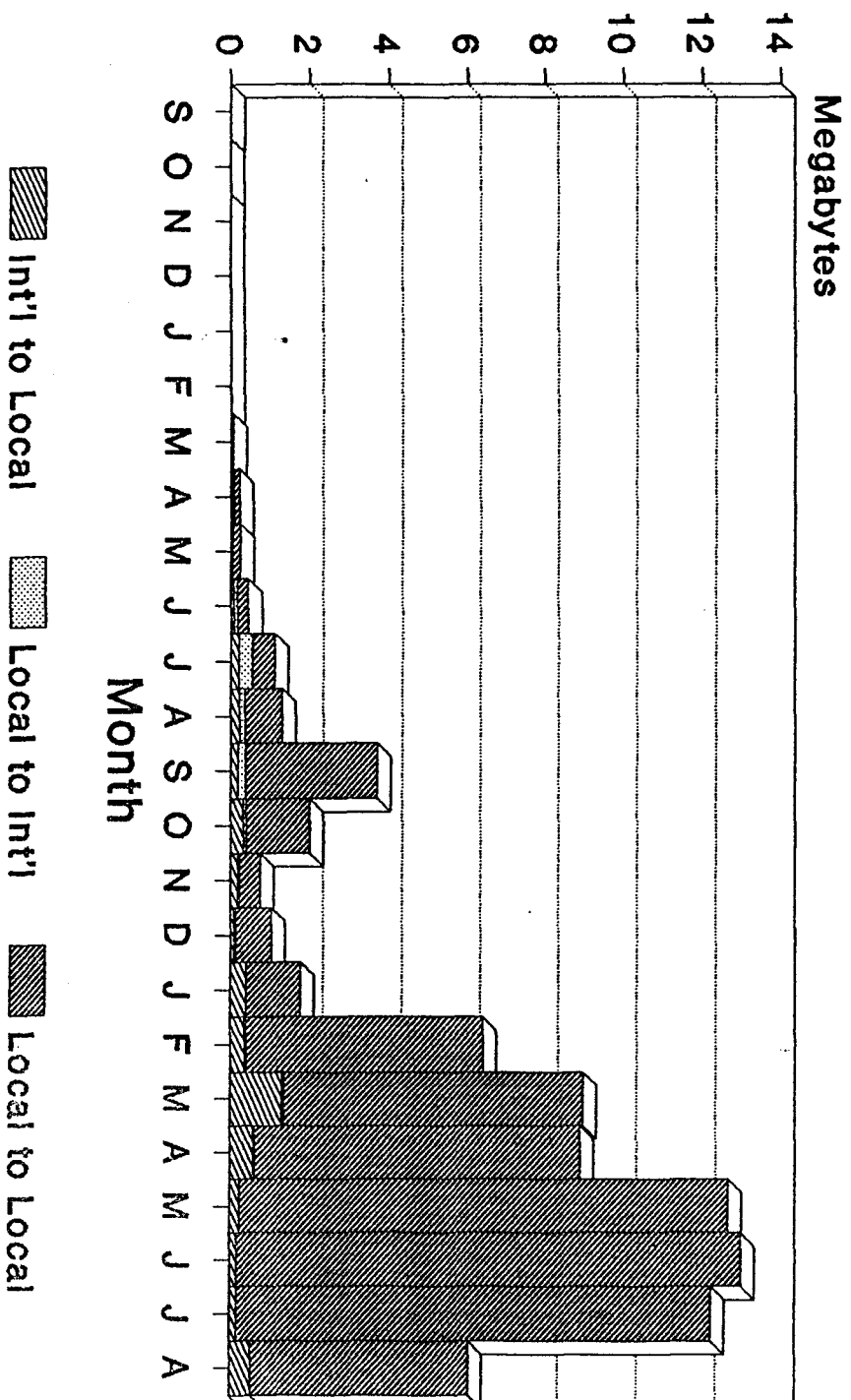
HealthNet Traffic in Messages (91-93)



source: message track log

UNZANET Activity

HealthNet Traffic in Bytes (91-93)

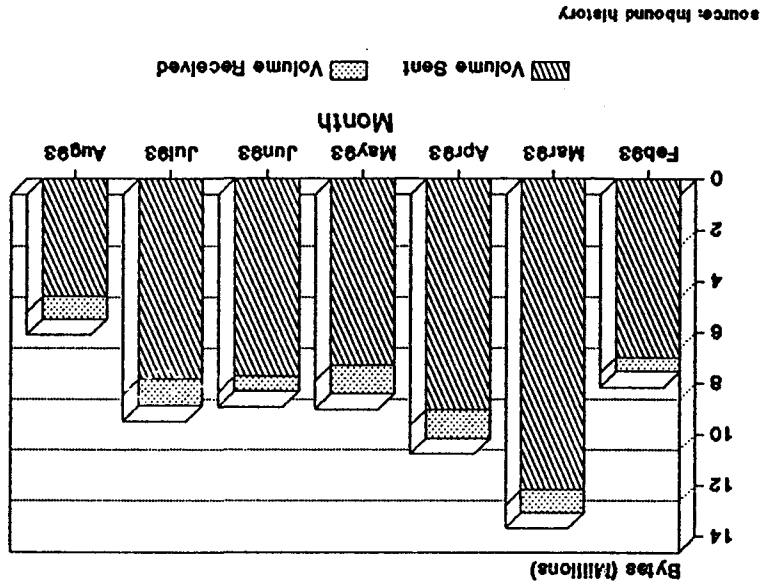
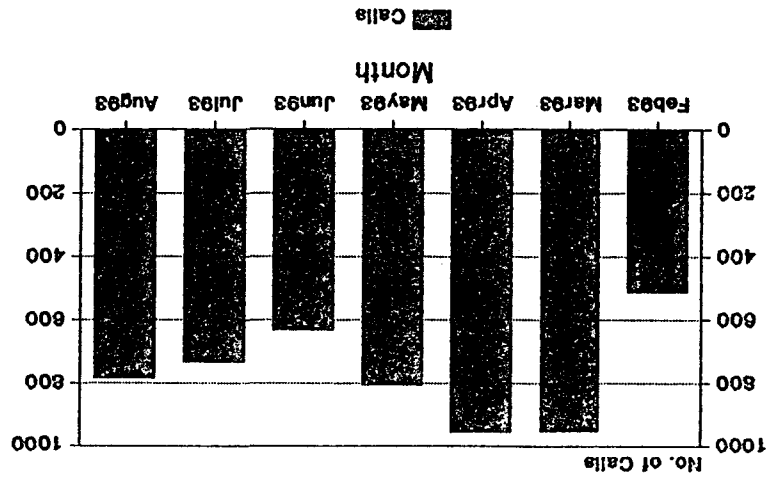


source: message track log

iii) UNZANET Host Activity (Calls & Bytes) by Month - HealthNet Users.

Year	Month	Calls	Calls per Day	Volume Rec'd	Volume Sent	Volume Total	Volume per Call	Volume per Day
1993	2	511	17	545762	6992713	7538475	14752	251283
1993	3	954	32	879769	12194524	13074293	13705	435810
1993	4	956	32	1108141	9057412	10165553	10633	338852
1993	5	806	27	1121720	7301114	8422834	10450	280761
1993	6	633	21	578128	7732803	8310931	13129	277031
1993	7	735	25	1024992	7853716	8878708	12080	295957
1993	8	785	26	886766	4604135	5490901	6995	183030
=====								
Total		5380		6145278	55736417	61881695	11502	

UNZANET Activity Calls to the Host by HealthNet Points



source: inbound history

List of Points and their status as at 23rd September, 1993.

Point	Installation Site	PC type/owner	Modem type/owner	Version	Tel/PABX	Manual	Training	Operational Status
1	UNZA Medlib	AEG Olympia / UNZA	External / UNZA	2.02	250801/Direct	Unknown	Basic	Operational
14	WHO	IBM(30)/ WHO	External / HNet	2.02	223251/PABX	Provided	Basic	Operational
15	MOH Deputy Minister	AST / MOH	External / MOH	2.02	Unknown/Direct	Provided	Basic	Operational
16	TDRC	Unknown	Internal/HNet	2.00	Unknown	Provided	Basic	Unknown
25	MOH Planning Unit	Toshiba / MOH	Internal / MOH	2.00	Unknown/PABX	Unknown	Basic	Semi - Operational
28*	Nkana Mine Hospital	Wang / ZCCM	Internal	2.02	Unknown	Provided	Basic	Unknown
30**	Unza MedTRU	IBM 55 / UNZA	External/HNet	2.00	250753/Direct	Not given	Basic	Operational
31	Min of HealthUCI	N-O-T Y-E-T I-N-S-T-A-L-L-E-D						
32	CMAZ	IBM PSI/CMAZ	Internal/HNet	2.02	Unknown/Direct	Unknown	Basic	Operational
33	Unza MedPaed	AST / UNZA	Internal / HNet	2.02	254965/Direct	Unknown	Basic	Operational
35**	Chainama College	IBM PS2/Chain Coll	External/HNet	2.00	Unknown	Unknown	Basic	Operational
39	UTH Labs	Toshiba / UNZA	External / HNet	2.02	252904/Direct	Not given	Elementary	Operational
40	Macha Hospital	N-O-T Y-E-T I-N-S-T-A-L-L-E-D						
41	Monze Hospital	NEC / HNet	Internal / HNet	2.02	50142/Direct	Provided	Advanced	Operational
42**	Chikankata Hospital	Unknown	Unknown	2.00	Unknown	Unknown	Unknown	Not Operational
43	Choma Hospital	NEC / HNet	Internal / HNet	2.02	20532/Direct	Provided	Basic	Operational
44	Mazabuka Hospital	NEC / HNet	Internal / HNet	2.02	30077/PABX	Provided	Basic	Operational
45	Livingstone Hospital	NEC / HNet	Internal / HNet	2.02	320222/PABX	Provided	Basic	Operational
46	PMO Southern	NEC / HNet	Internal / HNet	2.02	320912/PABX	Provided	Basic	Operational
47	Kafue Gorge Hospital	NEC / HNet	Internal / HNet	2.02	371081/Direct	Provided	Basic	Non - Operational
48	Zimba Hospital	NEC / HNet	Internal / HNet	2.02	Unknown	Provided	Elementary	Non - Operational
49	Maamba Hospital	NEC/HNet	Internal/HNet	2.02	78155/Direct	Provided	Basic	Operational
50	Siavonga Hospital	Emerson / HNet	Internal / HNet	2.02	511022/PABX	Provided	Basic	Operational
51	Mtendere Hospital	NEC / HNet	Internal / HNet	2.02	515066/Direct	Provided	Basic	Operational
52	Gwembe Hospital	NEC / HNet	Internal / HNet	2.02	40133/Direct	Provided	Basic	Operational
53	Namwala Hospital	N-O-T Y-E-T I-N-S-T-A-L-L-E-D						
54	Kalomo Hospital	Emerson/HNet	External/HNet	2.02	Unknown	Provided	Basic	Operational
55	St.Francis Hospital	Amstrad / KateteHosp	Internal / HNet	2.02	Unknown	Provided	Basic	Operational
60*	Kabwe Mine Hospital	Wang/ZCCM	Internal / ZCCM	2.02	Unknown	Provided	Basic	Operational
61*	Luanshya Mine Hospital	Wang/ZCCM	Internal / ZCCM	2.02	Unknown	Provided	Basic	Unknown

Point	Installation Site	PC type/owner	Modem type/owner	Version	Tel/PABX	Manual	Training	Operational Status
62*	Mutulira Mine Hospital	IBM (50) / ZCCM	External / ZCCM	2.02	Unknown	Provided	Basic	Unknown
63*	Nchanga Mine Hospital	Wang / ZCCM	Internal / ZCCM	2.02	Unknown	Provided	Basic	Unknown
64*	Kalusha Mine Hospital	Wang / ZCCM	Internal / ZCCM	2.02	Unknown	Provided	Basic	Unknown
65*	Konkola Mine Hospital	Unknown	Unknown	2.02	Unknown	Provided	Basic	Unknown
66*	ZCCM Med Tech	Unknown	Unknown	2.02	Unknown	Provided	Basic	Unknown
67*	ZCCM CMIS	IBM (80) / ZCCM	External / ZCCM	2.02	Unknown	Provided	Basic	Unknown
68**	ZAMBART	Librex / ZAMBART	Internal / ZAMBART	2.02	211173/Direct	Not given	Basic	Operational
69**	UTZAM	Librex/UTZAM	Internal / UTZAM	2.02	Unknown	Unknown	Basic	Operational
70**	AmEmUTZAM	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Not Operational
81**	Anti AIDS HQ	IBM / Anti AIDS	External/HNet	2.02	Unknown	Unknown	Basic	Operational
83	UNICEF	Wang386/UNICEF	Internal/UNICEF	2.10	Unknown/PABX	Unknown	Basic	Operational
84**	Family Life	Packard Bell / Fam. Lif	Internal / ZANGO	2.02	224609/Direct	Not given	Basic	Operational
85**	PPAZ	Unknown	Internal/ZANGO	Unknown	Unknown	Unknown	Basic	Operational
87**	ZARD	IBM PS2/ZARD	External/ZANGO	Unknown	Unknown	Unknown	Basic	Operational
112	UNICEF Health	AST 486/UNICEF	Internal/UNICEF	2.02	Unknown/PABX	Unknown	Basic	Operational
130**	Kara Hope	Unknown/Kara	Internal/HNet	2.02	Unknown	Unknown	Basic	Operational
134**	Mfuwe	Unknown/Mfuwe	Unknown	Unknown	Unknown	Provided	Basic	Operational
139**	Anti AIDS Kasama	Unknown	External / Unknown	Unknown	Unknown	Unknown	Unknown	Semi - Operational
150	MOH Minister	AST 386/MOH	Internal/MOH	2.02	Unknown/Direct	Provided	Unknown	Not operational
151	MOH Permanent Sec.	N-O-T Y-E-T I-N-S-T-A-L-L-E-D	(Waiting for feedback from Ministry of Health)					
152	MOH Info Officer	Toshiba / MOH	Internal / MOH	2.00	Unknown/PABX	Provided	Basic	Operational
153	MOH Info Unit	Rhino / MOH	Internal / MOH	2.02	Unknown/PABX	Provided	Basic	Operational
154	MOH Senior Health Plan	N-O-T Y-E-T I-N-S-T-A-L-L-E-D	(Waiting for feedback from Ministry of Health)					
155	MOH Epidemiologist	IBM (35) / MOH	Internal / MOH	2.02	221301 / Direct	Provided	Basic	Operational
156	MOH Primary Hlth. Care	N-O-T Y-E-T I-N-S-T-A-L-L-E-D	(Waiting for feedback from Ministry of Health)					
157	MOH DP Manager	Rhino / MOH	Internal / MOH	2.00	225785/PABX	Provided	Basic	Operational
158	Medical Stores Ltd.	NCR / Med Stores	Internal / HNet	2.02	246104/Direct	Provided	Basic	Operational
159	MOH Pharm Services	AST / MOH	Internal / HNet	2.02	Unknown/Direct	Provided	Basic	Operational
160	MOH AIDS Coordinator	Toshiba / WHO	External / HNet	2.02	Unknown/PABX	Provided	Basic	Operational
200	HealthNet_Support	NEC / HNet	Internal / HNet	2.00	236286/Direct	N/A	Advanced	Operational
201	UTH Administration	N-O-T Y-E-T I-N-S-T-A-L-L-E-D						

* Awaiting information from Ken at ZCCM.

** Installations not done by me, will get in touch with these places and give a feedback as soon as I get replies.

Note :

- 1) On the operational status of some points it is marked with "unknown". I will know the status of these points after I have analysed the inbound, his and the Msgtrck. log files.
- 2) The above mentioned points are 61 in number and will be put on "monitoring" for traffic.

ESAnet Project
Zimbabwe Terrestrial E-Mail Report
November 1992 - September 1993

Rob Borland
Computer Science
University of Zimbabwe

Hardware Update

Hardware acquired in this reporting period includes 10 Viva 2400 bps external modems purchased against general project equipment funds and 30 GVC 2400 bps external modems purchased against Zimbabwe Research Expenses. A 120 MB hard drive unit to upgrade the 40 MB drive originally installed on the node machine was also acquired against Research Expenses.

Software Update

Node software updates include the upgrading of GEcho Beta to Version 1.00 which incorporates significant operational and performance improvements, and the installation of the echomail tracking utilities GUS and Echovol. These utilities subsequently had to be dismounted from the low volume hard drive originally installed but will be re-installed on the new drive.

Several versions of the current points' software package incorporating upgrades, improvements and bug-fixes have been distributed. Beta versions of Marimba, the IDRC-sponsored Fido package, were released to selected users for testing. Production versions of this package, incorporating Msgedsq, Squish and BinkleyTerm within a compiled shell, are expected by the end of the year. This package is urgently required as the present points' package is excessively complex to operate, fragile, bug-ridden and poorly documented.

Connectivity

ESAnet Zimbabwe has not yet been allocated a direct telephone line so ESAnet/HealthNet users are still temporarily connected to MANGO. All international mail is routed through WorkNet in Johannesburg, via two daily polls (WorkNet polls MANGO at 11:00 and MANGO polls WorkNet at 18:00). Both PEP and V.32 have been used and throughput of over 1000 cps is regularly obtained. WorkNet now has full Internet connection via Infonet, a UNINET service provider. All outgoing Fidonet and Internet mail is routed via UNINET. Incoming Fidonet mail is routed via the Africa Zonegate and UNINET. Incoming Internet mail is routed via CSIRnet and UNINET.

Network Traffic

Over 20,000 messages totalling nearly 45 Mbytes were sent or received by ESAnet and HealthNet points in the period September 1992 - August 1993. Detailed tabulations of network traffic have been supplied to the Zambian node for consolidation.

User Base

There are currently approximately 44 active ESAnet/HealthNet terrestrial e-mail user-sites, 17 on the University of Zimbabwe main campus; 11 on medical campus; 1 on the National University of Science and Technology campus in Bulawayo; 12 in Ministry of Health offices throughout the country and 3 in Non-Governmental Organisations. Most sites have several registered users and only the system operators name and affiliation is given in Appendix 1 below.

Network Management and Finance

MANGO operates on a full cost-recovery basis and ESAnet users have been made responsible for these costs, which include Z\$10.00 monthly subscription fee plus a usage fee of Z\$0.10 for the first kilobyte and Z\$0.02 for each additional kilobyte per message (Z\$1.00 = US\$0.15 approx). Most users are able to debit these costs against Departmental budgets. HealthNet users' charges have been carried by SatelLife.

Charges raised by WorkNet for polling and gateway services have been settled against Zimbabwe Research Expenses funds.

Software Development

A prototype accounting program has been developed to produce statements of usage. Input data are currently obtained from MsgTrack, which unfortunately tracks only netmail. The program is being extended to include file attaches, which are logged by FrontDoor, and echomail, which is logged by GUS and Echovol. The program is a prototype only and a more efficient and robust binary compiled version is urgently required.

Consultancy

Mike Jensen was engaged against general project funds to upgrade node Fido software and to install Fido-to-Unix gateway software.

Financial Statement

Project Consultancy Funds

Software installation consultancy	US\$ 600
-----------------------------------	----------

Country Research Expenses

Opening balance	C\$ 6228	
Modems and hard drive		C\$ 5228
WorkNet polling/gateway charges		C\$ 1000
Total Research Expense expenditure		C\$ 6228

Future Developments

An ESAnet node will be established in the Department of Computer Science on an internal PABX line. Tests conducted on a prototype system indicate that these internal lines have sufficient data-carrying capacity. Since internal PABX extensions are not directly accessible from off-campus this node cannot be registered in the public Fidonet node lists. However, the Fidonet Africa Zone Co-ordinator has already authorised the establishment of this node on an experimental basis pending the allocation of a direct telephone line. The PTT is currently upgrading the PSTN and the University expects to receive a significant allocation of additional lines in the near future.

A gateway will be established between this ESAnet node and ZIMBIX, the UUCP dial-up network operated by the University Computer Centre, using Waffle and Fred software. This will improve network redundancy and provide practical experience in the migration from Fidonet to UNIX technology.

An independent HealthNet node will be established at the Medical School campus on a direct telephone line currently dedicated to a fax machine. Hardware for splitting fax and modem signals has already been donated by SatelLife.

The organisational difficulties in the operation and management of these additional nodes are significant and have not been underestimated.

ESAnet/HealthNet User Sites and System Operators

1 Rob Borland	ESAnet Project Co-ordinator (E)
3 Dan Peterson	UZ Community Medicine (H)
5 Cathy Tsikirayi	UZ Medical Rural Attachment Co-ordinator (H)
7 Richard Laing	UZ Community Medicine (H)
15 Helga Patrikios	UZ Medical Library (H)
19 Dieter Neuvians	GTZ Health Systems Research Officer (H)
28 Chas Todd	UZ Community Medicine (H)
31 Glyn Chapman	UZ Community Medicine (H)
32 Carol Thompson	UZ Political Studies (E)
33 Amanda le Grand	WHO Health Systems Research Officer (H)
39 Yuri Velinov	UZ Computer Science (E)
40 Andrew Matondo	UZ Computer Aided Learning Laboratory (E)
41 Mike Collier	UZ Electrical Engineering (E)
42 Xavier Carelse	UZ Physics (E)
43 Khulu Mangena	NUST Computer Science (E)
44 Busiso Chisala	UZ Mathematics (E)
45 Jephath Chifamba	UZ Physiology (E)
46 John Read	UZ Biochemistry (E)
47 Ian Dow	UZ Veterinary Science (E)
48 Pam Woods	UZ Veterinary Science (E)
58 Dana Allen	UZ Political Studies (E)
60 Sabelo Mapasure	UZ Medical Library (H)
61 Archibald Gumiro	MoH Harare (H)
63 Bothwell Mutandiro	MoH Blair Research Laboratory (H)
64 Mary Bassett	UZ Community Medicine (H)
65 Smockie Dube	MoH Bulawayo (H)
66 Peter ten Ham	MoH Harare (H)
68 Henri van den Hombergh	MoH Gweru (H)
69 Pierpaolo deColombani	MoH Chinhoyi (H)
74 Farhad Aghdasi	UZ Mechanical Engineering (E)
75 Firouz Aghdasi	UZ Electrical Engineering (E)
91 Shepard Mashayamombe	UZ MPH Program (H)
92 Stanford Chigumira	UZ MPH Program (H)
93 Cephas Dzuda	UZ MPH Program (H)
94 David Matanhire	UZ MPH Program (H)
95 Kevin Mwenye	UZ MPH Program (H)
96 Sue Grady	UZ Community Medicine (H)
100 Godfrey Woelk	UZ Community Medicine (H)
109 Lev Gonick	UZ Political Studies (E)
125 Robin Murphy	UZ Electrical Engineering (E)
129 Aad van Geldermalsen	MoH Rusape (H)
135 Philip Leis	UZ Sociology (E)
136 Alesandro Loretta	WHO Health Systems Research (H)
139 Vikram Patel	UZ Psychiatry (H)

GTZ	German Agency for Technical Co-operation
MPH	Masters in Public Health degree program
MoH	Ministry of Health
NUST	National University of Science and Technology (Bulawayo)
UZ	University of Zimbabwe
WHO	World Health Organization

ZIMBAWE COUNTRY REPORT

HEALTHNET

The HealthNet station is in the University of Zimbabwe Medical Library. We were connected on e-mail through MANGO in 1991. The Satellite ground station was installed in January 1992 and the licence for the station was only granted in July 1993. During the time we had no licence, we were however, able to down-load a few conference messages such as The African Medical Librarians Bulletin.

A. HARDWARE

Modem	-	Hayes Smartmodem 2400
Computer	-	NEC power Mate 386
Radios	-	Kenwood
	-	PacCom Tiny 2
	-	DC Power Supply PS 30XMII
	-	KCT
Fax	-	Siemens HF 2301

There has been no update on the hardware since 1992.

B. SOFTWARE

Electronic mail	-	Frontdoor and Binkley
Satellite	-	HNet for Satellite

B. Connectivity

We have not been able to operate Satellite ground station up to now mainly because:

- (i) We had no licence till July 1993
- (ii) The software which was installed is giving difficulties in operating as it appears it is now out of date.

C. E-Mail

Besides these problems with Satellite the station is receiving and sending a lot of messages through e-mail.

i) Mail

507 messages were received by e-mail in January to August 1993 between the two e-mail points of the Library. The messages were mainly from colleagues in America, Geneva, Britain and Zambia and from library users/patrons in Gweru, Bulawayo and Harare requesting literature from the Medline Database on CD-ROM.

i) **Mango.AIDS**

We now subscribe to the AIDS Conference through MANGO. We receive on daily basis, information on AIDS from the Centre for Disease Control and Prevention (CDC), Bethesda, USA. Print outs are produced and posted on the notice board for library patrons.

iii) **WHO News Bulletin**

The Medical Library receives on a regular basis, a news bulletin from WHO with citation from most recent WHO publications. Printed copies of the messages are posted on the notice board outside the library.

iv) **Messages Sent**

Our communication with other institutions both locally and internationally has widened. We communicate with doctors from the provinces who request literature searches on CD-ROM in most cases. From January to August 1993, 104 messages were sent to other institutions by e-mail.

D. Userbase

The academic staff is not yet fully aware of e-mail benefits compared to facsimiles. In March the library circulated a letter inviting the Medical academic staff to utilise the e-mail facility, but the response was not higher than expected. Only a few lecturers who have had the opportunity to use e-mail in other countries reacted positively to the information.

E. Future plans

Now that we have a licence to operate satellite, we hope to consolidate our shortcomings in communicating with other African countries by utilising the facility. It should not be emphasised that close cooperation and coordination with computer experts for back up should be continued.

More efforts will be made to influence medical staff to recognise the usefulness of e-mail and Satellite.

Sabelo Mapasure

University of Zimbabwe Medical Library

Eastern and Southern Africa Network (ESANET)

UGANDA COUNTRY REPORT

1.0 The ESANET Project: Goals and Objectives

The ESANET network is a research project aimed at investigating various microcomputer methodologies for communications. The countries participating in the project are all members of the Preferential Trade Agreement (PTA) region. They consist of the Institutes of Computer Science at Nairobi and Makerere, and the Computing Centres at Dar es Salaam, Lusaka and Harare. The general goals of the project are to:

- 1.0.1 to experiment with microcomputer based communication networking in order to acquire the necessary technological capacity, and;
- 1.0.2 to promote more effective and efficient communication within the research community in the region.

Within these more general goals, more specific objectives of the project are:

- 1.0.3 to experiment with alternative modalities and techniques for data communication among and within the five nodes;
- 1.0.4 to evaluate the technical, economic, sociological and management aspects of the communication network experiments;
- 1.0.5 to disseminate information to the research community within the region about the development and the results of the project with a view to increasing the awareness of possibilities, stimulating new and wider applications, and inviting feed-back on related topics; and,
- 1.0.6 to make recommendations to the research community (users and institutions) and telecommunications authorities in the region on cost effective data communication modalities, and appropriate network models and policies for specific environments and applications.

2.0 Progress Report on Achieving Specific Project Objectives

Electronic Networking

- 2.0.1 In March, 1991, the Makerere node was initially temporarily installed in the Deputy Vice Chancellor's office owing to lack of a direct line at the ICS, for

which an application was made to Uganda Posts and Telecommunication Corporation on 19-2-1991. In mid December, 1991, Frontdoor software and modem were installed at ICS and was operational since then.

- 2.0.2 By the time of the Harare Design Workshop at the end of May 1991, the ESANET equipment had not arrived as reported, however notice of shipment was received from NIRVCENTRE on 10th December, 1991 and the complete consignment arrived at Entebbe on the 3rd January, 1992 and were cleared immediately.
- 2.0.3 It should be noted that although we expected to receive only one microcomputer and this is what we did indeed receive, the advice of 10th December, 1991 had indicated 2 PCs.
- 2.0.4 In mid January 1992, a direct line (256-41-532440) for the ESANET equipment was in place and initial attempts Frontdoor and internal modem were not successful.
- 2.0.5 At the time of the UNESCO IIP Workshop in mid March, 1992, in an attempt to demonstrate the system, node became fully operational with the assistance of the ESANET Project leader and the Nairobi node. It has become a regular feature of the numerous UNESCO IIP Workshops that were held hence forth to have hands-on demonstration of networking using the computers in the ICS on the Intercom.
- 2.0.6 ISD facilities were installed, and payment made from the ESANET funds. Following this, MUKLA has now been upgraded from a point of the ELCI to a full node to serve users in the University e.g. Departments of Mathematics, Physics, Chemistry, Biochemisry, Deans Office, Library, Makerere Institute of Social Research (MISR), the University Bookshop, the Cancer Institute at Mulago Hospital, the Faculty of Engineering, Medical School, ISAE and short term visitors from overseas universities. The addressing format will be provided by the Nairobi node. Complete cooperation with Ngonet has ben achieved through the Sysop Charles Musisi whose ability has grown from strength to strength as he serves all the three networking efforts (Esanet, Healthnet, and Ngonet). The number of NGOs installed as points off MUKLA grows by the day. The list includes CBR, WFP, ADD, URTD, JEEP, WHO. We have gone to the extent of installing for the Computer Room of the Uganda Posts and Telecommunications Corporation, and this is our way of getting cooperation of the Telecommunications authorities through the back door.

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- 2.0.7 The activities of ESAnet have thrived during the period from March, 1992. By this time, the current number of users had risen to over 50. This number could have been higher but owing to a number of limitations such as unavailability of a ready source of cheap modems. The number of mails exchanged in a daily session stands at about 20. We were still running on a low speed modem of 2400 baud, making the sending/receiving of large documents internationally, a lengthy and costly matter, whereas the quality of the lines could permit up to 9600 baud.
- 2.0.8 As a result of our exposure on the international news networks, e-mail has proved to be a powerful tool by which different professionals can interact to discuss matters of mutual interest. A number of Africans and Africanists have been pleased with our development of this type of communication. Our communication via KCI-NET with a number of Kenyans living abroad (mainly USA, and UK) have exposed us to an organisation they have set up to foster the mobilisation of the scattered human resources towards useful ventures like the proposed Kenya Association for the Advancement of Computer Technology (KAACT). It is suggested each country could harness its nationals abroad by setting a national chapter of such a network (ie UAACT, TAACT, ZAMAACT, ZIMAAT).
- 2.0.9 Through international appeals and exposure, the MUKLA node thankfully received a donation of a high speed Worldblazer Telebit 3000 modem courtesy of Dr. M. Barad of Telebit Corporation. On installation with assistance of GNFIDO Sysop Ms Karen Banks, the fastest transmission 'ever' (in her words), between Africa (probably Sub Saharan) and Europe (UK) happened at 19200 baud!
- 2.0.10 Although ESAnet was originally perceived to be primarily a south-to-south interaction medium, for the MUKLA node, it has mainly grown as a north-south or south-north network. It is our strong desire to encourage more interaction regionally.
- 2.0.11 The second component of the original cooperative wider network incorporating HealhNet is operational albeit under a different management. The site of the ground station at the Medical School now has a fully operational fido node linking the satellite with the ESAnet node at the Institute.

3.0 Cost Analysis of Makerere University Node

3.0.1 Following the outlined achievements in during experimentation period and also the enthusiasm of the user community, and yet the initial funding run out, with the project duration extended by another year to the end of 1993. We realised the need for alternative support funds. This prompted us a cost recovery structure which would sustain the network beyond the experimentation period by sensitising the community that they need to contribute to its upkeep.

Our attempts at charging for the services have met with mixed reaction. Some users have been put off, while others realise the need for contributing something.

3.1 Analysis of Cost Recovery Structure

With the support of IDRC financing, the node at Makerere has not had to contend, until recently with the prospect of achieving full cost recovery for the services it has been providing to the research community at the university. The rationale behind subsidizing the electronic mail was to serve as a point of introduction to users and institutions who had not previously considered the option of using electronic networking to improve their communications with researchers both in the region, and elsewhere in the world. As the IDRC funding draws to an end, there is need to analyze the present cost structure and management systems of the node to explore options for reducing costs, improving revenue performance, and improving the overall management and financial administration of the ESANET node to make the transition to being self sustaining.

As of now the revenue collections have demonstrated the ability to sustain the e-mail service beyond the period of donor funding. Messages are presently charged at Ug.Sh1000 (just less than \$1) per equivalent of A4 size page, and this charge is carefully administered to only those who afford. This applies to mostly people wishing to relay messages of a private nature. Cost recovery doesn't apply to connected University departments and faculties.

3.1.1 IDRC & Makerere Support

As the IDRC funding comes to an end, it is important to emphasize the Makerere University has an ongoing interest in the viability of the ESANET network and is continuing

to subsidize the network both through providing office space, equipment, and staff to the node. While the University has not indicated any timetable for requesting payment for these services, it may become an issue in the future which will lead to higher costs.

3.1.2 Personnel Costs

It is also important to note that the staff operating the node at Makerere are doing it on a volunteer basis and are not presently receiving any payment for the skills which they are now contributing to the node. While the staff must be commended on their dedication to the project, the present situation is unsustainable in the long run and funds will have to be allocated for paying the Systems Operator and other individuals as required to ensure continuity and reliability of the node. As the number of users and institutions using the node increase their will also be a need for more systematic financial administration to ensure that cash receipts and payments remain within close proximity to one another.

3.1.3 Equipment

The current microcomputer equipment, which was purchased under the IDRC project is functioning well. In an attempt boost capacity, the Institute has installed the node on its own Intel 486 microcomputer. However, with frequent electrical surges and troughs, the possibility of technical malfunctions is bound to be high. At the moment, the maintenance of all equipment is covered under a service contract for the Institute of Computer Science as a whole. However, the node should both contribute to payment for the services recieved and make provision for replacement of equipment which may crash due to erratic power supply and general use over time. The computer supplied at the initiation of the project now serves asa terminal for general access to all users wishing to use the e-mail facility.

The Last batch of the project modems were procured through SatelLife and got here in mid may '93. Most of these have been installed. There about 6 still in stock awaiting allocation.

Some brand of the earlier modems supplied were known to have a high failure rate so much so that out of a stock of ten, six broke down the first of use.

3.1.4 Telephone Call Costs

The operations of the Makerere node are currently being subsidized by GNFIDO in London which polls twice a day. Prior to this the MUKLA Node initiated daily calls to GreenNet at an average cost of U.S\$20 per day . This greatly constrained our financial resources as we had a monthly period telephone bill of over Ug.Shs 700,000(approx. \$700). The change to have GreenNet initiate the polls reduced the total monthly bill to just under \$200 with a two poll -- 7 hour mail turn around .

3.1.5 HealthNet Project participation

Despite initial agreement at the esanet start-up meeting in November 1990 that the earth station would be based at ICS for operational and technical reasons, the SATELLIFE Ground Station was relocated to the Medical School where a ground station is now fully operational.

The systems operator for the MUKLA fido Node has till recently also doubles up as the ground station operator where he works on a part time basis. As a result the Institute of Computer has not actively been involved in the management decisions with regard to the Earth Station. However, participation has been via representation on interim user committee.

Conclusion:

As of today, the MUKLA node has established itself as an e-mail service provider to not only the university community but increasing the NGO community, government, health community and foreign agencies like the UNDP, WHO, The International Red Cross and the WFP. The node also carries conferences of particular categories of researchers like the Green House Gases(GHG) for group of researchers in a number of African Countries doing inventory collections and Africa.Horn supported by funds from CIDA of Canada.

In the absence of donor funding, MUKLA's cost recovery scheme offers away to provide the e-mail service on cost recovery basis.

ESANET EVALUATION/WIND-UP WORKSHOP KAMPALA, UGANDA

TANZANIA COUNTRY REPORT

SEPTEMBER 27th – OCTOBER 1st 1993

By: William H. Sangiwa
Muhimbili University College of Health Sciences
of the University of Dar es Salaam

TERRESTRIAL E-MAIL:

BACKGROUND

Electronic mail (email) in Tanzania was firstly introduced in Tanzania by the ESANET project and the first email host node for Tanzania was installed back in February 1991 in the offices of the Eastern and Southern Africa Universities Research Programme (ESAURP). Before that there were email points which exists directly from hosts which were outside Tanzania or used a point to point communications between two agreed parties, usually from inside to outside the country and vice versa there was no email links between individuals or organisations within the country. Since the introduction of e-mail in Tanzania, by IDRC consultant Mr. D. Rigby of ELCI, Nairobi, email activities under the ESANET project have been going on, in order to build a sustainable service and improve the quality of services offered by the network. Although the ESANET project primarily was aimed at establishing the data links between the universities of Eastern and Southern Africa countries, the University of Dar es Salaam was not in a position to provide the needed requirements at the time of first installation of the email host in the country that is they did not have the direct telephone line. At that point the ESAURP was approached, as a prospectus email user and also a collaborator in another email initiative known as PADISNet, ESAURP agreed to host the node and was given the task of co-ordinating the e-mail activities in Tanzania for the time being while the University of Dar es Salaam was struggling to get the needed requirements at the same time. I was appointed the Sysop together with another staff from ESAURP.

Things never worked fine with the ESAURP for a long time, and during our time at the ESAURP there were frequent breaks in communication by reasons which where sometimes within our reach of offering solutions, like the computer was accessible by email whenever there is no one from ESAURP who wants the computer at the material time, also we never had schedule on times we can use for email activities, and that proved to be difficult especially for me as I had to travel about 13 kms from my office to ESAURP office. And on January 1992 with the help of D. Rigby and F. Manji of the

IDRC Nairobi, we were forced to organise the first Users Council. Invited participants of the first Users Council were the prospective and current users of email in Tanzania, the aim was to try to find the possible means of getting another host institution. The Tanzania Commission for Science and Technology (COSTECH) volunteered to be the next host for Tanzania, and thus from February 1992 when the COSTECH node was installed, the node have been up and running up-to-date and I was the Sysop together with a staff from COSTECH. On February 1993 we changed the mail route instead of passing our mail via Nairobi (ELCI) to GreenNet Gateway (London) we moved to passing our mail via Johannesburg (WorkNet). The main reason being that we were getting in trouble with line to Nairobi and also WorkNet had volunteered to carry our traffic free. As an ESANET project initiative we had a task also of research and report in the end, about possibilities of data links between the Universities participating in the project. In our trial tests which were never many due to financial constraints we were able to demonstrate that links to Universities of Nairobi and Zambia, Makerere University and Mango (University of Zimbabwe) were possible and feasible as long as there is a will to do so. We never had regular direct polls to those places as the economics of running a node would not allow to carry the costs of little mail that goes directly to those places as a result we were polling to WorkNet and latter on the goes on to GreenNet as all other nodes were doing so and in that case it was economical to have all the traffic just going to on place. COSTECH has twenty one points connected.

At the same efforts were being made to bring up on-line the University of Dar es Salaam, as the vast of researchers and academicians were not still accessible via email. The computer donated by the ESANET project to the University of Dar es Salaam had arrived in Dar es Salaam on March 1992 and was in the care of the University computing centre. As there was communication breakdown between the Country Co-ordinator (Tanzania) and the Project Leader (Prof. Anthony Rodrigues) despite the latter several letters of enquiry into the matter, the decision was reached on the ESANET Lusaka meeting which was held in November 1992 to move the computer from the Computing Centre to Faculty of Engineering (Electrical Department). The letters to authorise the transfer of equipment were formally sent to the Vice Chancellor of the University of Dar es Salaam to assist on the matter. At the same time the Vice Chancellor was in a process of affecting the administrative changes at the computing centre and was replacing the Director of Computing Centre who was also the Country co-ordinator of the ESANET project. After the administrative changes at the University Computing centre, The Vice Chancellor had given the new administration the task and time to install the email services for the University, and the new Director of the Computing centre Dr. Beda Mutagahywa had approached me to assist in putting the University on-line using the ESANET equipment. And on May 1993, the University of Dar es Salaam node was finally installed at the Computing centre. Having it's own node address at the same time existing as a point off COSTECH node. Before the installations at the computing centre there were some faculties of the University which were hooked directly to COSTECH. The newly installed node for the University of Dar es Salaam was installed using the ESANET donated equipment i.e. Computer & modem. The other equipment's (3 modems) which arrived with the computer have been

installed at the University departments including the Vice Chancellor's office. There are currently four points connected to the University node. Up to now there is very little traffic going on between the email users who are within Tanzania although what is evident is that they need to communicate.

So far Tanzania has not received any amount of money that was allocated by the project for use as recurrent and running cost of the project this includes the money set aside for the telephones bills etc. Due to the above the expansion on email in Tanzania has been grossly hampered as all the efforts had to use the little resources we can get from the University and individual assistance from places like ELCI (Nairobi) and WorkNet (South Africa) who had offered to carry our traffic to/fro Tanzania. Also as the traffic grew-up slowly the cost for mail has been increasing quickly, As at the University we are using a 2400 bps modem, if we are not going to get a high speed modem we will soon run aground. A quick cost comparison analysis, would reveal that, the cost of buying a high speed modem (9600 bps) is quickly surpassed by the telephone bills when using the standard modern (2400 bps) especially when someone has to make an International call.

As I write this paper ten (10) modems ordered for Tanzania from ESANET through SatelLife have now arrived in Dar es Salaam. We had asked for the delay on sending the modems to Tanzania as we have to pay duties/tax on any importation into Tanzania, although the IDRC has an agreement with the Tanzanian government to import research equipment free into Tanzania, the latter does seem to abide by the contract as was the earlier experience with the importation of Helical spring antennas.

NOW and the FUTURE

The currently distribution of resources at the academic and research institutions here in Tanzania play part in the delaying the development of e-mail in Tanzania. As most of the computers that are found in the institutions were donated by specific projects and are confined to projects staff and project work although sometimes negotiations can be made to allow the computer to be available for email.

During the whole process of establishing email networks around Tanzania (mainly Dar es Salaam) we have encountered some problems/obstacles which are worthwhile mentioning. The main obstacles are:

- i) Lack of technological know-how to implement email
- ii) Lack of necessary tools (hardware)
- iii) Poor telecommunication/power infrastructure

i) Lack of technological know-how to implement email

Email is the most commonly used feature of computer networks. As email has emerged from computer networks which are hardly there in Tanzania the whole concept of email is new to the users, and that means training and sensitisation of users is very crucial factor for any rapid development. With lack of expertise, this leaves only few people with knowledge, and very few with knowledge and facilities run on email networks. The

lack of expertise coupled with easiness of use in which other communication facilities offer (e.g. fax, telex) is the biggest challenge in implementing email as it stretch the gap between the email and users more wider.

ii) Lack of necessary tools (hardware)

In most cases (abroad), the connection of a user to email network assuming on the ground (user) there is a computer and telephone line already in place, it will cost the user approximately between US\$ 100 – 300 depending on the modem and the software used. Assuming the same situation in Tanzania, the cost might not be prohibitive to some of the users, but there are no places in Tanzania which sells modems, all your orders will be specific to you and that will definitely attract higher prices. Thus means for any serious expansion of email in Tanzania we have to think of a way of providing the modems with comparison prices to those from abroad. As the computers are not widely spread in Tanzania, mainly due to the high prices of acquiring the computer, email will be confined to few University departments and Organisations which have computers.

iii) Poor telecommunication/power infrastructure

The distribution of telecommunications/power infrastructure in most urban places where this facility are available, is that only few places are having good communications/power lines while many have fairly good to poor communications/power. Because of the above, frequent breakdowns of the telephone lines and power black-out has been a major problem in the making the of e-mail. As of now the email access via Costech is out of order due to telephone line. We had on two occassion blown out the Computer due to power surges developed by frequent black-outs. In order to make the network a success we have established some kind of a "escape route", and that will allow from University Computing centre to pick up mail when the Costech is out of order.

CONCLUSION

As noted above on the cost of running email, It has been clearly to me that the future of email networks in the region does greatly depends on the collaboration between the users in the region. There is an urgent need to establish a regional host (node) that will allow to reduce the cost of a long distance calls and allow all the nodes to share the cost of mail thereafter which on my opinion would be much less than each making a long distance call.

Why FIDO??? This is the mostly frequently asked question by the users and observers and some critics have surfaced that was a wrong way to go into email. On my opinion which I would like to express, definetely we had to make a choice in which we had to reach a compromise somewhere, and as FIDO software as our choice, It have proved to work, and it is very good over poor telephone line and easy to learn and use while offer email services that at this material time satisfy our users, and the question of up-gradability is always easy to upgrade from one software/environment to another rather

than starting high from the ground. It should be also remembered that expansion of email network (Tanzania in particular) is currently driven by users demand and as long as the users are satisfied and the system is economical and acceptable, I don't see why we should not continue with FIDO. All I can say for now is that, probably there is a need for each country to reassess the situation in hand and decide on where the future direction would be. To have an Internet connectivity at least to the host node of each country, I think in my opinion is a priority but the pros and cons should be looked upon carefully.

The University of Dar es Salaam is now on-line and in order for the email to expand we have to make plans for the future, that includes plans on where and how to get more modems for our users and how to run the network supported solely by its users.

As a priority which we see there is a need to put it forward on our last plea to ESANET project to provide us with the following:

- 1: High Speed modem 14.4k bps (for use at the University node)
2. Funds to run the node (at least for the next year)
3. Data switch (phone/modem) as the line is in use with both now.
4. Multi-port mailer (InterMail) support the users who access host via the internal switchboard.
5. Supply of more modems as the ones just received have been allocated to users.

HEALTHNET

BACKGROUND

This is a second option of communications adopted by ESANET to provide email services. The network was to be implemented using the packet-radio communications. This system was to be used by the Health professionals of the region. It's Satellite based electronic messaging was installed in Tanzania at the Muhimbili Medical Centre formerly the Faculty of Medicine now Muhimbili University College of Health Sciences (MUCHS) Medical Library and was officially inaugurated on December 91, and was not on the air until March 92 when the stolen TNC (Terminal Node Controller) was replaced by another one from Zambia. The TNC was stolen on way to Dar es Salaam and was never recovered.

Unlike the terrestrial email which does not need the licence to operate, the Satellite based electronic mail network has to get a licence to operate it's transceiver used in communication between the ground station and the satellite. The procedure to get the licences to operate from the Tanzania Posts and Telecommunication Co-operation (TP&TC) was fairly straight forward, with the sense that we had our license granted within two months since they were logged in. Unlike the terrestrial e-mail which absolutely depends on the telecommunication infrastructure in place, the Satellite email, (here and thereon referred as HealthNet) to an extent has been a success due to the fact that it does not solely depend on the telecommunication infrastructure in place.

Since it started to be operational we have had no breakdowns interms of equipment or otherwise. At the time of installation we were using egg-beaters antenna for uploading and downloading they worked but were soon unable to achieve the expected transmission speeds and deliver the expected throughput. And on May 1993 we changed the downlink antenna to the Helical spring "Bazooka" and remaining with egg-beater antenna on uploading side. The difference noted over the new antenna was significant and we were able to have all the files downloaded in one pass in most cases. But as the SatelLife is now standardizing on antenna system as was the case with computer and transceivers we are now receiving the Steerable Yagi antenna which are going to replace all the uplink and downlink antennas. The Steerable Yagi antennas have had good results in places installed and including Tanzania as they're used by the Kibindula Farm Institute in Njombe, Iringa, Tanzania (VITA station) and have reported very good performance.

Although I have mentioned all the goodies of a working station one of the setbacks as the computer clock looses time significantly, we need software that can have the ability to update the time of computer to be exactly with the one in satellite, as we've noticed from operational point of view anything more 15 seconds away in both direction would grossly reduce the system performance. Also I would like to point out if there is a way

to make the system works in multitasking mode, as now we have to one task at a time (upload and download in different time). As I'm running the node for HealthNet (here and thereon satmail will be used to refer all the electronic mail messages going via satellite and email to electronic mail messages that are going through terrestrial email) the potential shown by the email services are not much exploited at least in Tanzania. As the technology in use has so far proved to be fairly trouble-free, thus shows us the station can even be used in the remote areas. Although the HealthNet on one side does not depend on the existing telecommunication facilities available on the other side it does as mail after reaching the ground station needs terrestrial email to reach its users. As of now the ground station has six points connected directly into it.

The expansion of the HealthNet here in Tanzania have been greatly hindered by the poor telecommunication facilities in place, lack of equipment (computers) and lack of funds available to run hospitals and the health centres where mostly you'll find the Health professionals working and have very little knowledge acquired since they left college as most medical journals are not available in libraries.

HealthNet in Tanzania is proposing to expand its services into other hospitals in the country. In the expansion we will have to firstly carefully assess the situation in selected hospitals/health centres before making a proposal for funding to all possible donors and the government. The expansion planned would be divided in zones, which are being used in the providing the Health services by the Ministry of Health, in that way we hope to reach many. The zones are Northern zone (Kilimanjaro Christian Medical Centre) in Moshi, Western Zone (Bugando Medical Centre) Mwanza as it's station, the southern highlands Zone (Mbeya Referral hospital) Mbeya as its station and southern zone (Mtwara Regional Hospital) Mtwara as its station.

East and Southern Africa Network (ESANET) Workshop
Kampala, Uganda
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REPORT ON COMPUTER BASED COMMUNICATIONS IN MALAWI

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E-MAIL PROJECTS IN MALAWI

Although Malawi has been represented in two ESANET workshops including this one and a request was submitted for Malawi to join the ESANET project, no conclusive evidence exists as to whether Malawi is considered as being a participant in the ESANET project with full benefits and responsibilities. For this reason the terrestrial e-mail and the satellite based HealthNet projects within Malawi have had to seek inputs from different organisations within Malawi and outside such as the University of Malawi and the U.S. based SatelLife in addition to ESANET funding from IDRC.

The University of Malawi has provided a grant for the establishment of an e-mail network to serve all the colleges of the University which are geographically far apart in relation to the size of the country. It is expected that this network will serve the rest of the community once in place. Progress on this activity is reported here. SatelLife, in conjunction with the College of Medicine in the University, has undertaken to install a HealthNet earth station at The Polytechnic in Blantyre where the College of Medicine library is currently housed. Progress on this is also reported here. There are also individual attempts in Malawi to implement UUCP connections.

PROGRESS ON THE ESTABLISHMENT OF AN E-MAIL NETWORK IN MALAWI

An agreement was reached in August 1992 between the ESANET project leadership and a member of the University of Malawi to look into ways and means to include the

University of Malawi into the ESANET project. A letter to this effect was written to a participant from the University of Malawi in the ESANET Lusaka workshop in November, 1992. The main aim of the letter was to request him to find out if the University of Malawi wanted to participate in the ESANET project following persistent enquiries from one of its staff members.

Following this we wrote to the University of Malawi administration in November, 1992 to find out the official position of the University of Malawi on the ESANET project and on introduction of electronic mail in the University. In addition to this we submitted a project proposal to the University with the title "Study of Computer and Telephone Based Communications in Malawi". The proposal was accepted and a grant of MK5123 was authorised by the University in January 1993 to fund the project. The response to the letter on ESANET participation came in February 1993 in which the University officially expressed keen interest in participation in ESANET and in the establishment of electronic mail services within the University as evidenced by the research proposal acceptance and grant. These were promptly forwarded to the ESANET leadership and copied to IDRC.

The general objectives of the proposal to study computer and telephone based communications in Malawi are

- (i) to investigate the feasibility of establishing computer and telephone network based communications (e-mail) and
- (ii) to demonstrate more efficient communications among researchers and academics within Malawi as well as between those in Malawi and outside.

The main objectives of the grant was to cover costs for some hardware such as modems, processing of the direct line application, approval and installation of modems for at least two sites, collection of data on telephone installations in Malawi and to cover telephone calling costs during the testing phase.

For this project to proceed, it was required to obtain government clearance as well as clearance from the Department of Posts and Telecommunications (DPT) in Malawi. DPT informed the University that any clearance from it could not be granted without the government clearance. The application for government clearance was made promptly in February, 1993 and clearance was granted on 15 June, 1993, a day after the referendum on whether Malawi should move to a multiparty system of government. General clearance from DPT followed thereafter in July.

After the granting of the clearance, the DPT has been very cooperative and helpful in granting and installing a direct line specifically for the modem in September at Chancellor College in Zomba. The telephone line number is +265-522-241. The modem was type approved by the DPT on 21 September 1993 less than a week before this Evaluation/Windup Workshop on the ESANET project. The modems type approved are those that were supplied to the University of Malawi under the ESANET project following the Lusaka ESANET Workshop in 1992. It is one of these modems, the "Viva Modem 24", that is currently linked to the direct telephone line. It has a maximum speed of 2400 baud.

The initial installation is running as a point off the Zambia node with the fidonet address 5:761/1.500. The internet address is <PNyirenda@unza.gn.apc.org>. It is our ambition to develop the point into a node as soon as possible so as to proceed with the establishment of a network in Malawi. The Fidonet software running on the system is FrontDoor which was kindly supplied to us from the Uganda ESANET node and brought to Malawi by Dr. Charlie Clements of SatelLife in June 1993. The point installation is left on 24 hours a day and can be called any time. So far it has been possible to call and deliver mail to Zambia, GreenNet (London), Mukla (Uganda), South Africa, Zimbabwe and Kenya with attempts in that order. Although most of the calls to the Zambia boss node get through, connection for mail seems to be a problem for unknown reasons. Hopefully more information on the Zambia node can be obtained during this workshop to clear this problem.

A major problem with the current (and future) installation is that the University of Malawi currently does not have a computer (IBM compatible PC or higher) which can be dedicated to the e-mail installation. The computer currently used has to be shared with other research and teaching activities during the teaching periods which for the next academic year start on 10 October, 1993. It is in this regard that we would like to request a computer (and a backup) to be supplied to the University of Malawi under the ESANET project to be dedicated to this initial installation which is to be developed into the node for the University of Malawi e-mail network. The network is to serve the whole country.

The University of Malawi has now established an e-mail committee to oversee and coordinate the establishment of electronic mail services within the University. This committee has now recommended, among other things, that for the expansion of the system the University should budget for the purchase of an "e-mail" computer for each college so as to extend the network from the node to the rest of the geographically

distant colleges. The source of funds for the implementation of this recommendation is not known at this point. It is envisaged that the modems supplied to the University under ESANET will be distributed initially to these college installations. The colleges are to be points off the fidonet node to have the dedicated computer in Zomba. It has also been recommended that the running costs of the system, notably the telephone charges are to be handled in the same way as the official telephone, fax and telex charges are currently handled. This effectively means that the service will be "free" for staff members, a move which was taken in order to promote usage of the services for teaching, research and administration.

PROGRESS REPORT ON THE ESTABLISHMENT OF HEALTHNET IN MALAWI

Following fruitful consultations between the College of Medicine which is a constituent college of the the University of Malawi and SatelLife, the installation of an earth station for HealthNet was scheduled for September, 1993. This was announced to the University by Dr. Charlie Clements who visited the College of Medicine and the earth station site at the Polytechnic on 24 June 1993. However, it has now been reported to the e-mail committee mentioned above that this has been postponed by two months by SatelLife.

It is planed and hoped that the HealthNet site at the College of Medicine in Blantyre which is about 65 km from the University e-mail network node at Chancellor College in Zomba will be linked to the University of Malawi e-mail network and will act as a backup node for the Zomba node with full international access.

CONCLUSION

Electronic mail services in Malawi are at an infant stage. However electronic mail projects have been started in the country and in the University of Malawi in particular with the aim of accessing ESANET, the wider Fidonet and Internet. These include Fidonet and HealthNet installations. Presently, there are only points in Malawi but hopefully the University of Malawi initial point will be assigned a node status in the near future. The University requires external assistance to upgrade and expand the current installations.

ESANET EVALUATION MEETING
MWEYA, UGANDA
26-30 SEP '93

When the ESANET project began at the Nairobi meeting three years ago, HealthNet was invited to participate side-by-side as a sister effort. Maybe "little sister" effort would be a more apt description as ESANET had been on the drawing boards for more than a year and I had just completed a round of visits to the medical schools and computer centers in the region looking for partners for HealthNet.

Satellife had no licenses. There was a lot of skepticism whether any of the authoritarian governments in the region would grant them. There was a satellite in orbit, which no one had yet used so there those who thought the technology was science fiction.

The day before this meeting we were notified our seventeenth license--ERITREA--had been issued in Africa and last night HealthSat II was launched by Arianespace. It will be the first satellite registered with the International Telecommunications Union (ITU) and licensed by an African nation--UGANDA. Thus, Mweya is a fitting location for this occasion.

ESANET may not have achieved 11 of its goals, but if HealthNet can claim any success it is due to the people in this room and thus should be a credit to ESANET. HealthNet too has yet to achieve many of its goals, but I think there is cause for satisfaction in what has been accomplished. Let's examine some of the successes and be equally frank about its shortcomings. Perhaps from the two we can draw some lessons.

LICENSURE: Some licenses are being granted in as little as a week though some like Zimbabwe took almost three years. (Robe Borland should get special recognition for keeping steady and firm pressure on the Ministry of Health and the Ministry of Posts and Telecommunications.)

In the case of Zimbabwe, the issue seemed to be a fear of competition, but they finally recognized that HealthNet was neither a threat to security nor a drain of revenue.

In the case of authoritarian regimes like the Sudan and Malawi, they were invited to speak to the Kenya Posts and Telecommunication Corporation to understand how they overcame their fear of uncontrolled communication. (Thanks here goes to the patient and thorough approach of Tony Rodrigues in securing the license in Kenya.)

It was the Sec Gen of WHO, Dr Nakajima, who said to me in 1989 that they were not interested in HealthNet because "I know Africa and you'll never be licensed in places like the Congo. We've tried and if WHO can't, well..."

Well HealthNet does have a license in the Congo, and the Sudan, and Malawi and in all the ESANET countries and in nine other nations

You've helped us understand and resolve these problems. In some cases it meant taking things into your own hands and writing software to solve them in the case of Bill Okelo Odongo.

The technology and equipment that will be used in the six installations this fall would hardly be recognizable to Mark who helped me install the first station in Africa late one night a little over two years ago.

MANAGEMENT:

We along with you have learned that we drastically underestimated the management issues. We have benefitted from your Sys Ops training sessions and learned along side you how much support new users require. We have benefitted your development of management tools such as Neil Robinson has developed in Zambia.

We have learned that building networks takes a combination of the confidence of salesmanship, the patience of a primary school teacher, the ingenuity of a problem solver, and the determination of someone who doesn't take no for an answer. So now look for the ability to walk on water as a screening criteria on c.v.'s of potential Sys Ops.

We have agonized whether we should have distinct HealthNets in new countries deciding yes in a place like Ghana where HealthNet simply doesn't work and no in places like Malawi where we can build synergy from day one.

We've learned that topping up salaries helps, but full time paid Sys Ops are a necessary ingredient for success in the challenges we face together. We've also learned that users are willing to financially support a service they experience as reliable and in fact probably have more confidence in something they pay for than something that is given away.

One of our biggest management disappointments has been the Users Councils. We had hoped they would provide both support and guidance to the Sys Ops in building HealthNet in each country as well as provide accountability. The Users Councils have generally been convened to assist with licensing and are thus heads of institutions or departments that are interested in using HealthNet. As heads of institutions they often been too busy and too removed from information technology to function in the way we had hoped. With the exception of Zambia the Users Councils have not functioned well. In the time set aside for discussion this is one of many issues which we hope to gather some collective wisdom. || *

SERVICES:

We've also learned that a concomitant of expensive or non-existent communication infrastructures is lack of information, which Julia Royall has been addressing through the HealthNet Information Service.

We now have five electronic publications that are distributed via

thanks to the fact that the system has not been abused and that it is slowly being recognized as a public service.

TECHNOLOGY:

I think that this would have to be described as both an achievement and a shortcoming. The technology had been inherited from the amateur radio/satellite community. It (we) promised more than could be delivered.

The software was a patchwork of manually executable programs that were practically without documentation. They did not interface with any existing software.

The antennas were crude omni-directionals that we discovered--with your observations that led to further research--had nulls at the horizon where the spacecraft spends more than 50% of its time.

The ground stations calculated where the satellite was supposed to be based upon both recently updated orbital elements and a time hack accurate within 10 seconds which then enabled it to mechanically track the satellite without really knowing whether there was a lock on or not.

All of that has changed or is about to within a couple of weeks with the release of fully automated software which takes messages from FIDO points to the FIDO node, from the FIDO node into the bundled mail sack of the satellite software, from there to the satellite, from there to another FIDO node and either into the Internet or to another FIDO point--all without the need of key stroke by any operator after the send message command by the end user.

The ground stations now listen for and lock onto the satellite, no longer requiring the time hack or orbital elements. We have omni directional antennas that are designed to optimize their reception at the horizon where the spacecraft spends most of its time. We finally recognized that for Health Sat I omni-directional antennas were simple not suitable, because of problems uploading (50 kbyte limitations).

We've had the manufacturer rewrite many parts of the code on the spacecraft itself and our engineers write new code so there are now markers of how much is transmitted and how much is received by/from both the spacecraft and any station allowing us to evaluate its performance. This wasn't possible a year ago.

The new software package includes documentation and even hypertext for the FIDO user. There will also be documentation for the Sys Op (after the beta testing by you--our most experienced operators).

The new satellite will have a sophisticated new protocol that listens for and schedules ground stations doing away with the degraded performance that comes from the ALOHA protocol.

These are changes that in some cases have come about too slowly. We've learned that Sys Ops would prefer to pay for dial-up connections than have a free satellite connection if they have to manually transfer messages. While the uplink limitation of an omni may not be a problem for a remote station such as GHANA2 in Navrongo, we learned it is a serious problem for a node serving 25 points in a national network.

satellite:

HEALTHNET NEWS--a selection of the world's medical literature most relevant to the developing world's health information needs. [weekly]

BULLETIN OF THE AFRICAN MEDICAL LIBRARIANS--a summary of the most current medical research, some of it so-called "gray" material not available in Medline, from each country usually two per edition [quarterly]

WHO LIRARY DIGEST--updates, summaries, abstracts of information published by the Library of the World Health Organization of interest to health professionals in the developing world. [monthly]

AIDS BULLETIN--updates on policy issues related to HIV/AIDS published by the Global Coalition on AIDS at Harvard School of Public Health [quarterly]

PRESCRIBER'S BULLETIN--an examination of some of the most common mistakes made in prescribing medications at the primary health care level in Africa published in French and English [quarterly]

With the assistance of THE HEALTH FOUNDATION Medline on CD-ROM and equipment to search it is being provided to most libraries, so literature searches can be done locally. For the first time this is making some of the resources of the medical library disributable to rural areas.

Resource distribution within the region is also beginning to be possible as the medical librarians of AHILA are networking themselves via satellite to locate articles, perform searches, and to connect as well with Partner Libraries in the industrialized world that are setup as a program of the HealthNet Information Service.

I'm including some transparencies of which I'll make copies of some recent exchanges via satellite. We monitor the "TO ALL" messages and often ask the caller if we can shre the results of those inquiries. As you will see in most cases they would not have been answered without a Sys Op directing the inquiry to the appropriate party.

Through "Dialogue for Health" we attempt to bring other institutions or individuals into HealthNet that are important for collaboration or research. Thus for example the Oswaldo Cruz Institute Rio de Janeiro, Brazil was brought online to assist the National Institute of Health in Mozambique.

ESANET PROJECT MEETING - UGANDA - 27TH to 30TH SEPTEMBER 1993

REGIONAL ACTIVITY
AN ANALYSIS UNDERTAKEN BY THE ZAMBIA NODE

Analysis of system activity within each ESANET country, and in the region as a whole is difficult. Different nodes are using different software which in turn produce log files in different formats and containing different data. Isolating specific 'ESANET' activity is also difficult given that most nodes play host to some non-academic/research organisations as well as HealthNet participants.

In order to process log files produced on the Zambian UNZANET system two programs were written (HISMON.EXE and MTMON.EXE). These generate comma-delimited files from the FrontDoor inbound (or outbound) history file and the message track log respectively. These programs were distributed to all hosts in the region via satellite at the beginning of this year. The results of the analysis of data received from each country are summarized below:

1. Kenya

No data was received from Kenya and therefore no analysis was possible.

2. Tanzania

The academic ESANET points for Tanzania representing the University of Dar Es Salaam are currently using the COSTECH host. Thus isolation of ESANET traffic is difficult. However some data has been collected in the form of reports produced automatically using FrontDoor and using the Inbound and Outbound History files.

The data is spartan covering the isolated periods from 12th February 1993 to 12th March 1993, from 3rd June 1993 to 14th June 1993, and from 24th June 1993 to 1st July 1993. The gaps (often lengthy periods) represent periods when the COSTECH PTT line was unavailable.

The data provided reveals a single local call from the University Computer Centre. International calls were made to/from:

- i) South Africa (WorkNet - 34 polls);
- ii) United Kingdom (Community Information Network - 11 polls; and GreenNet - 2 polls);
- iii) Kenya (ELCI - 1 poll, 28,295 bytes received; and ICS - 5 polls, 375 received, 1,842 sent)
- iv) Zimbabwe (MANGO - 1 poll, 100,885 bytes sent)

A monthly analysis of the data available can be found in the appendix.

3. Uganda

The MUKLA node was also able to provide an automatically produced report of Inbound History activity using FrontDoor. As with Zambia and unlike Tanzania all calls are inbound so a single report could be produced for a given period from the Inbound History.

Data was provided for the 18 day period from 10th April 1993 to 27th April 1993. While international traffic was easily identifiable (all international mail is collected and delivered through GreenNet in London), local traffic was more difficult to analyse in terms of academic, health, NGO and other users (all of these groups are represented on the MUKLA system). Thus ESANET activity is impossible to isolate without first hand knowledge of the MUKLA user base. The data summarised in the appendix below covers all activity.

4. Zambia

Message Track has been running on the UNZANET host since the system was first installed in September 1991, and apart from a brief gap in January and February 1992 a complete log of activity as recorded by this program has been archived and analysed. The results of this analysis are incorporated in the Zambia country report. The weaknesses of Message Track as a monitoring device are also noted in this report.

The Inbound (or Outbound) History file produced by FrontDoor is only preserved for the number of days specified within the FrontDoor configuration. It is used to display calls made to (and from) the host during that period from within the FrontDoor program using Alt-I and Alt-O respectively. This display feature has a memory size limit. In the case of the Zambian node, as the system has grown it has been necessary to reduce the number of days of history to be kept within the Inbound History file in order to keep within this size limit. It is now set to 26.

Data from the Inbound History has only been archived (using the locally produced HISBCKP program) and analysed from February of this year. The results of this analysis are again shown in the Zambia country report. No analysis of the Outbound History has been made as no outgoing calls are made by the UNZANET host, although both HISBCKP and HISMON operate on both Inbound and Outbound files.

5. Zimbabwe

MANGO runs a FrontDoor host and using Message Track to monitor and redirect messages passing through the host.

Locally analysed data from the Message Track log file was received in a series of monthly files covering the period from September 1992 to August 1993. These files isolated ESANET points from the Mango system and recorded the number and volume of messages sent from and received by each point in each month.

A report and graphs showing the total activity by month over the period in question can be found in the Appendix.

APPENDIX

TANZANIA ESANET STATISTICS BY MONTH source: COSTECH Inbound History

i) Calls handled by the COSTECH host.

Month	Int'l Calls	Local Calls	Total Calls	Calls per Day	Total Volume	Volume per Call	Volume per Day
Feb93	9	0	9	0.30	42730	4748	1424
Mar93	6	0	6	0.20	22983	3831	766
Jun93	38	1	39	1.30	376552	9655	12552
Jul93	1	0	1	0.03	719	719	24
Total	54	1	55		442984	8054	

ii) Volume (Bytes) handled by the COSTECH host.

	Int'l Rec'd	Int'l Sent	Int'l Total	Local Rec'd	Local Sent	Local Total
Feb93	30386	12344	42730			0
Mar93	6314	16669	22983			0
Jun93	185921	190631	376552	0	0	0
Jul93	0	719	719			0
Total	222621	220363	442984	0	0	0

UGANDA ESANET STATISTICS BY MONTH source: MUKLA Inbound History

iii) Total volume (calls & bytes) handled by the MUKLA host.

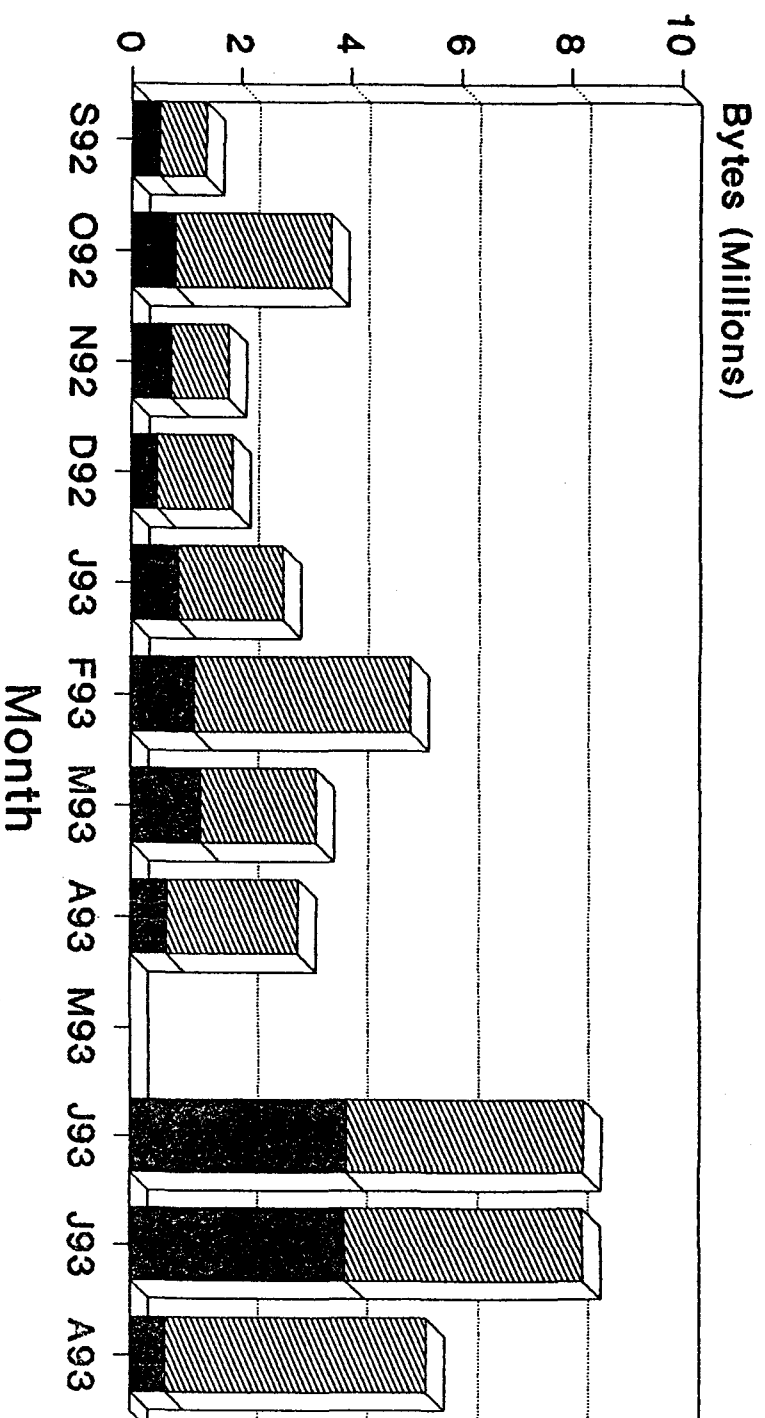
	Volume Sent	Volume Rec'd	Total Volume	Total Calls	Calls per Day	Volume per Day	Volume per Call
Local	1142890	799896	1942786	257	14.28	107933	7559
Intern'l	310699	238618	549317	24	1.33	30518	22888
Total	1453589	1038514	2492103	281	15.61	138450	8869

ZIMBABWE ESANET STATISTICS BY MONTH source: MANGO Message Track Log

Month	<-----Sent----->			<-----Received----->			<-----Total----->			Users
	Msgs	Bytes	Ave	Msgs	Bytes	Ave	Msgs	Bytes	Ave	
Sep92	278	502140	1806	667	841871	1262	945	1344011	1422	19
Oct92	600	810703	1351	1113	2829976	2543	1713	3640679	2125	24
Nov92	362	728415	2012	567	1029799	1816	929	1758214	1893	19
Dec92	275	476643	1733	647	1371311	2119	922	1847954	2004	21
Jan93	599	850451	1420	951	1917369	2016	1550	2767820	1786	23
Feb93	714	1156035	1619	1423	3948872	2775	2137	5104907	2389	30
Mar93	816	1271004	1558	1152	2100030	1823	1968	3371034	1713	30
Apr93	625	661535	1058	1106	2403234	2173	1731	3064769	1771	33
May93	0	0	0	0	0	0	0	0	0	0
Jun93	1355	3938888	2907	1889	4289654	2271	3244	8228542	2537	44
Jul93	1351	3934079	2912	1883	4279897	2273	3234	8213976	2540	44
Aug93	431	640268	1486	1376	4744658	3448	1807	5384926	2980	41
Total	7406	14970161	2021	12774	29756671	2329	20180	44726832	2216	

Zimbabwe ESANET Traffic

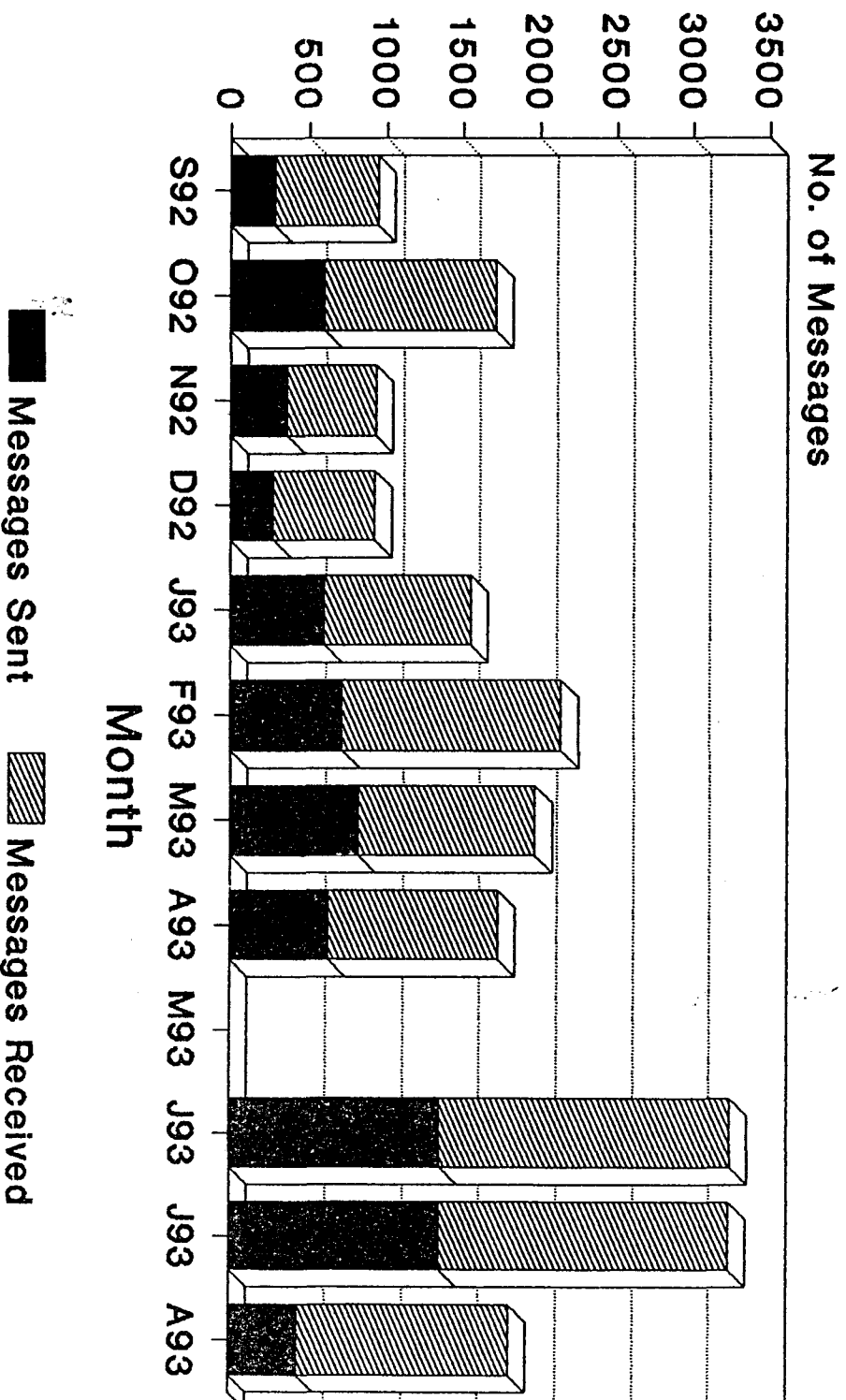
Volume Sent & Received by ESANET Users



source: MANGO message track log

Zimbabwe ESANET Traffic

Messages Sent & Received by ESANET Users



source: MANGO message track log