

19.3

ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES
SCHOOL OF INFORMATION STUDIES FOR
AFRICA

አዲስ አበባ ዩኒቨርሲቲ
ADDIS ABABA UNIVERSITY
SISA
የአገልግሎት ምረቃ ትምህርት ማዕከል

INTERNET AS AN INFORMATION SERVICE:
OPPORTUNITIES IN ETHIOPIA AND CONNECTIVITY
CONDITIONS
A CASE STUDY OF POTENTIAL INTERNET USERS IN ADDIS
ABABA

A THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENT
FOR THE DEGREE OF MASTER OF SCIENCE IN INFORMATION SCIENCE

ADDIS ABABA UNIVERS
LIBRARIES
P.O. BOX 1178
ADDIS ABABA ETHIOPIA

BY
FANTA ADANE DILNESSA

MAY 1996

ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE OF STUDIES
SCHOOL OF INFORMATION STUDIES FOR AFRICA

INTERNET AS AN INFORMATION SERVICE:
OPPORTUNITIES IN ETHIOPIA AND CONNECTIVITY CONDITIONS.

By
Fanta Adane



Name and Signature of Members of the Examining Board

Ato Getachew Birru, Chairman, Examining Board

Dr. G.G Chowdhury, Advisor

Ato Tesfaye Biru, Advisor

Dr. G.A. Alabi Internal Examiner

Prof. Wilson Aiyepaku External Examiner

DEDICATION

TO MY MOTHER ZEWEDE AND FATHER ADANE

ACKNOWLEDGEMENT

This work would have not been completed had it not been for the unreserved assistance of many people. It is not possible to mention all but a few of them here.

I owe a great deal of gratitude and appreciation to my advisors Dr. G.G. Chowdhury and Ato Tessfaye Biru for their valuable guidance, advice, encouragement and help during the course of writing this paper.

I extend my heartfelt thanks to Ato Lishan Adam, Ato Mulugeta Libse, and Ato Asfaw Hailemariam who helped me in data collection and in providing me pertinent reference materials.

Special thanks is due to Ato Nega Alemayehu for his concern, constructive criticism and persistence encouragement. He has been also helpful in processing the data and providing me with the necessary materials. I am also indebted to w/t Yemisrach Alemayehu and W/ro Berhane Beri for their help in typing the paper.

My sincere gratitude goes to Ethiopian Telecommunications Authority for sponsoring me to participate in the graduate programme, and to Ato Yiheyis T/Selassie, A/Central Region manager, to every facility and moral support that I got from him during my studies at SISA. Finally, I thank all organizations, individuals and my friends who helped me during the course of my thesis work.

ABSTRACT

Connectivity enhances activities being done by individuals, stimulates interaction and enables access to knowledge and resources. In general, connectivity facilitates quick economic, social and political transformation. In view of this fact, this study was conducted to assess the opportunities and connectivity conditions of the Internet in Ethiopia.

Questionnaire survey and interview were used to conduct the survey and SAS was used to analyze the collected data. Stratified sampling was followed in assessing the potential Internet users in different sectors of the community. One hundred twenty one (121) sample of e-mail users of the PADISNet were selected from Private/Individual, Academic and Research, NGOs, governmental, and Interactional sectors and 90 of them have replied the questionnaire.

The findings of the survey indicated that a large number (81.1%) of the respondents are aware of the Internet, its benefits and pitfalls as well. It was found out from the survey that majority (67.8%) of the respondents require e-mail service, a large number (88.9%) of them need textual information and 78.9% responded that they are interested on research data on the Internet. In addition, the highest (84.5%) number of potential Internet users believed that it is the right time for the country be connected to the Internet and 53.3% of them responded that they are capable of covering the cost of the Internet.

Based on the above conclusion, the following recommendations are made to sustain a successful Internet service in Ethiopia:

- It is the right time for the country to be connected to the Internet;
- Appropriate institution or management body be established to monitor the provision of the Internet;
- The government needs to establish intellectual property right, copy right and privacy laws;
- Strategic information systems be established in education, health, financial management, early warning, and disaster prevention and preparedness which lead to a national information infrastructure. The government needs to encourage ETA to develop its infrastructure;
- Attention should be given to develop a National Policy which will guide electronic communications in the country;
- The government needs to seek fund from donor agencies for Internet connectivity;
- It is necessary to design user awareness programmes on national level to increase the user base;
- The government needs to take measures either through filtering or other mechanism to protect the pornographic materials and crime contents of the Internet from the start; and
- A future area of research is needed to develop a national script on the Internet for the country.

TABLE OF CONTENTS

Declaration	iii
Dedication	iv
Acknowledgement	v
Abstrct	vi
Table of Content	viii
List of Tables	xvi
List of Figures	xviii

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND	1
1.2 STATEMENT OF THE PROBLEM	4
1.3 SIGNIFICANCE AND JUSTIFICATION OF THE STUDY	9
1.4 OBJECTIVE	12
A) General Objective	12
B) The specific objectives are:	12
1.5 SCOPE AND LIMITATION OF THE STUDY	13
1.6 ORGANIZATION OF THE STUDY	13

CHAPTER TWO

PROCEDURES AND METHODS

2.1	PROCEDURES	14
2.1.1	The Survey Instruments	14
2.1.1.1	Document Analysis	14
2.1.1.2	Data Collection Methods	15
2.1.2	Data Collection and Sources	16
2.1.2.1	Samples of the population	16
2.1.2.2	Resource Persons	19
2.2	METHODS OF ANALYSIS	19
2.3	PROBELMS ENCOUNTERED DURING DATA COLLECTION PROCESS	19

CHAPTER THREE

INTERNET BASICS

3.1	WHAT IS TELEMATICS?	21
3.2	WHAT IS INTERNET?	23
3.3	THE INTERNET PROTOCOLS	26
3.4	FIDONET AND UUCP SERVICES	29
3.4.1	FidoNet	30
3.4.2	UUCP : Unix to Unix Copy Protocol	36
3.5	INTERNET CONNECTIVITY OPTIONS	40

CHAPTER FOUR

INTERNET FACILITIES

4.1	INTERNET SERVICES	46
4.1.1	Information Highway	46
4.1.2	Information Services	47
4.1.3	Electronic Mail	49
4.1.4	Telnet	55
4.1.5	FTP : The File Transfer Protocol . . .	57
4.1.6	Internet Bulletin Board Services . .	58
4.1.7	Tools for Reading the News	59
4.1.8	Categories of USENET News Groups . .	59
4.2	INTERNET INFORMATION RETRIEVAL TOOLS	60
4.2.1	Gopher	62
4.2.2	Veronica and Jughead	64
4.2.3	Archie	64
4.2.4	Wide Area Information Server (WAIS) .	65
4.2.5	WWW : The Word Wide Web	65
4.3	IMPACT OF THE INTERNET	67
4.3.1	Security Issue	69
4.3.2	Property Rights Issues	72
4.3.3	Cultural issues	75

CHAPTER FOUR

INTERNET FACILITIES

4.1	INTERNET SERVICES	46
4.1.1	Information Highway	46
4.1.2	Information Services	47
4.1.3	Electronic Mail	49
4.1.4	Telnet	55
4.1.5	FTP : The File Transfer Protocol	57
4.1.6	Internet Bulletin Board Services	58
4.1.7	Tools for Reading the News	59
4.1.8	Categories of USENET News Groups	59
4.2	INTERNET INFORMATION RETRIEVAL TOOLS	60
4.2.1	Gopher	62
4.2.2	Veronica and Jughead	64
4.2.3	Archie	64
4.2.4	Wide Area Information Server (WAIS)	65
4.2.5	WWW : The Word Wide Web	65
4.3	IMPACT OF THE INTERNET	67
4.3.1	Security Issue	69
4.3.2	Property Rights Issues	72
4.3.3	Cultural issues	75

CHAPTER FIVE

ELECTRONIC NETWORKING CONNECTIVITY IN

AFRICA

5.1	CURRENT CONNECTIVITY MAP IN AFRICA	77
5.2	EXPERIENCE OF INTERNET CONNECTIVITY IN OTHER SUB-SAHARAN AFRICAN COUNTRIES	85
5.3	CURRENT NETWORKING PROJECTS IN AFRICA	90
5.4	CURRENT STATUS OF ELECTRONIC CONNECTIVITY IN ETHIOPIA	107
5.4.1	Ethiopian Science and Technology Commission	107
5.4.2	Addis Ababa University	109
5.4.3	Implementation of Healthnet in Ethiopia	110
5.5	CONSTRAINT TO BRING THE INTERNET TO AFRICA	112
5.5.1	Socio-economic Issues	113
5.5.2	Cultural Issues	114

CHAPTER SIX

FINDINGS AND DISCUSSION ON THE

OPPORTUNITIES

OF THE INTERNET IN ETHIOPIA

6.1	OPPORTUNITIES OF THE INTERNET IDENTIFIED BY THE RESPONDENTS	116
-----	---	-----

6.1.1	Potnetinal Users Awareness of the Internet	116
6.1.2	Possible Benefits From Using the Internet	117
6.1.3	Possible Pitfalls From Using the Internet	122
6.1.4	Potential Users' Requirements of Internet Services	126
6.1.5	Potential Users' Information Need in Terms of Format	126
6.1.6	Potential Users' Information Need in Terms of Content	127
6.1.7	Potential Users' Level of Experience of Computer	127
6.1.8	Poteential Users' Contribution to the National Internet Network	128
6.2	OPPORTUNITIES OF THE INTERNET IN ETHIOPIA	128
6.2.1	Benefits of the Internet to Ethiopia	129
6.2.2	Pitfalls of the Internet	133
6.3	OPPORTUNITIES IDENTIFIED BY RESOURCE PERSONS	134
6.4	DISCUSSIONS	138
6.4.1	The Opportunities of the Internet in Ethiopia	138
6.4.1.1	Opinion on the Benefits of the Intnernet in Ethiopia	138
6.4.1.2	Opinion on the Pitfalls of the Internet	143

6.4.2	What is Going on Globally to Prevent the Pitfalls of the Internet? . . .	145
-------	---	-----

CHAPTER SEVEN

FINDINGS AND DISCUSSION ON THE INTERNET CONNECTIVITY CONDITIONS IN ETHIOPIA

7.1.	GENERAL FACTORS TO BE CONSIDERED IN NATIONAL NETWORKING CONNECTIVITY	149
7.2	PRESENT STATUS AND FUTURE PLANS OF TELECOMMUNICATIONS INFRASTRUCTURE	151
7.2.1	Present Status of Telecommunications Infrastructure	151
7.2.2	Future Plans of Developing the Telecommunication Infrastructure . . .	156
7.3	OPINION OF THE POTENTIAL USERS ON THE CONNECTIVITY CONDITION OF THE INTERNET	160
7.3.1	Bringing Internet to Ethiopia	160
7.3.2	Preference of the Internet Connectivity to Everybody in the Organization . . .	161
7.3.3	Cost Capability	161
7.3.4	How soon the Internet Connectivity be Implemented	162

7.4	DISCUSSION	163
7.4.1	On bringing Internet to Ethiopia .	163
7.4.2	On the Preference of Internet Connectivity to everybody in the Organization	163
7.4.3	On the Cost Issues	164
7.4.4	On the Urgency of Connectivity . .	165
7.4.5	What can Ethiopia Learn from other African Countries?	165

CHAPTER EIGHT

CONCLUSION AND RECOMMENDATIONS

8.1	CONCLUSION	168
8.1.1	Opportunities of the Internet . . .	168
8.1.2	Connectivity Conditions	169
8.1.3	Importance of the Experience of other African Countries to Ethiopia . .	170
8.1.4	Response of Connectivity Conditions	171
8.2	RECOMMENDATIONS	172

BIBLIOGRAPHY	176
ANNEX 1 : QUESTIONNAIRE	184
ANNEX 1.1: GROUP I	184
ANNEX 1.2: GROUP II	187
ANNEX 1.3: GROUP III.	190
ANNEX 1.4: GROUP IV.	193
ANNEX 1.5: GROUP V	196
ANNEX 2 : STRUCTURED INTERVIEW.	199
ANNEX 3 : PADISNET POINT LIST E-MAIL USERS .	202
SIGNED DECLARATION	227

LIST OF TABLES

TABLE 2.1:	DISTRIBUTION OF SELECTED SAMPLES BY GROUP	21
TABLE 4.1:	FAX VS. E.MAIL BETWEEN ADDIS ABABA AND LONDON	55
TABLE 4.2:	CATEGORIES OF USERNET NEWS GROUPS.60
TABLE 4.3:	DOMAINS AND THEIR DESCRIPTIONS.61
TABLE 5.1:	CURRENT ELECTRONIC NETWORKING IN AFRICA	79
TABLE 5.2:	NETWORKING PROJECTS IN AFRICA	92
TABLE 5.3:	CGNET USERS ORGANIZATION AND THEIR LOCATION	100
TABLE 5.4:	RIONET PROJECT IN THE AFRICAN INTER-TROPICAL COUNTRIES	103
TABLE 6.1:	OPINION OF POTENTIAL USERS ON THE AWARENESS OF THE INTERNET	117
TABLE 6.2:	RESULT OF THE OPINION OF GROUP I ON THE BENEFITS OF THE INTERNET	118
TABLE 6.3:	RESULT OF ON THE OPINION OF GROUP II THE BENEFITS OF THE INTERNET	119
TABLE 6.4:	RESULT OF THE OPINION OF GROUP III ON THE BENEFITS OF THE INTERNET	120
TABLE 6.5:	RESULT OF THE OPINION OF GROUP IV ON THE BENEFITS OF THE INTERNET	121
TABLE 6.6:	RESULT OF THE OPINION OF GROUP V ON THE BENEFITS OF THE INTERNET	122

TABLE 6.7:	OPINION OF GROUP I ON THE PITFALLS OF THE INTERNET	123
TABLE 6.8:	OPINION OF GROUP II ON THE PITFALLS OF THE INTERNET	124
TABLE 6.9:	OPINION OF GROUP III ON THE PITFALLS OF THE INTERNET	124
TABLE 6.10:	OPINION OF GROUP IV ON THE PITFALLS OF THE INTERNET	125
TABLE 6.11:	OPINION OF GROUP V ON THE PITFALLS OF THE INTERNET	125
TABLE 6.12:	OPINIO ON THE REQUIREMENTS OF THE INERNET SERVICES	126
TABLE 6.13:	OPINION ON INFORMATION NEED IN TERMS OF FORMAT.	126
TABLE 6.14:	OPINION ON INFORMATION NEED IN TERMS OF CONTENT	127
TABLE 6.15:	OPINION ON LEVEL OF EXPERIENCE OF POTENTIAL INTERNET USERS	127
TABLE 6.16:	OPINION ON THE CONTRIBUTION OF POTENTIAL USERS TO THE NATIONAL INTERNET NETWORK . .	128
TABLE 6.17:	OPINION ON THE COMMON BENEFITS OF THE INTERNET BY GROUP	142
TABLE 7.1:	OPINION ON BRINGING INTERNET TO ETHIOPIA. .	160
TABLE 7.2:	OPINION OF PREFERENCE OF INTERNET CONNECTIVITY	161
TABLE 7.3:	OPINION OF COST ISSUES	161
TABLE 7.4:	OPINION ON URGENCY OF CONNECTIVITY	162

LIST OF FIGURES

FIGURE 1 :	CONTEXT OF INTERNET LINKS.	25
FIGURE 2 :	NETWORKING CONNECTIVITY MAP OF AFRICA.	81

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND

Electronic networking which refers to any of several forms of information exchange between two or more computers through any of several methods of interconnection is transforming communications, the conduct of business and research around the world. It is offering advantages in terms of reduced costs, increased reliability, security, flexibility, variety of services and speed over the already established means of communication such as telephone, fax, telex and the postal system for countries which have electronic networking connections.

The impact of electronic networking is more pronounced in the industrialised world. The desire to improve the performance and capacity of electronic networks in industrialised countries has resulted in a greater need to establish what is being termed as an *information superhighway*. (For further explanation refer to sub section 4.1.1).

Information Superhighway, basically, is an interconnection of electronic networks embracing computers, telephones and televisions linking customers with services and with each other across the globe. The information superhighway is expected to revolutionize communications in the 21st Century. The backbone of the information superhighway will be the *Internet* (Chisenga 1995).

According to Addis Tribune (1995) the Internet is a world wide network of computer networks. It is comprised of thousands of separately administered networks of many sized and types. There is no precise inventory of Internet users, but the Internet Society estimates that more than 40 million have access to the Internet, and that in mid- 1995 there were around 5 million "host" computers connected to the world wide.

Over 110 countries have direct Internet access with at least one "host" computer in-country, but if other e-mail networks are taken into account, about 168 countries have links with the Net. All Northern countries have direct access to the Net, as do most of Eastern Europe, Latin America and South East Asia. Parts of Central and South Asia are connected to e-mail, as is most of Africa -mainly through networks like FidoNet (Addis Tribune 1995).

The use of the Internet extends to various sectors of the society i.e, it enhances development to the economical, social, and cultural assets of a Nation. The use of Internet is vital in fundamental and applied research, agriculture and management of natural resources, international relations etc.

In general, Internet has the following potential social and economical benefits (White 1994):

- Internet can help create ways to overcome the crippling effects of economic and resources deprivation;
- Opportunities in the new "information age" helps to reduce poverty, to overcome hunger and diseases, to

educate, and to mitigate or even predict natural disasters;

- It can be a tool of employment that will generate jobs and open avenues of investment;
- As a Communication network, it is a tool for democratization, education, and community development;
- Through networks, people create their own communities and business as geographical distance and political boundaries become less and less significant. Modern communication networks are like markets; you buy things, you visit with your neighbours, you meet new people, and you debate issues of common interest; and
- Networks essentially provide a non-formal and non-sectoral means of communication through which strangers become more familiar; the impersonal modern society becomes smaller and friendlier.

Internet can be used to:

- Send and receive electronic mail messages. At many institutions, special gateways permit staff to send and receive Internet messages via their regular PC-based e-mail system.
- Contact and search computers at remote sites. This capability is called *Telnet*. Once a connection is established with a remote computer, it is possible to

3

search that computer as if one was sitting at a hard-wired terminal.

- Copy files between computers. This is called FTP (*File Transfer Protocol*). It is possible to copy a file from one PC (or terminal) to another computer at a remote site, or copy a file from that computer to another PC.

1.2 STATEMENT OF THE PROBLEM

Many international and local development-oriented organisations have become increasingly concerned about the seemingly low level of access to developmental information that is prevalent in many African countries. The feeling among them is that lack of or inadequate access to quality information is a serious hindrance to the potential economic and social development of these countries. The concern has grown increasingly more shrill because of the rapid technological development occurring in the telematics field. The advent of the micro-chip has transformed the way we live and work. The application of micro-electronic technology to telematics has the potential of creating wide gaps, in technological and social development terms, between those who have the capability to effectively apply the technology and those who do not. The alarming rate at which developed and newly industrialised countries are applying microelectronics technology makes the apparent lethargy of less industrialised African countries in taking up the technology very frightening (Grant 1995).

On the other hand, a good scientific or technological base needs a sound information system to sustain it. Although the African region is notoriously known for its weakness in information

systems, the communication infrastructure can vary from very good to poor from one country to another (Godard 1995).

Many people approach electronic network implementation from a purely technical standpoint. It has to be conceded, however, that the implementation of electronic networking technology is both a technical and social process. Communication by its very nature is a social activity. Efforts to implement computer-mediated communication system therefore, present both technical and social challenges (Grant 1995).

Coming to Ethiopia, a technical and advisory committee (known as BITE- Bringing Internet to Ethiopia) was formed in May 1995. The main objective of BITE was to investigate the possibilities and options for Internet connectivity in Ethiopia and to produce a working document detailing its findings.

More specifically the objectives of BITE were (BITE 1995):

- to consider the different phases involved in implementing and sustaining Internet connectivity;
- to detail the resources necessary to set up and maintain a National information network;
- to recommend an organizational network within which Internet connectivity could be managed;
- to produce a proposal for initiating Internet connectivity; and

- to submit its recommendations and a detailed Action Plan of the project to the Executive Committee for its consideration.

In addition to above points, the researcher has tried to discuss on the mission of BITE, with one of the members of the committee and has found out that the committee is an Action oriented group to implement the connectivity of Internet in Ethiopia. Furthermore, the committee is conducting its study based on the approval of government officials who are members of the Executive committee of BITE. Besides, it is mentioned from the member of BITE that the working group is investigating the general not the specific situations towards the connectivity of Internet in Ethiopia.

The study conducted by BITE was not a research oriented and was not based on the user-based survey study. However, the working group has tried to conduct some of the informal interviews. Though BITE has touched many of the issues that are connected with the Internet, it did not carry out a formal survey which is very essential to start a new service in any sector of the society.

Therefore, this study has tried to fill the gap that is not assessed or answered by BITE or any other study i.e., the assessment of the potential Internet users in Ethiopia whether they are aware of the Internet or not and their expectation of the benefits and pitfalls of the Internet, their information need from the Internet if the country gets the chance to be connected to the Internet, and their capability to pay to the services of the Internet.

Recognizing the world-wide development of telematics, a number of organizations have considered information networking through electronic communication as an effective means to access up-to-date and reliable information both from local and external sources. A number of institutions have taken initiatives to develop an electronic information networking in their respective field of competence and among organizations with related objectives. However, these initiatives have evolved in uncoordinated and discrete manner.

BITE (1995) believes that a national telematics Policy for Ethiopia should be developed which will guide all telematics initiatives. Internet connectivity and a national telematics policy are not in themselves an end, but really only the beginning of moving towards an information age. This requires a new culture of communication. There are other implications of Internet connectivity if Ethiopia is committed to build a reliable and sustainable Internet service. This condition raises issues on the telecommunications services and existing capacities to implement Internet in Ethiopia.

BITE (1995) mentions that the mandate given to Ethiopian Telecommunications Authority (ETA) to expand and upgrade telephone lines and switching is crucial for updating of the national infrastructure and will in turn improve Internet accessibility. As the infrastructure develops it will be possible to give consideration to regulatory structures and the effects of tariffs on promoting connectivity.

This study, therefore, has attempted to answer the problems that have not been assessed by any study. The problems assessed in this study are:

- Unlike from BITE committee, the opportunities and connectivity conditions of the Internet is assessed based on survey;
- Unlike the BITE's objective, which was mission-oriented, this study is research-oriented and tried to show the academic facts showing all the benefits and pitfalls of the Internet to different sectors of the community;
- There was not any study up to now that assessed the opportunities viz the potential pitfalls or traits of the Internet in Ethiopia;
- It is necessary to assess the Present telecommunications infrastructure and its future plan from the Authority's and the potential Internet users' point of view; and
- On the opinion of potential Internet users and experts, there will be a balanced opinion on the benefits and pitfalls of the Internet in Ethiopian situation.

1.3 SIGNIFICANCE AND JUSTIFICATION OF THE STUDY

Most African countries now record very poor socio-economic indicators that are the reflection of development of strategies that were based on certain weakness, such as data inadequacies for planning in major sectors of their economy. Failure by these countries to organize the large amount of available information has seriously eroded their capacity to formulate development agendas that address their long term interests. These weaknesses can be reduced by creating information in manpower and capital that are prevalent on the African continent (American Association for Advancement of Science 1992).

The community of electronic networkers in Africa is very small. However, thanks to the pioneering efforts of dedicated workers-helping to establish projects, collect and distribute mail, improve and disseminate software, and train users - electronic networking has gained a foothold in Africa. The various levels of success already achieved by some pilot projects - such as *ESANET*, *CGNET*, *Healthnet*, and *PADISNET* -have raised interest in African networking and laid large scale project such as *RINAF* (Godard 1995).

The biggest challenge is to create the conditions- financial, institutional, and human-that are conducive to development of indigenous and innovative applications of information technologies for development. Information and communication technologies have value only as they contribute to an objective, such as increased productivity, more efficient operations, or better resource sharing (White 1994).

In Africa, conducting a research before running any project is not a common practice. On the other hand, it is a common practice to import Information Technologies or start applying these technologies without investigating the real situations in the environment. This is one of the reasons for under utilization of information technologies, and maintenance problems that Africa faces today.

BITE (1995) has come up with proposal on the connectivity of Internet in Ethiopia. However, it would have been of a paramount importance if a number of studies had been conducted on the connectivity of the Internet in Ethiopia to see different alternatives before going ahead for Internet connectivity of the country.

Therefore, this is one of the reasons behind undertaking this study believing that the outcome of the study will contribute towards an additional assessment on the existing picture to the connectivity of Internet in Ethiopia.

In addition, the need for Internet connectivity in Africa is a hot issue nowadays because:

- The increasing pressure towards Connectivity to Internet (or electronic networking) is becoming an evaluating factor and an incentive for attracting investments; and
- The way society lives and works is getting transformed by the customizing separate media- voice, data, and video into one common platform- multimedia.

These conditions also call for a research to be conducted to assess the existing reality of each African Nations because it is necessary to react upon the utilization of information technologies based on planned movement. The benefits of planned movement towards information technologies in general and electronic networking connectivity in particular will help:

- to save unnecessary wastage of resources or avoiding under utilization of equipments;
- to avoid maintenance problems during operational activities; and
- to access information services directly by the appropriate users.

Finally, it is known that telecommunication services and Internet are inseparable entities contributing a lot in information capturing, processing, storage and dissemination activities. Henceforth, this study will lay a ground to ETA to prepare itself towards its capacity building since it is the only monopoly organization responsible to the expansion of telecommunications services in the country.

1.4 OBJECTIVE

A) General Objective

The general objective of this study is to assess the connectivity conditions and opportunities of Internet as an information service in Ethiopia based on the initiatives taken nationally and on the existing experience of other African countries which are connected to the Internet.

B) The specific objectives are:

- to assess the experience of other African countries which are connected to Internet;
- to assess the awareness of potential Internet users in Ethiopia;
- to assess the opinion of potential Internet users on the benefits and pitfalls of Internet;
- to identify the information needs of the potential Internet users;
- to assess the telecommunications infrastructure with regard to the connectivity of Internet in Ethiopia;
- to assess the level of experience of the existing e-mail users on the use of computer; and
- to recommend on the opportunities and connectivity conditions of Internet in Ethiopia based on the findings of the survey.

1.5 SCOPE AND LIMITATION OF THE STUDY

This study is restricted on the assessment of the potential users and their information needs who are living in Addis Ababa. Therefore, the study doesn't cover those potential Internet users who are living outside of Addis Ababa.

1.6 ORGANIZATION OF THE STUDY

The study is divided in eight chapters. Chapter One is the introduction which covers background, statement of the problem, justification, objective, scope and limitations of the study. Description of the procedures and methods used for the study are discussed in chapter two; chapter three and four review Internet basics and Internet facilities respectively. chapter five deals with electronic networking experience in other African countries. Chapter six deals with the findings and discussion on the opportunities of Internet, assessment of the awareness of the potential Internet users, and their information needs. The findings and connectivity conditions are assessed and discussed in chapter 7. The last chapter is eight which finalizes the conclusion along with the recommendations.

CHAPTER TWO

PROCEDURES AND METHODS

2.1 PROCEDURES

2.1.1 The Survey Instruments

2.1.1.1 Document Analysis

Document Analysis is one of the survey instruments used in this study. A number of documents have been assessed and analyzed for the following reasons:

- It was essential to have a theoretical background on the basics of the Internet, on its facilities, and on the benefits that users get out of it;
- To share with the experience of other African countries on the course of getting connected to the Internet;
- To see that if other similar studies have been conducted on the Internet; and
- To investigate the initiative taken by institutions, organizations, on non-governmental and International organizations on the connectivity of Internet in Ethiopia.

2.1.1.2 Data Collection Methods

The questionnaire and interview were methods used to collect data for the research.

Questionnaire

The questionnaire was prepared to investigate the benefits or pitfalls that potential Internet users may think they will have from the Internet services and the type of the service that they need from it if Ethiopia is connected to the Internet. Therefore, through the questionnaire, it was attempted to assess the opportunities of the Internet in Ethiopia particularly focusing on the current PADISNet, CGNET and HealthNet users believing that they would be the potential Internet users since they are exposed to the electronic networking communication services.

The questionnaire was organized in a way that it enables the user to get an idea on what the Internet is and few questions were taken from BITE document and were modified for the purpose of the study.. It consists of five sections. Section 'A' contains user identification, section 'B' deals with the potential advantages or benefits of the Internet, section 'C' poses issues on disadvantages or pitfalls of the Internet, section 'D' contains information needs and the level of experience of potential Internet users, and the

last section which is 'E' contains the connectivity conditions of the Internet in Ethiopia (*Please see the questionnaires on annex 1*).

One hundred twenty one (121) of the PADISNet e-mail users were selected as the respondents out of the total population of 481 active members of the PADISNet and 90 e-mail users responded to the questions. The response rate was 74.5%. Random table is used to select the samples.

Interview

The interview technique applied in this study is a structured one (*Please see the structured interview on annex 2*). Two types of interviewees groups were selected for the study. The first group of interviewees were formed from the PADISNet e-mail users to strengthen some of the questions answered by the respondents in the questionnaire method. The second group of interviewees were resourceful persons who are exposed to the Internet and on the Telecommunications infrastructure in Ethiopia. The study attempted to assess the capacity of Ethiopian Telecommunications Authority in terms of its current networking facilities and future directions.

2.1.2 Data Collection and Sources

It was difficult to identify the potential users of the Internet in Ethiopia since the benefits of it as an information service goes deep to all sectors of the society. However, samples were chosen from the PADISNet e-mail users on a stratified sampling basis.

2.1.2.1 Samples of the population

One problem often encountered by new evaluators is attempting to obtain assessments from sample participants that may not have the necessary information, or selecting a sample which may not be an active subscriber or user of a particular service. For example,

in the evaluation of a particular Bulletin Board, simply collecting data from a random sample of network users may not produce enough participants/respondents that have actually used or know about the Bulletin Board. The general rule of thumb is not to expect users to provide a researcher with information about things that they know nothing about (McClure 1992).

There are a number of strategies to overcome the above conditions; these are:

- To carefully consider whether the information needs are from naive, beginners, or expert network users;
- To use a filter question in interviews and surveys to determine the type of user and his or her background before the researcher proceed with collecting the information required.

Stratification is a common technique. For the purpose of this study, the PADISNet e-mail users were divided into five sectoral groups or strata, (i.e in private or Individual, Academic and Research, Non-Governmental Organization, Governmental and International sector). The reason behind is that:

- The information needs of these sectors differ from each other since each sector has different objectives from the other;

- The expectation of the benefits that the potential users expect from the Internet varies based on the engagement of the job in the different sectors;
- It is necessary to identify a particular sector that needs more Internet service compared to others so that it will be easy to give attention to that particular sector.

**TABLE 2.1: DISTRIBUTION OF SELECTED SAMPLES
BY GROUP**

(Data of PADISNet point list taken as of January 1996)

No.	GROUP	NO OF POINT USERS	PERCE NTAGE	NUMBER OF SAMPLE
1	Private/Individual	194	40.0	48
2	Academic/Research	46	10.0	12
3	Non-Governmental	147	30.0	37
4	Governmental	22	5.0	6
5	International	72	15.0	18
	Total No. of Users	481	100.0	121

A total of 121 samples were selected on random bases as respondents of the survey and they were grouped into the following categories:

- Private and Individuals (includes private business);
- Academic and Research institutions;
- Non-Governmental Organizations (NGOs);
- Governmental Organizations; and
- International Organizations.

2.1.2.2 Resource Persons

It was necessary to interview experts who have knowledge on networking and who are exposed to the Internet in addition to the respondents of the questionnaire. The interviewees were selected purposefully to share with the experience of these experts on the Opportunities and Connectivity Conditions of Internet in Ethiopia.

Therefore, five selected individuals from the PADISnet, Ethiopian Science and Technology Commission, Ethiopian Telecommunication Authority, from private or individual, and from the International Organizations sectors were interviewed.

2.2 METHODS OF ANALYSIS

To analysis the data collected from document survey the method known as Information Analysis and Consolidation (IA + C) was used. The SAS package available in the SISA computer laboratory was used to process and analyze the data collected from the survey.

2.3 PROBLEMS ENCOUNTERED DURING DATA COLLECTION PROCESS

It was difficult to distribute the questionnaires and get the interviewees per the scheduled for the following reasons:

- It was tried to contact the PADISNet e-mail users getting their telephone addresses from their card in PADSIS. However, the researcher was surprised that most of the e-mail users from the private or individual sector were found out that they have changed offices;

- Transportation was the other problem during the study. It was difficult to distribute and collect the questionnaires on the required date;
- It was also a problem to get response on time. Therefore, the researcher had to go several times to remind the respondents in filling out the questionnaire.

CHAPTER THREE

INTERNET BASICS

3.1 WHAT IS TELEMATICS?

Telematics is used to describe the convergence of computer, telecommunications and broadcasting technologies (FID News Bulletin 1995).

As computers have gained widespread penetration in organization, it is increasingly apparent that the use of stand alone functions can be greatly enhanced through efficient networking and information sharing. Aside from wider access to scarce resources such as laser printer and larger hard disk storage, the ability to easily communicate documents, messages, moving and still images, sounds, spreadsheet and databases can greatly improve the effectiveness of any organization or individual working with information. Appropriately used, networked information systems have the power to equip every level of decision maker with better resources for making decisions. Although the technology is still relatively new, it is already being extended into areas of education, public information access and new forms of cultural expression (Jensen 1995).

Combined with the ongoing digitalization of the underlying telecommunications networks, computerization has resulted in the convergence of applications in informatics, communication and audio-visual technologies. The logical extension of this tendency is the routing of all of a user's communications through a single public exchange and a single easily managed digital connection. This allows simultaneous use of the link for voice telephony,

radio and television reception, and any number of networked information access functions, depending on the capability of the connection.

For the convergence of the different technologies the flow of data is nowadays commonly referred to as "**bandwidth**" to describe the need for any information delivery, be it in traditional voice, telephone, a television channel, or an electronic mail message.

On the cost of the different technologies, Jensen (1995) said "... networking access and maintenance costs will decrease still further with the increased economies of scale and improved facilities for managing these data flows between users. As trunk routes grow in size, bandwidth can be more efficiently delivered, and as the users become equipped with better computer tools to exploit it".

The emergence of low cost international computer networks paves the way to communicate daily with other around the world at very low cost, even in developing countries. And with recent advances in signal delivery and in image and audio compression techniques, even a basic analogue copper network infrastructure is now capable of delivery good quality still images, slow-screen video conferences, animation and sound. Experience with full broadcast quality video over these networks have been initiated with higher bandwidth telecommunications links.

In view of the growing rate of communication and information as a critical force in development, wide area connectivity has become a primary issue. It is now expected that every computer

should be 'on the net' in some way and be able to communicate with any other computer similarly connected, be it in the same office, or on another continent. In this case, a cooperative, user developed network known as the **Internet** has emerged as the general data trunking system (Jensen 1995).

3.2 WHAT IS INTERNET?

The global electronic networking started 25 years ago as an experiment by the US Defence Department, where it created the ARPANet as an experimental network to support military research especially about how to achieve a network which could withstand partial outrage such as bomb and other attacks. Its growth led to its use in sharing information among government departments which later spread to universities. The result of this was more development in computer and the networking of supercomputers to create electronic linkages (Jegede 1995).

Jegede (1995) notes that the United State National Science Foundation created five super computer centres opened for scholarly research. The linking of these and other supercomputers to other parts of the world created the **INTERNET**.

Jegede (1995) goes on, putting Hellaby and Cokley (1995), to suggest that the Internet combines the knowledge of universities, libraries, art galleries, government departments, scientists, researchers up to exponential individual users in millions. Companies make it accessible to any one with a computer, a telephone, a modem to link the two. The environment created through the connection of regional super computers and local networks to which individual computers link to is called the **INTERNET**.

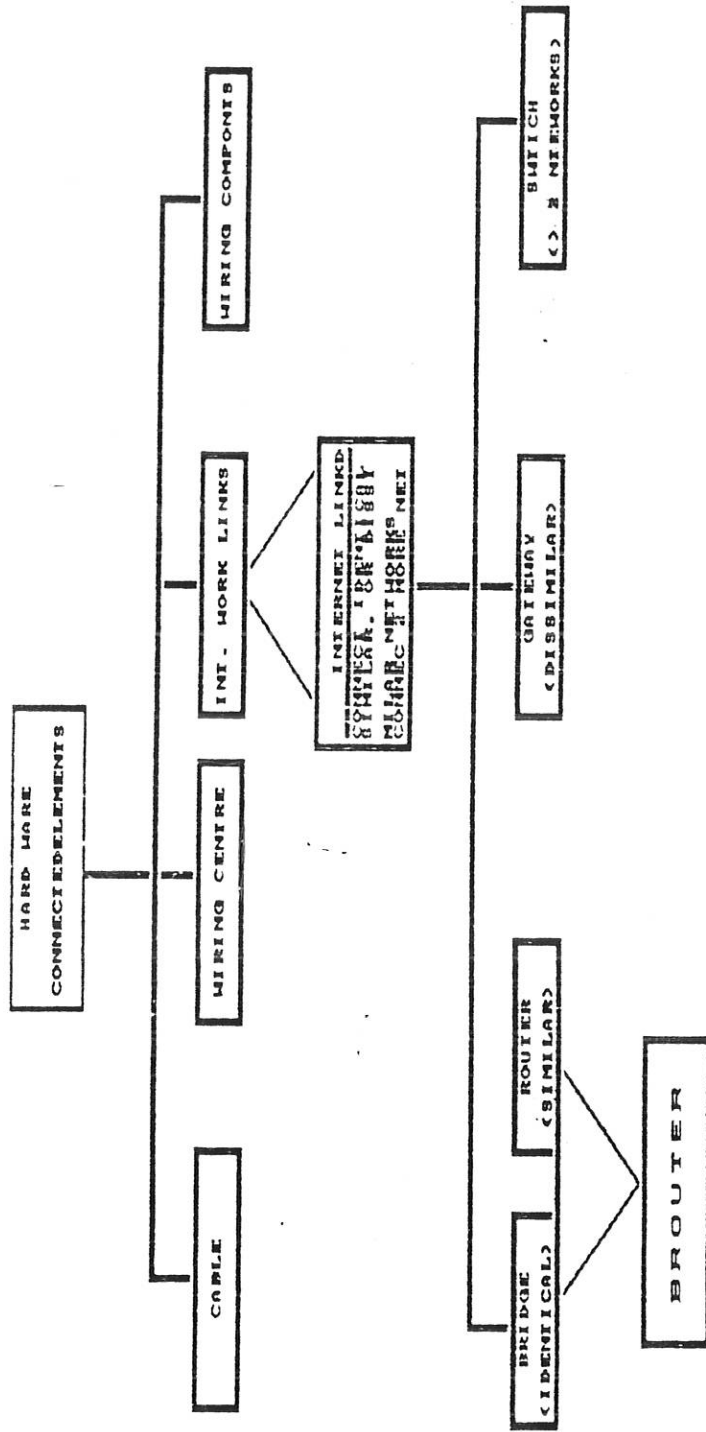
Therefore, Internet is a system of interconnected computer networks which provides access to computers', electronic mail, bulletin boards, databases, and discussion groups, all using the TCP/IP (Transmission Control Protocol/Internet Protocol) protocol. The Internet has emerged as one of the greatest educational resources ever known to human civilization /see Figure 1/.

The Internet is not a single network, but is a series of smaller networks which inter-operate, creating the image of a single, seamless entity. The backbone of the Internet, the NSFnet serves to connect NSF-funded super computing centres and various regional networks. In addition, commercial networks, such as Prodigy or CompuServe allow members to connect to the Internet.

Cronin et al (1994) note that the Internet is essentially without any governing body, decentralized, self-regulating communication entity. There is no any single authority that exists to enforce the Accepted Uses Policy (AUP) governing the use of the NSFnet Backbone, which states specially that unaccepted uses include:

- Use for for-profit activities;
- Extensive use for private or personal business; and
- Advertising of any kind.

Fig 1: CONTEXT OF INTERNET LINKS



3.3 THE INTERNET PROTOCOLS

Internet connectivity is impossible without TCP (Transmission Control Protocol) and IP (Internet Protocol). Since these protocols are the basis of the Internet connectivity, it is important to be aware of them before discussing in detail on the basics of the Internet.

Before describing what TCP/IP protocols are, it is essential to say a few words on what protocols are. If one wants to send a letter, he/she cannot just drop the typed letter into the mailbox and expect delivery. The sender needs to put the paper into an envelope, write an address on the envelope, and stamp it. Just as the post office has rules that define how its network works, there are also rules that governs how the Internet operates. These rules are called *protocols*. *Network protocols are special-purpose languages that computers use to communicate with each other. Some protocols choreograph the movement of messages, some check the integrity of what was sent, and some "massage" data from one format into another (Falk 1994).*

IP : The Internet Protocol

A wire can get data from one place to another. However, the user already knows that the Internet can get data to many different places, and distributed all over the world.

Krol (1994) explains how IP are distributed to their destination as " the different pieces of the Internet are connected by a set of computers called *routers*, which connect networks together. These networks are sometimes Ethernet, sometimes token rings, and sometimes telephone lines".

The telephone lines and the Ethernet are equivalent to the trucks and planes of the postal service. They are the means by which mail is moved from place to place. The routers are postal substations; they make decisions about data ("packets"), just like a postal substation decides how to route envelope containing mail. Each substation or router does not have a connection to every other one.

For a number of practical reasons (notably hardware limitations), information sent across IP networks is broken up into bite-sized piece, called *packets*.

The size of character within a packet to be sent is restricted and this limitation prevents any one user of the network from monopolizing the network, allowing everyone to get a fair shot. It also means that when the network is overloaded, its behaviour gets slightly worse for all users; it does not stop dead while a few heavy users monopolize it.

Krol (1994) emphasizes that as long as the data to be sent is put in an IP envelope, the network has all the information it needs to get the user's packet from the computer to its destination. He adds that there are problems over IP protocols like that of a post office in that a letter may be lost on its way. There is the same problem also in sending information on IP protocols.

The problems that need attention are:

- Most information transfers are longer than 1500 characters. Let us compare again with the post office. One will be disappointed, indeed, if the post office

would only carry postcards, but refused anything larger;

- Things can go wrong. The post office occasionally loses a letter; networks sometimes lose packets, or damage them in transit.
- Packets may arrive out of sequence. If the user mails two letters to the same place on successive days, there is no guarantee that they will take the same route or arrive in order. The same is true of the Internet.

Although the above problems occur sometimes, unlike the post office, the Internet can deal with these problems successfully with the help of Transmission Control Protocol (TCP/IP).

TCP : The Transmission Control Protocol

TCP is the protocol that is used to get around the above mentioned problems.

Krol (1994) explains what it is and does as "...what would happen if you want to send a book to someone, but the post office only accepts letters? what could you do? You could rip each page out of the book, put it in a separate envelope, and dump all the envelopes in a mailbox. The recipient would then have to make sure all the pages arrived and pass them together in the right order". Krol said that this is what TCP does.

So, TCP takes the information that the user wants to transmit and breaks it into pieces. It numbers each piece so that receipt can be verified and the data can be put back in the proper order to

pass this sequence number across the network; it has an envelope of its own which has the information it requires "written on it".

The process will be :

- A piece of data, which is to be send, is placed in TCP envelope;
- The TCP envelope is , in turn, placed inside an IP envelope; and then
- The network can carry it.

On the receiving side, a TCP software package collects the envelopes, extracts the data, and puts it in the proper order. If someone's envelope is missing, it asks the sender to retransmit them. Once it has all the information in the proper order, it passes the data to whatever application program is using its series.

3.4 FIDONET AND UUCP SERVICES

Godard (1995) notes that there are two basic kinds of communication services: Computer mediated communications which allow people to exchange messages; and resource sharing that offers access to computing resources such as files and databases.

Either type of services may be interactive, when messages are delivered and read immediately, or batch when messages are received after a certain delay.

Computer Mediated communication (CMC) services may be primarily either one-to-one (electronic mail), one-to-many (bulletin board systems) or many-to-many (conferencing systems), where as

resource sharing services include remote login, file transfer, and remote device access. The types of networking services are categorized under these two kinds of services as follows.

FidoNet and UUCP networking services are categorized under computer-mediated communication (CMC) where as Internet is categorized under remote resource sharing services.

Let us see the two types of networking services (FidoNet and UUCP) to have a general picture of services given by them and that of the Internet.

3.4.1 FidoNet

What is FidoNet?

FidoNet is a point-to-point and store-and-forward wide area network (WAN) that uses modems over normal switched telephone line to exchange messages and data. The services normally offered on FidoNet include private mail exchange between users, public conferencing, and file transfer. (American Association for the Advancement of Science 1993).

Fidonet is a PC-based Bulletin Board System (BBS) that had a fancy mailing system added in it. Most Bulletin Board Systems allow users to leave messages for other users of that same Bulletin Board Systems. Tom Jennings in the United states devised a means to allow Bulletin Boards System of users to send messages to another Bulletin Board Systems. The development was started in the era when it was difficult for the layman to get access to national e-mail systems in the United States, and so the system was not designed to interconnect to their mailing systems (it was designed to be a BBS-to-BBS system).

What Fido was designed for, and has achieved, is very efficient file transfers. Bulletin Board Systems are run by private individuals who pay for the telephone calls out of their own pockets. Such folk are often competent computer people, and know how to get the last ounce out of the hardware and software.

The control of the Fidonet network is very bureaucratic. There are all types of coordinators, who are elected by a complex mechanism, and if these coordinators don't perform their functions properly, the system breaks down. The general structure is that a city would have one Fidonet system that acts as a hub to which all local Fidonet systems would forward inter-city mail. *A hub is a component that serves as a common termination point for multiple nodes and that can relay signal along the appropriate path. Generally a hub is a box with a number of connectors to which nodes are attached. A hub usually connects nodes that have a common architecture, such as Ethernet, or token ring.*

Local Fidonet systems might act as a hub within an organization by having "points" connected. The hubs across the country would be grouped into regions with regional hubs that feed to one national hub. This national hub links to the continental hub which links between continents. Thus a mail from one user on one continent to a user on another continent might have to make many hops to reach its destination, and so considerable delays can be introduced. Also, registering your Fido node with the larger Fido network can take sometime, like several weeks or more.

Fidonet has a hierarchical addressing system. "Zones" representing continents or subcontinents, are the highest category in the hierarchy. "Regions" are the next level, and

generally designate a subregion, or group of countries. For example, Africa is Zone 5 in the FidoNet system, and East Africa is designated as "73", thus, the first part of the FidoNet address for any East African country would be 5:73. Each country may have its own "net," represented by a number appended to the region code; Kenya, for example, is 5:731. A net can include one or more "nodes", which are host machines that serve as clearinghouses for messages each changed between machines within and outside the country or region. Nodes are given numbers and are represented in the address following a slash after the net code; thus node 100 in Kenya is addressed 5:731/100 (American Association for the Advancement of Science 1993).

Finally at the "leaves of the tree", there are points, which are machines not necessarily dedicated to e-mail service, but which are used by individual users or organizations on an ad hoc basis to exchange mail with nodes or other points.

It is possible to set up a private Fidonet network. Just as can be done with any of the mailing systems, so one must be careful to distinguish between running the Fidonet software as part of the Fidonet network (i.e., with entries in the nodelist, using the public Fidonet gateways) or as part of a private network (e.g., GreenNet). As with most networks, it is possible to connect your Fidonet software to more than one network if you so wish. FidoNet is a low-cost networking technology.

Some of the factors that make Fidonet a low-cost networking platform are:

- The technology is optimized for use on low-quality phone line (through using a protocol that features high

resiliency to line noise and satellite delays, as well as automatic file compression and "crash recovery," i.e., should a connection break while data transfer is in progress, the transfer simply resumes from where it was interrupted on a subsequent call).

- The required hardware and accompanying software operating environment (DOS) are common and therefore well supported even by relatively unsophisticated programmers.
- The software is inexpensive and sometimes free for non-commercial use.

Even though FidoNet is a low-cost networking technology, it has got its own limitations.

Fido Limitations

Network operators know only too well that satisfying a client is like chasing a moving target. No matter how much band width is available, it will be used up. Sooner or latter, a user realizes she or he needs services that current capabilities may not readily offer, especially when she or he becomes an ardent user. Some of the services that such a user very soon realizes would be most helpful are:

- on-line access to remote machines or databases ("remote login" or "rlogin");
- real time point-to-point communication (as in fax or telephone; on other e-mail platform a live, interactive "phone" or "chat" facility exists);

- efficient transfer of large files (also known as "FTP" for file transfer protocol).

Although messages can be exchanged between Fidonet and Internet, FidoNet is not Internet upgradable; it uses an entirely different protocol. FidoNet is a batch-based store-and-forward system whereas Internet operates in real time. There is, therefore, normally a requirement for gateway software to transfer messages from one network's protocol to the other. Fido-TCP/IP (the Internet protocol) gateways are not widely available. What are found more often are Fido-UUCP gateways. Whereas UUCP also operates in batch mode, it is Internet-upgradable, and in many cases, conversion to Internet simply requires upgrading from a dial-up phone line to a leased line.

Fidonet, for all its strengths, is not the ultimate in networking. Some of the limitations of Fido are technical, and others are not. The limitations can be categorized into:

- general;
- technical; and
- bugs.

It should, however, be emphasized that the latter two categories may not necessarily be true of Fido-compatible programs other than FrontDoor. It is also expected that the "bugs" in FrontDoor will disappear in later versions of the software.

General limitations

- Its existence in several software version; user who moves from one platform to another may find the retraining bothersome;

- It can be weak in confidentiality and integrity. Fortunately, there are codes of ethics that node operators are required to, and normally do, observe. Furthermore, most node operators would be hard-pressed to find time to delve into others' mail.
- Documentation is hard to come by (a common problem associated with "shareware"). The rapid proliferation of newer versions means that updated documentation may not become available in a timely manner.

Technical problems

The following points are the major technical problems with FrontDoor:

- There are awkward restrictions on e-mail address because of Fido's addressing scheme;
- FrontDoor 2.02 can only support up to ten user accounts. Ideally, an organization may want to create accounts for a number greater than that but sharing the same facility;
- Although support for automatic generation of carbon copies exists, "cc:" will only recognize addresses in the Fido format; and
- Support for "mailing lines" is poor, and will in any case work only if entries in the relevant file are in the Fido format.

Some known bugs

There are a number of problems that are believed to be bugs, i.e., software errors, that will hopefully be fixed in the next releases. These includes:

- Although it is perpetuate that when a call breaks during a data transfer session, a subsequent call to the remote machine will begin transmission where it was discontinued, experience has shown that this is only true the communication had only gone into the second "phase" when the line disconnected. When a connection is established, the local machine first enters a "pending" mode, then proceeds to "receiving" mode, assuming that the first phone was successful.
- In the FrontDoor implementation, using CTRL-R to generate automatic replies may not work, unless the status of the message is changed to "Direct" (using CTRL-D). In nearly all cases, it is required to do that for such messages to be sent during a next poll.

3.4.2 UUCP : Unix to Unix Copy Protocol

UUCP is the protocol that was developed to allow two Unix computers to interchange files using dial-up modem. Nowadays there are implementations of this protocol on the popular personal systems, like MS-DOS and Apple Mac. Since Unix systems also run TCP/IP protocols, UUCP-to-Internet gateway is very easy to implement and there are many in operation. There is a very large installed user base of UUCP, and knowledge of how it works, how to configure it, and how to use it seems to be readily obtainable.

Connection into a UUCP network is very straightforward. One can simply make an arrangement with another UUCP host of his/her choice. If one wishes to change this connection for some reason or other, it is possible to do so at very short notice without an impact on the flow of e-mail to or from the user's computer. There is nothing at all to prevent the user from arranging to connect to many computers, so that one can optimize the delivery of e-mail. This can avoid the delays inherent in a store-and-forward system. However, if one uses an Internet gateway site as his/her connection point, there is no need to set up links elsewhere because the forwarding process is at Internet speeds.

As with Fidonet, e-mail flows in both directions when the telephone call connects, and a sponsoring organization can pay for the telephone calls for all of the user's traffic.

The standards used by UUCP are those of the Internet. The addressing system, the mail format, the Usenet News, and virtually everything is to this standard. Their compatibility makes the conversion from UUCP to TCP/IP painless for users, and had a minimal impact on ones technical staff.

An alternative low cost technology to FidoNet is UUCP. UUCP is based on a technology that seems to have become the *de facto* standard for the academic and research environment. Unlike in Africa, when Fido is the more prevalent, UUCP is the more common technology in other developing countries, especially in Latin America. One of the reasons why it may not readily find root in Africa is the fact that Unix machine (being mainly of the mini- and mainframe variety) are not very common. A number of countries in Africa, including Mozambique, Kenya, Zimbabwe, and South

Africa, are however operating UUCP nodes. Although today there are nearly as many UUCP nodes as Fido ones, the UUCP growth rate suggests that it will not be long before UUCP becomes the more common technology.

One other key advantage of UUCP over the Fido is the diversity of the network media over which it can run, conveniently adjusting and maximizing throughput. It can be run, for example, on a normal dial-up line, packet switching, X.25 line, or leased line. When used over packet switched data lines, a more efficient protocol can be selected, thus optimizing performance.

A further advantage of the UUCP is that the "hierarchy" that is evident in Fido is absent. UUCP operates on a "friend of my friend" basis by allowing one machine to talk to another (which talks to another, etc) as peers. But that might also be a drawback; control may be difficult! Given the Unix's good maintenance facilities, managing a UUCP network should, at least in principle, be easier than FidoNet. Unix systems and related products generally come complete with excellent technical support, adding to their inherent desirability.

Perhaps more importantly, UUCP supports remote command execution, and some of the technology is TCP/IP-compatible. It is a straightforward proposition to offer some of the Internet services, especially news. There is also more documentation available for UUCP than FidoNet.

The Fido and UUCP-compatible systems are fairly similar in terms of what they are basically able to do and with respect to the user interface, regardless of their underlying technical

differences. Nonetheless, each system has its proponents, and some important differences between them may be gleaned, although these depends to an extent upon which particular version of either system is considered.

There are two key points at least that can be made with confidence on the above mentioned software:

- Fido software is superior in terms of handling poor phone lines, because of its sophisticated data compression and error detection/correction features;
- UUCP software is compatible with and upgradable to Internet standard up on acquiring a leased line, whereas Fidonet uses an entirely different protocol that is not compatible with the Internet standard. Therefore, the jump to Internet from UUCP would require very little retraining for system operators.

Neither point makes an ironic lead case for either software. One may argue that Fidonet is better suited for Africa, giving the still shaky telecommunication infrastructure in many countries and the relatively greater amount of available experience and support on the continent. One may argue equally well that it is preferable to start in the UUCP world given its promise of a smooth transition to the inevitable Internet once the number of users justifies a leased line.

The critical issue that is left is the cost factor. Which costs less? Usually Fidonet, depending on such variables as the particular modem used, because of its highly efficient transmission of data, but not by very much. There is public

domain (free) software available for both systems. For both systems, a computer, a modem, and a node with which to exchange messages are all else that is required to start communicating with the Internet.

3.5 INTERNET CONNECTIVITY OPTIONS

Hardware and software requirements are the requirements to have an Internet connectivity for any type of users. Therefore, a computer, a high speed modem with compression and error detection/ correction-protocols are needed to get into the Internet connectivity in general.

The choice of the communication software depends on the transport protocol in use at the node (Fido, UUCP, or TCP/IP). Most of these software are freeware and can be downloaded from different servers worldwide (Godard 1995).

Tennant (1992) suggests Internet connectivity condition as "for the Internet to exist, there must be connections between computers and agreements on how they are to communicate. Connections can consist of any of a variety of communication media or methods: metal wires, microwave links, packet radio or fibre optic cables. These connections are usually established within area of regions by a particular networking organization with authority or economic interest in that area. For example, a university academic department may lay Ethernet cable to connect its personal computer and workstation into a local area network (LAN), which is then connected to the cables the campus laid to connect its buildings together, which is then linked to cables laid by a regional network that itself ties into the

NSFNet backbone. Therefore, the path between any two points on the Internet often traverses physical connections that are administered by a variety of independent authorities".

The following are the Internet connectivity options that are available to users.

- Dedicated Internet Access;
- SLIP and PPP;
- ISDN Access;
- - Dial-up access;
- UUCP Access; and
- Access via other networks.

Let us see each of the Connectivity options so that one can have an alternative to choose according to his/her capacity and interest.

a) Dedicated Internet Access

This is a type of connection which gives complete access to all of the Internet's facilities. In this type of connection, it is the services provider who leases a dedicated telephone line, the speed being chosen according to the user needs (the faster the line speed, the more it costs), and place a special computer at the user's location. The router is responsible for the communication activities taking place between the user and somewhere else and sending the messages in their way.

The connection is quite expensive, running it requires several thousand dollars for initial and monthly fee. The advantage of this type of connection is that once the user sets up the

connection, it is possible to let as many computer as the user likes connect to the Internet. To do so the user only needs to place the computer on a local area network (LAN), along with the router.

The main advantages of the dedicated access are:

- It offers the most flexible connection;
- Each computer will be full fledged Internet member, capable of performing any network function.

On the other hand, dedicated Internet access usually requires some support structure for the users' local network. It must be noted that the service provider will give assistance in the beginning, but once the service is started, he is only responsible for the **router** and the **phone line**. The responsibility of the local network lies on the user.

b) *SLIP and PPP*

SLIP (Serial Line Interface Protocol) and **PPP (Point-to-Point Protocol)** are host software that allow users to utilize the point-to-point or serial line interface protocols on their computers.

These are versions of Internet software which run over normal phone lines, using standard high speed modems. To have a SLIP and PPP connection, a SLIP or PPP software and a more expensive modem is needed. However, the user will not have the very high connection costs. The user is not forced to use the dedicated line. The user can use SLIP or PPP to dial in to the network when

he/she wants an access, leaving the phone line free for other use when the user does not need it.

The real advantages of SLIP or PPP are:

- They allow a full fledged connection to the Internet;
- The user is not using someone else's system as an "access point" to the Net; the user is on the Net him/her self;
- SLIP and PPP are very appropriate for connecting a home computer to a large local network, which is in turn connected to the Internet;
- They are also appropriate for connecting a home computer (or perhaps a very small local network) to a service provider, who can give full Internet access.

SLIP or PPP have some disadvantages too:

- They are not appropriate for connecting a medium sized or large network to the Internet; and
- They cannot talk far enough to support many users at once.

Krol (1994) suggests that it is advisable to look into "real" dedicated access if the user has a medium or large network. SLIP is a moderate cost option. It provides very good service and is not expensive.

c) ISDN Access

ISDN stands for "Integrated Services Digital Network". In essence, it means using a digital telephone line between the Subscriber's home and the telephone company's switching office (or "central office"). ISDN access can be either dial-up

(intermittent access, as needed), or dedicated (a permanent connection to the Internet).

The main advantage of ISDN is that it provides very high-speed access at relatively low cost. Pricing is a big variable, it is almost certainly a lot less than a traditional dedicated line of the same speed would have cost a few years ago. Rates depend entirely on how the service is tariffed with the local public utilities commission.

d) Dial-up Access

There is also an easy way to get network access, if the user does not afford dedicated access, and he/she does not want to experiment with SLIP or PPP. The means is that to get a timesharing account on a computer that already has dedicated access. Timesharing access is almost (but not quite) as good as having one's own connection, and it is considerably easier to set up. The user's computer does not actually become part of the Internet; it is just accessing the servers computer that's permanently connected to the network.

This types of connection has its pros and cons. On the good side, the user probably has the hardware and software the user needs (i.e., a modem and a terminal emulation package). The user only does what the service provider allows. The user may not be able to use all the services that the Internet has. There is probably no way to load random nifty software application and use it; the user has to appeal to the service provider to add that service. The user can not run fancy X-based applications, like Mosaic.

e) UUCP Access

All UNIX systems support a set of service called UUCP, which transfer data over standard phone lines. If the user finds a cooperative service provider (like UUNET, an employer, or a friend), he/she can arrange to use UUCP to pick up Internet mail and USENET news. The user's system uses UUCP to dial into a remote system at regular intervals and transfer news and mail back to the user. Here, the user cannot do much more than read mail and news, since the user is not really connected to the Internet at all. The user's computer dials-up an Internet computer periodically and transfers files.

If the user has UNIX and a modem, there is no need of spending anything on software or equipment. All the UNIX system has all the software the user needs. Setting up UUCP is not trivial, but not terribly difficult, either.

f) Access Via Other networks

Most networking services, like the BITNET and compuServe, have set up gateways that allow the user to exchange electronic mail with system on the Internet. Some have set up gateways that let the user read the Internet's bulletin boards (USENET news). In addition, there are a few devices scattered around that let the user request a file via an electronic mail message; such services fetch the file and mail it to the user automatically.

CHAPTER FOUR

INTERNET FACILITIES

4.1 INTERNET SERVICES

4.1.1 Information Super Highway

Several industrialized countries have established national initiatives, to address the potential opportunities and challenges offered by the vision of a global information infrastructure.

Information super highway is defined as an interconnection of existing communication and information media, bringing television, telecommunication, and computer technologies into a single medium. The primary technological development of this convergence is the digitalization of information. All information, be it in audio, visual, or textual format, can be reduced to binary digit, or "bits" understood by computers. Once information is reduced to these electronic pulses, any medium with the right computer equipment can send it along its own network, which may consist of any combination of coaxial cables, satellites, microwaves or cellular transmitters and receiving dishes. In a world without regulation, this would mean that telephone companies may become program broadcasters and cable companies may provide telephone and video conferencing services (Nosthaken and Akhtar 1995).

US vice-president, Al Gore, has referred to the system "as the *Global Information Infrastructure (GII)*". Equipped with the latest information technology, individuals in even the most remote regions of the world will be able to access libraries, databases,

educational institutions, hospitals, governments, and private organizations virtually anywhere in the planet. They will be able to share ideas or co-author academic papers with colleagues across oceans.

Nosthaken and Akhtar (1995), putting Cohen (1994), states that the president of Steintor-Communication (Canada) defines an information highway as *"a network of networks that are interoperable and interconnected, providing a seamless web of networks that are entirely transparent to users, once operational, the highway will allow anyone to communicate with anyone else, whenever they want, however, they want and whatever they want"*.

Telecommunications and cable companies characterize the highway as a series of high-speed wide-band, communication links on a fibre-cable infrastructure. Broadcasters emphasize the multi-channel universe, in part based on satellites, and the wide range of choices available to viewers.

To a large extent the information highway agenda has stressed competitive, industrial advantages, although social, cultural, and political aspects are occasionally raised. The Internet is often given as an example of the information highway in embryo.

4.1.2 Information Services

Currently there are thousands of commercial and non-commercial online services that host multiple databases and perhaps hundreds that deliver network connections for the user along with a range of information services. But permanent connectivity is now so cheaply and easily available that the role of large hosts is weakening, as is that of the closed, multiple service networks. The publishers of the original information are now able to

provide the information delivery service directly to users anywhere on the Internet, so that the use of traditional commercial online information brokers, providing a wide range of information services from other sources, is likely to decrease (Jensen 1995).

The growth of the Internet in the U.S.A and Europe has already forced Dialogue - the largest commercial host in terms of numbers of databases provided - to restructure its pricing policies.

Jensen goes on to explain that there has been substantial growth in some of the major closed network commercial online services such as CompuServe, GENie and America Online. These networks have so far successfully integrated the provision of online access with a comprehensive range of well organized information services. The demands of their users has recently encouraged them to provide Internet access. In addition, the growth in these commercial services has been outstripped by even greater growth in LAN and cheap local dial-up public access hosts which simply provide a conduit to remote information services resident on the other 2 million plus hosts on the Internet.

Nevertheless, new alliances between PTOs (Public Telecommunications Operators), information providers and publishers are likely to produce a growing number of competing commercial services which integrate network access with information and entertainment facilities. Also, with the vast range of information sources now becoming available, It is expected that new information gathering services will spring up to locate, remember, process, analyze and in general add value to the data in a manner that users will be willing to pay for.

Although the full range of electronic networking services are too numerous to discuss here, the major services can be broken down into the following categories.

4.1.3 Electronic Mail

a) *What is e-mail?*

Electronic mail (e-mail) is a computer-mediated communication system, in which messages in electronic form are exchanged between computers linked in some way, often through terrestrial public telephone networks. In sending and receiving computers use a suite of computer-based tools (program or protocols) to compose, edit, modify, store, retrieve, or otherwise manipulate transmission time of delayed messages (American Association for the Advancement of Science 1993).

Jensen (1995) describes electronic mail as " the ability to send messages, documents, databases, audio, image, video and other files, It is usually the baseline telematics service requirement. Other types of links allow computers to share applications, peripherals and large data sets, but electronic mail (e-mail) forms a common denominator between local and wide area networks of all types world-wide".

Using standard voice grade dial-up phone lines, electronic mail has become the principal text communication tool for many professionals. With further penetration of low cost computer-based audio, still camera and video systems, electronic mail is increasingly being used to transmit these media, singly, or as part of integrated multi-media presentations.

Further savings in time and cost are being made because the medium is not limited to one-to-one communication with another individual, but can also broadcast text, sound and images to groups of interested recipients. Up to 100 times faster than fax, e-mail reduces paper consumption, does not require time consuming re-entry of data into the computer and automatically stores the information in a machine-readable filing system for quick reference. As a result electronic mail is usually by far the most used of all telematics functions.

b) Commonly Supported Features

There are several common features that are supported by most e-mail programs. Some of them are:

- carbon copies;
- Blind carbon copies; and
- signature files

Carbon Copies

Krol (1994) suggests that all mailers let the sender put several addresses in the **To:** field of the header. It is frequently useful to differentiate between those to whom the message is primarily directed, and those who revive it for their information. To do so, the mail-for-forwarding software recognizes that a line beginning with **Cc:** line will also receive a copy. Just as if the user was listed on the **To:** line. Thus, the **cc** field has the same meaning as the old **cc:** line on a business letter. Many mailers have a facility of creating a **Cc:** line automatically. If the mailer allows the user to edit the header, the user can create a **Cc:** line manually.

Blind Carbon Copies

Blind carbon copies are copies sent to a list of readers, just like carbon copies. However, the header line that lists the recipient is automatically deleted from the outgoing mail. Therefore, none of the other recipients will know who (if anyone) received blind carbon copies.

Signature Files

Signature files are a way to append additional information to outgoing mail messages. They are often used to include information about who the user is and how the user can be contacted.

There are some unusual non-standard features which are found in some electronic mail pockets which cannot be assumed to be available to everyone. Some of them are like attaching documents, notification of receipt, notification of reading, and message cancel (Krol 1994).

c) The advantages of e-mail

The American Association for the Advancement of Science (1993) has enumerated the major advantages of e-mail over the traditional communication modes (e.g. telephone, fax, telex, cable, and post)as follows:

- E-mail provides a speedy, inexpensive, and convenient means of communication;
- Messages can be sent at any time regardless of time-zone difference between countries or continents;

- Electronic networking allows the transfer of documents and, depending on the particular protocol used, remote log-in (using a distant computer as if it was on your own desk), allowing sharing of distributed resources;
- E-mail can be targeted to an individual, institution, or other group. It can be "publicly broadcasted" at little or no additional cost;
- E-mail provides for blocking undesirable mail sites. Such
E-mail can read, expedited, and deleted while still on-line, obviating the need for printing, thereby saving on paper costs;
- E-mail can be interconnected with other electronic communication modes, including fax, CD-ROM players, optical scanners, etc;
- E-mail systems, unlike fax machines, do not necessarily need a dedicated phone line;
- The flexibility of e-mail allows for easy data reprocessing/editing and redistribution;
- E-mail, while not entirely foolproof in terms of security, offers better confidentiality than other communication technologies, particularly when encryption/passwords are supported;
- Although other technologies can incorporate value-added services, such as auto redial, redirect, forwarding,

conferencing, and so on, most of these are an inherent, built-in components of e-mail; and

- Whereas some of the more widely available e-mail packages cannot transmit graphics, the more advanced (and not uncommon) suites can. Indeed, an important emerging communications trend is towards multimedia networking, combining data, audio, video, etc, as normal components of e-mail.

American Association for the Advancement of Science has identified some opportunities and potentials of E-mail such as:

- elicitation and conduct of regional and national collaborative research initiatives;
- Source of technology transfer, e.g by broadcasting technical questions to mailing list ("listserv") subscribers in the parts of the world;
- gathering, storage, and dissemination of vital information, e.g., in health, food, agriculture, environment, and so on;
- administrative purpose, e.g., for circulating internal memos or minutes of meetings, collecting data on vacancies number taken up by admitted students/staff, accounting and auditing, processing and disseminating personnel information among authorized officers, ...etc;
- on-line library service and searching;

- computer-aided distant learning and tutoring, e.g., a member of a staff on sabbatical may continue to remotely tutor his or her supervisee, or a foreign professor can co-supervise a local postgraduate student. Indeed, this is an excellent way of tapping African brains based in foreign lands; and
- commercial applications: appropriate centres can serve as "consultancy units", e.g., by offering on-line technical advice, allowing remote utilization of computing facilities on a lease or hire basis, selling nonsensitive information, serving as e-mail bureaus, or simply serving as nodes for other organizations;

d) Comparison of E-mail and Fax based on cost

E-mail is usually cheaper than all other forms of existing transmission media. The following table shows the speed and cost comparison between fax and E-mail.

TABLE 4.1 : FAX VS. E.MAIL BETWEEN ADDIS ABABA AND LONDON

Media	10k file (4 pages)	60k file (24 pages)	Cost in US\$ (4 pages)	Cost in US\$ (8 pages)
Fax	8 minutes	48 minutes	14.00	84.00
e-mail no compression 2400 bps	2 minute	5.6 minutes	3.20	9.00
e-mail compression 2400 bps	1 minute	3.7 minutes	1.60	6.00
e-mail no compression 9600 bps PEP	30 seconds	1.2 minutes	1.60	3.20
e-mail compression 9600	20 seconds	40 seconds	1.60	1.60

Source:- Electronic Networking for Western Universities,
AAAS, 1993 (Lishan 1993).

4.1.4 Telnet

a) What is Telnet?

Telnet is the Internet's standard protocol for remote terminal connection services used for login into and searching other computers connected to the Internet.

Telnet allows the user's computer to interact with a remote time sharing system at another site as if the user's terminal were connected directly to the remote computer (Technology fact sheet 1994).

b) *Telnet facilities*

Some of the typical circumstances in which a user might want to use Telnet are:

- When the user wants to login on a remote computer and he wants to do some work on that host;
- When the user wants to use one of the Internet's client program installed on the user's machine;
- When the user needs access to a stand-alone application that is installed on another computer.

Telnet is the only way to get in touch with the Internet's stand-alone applications. There are three distinct kinds of stand-alone examples of each kind of services.

- BBS: Internet's Bulletin Boards System are similar to the dial up Bulletin Boards System. They provide access to files about some topic and occasionally after the opportunity to exchange messages with other Bulletin Boards System users;
- Databases: Internet databases are collections of information about some topic, like the metro databases, when the user is connected to the database on the Internet, he/she will be able to query the databases for specific information.

- Program that integrates Internet services and provide menu drive access: These are stand-alone programs that give the user a convenient way of reading many of the Internet's resources.

In any list of Internet Services, you will find stand-alone services and resources of all these types. To use Telnet to reach these resources, you need to know the name (or IP address) of the computer that hosts the resource you are interested in and a valid login name and password for that computer. Most services, which relay on Telnet access, provide a special login name that anyone can use to connect to the service. This is similar to the "anonymous" login with ftp, but each service available through Telnet assigns login information independently (Falk 1994).

4.1.5 FTP : The File Transfer Protocol

Krol (1994) explains in detail how to use the directories in **ftp** services in local and remote machine. He describes that the **ftp** is named after the application protocol it uses, the "file transfer protocol (FTP)". As the names implies, the protocol's job is to move files from one computer to another. It is the users problem to identify where the two computers are located, how they are connected, or even whether or not they use the same operating system, provided that both computers can "talk" the **ftp** protocol and have access to the Internet. **Ftp** command can be used to transfer files.

Ftp is a complex program because there are different ways to manipulate files and file structures, different ways of storing files (binary or ASCII, compressed or uncompressed,

etc). All these introduce complications and may require additional thought to get things right (Krol 1994).

There are a number of commands in **ftp** to deal with file system directories_ probably more commands than when there are needs to use. There are also many commands because two sets of directories are involved during the **ftp** session.

- the working directory on the user's local machine; and
- the directory on the remote machine.

Anonymous FTP

Anonymous FTP allows users who does not have login name or a password to access certain files on a machine, However, there are strong restrictions such as:

- anonymous users can normally only get files (i.e., copy them);
- They cannot install new files or modify files that already exist; and
- There are limits on files that can be copied.

4.1.6 Internet Bulletin Board Services

Internet bulletin boards are like bulletin board services (BBS) elsewhere. They are designed to be easy to use without a lot of preparation. A good Bulletin Boards System will provide on-line all the information you need to use the service. Many Bulletin Boards System require users to register, and you

should be ready to provide some information about yourself. Registering helps the Bulletin Boards System operators to know their audience, and it helps the Bulletin Boards System stay secure.

4.1.7 Tools for Reading the News

A news reader is a program that manages the user's subscription to newsgroups. It keeps track of what groups the user is interested in and what articles he/she has already read in those groups.

To read the Network news, the user need access to an Internet host that carries Net News and a news reader. Ordinarily the user will get access to a New server from his/her Internet access provider.

4.1.8 Categories of USENET News Groups

Novell's Complete Encyclopedia of Networking (1995) has described **USENET** as "a distributed network for UNIX-based machine with more than a million users worldwide. The network organization includes backbones, branch, and leaf sites, with the last representing individual users. The network is most commonly used for the UUCP, mail, and NetNews services on UNIX".

USENET is a loose network of thousands of discussion groups about various topics ranging from the mainstream and mundane to the esoteric and "out of this world," with some topics being even further out than that.

At the most general level, there are seven categories for official USENET news groups. Groups in these categories are distributed worldwide to all USENET sites.

TABLE 4.2: CATEGORIES OF USENET NEWS GROUPS

Category	Description
Comp	Newsgroups dealing with computer related topics including hardware, software commercial applications, and distribution of public domain and shareware programs.
Misc	Newsgroups that cut across categories of that address themes not easily classified under any of the other group
News	Discussion related to net news distribution and software.
Rec	Groups discussing recreational activities, the arts, and other enjoyable things
Sci	Discussion related to topics in the sciences.
Soc	Discussion groups for social issues.
Talk	Groups providing an opportunity for open ended debate.

4.2 INTERNET INFORMATION RETRIEVAL TOOLS

Logging in

When the user wants to be connected to the Internet via phone he/she will have to log in to her/his Internet access providers. Internet access providers use all sorts of computers but it is very likely that the user's internet access will be via a computer running the UNIX operating system before he/she can log in to a UNIX system, the user must have arranged with his/her Internet access provider for a login account. The access provider will give his/her a conventional dial-up connection or a protocol dial-up connection, the user will have to log in to begin work (Falk 1994).

Logging in tells the computer who the user is. The user login name is his/her on-line identity. It determines what files, directories, and programs he/she can work with. Any file or directory the user creates will be stamped with this identity, so that he/she can control access to them. All login names should also be protected by a password known only to the authorized user of the begin account.

Before being connected to the Internet, a user has to know the address of other computers in the networks so that he/she can use the facilities available.

Domains

Getting where one wants to go can often be one of the more difficult aspects of using network. Krol (1994) defines the domain name system as "a method of administering names by giving different groups responsibility for subsets of the names. Each level in this system is called *domain*".

For example, if someone were to ask for a home address, one would probably expects a street, apartment, city, state, and zip code. That is all the information the post office needs to deliver mail in a reasonable speedy fashion. Likewise, computer addresses have a structure to them. The general form is:

A persons's e-mail address on a computer:

user@somewhere.domain A computer's name: *somewhere.domain*

The user portion is usually the person's account name on the system; though it does not have to be, **somewhere.domain** tells the name of the system or location, and what kind of organization it is. The trailing domain is often one of the following shown in table 4.3.

TABLE 4.3: DOMAINS AND THEIR DESCRIPTIONS

DOMAIN	DESCRIPTION
com	Usually a company or other commercial institution or organization
edu	An educational institution
gov	A government site
mil	A military site
net	gateways and other administrative host for a network
org	This is a domain reserved for private organizations, which do not comfortably fit in the other classes of domains.

As the Internet became an international network, a way was needed to give foreign countries responsibility for their own names. To do so, there are a set of two-letter domain which corresponds to the highest-level domains for countries. For example 'au' stands for Australia. The proper terminology for a site's domain name (somewhere.domain) is called *the Fully Quality Domain Name*, or *FQDN*. It is usually selected to give a clear indication of the site's organization or sponsoring agent (Cronin et al 1994, Krol 1994).

There are also tools that are useful for information-retrieval purposes based on the requirements of the user on the Internet. In the next sub-section, we will see the tools that are available to users.

4.2.1 Gopher

Gopher is the most used search tool. It is the software program for browsing and information retrieval, developed at the University of Minnesota. It provides a menu-driven interface that initially shows what is available on one particular Gopher server. The user brows through a set of "nested" menus to get closer to a specific topic. The advantage of Gopher is that it collects information that may be scattered across many computers in different forms and presents it on the same menu. If one selects a menu item that involve making connection to another computer, the connection will made automatically (Falk 1994).

Technically speaking, Gopher is a "distributed document delivery system". Fortunately, it is more appealing (and much more fun to use) than the description makes it sound. In

practice, one can retrieve files via Gopher without knowing which Internet host contains the file or what directory the file is stored in. The user can connect to other systems just by selecting menu items. The aim of the Gopher application is to bring the user information from all over the Internet as seamlessly as possible. Unlike any other application, Gopher doesn't require users to memorize a domain name or login information. One will not even have to remember which Gopher server manages the information he/she wants to retrieve.

A Gopher server's resources are organized hierarchically, usually in a tree-like directory structure. The server will answer the user's first request with a listing of the root level of this directory hierarchy. Each item in this listing consists of a short description, an identifier that tells the client what kind of item is a host name and a port number.

The work of Gopher

The client program turns the listing into a menu and displays it on the user's screen. When the user selects an item from this menu, the client figures out what kind of item the user has selected, looks at the host name and port number attached to that item, and connects to that host and port. The client uses this new connection to send a request for the item the user selected. If the item the user selected is a directory, the server sends back a listing of presents that to the user as a menu. If the selection is a file, the server will send the client the contents of the file.

When the client receives a file, it checks the file type and does whatever is sensible for a file of that type. If the

file is text, the client displays it, and after the user has looked at it, the user will have the option of printing, mailing, or saving the file locally. If the file is binary and the user is working over a conventional dial-up connections, the client will prompt the user for a file name to use when saving the file locally.

4.2.2 Veronica and Jughead

They are databases that contain information about what is available in Gopher space. They provide roughly the same service for Gopher that Archie provides for FTP. The Veronica database stores the names of menu items in all the Gopher servers that can be reached from the University of Minnesota Gopher. When the user queries the Veronica database he/she will be prompted for keywords, and Veronica will return a list of Gopher items where descriptions contain those keywords.

Jughead does the same sort of thing on a similar scale, allowing the user to query the menu items at a single site or at a small number of sites. Jughead queries also require the user to enter key words for the subjects he/she is interested in. Menu items representing that subject area are returned to the user as a menu. Jughead gives a slightly different view of Gopher space, and it will allow the user to combine keywords using 'AND', 'OR' and 'NOT' as operators.

4.2.3 Archie

Archie is a software program, developed at McGill University, Montreal, Canada, that searches the indexes of public-access computers (computers that permit anonymous FTP) for a keyword that the user specify. Only file names and computer sub

directory names are searched not the text of the actual documents. Archie returns to the list of the matches it finds. If a particular file interests users, they can log onto the computer where it resides and anonymous FTP to copy it to the user's PC. Archie clients query a single database that contains the locations of various files by filename. This is useful when one wishes to know the location of a specific file so one can retrieve it using FTP.

4.2.4 Wide Area Information Server (WAIS)

WAIS is more powerful than Gopher because it actually searches the full text of a document to look for specified key words. WAIS accepts commands in plain English, processes them at the user level, and relays the processed information from the user level to the selected databases. The documents stored on these WAIS servers are indexed (usually by every word in the document). In response to the user's query, WAIS searches the index on the server or servers the user specified and tells him which documents are likely to hold information he is searching for. WAIS servers can be good sources of information on science related topics.

4.2.5 WWW : The Word Wide Web

The origins of the web

The World Wide Web was developed at CERN (Europe Centre for Nuclear Research) an institution for high energy physics research in Geneva, Switzerland. Its original purpose was to promote the sharing of research materials and Collaboration between physicists at many different locations.

the World Wide Web is a client/server application that is similar to Gopher in many respects. Like Gopher, the World Wide Web lets the user retrieve information without having to know where on the Internet that information is stored. Like Gopher, the World Wide Web provides an interface to other Internet applications such as Gopher, ftp, or WAIS. However, the World Wide Web has included a subject catalog from the outset, and even though the catalog is incomplete. It is a tremendous help in guiding the curious to resources of interests. the World Wide Web is also the only Internet application that is hyper text-based. Hypertext is what gives the World Wide Web its web like character.

The underlying protocol used by the World Wide Web is the hypertext transfer protocol (**HTTP**), and the Hypertext Markup Language (**HTML**) is used to produce and link documents.

How the Web Works

The interaction between the World Wide Web clients and servers resembles the Gopher client/server dialogue. The client connects to a server long enough to submit one request and receive a reply. In the World Wide Web, the client requests take the form of URLs (Uniform Resource Locators). URLs look like the following:

`http: // info.cern.ch/hypertext/www/The project, htm 1.`

Choosing a Browser

The client software one uses to look at a hypertext is called a *browser*. Browser gives the user a clear view of where the links are in a hypertext document and a way of following links from one documents to another. The World Wide Web browsers are also client programs.

The link mode browser is the most primitive, but it has the great advantage that the user can use it with almost any display terminal and with any kind of connection to the Internet.

Full screen browsers are a set up. They show the user the World Wide Web documents on a screen at a time and use the display capability of the user's terminal (highlighting, reverse video, or underlining) and cursor movement keys.

4.3 IMPACT OF THE INTERNET

Bringing Internet to Ethiopia (BITE 1995) indicated that the advent of new forms of electronic communication has opened up new ways of accessing information. Although, this has many advantage, the ease with which information can be freely accessed and disseminated also brings many challenges and these may be perceived shortcomings.

The Internet society has taken into consideration the impact of electronic communication on various dimensions of the society. This is the reason that the ISOC has utilized guidelines for the users of the Internet. Most of the networks follow the NSFNet (National Science Foundation Network) Acceptable Use Policy (AUP) which is stated by the National Science Foundation (NSF) in U.S.A as follows:

" The service is provided to support open research and education for research and educational institutions and the research sections of commercial companies, communication and exchange of ideas and information with foreign researchers, traffic with other networks, communications and product and service communications".

There are also clearly stated regulations which condemn the illegal use of the Internet. However, there are social, economical, technical, and political issues to be faced by those countries which are connected to the Internet. That is why nations with Internet connectivity are attempting to find solution to the stated problems.

The Internet has been also been criticized for being uncharted, unnavigable and like a "library where all the books are dumped on the floor in no particular order", with no comprehensive directory of services. Exploring the network can be both time consuming and frustrating. In spite of the ever expanding number of resources on the Internet, knowing how to use them can be problematic; many users often wind up chasing their tails when they try to fetch information.

In addition, the vast quantity of information available on the Internet may contribute to what is called "problem of information overload. With the knowledge of explosion and the availability of information services and electronically delivered information, the problem of information bigness and information confusion seem to be inevitable.

Cronin et al (1994) note that " it is clear that the Internet is set to become an integral part of corporate America. An Internet address is rapidly becoming a status symbol on the business card". The Internet has the potential to become a major facility for new business approaches involving new partnerships between corporate, academic and governments entities.

The Internet has also raised such controversial issues like security, property rights, and cultural issues. Let us see the impact of it on each of the issues in detail.

4.3.1 Security Issue

Krol (1994) emphasises that a computer connected to the Internet is not, in itself, a much different security problem than a machine that works with a modem, The problems are the same; it's the magnitude of the problem that changes. In a dial-up modem, any one can dial the number and try to break in. According to Krol, there are three mitigating factors: the computer's phone number probably is not widely known; if the intruder is outside the local calling area, he has to pay for the experience (or have stolen something else there); and there is only one interface which can be attacked.

If someone is on the Internet, the mitigating factors are gone. The general address of ones network is easily found, an intruder would only have to try a few host numbers before stumbling on to an active one. In practice, this is still no worse than computer services that provide dial-up access to their machines through total free 800 numbers. the problem is that those services have staff who worry about security, and

there is still only one point to break in from- the ASCII terminal port. On the Internet, someone could try to break in through the interactive terminal port, the file transfer port, the e-mail port, etc. It is easy to someone to pull a workstation out of the box and put it on the Internet without thinking about security at all. One plugs the machine in , turns it on, and it works. The job is done, until someone breaks in and does something bad. In the long run, it is less time-consuming to put a little through into security before hand than to deal with it after the fact.

The user must believe that it is his workstation's responsibility to protect itself, and, not the network's job to protect it. A network provider can restrict who may talk over the user's connection. However, that probably is not what the user wants, because it strips away much of the Internet's value. Security on the Internet is really a group effort by the whole community.

Krol (1994) indicates four ways in which network machines become compromised. In decreasing order of likelihood, these are:

- Valid users choosing bad passwords;
- Valid user importing corrupt software;
- Illegal users entering through misconfigured software;
- Illegal users entering through an operating system security flaw.

To stay out of trouble, passwords are of a great help to the Internet users like any computer users.

Passwords

From practice, it is known that most people choose passwords for their convenience. Unfortunately, what is convenient for the user is also convenient for the backer. CERT (Computer Emergency Response Team) was put by Krol to believe that 80 per cent of computer break-ins are caused by poor passwords choice.

Most passwords crackers do not pick random letters, they pick common words from the dictionary and simple names. So to be on the safe side, pick a good password which:

- is at least six characters long;
- is a mixture of uppercase, lowercase, and numbers;
- is not a word;
- is not set of adjacent keyboard keys (e.g., QWERTY).

Krol (1994) advices that when one installs a workstation, he/she has to make sure that he/she assigns passwords to root, system, maint, and any other login names that have special powers. It is necessary to change the passwords regularly because if one does not change them, everyone who bought the same type of workstation knows the passwords since some machines come out of the box with standard passwords on their system.

The Journal "Managing Information" (1995) notes that more than one on two of the U.K's largest corporates fear their Internet

access may be used for criminal activities, according to the survey conducted by the PC vendor AST computer. The Journal added that a report carried out by the Banner and Co. questioned 200/IT professionals, all of whom are responsible for hardware and software purchasing at UK companies with more than 200 employees, to establish corporate UK's views on the Internet. The survey also reveals that 59 per cent are concerned about employees shopping on the Internet, while 69 per cent fear that the introduction of the Internet would lead to substantial time-wasting by staff.

4.3.2 Intellectual Property Rights Issues

Intellectual property right can also become an issue when one sends something to someone else. The problem gets even more confusing when the communication is across national borders. Copyright and patent laws vary greatly from country to country. So, to keep the property right of someone, the user has to know who has the right to anything that is going to be sent across the network. One has to make sure he/she has permission before giving something away.

The law surrounding electronic communication has not kept pace with the technology. It has to be noted that property rights can be in problems even when using publicly available files. Some software available for public retrieval through the Internet must be licensed from the vendor. For example, a workstation vendor might make updates to its operating system software available via anonymous FTP. So, one can easily get the software but in order to use it legally one must hold a valid software maintenance license.

Oppendeium and associates (1996) note that in 1993, the US Administration considered the intellectual property and President Clinton formed an Information Infrastructure Task to implement his Administration vision for the US National Infrastructure. Intellectual property was quickly recognized as a key issue, and so a sub-committee to consider this issue was set up under US Commissioner of Patents, Bruce Lehman. The committee issued its white paper in September 1995, following consultation with interested parties.

The report argues that the mere transmission of something over network is not enough to make that material 'fixed' and therefore subject to copyright. In order to enjoy copyright, the work must be stored in some way (easy on RAM disc) either prior to, or at the same time as, it is sent over the networks. This situation is somewhat analogous to speech. It says that if one makes a speech, it is not copyright. As soon as his/her speech is fixed in some way, such as by transcription or by tape recording, then it is copyright (Oppendeium and Associates 1996).

This could be contentious in the electronic information environment said Oppendium, and asks a question if, say, he sends e-mail and failed to record it himself, but the person receiving it stores it on his computer, to whom the copyright belongs to. Oppendeium puts it that under most countries laws, the above question is unresolved.

Discussing on the content of the report produced by the sub-committee, Oppendium (1996) says that the report considers the liability of bulletin board suppliers (Bulletin Boards

Systems), and it argues forcefully that these organizations are in business to move information about, they presumably make profit from this, and must accept the responsibilities that to go with this, i.e., a risk of being sued for copyright infringement. The report advises all Bulletin Boards Systems to take appropriate precautions, such as always acting immediately if warned of possible copyright infringements and taking out indemnity insurance.

Oppendeium summarizes the recommendation of the report as follows:

- The US copyright Act be amended to recognize that transmission of copyright material falls within the exclusive distribution right of the copyright owner;
- The law must balance the copyright owners with the legitimate needs of users.

The report concluded that there is an important public interest in library exemptions, especially in the case of the use of digital technology. Therefore, the working group recommended that the library exemptions be amended to allow the preparation of three copies of works in digital form, with no more than one copy in use at any time.

The report also notes the public should be protected from false information about who created the work, who owns rights in it, and what uses may be authorized by the copyright owners. Therefore, the committee recommends that the US Copy right Act be amended to prohibit the provision, distribution or importation for distribution of copyright management

information known to be false and the unauthorized removal or alteration of copyright management information.

Finally, Opendeium, comments that although it lacks a number of major issues that will surely have to be dealt with sooner or later, the White Paper, balances the needs of copyright owners and of users in a realistic and fair manner.

4.3.3 Cultural issues

Vowler (1995) notes that the Archbishop of York is courting controversy on the eve of his retirement through his comments on the dangers posed to society by Information Technology and the Internet.

In an interview with The Guardian the Archbishop, Dr John Habgood, said he feared that the information superhighway could contribute to the creation of a "devilish" underworld populated by self-obsessed, morally corrupt people.

Dr Habgood expressed his concern over the numbing effects of becoming hooked on violent and obscene material available from the Internet. He also said that he feared that the increasing use of remote services, such as home shopping, will exacerbate social isolation and break down human communication.

"If anyone laughs at the idea of child pornography on the Internet being devilish then they have a problem," said a Church of England spokesman. "There are benefits as well as possible bad effects from Information Technology and the Internet, and we need to do all we can to avoid the latter."

"It is important for the Church to be on the Internet, even though we share the Archbishop's fears about the fragmentation of society," said Rev Richard Steel, chair of the Church's Internet Working Party.

CHAPTER FIVE

ELECTRONIC NETWORKING CONNECTIVITY IN AFRICA

5.1 CURRENT CONNECTIVITY MAP IN AFRICA

Electronic networking, which refers to any several forms of information exchange between two or more computers through any of several methods of interconnection, is spreading throughout much of the world as a fast, reliable, and in most applications, inexpensive form of communication. It is inexpensive because of its speed, and because it can use existing public phone lines as medium. Multiple messages can be sent in a single phone call, lowering still further, while error-correcting modems can ensure reliability of transmission.

Jensen (1995), in his survey, observed that the African environment is characterized by very large variations in electronic networking use. In some countries such as Zaire, activity is virtually non-existent, in others like Tunisia and South Africa, there are tens of thousands of users taking advantage of the advanced networks that have been installed in metropolitan areas which rival those in developed countries. As is to be expected, the majority of countries lie somewhere in between these two extremes. However, less apparently, the degree of networking activity does not necessarily reflect the state of the telecommunication infrastructure. Other factors often have a more important role.

Electronic networking is an evolving phenomenon, and it has its drawbacks, for example, there are those who have concern about the privacy and security of their messages. Although security-enhancing technologies exist, there are no absolutely impenetrable systems (one might add, however, that the same is true for all other forms of communication). Also, messages tend to be relatively informed- which is also often a benefit- but insufficient sensitivity to working or etiquette in the absence of physical cues can lead to misunderstandings in the quick give and take, for instance, of an electronic conference "conversation." And relatively few people are accessible through networking as yet, particularly in Africa, giving rise to concerns that, rather than enhancing democracy and empowering individuals by decentralizing information access, computer networks may be creating information elites. There are also other political, social and technical challenges in networking that vary in relative importance depending upon the world one is considering.

Lishan (1995) suggests that though it is spreading, electronic connectivity is still very low in Africa. Many networking developments in the region are based on initiatives serving the academic and research community. The user base in most countries remains relatively low. There are six networking technologies in use in Africa- FIDONET, HEALTHNET, SLIP connection, UUCP, cooperative TCP/IP, and commercial TCP/IP (See table 5.1 and figure 2).

The following table shows the existing electronic connectivity of African counties and the type of networking technology used.

TABLE 5.1: CURRENT ELECTRONIC NETWORKING IN AFRICA

Country	Fido	HelathNet	SLIP	UUCP	CO.IP	COMM.IP
Algeria	X	X	X			
Angola	X					
Botswana	X	X	X			
Burkina Faso			X			
Cameroon	X	X	X			
Chad	X	X				
Congo				X		
Cote D'ivoire	X			X		
Egypt	X			X		
Eriteria	X	X				
Ethiopia	X	X				
Gambia	X	X				
Ghana	X	X				
Guinea				X	X	
Kenya	X	X			X	
Leseto	X			X		
Madagascar	X				X	
Malawi	X	X				
Mali	X	X	X			
Mauritius	X			X		
Morocco	X				X	
Mozambique	X	X		X	X	
Namibia	X			X	X	
Niger				X		
Nigeria	X			X		
Senegal	X			X	X	
Seychelles				X		
South Africa	X			X	X	X
Sudan		X				
Swaziland				X		
Tanzania	X	X				
Togo				X		
Tunisia	X				X	
Uganda	X	X				X
Zambia	X	X				X
Zimbabwe	X	X		X	X	

Source:- Electronic Communications Technology and Development in Africa, FID News Bulletin- Volume 45(1995)- issue 10 (October).

The above table shows a significant level of progress in connecting the region and a challenge for linking some 15 African countries with no formal connectivity and upgrading store and forward technologies such as Fido and UUCP to full Internet link in over 30 countries. Except in South Africa, where Internet is spreading over a large pipe (high bandwidth) the implementation, user base and influence of TCP/IP link in other countries remained minimum. Most TCP/IP connections are new and implemented using low bandwidth (19.2 Kbps) that makes some Internet tools such as the World Wide Web difficult (Lishan 1995).

According to Lishan (1995), the Internet users' base is also very low in most of these countries. Kenya has just set up a full Internet link; Ghana, Morocco, Algeria, and Uganda have fewer than 100 users; Zimbabwe and Mozambique have less than 300 users each; Zambia has some 300 users; Tunisia has 310 and Egypt about 900 users. When one compares the number of FidoNet and Internet users in Africa, Fido technology surpasses those using full TCP/IP, though the growth rate in countries with full access to TCP/IP is very high.

A recent survey by the Pan African Development Information System (PADIS) shows that Fido users are the largest in Africa. This is partially energized by IDRC funded projects such as the **Capacity Building for Electronic Communications for Africa (CABECA)**.

NETWORKS BY COUNTRY

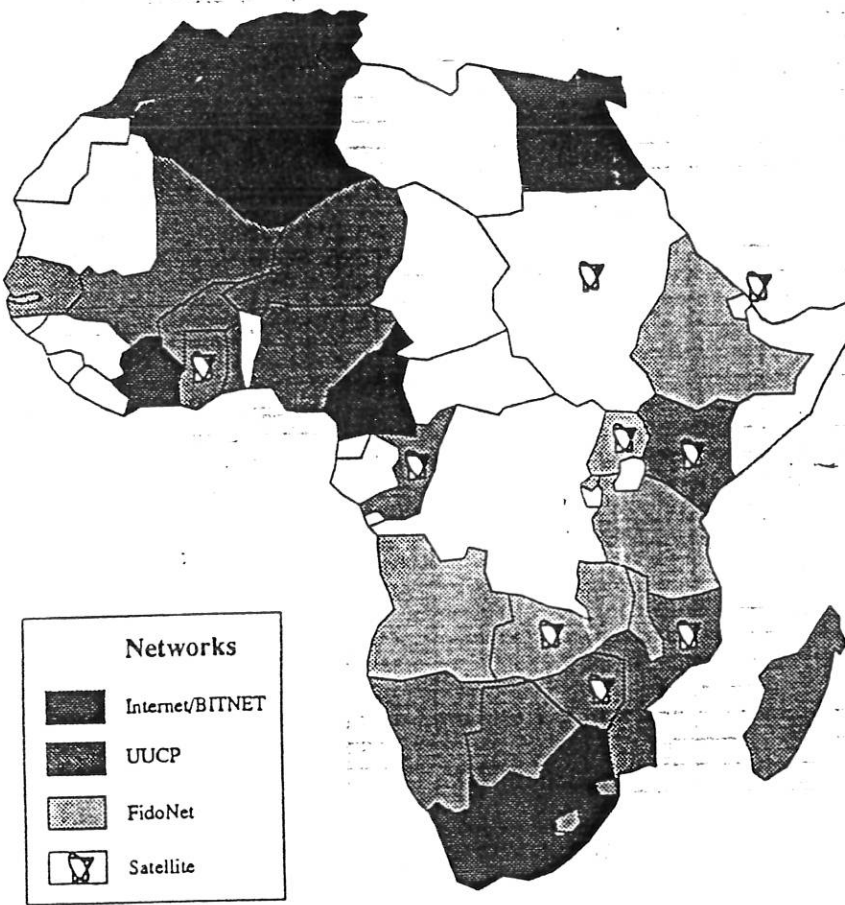


Fig. 2 The map indicates the presence of the three different types of network in Africa.

The development of electronic networking will prepare African countries to respond and participate more actively in a rapidly changing global economy. Without the human technical expertise and the infrastructure to move information rapidly, Africa will be further disadvantaged in the global economy. Networking is important for African enterprises to improve their competitive position. African electronic networks can also help in with the development of research networks in Africa so that African scientists and thinkers can work with each others more and be less dependent on the North. Furthermore, electronic networks can let Africans "repatriate" large volumes of data and analysis, originally obtained from African sources, which have accumulated in Northern libraries and research centners. Such information is often unavailable to African scholars in their own countries (Baranshamaje et al 1995).

Many networking developments taking place in Africa are grassroots initiatives serving the academic mail with the ultimate goal of providing Internet connectivity. The East and Southern African Network (ESANET) is a pilot project linking university.

Telecommunications Infrastructure in Africa

Telephone lines are the foundation of a national information infrastructure. Besides, their traditional role of supporting voice communications, telephone lines are increasingly used to transmit faxes and to connect computers for sending electronic mail, accessing on-line databases and exchanging data. Developments in compression technology now makes it possible to even transfer video images over conventional telephone lines (Minges 1995).

According to Minges (1995), the number of main telephone lines per 100 people (teledensity) in Africa stood at 1.6 at the end of 1993. This is just 15 per cent of the world average and just 3 per cent of the average for developed economies. Though Africa lags other developing regions such as Asia and Latin America in telephone line growth, the African growth rate in main lines is above the world average and about twice that of developed countries. Unfortunately the increase in main lines is offset by high population growth resulting in a smaller change in overall teledensity. There has to be much higher growth in lines and lower growth in population if Africa is to catch with the rest of the world. Most African PTOs (Public Telecommunications operators) derive over 90% of their revenues from telephone services, a higher percentage than the world average of 75%. Over the half telephone lines in Africa are connected to digital exchanges yet the benefits in providing extra services has rarely been exploited. This suggests that there is considerable potential for developing new services such as data communications, value-added-services and entertainments.

Africa lags other regions in the provision of business communications support such as packet switched data networks, leased circuits and value-added-services. The dearth of facilities is striking. For example, at the end of 1993, ISDN had not been introduced commercially in a single African country, and in the whole of Sub-Saharan Africa, there was just a single computer directly connected to the world-wide Internet network. Packet switched data network do not exist in two-thirds of the African countries and the number of leased lines being used in the continent is less than 1% of the world total. Telex usage, which is declining world-wide, is still popular in Africa where

there are roughly as many telex subscribers as fax machines in the Sub-Saharan region (Minges 1995).

Jensen (1995) has found out in his survey that Public access packet switching services have recently been installed by many PTOs as their response to users' needs for data services. As of April 1995, There were 21 African countries which have a public packet switched data network (PSDN): Botswana, Burkina Faso, Cameroon, Chad, Côte d'Ivoire, Djibouti, Egypt, Gabon, Gambia, Kenya, Mauritius, Mozambique, Namibia, Niger, Senegal, Seychelles, South Africa, Sudan, Togo, Tunisia and Zimbabwe.

Tanzania and Ethiopia are known to be planning an X.25 service. The predominance of packet-switched networks in West Africa is partly due the presence of foreign oil firms in the area.

PSDNs are relatively cheap to use in Africa for intercity links but very expensive for international ones. As there have been very few local public access hosts, and almost none connected to the PSDN, most development oriented users in Africa have not been able to afford to use electronic communication tools. Those that have had sufficient funds have either used the PSDN sparingly or found it cheaper to direct dial without going through the PSDN. With the advent of high speed modems, data can be transferred so much faster over the traditional dial-up telephone network that the volume charges imposed by the PSDNs make them uneconomical by comparison (Jensen 1995).

5.2 EXPERIENCE OF INTERNET CONNECTIVITY IN OTHER SUB-SAHARAN AFRICAN COUNTRIES

Until recently telematics users in most of Africa have had very little option but to make expensive international calls to access the only services available - in Europe and North America.

The experience of other African countries with regard to electronic networking in general and on Internet in particular is very useful to investigate the opportunities and connectivity conditions of Internet in Ethiopia.

a) *South Africa*

Shaw (1994), the manager of UNINET project, has shared his experience in networking in South Africa as shown below.

The first condition for the operation of a successful national network is establishment of an organization having the confidence of the prospective participants and the resources to take effective action accepted the responsibility for getting the network established.

Several of the original participants already had some considerable networking facilities on their own uses. These campus networks were based on various protocols; the concept of "open systems" had not yet arrived. A network linking individual universities is no substitute for an effective campus network but one should try to build on the considerable investment necessary for the development of campus networks and on the technical skills that exist on campus. The current widespread and relatively low cost of PC-based LAN's make inter-networking far easier than in the case of mainframe-based campus networks.

The implementation and maintenance of an effective network depends very much on the availability of an effective public telecommunications infrastructure. The possibilities of electronic connectivity with the absence of such an infrastructure is in fact an unhappy circumstance prevailing in many developing countries, that it is still possible to establish a mail network through the judicious use of dial-up circuit and mail-system protocols.

TCP/IP offers a very practical solution both for intra-campus and inter-campus networking with the ready availability of LAN's, small UNIX systems, TCP/IP software and low-cost PC routers.

The UNINET of South Africa shares with us its experience that in the absence of Ethernet or similar campus networks and reliable inter-campus data-links, the use of mailing protocols such as Fidonet and UUCP over dial-up offers a practical and affordable interim solution.

On the other hand, UNINET experience warns other African countries that, if the international link is subject to "traffic-based" costing the cost may quickly run out of control and end up exceeding the cost of a dedicated link. This is indeed what happened in the case of UNINET.

Therefore, while traffic-based carriers, such as dial-up or X.25, may initially offer a cost effective system, if the traffic is not controlled, it can easily exhaust the resources of the network operator, and bring the network to a standstill.

While the use of dial-up or X.25 link can initially provide an international link, the rapid build-up of traffic, unless controlled is likely to cause the cost of such a link to become prohibitive. Wherever possible a dedicated data-link should be installed.

In financing the network, UNINET adopted a principle that the FRD (Foundation for Research and Development) would bear all the overhead and management costs of the network, while the participants, by means of an annual fee, would bear the operating costs, which consisted mainly of the hire of data-communication circuits.

The main problem, in the experience of South Africa, especially in UNINET, is a lack of finance for a "continental" data circuit in getting universities in Southern Africa connected to the rest of the works through the existing UNINET infrastructure.

Shaw (1994) concludes on the experience of UNINET, as "little progress will be made with the establishment of a network or its interconnections unless there is a "champion" who is prepared to overcome all manner of difficulties in getting a network established; from exciting the interest of potential users, obtaining the necessary top-management support, procuring the equipment and finding or even himself acquiring the necessary technological knowledge".

b) *Zambia*

Zambia is the fifth and the first Sub-Saharan country (except South Africa) to get a full access to the Internet in Africa starting from December 22, 1994 (Bringing Internet to Ethiopia 1995).

Zambia's effort and success to its Internet connectivity gives much more experience to Ethiopia than any other countries in Africa

due to the following critical conditions in which the country takes the initiative. These conditions were:

- 1) Zambia's official status of being one of Africa's poorest nation;
- 2) The absence of a computer science degree course; and
- 3) The scarcity of the advanced computer skills.

Despite the above critical conditions, Zambia has become successful to be connected to the Internet, resisting and overcoming all the constraints it had.

BITE (1995) notes that by middle of 1993, it was decided to submit a proposal for donor funding agencies to establish an Internet connectivity in the University of Zambia. However, the proposal failed to draw attention of the donor agencies.

It was at the beginning of 1994, the University of Zambia decided to establish ZAMNET communication system Ltd which was a private campus company and to get the connection to the Internet. After this risky action, the World Bank agreed to fund 80 per cent of the first year's operating costs of the ZAMNET company.

BITE (1995) notes the development of gopher server in ZAMNET as "In December 1994, a gopher server was set up with a limited menu structure covering Agriculture, Engineering, Health, communications Networking, ZAMNET news and Information. This proved to be a very useful way of publicising the work that was being done and making contact and service information to potential customers and other interested parties around the world. It was also found that gopher was useful for advising customer of the latest developments (or problems) happening on ZAMNET".

ZAMNET's development was very fast because of the customer's awareness of the potential of the Net gopher for the dissemination of local information and they started showing interest in storing their own information within the menus.

ZAMNET has proved that the participation of customers and paying their share plays an important role for any networking sustainability when one observes that:

- The national Farmer Union is providing weekly agricultural commodity exchange prices;
- The Ministry of Agriculture posts regular food security and marketing bulletin; and
- The Engineering Institute of Zambia is publishing a range of information about the institute and its activities.

It was in April 1995 that ZAMNET installed its own WWW server and the ZAMNET WWW page currently contains pointers to information about Zambia, about ZAMNET, to the ZAMNET gopher, and to a small but growing number of pages developed for ZAMNET's customers.

BITE's paper entitled "Proposal For Internet Connectivity in Ethiopia" (1995) enumerated the information given by ZAMNET to its customers as follows:

- The full text of the Zambian source articles from the post Newspaper is currently published twice weekly before the paper has actually reached the street;
- The Zambian national Tourist Board has published some information about travel and tourism in Zambia from its own brochure; and
- The University of Zambia has published the text of a short leaflet giving background information about the University.

5.3 CURRENT NETWORKING PROJECTS IN AFRICA

Jensen (1995) notes that the community of electronic networkers in Africa is still relatively quite small; indeed, a few dedicated individuals have had great impact by virtue of their active roles in helping to establish projects, select and distribute mail, improve and disseminate software, and train users. It is because of the pioneering efforts of such people that electronic networking has gained a foothold in Africa. The various levels of success already achieved by some pilot projects, such as ESANET, CGNET, Healthnet, NGONET, PADISNet, and

RINONET have liaised interests in Africa networking and laid large- scale project such as RINAF.

Following a number of successful, small-scale electronic networking projects which demonstrated the viability of low cost electronic communications in difficult conditions, a growing amount of support has been forthcoming for consolidating these gains and expanding the available connectivity.

The electronic networking projects in Africa can be categorized into two :

- 1) Assistance provided to those responsible for local services aimed at a particular sector of users,
- 2) Assistance given directly to a defined user group, such as newspapers or agriculture research centres, to obtain connectivity.

In the latter case, if the users are being assisted to connect to a local host then these projects also assist in infrastructure building because they contribute to the long term sustainability of the local initiatives. While there is a considerable degree of overlapping support for many of these projects, it lacks concerted co-ordination.

Currently the major funders for local infrastructure building projects in Africa have been the United Nations, the International Development Research Centre (IDRC), of Canada, and the French overseas research organization - ORSTOM.

information infrastructure building endeavours of the country. Thus it can only be accepted as a competing force that may serve a certain niche of users in the country.

The following table shows the existing networking projects in Africa, their host country linkage, technology used and funding agencies and a brief description of some of the networks as well.

TABLE 5.2: NETWORKING PROJECTS IN AFRICA

Project/ Network	Link	Technology	Funding Agencies	Countries Involved
AFRIKANET	France	PSN	Telecom	Cameroon
PADISNET	London	GreenNet Fido Gateway	UNECA/UNDP	to link 34 countries
NGONET Africa	London	Greennet Fido Gateway	UNDP	East and Southern Africa
ESANET	London	Greennet Fido Gateway	IDRC (Canada)	Kenya, Tanzania, Uganda, Zambia, Zimbabwe
AFRINET	USA	NSFNET/ DECNET	NSF, California State University	Kenya, Tanzania, Uganda, Zimbabwe,
ARSONET	London	GreenNet Fido Gateway	IDRC (Canada)	Ethiopia, Kenya, Senegal, Egypt
EARN	Paris	NJE	EARN members	Algeria, Egypt, Morocco, Tunisia
WEDNET	London	GreenNet Fido gateway	IDRC (Canada)	Burkina Faso, Ghana, Kenya, Nigeria, Senegal, Sudan, Zambia, Zimbabwe
HEALTHNET	London	GreenNet Fido Gateway	IDRC (Canada), Satellite, Boston (USA)	Kenya, Mozambique, Tanzania, Zambia, Uganda, Zimbabwe
GHASLTNET	London	GreenNet Fido Gateway	IDRC (Canada), UNICSTD	Ghana
UNINET-ZA	Internet	Internet	FRD, South Africa	South Africa & Southern African countries
RECOSCIX-WIO	Not stated	Internet	UNDP, UNESCO, FAO, IDRC (Canada), CSIRO (Australia), NOAA (USA), TELLINDUS (Belgium)	Ethiopia, Kenya, Madagascar, Mauritius, Mozambique, Somalia, Tanzania
RIO Africa	Paris	Internet	ORSTROM	Burkina Faso, Cameroon, Congo, Cote d'Ivoire, Madagascar, Mali
WORKNET	London	GreenNet Fido Gateway	Not stated	South Africa
RINAF	London	PSN, FidoNet	CNUCE- istituto del CNR, UNESCO	Algeria, Kenya, Senegal, Zambia, Nigeria, Swaziland, Guinea, Egypt, Ethiopia, Tanzania, Uganda, Tunisia, Mozambique, Gabon, Cameroon, Ivory Coast

SOURCE:- FID News Bulletin- Volume 45(1995)- issue 7/8 (July/august)

Godard (1995) has categorized the existing networks in Africa as Non-Profit Networks and Commercial Networks. Most of the non-profit network's purposes are either to link research and academic institutions, health care centres and hospital, or NGO's. Let us see some of the existing networking and the ongoing projects in the following sections:.

CABECA

Capacity Building for Electronic communication in Africa (CABECA) is an on-going project to promote computer networking throughout Africa, executed by the Pan African Development Information System (PADIS) of the United Nation Economic Commission for Africa (UNECA) and funded by a grant from the International Development Research Centre (IDRC), of Canada.

The overall objective of CABECA is to provide the necessary technical assistance to bring about sustainable computer-based networking in Africa, at an affordable cost and accessible to a wide variety of users from the private and the public sector, non-governmental and international organizations.

CABECA promotes low-cost computer networking run by local operators and sustained by revenue from user. The project supports the creation and strengthening of dial-up store and forward computer networks providing inexpensive and easy access to local and international information service. It is believed that CABECA's initiative can sensitize decision makers to work towards full Internet connectivity.

The project began in June 1993 and it is currently supporting projects in more than twenty-six African countries including

Ethiopia. CABECA's goal is to strengthen the existing systems and initiate others in order to put computer networking on a firm footing within the project life span. It works in co-operation with other networking initiatives in the region. The project is assumed to end on June 1996 (BITE 1995).

IGADD

IGADD (Inter-Governmental Authority on Drought and Development) is an inter-governmental organization (IGO). It composes seven countries in the horn of Africa. Ethiopia, Eritrea, Djibouti, Kenya, Uganda, Sudan, somalia are members of *IGADD*. These countries have common information need on environmental issues, desertification, population, refugees, geological and ecological maps and satellite data which are very useful for planning against these crises.

According to BITE (1995), the project is proposed to have three phases to develop an *IGADD*/Greater Horn network that gradually assumed to develop to full Internet connectivity using the existing high-bandwidth telecommunication facilities of the member countries. The three phases involved in this project were enumerated as:

- Establishment of National links in the greater Horn using FidoNet technology over the existing the telecommunications infrastructure;
- Development of an Internet link and promotion of the network to expand the user-base; and
- Full Internet connection.

UNECA/PADIS has developed a detailed project for the first phase of the project in order to implement the sub-regional information network.

Regional Telematics Network Services (RTNS) at Djibouti

The RTNS Project is the result of meetings between regional states and Chambers of Commerce who identified the need for better regional business co-ordination. Djibouti's International Chamber of Commerce through the government, proposed the RTNS project to the annual regional meeting for the European Development Fund (EDF) held in Djibouti in 1992. The member states - Burundi, Djibouti, Eritrea, Ethiopia, Kenya, Somalia, Sudan, Rwanda, Tanzania, and Uganda identified the project as a regional priority and attributed 1.4 Million Ecu (approx. 11.3 Million Birr or US\$1.8 Million) is allocated to this project (BITE 1995).

Djibouti is already the relay station of the South East Asia-Middle East-Western (SEA-ME-WE) telecommunications cable. It is intended that the project will be managed by a private firm created by the International Chamber of Commerce and Industry of Djibouti with a mix of public and private shareholder participation.

The implementation strategy would take into consideration both the relatively simple actual needs of the business community and the rapidly evolving technological context. That is, it will favour adopting international standards (UNIX, TCP/IP, Hypertext, etc.) which will allow change of equipment with changing technology and developing services.

The Chamber will hire, through a newly created firm, a general contractor to initialise the project, supervise the technical installations, organise the administration of the firm, programme the training of personnel and guide the development of the project during the initial five year period.

The firm will install in each country a service provider and the user community, especially the business community, would subscribe through their local computer base. Basic services including full Internet connectivity, capacity extended service, and personalised services will be available. The RTNS at Djibouti will require a 5 year financial guarantee of support and management mandate to ensure stability and overcome the human and organisational problems that it may encounter.

In summary, most local initiatives concentrate on institutional capacity building and targeting specific user groups. Most have a long term vision of full Internet connectivity. The main directions of development include (BITE 1995):

- Developing Local Area Networks (LANs) that facilitate institutional and inter-institutional computer and information resources sharing and communication;
- Establishing low cost computer networking that can be implemented on the existing telecommunication, i.e. dial-up store and forward (FidoNet) technology providing inexpensive and easy access to local and international information services;

- Developing the user base and promoting optimal utilisation of the networks through training users and system operators, forming of strong user groups, sensitising of policy makers and through other promotional and development programmes;
- Adopting a phased approach to advanced international standards using UNIX systems and the TCP/IP protocols that support all the major network services, based on the experiences gained in the operation and management of the FidoNet technology.

Except for the RTNS project of the International Chamber of Commerce of Djibouti, all the regional and sub-regional initiatives are essentially capacity building undertakings, and hence are complementary to national information infrastructure building.

BITE (1995) describes that the RTNS Project in Djibouti can be generally considered as a parallel development and optional course of getting Internet connectivity with its own service node in Ethiopia. As it is operated by a profit-oriented, private firm under the Chamber of Commerce and Industry in Djibouti, this would mean that Ethiopia would be bound to accept its policies. Furthermore, as this initiative is primarily targeted to the business community, it may not be able to cater to all the national information infrastructure building endeavours of the country. Thus it can only be accepted as a competing force that may serve a certain niche of users in the country.

PADISNET

PADIS is based on the UNECA in Addis Ababa (Ethiopia) which operates the PADISNET node connecting on demand to London, South Africa and the US.

PADISNET was formed as the largest of all the networking projects in Africa, and supported by IDRC. The problems, that were facing the project, were reported on the workshop on Science and Technology communications Networks in Africa in August 27 -29, 1992, Nairobi, Kenya by Lishan Adam and Nancy J.Hafkin (1992) as follows:

- Lack of skilled personnel to install and configured data communication equipment and software;
- Insufficient mastery of computer-mediated communications software;
- Unavailability of direct telephone lines for communications links;
- Poor communications lines;
- Management and administrative problems;
- Unavailability of data communications supplies and equipment; and
- Loss of equipment.

The PADISNET links 37 African countries into a network of participating development planning centres which exchange database and information.

NGONet and PADISNET share resources in the support of other nodes in Dakar (Senegal), Accra (Ghana) and Dar Es Salam (Tanzania). PADISNET is based on Fido technology.

The local BBS at Addis Ababa is organized around four items: PADIS news, ECA news, data communications issues, and general news on information systems and technologies. PADIS also offers a public on-line access to the databases maintained on its HP3000.

As a FidoNet node in Africa, PADISNET participates in several on-line conferences such as the consultation conference of experts in the Africa region (EXPZONES) and the global NGONET conference.

ARSONET (Africa Regional Standards Organization)

ARSONET is a CIDA (Canadian International Development Agency) professional development project to link the *Africa Regional Standards Authorities* in Addis Ababa (Ethiopia), Nairobi (Kenya), and Cairo (Egypt) with Fido networking technology.

CGNET

CGNET (Consultative Group Network) is a conferencing system specialised in agriculture. It has been founded in 1985 by the CGIAR and is funded by the FAO, the World Bank and the UNDP. The CGNET machine is a Digital VMS system located in Palo Alto that connects 130 hosts (agricultural research centres, UNDP offices) in 70 countries (about 200 mailboxes for 10000 people) through PDN, when available. In Africa, CGNET links the following organizations and countries.

TABLE 5.3: CGNET USERS ORGANIZATION AND THEIR LOCATION

COUNTRIES	ORGANIZATION
Benin	IITA
Burkina Faso	IMI
Burundi	CIP
Cameroon	ITA, NCRE
Egypt	CDI, FAO, ICARDA, IDRC, IRRI & PLAN
Ethiopia	ILRI
Ghana	FG
Ivory cost	IBRSAM, IIRSDA, RTI, WARDA
Kenya	CIP, FORD, ICPE, ICR, IDRC, ILCA, ILRAD, PLAN, ROCKEFELLER, TSBF, UNEP, & USAID
Malawi	CIAT
Mali	ILCA, & IER
Morocco	IAV, IIMI & USAID
Niger	IMMI
Nigeria	IITA and ILCA
Rawanda	CIP
Senegal	IDRC, IIEN & Winrock
Tanzania	CIAT & PLAN
Togo	FG & IFDC
Tunisia	CIP
Uganda	CIAT & ICRAF
zimbabwe	CIMMYT, FAO, ICRISAT, ILCA & PLAN

Based on Dialcom, CGNET offers other services such as database access, airline reservation and interface to fax and telex.

EARN

EARN (European Academic Research Network) was formed in 1983 on the model of BITNET. Its charter states that it is a network for Europe, Middle East, and Africa. EARN hosts exist in Algeria, Egypt, Ivory cost, Morocco and Tunisia.

EARN links more than 600 hosts corresponding to about 3000 users. Many links to national and international networks exist.

EARN is funded by each participating country, but it is not charging the individual user.

ESANET

ESANET (East and Southern African Network) is a pilot project to link researchers at universities in Kenya, Tanzania, Uganda, Zambia, and Zimbabwe with each other and with researchers worldwide by installing e-mail facilities at their computer centres. Zambia, Kenya and Zimbabwe can connect directly to the *GreenNet* gateway, while Uganda and Tanzania can only connect via Nairobi because direct dialling facilities outside the (Preferential Trade Agreement._ PTA) area are not available. Zambia has begun to experiment with direct dialling to London and the other nodes are expected to begin connectivity later.

Based at the University of Nairobi, Institute of Computer Science, it is partially funded by the Niry centre (Web) in Toronto, Canada, and is co-ordinated with NGOnet project to allow NGO's without host to use campus resources.

The system is based on Fido software running on PC-AT/40 and using high speed modem and dedicated phone line.

GHASTINET

The GHASTINET (Ghana National Scientific and Technological Information Network) offers e-mail service in Ghana to institutions.

It uses Fido protocol and connects twice a week to the GNFido gateway in London.

HealthNet

HealthNet is operated by a Boston based NGO called *Satelife* which was initiated as a project of the IPPNW (International Physicians for the Prevention of Nuclear War).

The network was initially addressed to exchange health and medical information within the universities participating in the ESANET project and via Memorial University in Newfoundland in Canada.

HealthNet uses store-and-forward micro satelife called HealthSat to pick up and deliver e-mail messages and electronic publications for health. The ground station uses technology that is affordable and appropriate for Africa.

RINAF Project

The RINAF (Regional Informatics Network for Africa) project was conceived by the Intergovernmental Informatics Program (IIP) of UNESCO and financed by a grant of the Italian Government and by the contribution of Korea. The project started in 1992.

The aim of the project is to bring Internet services to African countries by establishing 5 regional nodes- CERIST in Algeria, NCST and Moi University in Kenya, NCTM and Obafemi Awolowo University in Nigeria, CNDST in Senegal and University of Zambia- and 10 national nodes._ Cameroon, ENSTINETIFRCU in Egypt, Ethiopia, Ghana, University de Conakry in Guinea, Ivory Cost, Mozambique, Manzini University in Swaziland, Tanzania and Tunisia.

RINAF relies on the co-operation with other existing initiatives operating in the African continent such as the IDRC and the RIONet project. The protocols used are heterogeneous - Fido, UUCP, and TCP/IP, because of the variety of interconnections.

RIONet (Reseau Informatique de L'ORSTROM).

The Paris based research organization ORSTOM has involved itself through the FIDONet (Reseau Inter-tropical d'Ordinatur) -in the setting up of a network that presently interlinks many laboratories in inter tropical countries including 11 French speaking African countries.

TABLE 5.4: RIONET PROJECT IN THE AFRICAN INTER- TROPICAL COUNTRIES

COUNTRIES	LABORATORIES
Burkina Faso	ESI, ARTS, CECI, and UERD
Cameroon	OCCGE (Yaounde)
Congo	Brazzaville
Ivory Cost	Abidjan
Madagascar	CIMAD
Mali	ISFRA, INRSP, CERPOD, WHO/OCP, IER and PNVA
Mauritius	Maurice
Niger	SEAG, AGHYMET and CERMES (Niamey)
Senegal	ISRA, ENSUT, CSE, CORAF, the University CAD de Dakar, the Ministere Senegalis de la Modernization and the Agence Phanaircine de l'Information (Dakar)
Seychelles	Victoria
Togo	Lome

International organizations are also partner of the RIO project. RIO is member of the Internet. The central node is located in Montpellier, France.

WEDNET (Women and Natural Resource Management Project)

WEDNET supports research on women and natural resources management. WEDNET is based at ELCI in Nairobi. The aim is to link researchers in Senegal, Ghana, Burkina Faso, Nigeria, Sudan, Kenya, Zimbabwe, Zambia and Canada via electronic communications and conventional networking.

WOKNet

The network has been established in 1990 and now has about 150 users on a multi-user BBS programme called Major BBS.

WORKNet operates as the national electronic network host for NGO's in South Africa, called SANGOnet. Users include the labour movement, human rights groups, the alternate press, documentation centres, service organizations and church groups.

Comments on the African Regional Symposium on Telematics for Development

Africa's largest ever gathering of computer and telecommunication experts met in Ethiopia in April 1995 to chart the continent's route onto the global information superhighway. It was sponsored by ITU, UNESCO and IDRC, and hosted by the UN Economic Commission for Africa in Addis Ababa.

The participants were from 8 African Countries, 31 different African PTTs or Telecom Industries, and almost all of the major forces in International computer networking development projects. The participants concluded that unless African countries become full actors in the global information revolution, the gap between the "haves" and "have-nots" will widen, opening the possibility of

increased marginalization of the continent. The participant also decided that education, health, trade, and commerce, as well as regional and international co-operation would be vastly strengthened by an enhanced telematics infrastructure in the region.

Delegates also wanted the ITU, UNESCO, and UNECA, to assist in the establishment of an African Telematics Association (ATCTA), where members would be drawn from each of the stakeholder-government, telecommunications, and broadcast operations, service providers and users.

Jegade (1995) suggested five major recommendations which Africa must seek to successfully accomplish its linkage to the emerging global community. The following are the recommendations given to solve Africa's problem of networking:

- 1) Africa should map out set of objectives, guidelines and roles of electronic networking in the continent. African governments through the Organization for African Unity, and its experts in communications technology, must meet to put in concrete plans what and where they think Africa should be in the next millennium;
- 2) Africa should attempt to talk to and seek assistance from Africa where these are readily available and in most cases are no major cost. The experience of South Africa should be useful to another regional and continental networking in Africa;

- 3) Africa should recognize and use its resources scattered all over the world. The greatest resources Africa has, and has been exporting to other countries especially of the North, is human;
- 4) Africa needs to seek a meeting ground for its most prized traditional culture of face-to-face communication and human interface to day-to-day interaction; Africa need not sacrifice its distinctive social cultural values for technological development at the risk of losing a valuable and most envied culture; and
- 5) There needs to be a solution found to the sorry sight of libraries in Africa, especially the institutions of higher learning. Libraries are centres for sharing information and represent a non-electronic equivalent of providing an information "super-Subscription".

Another critical commentator is Odedra-straub (1995). She said that most of the projects in Africa were still at pilot stages. A few users send/receive personal messages via electronic mail. Very few of these networks are being used for purposes which may influence or enhance the user organization's, or host county's development.

Odedra-Straub observes that there was very little co-operation or coordination between the different projects. Some of those involved in these projects were unaware of some of the initiatives taking place.

Odedra-Straub goes on commenting that "there is/was very little one could learn from these projects. For instance, the following were not given attention in the symposium issues who are the current users? What are they using the system for? Are the systems being used for their intended purposes? If the systems are only used for their intended purposes? If the system are only used by friends to exchange personal information via e-mail, their significance, at least in the African context, is debatable considering the costs involved in implementing, maintaining and running them.

For any technology to play a significant role in the development process, it has to be successfully applied. This, however, is not a simple process and calls for skilled human and financial, managerial, political and organizational environments. The latter issues, which are far more important than technical issues in the successful application of telematics and information, received very little attention at the symposium. Neither did issues of policy and strategy receive much attention (Odedra-Straub 1995).

5.4 CURRENT STATUS OF ELECTRONIC CONNECTIVITY IN ETHIOPIA

5.4.1 Ethiopian Science and Technology Commission

There is an initiative by NCIC (National Computers and Information centre) of the ESTC (Ethiopian Science and Technology Commission) to establish a National Network in the country called **ETHIONet**. The target groups of this project are academic and Research institutes.

The aim of the project is to initially start e-mail and BBS services within and outside of Ethiopia. The connectivity began on October, 1995.

Currently, the following institutions are connected to the ETHIONet.

- Alemaya University of Agriculture;
- Mekele College of Dryland Agriculture and Natural Resources;
- Mekele Business College;
- Gondar College of Medical Science;
- Bahir Dar Polytechnic Institute;
- Essential Oils Research Centre;
- Chamber of Commerce;
- Some departments of ESTC;
- Ministry of Health;
- Bahir dar Pedagogy;
- Debrezeit College of Agriculture;
- Debrezeit College of veterinary;
- Jimma College of Medical science;
- Jimma College of Agriculture;
- Arbaminch Water Technology Institute;
- Ethiopian Health and Nutrition Institute; and
- Ethiopian Chemical Society.

It is found out from the interview held with the chief of the NCIC that the support of the ETHIONet is PADIS, and the ETHIONet gets its international link through PADISNet.

The strategic plan of ETHIONet is to be connected to the Internet to fulfil the following objective:

- 1) To develop a National Information Infrastructure; and
- 2) To develop a distributed database system at sectoral level.

The ETHIONet users are expected to be information providers and not to be only information users.

5.4.2 Addis Ababa University

According to Semeret (1995), there are efforts to increase connectivity in Addis Ababa University. These effort are currently underway on several different fronts and in different levels. The ultimate objective is twofold:

- 1) A full fledged connection to the global Internet (i.e., an IP node) offering among other things:
 - file transfer (ftp);
 - USENET newsgroups;
 - the World Wide Web (WWW).

- 2) A university-wide network interconnecting many local Area Networks (LANs) serving individual departments, libraries, administration, etc., and offering all of them connection to the Internet via one or two principal gateways.

The current connectivity in AAU is the FidoNet e-mail system. Departments such as Chemistry, Mathematics, Technology etc use e-mail to communicate with colleges worldwide. The configuration is one whereby stand-alone PCs equipped with modems connected to local FidoNet node (PADISNet).

In all the departments (except SISA, School of Information Studies for Africa), the e-mail access is only from a machine equipped with a modem, which is available in each of the departments. Most often users compose their messages elsewhere and take them to the e-mail PC by hand on diskette to send them.

The SISA set up is also ideal to maximize e-mail utilization. Like the other departments, it has only one modem, and get e-mail through PADISNet. But SISA users do not have to be physically on the same machine on the LAN and users can log in to any machine, to read and compose messages.

5.4.3 Healthnet

According to BITE (1995) the Healthnet is an international project that was launched in 1989 by the non-profit organization SateLife whose base is in USA. The HealthNet satelife receives, stores, and forwards information from ground stations in all regions of the world.

As of 1994, ground stations of HealthNet were installed in Congo, Ethiopia, Ghana, Kenya, Mozambique, Tanzania, Uganda, and Zambia.

The information base of the HealthNet are the Canadian Medical and Health Science Libraries and the New England Journal of Medicine.

In Ethiopia, the national node of the HealthNet is the Medical Faculty Library of Addis Ababa University. The following institutions are connected to the HealthNet:

- Amien Hansen Research Institute (AHRI) library;
- The Library of Ethiopian Health and Nutrition Research Institute; and
- The National Computer and Information Centre.

BITE (1995) has found out in its studies (through private conversations) that as of November 1995, the e-mail and BBS services of the HealthNet were under utilized because of lack of cooperation and an awareness.

Though a concrete funding strategy is lacking, all national initiatives have plans for Internet connectivity. The parallel developments being planned by local institutions confirming that there exists a prevailing need for institutional and national network to be co-ordinated into a national effort. The need for co-ordination is more pronounced and looks a matter of urgency when one considers the overlap in objectives and user domains among the NCIC, AAU, and the HealthNet networking projects.

5.5 CONSTRAINT TO BRING THE INTERNET TO AFRICA

Nostbakken and Akhtar (1995) indicate that technology itself cannot create change, however. The use and availability of technology is dependent upon both the historical moment and the prevailing social, economic, and cultural structure into which it is introduced. For example, moveable type was invented in China long before it came to Europe, but some would argue it never developed as a technology of freedom as it did in Europe, because of the social and economic system prevailing in China.

So, before we accept that technologies of information and communication will bring positive change, we need to consider the social, cultural, and political context into which the technologies are being introduced. Then, we must determine the kind of actions that help to truncate the improvements in communicative capacities and facilities into actual improvements in living conditions (Nostbakken and Akhtar 1995).

Access to and effective use of information and communication technologies is essential if those technologies are to play a part in a country's development. However, having access to the information highway is not enough. The people must also be able to contribute to its content.

Nostbakken and Akhtar (1995) emphasize that any argument that encourages the installation of communication and information technologies for the promotion of a nation's development must see development not only in economic terms, but also in terms of the cultural well-being, the political participation and the self-fulfilment of the members of society.

The introduction of electronic networking technology has also brought about rapid cultural and social change in research and development. The generation of new information through electronic messages and the exchange of all kinds of electronic files have encouraged broader communication. Electronic networks are becoming invaluable tools to facilitate management and coordination, including scheduling of meetings, form filling, and other office support, which could be difficult using other media.

5.5.1 Socio-economic Issues

Countries of the South with limited technological resources are in the position of being on the receiving end without having an adequate opportunity to articulate to the world community their real concerns, interests, and needs. And the global dichotomy between rich and poor, the information haves and have-nots, is reflected within countries. Urban rich communities continue to the benefit from what communicative resources are available, while some 70 to 80 percent of the population of most Southern countries, basically rural communities, are denied any defective access.

The exchange of ideas and references has also improved research and development and technical productivity. Reduction of isolation has improved individual's attitudes toward their jobs and toward computer communications.

Electronic communication is also improving the coordination of sharing and organizing non-computer resources, such as money, books, etc., for universities in Africa joint projects and research are beginning to be carried out using e-mail between researchers in Africa and those in developed countries.

5.5.2 Cultural Issues

The notable impacts of networks in Africa have also changed the nature and culture of computing, They indicated that changes of attitude are required in academic institutions. Implementors of networking programs and project have been forced to discard some of their initial views toward networks in the region. Some attitudes requiring major changes include:

- Considering computer utilization to be the exclusive domain of technical departments. Such attitudes should be changed and all fields of endeavour should use e-mail and computers for their research and development;
- Low emphasis on computer literacy. All concerned should be required to be literate in using computers and networks, and appropriate training should be supplied;
- Documentation on programming, applications, and development is frequently regarded as unimportant, and are seldom available. Such attitudes should be altered. Software and procedure documentation is a key factor in the learning process and the creation of sustainable network; and
- Software are being regarded as free and disseminated through sharing. such an attitude may encourage piracy and lack of innovation, and often results in frustration through the spread of computer virus infections.

Nostbakken and Akhtar (1995), putting Tengku Mohd. Azzman shariffadeen, of the Malaysian Institute of Microelectronic systems, said that in his keynote address, he spoke of the many benefits of a well planned communications infrastructure. Tengku Mohd. Azzman shariffadeen stressed that access to information and knowledge has become essential for social and economic development. However, he warned of the dangers of ignoring the social and cultural "push factors" in favour of the technological "pull factors".

Tengku Mohd. Azzman shariffadeen went on to explain that "cultural change is the most difficult issue to deal with as it touches upon the very personality and values of people as individuals and as members of society. The new communications era opens up a completely new paradigm where the democratisation of access to information can lead to a real democratisation of opportunities. However technology always behaves as a double-edged sword. Instead of narrowing the gap between the haves and the have-nots, new technology may actually widen it" (Nostbakken and Akhtar 1995).

It is a technology that basically has gone berserk. It is leading the users into all kinds of lifestyles and thought patterns which cannot survive for very long. So it should be given more thought. It is not enough today that to revolutionize ones organization's information habits without looking at what information that organization really needs.

CHAPTER SIX
FINDINGS AND DISCUSSION ON THE
OPPORTUNITIES
OF THE INTERNET IN ETHIOPIA

The findings and discussion part focuses on the results obtained from literature review, the survey on the opportunities part, and from the resource persons who have experience and are exposed to the Internet. In addition, the findings on the pitfalls of the Internet evaluated by potential users are also discussed based on the of respondents' views from each of the groups.

6.1 OPPORTUNITIES OF THE INTERNET IDENTIFIED BY THE RESPONDENTS

The results of the survey are based on the analysis of questionnaires filled by 90 respondents, amounting to 74.5% out of 121 distributed questionnaires. It may be noted that in each table responses are categorized by the Group numbers, where group 1 refers to Private/Individual, group 2 refers to Academic and Research, Group 3 refers to Non-Governmental Organization, Group 4 refers to Governmental Organization and Group 5 refers to International Organization.

6.1.1 Potential Users Awareness of the Internet

The following frequency table shows opinion of the respondents on the question asked whether they have an idea about the Internet or not.

Nostbakken and Akhtar (1995), putting Tengku Mohd. Azzman shariffadeen, of the Malaysian Institute of Microelectronic systems, said that in his keynote address, he spoke of the many benefits of a well planned communications infrastructure. Tengku Mohd. Azzman shariffadeen stressed that access to information and knowledge has become essential for social and economic development. However, he warned of the dangers of ignoring the social and cultural "push factors" in favour of the technological "pull factors".

Tengku Mohd. Azzman shariffadeen went on to explain that "cultural change is the most difficult issue to deal with as it touches upon the very personality and values of people as individuals and as members of society. The new communications era opens up a completely new paradigm where the democratisation of access to information can lead to a real democratisation of opportunities. However technology always behaves as a double-edged sword. Instead of narrowing the gap between the haves and the have-nots, new technology may actually widen it" (Nostbakken and Akhtar 1995).

It is a technology that basically has gone berserk. It is leading the users into all kinds of lifestyles and thought patterns which cannot survive for very long. So it should be given more thought. It is not enough today that to revolutionize ones organization's information habits without looking at what information that organization really needs.

TABLE 6.1: OPINION OF POTENTIAL USERS ON THEIR AWARENESS OF
THE INTERNET

GROUP	OPINION OF RESPONDENTS			Total
	Aware	Not aware	No response	
1	26	0	2	28
2	9	3	0	12
3	17	8	0	25
4	5	2	0	7
5	16	1	1	18
TOTAL	73	14	3	90

The survey indicated that 81.1% of the respondents are aware of the Internet. They have an idea about the Internet either from literature or may have used it while in their stay outside the country.

6.1.2 Possible Benefits from using the Internet

The next question answered by respondents was the benefits of the Internet that each member of different group gets from using it. Since the benefits that each group gets varies from one another, the questionnaire designed for each of the groups are a little bit different from each other. The data obtained are summarized in the tables.

TABLE 6.2: RESULT OF THE OPINION OF GROUP I ON THE BENEFIT OF
THE INTERNET

Benefit*	F.A	P.A	DI.	N.A	N.R	O.B	Total
1	23	4	0	0	1		28
2	18	5	0	5	0	-	28
3	11	8	1	8	0		28
4	14	8	1	4	1		28
5	13	6	2	6	1		28
6	14	10	1	3	0		28
7	20	8	0	0	0		28
8	14	13	1	0	0		28
9	14	14	-	-	-		28
10	5	10	5	7	1		28
11	4	15	6	2	1		28
12	19	8	1	-	-		28
13	14	10	0	3	1		28
14	-	-	-	-	13	10	28

* N.B_ The benefits correspond to the serial number of the benefits as indicated on annex 1.1.

F.A = Fully agree P.A = Partially agree DI = Disagree

N.A =Not aware N.R = No Response O.B = Other Benefit

TABLE 6.3: RESULT OF THE OPINION OF GROUP II ON THE BENEFIT OF
THE INTERNET

Benefit*	F.A	P.A	DI.	N.A	N.R	O.B	Total
1	10	2	0	0	0	-	12
2	3	4	1	1	3	-	12
3	11	0	0	-	0	1	12
4	9	3	-	-	-	-	12
5	6	6	-	-	-	-	12
6	4	5	3	-	-	-	12
7	7	2	1	1	1	-	12
8	6	4	0	0	1	-	12
9	9	2	0	0	1	-	12
10	11	1	-	-	-	-	12
11	10	2	-	-	-	-	12
12	10	2	-	-	-	-	12
13	10	2	-	-	-	-	12
14	9	3	-	-	-	-	12
15	9	0	0	1	2	-	12
16	9	2	1	-	-	-	12
17	5	3	0	3	1	-	12
18	7	3	0	2	-	-	12
19	9	3	-	-	-	-	12
20	10	2	-	-	-	-	12
21	8	1	0	2	1	-	12
22	9	1	0	1	1	-	12
23	8	2	1	1	0	-	12
24	4	0	-	-	7	1	12

* N.B_ The benefits correspond to the serial number of the benefits as indicated on annex 1.2.

F.A = Fully agree P.A = Partially agree DI = Disagree

N.A =Not aware N.R = No Response O.B = Other Benefit

Respondents from the Non-Governmental Organizations have given their comment on some of the benefits as shown in table 6.4. From the interview held with some of the respondents, it was found out that the benefit of the Internet is universal in the world. For example, one of the dean of the faculties of AAU, and user of e-

mail, said that one cannot argue with the benefits of the Internet since they are universally accepted. He said that it is the conditions associated with telecommunication infrastructure and cost issues that have to be seen critically.

TABLE 6.4: RESULT OF THE OPINION OF GROUP III ON THE BENEFIT OF THE INTERNET

Benefit*	F.A	P.A	DI.	N.A	N.R	O.B	Total
1	21	1	0	2	1		25
2	8	12	1	3	1		25
3	23	2	-	-	-		25
4	18	5	1	-	-		25
5	16	7	0	2	-		25
6	12	6	0	6	1		25
7	12	10	0	3	0		25
8	9	9	-	6	1		25
9	9	10	0	5	1		25
10	20	4	1	-	-		25
11	20	5	-	-	-		25
12	23	1	0	1	-		25
13	16	6	0	2	1		25
14	8	7	1	8	1		25
15	-	-	-	-	25		25

* **N.B.** The benefits correspond to the serial number of the benefits as indicated on annex 1.3.

F.A = Fully agree P.A = Partially agree DI = Disagree

N.A =Not aware N.R = No Response O.B = Other Benefit

Respondents from the Governmental Organizations have also given their opinion on the benefits of the Internet as illustrated in table 6.5.

TABLE 6.5: RESULT OF THE OPINION OF GROUP IV ON THE BENEFIT OF
THE INTERNET

Benefit*	F.A	P.A	DI.	N.A	N.R	O.B	Total
1	4	1	-	2	-		7
2	1	4	-	1	1		7
3	5	0	-	1	1		7
4	2	3	1	1	-		7
5	5	1	-	1	-		7
6	1	2	1	-	-		7
7	3	2	0	2	-		7
8	4	-	-	3	-		7
9	2	3	1	-	-		7
10	-	5	-	2	-		7
11	5	1	0	1	-		7
12	5	1	0	1	-		7
13	6	0	0	1	-		7
14	3	2	0	2	-		7
15	4	1	0	2			7
16	5	1	0	1	-		7
17	4	1	0	1	-		7
18	2	2	1	3	-		7
19	-	-	0	-	5	2	7

* N.B_ The benefits correspond to the serial number of the benefits as indicated on annex 1.4.

F.A = Fully agree P.A = Partially agree DI = Disagree
N.A =Not aware N.R = No Response O.B = Other Benefit

Finally, respondents from the International Organizations have reacted to the potential benefits that they aspire to get from the Internet as indicated in table 6.6.

TABLE 6.6: RESULT OF THE OPINION OF GROUP V ON THE BENEFIT OF THE INTERNET

Benefit*	F.A	P.A	DI.	N.A	N.R	O.B	Total
1	16	1	0	1	-	-	18
2	7	7	3	1	-	-	18
3	18	-	-	-	-	-	18
4	13	3	1	1	-	-	18
5	9	9	-	-	-	-	18
6	6	6	3	1	2	-	18
7	7	4	1	5	1	-	18
8	8	6	0	2	2	-	18
9	4	7	4	1	2	-	18
10	8	8	0	2	-	-	18
11	14	1	0	2	1	-	18
12	13	3	0	2	-	-	18
13	14	3	1	-	-	-	18
14	13	4	1	-	0	-	18
15	15	2	0	1	-	-	18
16	16	1	0	1	-	-	18
17	15	2	-	1	-	-	18
18	13	4	-	1	-	-	18
19	8	7	-	3	-	-	18
20	7	10	-	1	-	-	18
21	12	4	2	-	-	-	18
22	13	2	0	3	-	-	18
23	12	3	0	3	-	-	18
24	10	3	1	4	-	-	18
25	16	1	0	1	-	-	18
26	10	3	1	4	-	-	18
27	10	3	0	4	1	-	18
28	-	-	-	-	12	6	18

* N.B_ The benefits correspond to the serial number of the benefits as indicated on annex 1.5.

Note:- F.A = Fully agree P.A = Partially agree DI = Disagree

N.A =Not aware N.R = No Response O.B = Other Benefit

6.1.3 Possible Pitfalls from using the Internet

There is also a huge amount of pornographic materials available in the jargon of the Internet-cybersex. It has been said that if the Internet is a global electronic village, most of it is a heavily used red light district. This seedier side is causing a

great deal of concern in the United States where there has been much debate about the need for, and possibility of, imposing censorship on this anarchic issues (Evans 1996). Respondents have also given the opinion on the pitfalls of the Internet as shown in the following tables.

TABLE 6.7: OPINION OF GROUP I ON THE PITFALLS OF THE INTERNET

PITFALLS *	FULLY AGREE	PARTIALLY AGREE	DISAGREE	NOT AWARE	NO RESPONSE
1	7	15	5	1	-
2	5	17	4	1	1
3	10	12	6	-	-
4	6	8	9	4	1
5	6	14	5	3	-
6	3	15	8	2	-
7	2	14	11	1	-
8	4	16	5	3	1
9	6	14	5	2	1

* N.B_ The pitfalls correspond to the serial number of the pitfalls as indicated on annex 1.1.

It is indicated in table 6.7 that few of the respondents have not replied to certain questions that is why a column "No response" is shown there.

TABLE 6.8: OPINION OF GROUP II ON THE PITFALLS OF THE
INTERNET

PITFALL*	FULLY AGREE	PARTIALLY AGREE	DISAGREE	NOT AWARE	NO RESPONSE
1	2	6	1	2	1
2	1	6	2	2	-
3	3	1	7	1	-
4	1	2	7	2	-
5	6	2	3	1	-
6	2	5	3	2	-
7	-	3	7	2	-
8	3	6	1	2	-
9	3	2	5	1	1
10	3	2	6	-	1

* N.B_ The pitfalls correspond to the serial number of the pitfalls as indicated on annex 1.2.

TABLE 6.9: OPINION OF GROUP III ON THE PITFALLS OF THE
INTERNET

PITFALL*	FULLY AGREE	PARTIALLY AGREE	DISAGREE	NOT AWARE	NO RESPONSE
1	9	10	3	2	1
2	4	10	4	5	2
3	9	9	5	1	1
4	3	7	10	4	1
5	7	6	45	7	1
6	-	9	10	5	1
7	2	9	8	5	1
8	1	9	10	3	2
9	4	6	9	3	3

* N.B_ The pitfalls correspond to the serial number of the pitfalls as indicated on annex 1.3.

TABLE 6.10: OPINION OF GROUP IV ON THE PITFALLS OF THE
INTERNET

PITFALL*	FULLY AGREE	PARTIALLY AGREE	DISAGREE	NOT AWARE	NO RESPONSE
1	1	2	2	2	-
2	1	4	1	1	-
3	1	1	3	3	2
4	-	-	2	4	1
5	1	3	-	3	2
6	-	2	3	2	-
7	-	1	4	2	-
8	1	-	4	2	-
9	-	3	2	2	-

* N.B_ The pitfalls correspond to the serial number the pitfalls as indicated on annex 1.4.

TABLE 6.11: OPINION OF GROUP V ON THE PITFALLS OF THE
INTERNET

PITFALL*	FULLY AGREE	PARTIALLY AGREE	DISAGREE	NOT AWARE	NO RESPONSE
1	8	4	5	1	-
2	4	8	3	2	1
3	6	5	6	1	-
4	-	4	9	1	-
5	6	7	9	5	-
6	3	8	6	1	-
7	3	3	9	2	1
8	2	6	9	-	1
9	6	5	6	1	-

* N.B_ The pitfalls correspond to the serial number of the pitfalls as indicated on annex 1.5.

6.1.4 Potential Users' Requirements of Internet Services

TABLE 6.12: OPINION ON THE REQUIREMENTS OF THE INTERNET SERVICES

Group	E-mail	File transfer	Database Access	Usenet news	On-line confern.
Private, Individual, & Business	25	14	17	12	5
Academic & research	11	9	10	5	4
Non-Governmental Organizations	23	14	18	9	5
Governmental Organizations	7	5	4	3	2
International Organizations	15	10	12	11	9
TOTAL NO. OF RESPONSES	61	52	61	40	25

The sum of the responses will not add up to 90 since many of the respondents answered more than 1 service. For example, most of them responded that e-mail, file transfer, database access, and usenet news are important to their work area.

6.1.5 Potential Users' Information Need in Terms of Format

TABLE 6.13: OPINION ON INFORMATION NEED IN TERMS OF FORMAT

Group	Text	Video	Static graphic	Sound
Private, Individual, & Business	25	9	11	4
Academic & Research	10	9	5	8
Non-Governmental Organizations	22	7	5	4
Governmental Organizations	7	2	3	2
International Organizations	16	9	6	5
TOTAL NUMBER OF RESPONDENTS	80	36	30	23

Again here, the total does not add up to 90 since there is more than 1 choice.

6.1.6 Potential Users' Information Need in Terms of Content

TABLE 6.14: OPINION ON INFORMATION NEED IN TERMS OF CONTENT

Group	Research data	Discussion	Inter & Intra comm.	Technical Report.	Financial Report.
Private, Individual, & Business	27	14	14	15	7
Academic & Research	9	5	6	2	4
Non-Governmental Organizations	19	12	23	10	2
Governmental Organizations	5	3	4	3	2
International Organizations	11	11	18	9	3
TOTAL NUMBER OF RESPONDENTS	71	45	65	39	18

Again here, the respondents responded more than 1 need that is why the total does not add up to 90.

6.1.7 Potential Users' Level of Experience of Computer

TABLE 6.15: OPINION ON LEVEL OF EXPERIENCE OF POTENTIAL INTERNET USERS

Group	No experience	Appl. Oriented	OPS aware	Network Administrator	Script Writer	Programmer
Private, Individual, & Business	5	15	8	1	0	5
Academic & Research	0	7	6	1	1	0
Non-Governmental Organizations	3	18	9	0	2	0
Governmental Organizations	2	2	1	2	0	0
International Organizations	3	10	5	2	0	4
TOTAL NUMBER OF RESPONDENTS	13	52	29	6	3	9

6.1.8 Potential Users' Contribution to the National Internet

Network

TABLE 6.16: OPINION ON THE CONTRIBUTION OF POTENTIAL USERS TO

THE NATIONAL INTERNET NETWORK

Group	Establishing database	Publishing info. gathering	Development of tutorial & On-line Help	Write program, script	Provide Training
Private, Individual, & Business	6	3	2	3	3
Academic & Research	5	1	0	1	4
Non-Governmental Organizations	6	5	3	0	4
Governmental Organizations	3	3	2	0	2
International Organizations	4	3	1	2	2
TOTAL NUMBER OF RESPONDENTS	24	15	8	6	20

6.2 OPPORTUNITIES OF THE INTERNET IN ETHIOPIA

There are a number of opportunities that arise from using the Internet. Some of the opportunities that Ethiopia might get can be categorized as social, economical, political, academic and research benefits. Benefits in each of these categories, as has been identified from literature, is briefly described in following subsections. However, one of the major objectives of this research was to assess the users' views regarding these identified advantages and pitfalls of the Internet in the content of Ethiopia. Results of the survey conducted in this regard are presented in sections beginning with 6.2.

6.2.1. Benefits of the Internet to Ethiopia

Sadawsky (1993) notes that while the benefits of computing and communication technologies may be evident to many people in developed countries who have woven them into the fabric of their everyday lives, they may not be apparent to people in developing countries.

Governments can do more for or against the development of networking than can the efforts of many motivated and involved private individuals in a single statement of policy, or in a single reallocation of financial resources. Therefore, the ability to locate and retrieve the content is critical for networking success in developing countries.

Electronic network connections have a potentially higher payoff for developing countries because of the lack of reliable alternative delivery mechanism when compared to the various communication facilities of the developed world.

The benefits that Ethiopia might get from being connected to the Internet will have social, economical, political, academic and research dimensions. Some of the specific benefits maybe as follows (BITE 1995, Sadawsky 1993):

1) *Social benefits*

- To prevent the possible natural disasters, data on the weather and climate are vital for prevention of these disasters. Managing and interpretation of these data can be assisted through Internet. In addition, Internet plays a great role in mobilizing national and international communities to respond to the disaster;

- Internet helps to address the needs of administration, teachers and students of the school system, by substituting outdated or insufficient text books with appropriate materials;
- Internet helps as a medium of international cultural exchanges between students in different countries;
- Through Internet, it is possible to have language instruction through language structured communication with similar students in other countries; and
- Teachers and students will have access to collection of teaching materials through Internet.

2) *Economic benefits*

- The information infrastructure of a country becomes one of the evaluating factors for foreign investors in selecting an investment areas. The beneficial consequences of the capital investment that those International moves represent is patently obvious. Therefore, Ethiopia will get economic benefits if the country is committed to an information infrastructure that attracts foreign investors;
- The very fact that Addis Ababa is the headquarters of regional, sub-regional, and international inter-governmental and non-governmental organizations

necessities the establishment of Internet nodes as a communicating and dissemination of information since the services of the Internet are rapidly becoming standard tools for conducting business in an international environment;

- The Internet can be a positive influence to keep Ethiopian's future scientists, businessmen, and leaders in the country instead of flying to western countries searching for educational opportunities and other way of life;
- The National Tour Operation (NTO) will get the opportunity of providing interesting and useful information on history, geography etc about Ethiopia to other Internet users. Therefore, the Internet would provide a very cost effective means to promote tourism in Ethiopia;
- TCDC (Technical Cooperation among Developing Countries) can be possible through direct information interchange or through international intermediaries, e.g. the PADIS model; and
- Opportunities will be more to work with multilateral and bilateral development agencies in the more rapid formulation and approval of development projects.

3) *Political benefits:*

- The Internet will give Ethiopia greater visibility within the international political community regardless of the government's degree of utilization of the Internet;
- Internet can be an excellent medium for national and international political forums;
- It helps to report statistics to international organizations in a more timely manner, and to obtain international statistical comparisons in computer form as they become available; and
- It helps to create Additional links to Embassies and consulate capable of transmitting computer-to-computer text.

4) *Academic and Research benefits:*

- The Internet is useful for Addis Ababa and Alemaya Universities and other colleges in research collaboration with colleagues outside of Ethiopia, access to scholarly journals or papers, publishing of research results, efficient transfer of technology to and from Ethiopia, broader availability of research materials for undergraduate students, attendance to electronic conferences, access to interactive text books, access to experimental software for all academic fields, enhancing library services...etc.; and
- Ethiopian scientists and researchers will have the ability to confer with physicians, epidemiologists, and

so forth regarding immediate health concerns and access to participation in active Net News groups in the health sciences.

Following are some of the additional benefits that Ethiopia might get from being connected to the Internet.

- Internet is a tool for employment that will generate jobs and open avenues of investment;
- Internet is a tool for democratization, education, and community development;
- Through Internet, people create their own communities and business. As a result of this, geographical distance and political boundaries become less and less significant. Modern communication networks are like markets; it will be possible to buy things. Visit with ones neighbours, to meet new people, and debate issues of common interest; and
- Internet essentially provides a non-formal and non-sectoral means of communication through which strangers become more familiar; the impersonal modern society becomes smaller and friendlier.

6.2.2 Pitfalls of the Internet

Intellectual property rights and privacy are the expected pitfalls that potential users may face in using the Internet.

However, these pitfalls have solutions if appropriate measures are taken in setting legislative framework and adopting laws to protect the users.

Intellectual property is becoming a major factor influencing the development of information use and its protection. Ethiopia, therefore, needs to adopt a legislative framework that strikes a balance between the commitment to intellectual property as an international necessity and the provision of basic intellectual needs to the poor. Besides, the government needs to establish and enforce copyright laws, as well as spread awareness to the public about intellectual property rights and at the same time provide schemes for reducing the negative effects of these laws on the society.

On the other hand, the government has an important role to play in securing citizens' privacy through adopting laws to protect its people against invasion of their lives through the new technologies. This will also involve formulating clear policy regarding electronic recording of personal data and means for controlling its use.

6.3 OPPORTUNITIES IDENTIFIED BY RESOURCE PERSONS

Opinion of the resource persons were asked from Private/Individual, Governmental, International Organizations on the opportunities of Internet in Ethiopia. The opinion of each of them is discussed in this section.

Lishan Adam, coordinator of the CABECA project at PADIS/UNECA, emphasized that Ethiopia will benefit from the Internet connectivity in educational and research areas. Internet upgrades

research capacity, opens up knowledge, and brings efficiency in the business group as well. Most of the potential users of the Internet in Ethiopia may use e-mail at most followed by WWW. On the other hand, from the existing trend one can predict that the Academic and research Institutions will be potential users of the FTP, Telnet, and WWW users.

Mulugeta Libse, chief of NCIC (National Computers and Information Centre) of ESTC (Ethiopian Science and technology Commission), suggests that the majority of the potential users of the Internet will need e-mail service. Newsgroups may be used next to e-mail and FTP, and Telnet are expected to be used by few people at the start. Even though e-mail service is there through the existing FidoNet, e-mail service of the Internet is on real-time basis, and is very efficient and reliable compared to the service given by the FidoNet. In addition, since, the world is moving to the information superhighway, it is the right time to create awareness and need within different groups of the population about multimedia.

Mulugeta added on the importance of the Internet in that not only is the Internet an important vehicle for mouse-to-mouse communication, it can also sustain text, sound and video. Computers with basic sound cards are needed in order to receive the audio and visual elements on the Internet, but then one can listen to speeches from to his favourite speakers in voice, and even receive one's choice of radio programmes. This is the area where the technology is changing fast. It is possible to listen to programmes as they are being broadcast. Besides, it is also possible to store radio programmes for later, in much the same

way as video recorder enables one to watch the television programmes of his or her choice at a time that suits.

Jane Furzey, one of the members of the BITE group, from Private/Individual group, has commented on the opportunities of the Internet in Ethiopia as following:

The opportunities of the Internet depends very much on the people who are using it. Internet itself is a collection of networks. The benefits of the Internet to Ethiopia depends only on how Ethiopia shapes the information that it gets from the Internet. The benefits that Ethiopia gets from the Internet can be seen into two ways:

Internationally, the country does not have a good profile. It has an important role in promoting the image and profile of the country and changes that are taking place. Internally, Internet has a tremendous benefit. People are widely scattered in Ethiopia, the topology of the country does not help to promote development. The central and regional level decision makers need information. Therefore, potentially, the Internet or TCP/IP connectivity allows to exchange grater information and to keep up to date information. Internet helps to develop research, education, business, and tourism in Ethiopia. Internet has to be a tool of communication between the federal States of the country and for this purpose there is a need to develop a national script (Amharic or geez) so that it will be easy for every citizen to use the Internet.

The respondent, who has experience in using the Internet while she was in UK, puts the following remarks on the use of the existing

e-mail service. FidoNet is not a user friendly program, and users of e-mail do not have someone to communicate with. She thinks that these factors are the hinderance to use the existing network at the expected amount. On the acceptance of the Internet in Ethiopia at the initial stage, the benefits will have only marginal or small degree of acceptance amongst the academic.

On the pitfalls of the Internet, the respondent has suggested that safe way in terms of content should be taken into consideration since the first pitfall is the content of the Internet. Besides, security and privacy are the pitfalls associated with the Internet. There has to be a middle line to protect the pornographic and crime content of the Internet.

6.4 DISCUSSIONS

6.4.1 The Opportunities of the Internet in Ethiopia

6.4.1.1 Opinion on the Benefits of the Intnernet in Ethiopia

The discussion on the findings of the survey on the benefits of the Internet is approached differently from other issues raised to the respondents since there are certain benefits which are unique only to a particular group.

Therefore, the benefits which are unique to each group are discussed separately and the common benefits that have responses are discussed together to have an overall view of the potential Internet users' in the country.

On the benefit of Internet in helping to participate in a number of discussion groups, 82.1% of the respondents from the Private/Individual or business group responded that they fully agree to it whereas only 14.3% of them agreed partially. In addition, the user groups were asked to respond to the benefit of current information on the stock market and 64.3% of them have responded that they fully agree to the benefit, 17.9% of them agreed partially, and 17.9% of the respondents are not aware of this benefit. On the non-formal and non-sectoral communication that Internet allows for the strangers to be more familiar, 50% of them answered that they fully agree, 17.9% of them agreed partially, and 21.4% respondents answered that they are not aware of that benefit. Finally, 17.9% of them responded that they fully agree, 35.7% of them partially agreed, and only 3.6% disagreed on the question that Internet benefits national businessmen in the country from flying abroad.

Respondents from the Academic and Research group also have responded unique questions posed to them. On the benefits of Internet in keeping scientists and experts in the country from flying abroad,, only 33.3% of them responded that they fully agree, 41.7% of them agreed partially, 25% of them disagreed. Besides, on access to information on agricultural and national resources, 66.7% of the respondents answered that they fully agree, 16.7% respondents agreed partially. On collaboration in research with colleagues outside Ethiopia, 83.3% of them responded that they fully agree and 16.7% of them partially agree to the benefit. The other issue asked was that on the facility of the Internet to have broader availability of research materials. The finding is that 75% of them fully agreed and 25% of the respondents agreed partially. Majority of the respondents (66.7%) have responded that they fully agree, 8.3% of them partially agree, 16.7% of them are not aware of this service of the Internet, and 8.3% of them did not answer to the question at all on the issues that the Internet helps to access interactive text books.

Respondents of the NGOs have also answered that on the question of "geographical distance and political boundaries become less significant in communication"- 92% of the respondents fully agreed whereas 8% agreed partially. On the other hand, the information facility of the Internet which helps to evaluate economic areas in selecting an investment area has got 36% respondents who fully agreed, 40% partially agreed, 20% of them who are not aware of the benefit, and 4% of them did not respond to this question at all. Eighty percent of the respondents indicated that they fully agree, 16% of them partially agree, and 4% of them disagree to the benefit that the Internet helps as

a excellent medium of national and international forum. Eighty percent of the respondents in this group fully agreed and 20% of them partially agreed to the benefit of the Internet being a source of information on history, geography, etc about the world and Ethiopia.

The next group of respondents were from the governmental organization and 28.5% of them fully agreed, 42.8% of them agreed partially, and 14.3% of them are not aware of the benefit of the Internet in preventing natural diaster. On the benefit of the technical cooperation among developing countries (TCDC) through direct information interchange on International medium, 42.8% of the respondents fully agreed, 28.5% of them partially agreed, and 28.5% of the respondents are not aware of this benefit. On its help as a tool for democratization, education and community development, 57.1% of them responded that they fully agree, 14.3% of them partially agreed where as 28.5% of them are not aware of this benefit to the group.

On the benefit that Internet brings the country to greater viability within the international political community, 71.1% of the respondents fully agreed, 14.3% partially agreed where as 14.3% were not aware of this benefit and 14.3% of them disagreed to it.

On providing a very cost effective means to promote tourism, 28.5% of the respondents agreed fully, 14.3% of them agreed partially, 42.8% were not aware of the benefit, and 14.3% of them disagreed that Internet does not give this benefit.

The last but not the least respondents were from International Organizations. Fifty percent of the respondents agreed fully, and 50% of them agreed partially to the benefit of Internet in creating international cultural exchange between people. On the other hand, 39.9% of the respondents agreed fully, and 55.6% of them agreed partially, and 5.6% of them were not aware of the benefit that Internet helps as an efficient transfer of technology to and from Ethiopia. On the issue that Internet helps to attend to electronic conferencing, 72.2%, 11.1%, 14%, and 3.3% of them answered that they fully agreed, partially agreed, disagreed and were not aware of the benefit respectively. On the benefit of Internet in creating additional links to Embassies and consulate, 55.6% of the respondents have answered that they agree fully, 11.1% of them said that they agree partially, 5.6% of them disagreed, and 22.2% of them were not aware of this benefit at all. Similarly 55.6% of the users fully agreed, 16.7% of them agreed partially, and 22.2% of them were not aware of the fact that Internet helps to have opportunities to work with multilateral and bilateral development agencies.

In general, the survey indicated that respondents either fully or partially agreed to the other common benefits of the Internet. For example, the percentage of the responses are indicated in table 6.17 showing the highest and the lowest response rate of the respondents who agreed fully from each group.

TABLE 6.17: OPINION OF GROUPS ON THE COMMON BENEFITS OF THE
INTERNET

Group	Highest % of Fully Agreed	Lowest % of Fully Agreed
1	82	17
2	91	25
3	92	32
4	85	14
5	100	22

We can see from the above table that the majority of the respondents agreed to the common benefits of the Internet.

The findings of the survey indicated that 67.8% of respondents of potential users of the Internet from the five groups, need e-mail service and database access whereas those who need file transfer, usenet news, and on-line conferencing are amounted to 57.8%, 44.5%, and 28.% respectively.

The information need in terms of format of the respondents shows that 88.8% of them need text, 40% of them need video, and static graphic and sound amounted to 33.3% and 25.6% respectively.

Table 6.14 indicates that 78.9% of the respondents needed research data, 72.2% of them need inter and intra communications, whereas discussion, technical and financial reports are needed by 50%, 44.5%, and 20% of the respondents respectively.

The findings of the survey indicated that most of the respondents are applications-oriented and are aware of operational system, amounting to 57.8% and 32.2% respectively whereas 14.5% of them

have no experience in computer facilities, 10% of them have programming knowledge, and 6.7% of the respondents are network administrators. The least number of respondents are script writers, amounting to 3.3% of the total sample size.

It was tried to assess the potential Internet users' contribution to the National Internet Network if Internet is brought to Ethiopia. It was found out that 26.7% of the users are capable of establishing database and 22.2% of them have responded to provide training and 16.7% of them are participating in publishing on information gathering by their organization. The small number of respondents, amounting to 8.9%, replied that they can contribute in development of tutorial and on-line help and 25.5% of them did not respond to the question raised to them believing that this question is to be answered by head of the organization or institute.

6.4.1.2 Opinion on the Pitfalls of the Internet

Respondents have answered 9 issues on the pitfalls of the Internet. For our discussion, the major issues have been selected since some of them are nowadays controversial in every part of the continent.

a) On the pornographic and crime content of the Internet

A question was put to respondents to comment on the sensitive issues of the Internet that pornographic and crime may be publicized on it. The findings indicated that 50% respondents of the Private/Individual or business groups partially agreed, 50% of the Academic and Research and NGOs respondents fully agreed to the issue where as 50% the respondents from the International

organizations disagreed to it. On the other hand, 42.6% of the respondents from the Governmental group partially agreed to the pitfall and the same amount i.e., 42.6% were not aware of this pitfall of the Internet.

b) On the security problems on documents and patent rights

It was found out from the survey that most respondents from the three groups i.e., 53.6% of the respondents from Private or Individuals, 50% from the Academic and Research, and 40% from the NGOs partially agreed on the security problems on documents and patent rights while using the Internet.

On the other hand, it was found out that 44.5% respondents from the International Organization fully agreed to the issue whereas 28.6% of respondents from the Governmental group were found out to be partially agreed, 28.6% of the respondents also disagreed and 28.6% of them were not aware of the this pitfall at all.

c) On the cultural domination of the Internet

Fifty seven (57.1% to be precise) percent of the respondents from the Governmental, 50% of the respondents from International, and 40% of them from the NGOs disagreed to the cultural domination of the Internet to any country whereas 57.1% of the respondents of the Private/Individual and 50% of the respondents from the Academic and Research groups partially agreed to the pitfall of the Internet from the cultural domination point of view.

d) On the issue of employees playing games and shopping on the Internet

Fifty three (53.6% to be precise) percent of the respondents of the Private/Individual, 41.7% from academic and research, 44.5% respondents of the International group have partially agreed, and 42.6% of the respondents from the Governmental and 40% from the NGOs have answered that they disagreed to the saying that employees may use the Internet for playing games and shopping of their own activities.

e) On the difficulty of navigating on the Internet

The survey indicated that 58.3% of the respondents of the Academic and Research group, 40% of the NGOs and 50% of the respondents from the International organizations disagreed on the difficulty of navigating on the Internet, where as 21.4% of the respondents from the Private/Individual group fully agreed, and 57.1% from the governmental Organizations have responded that they were not aware on this issue as a pitfall of the Internet.

It has to be noted here that the amount percentage of the respondents from each group who have not responded to each issue are not included in the discussion since their number is negligible or insignificant.

6.4.2 What is Going on Globally to Prevent the Pitfalls of the Internet?

From the findings of the survey, we can conclude that the pitfalls of the Internet is revolving around pornographic, and crime issues. Only respondents from the International Organization disagreed to this pitfall. On the other hand, it is advisable that the country has to take measures on how to avoid

these issues in being connected to the Internet. Countries like China, France, Germany, Singapore, Saudi Arabia etc, are becoming very sensitive and trying to censor or regulate the Internet for its pornographic, crime and dissent issues.

For example, the latest issue of the Newsweek (April 22, 1996) indicates that governments everywhere are trying to understand the new medium and to regulate it. Some want to limit to people's access to the Net, seeing it as a threat to their cultural or national security. Others embrace the new technology but worry about "bad" things that come with it: pornography, crime, political dissidence, even cultural imperialism. Let us see some examples relating to the preventive measures taken against some of the vices of the Internet.

China has been looking for ways to reap the economic benefits of the Internet without sacrificing control over information. Lately the measures have become more clear and on Feb. 11, 1996, Chinese officials announced that, henceforth, the country's 50,000 or so Internet users must channel electronic communications through a series of "ports" or "filters" monitored by the Ministry of Post and Telecommunication and other agencies. The government became even more strict on its measures on Feb. 16, 1996 it ordered all domestic Internet users to register with the police. Furthermore, companies and individuals using or providing access to the Net are "forbidden to produce, retrieve, duplicate or spread information that may hinder public order". China is aiming to create a national "Internet", a subset of the Internet that is linked to outer world but which can be censored and controlled.

France like China has elevated the Internet into the realm of foreign policy. It was reported by one of the Washington Post columnist that French officials had quickly asked the United States to crack down on an Islamic group in San Diego, known to be posting instructions on the Internet for assembling inexpensive bombs such as those exploded in the Paris subways (Newsweek April 22, 1996).

Newsweek (April 22, 1996) notes that in Asia, Japanese police recently arrested a 26 years old man for posting and distributing frontally nude images on his (widely popular) personal Web page. Thailand is exploring ways to discourage a thriving trade in exported electronic smut, under pressure from authorities in the United States and Europe. Authorities have also expressed an interest in monitoring purveyors of what they delicately describe as "anti-Thai sentiments." Singapore last month required all Internet providers to register with the national broadcasting authority, subjecting users to strict "guidelines" on what is acceptable and what is not .

Authoritarian regimes remain especially suspicious of the Internet. Communist Vietnam restricts it to a handful of top scientists and academics. Saudi Arabia, Bahrain and Iran, among others, have devised elaborate filtering systems to screen e-mail and keep out pornography and religious or politically seditious material.

The Internet is something new, a world apart, It challenges our definition of community, blurs geographies. undermines the customs, rules and laws by which we have always governed behaviour. Like it or not, that means the Internet will be

regulated. The only question is, how? Whose laws and community standards are to apply?

If the Internet were to be held hostage by every nation and municipal authority, the prospect is for a sort of digital jihad, waged in cyberspace between this or that group seeking to protect its cultural values and beliefs by closing down portions of the Net.

Newsweek (April 22, 1996) comments that fencing off the Internet has its own costs. The Internet is exploding as a global market place, not only for ideas but commerce. Those who limit their citizens access, or regulate the media too rigidly, risk losing out.

CompuServe has now developed the technology it needs to keep pornography out of Germany without limiting it elsewhere, a technical if not necessarily moral step forward. Europe and the United States, allied with leading companies like America On-line and Microsoft, are promoting a new software called PICS, or "Platform for Internet Content Selection." It is possible to avoid sex and violence using the software (Newsweek April, 22, 1996).

CHAPTER SEVEN

FINDINGS AND DISCUSSION ON THE INTERNET

CONNECTIVITY CONDITIONS IN ETHIOPIA

7.1. GENERAL FACTORS TO BE CONSIDERED IN NATIONAL NETWORKING CONNECTIVITY

Lishan (1995) attempts to identify the items to be considered in building a sustainable network. He indicates that according to Pimienta (1993) there are four factors that play a critical role in sustaining academic networks: institutional support, appropriate organization, reliable sources of finance, and a good technical plan.

The above factors hold true also to national or local networks. These factors should be considered in a strategic planning approach of networking in Ethiopia. Therefore, it is useful to see each of them separately.

a) Institutional support

Institutions play a major role in promoting networks. Lack of institutional support and political will to promote a network initiative are major stumbling blocks. Building of network user groups, supporting official structures for academic institutions such as Science and Technology Commissions, and involving active researchers to obtain political backing from their institutions are some ways of improving institutional support.

b) Organization

Centralizing network activities using some appropriate organizations that deal with plans, projects, results, and impacts of activities is very important. Effective organization saves money and effort in dealing with governments and different institutions. The specification of obligations and rights for participation in a network and the integration of various network activities to form national electronic networks help foster sustainability.

c) Financial sources

Technical plans and network architectures should be based on available financial resources. Financial resources should be assessed in order to overcome the following cost of the networking project:

The major costs of a network consist of:

- coordination of a network from conceptualization to implementation;
- installation and configuration of a network;
- network support, including training (user support);
- maintenance both at user level and at national hub; and
- communications costs.

d) Technical plan

A sound technical plan is also a critical element to sustain a national network. Networks should match national infrastructure and user requirements. An affordable yet advanced entry solution such as UUCP, a migration strategy to Internet, and the development of Fido-based networks wherever and whenever appropriate are some technical solutions for sustainable networking in Ethiopia. Concentrating efforts toward building

robust national hosts (rather than numerous smaller nodes) allow for better transmission media and continuous support for the improvement of bandwidth.

The implementation of an effective and sustainable Internet service in Ethiopia will require proficiency in networking technology and human resource development, as well as international assistance, at least in the short term.

7.2 PRESENT STATUS AND FUTURE PLANS OF TELECOMMUNICATIONS INFRASTRUCTURE

7.2.1 Present Status of Telecommunications Infrastructure

The following points are taken from the interview with Ato Asfaw Hailemariam, a transmission expert of Ethiopian Telecommunications Authority (ETA), and from the BITE (1995) document.

Internet connectivity requires the coming together of many technical elements. Technical details of Internet connectivity vary from country to country, depending on the context of connectivity. It should be borne in mind that the connectivity context changes rapidly as technology advances and the infrastructure of a nation develops.

The most critical link in the chain of establishing the Internet as a national resource is the availability of telecommunication alternatives. The options provided by Ethiopian Telecommunications Authority (ETA) will either enhance or restrict the design of the national network and thereby influence the requirements for hardware and software.

Telecommunication infrastructure is one of the factors that should be considered in starting Internet service in a country. The choice of a particular communication technology largely depends upon the nature of application, the size of traffic, and economic considerations.

According to Ato Asfaw, presently, ETA has the following networks for data transmission and voice casting services and the existing infrastructure is enough to start the Internet services in Ethiopia.

- Leased circuits;
- PSTN (Public Switching Telephone Network);
- CSPDN (Circuit Switched Public Data Network); and
- VSAT (very Small Aperture Terminal).

The stages of development of communication technologies applicable for data communication services has not satisfactorily grown in Ethiopia. The high growth of data communication services witnessed in the past years has been mainly nurtured on the basic dial-up provisions of the Public Telephone Network. The use of the Public Switched Telephone Network (PSTN) has not been the best performance since it is designed for ordinary voice communication applications.

For high quality and large volume of data communication requirements, customers rely on leased circuit facilities, which ETA readily provides. Presently, there are only a few international leased circuit connections owned by corporate organizations at successful speeds of operation ranging from 9.6 kbps to 19.2 kbps. There are also a wide base of inland leased

circuit owned by government, private, and corporate organizations operated at speeds from 600 bps up to 9.6 kbps. These leased circuit provisions are, however, limited to analogue signalling techniques.

Digital leased circuits which require end-to-end digital signalling and transmission media are not common provisions of the ETA. Although digitalization of switching systems and radio based transmission circuits are increasingly being used by ETA, the wide base of cable loop network which delivers the service up to the customer remains to be the best bearer for analogue signals.

ETA has also made available circuit switched data communication services alongside its digital switching system for telex. This system which is designed for synchronous mode of operation can provide point-to-point and dial-up domestic connections at signalling rate up to 9.6 kbps. Although this system is better optimised for data communication, it is not provided with international gateway links.

Excepting a few private terminals allowed to be operated by certain firms, the VSAT-HUB system is not yet introduced in Ethiopia. Realising the potentials of customer demands to reach places where terrestrial telecom means are not available. ETA is considering VSAT communication. Ownership and operation of VSAT terminals is regulated by ETA with permission granted on a case-by-case basis.

BITE (1995) has made a comparative analysis of the above mentioned type of telecommunication media on their relative merits in technical and economic terms as follows.

It is generally true for large volume, long distance and sustained transmission of data at minimized transmission error, the different communication technologies could be put in the following descending order from the most optimal up to the least attractive.

- Digital Leased Circuit;
- CSPDN;
- Analogue Leased Circuit;
- PVC (Permanent Virtual Call) Leased and VSAT;
- SVC (Switched Virtual Call); and
- PSTN.

SVC and PSTN are economically best suited access networks which usually carry less volume of traffic and require less stringent quality of transmission. On the other hand, CSPDN circuits are suited both for user access networks and international gateway function. Under the situation that the existing CSPDN in Ethiopia is not provided with international links and is most economical for short to medium distance connections, it is limited to the application for user access networks. In terms of economic applicability, the following four types of communication media are the best suited for high traffic, all time connectivity applications, put in ascending order of expense.

- PVC Lease;
- VSAT;
- Analogue Leased Circuit; and
- Digital Leased Circuit.

Technically speaking, a 64 kbps digital leased circuit is of the best performance and the most suitable for full Internet connectivity which requires the transfer of high volume of data in real time (interactivity). Although the other three systems are also suited for interactive applications, they are limited in speed and/or capacity of handling voluminous traffic.

PVC lease medium over PSPDN presents the best of performance and capability to handle e-mail, moderate file transfer, and interactivity applications at a cheaper cost than any one of the other systems could provide. Since the pricing in PVC is dependent upon the volume of data transmitted while guaranteeing a pre-arranged size of bandwidth, it also proves to be the most economical when the user cannot ensure full time utilisation of a leased capacity.

VSAT on the other hand, proves to be the most economical choice for point-to-multipoint communications between remote sites inaccessible by conventional telecommunication means or where the telephone system is unreliable. They are designed for bursty nature of traffic where partner distributed VSATs, which share the out-route bandwidth on the HUB, do not put up too much continuous traffic. Although VSATs are also applicable for point-to-point dedicated applications, their prices increase with the size of bandwidth leased on the HUB and the satellite transponder.

Analogue leased circuits are particularly suited for point-to-point communication applications in which large volume of sustained data are transferred. They prove to be rather

economical and of sufficient performance for text based interactive applications, e-mail, and file transfer, which should run for lengthy duration (more than four hours) each day. The technical performance and handling capacity of analogue leased circuits is largely dependent upon the type of modem chosen. for all time availability and the handling of large volume of data. analogue leased circuits prove to be the adequate media next to the digital leased circuits.

Digital leased circuits are the direct media for bandwidth intensive file transfer and image transmission applications in which large volume of data will be transmitted for sustained long period of time. As they are the most expensive to lease, their applications prove to be most economical for bandwidth hungry applications and/or gateway functions of a large group of users, such as Internet connectivity.

According to BITE (1995) start-up Internet connectivity must be based on the above technical and economical considerations and must also take into account the rapid growth anticipated. For user access for national Internet node either one of the existing PSTN or CPDN circuits or the SVC of a PSPDN could be used. Next to an SVC, the CSPDN proves to be better optimised for data communication applications than the PSTN.

7.2.2 Future Plans of Developing the Telecommunication Infrastructure

When one sees the future plan of ETA, there is a trend to develop its infrastructure in term of its capacity and efficiency. Sufficient budget had been allocated to develop its

infrastructure, particularly to install X.25 switching packages. However, the rapid change of communication technologies paved the way to choose the latest communication technologies such as **Frame Relay** and **ATM (Asynchronous Transfer Mode)** which have a better facility than the Package Switching Systems. Therefore, ETA is focusing to install one of these recent communication technologies for efficient data communications and Internet service.

Heldman (1992) describes Frame relay as "a data-link layer protocol that defines how frames of data are associated and routed through the packet network. Due to its higher performance than other wide area packet switching technologies, such as X.25, frame relay is a viable alternative for supporting bursty, high-volume data traffic such as LAN-to-LAN links. The frame relay has a total of 48 bits of overhead, which is four to five times less than the X.25 implementations. Frame relay is so named because it defines how frames are relayed across a series predefined switches. The order in a single transmission is maintained as it traverses the network, while X.25 routes packets over a number of different lines, reacquiring recording of the distant receiving device. After receiving a frame, the switch examines an 11-bit data link connection identifier (DLCI) to determine the frame's destination and then set up the connection between switches".

ATM (Asynchronous Transfer Mode) has also been called fast packet and cell relay. ATM has become an integrated switching technique for integrating conventional voice and bursty data traffic. ATM is a compromise network, and it is sub-optimal forever specific mode of traffic. On the other hand, in the aggregate, across a

varied mix of traffic of different modalities, i.e, voice, data, image, ATM is expected to be optimal. It follows, then, that ATM will be optimal for multimedia communications where voice, data, and image are integrated. ATM will surely mean higher bandwidth. With this greater bandwidth, higher reliability will be critical (Heldman 1992).

On the other hand, there is a trend also to integrate the whole of the communication systems into a system known as "*Global Messaging System*." In this system, services like telex, fax, e-mail, and Internet will be integrated in a platform system. Sufficient budget is also allocated for Global Messaging System's project.

There is also a plan to enhance the existing number of telephone lines by 100% to meet the demand of the potential subscribers.

On the other hand, being aware of the Internet facilities, ETA is taking initiatives to start Internet service in Ethiopia. Recently, Sprint Company from USA has demonstrated to ETA on the Internet connectivity options in ETA. It is planned that the transportation service up to the user's point will be handled by ETA in the future plan of Internet service provided. Database and information generation is assumed to be handled by user institutions or organizations. It is expected that individuals, business groups, and commercial groups will create their own home page as a local host.

According to Ato Asfaw, Sprint and MCI Companies are invited to submit their proposal for the implementation of the project.

These companies have been chosen after comparing with the service cost of the European Internet service Providers.

The encouraging news for the future of the Internet connection is that all the seven exchange areas in Addis Ababa and over 30 other towns are interconnected with high quality digital microwave links. ETA is making preparations to provide digital leased circuit services for international connections at 64 kbps. Apparently, the technical issues regarding digital leased lines have been resolved and the only item that remains is the setting of appropriate tariffs.

It is expected that the bandwidth of an analogue leased line will be inadequate in the very early stages of Internet connectivity in Ethiopia. However, with governmental support it may be entirely possible that both digital leased and VSAT technology will be available for consideration for international Internet connectivity.

7.3 OPINION OF THE POTENTIAL USERS ON THE CONNECTIVITY CONDITION OF THE INTERNET

7.3.1 Bringing Internet to Ethiopia

Table 7.1: Opinion on Bringing Internet to Ethiopia

GROUP	NOT NECESSARY	RIGHT TIME	E-MAIL IS ENOUGH	NO RESPONSE	TOTAL
Private, Individual, & Business	-	23	5	-	28
Academic & Research	1	11	-	-	12
Non-Governmental Organizations	-	22	3	-	25
Governmental Organizations	-	5	1	1	7
International Organizations	2	15	1	-	18
Total Number of Respondents	3	76	10	1	90

It can be noted from the table that only 1 respondent did not answer the question on bringing Internet to Ethiopia for the reason not known, and others have filled the questionnaire based on the option given.

7.3.2 Preference of the Internet Connectivity to Everybody in the Organization

Table 7.2: Opinion on the Preference of Internet Connectivity to Everybody in the Organization

GROUP	AGREE	DISAGREE	NO RESPONSE	TOTAL
Private, Individual, & Business	20	8	-	28
Academic & Research	9	2	1	12
Non-Governmental Organizations	18	7	-	25
Governmental Organizations	4	2	1	7
International Organizations	10	7	1	18
Total Number of Respondents	61	26	3	90

It can be noted from the above table that a total of 3 respondents did not answer the question on the preference of Internet connectivity to everybody in their organizations for the reason not known, however, they have replied to other questions.

7.3.3 Cost Capability

Table 7.3: Opinion on the Cost of the Internet on its Connectivity and Services

GROUP	CAPABLE	NOT CAPABLE	NO RESPONSE	TOTAL
Private, Individual, & Business	15	6	7	28
Academic & Research	5	5	2	12
Non-Governmental Organizations	15	6	4	25
Governmental Organizations	4	2	1	7
International Organizations	9	1	8	18
Total Number of respondents	48	20	22	90

It has to be noted that those respondents, who have answered that they are capable of covering the cost of the Internet, apart from Private/Individual group, have given their opinion believing that their institutions or organizations will be capable to cover the cost of the services as well as other expenses of the Internet services. 22 respondents have not answered to the cost issues thinking that this is a question to be answered by head of the institution or organization.

7.3.4 How soon the Internet Connectivity be Implemented

Table 7.4: Opinion on Urgency of connectivity

GROUP	AS SOON AS POSSIBLE	WITHIN 1 YEAR	WITHIN 2 YEARS	I CAN'T GUESS	NO RESPONSE	TOTAL
Private, Individual, & Business	15	2	2	8	1	28
Academic & Research	5	4	-	2	1	12
Non-Governmental Organizations	17	2	2	4	-	25
Governmental Organizations	1	3	-	2	1	7
International Organizations	4	2	1	9	2	18
TOTAL NUMBER OF RESPONDENTS	42	13	5	25	5	90

From the above table one can see that 25 respondents have answered that they cannot guess on how soon the Internet connectivity be implemented in Ethiopia, believing that the connectivity condition depends on the infrastructure of the telecommunications in Ethiopia and other conditions that must be fulfilled by the government.

7.4 DISCUSSION

7.4.1 On bringing Internet to Ethiopia

It was found out that 84.5% of the respondents replied that it is the right time for the country to be connected to the Internet where as 11.1% of the respondents suggested that e-mail service is enough for the time being, and 3.3% responded do not think Internet is necessary to the country compared to its other problems.

In addition, it was found out from the interview that if Ethiopia is not connected to the Internet, it is to its disadvantage as it is the centre for AAU, UNECA, NGOs, and other International Organizations.

7.4.2 On the Preference of Internet Connectivity to everybody in the Organization

A large number of (67.8%) the respondents agreed that they prefer that everybody be connected to the Internet in their institutions or organizations, where as 28.9% of the respondents disagreed to the question raised to them, and 3.3% of them did not respond to the question. For example, one of the interviewee indicated that for the time being, one node is enough for any institute or organization to reduce costs.

The response of the interview indicated that in principle, everybody should be connected to the Internet. People who realize the benefit may keep on using it if the charge is small initially. But if the charge is grater initially, people may be connected but the user base will decline after words. Besides,

if the cost is high government bodies and Academic and Research centres could not use it.

One of the interviewee suggested that if the Internet Service Provider (ISP) is a non-profit making organization, the charge will be very small and potential Internet users will be attracted to use the services. Respondents have indicated also that the potential ISPs in Ethiopia are Addis Ababa University (AAU), Ethiopian Science and Technology commission (ESTC), and Ethiopian Telecommunications Authority (ETA).

7.4.3 On the Cost Issues

It was tried to assess if the respondents are capable to cover the cost of the services and other expenses related to the Internet if the country gets connected to the Internet. The finding indicated that 53.3% of the respondents are capable of covering the costs of the Internet services and its related expenses where as 22.2%, of the respondents responded that they are not capable of covering the cost of the service and other related expenses where as 21.5% of the respondents did not answer the question raised on the cost issue.

Those respondents who have answered that they are capable of covering the cost of the Internet suggested believing that their institutions or organizations are capable to cover the cost of the connectivity and its services.

Respondents from the Academic and Research Institute indicated that the government should cover their cost from the teaching and research point of view for the development of the country.

7.4.4 On the Urgency of Connectivity

The final question raised to the respondents was on their interest on how soon they want the Internet be connected in Ethiopia. The survey finding indicates that 46.7% of the respondents want the Internet to be implemented as soon as possible, and 27.8% of them have answered that they cannot guess on the duration of time, 14.5% of them said that they want it to be connected within one year, and 5.5% of the respondents replied that the implementation be within two years. 5.5% of the respondents did not reply on this question.

7.4.5 What can Ethiopia Learn from other African Countries?

Ethiopia can share experience of South Africa and Zambia. The experience of South Africa is that to have a successful Internet network, it is necessary to establish an Internet Service Provider (ISP) which has the confidence of the prospective participants and the resources to take effective action based on the accepted responsibility for getting the network established.

In providing the Internet service, it has to be noted that if the International link is subject to "traffic-based" costing, the cost may quickly run out of control and end up exceeding the cost of a dedicated link. This is indeed what happened in the case of UNINET of South Africa.

While the use of dial-up or X.25 link can initially provide an international link, the rapid build-up of traffic, unless controlled is likely to cause the cost of such a link to become prohibitive. Wherever possible a dedicated data-link should be installed.

The experience of UNINET can be a lesson to Ethiopia in that progress cannot be made unless there is a "champion" who is prepared to overcome the difficulties in getting a network established; from exciting the interest of potential users, obtaining the necessary top-management support, procuring the equipment and finding or even himself acquiring the necessary technological knowledge.

Zambia's effort and success to its Internet connectivity gives much more experience to Ethiopia than any other countries in Africa for the following critical conditions in which the country takes the initiative. These conditions were:

- 1) Zambia's official status of being one of Africa's poorest nation;
- 2) The absence of a computer science degree course; and
- 3) The scarcity of the advanced computer skills.

Even though the technological achievement was perhaps less important than the ability to meet the considerable costs of Internet connectivity to establish a suitable Internet service, Zambia was successful to be connected to the Internet despite the existence of the above unfavourable conditions .

ZAMNET has proved that the participation of customers and paying their share plays an important role for any networking sustainability when one observes that the National Farmer Union, the Ministry of Agriculture, and the Engineering Institute of Zambia and other institutions are participating in providing information for the Net and paying their service costs.

Therefore, we can conclude that the sustainability of Internet in Ethiopia depends on the role of its potential customers' participation in every aspect that is needed.

CHAPTER EIGHT

CONCLUSION AND RECOMMENDATIONS

8.1 CONCLUSION

It must be noted that the conclusion of this research is different from that of BITE's in that the conclusion given in this paper is based on users survey and depends on figures and facts.

8.1.1 Opportunities of the Internet -

We can conclude from the outcome of the survey that the connectivity of Internet in Ethiopia is highly feasible. Benefits are very well recognized by different sectors as well. Besides, its pitfalls, particularly its pornographic and crime content, and privacy and properly right issues are very well recognized by its potential users.

The fact that 81.1% of the respondents are aware of the Internet shows that the potential Internet users have knowledge on the Information service that one gets from the Internet even though Ethiopia is not connected to the Net. In addition, we can conclude also that benefits of the Internet is well known by its different potential users from different sectors since most of the respondents have agreed either fully or partially to the benefits of the Internet.

The opinion of respondents on the pitfalls of the Internet is revolving around its pornographic and crime contents, however, 50% of respondents of the International organization have disagreed to this pitfall.

The study indicated also that the type of information service that potential Internet users require, based on decreasing order, is

e-mail and database access, file transfer, usenet news, and on-line video conferencing. In addition, the information need of the potential Internet users in terms of format has been found out, in decreasing order, to be as text, video, static graphic, and sound whereas the information need identified by potential users' in terms of content is ranked as follows.

- 1) Research data;
- 2) Inter and Intra communication;
- 3) Discussion;
- 4) Technical report; and
- 5) Financial report.

The existing level of experience of computer of the potential Internet users is found out to be application oriented followed by those aware of operational system. In fact, there are also programmers and network administrators even though their number is very small compared to the other respondents.

The outcome of the survey indicated also that there is an encouraging number of potential Internet users in establishing databases publishing an information gathering in the organization, and in providing training as contributors of the national network.

8.1.2 Connectivity Conditions

There are basic factors to be seen critically when intending to be connected to the electronic networking. These factors are

institutional support, effective organization, financial support, and technical plan. In addition to these factors, the implementation of an effective and sustainable Internet service requires proficiency in networking technology and human resource development as well as international assistance at least in the short term.

Grant (1995) emphasizes that the importance of strong, competent organizations in the effectiveness of electronic networking initiatives is unquestionably significant. Introducing new technology into organizations that do not have the capacity to institute and manage change will only lead to frustration and disaster. The fact that so many initiatives involving technological innovations have failed, in Africa elsewhere, is a testimony to the need for organizations to develop both technical and managerial capacity to institute and sustain change. The experience of other African countries is that the majority of organizations have severe weaknesses either in terms of strategy, structure, technology or skill or in terms of management and other organizational processes and linkages.

8.1.3 Importance of the Experience of other African Countries to Ethiopia

We have seen in chapter 5 that a large number of networking projects that have a number of common features. Odedra-straub (1995) observes that most of these projects were still at pilot stages and a few users send/receive personal messages via electronic mail.

Very few of these networks are being used for the purpose of the users organization's, or host countries' development. Grant

(1995) notes also that since most African governments do not have the resources or capacity to develop electronic networking infrastructure, most of the projects have been taken up by international development agencies and NGOs. Therefore, it is not surprising that most electronic service providers in Africa are connected in some way to an international agency or NGO and has been funded for hardware, software, and staff training by these organizations. The role of international agencies in electronic network development in Africa is very pivotal and influential. This raises the question of how to ensure that the local needs of the country are being served rather than those of a foreign agency.

Lishan (1995) has found out in his survey that except in South Africa user base and influence of TCP/IP link in other countries remained minimum. The Internet users base is also very low in most of these countries. For example, Ghana, Morocco, Algeria and Uganda have fewer than 100 users. Zimbabwe and Mozambique have less than 300 users each. Zambia has some 380 users; Tunisia has 310 and Egypt about 900 users.

8.1.4 Response on the Connectivity Conditions

We can conclude from the survey that there is a fertile ground for Internet connectivity in Ethiopia in terms of telecommunication infrastructure, its acceptance, and need by potential users.

The existing telecommunication infrastructure is capable to start the Internet service in the country. It is also encouraging to note that ETA is taking initiative to give Internet as one of its new value-added services.

On the other hand, 84.5% of the respondents of the survey suggested that it is the right time for Ethiopia to be connected to the Internet. The outcome of the survey justified also that there is a need to be connected in more than one node in an organizations when we see that 67.9% of the respondents prefer that everybody should be connected to the Net. However, each organization will have a node, and users should be able to access through LAN.

It is also encouraging to observe that 53.3% of the respondents are capable of covering the cost of the Internet and 46.7% of the respondents are of the opinion that they are interested if Ethiopia is connected to the Internet as soon as possible.

8.2 RECOMMENDATIONS

Based on the findings and discussion of the survey the following recommendations are made to sustain a successful Internet connectivity in the country.

- 1) It is the right time for the country to be connected to the Internet. Therefore, it is advisable to start processing of connectivity conditions as well;
- 2) There is a need for co-ordination when one considers the overlapping in objectives and users domain among the NCIC, AAU, and HealthNert networking projects in the country;
- 3) Appropriate institution or Management body be established that will be legally responsible for monitoring the Internet service provision in the

country to ensure an appropriate service and implementation of the Internet. The management body should be lead by a board of directors containing members from the Private/Individual, Academic/Research, NGOs, Governmental, and International sectors;

- 4) Intellectual property right is becoming a major factor influencing the development of information use and its protection. Ethiopia therefore needs to adopt that a legislative framework that strikes a balance between the commitment of intellectual property as an international necessity and the provision of basic intellectual needs to the society. The government needs to establish and enforce copyright laws, as well as spread awareness to the public about intellectual property right and at the same time provide schemes for reducing the negative effects of these laws on society;
- 5) The government has an important role to play in securing citizen's privacy through adopting law to protect people against invasion of their lives through the new technologies. This will involve formulating clear policy regarding electronic recording of personal data and means for controlling its use.
- 6) The government needs to take measure or put some means of mechanism, say "filtering", to prevent pornographic and crime content of the Internet from the start than trying to cure it like in China or other countries;

- 7) Strategic information systems in education, health, financial management, transportation, law, statistics, early warning, disaster prevention and preparedness and data for planning are all required for improving and expanding strategic information system nationwide so that its access can lead to a national information infrastructure;
- 8) Telephone lines are the foundation of a national information infrastructure. In addition, their traditional role in supporting voice communications, telephone lines are used to transmit electronic messages, and exchange data. Therefore, the government needs to encourage ETA to develop its capacity to satisfy the demand of its potential customers. Besides, ETA should be encouraged to be more involved in information infrastructure development. If ETA were more entrepreneurial, it would seize the growing opportunities for providing advanced services. It would also be more cost and quality conscious. This trend would result in better procurement practices so that more equipment can be purchased with the same amount of investment. Quality of services would be improved so that value added services can be provided over the telephone network;
- 9) Attention should be given to develop a national policy which will guide the development of electronic communications in Ethiopia;

- 10) It is obvious that the government does not have resources to cover the connectivity and running costs of the Internet for certain period of time until the user base develops. Therefore, the government needs to seek funds from donors for Internet connectivity. However, the government needs to follow that the national needs of the country are being served rather than that of the sponsoring agency;
- 11) Even though, there will be enough potential user base in the country to start the Internet service, it is necessary to design user awareness programmes on national level to increase the user base. This could be done through a series of seminars and workshops to be conducted frequently to take account of benefits of the Internet. Besides, the mass media plays a critical role in spreading awareness in the country on the importance and benefits of the Internet; and
- 12) Recently, a research on the use of Geez Script on the Internet has been done from UNECA/PADIS area and the researcher demonstrated in AAU, SISA how the script should be used in the network. It was encouraging outcome in that this will solve the language barriers in communication in the future use of the Internet in the country. This is an indication that there is a future area of research work in developing a national script that will be commonly used by a large number of the population.

BIBLIOGRAPHY

1. AAAS. 1993. *Electronic Networking for Western Africa Universities: proceedings from a workshop held in Africa. Ghana; December 1993.*
2. AAAS. 1992. *Electronic networking in Africa: Advancing science and technology for development. Proceedings of all Workshop on Science and Technology Communication Networking in Africa] August 27-29, 1992 Nairobi, Kenya. Washington D.C.: AAAS.*
3. AAAS. *User's guide to Networking in Africa.*
4. Abba, L , Gebrehiwot, A ,Lazzaroni, A and Trumpy, 1995. *Status and Objectives of the RINAF Project. FID News bulletin - 45 (issue 7/8) July/August 1995.*
5. Addis Tribune. 1995. *Wiring Up to the Internet: connecting to the Internet.* Addis Ababa: November 10, 1995.
6. Aslib Publications. 1995. *Journal of Managing Information.* London: vol II (2); December 1995.
7. Baranshamaje, Etienne, Boostrom, Eugene, Brajovie, Vidoje, Cader, Masud, Clement-Jones, Hawkins, Robert, Schware, Robert, and Sloan, Hugh. 1995. *Increase Intrenet connectivity in Sub-saharan Africa: Issues, options, and World Bank group role. Paper presented at African*

regional symposium on Telematics for Development. 3-7 April 1995, Addis Ababa: ECA.

8. Barale, Ron. *Internet and the Art of the possible: Introduction to what can done on the Internet using E-mail Addis Ababa; UNECA.*
9. BITE. 1995. *Proposal for Internet connectivity in Ethiopia.* Addis Ababa:
10. BOSTID. 1995: *Internet Primer. Technology fact sheet 6 (July): 1995.*
11. Chisenga, Justin. 1995. *Users' needs for electronic connectivity: Libraries and other information centres. Paper presented at African regional symposium on Telematics for Development. 3-7 April 1995, Addis Ababa: ECA.*
12. Cochran, wolliam G.1977. *Sampling Techniques.* 3rd ed.- John Wotey and Sons, inc
13. Cronin, B; Overfelt, K; Fouchereaux, K; Manzanuile, T; Chanande, M; and Song. 1994. *The Internet and Competitive Intelligence: A survey of current practice. International Journal of Information Management, 14 (No 3).*
14. Djamen, Jean-Yves. 1995. *Networking in Africa:An unavoidable evolution towards the Internet. Paper presented at*

African regional symposium on Telematics for Development. 3-7 April 1995, Addis Ababa: ECA.

15. Ernberg, Johan. 1995. Towards a new Paradigm for International cooperation; Telematics and computer networks-tools for sustainable development of rural and "remote" regions and countries. Paper presented at African regional symposium on Telematics for Development. 3-7 April 1995, Addis Ababa: ECA.
16. Evans, Ruth. 1996. Internet in Africa. *BBC Focus on Africa*. London: January-March 1996.
17. Falk, Bennett, 1994. *The Internet Roadmap*. 2nd ed. San Francisco; SYBEX inc.
18. Feibel, Wernner. 1995. *Novell's complete Encyclopedia of Networking*. SYBEX INC.
19. Gaffin, Adam. 1994. *Everybody's Guide to the Internet*. Massachusetts: electronic Frontier foundation.
20. Godard, Panl. 1994. *Electronic Networking in Africa: Preliminary Analysis*. Belgium.
21. Godard, Paul. 1995. Africa and science: The availability of computer communications. Paper presented at African regional symposium on Telematics for Development. 3-7 April 1995, Addis Ababa: ECA.
22. Grant, Gerald. 1995. Implementing electronic networking in Africa: Paper presented at African regional symposium

on Telematics for Development. 3-7 April 1995, Addis Ababa: ECA.

23. Heldman, Robert K. 1992. *Global Telecommunications: Layered networks' layered services.* McGraw-Hill, inc.
24. Jegede, Olngebemiro F. 1995. From Talking Drums to Electronic Networking Africa's Snailmobile through the Cyberspace. *FID News Bulletin - 45 (issue 7/8).* July/August, 1995.
25. Jengen, Mike. 1995. Low cost Global Electronic Communications System for Africa. *FID News bulletin - 45 (issue 7/8) July/August 1995.*
26. Jensen, Michael 1995. Telemstics for Africa in a Global context. *Paper presented at African regional symposium on Telematics for Development. 3-7 April 1995, Addis Ababa: ECA.*
27. Kebnoe, Brendan P. 1993. *Zen and the Art of the Internet.* Eaglewood Cliffs; Prentice-Hall, inc.
28. Krol, Ed. 1994. *The Whole Internet: User's Guide and catalog.* 2nd ed. O'reilly and Associates Inc.
29. Lindsey, George, Novak, Keen, and Balson, David. 1994. *The CGNET STORY: A case study of International computer networking.* Ottawa: International Development Research Centre, Canada.

30. Lishan Adam. 1995. Electronic communications Technology and Development in Africa. *FID News Bulletin* - 45 (10) October 1995.
31. Minges, Michael- 1995. Towards An African Information Infrastructure. Paper presented at African regional symposium on Telematics for Development. 3-7 April 1995, Addis Ababa: ECA.
32. McConnel, Paul, 1995. Making a Differences: Measuring the impact of Information on development. *Proceedings of a workshop held in Ottawa, Canada, 10-12 July 1995.* Ottawa: IDRC, Canada.
33. Newsweek. 1996. *Whose Internet Is It?*. April 22, 1996.
34. Nostbakken, David and Akhtar, Shahid, 1995. Does the Highway to the south ? Southern Perspectives on the Information highway. Paper presented at African regional symposium on Telematics for Development. 3-7 April 1995, Addis Ababa: ECA.
35. Odedra-Starub, Mayari, 1995. Contemporary Issues in Electronic Communications in Africa; A Summary of the Addis Ababa Symposium. *FID News bulletin* - 45 (issue 7/8) July/August 1995.
36. Oppendeium, Charles and Associates. 1996. Legal issues of concern to the library and information sector. *LISLEX. Journal of Information Science.* 22 (1) 1996, pp.55-62.

37. Sadawsky, George. 1993. Networking Connectivity For Developing countries. *Communication of ACM*, 36 (8), 42-47.
38. Wartz, Michal F. and Cluartermann, Johns. 1993. The changing global Internet Services Infrastructure. *Internet Research*. 3(1) Fall 1993, pp. 8-25.
39. Semeret, Nemo. 1995. *Recommendation for AAU Departmental Computer Networking*. Addis Ababa: UNECA/PADIS.
40. Shaw, V.A. 1992. Academic and research Networking in Southern Africa; the UNINET-ZA Experience. *Proceedings of INET'92, Kobe - Japan: Internet Society*.
41. Tennant, Rpy. 1992. *Internet Basics*. New York: ERIC Digest.
42. UNECA. 1996. Building Africa's Information highway. Paper presented on the Ninth session of the Conference of African planners, Statisticians, and population and Information Specialists, Addis Ababa. 11-16 March 1996.
43. UNECA/CABECA. 1995. Directory of electronic communications in Africa. Paper presented at African regional symposium on Telematics for Development. 3-7 April 1995, Addis Ababa: ECA.
44. Vowler, Julia. 1995. Archbishop fears evil influence of Internet. *computer weekly*. reed Business Publishing Group. August 10, 1995, p 6 (1)

45. Walker, Thomas D. 1994. Libraries and the Internet. *Library Trends* 42(4) .PP. 585-758.
46. Walker, David. 1995. Telematics: A solution resource for education. Paper presented at African regional symposium on Telematics for Development. 3-7 April 1995, Addis Ababa: ECA.
47. White, D. Wendy. 1994. Outreach programs for the Information Highway design programs for all. Paper presented at NIT '94 7th International conference. November 18-20, 1994. Alexandria, virginia.

ADDIS ABABA UNIVERSITY

SCHOOL OF INFORMATION STUDIES FOR AFRICA

This questionnaire is prepared to study the Opportunities and connectivity Conditions of Internet in Ethiopia.

Your help in filling out the questionnaire will assist to carry out the study to the effect required, and discussions related to the questionnaire are highly welcome.

Please complete the questionnaire at your earliest convenience.

Thank you for your time and thoughtfulness in filling out this questionnaire.

ANNEX 1 : QUESTIONNAIRE

ANNEX 1.1: GROUP I

IDENTIFICATION

Name of the organization/Institute _____

Address _____

E_mail _____

Telephone _____

* Do you have any idea about the Internet? Yes No

Note:- 1) Please read the following if your answer to the above question is NO, if not you leave this box and go to the following questions.

2) Please mark [x] on the space provided on the right hand side for each item given based on your preference.

What is the INTERNET?

The Internet is a cooperative computer network of networks that links governments, schools, libraries, corporations, individuals, and others to each other and to vast information resources. The Internet protocol links many disparate and independent networks together so that they appear as a single network to the user.

THE FOLLOWING POINTS ARE THE BENEFITS THAT A PRIVATE, AN INDIVIDUAL OR A BUSINESSMAN GETS FROM THE INTERNET INFORMATION. WHAT IS YOUR REACTION TOWARDS EACH OF THESE BENEFITS?

SPECIAL ADVANTAGES/BENEFITS OF THE INTERNET

YOUR COMMENT

to participate in a number of discussion group

Fully Agree Partially Agree Disagree Not Aware

to get current information on the stock market

Fully Agree Partially Agree Disagree Not Aware

to agricultural and National resources

Fully Agree Partially Agree Disagree Not

to evaluate economic factors in selecting

Fully Agree Partially Agree Disagree Not Aware

investment area

to participate in Global tender

Fully Agree Partially Agree Disagree Not Aware

job opportunities

Fully Agree Partially Agree Disagree Not Aware

physical distance and Political boundaries

less significant in communication

Fully Agree Partially Agree Disagree Not Aware

Non-formal and non-sectoral communication,

allows strangers to be more familiar	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
enables International cultural exchange between	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
people	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
helps National businessmen in the country from	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
going to abroad	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
helps to prevent possible National disaster	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
source of Information on History, geography, etc	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
about the world and Ethiopia	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
an excellent medium for National and International	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
communication	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
Would you mention any other benefits that you	
think of	

THE FOLLOWING POINTS ARE SOME OF THE DISADVANTAGES OR PITFALLS THAT A PRIVATE, AN INDIVIDUAL OR A BUSINESSMAN FACES FROM INTERNET CONNECTIVITY. WHAT IS YOUR REACTION FOR EACH OF THE ITEMS LISTED BELOW?

DISADVANTAGES/PITFALLS OF THE INTERNET

Y O U R C O M M E N T

security problems in terms of documents,	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
copyright rights etc	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
questionable nature of dubious reliability	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
information	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
information overload	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
shopping on the Internet is a difficult job	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
contentive issues like pornography, crime etc.	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
are more publicized	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
employees may spend their working hours on playing	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
games and their shopping activities	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
run out of budget due to over expenses that	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
arise from the use the Internet	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
lead to cultural domination	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
lead to creation of information elites while the	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
majority may be further marginalised	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware

EX 1.2 : GROUP II

IDENTIFICATION

Name of the organization/Institute _____
 Address _____
 Email _____
 Telephone _____

* Do you have any idea about the Internet? Yes No

Note:- 1) Please read the following if your answer to the above question is
 NO, if not you leave this box and go to the following questions.

2) Please mark [x] on the space provided on the right hand side for each of items given
 based on your preference.

What is the INTERNET?

The Internet is a cooperative computer network of networks that links governments, schools, libraries, corporations, individuals, and others to each other and to vast information resources. The Internet protocol links many disparate and independent networks together so that they appear as a single network to the user.

ALLOWING ARE SOME OF THE ADVANTAGES OR BENEFITS THAT AN ACADEMICIAN OR A RESEARCHER GETS FROM THE INTERNET SERVICES.
 IS YOUR REACTION TOWARDS EACH OF THESE BENEFITS?

INITIAL ADVANTAGES/BENEFITS OF THE INTERNET

Y O U R C O M M E N T

to participate in a number of discussion group	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
creates job opportunities	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
Overcomes geographical distance and Political boundaries	
becomes less significant in communication	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
allows Non-formal and non-sectoral communication,	
allows strangers to be more familiar	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
enables International cultural exchange between	
enables Scientists/Experts in the country from	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
travelling to abroad	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
access to agricultural and National resources	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
allows access to automatic and immediate delivery of	

cial health alerts	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
ce of Information on History, geography, etc	
ut the world and Ethiopia	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
ellent medium for National and International	
um	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
ortunities to report statistics on National or	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
ernational basis	
chnical Cooperation among Developing Countries	
OC) through direct information interchange	
international	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
laboration in research with colleagues outside Ethiopia	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
s to exchange ideas/opinion on research funds/projects	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
s to access reference information on home pages	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
ss to scholarly journals or papers	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
ishing research results	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
cient transfer of technology to and from Ethiopia	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
der availability of research materials	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
ndance to electronic conferencing	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
ss to Interactive text books	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
ss to experimental software for different fields	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
nces library services	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
d you mention any other benefits that you	
nk of	

OWING ARE SOME OF THE DISADVANTAGES OR PITFALLS THAT AN ACADEMICIAN OR A RESEARCHER FACES FROM THE INTERNET SERVICES.
YOUR REACTION TOWARDS EACH OF THESE BENEFITS?

DISADVANTAGES/PITFALLS OF THE INTERNET

Y O U R C O M M E N T

ty problems in terms of documents,	
rights etc	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
onable nature of dubious reliability	
ormation	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
ation overload	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
ting on the Internet is a difficult job	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
ive issues like pornography, crime etc.	
more publicized	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
ees may spend their working hours on playing	

es and their shopping activities

Fully Agree Partially Agree Disagree Not Aware

ds out of budget due to over expenses that

Fully Agree Partially Agree Disagree Not Aware

ses from the use the Internet

Fully Agree Partially Agree Disagree Not Aware

perty and copy rights problem

Fully Agree Partially Agree Disagree Not Aware

ds to cultural domination

ads to creation of information elites while the

Fully Agree Partially Agree Disagree Not Aware

ority may be further marginalised

INFORMATION NEEDS/EXPERIENCE

Y O U R C O M M E N T

h of the following Internet services

E-mail File transfer

ou require?

Database access

type of information you need in terms of format

Usenet news groups

On-line video conferencing

type of information you need in terms of content

Text Video Static graphics

Sound

is your level of experience?

Research data Discussion

Inter and Intra-organizational communication

Technical report Financial report

contribution to the National Network

No experience Application oriented

Operation system aware Network administrator

Script writer Programmer

Establish database

Publishing on information gathering by the organization

Development of tutorials and on-line help

Write program scripts for network administration

Provide training

ACTIVITY ISSUES

Y O U R C O M M E N T

suggestion on bringing Internet to Ethiopia

I don't think it is necessary to the country compared to its other problems

It is the right time for the country to be connected to the Internet

E-mail service is enough for time being

u prefer that everybody be connected

Yes No

e Internet in your Institution/Organization

Yes No

ou capable of covering the cost for

oving the infrastructure and the services given

u suggest that bringing Internet to Ethiopia

ecessary, how soon will it be implemented?

As soon as possible Within 1 year

Within 2 years I can't guess

EX 1.3 : GROUP III

IDENTIFICATION

Name of the organization/Institute _____
 Address _____
 Telephone _____

* Do you have any idea about the Internet? Yes No

Note:- 1) Please read the following if your answer to the above question is NO, if not you leave this box and go to the following questions.

2) Please mark [x] on the space provided on the right hand side for each items given based on your preference.

What is the INTERNET?

The Internet is a cooperative computer network of networks that links governments, schools, libraries, corporations, individuals, and others to each other and to vast information resources. The Internet protocol links many disparate and independent networks together so that they appear as a single network to the user.

LOWING POINTS ARE THE ADVANTAGES OR BENEFITS THAT A NON-GOVERNMENTAL ORGANIZATION GETS FROM THE INTERNET SERVICES. WHAT REACTION TOWARDS EACH OF THE BENEFITS?

ADVANTAGES/BENEFITS OF THE INTERNET

YOUR COMMENT

participate in a number of discussion group	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
creates job opportunities	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
geographical distance and Political boundaries				
is less significant in communication	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
non-formal and non-sectoral communication,				
allows strangers to be more familiar	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
enables International cultural exchange between				
	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
access to agricultural and National resources	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
access to automatic and immediate delivery of				
global health alerts	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
measures to prevent possible National disaster	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
measures to evaluate economic factors in selecting				

investment area Fully Agree Partially Agree Disagree Not Aware

Source of Information on History, geography, etc

about the world and Ethiopia Fully Agree Partially Agree Disagree Not Aware

Excellent medium for National and International

forum Fully Agree Partially Agree Disagree Not Aware

opportunities to report statistics on National or

international basis Fully Agree Partially Agree Disagree Not Aware

Technical Cooperation among Developing Countries

(TDC) through direct information interchange

or international Fully Agree Partially Agree Disagree Not Aware

serves as Additional links with Embassies and

consular Fully Agree Partially Agree Disagree Not Aware

could you mention any other benefits that you

think of

FOLLOWING POINTS ARE SOME OF THE DISADVANTAGES OR PITFALLS THAT A NON-GOVERNMENTAL ORGANIZATION FACES FROM THE INTERNET
 USES. WHAT IS YOUR REACTION TOWARDS EACH OF THE BENEFITS?

ADVANTAGES/PITFALLS OF THE INTERNET

Y O U R C O M M E N T

security problems in terms of documents, Fully Agree Partially Agree Disagree Not Aware

intellectual rights etc Fully Agree Partially Agree Disagree Not Aware

questionable nature of dubious reliability Fully Agree Partially Agree Disagree Not Aware

information Fully Agree Partially Agree Disagree Not Aware

information overload Fully Agree Partially Agree Disagree Not Aware

posting on the Internet is a difficult job Fully Agree Partially Agree Disagree Not Aware

sensitive issues like pornography, crime etc. Fully Agree Partially Agree Disagree Not Aware

to be more publicized Fully Agree Partially Agree Disagree Not Aware

employees may spend their working hours on playing Fully Agree Partially Agree Disagree Not Aware

games and their shopping activities Fully Agree Partially Agree Disagree Not Aware

runs out of budget due to over expenses that Fully Agree Partially Agree Disagree Not Aware

arises from the use the Internet Fully Agree Partially Agree Disagree Not Aware

leads to cultural domination Fully Agree Partially Agree Disagree Not Aware

leads to creation of information elites while the Fully Agree Partially Agree Disagree Not Aware

minority may be further marginalised Fully Agree Partially Agree Disagree Not Aware

INFORMATION NEEDS/EXPERIENCE

Y O U R C O M M E N T S

each of the following Internet services E-mail File transfer

you require? Data base access

Usenet news groups

On-line video conferencing

type of information you need in terms of format text video static graphics

sound

type of information you need in terms of content research data discussion

inter and intra-organizational communication

What is your level of experience?

- technical report financial report
- No experience Application oriented
- Operation system aware Network administrator
- Script writer Programmer

What is your contribution to the National Network?

- Establishing databases
- Publishing of information gathering by the organization
- Development of tutorials and o-line help
- Write programs scripts for network administration
- Provide training

OBJECTIVITY ISSUES

What is your suggestion on bringing Internet to Ethiopia?

- I don't think it is necessary to the country compared to its other problems
- It is the right time for the country to be connected to the Internet
- E-mail service is enough for time being

Do you prefer that everybody be connected?

- Yes No

Do you have the Internet in your Institution/Organization?

- Yes No

Are you capable of covering the cost for providing the infrastructure and the services given?

Do you suggest that bringing Internet to Ethiopia is necessary, how soon will it be implemented?

- as soon as possible within 1 year
- within 2 years I can't guess

EX 1.4 : GROUP IV

IDENTIFICATION

Name of the organization/Institute _____
 Address _____
 Mail _____
 Telephone _____

* Do you have any idea about the Internet? Yes No

- Note:-** 1) Please read the following if your answer to the above question is NO, if not you leave this box and go to the following questions.
 2) Please mark [x] on the space provided on the right hand side for each item given based on your preference.

What is the INTERNET?

The Internet is a cooperative network of networks that links governments, schools, libraries, corporations, individuals, and others to each other and to vast information resources. The Internet protocol links many disparate and independent networks together so that they appear as a single network to the user.

HOWING ARE SOME OF THE ADVANTAGES OR BENEFITS THAT A GOVERNMENTAL ORGANIZATION GETS FROM THE INTERNET SERVICES. WHAT IS YOUR REACTION TOWARDS THESE BENEFITS?

ADVANTAGES/BENEFITS OF THE INTERNET

Y O U R C O M M E N T

to participate in a number of discussion group	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
creates job opportunities	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
geographical distance and Political boundaries	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
less significant in communication	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
Non-formal and non-sectoral communication,	
allows strangers to be more familiar	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
enables International cultural exchange between	
Scientists, Experts and businessmen	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
country from flying to abroad	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
access to agricultural and National resources	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
leads to automatic and immediate delivery of	
national health alerts	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
helps to prevent possible National disaster	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
enables to evaluate economic factors in selecting	
investment area	<input type="checkbox"/> Fully Agree <input type="checkbox"/> Partially Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Not Aware
availability of Information on History, geography, etc	

ut the world and Ethiopia
 ellent medium for National and International
 um
 ortunities to report statistics on National or
 ernational basis
 nical Cooperation among Developing Countries
 OC) through direct information interchange
 International
 s as a tool for democratization, education,
 community development
 the country greater visibility within the
 national political community
 s as an additional links to Embassies and Consular
 des a very cost effective means to promote Tourism
 you mention any other benefits that you
 of

- Fully Agree Partially Agree Disagree Not Aware
- Fully Agree Partially Agree Disagree Not Aware
- Fully Agree Partially Agree Disagree Not Aware
- Fully Agree Partially Agree Disagree Not Aware
- Fully Agree Partially Agree Disagree Not Aware
- Fully Agree Partially Agree Disagree Not Aware
- Fully Agree Partially Agree Disagree Not Aware
- Fully Agree Partially Agree Disagree Not Aware
- Fully Agree Partially Agree Disagree Not Aware
- Fully Agree Partially Agree Disagree Not Aware

OWING ARE SOME OF THE DISADVANTAGES OR BENEFITS THAT A GOVERNMENTAL ORGANIZATION FACES FROM THE INTERNET SERVICES. WHAT
 REACTION TOWARDS THESE BENEFITS?

ADVANTAGES/PITFALLS OF THE INTERNET

Y O U R C O M M E N T

ity problems in terms of documents,
 rights etc
 onable nature of dubious reliability
 formation
 ation overload
 ating on the Internet is a difficult job
 ive issues like pornography, crime etc.
 e more publicized
 ees may spend their working hours on playing
 and their shopping activities
 out of budget due to over expenses that
 e from the use the Internet
 to cultural dominations
 to creation of information elites while the
 ty may be further marginalised

- Fully Agree Partially Agree Disagree Not Aware
- Fully Agree Partially Agree Disagree Not Aware
- Fully Agree Partially Agree Disagree Not Aware
- Fully Agree Partially Agree Disagree Not Aware
- Fully Agree Partially Agree Disagree Not Aware
- Fully Agree Partially Agree Disagree Not Aware
- Fully Agree Partially Agree Disagree Not Aware
- Fully Agree Partially Agree Disagree Not Aware
- Fully Agree Partially Agree Disagree Not Aware

INFORMATION NEEDS/EXPERIENCE

Y O U R C O M M E N T

of the following Internet services
 require?
 pe of information you need in terms of format
 pe of information you need in terms of content

- E-mail File transfer
- Database access
- Usenet news groups
- On-line video conferencing
- Text Video Static graphics
- Sound
- Research data discussion

What is your level of experience?

- Inter and Intra-organizational communication
- technical report financial report
- No experience Application oriented
- Operation system aware Network administrator

What is your contribution to the National Network?

- Script writer Programmer
- Establishing databases
- Publishing of information gathering by the organization
- Development of tutorials and on-line help
- Write programs scripts for network administration
- Provide training

ACTIVITY ISSUES

What is your suggestion on bringing Internet to Ethiopia?

Y O U R C O M M E N T

- I don't think it is necessary to the country compared to its other problems
- It is the right time for the country to be connected to the Internet
- E-mail service is enough for time being

Do you prefer that everybody be connected to the Internet in your Institution/Organization?

- Yes No

Are you capable of covering the cost for providing the infrastructure and the services given?

- Yes No

If you suggest that bringing Internet to Ethiopia is necessary, how soon will it be implemented?

- As soon as possible Within 1 year
- Within 2 years I can't guess

out the world and Ethiopia	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
cellent medium for National and International	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
rum	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
ortunities to report statistics on National or	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
ernational basis	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
hnical Cooperation among Developing Countries	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
DC) through direct information interchange	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
international	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
aboration in research with colleagues outside Ethiopia	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
s to exchange ideas/opinion on research funds/projects	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
ps to access reference information on home pages	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
ess to scholarly journals or papers	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
lishing research results	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
icient transfer of technology to and from Ethiopia	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
nder availability of research materials	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
endance to electronic conferencing	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
ss to Interactive text books	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
ss to experimental software for different fields	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
ances library services	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
es additional links to Embassies and Consular	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
rtunities to work with Multilateral and Bilateral	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
velopment Agencies	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
d you mention any other benefits that you				
k of				

OWING ARE SOME OF THE DISADVANTAGES OR PITFALLS THAT AN INTERNATIONAL ORGANIZATION FACES FROM THE INTERNET SERVICES.
YOUR REACTION TOWARDS EACH OF THE BENEFITS?

ADVANTAGES/PITFALLS OF THE INTERNET

Y O U R C O M M E N T

ity problems in terms of documents,	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
t rights etc	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
ionable nature of dubious reliability	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
formation	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
ation overload	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
ating on the Internet is a difficult job	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
ive issues like pornography, crime etc.	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
e more publicized	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
ees may spend their working hours on playing	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
and their shopping activities	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
out of budget due to over expenses that	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
s from the use the Internet	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
to cultural domination	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware
to creation of information elites while the	<input type="checkbox"/> Fully Agree	<input type="checkbox"/> Partially Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Not Aware

majority may be further marginalised

Fully Agree Partially Agree Disagree Not Aware

YOUR INFORMATION NEEDS/EXPERIENCE

Which of the following Internet services do you require?

What type of information do you need in terms of format

What type of information do you need in terms of content

What is your level of experience?

What is your contribution to the National Network

YOUR COMMENT

- E-mail File transfer
- Data base access
- Usenet news groups
- On-line video conferencing
- Text video static graphics
- Sound
- Research data discussion
- Inter and intra-organizational communication
- Technical report financial report
- No experience Application oriented
- Operation system aware Network administrator
- Script writer Programmer
- Establish databases
- Publishing of information gathering by the organization
- Development of tutorials and on-line help
- Write programs scripts for network administration
- Provide training

ACTIVITY ISSUES

What is your suggestion on bringing Internet to Ethiopia

Do you prefer that everybody be connected

Can you have the Internet in your Institution/Organization

Are you capable of covering the cost for

Improving the infrastructure and the services given

Do you suggest that bringing Internet to Ethiopia

If necessary, how soon will it be implemented?

YOUR COMMENTS

- I don't think it is necessary to the country compared to its other problems
- It is the right time for the country to be connected to the Internet
- E-mail service is enough for time being
- Yes No
- Yes No
- As soon as possible within 1 year
- Within 2 years I can't guess

ANNEX 2 : STRUCTURED INTERVIEW

"OPPORTUNITIES OF THE INTERNET IN
ETHIOPIA
AND CONNECTIVITY CONDITIONS"

(INTERVIEW GUIDE)

I. On the potential advantages/Benefits of the Internet

1. What are the possible advantages/benefits of Internet in Ethiopian situations?
2. What is the opinion of potential Internet users on the benefits of the Internet in Ethiopia ?

II. On the disadvantages/pitfalls of the Internet

1. What are the pitfalls of Internet in its practical applications?
2. Do you think there are solutions to the pitfalls of the Internet? could you mention some of them?

III. On the Internet information services

1. Which of the following Internet services are required in Ethiopia base on their priority?
 - E-mail File transfer
 - Database access
 - Usenet news groups
 - On-line video conferencing

2. What type of information do you need in terms of format? and why?
 - Text
 - Video
 - Static graphics
 - Sound

3. What type of information do you need in terms of content? and why?
 - Research data
 - Discussion
 - Inter and intra-organizational communication
 - Technical report
 - Financial report

4. What do you think on the level of experience of e_mail users in Ethiopia?
 - Most of them have no experience
 - Most of them are application oriented

- Most of them are operation system aware
- Some of them are network administrators
- Some of them are script writers
- Some of them are programmers

IV. *Connectivity Conditions*

1. What is your opinion on bringing Internet to Ethiopia?

- I don't think it is necessary to the country
- compared to its other problems
- It is the right time for the country to be connected to the Internet
- E_mail service is enough for time being

2. Do you prefer that everybody be connected to the Internet in your Institution/Organization?

3. Are you capable of covering the cost for improving the infrastructure and the services given? and why?

4. If you suggest that bringing Internet to Ethiopia is necessary, how soon will it be implemented? and why?

- As soon as possible
- Within 1 year
- Within 2 years
- I can't guess

ANNEX 3 : PADISNET POINT LIST E-MAIL

USERS

;A PADISnet point list for January 1996

;AAU = Addis Ababa University

;a semi-colon before the user means they are presently inactive

BOSS,5:751/1

,2,Croce_Gabriella,Addis_Ababa_Ethiopia,private,-unlisted-,2400,
,3,Thomas_Tilson,Addis_Ababa_Ethiopia,private,-unlisted-,14400,
,4,Thomas_Tilson,BESO_Awassa,Addis_Ababa,-unlisted-,14400,
,5,Paulos_Gorfu,Addis_Ababa_Ethiopia,private,-unlisted-,2400,
,6,Minas_Hiruy,HOPE_Enterprises,Addis_Ababa,-unlisted-,14400,
,7,C.H.de_Graaf,SNV,Addis_Ababa,-unlisted-,2400,
,8,Sheba_Computer_Center_plc,Elizabeth_Yohannes_Abraham,Addis_Ababa_Ethiopia,-unlisted-,2400,
,9,UNECA,Daniel_Yacob,Addis_Ababa,-unlisted-,14400,
,10,UNECA,Poanne_Cabrera,Addis_Ababa_Ethiopia,-unlisted-,2400,
,11,Van_den_Heuy,ECA_Addis,Heuy,-unlisted-,2400,
,12,Bethlehm_Teshager,PADIS_Addis_Ababa,Betty,-unlisted-,2400,
,13,Haile_Menkerios,Addis_Ababa_Ethiopia,Haile_Menkerios,-unlisted-,2400,
,14,Indrias_Getachew,Addis_Ababa_Ethiopia,-unlisted,2400,
,15,Edward_Tiagha,ECA_IHSD,tiaghae,-unlisted-,2400,
,16,Brown,Itu_Addis,Brown,-unlisted-,2400,
,17,Mesfin_Woldemariam,Addis_Ababa_Ethiopia,-unlisted-,2400,
,18,National_Herbarium,AAU_Addis_Ababa,-unlisted-,2440,
,19,Walter_Cabrera,Addis_Ababa_Ethiopia,Wcabrera,-unlisted-,2400,

,20,Lutheran_World_Federation,Addis_Ababa_Ethiopia,LWF,-unlisted,-2400,
,21,Maurizio_Melloni,Addis_Ababa_Ethiopia,Maurizio_Melloni,-unlisted-,14400,
,22,George_Abalu,ECA,Abalu,-unlisted-,2400,
,23,CISP,Addis_Ababa_Ethiopia,Dolly_Mattosovich,-unlisted-,14400,
,24,Vladimir_Petkov,Addis_Ababa_Ethiopia,Vladimir_Petkov,-unlisted-,2400,
,25,Thomas_musa,Addis_Ababa_Ethiopia,Thomas_Musa,-unlisted-,2400,
,26,UNECA,Addis_Ababa_Ethiopia,Mebo_Mwaniki,-unlisted-,2400,
,27,J_Astill_Brown,Addis_Ababa_Ethiopia,J-Astill_Brown,-unlisted-,9600,
,28,KJAERETH,Addis_Ababa_Ethiopia,-unlisted-,9600,
,29,SNV_Ethiopia,Addis_Ababa_Ethiopia,-unlisted-,2400,
,30,Markos_Kebede,MARTRADET,Addis_Ababa_Ethiopia,-unlisted-,9600
,31,Wallia_Tannery,WAM,Addis_Ababa_Ethiopia,-unlisted-,14.4
,32,Food_For_The_Hungry,Addis_Ababa_Ethiopia,Paul_Erickson,-unlisted-,2400,
,33,Save_the_Children_(US),Addis_Ababa_Ethiopia,Chris_Purdy,-unlisted-,2400,
,34,Eygenraam_WIHE,Addis_Ababa_Ethiopia,Eygen,-unlisted-,2400,
,35,TDA_Addis,Addis_Ababa_Ethiopia,TDA_Addis,-unlisted-,2400,
,36,Saddik_Solbi,PADIS_Addis_Ababa,Solbi,-unlisted-,2400,
,37,Donald_Holsinger,Addis_Ababa_Ethiopia,-unlisted-,28.8
,38,Farm_Africa,Addis_Ababa_Ethiopia,Samson_Hailu,-unlisted-,2400,
,39,USAID,Addis_Ababa_Ethiopia,William_Douglass,-unlisted-,2400,
,40,Norwegian_Church_Aid,Addis_Ababa_Ethiopia,Inge_Herman,-unlisted-,2400,

,41,Geography_AAU,Addis_Ababa_Ethiopia,Helmut_Schrenk,-unlisted-,2400,

,42,Mennonite_Mission_Ethiopia,Addis_Ababa_Ethiopia,Mennonite,-unlisted-,2400,

,43,Department_of-Geology,Addis_Ababa_Ethiopia,Geology,-unlisted-,2400,

,44,Vahak_Karibian,Addis_Ethiopia,Karibian,-unlisted-,14.4,

,45,MAP,Addis_Ababa_Ethiopia,Alemayehu_Negash,-unlisted-,2400

,46,Private,Addis_Ababa_Ethiopia,Stephen_Schwartz,-unlisted-,2400,

,47,Neurology,Addis_Ababa_Ethiopia,Redda_Teklehamanot,-unlisted-,2400,

,48,BETA,Tewodros_Mekonnen,Addis_Ababa,Ethiopia,-unlisted-,14.4,

,49,Francis_Inganji,PADIS_Addis_Ababa,Inganji,-unlisted-,2400,

,50,PADISnet_Administration,Addis_Ababa_Ethiopia,Hirut_Mammo,-unlisted-,2400,

,51,Peace_Corps_Ethiopia,Addis_Ababa_Ethiopia,Hill_Denham,-unlisted-,2400,

,52,Frew_Dubale,PADIS-Addis_Ababa_Ethiopia,Frew,-unlisted-,2400,

,53,Mansourou_Chitou,Addis_Ababa_Ethiopia,mchitou,-unlisted-,2400,

,54,Tambek_International,Addis_Ababa_Ethiopia,Menbere_Seyoum,-unlisted-,2400,

,55,Pankhurst,Addis_Ababa_Ethiopia,Pankhurst,-unlisted-,2400,

,56,PCUSA,Addis_Ababa_Ethiopia,Tedd_Roos,-251-1-753656,2400,

,57,Michael_Shebelle,Addis_Ababa_Ethiopia,Michael_Shebelle,-251-1-611388,2400,

,58,Private,Addis_Ababa_Ethiopia,Thomas_Gibson,-unlisted-,2400,

,59,Radda_Barnen,Addis_Ababa_Ethiopia,Radda_Barnen,-unlisted-,2400,

,60,AJDC,Addis_Ababa_Ethiopia,Rick_Hodes,-unlisted-,2400,

,61,Baptist_Mission_Ethiopia,Addis_Ababa_Ethiopia,Robert_Lundq
uist,-unlisted-,2400,
,62,Institute_of_Language_Studies,Addis_Ababa_Ethiopia,Dr._Geb
remedhin_Simon,-unlisted-,2400
,63,Bingham_Academy,Addis_Ababa_Ethiopia,Bingham,-unlisted-,2400,
,64,Ethiopian_Management_Instiute,Addis_Ababa_Ethiopia,Daniel_
Tuffa,-unlisted ,2400,
,65,UNECA_Industry,Addis_Ababa_Ethiopia,Awa_Fall,-unlisted-,2400,
,66,PSI_ADDIS,Addis_Ababa_Ethiopia,PSI_ADDIS,-unlisted,9600,
,67,CARE_Ethiopia,Addis_Ababa_Ethiopia,Tewodros_Demissie,-unli
sted-.2400,
,68,Margis_befekadu,Addis_Ababa_Ethiopia,Margis_Befekadu,-unli
sted-,2400,
,69,Stephen_Anderson,Addis_Ababa_Ethiopia,Stephen_Anderson,-un
listed-,14400,
,70,Paolo_Mattei,EEC_Addis_Ababa_ethiopia,Paolo_Mattei,-unlist
ed-,2400,
,71,Keith_Ketchum,Addis_Ababa_Ethiopia,Keith_Ketchum,-unlisted
-,2400,
,72,JTO_Dessie,Dessie_Ethiopia,Sisay_Amanuel,-unlisted-,2400,
,73,Arbaminch_Water_Technology_Institute,Arbaminch_Ethiopia,Da
niel_Schotanus,-unlisted-,2400,
,74,CIMMYT_ETHIOPIA,Addis_Ababa_Ethiopia,-unlisted-,2400,
,75,Martin_Anthony_Hall,Addis_Ababa_Ethiopia,Tony_Hall,-unlist
ed-,2400,
,76,IDR,Addis_Ababa_Ethiopia,Abdulhamid_Bedri_Kello,-unlisted-
,2400,
,77,Bluye,Addis_Ababa_Ethiopia,Bluye,-unlisted-,2400,
,78,Geography,Addis_Ababa,Geography,-unlisted-,2400,
,79,phys,Addis_Ababa_University,Siegfried_Tesch,-unlisted-,2400,
,80,AAFS,Fistula_hospital,Steven_Arrowsmith,-unlisted-,2400,

, 81, Anders_Jeppsson, Addis_Ababa_Ethiopia, Anders, -unlisted-, 2400,
, 82, REST, Addis_Ababa_Ethiopia, Relief_Society_Tigray, -unlisted-
, 2400,
, 83, jugessur, ESA_Science_&_Technology, Soodursun_Jugessur, -unli
sted-, 2400,
, 84, ILCA_Addis, Addis_Ababa_Ethiopia, Sagary_Nokoe, -unlisted-, 2400,
, 85, ILCA-Debre_Zeit, Debre_Zeit_Ethiopia, ILCA_Debre_Zeit, -unlis
ted-, 2400,
, 86, Wondmagegnehu_Gizaw, Addis_Ababa_Ethiopia, Feed_the_children
, -unlisted-, 2400,
, 87, Wondimagengnehu_Gizaw, Addis_Ababa_Ethiopia, Wondim, -unliste
d-, 2400,
, 88, SOS_Sahel_International, Addis_Ababa_Ethiopia, Daniel_Tessem
a, -unlisted-, 2400,
, 89, CIDA_PSU, Addis_Ababa_Ethiopia, Heinz_Freyer, -unlisted-, 2400,
, 90, Abeba, Addis_Ababa_Ethiopia, ILCA_Computer, -unlisted-, 2400,
, 91, ILCA_Breeding, Addis_Ababa_Ethiopia, ILCA_Breeding, -unlisted
-, 2400,
, 92, ILCA_SESD, Addis_Ababa_Ethiopia, ILCA_SESD, -unlisted-, 2400,
, 93, ILCA_ADMIN, Addis_Ababa_Ethiopia, ILCA_ADMIN, -unlisted-, 2400,
, 94, ILCA_DTI, Addis_Ababa_Ethiopia, ILCA_DTI, -unlisted-, 2400,
, 95, ILCA_Debreberhan, Debreberhan_Ethiopia, ILCA_Debreberhan, -un
listed-, 2400,
, 96, ILCA_Holleta, Addis_Ababa_Ethiopia, ILCA_holleta, -unlisted-,
2400,
, 97, ILCA_Hostel, Addis_Ababa_Ethiopia, ILCA_Hostel, -unlisted-, 2400,
, 98, fitzhugh, Addis_Ababa_Ethiopia, fitzhugh, -unlisted-, 2400,
, 99, ILCA_DG, Addis_Ababa, ILCA_Debris_Zeit, -unlisted-, 2400,
, 100, PADIS, Addis_Ababa_Ethiopia, Lishan_Adam, -Unlisted-, 2400,
, 101, PADIS, Addis_Ababa_Ethiopia, Nancy_Hafkin, -Unlisted-, 2400,

,102,Mekane_Yesus_Seminary,Addis_Ababa_Ethiopia,Jonny_Bakke,-unlisted-,2400,

,103,Bettya,Kysifa,Addis_Ababa,-Unlisted,9600,

,104,Frank_Buer,Addis_Ababa_Ethiopia,-Unlisted-,2400,

,105,Ethiopian_Standards_Institute,Addis_Ababa_Ethiopia,Mulatu_Retta,-unlisted-,2400,

,106,UNECA/ASCD/ISS,Addis_Ababa_Ethiopia,Ron_Barak,-Unlisted-,2400,

,107,ECASTAT,Addis_ET,ECASTAT,-unlisted-,2400,

,108,PADIS,Addis_Ababa_Ethiopia,Makane_Faye,-unlisted-,2400,

,109,AHRI,Addis_Ababa_Ethiopia,Tefera_Tafesse,-Unlisted,-2400,

,110,ILCA,Addis_Ababa_Ethiopia,Sinha,-unlisted-,2400,

,111,Baptist_Mission_Ethiopia,Addis_Ababa_Ethiopia,Robert_Lundquist,-unlisted-,2400,

,112,School_of_Information_Science_for_Africa,Addis_Ababa_Ethiopia,Getachew_Birru,-unlisted-,2400,

,113,East_Africa_Investment_Securities,Addis_Ababa_Ethiopia,Zinash_Abebe,-unlisted-,2400,

,114,Reddba_Barna_Ethiopia,Addis_Ababa_Ethiopia,reddba.nor,-unlisted-,2400,

,115,PADIS,Addis_Ababa_Ethiopia,Ben_Parker,-Unlisted-,9600,

,116,UNECA,Addis_Ababa_Ethiopia,Dickson_Mzumara,-unlisted-,2400,

,117,ECA_Staff,Addis_Ababa_Ethiopia,ECA-staff,unlisted,2400,

,118,AFCOR_IBM,Addis_Ababa_Ethiopia,AFCORIBM,-unlisted,2400

,119,David_Emmert,Addis_Ababa_Ethiopia,-unlisted,2400,

,120,UNECA_POP,Addis_Ababa_Ethiopia,Ahmed_Bahri,-unlisted-,2400,

,121,Save_the_Children_Fund(UK),Jigiga,SCFUKJJ,-unlisted,9600,

,122,UN_Emergencies_Unit_for_Ethiopia,Addis_Ababa_Ethiopia,Mark_Bidder,-Unlisted-,2400,

,123,SCF_UK,Addis_Ababa_Ethiopia,Ben_Foot,-unlisted-,2400

,124,Joint_Transport_Operation,Addis_Ababa_Ethiopia,George_Fenton,-Unlisted-, 2400,

,125,CPAR,Addis_Ababa_Ethiopia,Wayne_deJong,-unlisted-,2400,

,126,Ethiopian_Human_Rights_Council,Addis_Ababa_Ethiopia,EHRCO,-unlisted,2400

,127,ALERT,Addis_Ababa_Ethiopia,Paul_Saunderson,-unlisted,2400

,128,Dianne_Zemichae,Addis_Ababa_Ethiopia,DianneZ,-unlisted,2400

,129,UNECA,PKOKI,Addis_Ababa_Ethiopia,-unlisted,2400

,130,James_Andersen_Milley,Addis_Ababa_Ethiopia,Milley,-Unlisted-,2400,

,131,Chemistry_AAU,Addis_Ababa_Ethiopia,Wendimagegn_Mammo,-Unlisted-,2400,

,132,UNICEF_Information,Addis_Ababa_Ethiopia,Mark_Thomas,-Unlisted-,9600,

,133,McGill_Community_Health_Project,Addis_Ababa_Ethiopia,David_Zakus,-Unlisted-,1200,

,134,Bmoriniere,Addis_Ababa_Ethiopia,-Unlisted-,2400,

,135,MSF_Holland,Addis_Ababa_Ethiopia,Nick_Heemskerk,-Unlisted-,2400,

,136,Institute_of_Agricultural_Research,Addis_Ababa_Ethiopia,Gashaw_Kebede,-Unlisted-,2400,

,137,Richard_Hodes,Addis_Ababa_Ethiopia,Richard_Hodes,-unlisted-,2400,

,138,UNICEF,Addis_Ababa_Ethiopia,Tsedale_Mihrete,-Unlisted-,9600,

,139,Private,Addis_Ababa_Ethiopia,Della_Dash,-unlisted-,2400

,140,Basic_metals_Engi_ind,Addis_Ababa_Ethiopia,Futurzeab_Asgedom,2400,

,141,SNV_Netherlands_Dev_Org,Addis_Ababa_Ethiopia,SNVEthiopia,-unlisted-,2400,

,142,Inter_Africa_Group,Addis_Ababa_Ethiopia,Vanessa_Sayers,-Unlisted-,9600,

,144,WSCG/TDA,Mekelle_Ethiopia,Wray_Witten,-unlisted-,2400,
,145,Circus_Ethiopia,Addis_Ababa_Ethiopia,Marc_La_Chance,-unli
sted-,2400,
,146,Office_of_the_Special_Prosecutor_TGE,Addis_Ababa_Ethiopia
,Girma_Wakjira,-Unlisted-,2400,
,147,Teshome_Gebremariam,Addis_Ababa_Ethiopia,Teshome_Gebremar
iam,-unlisted-,2400,
,148,Economics_AAU,Addis_Ababa_Ethiopia,Abu_Girma,-unlisted-,2
400,
,149,JTU_Regional_Office,Addis_Ababa_Ethiopia,K_Tangen,-unlist
ed-,2400,
,150,SIM_International_Ethiopia,Addis_Ababa_Ethiopia,Steve_Jay
, -Unlisted-,9600,
,151,EMAISC,Addis_Ababa_Ethiopia,Berhanu_Nega,-unlisted-,2400,
,152,Faculty_Of_Technology_AAU,Addis_Ababa_Ethiopia,Getachew_H
ailu,-unlisted-,9600,
,153,UN_World_Food_Programme,Addis_Ababa_Ethiopia,John_Aylieff
, -unlisted-,2400,
,154,S.T._MAY,Addis_Ababa_Ethiopia,Sidniey_May,-unlisted-,2400,
,155,Terrence_Lyons,Addis_Ababa_Ethiopia,Terrence_Lyons,-unlis
ted-,2400,
,156,Agricultural_U_Wageningen,Addis_Ababa_Ethiopia,Leo_Nagelh
erke,-unlisted-,2400,
,157,Inter_Press_Service,Addis_Ababa_Ethiopia,Anaclet_Rwegayur
a,-unlisted-,2400,
,158,Walter_Suggs,Addis_Ababa_Ethiopia,Walter_Suggs,-unlisted-
,2400,
,159,ljhog,Addis_Ababa_Ethiopia,ljhog,-unlisted-2400,
,160,Canadian_International_Development_Agency,Addis_Ababa_Eth
iopia,Peter_Kem p,-Unlisted-,2400,

,161,Save_the_Children,Addis_Ababa_Ethiopia,Lennart_Reinius,-unlisted-,2400,
,162,RTRD_Addis,Addis_Ababa_ethiopia,I_Karish,-unlisted-,2400,
,163,Community_Health_AAU,Addis_Ababa_Ethiopia,Damen_Haile_Mariam,-unlisted-,2400,
,164,Bethel_Synods_EECMY,Addis_Ababa_Ethiopia,Caroline_Kurth,-unlisted-,2400,
,165,Save_the_Children_(UK),Harar_Ethiopia,Barrie_Potter,-unlisted-,2400,
,166,Aaron_Tesfaye,Addis_Ababa_Ethiopia,Aaron_Tesfaye,-unlisted-,2400,
,167,Norwegian_Contracting_Center,Addis_Ababa_Ethiopia,Eriu_Sunde,-unlisted-,2400,
,168,ACTIONAID_ETHIOPIA,Addis_Ababa_Ethiopia,Assefa_Gebrehiwot,-unlisted-,2400,
,169,Children's_Village,Addis_Ababa_Ethiopia,Jaya_Chandra,-unlisted-,2400,
,170,Donnelson_Foundation,Addis_Ababa_Ethiopia,Jim_Singleton,-Unlisted-,2400,
,171,School_of_Pharmacy_AAU,Addis_Ababa_Ethiopia,Negussu_Mekonnen,-unlisted-,2400,
,172,Stevens,Addis_Ababa_Ethiopia,Stevens_Tucker,-Unlisted-,2400,
,173,Haile,Addis_Ababa_Ethiopia,Haile_Kiros,-unlisted-,2400,
,174,Gebreab_Barnabas,Addis_Ababa_Ethiopia,Gebreab_Barnabas,-unlisted-,2400,
,175,US_Embassy,Addis_Ababa_Ethiopia,Demsas_Abraha,-Unlisted-,9600,
,176,Donnelson_Foundation,Addis_Ababa_Ethiopia,Don_Sidebottom,-unlisted-,2400,
,177,Constitution_Commission,Addis_Ababa_Ethiopia,Jane_Furzey,251-1-550412,2400

,178,Dawit_Yohannes,Addis_Ababa_Ethiopia,Dawit_Yohannes,-unlisted-,2400,

,179,Equatorial_Communication,Addis_Ababa_Ethiopia,Biniam_Abraha,-unlisted-,2400,

,180,HOPEIDA,Addis_Ababa_Ethiopia,-unlisted-,2400,

,181,Essam_Saad_Eldin,Addis_Ababa_Ethiopia,-unlisted-,2400,

,182,UNDP_RAF_Project,Addis_Ababa_Ethiopia,Mengistu_Kifle,-unlisted-,14400,

,183,Norwegian_Institute_of_Human_Rights,Addis_Ababa_Ethiopia,Stein_Ove_Gronlund,-unlisted-,9600,

,184,Aziz_Adish,Tigray_Ethiopia,Aziz_Adish,-Unlisted-,2400,

,185,Stat,Addis_ET,Stat,-unlisted-,2400,

,186,Mechanical_AAU,Addis_ET,Mechanical,-unlisted-,2400,

,187,Civil,Addis_ET,Civil,-unlisted-,2400,

,188,DTRC_AAU,Addis_Ababa_Ethiopia,GKiros,251-1-115777,2400,

,189,Mathematics_AAU,Addis_Ababa_Ethiopia,Dida_Midekso,-unlisted-,9600,

,190,OXFAM_UK/I,Addis_Ababa_Ethiopia,Haregewoin_Kidanemariam,-Unlisted-,2400,

,192,SOSA_AAU,Addis_Ababa_Ethiopia,Sociology,-unlisted-,2400,

,193,Biology,Addis_Ababa_Ethiopia,Zerihun,-Unlisted-,2400,

,194,Demissu_gemeda,Addis_Ababa_Ethiopia,Demissu,-unlisted-,2400,

,195,Microprocessor_Laboratory_AAU,Addis_Ababa_Ethiopia,Hailu,-Unlisted-,2400,

,196,WHO_EPR,Addis_Ababa_Ethiopia,Giorgio_Sartori,-unlisted-,2400,

,197,Institute_of_Ethiopian_Studies_AAU,Addis_Ababa_Ethiopia,Bahru_Zewde,-unlisted-,2400,

,198,Peer_Just,ECA_ISS,Peer_Just,-unlisted-,2400,

,199,Shantilal,Addis_Ababa_Ethiopia,Desai,-unlisted-,2400

,200,Swiss_Disaster_Relief,Addis_Ababa_Ethiopia,Theo_Erni,-unlisted-,2400

,201,National_Democratic_Institute,Addis_Ababa_ET,Steven_Luttrebeck,-unlisted-,9600,

,203,DSA,Addis_Ababa_Ethiopia,Berhanu_Abebe,-unlisted-,2400,

,204,Goran_Radstrom,Addis_Ababa_Ethiopia,-unlisted-,2400,

,205,Tigray_Development_Association,Mekele_Ethiopia,Araya_Zerihun,-unlisted-,2400,

,206,Assefa,Private_Consultant,Assefa,251-1-513726,2400,

,207,MC_TES,Malaria_Control_Project,MC_TES,-unlisted-,2400,

,208,UNECA/TDFD,Addis_Ababa_Ethiopia,Kimiko_Uno,-unlisted-,2400,

,209,Shiferaw_Woldemichael,Addis_Ababa_Ethiopia,SWM,-unlisted-,2400,

,210,UNICEF/Africa_Hall,Addis_Ababa_Ethiopia,David_Frank_Williams,-unlisted-,2400,

,211,Medical_Faculty_AAU,Addis_Ababa_Ethiopia,Tadesse_Alemu,-unlisted-,2400,

,212,United_States_Information_Service,Addis_Ababa_Ethiopia,Me srak_Aseged,-Unlisted-,2400,

,213,Rural_Technology_and_Resource_Development_Company,Dire_Dawa_Ethiopia,Moh amed_Ibrahim,-Unlisted-,2400,

,214,DRC,Addis_Ababa_Ethiopia,Peter_Juul_Jepsen,-Unlisted-,9600,

,215,Gezahegn_Tesfaye,Addis_Ababa_Ethiopia,ERCS,-unlisted-,9600,

,216,CODEP,Brazzaville_Congo,Prosper_Ndjiodi,-Unlisted-,2400,

,217,Gebreyesus_Kidane,Addis_Ababa_Ethiopia,-unlisted-,2400,

,218,UNICEF,Addis_Ababa_Ethiopia,Wally_Eshenaur,-unlisted-,2400,

,219,JERBE,Addis_Ababa_Ethiopia,JERBE,-unlisted-,2400,

,220,Kennedy_Library_AAU,Addis_Ababa_Ethiopia,Abebe_Rorissa,251-1-115673,14400,

,221,Friedrich_Ebert_Stiftung,Addis_Ababa_Ethiopia,Axel_Schmidt,251-1-613753,2400,

, 222, ACORD, Addis_Ababa_Ethiopia, Alemtsehay Tadesse, 251-1-1836
14, 14400,
, 223, ACORD_DD, Dire_Dawa_Ethiopia, Aster_Asfaw, 251-5-113666, 14400,
, 224, Patrick_Diskin, Addis_Ababa_Ethiopia, Patrick_Diskin, -unlis
ted-, 2400,
, 225, CNEWA, Addis_Ababa_Ethiopia, Br_Vincent_Pelletier, 251-1-551
568, 14400,
, 226, cfgb, Addis_Ababa_ethiopia, Sam_Vander_ende, 251-1-513670, 2400,
, 227, Shiferaw_Bizuneh, Addis_Ababa_Ethiopia, Shiferaw_Bizuneh, -u
nlisted-, 2400,
, 228, Supreme_Court, Addis_Ababa_Ethiopia, Yohannes_Heroui, 251-1-
113155, 9600,
, 229, OSSREA, Addis_Ababa_Ethiopia, Etalem_Engeda, 251-1-551399, 14
400,
, 230, SJADD, Addis_Ababa_Ethiopia, Joseph_Rodrigues, 251-1-550600,
14400,
, 231, PHARMACY_AAU, Addis_Ababa_Ethiopia, Girma_Moges, 251-1-11474
4, 2400,
, 232, Society_of_Jesus_Ethiopia, Addis_Ababa_Ethiopia, Joseph_Rod
rigues, -unliste d, 14400,
, 233, Biotechnology, Addis_Ababa_Ethiopia, Berhanu_Abegaz_Gashe, -
unlisted-, 14400,
, 234, Abdulwahab_Aideed, Addis_Ababa_Ethiopia, guardain, -unlisted
-, 2400,
, 235, UNFPA/CST, Addis_Ababa_Ethiopia, Jean_Marc_Hie, -unlisted-, 2
400,
, 236, ECA, Addis_Ababa_Ethiopia, Selamawit_Abebe, -unlisted-, 2400,
, 237, UNHCR_RLO, Addis_Ababa_Ethiopia, Kassa_Lakew, -unlisted-, 2400
, 238, Rehoboth_Ministry, Addis_Ababa_Ethiopia, Benyamen_Yusuf, -un
listed-, 2400,
, 239, Natalie_Brown, Addis_Ababa_Ethiopia, Natalie, -unlisted-, 2400,

,240,Wolaitta_KHChurch,Wolaitta_Ethiopia,Gary_Vanderkooi,-unli
sted-,2400,
,241,EDGS,Addis_Ababa_Ethiopia,MARTE,-unlisted-,2400,
,242,MSF_HOLLAND,Addis_Ababa_Ethiopia,Nick_Heemskerk,-unlisted
-,14400,
,243,Hans_Georg_Will,Addis_Ababa_Ethiopia,hgwill,-unlisted-,14
400,
,244,CMF_International,Addis_Ababa_Ethiopia,DWagenen,251-71144
1,14400,
,245,Peace_Corps_Ethiopia,Addis_Ababa_Ethiopia,Charles_Teller,
-unlisted-,2400,
,246,Algerian_Embassy,Addis_Ababa_Ethiopia,Baba_Ali,-unlisted-
,2400
,247,USIS,Addis_Ababa_Ethiopia,DEENA_NEWMAN,-unlisted-,2400
,248,ENDA_ETHIOPIA,Addis_Ababa_Ethiopia,Camelle_De_Stoop,-unli
sted-,2400
,249,Telahun_Deda,Addis_Ababa_Ethiopia,Teodros_Tilahun,-unlist
ed-,2400,
,250,INFOTEC,Addis_Ababa_Ethiopia,Kebour_Ghenna,251-1-511033,2
400,
,251,Child_Studies_Unit,Addis_Ababa_Ethiopia,Jonathan_Rennison
, -unlisted-,2400
,252,William_Butt,Addis_Ababa_Ethiopia,butt,-unlisted-,2400,
,253,Baptist_Mission_of_Ethiopia,Addis_Ababa_Ethiopia,-unliste
d-,2400,
,254,Robin_Needham,Addis_Ababa_Ethiopia,Care_Ethiopia,-unliste
d-,2400,
,256,USC_Canada,Addis_Ababa_Ethiopia,Tetak_Samare,-unlisted-,2400
,257,Monika_and_Ralph,Addis_Ababa_Ethiopia,Ralph_Wiegand,-unli
sted-,2400

, 258, ADRA/Ethiopia, Addis_Ababa_Ethiopia, Colin_Richardson, -unlisted-, 2400

, 259, Ethiopian_Kale_Heywet_Church, Addis_Ababa_Ethiopia, Desta_Demessie, -unlisted-, 2400

, 260, WFP/Asmara, Asmara_Eritrea, wfp_asmara, -unlisted-, 2400,

, 261, Neun, Djibouti, Neun, -unlisted-, 2400,

, 262, Taye_hailu, Djibouti, Taye_hailu, -unlisted-, 2400,

, 263, Habbane, Djibouti, Habbane, -unlisted-, 2400,

, 264, Chemonics_International, Addis_Ababa_Ethiopia, Mike_Rossmann, -unlisted-, 2400

, 265, Embassy_of_India, Addis_Ababa_Ethiopia, ANIL_NAIB, -unlisted-, 2400

, 266, CISP, Addis_Ababa_Ethiopia, Luce_Russo, -unlisted-, 2400,

, 267, Olatunji_Daudu, Nairobi_Kenya, WAMDEVIN, -unlisted-, 2400

, 268, Julie_sisskind, Addis_Ababa_Ethiopia, Julie_Sisskind, -unlisted-, 2400,

, 270, Mamou_Ehui, Awassa, MEhui, -unlisted-, 9600,

, 271, EECMYSWS, Addis_Ababa_Ethiopia, Kenneth_Nielsen, -unlisted-, 2400,

, 272, Ruth_Abraham, Addis_Ababa_Ethiopia, Ruth_Abraham, -unlisted-, 2400,

, 273, ICS, Addis_Ababa_Ethiopia, Bob_Vicknair, -unlisted-, 2400,

, 274, Peter_Naiya, Nairobi_Kenya, AMTISA, -unlisted-, 2400

, 276, Edna_Bay, Addis_Ababa_Ethiopia, Edna_Bay, -unlisted-, 2400,

, 277, Kassa_Eskinder, Addis_Ababa_Ethiopia, Kassa_Eskinder, -unlisted-, 2400,

, 278, Sami_Bougacha, Addis_Ababa_Ethiopia, Tunisia_Embassy, -unlisted-, 2400

, 279, Ethiopian_Adventist_College, Addis_Ababa_Ethiopia, Joseph_Tobing, -unlisted-, 2400,

, 280, Gondwana, Ethiopia, Gondwana, -unlisted-, 2400,

, 281, UNICEF, Addis_Ababa_Ethiopia, Tsedale_Mihrete, -unlisted-, 2400,
, 282, UNECA, Addis_Ababa_Ethiopia, Cartography, Gulaid, -unlisted-,
2400,
, 283, TDA/MEKELE, MEKELE_TIGRAY, Girmay_Mehari, -unlisted-, 2400,
, 284, Awassa_College_of_Agr, Awassa_Ethiopia, ACARE, -unlisted-, 2400,
, 285, Zerihun_Woldu, Addis_Ababa_Ethiopia, Zerihun_Woldu, -unliste
d-, 2400,
, 286, UNECA/PHSD/DPMN, Addis_Ababa_Ethiopia, Abdalla_Bujra, -unlis
ted-, 2400,
, 287, Tunisia_Embassy, Addis_Ababa_Ethiopia, Sami_Bougacha, -unlis
ted-, 2400,
, 288, Center_for_Human_Environment, Addis_Ababa_Ethiopia, Costant
inos_Berhe, -unl isted-, 2400,
, 291, MSF, Addis_Ababa_Ethiopia, Patrick_Vercammen, -unlisted-, 2400
, 294, UN_EUE, Addis_Ababa_Ethiopia, Matt_Bryden, -unlisted-, 2400,
, 295, Baptist_Mission_of_Ethiopia, Addis, BME, -unlisted-, 2400,
, 297, CARE_International, Addis_Ababa_Ethiopia, Getachew_Dirriba,
-unlisted-, 2400
, 299, CARE_RTAT_Office, Addis_Ababa_Ethiopia, Hirut_Tsegaye, -unli
sted-, 2400
, 300, Edwin_Erickson, Addis_Ababa_Ethiopia, -unlisted, -2400
, 301, EUGENE, Addis_Ababa_Ethiopia, EUGENE_CHIAVAROLI, -unlisted-,
2400
, 302, EECMY, Addis_Ababa_Ethiopia, Timo_Iivarinen, -unlisted-, 2400
, 303, EECMY/IBS, Addis_Ababa_Ethiopia, Olli_Sjoblom, -unlisted-, 2400
, 304, VOCA.Ethiopia, Addis_Ababa_Ethiopia, Werqu_Mekasha, -unliste
d-, 2400
, 305, Tetemke_Mehari, Addis_Ababa_Ethiopia, -unlisted-, 2400
, 306, FEWS_ETHIOPIA, Addis_Ababa_Ethiopia, Kay_Sharp, -unlisted-, 2400
, 307, SIDCO, Addis_Ababa_Ethiopia, Messay_Asfaw, -unlisted-, 2400

, 308, BAHA' I_International, Addis_Ababa_Ethiopia, Asfaw_Tessema, -unlisted-, 2400

, 309, Heruy_Arefeaine, Addis_Ababa_Ethiopia, Heruy_Arefeaine, -unlisted-, 2400,

, 310, Fekadu_Berhane, Addis_Ababa_Ethiopia, Fekadu_Berhane, -unlisted-, 2400

, 311, Christina_Zarowsky, Addis_Ababa_Ethiopia, Zarowsky, -unlisted-, 2400

, 312, ALMAYA, Addis_Ababa_Ethiopia, Doron_Tashtit, -unlisted-, 2400

, 313, BITE, Addis_Ababa_Ethiopia, -unlisted-, 2400

, 314, Revy_Tuluhungwa, Addis_Ababa_Ethiopia, REP, -unlisted-, 2400

, 316, Ethiopian_Telecom_Org, Addis_Ababa_Ethiopia, Asfaw_Hailemar iam, -unlisted-, 2400

, 319, CONCERN, Addis_Ababa_Ethiopia, Samantha_Aarvold, -unlisted-, 2400

, 320, PLAN_International, Addis_Ababa_Ethiopia, Tesfaye_Tekle, -unlisted-, 2400

, 321, WAAG_COMMUNICATIONS, Addis_Ababa_Ethiopia, Tafari_Wossen, -unlisted-, 2400

, 322, CIDA, Addis_Ababa_Ethiopia, Shawn_Houlihan, -unlisted-, 2400

, 323, S.A._Bagersh, Addis_Ababa_Ethiopia, Abdullah_Bagersh, -unlisted-, 2400

, 325, Michael_Seyoum, Addis_Ababa_Ethiopia, HOECHST_Ethiopia, -unlisted-, 2400

, 326, UNDP, Djibouti, UNDP_Djibouti, -unlisted-, 2400

, 327, Equipment_Engineering_Co, Addis_Ababa_Ethiopia, Girmay_T.Ha imanot, -unlisted-, 2400

, 328, SDA_Church, Addis_Ababa_Ethiopia, Colin_Richardson, -unlisted-, 2400

, 329, UNICEF, Addis_Ababa_Ethiopia, Jan_E._Van_Manen, -unlisted-, 2400

, 330, Buna_PLC, Addis_Ababa_Ethiopia, Abdulmenan_Sheka, -unlisted-
, 2400

, 331, UNFPA, Addis_Ababa_Ethiopia, NAELAMINA, -unlisted-, 2400

, 332, Soil_Conservation, Addis_Ababa_Ethiopia, Esayas_Dagneu, -unl
isted-, 2400

, 333, Negash_Abdurahman, CBE, Addis_Ababa_Ethiopia, -unlisted-, 2400

, 334, CISP-TIGRAY, Tigray_Ethiopia, CISP_TIGRAY, -unlisted-, 2400

, 335, UN-EUE, Addis_Ababa_Ethiopia, Leila_Pakkala, -unlisted-, 2400

, 336, OAU_Population, Addis_Ababa_Ethiopia, Wubalem_Taye, -unliste
d-, 2400

, 337, IPAS, Addis_Ababa_Ethiopia, Lisa_Bohmer, -unlisted-, 2400

, 338, World_Vision_East_Africa, Addis_Ababa_Ethiopia, Ayalew, -unl
isted-, 2400

, 340, Private, Addis_Ababa_Ethiopia, Carol_Martin, -unlisted-, 2400

, 341, Paleoanthropology_Lab, Addis_Ababa_Ethiopia, Berhane_Asfaw,
-unlisted-, 2400

, 342, Private, Addis_Ababa_Ethiopia, Abate_Asfaw, -unlisted-, 2400

, 343, Private, Addis_Ababa_Ethiopia, Meera_Shekar, -unlisted-, 2400

, 344, Marwan_El_Khoury, Addis_Ababa, Marwan_El_Khoury, -unlisted, 2400

, 345, EERSC, Addis_Ababa, Lemma_Eshetu, -unlisted, 2400

, 348, Import_General, Addis_Ababa, Ismail_Ahmed, -unlisted, 2400

, 349, Addis_Clinic, Addis_Ababa, Ahmed_Abdi, -unlisted, 2400

, 350, BGG, Addis_Ababa, Helmut_Housig, -unlisted, 2400

, 351, ECA, Addis_Ababa, Jacques_Hamel, -unlisted, 2400

, 352, IFRC, Addis_Ababa, Howard_Arfin, -unlisted, 2400

, 353, JICA, Addis_Ababa, Hiroshi_Matsutani, -unlisted, 2400

, 354, USAID, Patrick_Diskin, FSRP, -unlisted, 2400

, 355, GITS, Addis_Ababa, Jamal_Husseini, -unlisted, 2400

, 356, APAP, Addis_Ababa, APAP, -unlisted, 2400

, 357, Save_The_Children_USA, Mekelle, Annamaria_Watrin, -unlisted-
, 9600,

, 358, AE-HBT_AGRA_Joint_Venture, Addis_Abeba, Dave_Robinson, -unlisted-, 14400,
, 359, Heli_Mission, Addis_Abeba, HM, -unlisted-, 2400,
, 361, UNECA, Abdalla_Bujra, Addis_Abeba, DPMF, -unlisted-, 2400,
, 363, Korea_Embassy, ROK.EMB, Addis_Abeba_Ethiopia, DPMF, -unlisted-, 2400,
, 366, Ishida, JICA, Addis_Abeba_Ethiopia, Yu_Ishida, -unlisted-, 2400,
, 365, Rie_Ijuin, JICA, Addis_Abeba_Ethiopia, RIE, -unlisted-, 2400,
, 367, Christer_Johansson, Addis_Abeba_Ethiopia, Christer, -unlisted-, 2400,
, 368, Hannu_Savolainen, Addis_Abeba_Ethiopia, Hannu, -unlisted-, 2400,
, 369, Selam_Children's_Village, Robert_Taylor, Addis_Abeba_Ethiopia, -unlisted-, 2400,
, 372, GTZ, Frank_Sandvoss, Addis_Abeba_Ethiopia, -unlisted-, 2400,
, 373, GTZ/PAS, GTZPAS, Addis_Abeba_Ethiopia, -unlisted-, 2400,
, 374, Beso_Mekelle, Bekett_Mount, Mekelle_Tigray_Ethiopia, -unlisted-, 2400,
, 375, Beso, Bekett_Mount, Addis_Ababa_Ethiopia, -unlisted-, 2400,
, 376, Frank_Sandvoss, Dansha_Settlement_Project, Addis_Ababa_Ethiopia, -unlisted-, 2400,
, 378, Daniel_Spencer, Heli_Mission, Addis_Ababa_Ethiopia, -unlisted-, 2400,
, 379, Michael_Vannotten, Eastern_Hararghe_Development_Agency, -unlisted, 2400,
, 381, Bacry_Yusuf, BACTEC, Addis_Ababa_Ethiopia, -unlisted-, 2400,
, 382, Flemming_Thunbo, Private, Addis_Ababa_Ethiopia, -unlisted-, 2400,
, 383, Techane_Abraha, Private, Addis_Ababa, Ethiopia, -unlisted, 2400,
, 384, FHI/AIDSCAP, Addis_Ababa_Ethiopia, -unlisted-, 2400,
, 385, Sigfrid_Socer_Ortiz, ICRC, Addis_Ababa_Ethiopia, -unlisted-, 2400,

, 386, Betru_Admassie, Private, Addis_Ababa_Ethiopia, -unlisted-, 2400,
, 387, Vincent_Coultan, CARE, Addis_Ababa_Ethiopia, -unlisted-, 2400,
, 388, Ronald_Schultz, ICS, Addis_Ababa, Ethiopia, -unlisted, 2400,
, 389, Alemayehu_Yifru, Addis_Ababa_Ethiopia, -unlisted-, 2400,
, 390, Capitan_Assefa_Sarkis, Ethiopian_Airlines, Addis_Ababa_Ethiopia, -unlisted-, 2400,
, 391, Robert_Monro, British_Council, Addis_Ababa_Ethiopia, -unlisted-, 2400,
, 392, CIDAPS, Program_Support_Unit, Addis_Ababa_Ethiopia, -unlisted-, 2400,
, 393, Aaron_Bajek, Private, Addis_Ababa_Ethiopia, -unlisted-, 2400,
, 394, Steven_Bryan, SIM, Addis_Ababa, Ethiopia, -unlisted, 2400,
, 395, SHE, Bernd_Fleischer, Addis_Ababa_Ethiopia, -unlisted-, 2400,
, 396, Sherman, ICS, Addis_Ababa_Ethiopia, -unlisted-, 2400,
, 397, Peter_Jeschofnig, Addis_Ababa_University, Addis_Ababa_Ethiopia, -unlisted-, 2400,
, 398, Norwegian_Church_Aid, Kjell_Solberg, Addis_Ababa_Ethiopia, -unlisted-, 2400,
, 399, Dragan_Stojanovic, Yugoslavia_Embassy, Addis_Ababa_Ethiopia, -unlisted-, 2400,
, 400, Berhanu_Gebremedhen, Private, Mekelle_Tigray_Ethiopia, -unlisted, 2400,
, 401, John_Bachmann, PADETH, Addis_Ababa_Ethiopia, -unlisted-, 2400,
, 402, Blaine_Pope, Africare, Addis_Ababa_Ethiopia, -unlisted-, 2400,
, 403, Grant_Cherrington, Baptist_Mission_of_Ethiopia, Addis_Ababa_Ethiopia, -unlisted-, 2400,
, 404, Ketema_Abebe, Christian_Children's_Fund, Addis_Ababa_Ethiopia, -unlisted-, 2400,
, 405, PM_Office, Assefa_Abreha, Addis_Ababa, Ethiopia, -unlisted, 2400,
, 406, Anthony_Filippo, CRS/Ethiopia, Addis_Ababa_Ethiopia, -unlisted-, 2400,

, 407, David_Orth_Moore, CRS/Ethiopia, Addis_Ababa_Ethiopia, -unlisted-, 2400,

, 408, David_Piraino, CRS/Ethiopia, Addis_Ababa_Ethiopia, -unlisted-, 2400,

, 409, Alemtsehai_Alemu, Dorcas_Aid_International, Addis_Ababa_Ethiopia, -unlisted-, 2400,

, 410, Awassa_College_of_Agriculture, Crop_protection, Addis_Ababa_Ethiopia, -unlisted-, 2400,

, 411, Lis_Doane, Private, Addis_Ababa, Ethiopia, -unlisted, 2400,

, 412, Daniel_Mebrathu, Dan_Technocraft, Addis_Ababa_Ethiopia, -unlisted-, 2400,

, 413, Bernhard_Minning, Addis_Ababa_Ethiopia, -unlisted-, 2400,

, 414, Josef_Holik, Private, Addis_Ababa_Ethiopia, -unlisted-, 2400,

, 415, Chetboun_Geraid, Private, Addis_Ababa, Ethiopia, -unlisted, 2400,

, 416, W. I. H. E. _Eygenraam, GTZ/Family_Planning, Addis_Ababa_Ethiopia, -unlisted-, 2400,

, 417, Darren_Gingras, Pentacostal_Assemblies_of_Canada, unlisted-, 2400,

, 419, Asmelash_Beyene, UNECA, Addis_Ababa_Ethiopia, -unlisted-, 2400,

, 420, Cheryl_Gregory_Faye, UNICEF, Addis_Ababa_Ethiopia, -unlisted-, 2400,

, 421, Howard_Standen, SCF_UK, Addis_Ababa, Ethiopia, -unlisted, 2400,

, 422, Le_Guillouzic, ICRC, Addis_Ababa_Ethiopia, -unlisted-, 2400,

, 423, Moges_Alemu, MA_Thermoplastic, Addis_Ababa_Ethiopia, -unlisted-, 2400,

, 424, Joe_Harding, SIM, Addis_Ababa_Ethiopia, -unlisted-, 2400,

, 425, Martin_Bodd, WOU/Ethiopia, Addis_Ababa_Ethiopia, -unlisted-, 2400,

, 426, Diane_Bethel, CARTE_Blanche, Addis_Ababa_Ethiopia, -unlisted-, 2400,

, 427, Megdelawit_Kidane, Kidun_Kindergarten, Addis_Ababa, Ethiopia
, -unlisted, 2400,
, 429, C.J. _Mitchell, PAddis_Ababa_Ethiopia, -unlisted-, 2400,
, 430, SOS/Ethiopia, Ulf_Larsen, Addis_Ababa_Ethiopia, -unlisted-, 2
400,
, 431, IPD, Walter_Dorn, Addis_Ababa_Ethiopia, -unlisted-, 2400,
, 432, Tamasmar_News, Tamene_Asmare, Addis_Ababa, Ethiopia, -unliste
d, 2400,
, 433, PACT, Eugene_Chiavaroli, Addis_Ababa_Ethiopia, -unlisted-, 2400,
, 434, Peter_Plenk, German_Embassy, Addis_Ababa_Ethiopia, -unlisted
-, 14.4,
, 435, Brook_Medical_Services, Belay_Abegaz, Addis_Ababa_Ethiopia,
-unlisted-, 2400,
, 436, MOSBEZ, Bezuayehu_Tesfaye, Addis_Ababa_Ethiopia, -unlisted-,
2400,
, 437, UNECA, B.M. _Vlavourou, Addis_Ababa, Ethiopia, -unlisted, 2400,
, 438, UNECA, Kodjo_Abassa, Addis_Ababa_Ethiopia, -unlisted-, 2400,
, 439, NRD/ECA, A.F. _Hoque, Addis_Ababa_Ethiopia, -unlisted-, 2400,
, 440, Experience_Ethiopia_Travel, Meseret_Hagos, Addis_Ababa_Ethi
opia, -unlisted- , 2400,
, 441, ICS, Donald_T. _Wertheim, Addis_Ababa_Ethiopia, -unlisted-, 2400,
, 442, Ogaden_Welfare_Society, Addis_Ababa, Ethiopia, -unlisted, 2400,
, 422, Le_Guillouzic, ICRC, Addis_Ababa_Ethiopia, -unlisted-, 2400,
, 443, Moges_Alemu, MA_Thermoplastic, Addis_Ababa_Ethiopia, -unlist
ed-, 2400,
, 445, ALERT, Roland_Kazen, Addis_Ababa_Ethiopia, -unlisted-, 2400,
, 446, British_Embassy, Matheos, Addis_Ababa_Ethiopia, -unlisted-, 2
400,
, 447, Gijs_Klooster, RDP_Livestock_Service, Addis_Ababa_Ethiopia,
-unlisted-, 2400,

, 448, Mulugeta_Abebe, World_Vision_International, Addis_Ababa, Ethiopia, -unlisted, 2400,

, 450, Salahadin_Tsihira, Addis_Ababa_Ethiopia, -unlisted-, 2400,

, 451, Finnish_Lutheran_Mission, Tapani_Kaitainen, Addis_Ababa_Ethiopia, -unlisted -, 2400,

, 452, Eyassu_Isak, Private, Addis_Ababa_Ethiopia, -unlisted-, 2400,

, 453, UNECA, Sharon_Gail_Lowery, Addis_Ababa_Ethiopia, -unlisted-, 2400,

, 454, Negash_Kebede, Private, Addis_Ababa, Ethiopia, -unlisted, 2400,

, 455, Pentecostal_Mission_Canada, Brian_Rutten, Addis_Ababa_Ethiopia, -unlisted-, 2400,

, 456, FELM, Risto_Leikola, Addis_Ababa_Ethiopia, -unlisted-, 14.4,

, 457, Mendoume_Emanuel, Gabon_Embassy, Addis_Ababa_Ethiopia, -unlisted-, 2400,

, 461, Michael_Strong, Private, Addis_Ababa_Ethiopia, -unlisted-, 2400,

, 462, ERDO, Ermes_Donati, Addis_Ababa, Ethiopia, -unlisted, 2400,

, 463, ABUGIDA, Abraham_Abebe, Addis_Ababa_Ethiopia, -unlisted-, 2400,

, 464, LUXCONSULT, Alex_Vreman, Addis_Ababa_Ethiopia, -unlisted-, 2400,

, 465, ETCON, Yazew_Bekele, Addis_Ababa_Ethiopia, -unlisted-, 2400,

, 466, Africa_Humanitarian_Action, Dawit_Zawde, Addis_Ababa_Ethiopia, -unlisted-, 2400,

, 467, OAU, Mellese_Gebrte, Addis_Ababa, Ethiopia, -unlisted, 2400,

, 468, OAU, O._Aseto, Addis_Ababa_Ethiopia, -unlisted-, 2400,

, 469, OAU, Poulation_Development_Unit, Addis_Ababa_Ethiopia, -unlisted-, 2400,

, 470, OAU, Abdelatif, Addis_Ababa_Ethiopia, -unlisted-, 2400,

, 471, Jesuit_Refugee_Service, Jan_Ermers, Addis_Ababa_Ethiopia, -unlisted-, 2400,

, 472, Agri_Service_Ethiopia, Hailemariam_Hailemeskel, Addis_Ababa_Ethiopia, -unlisted-, 2400,

, 473, UNECA, Lucas_Tandap, Addis_Ababa, Ethiopia, -unlisted, 2400,

,475, OAU, Wole_Gurmu, Addis_Ababa_Ethiopia, -unlisted-, 2400,
,479, Veslemay_Hogganvik, Private, Addis_Ababa_Ethiopia, -unlisted
-, 2400,
,480, Vigano_Marco, Italian_School, Addis_Ababa_Ethiopia, -unliste
d-, 2400,
,481, Sigmo_Sawmill, Daniel_Abraham, Addis_Ababa_Ethiopia, -unlist
ed-, 2400,
,484, Aster_Huphes, Private, Addis_Ababa, Ethiopia, -unlisted, 2400,
,485, Ethio_Plastic_Factory, Mateos_Shamebo, Addis_Ababa_Ethiopia
, -unlisted-, 2400,
,486, Tayo_Fashoyin, ILO_EAMAT, Addis_Ababa_Ethiopia, -unlisted-, 2
400,
,487, Thomas_Niblock, US_Embassy, Addis_Ababa_Ethiopia, -unlisted-
, 2400,
,488, Jose_Tegels, SNV, Private, Addis_Ababa_Ethiopia, -unlisted-, 2
400,
,489, Akaki_Adventist_School, Addis_Ababa, Ethiopia, -unlisted, 2400,
,490, A._Spring, Private, Addis_Ababa_Ethiopia, -unlisted-, 2400,
,491, Stephen_Millington, Ministry_of_Development_Cooperation, Ad
dis_Ababa_Ethio pia, -unlisted-, 2400,
,492, Allied_International, Addis_Ababa_Ethiopia, Ephraim_Zemicha
el, -unlisted-, 2 400,
,493, Healthnet_International, Arlette_Mevwis, Addis_Ababa_Ethiop
ia, -unlisted-, 2 400,
,494, UNECA, Robert_Okello, Addis_Ababa_Ethiopia, -unlisted-, 2400,
,495, V.P._Diejomaoh, ILO/EAMAT, Addis_Ababa, Ethiopia, -unlisted, 2
400,
,496, Addis_Ababa_University, Mogessie_Ashenafi, Addis_Ababa_Ethi
opia, -unlisted- , 2400,
,497, Private, Addis_Ababa_Ethiopia, Chaterin_Kimberlin, -unlisted
-, 2400,

,498,UNDP,Addis_Ababa_Ethiopia,Bwalya_Ng'andu,-unlisted-,2400,
,499,Paolo_Mattei,Addis_Ababa_Ethiopia,EU_Food_Security_Unit,-
unlisted-,2400,
,500,UNECA,Addis_Ababa_Ethiopia,Sylvain_Maliko,-unlisted-,2400,
,501,Federal_Express,Addis_Ababa_Ethiopia,Hailemeskel_Gessesse
,-unlisted-,2400,
,502,UNECA,Addis_Ababa_Ethiopia,Daniel_Faux,-unlisted-,2400,
,503,JICA,Addis_Ababa_Ethiopia,To_Iida,-unlisted-,2400,
,506,Ron_Barak,Ron_at_Home,Ron_Barak_at_Home,251-1-612982,2400,
,507,John_Doe,John_Doe_in_Addis,John_Doe_in_Addis,-unlisted-,2
400,
,508,Madam_Faye,Addis_Ababa_Ethiopia,Madam_Faye,-unlisted-,2400,
,510,UNECA,Addis_Ababa_Ethiopia,Sadig_Rasheed,-unlisted-,2400,
,512,Kibruyisfa_Achameyeleh,Addis_Ababa_Ethiopia,Kyisfa,-unlis
ted-,2400,
,513,Embassy_of_Switzerland,Addis_Ababa_Ethiopia,Peter_Schweiz
er,-unlisted-,2 400,
,514,Private,Addis_Ababa_Ethiopia,Carl_Hansen,-unlisted-,2400,
,515,WaterAid_Ethiopia,Addis_Ababa_Ethiopia,Amsalu_Negussie,-u
nlisted-,2400,
,516,Pathfinder_Group,Addis_Ababa_Ethiopia,Bereket_Molla,-unli
sted-,2400,
,517,Mission_Morning_Mountains,Addis_Ababa_Ethiopia,Craig_Kent
,-unlisted-,2400,
,518,Self_Development_International,Addis_Ababa_Ethiopia,Awole
_Mela,-unlisted -,2400,
,519,Goal_Ethiopia,Addis_Ababa_Ethiopia,David_Dalton,-unlisted
-,2400,
,520,Italian_Cooperation,Addis_Ababa_Ethiopia,Giampaolo_Mezzab
otta,-unlisted- ,2400,

, 521, Calub_Gas_Share_Company, Addis_Ababa_Ethiopia, Jihad_Abakoy
as, -unlisted-, 2 400,
, 522, UNDP, Addis_Ababa_Ethiopia, Anjimile_Mtila_Doka, -unlisted-,
2400,
, 523, US_Embassy, Addis_Ababa_Ethiopia, Thomas_Barzditis, -unliste
d-, 2400,
, 524, Senegal_Embassy, Addis_Ababa_Ethiopia, Mbaye_Ndao, -unlisted
-, 2400,
, 525, Shawel_Consult_International, Addis_Ababa_Ethiopia, Hailu_S
hawl, -unlisted -, 2400,
, 526, Sanford_School, Addis_Ababa_Ethiopia, Andy_Harrison, -unlist
ed-, 2400,
, 527, Tebebe_Solomon, Addis_Ababa_Ethiopia, Tsolomon, -unlisted-, 2
400,
, 528, Abdi_Ahmed_Adus, Addis_Ababa_Ethiopia, Adus, -unlisted-, 2400,
, 529, Swedish_Philadelphia_Church_Mission, Addis_Ababa_Ethiopia,
Seth_Malmvarn, - unlisted-, 2400,
, 530, KADISCO, Addis_Ababa_Ethiopia, Salahadin_Khalifa, -unlisted-
, 2400,
, 531, CBC, Addis_Ababa_Ethiopia, Rahel_Kassa, -unlisted-, 2400,

SIGNED DECLARATION

The Thesis is my original work, has not been presented for a degree in any other university and that all sources of material used for the thesis have been duly acknowledged.

Fanta Adane

May 1996