

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

UGANDA POSTS AND TELECOMMUNICATIONS CORPORATION
MINISTRY OF WORKS, TRANSPORT AND COMMUNICATIONS
THE REPUBLIC OF UGANDA

MASTER PLAN STUDY
FOR
TELECOMMUNICATIONS NETWORK
IN
THE REPUBLIC OF UGANDA

FINAL REPORT

(Summary)

November 1994

NIPPON TELECOMMUNICATIONS CONSULTING CO., LTD.

Tokyo, Japan

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All prices and costs used in this report are those prevailing in December 1993, excepting the case otherwise stated. They are also assumed to be constant during the whole project period.
Exchange Rate: US\$1 = Ugandan Shillings 1,190 (December 1993)

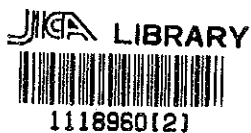
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PREFACE

In response to a request from the Government of the Republic of Uganda, the Government of Japan decided to conduct a Master Plan Study for Telecommunications Network in the Republic of Uganda and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Uganda a study team headed by Mr. Junichi KUROBE, Executive Chief Engineer, NIPPON TELECOMMUNICATIONS CONSULTING CO., LTD., three times between October 1993 and September 1994.

The team held discussions with the officials concerned of the Government of Uganda, and conducted field surveys at the study area. After the team returned to Japan, further studies were made and the present report was prepared.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of Uganda for their close cooperation extended to the team.

November 1994



Kimio Fujita

President

Japan International Cooperation Agency



November 1994

Mr. Kimio Fujita
President
Japan International Cooperation Agency

Dear Mr. Fujita:

Letter of Transmittal

It is our great pleasure to submit to you the Study Report on Master Plan Study for Telecommunications Network in the Republic of Uganda.

This report has been prepared by Nippon Telecommunications Consulting Co., Ltd., based on a contract with JICA. The study team consisting of 10 members conducted the works from September 1993 to November 1994.

The study aims to formulate the Master Plan for Telecommunications Network Development (1994 to 2010) in the Republic of Uganda.

Study objective areas covered the whole country. Through field surveys and analysis of survey results, the master plan has been drawn up, including formation of development targets, network and system plans, operation/maintenance plans, and implementation plans, as well as cost estimates and project evaluation.

We wish to take this opportunity to express our deep gratitude to the officials concerned of the Japan International Cooperation Agency and other authorities concerned of the Government of Japan. We wish to offer our sincere appreciation to the officials concerned of Ministry of Works, Transport and Communications, Uganda Posts and Telecommunications Cooperation and other authorities concerned of the Government of Uganda for their unlimited cooperation and assistance extended to the study team in connection with the execution of their duties.

Before closing, we earnestly hope that this report will be effectively used for further development of telecommunications in the Republic of Uganda.

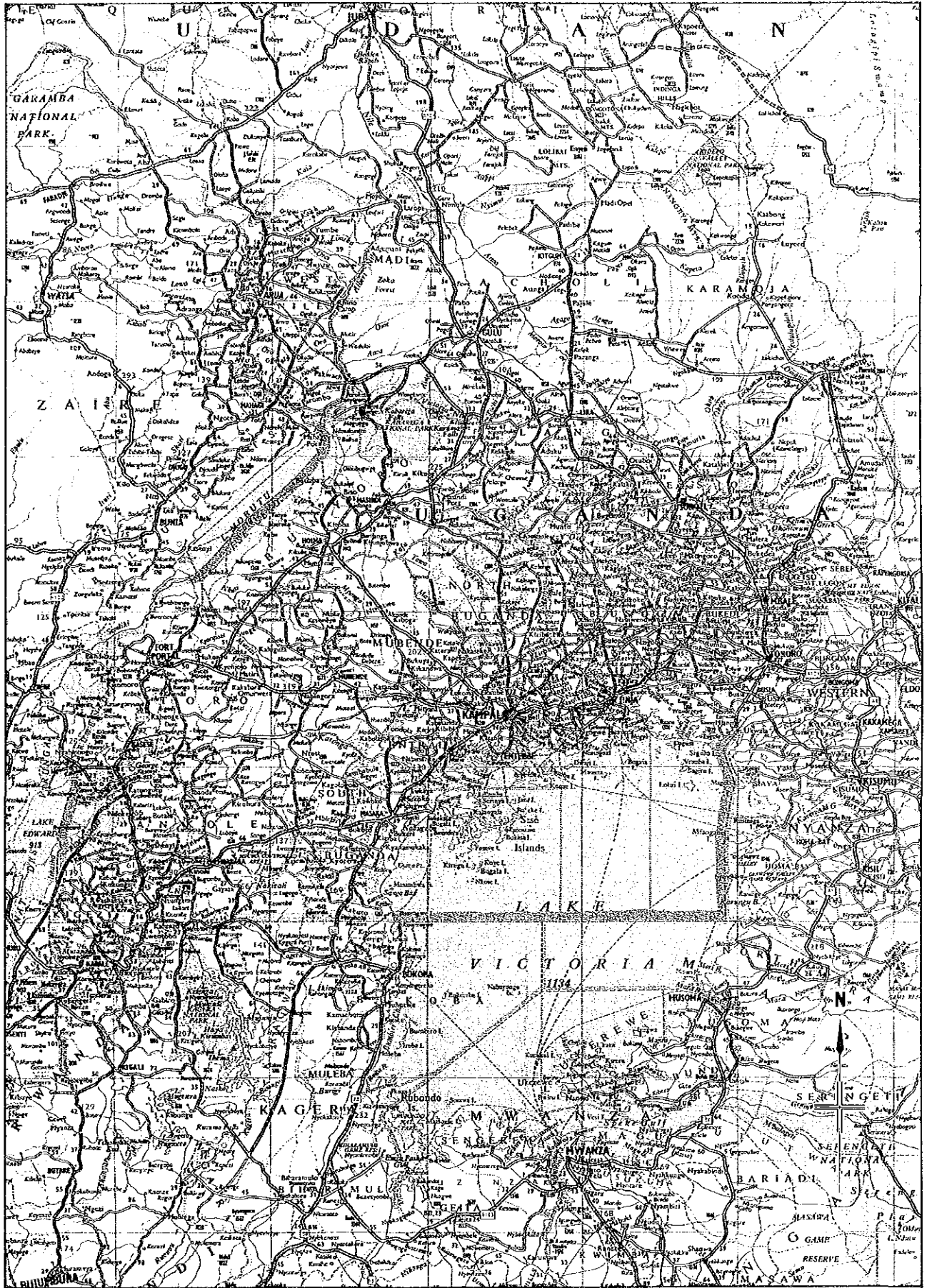
Very truly yours,



Junichi Kurobe
Team Leader
Master Plan Study for
Telecommunications Network
in the Republic of Uganda



The Republic of Uganda

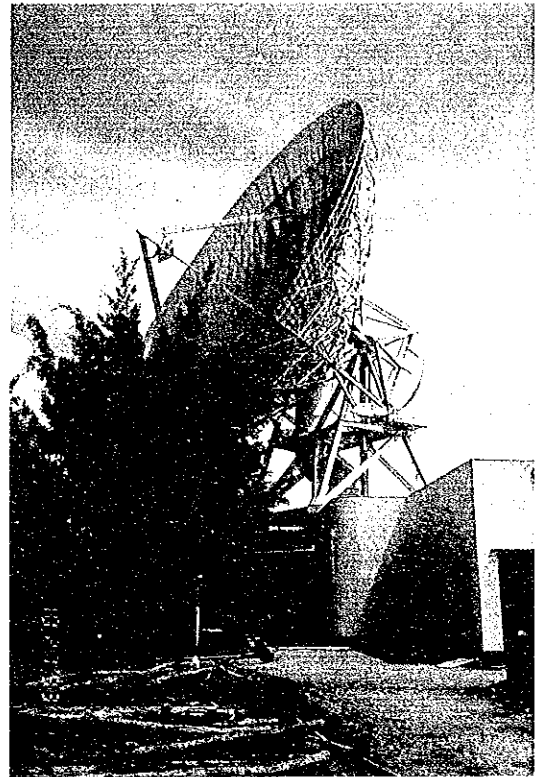


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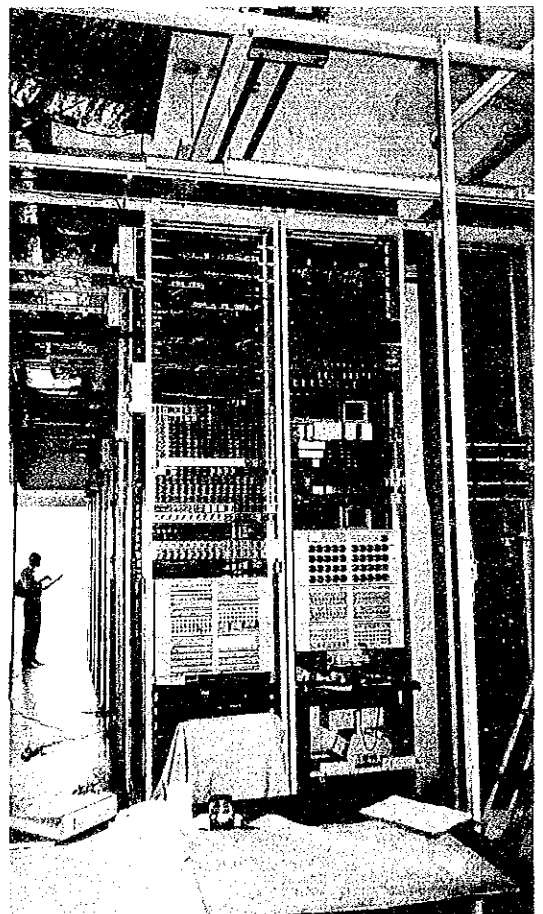




Central Exchange in KAMPALA

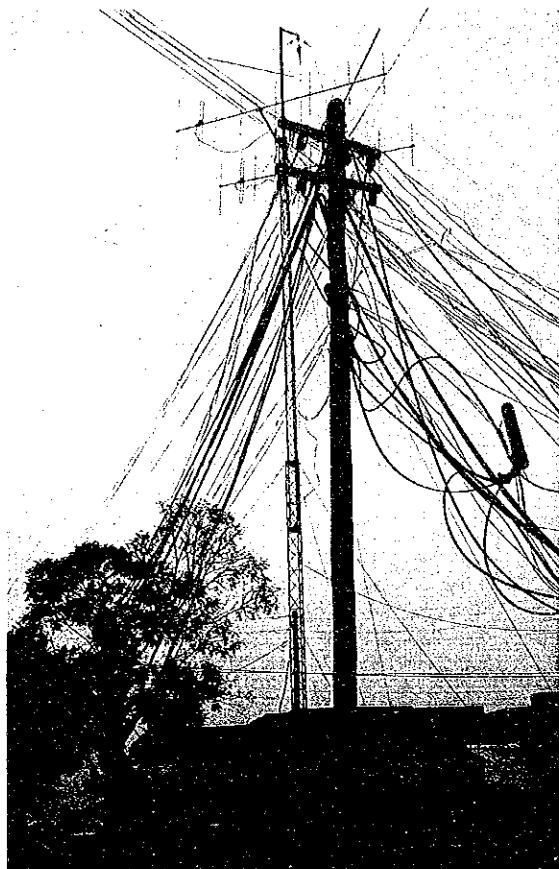


MPOMA Earth Station

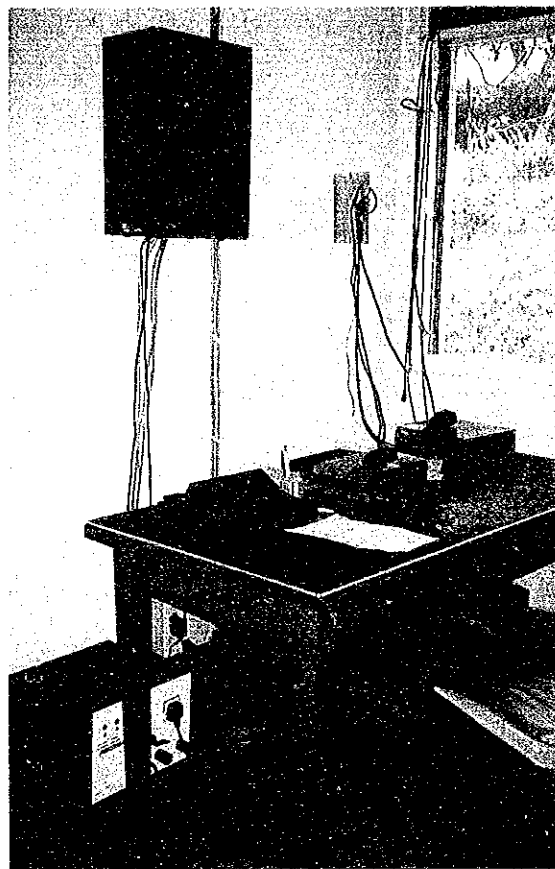


XB Exchange in ENTEBBE





Radio Tower and Pole in KAGADI

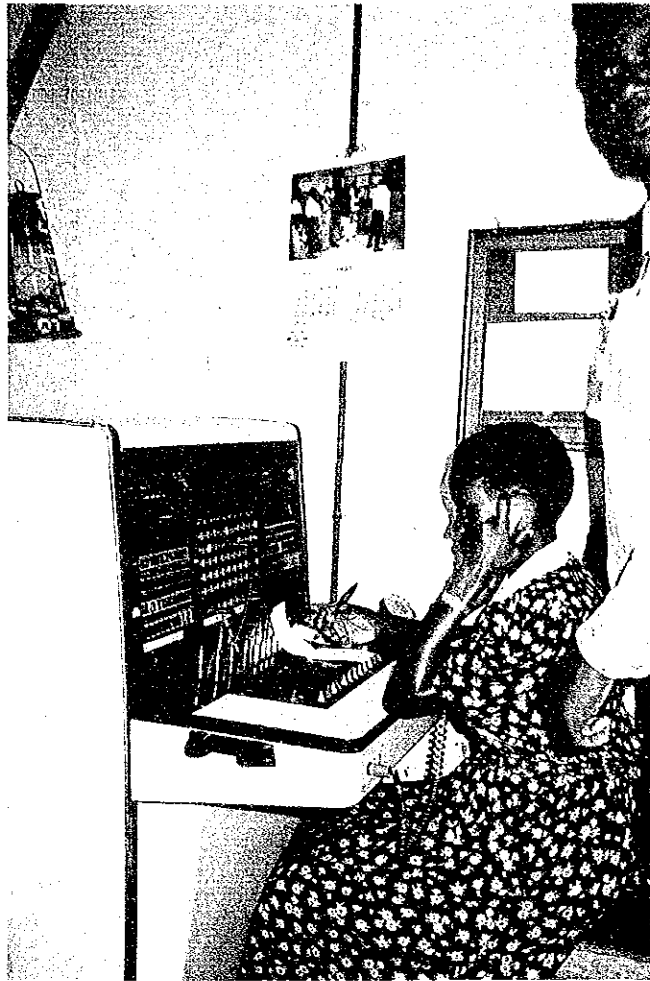


Radio Call Station System



Operator Room in JINJA





Manual Board in KAPCHORWA



Interview in Rural Area Survey



**MASTER PLAN STUDY
FOR TELECOMMUNICATIONS NETWORK
IN THE REPUBLIC OF UGANDA**

EXECUTIVE SUMMARY

1. Outline of the Study

The Master Plan Study for Telecommunications Network was carried out by the Japan International Cooperation Agency (JICA) for one year from October 1993, as a technical cooperation of the Government of Japan. This study aims to draw up the "Master Plan towards Year 2010" for telecommunications network in Uganda.

2. Socio-Economy of Uganda

Uganda is an entirely inland territory of Africa and lies on the Equator. Uganda has a 241,000 sq.km land area and a half part of Lake Victoria. The altitude of the most area is 1200 through 1500 meters. Uganda is presently estimated to have a population of about 16.7 million in year 1991 and about 90% of the population is classified as rural. The most of urban population is in Kampala and Jinja.

In the period of 1987/88 - 1992/93, the average annual growth rate of the national GDP reached 5.1%. The GDP per capita of US\$ 167 in 1992/93 has not reached the Sub-Saharan average (US\$ 276 in 1990).

The annual average national population growth rate up to the year 2010 is estimated to be 2.4% and the GDP growth rate, 5.6%. Hence in the year 2010, the population will reach 26 millions and the GDP per capita, US\$ 280.

3. Present Telecommunications Services

The public telecommunications services are solely provided by Uganda Posts and telecommunications Corporation (UPTC) as a common carrier in Uganda. The telephone density (0.17/100 inhabitants) in Uganda is lower than the average (approx.0.5/100 inhabitants) of Sub-Saharan countries. About 70% of telephone subscribers are concentrated in Kampala, Entebbe and Jinja.

28 exchanges out of 98 covering the whole nation have been automated. However, telecommunication facilities as a whole have been superannuated and it is difficult to provide reliable telecommunications services.

4. Demand Forecast

To collect the socio-economic data for telephone demand forecast in sub-urban and rural areas, field surveys were carried out in 6 sample districts. Telephone demand has been forecasted based on the microscopic data thus obtained and also the macroscopic data of other countries. As a result, demand in 2010 is estimated to be 227,000 subscribers.

5. Development Strategies

Objectives of development of the telecommunications sector are as follows:

- a) To provide the basic telecommunication services in the whole country for keeping urgent communication means in times of emergency, such as natural disasters, sudden illness, accidents, etc., and for improving and rationalizing government's administrative services aiming at upgrading of the welfare of the people of Uganda.
- b) To support the national development focusing on the Government policy of an "independent, integrated and self-sustaining" economy.

The development plan up to year 2010 is divided to three (3) phases. "Development of network" will be emphasized in Phase-1 (1995-2000), similarly, "Enhancement of services" in Phase-2 (2000-2005) and "Taking-off and self-sustaining" in Phase-3 (2005-2010).

The following supply policies are proposed for the provision of telecommunications services:

- a) To reach the Sub-Saharan level in 2004/05.
- b) To fill 70% of demand in 2009/10.
- c) To invest 0.5% of GDP every year.

Following the above-mentioned strategies, expansion of the telecommunications network will be done to reach the level of 160,000 subscribers in the year 2010.

6. National Network Expansion Plan

National network expansion is planned to realize the network in Figure-1 in the year 2010.

7. National Network Facilities Plan

70 exchanges will be established in the whole nation and be connected to each other with digital transmission links by 2010. About 12,000 subscriber lines of Digital Multiple Access Radio System (DMARS) will be installed in rural areas to realize convenient access to the telephone.

8. International Network Expansion Plan

The international telephone traffic in 2010 is forecasted to be four (4) times the present traffic. To cope with service improvement and traffic growth in international telecommunications, the facilities such as international gateway switching systems and earth station systems will be renewed one by one.

9. Operation and Maintenance Plan

At present, recovery of faulty telecommunications facilities takes long time. The rate of fault clearance within one day is about 30%, while the rate within one week is about 60%.

To analyze this problem, a case study using the Total Quality Control (TQC) system was carried out, and major causes of the fault clearance delay have been found as follows:

- 1) Unreliable transportation for maintenance work
- 2) Weak in-house wiring
- 3) Unstable network facilities
- 4) Delay in order issuing by the customer service office
- 5) Wrong order issuing by the customer service office

10. Management and Organization Plan

There are some problems in the financial performance of UPTC, and the following approaches are required to improve the problems:

- 1) Support from the Government of Uganda
- 2) Promotion of Bill Collection
- 3) Introduction of Managerial Accounting System

11. Project Implementation Plan

To achieve telecommunications network expansion and improvement in Uganda, the following investment cost will be required up to the year 2010.

	Exist. (1994)	Phase-1 (1994- 2000)	Phase-2 (2001- 2005)	Phase-3 (2006- 2010)	Total (1994- 2010)
New Provision (lines)		77,350	42,750	50,900	171,000
Total Capacity (lines)	57,630	89,590	125,200	171,000	
Investment Cost (Mil.US\$)		187	171	203	561
Cost/line (US\$/line)		2,420	4,000	3,990	3,280

12. Conclusion and Recommendations

12.1 Overview of Master Plan

(1) Basic Policy in Telecommunications Network Expansion

- a) For rural areas, basic services shall be provided to meet the urgent communication needs for the public utilities and the people of Uganda.
- b) For urban areas, all services for national development and promotion of economic activities shall be provided.

(2) Key Indexes on Master Plan

Category	Item	F--Year	1994/95	1999/2000	2004/05	2009/10	Objectives
Socio-Economy	Population (x 1,000)		18,400	20,800	23,480	26,380	
	GDP/Capita ('93 US\$ Price)		176	202	236	280	
Telephone Supply	Demand (x 1,000)		84	118	164	227	Same as
	Supply (x 1,000)		34	65	105	160	Sub-Saharan level
	Telephone/100 inhabitants		0.18	0.31	0.45	0.61	
Service Provision	Network Expansion	Major Cities		District HQ	Major Counties	All Counties	Telecom service
	Counties (Automatized)	10%		37%	56%	100%	in all Sub-Counties
	New Services	Mobile Tel.		ISDN	ISDN	ISDN	
Service Quality	Call Completion Rate		40%	50%	60%	70%	Same as
	Transmission Quality	Noisy		Clear	Clear	Clear	International level
	Recovery in 24 hours		30%	40%	50%	60%	
Operation Efficiency	Number of Staff		2,500	3,000	3,750	4,500	Highest level among
	Subscribers/Staff		14	20	28	36	similar counties
Revenue	Charge/Subs (US\$)		1,000	960	850	700	Same as
	Collection Rate		72%	80%	85%	90%	International level
	Revenue/Subs (US\$)		720	770	720	630	
	Total Revenue (x 1,000 US\$)		24,500	47,400	76,400	101,500	
Expenditure	O/M Cost (x 1,000 US\$)		20,600	29,600	38,900	49,900	
	Other Cost (x 1,000 US\$)		5,100	16,200	35,500	44,100	
	Total Expenditure (x 1,000 US\$)		25,700	46,000	74,400	94,000	
Profit	Profit before Tax (x 1,000 US\$)		-1,200	1,400	2,000	7,500	
Investment			Phase - I	Phase - II	Phase - III	Total	
	Project Cost (Mil. US\$)		187	171	204	562	
	Switch + Cable	Urban		Sub-Urban	Rural + Urban		
	Transmission	Backbone		Spur Link	Rural		
	Fund Sources:						
	Credit (Mil. US\$)		70%	60%	70%		
Grant (Mil. US\$)		30%	0%	0%			
	UPTC (Mil. US\$)		0%	40%	30%		

12.2 Recommendations on Management

(1) Privatization of Telecommunications Services

The basic telecommunication services, such as telephone, telegraph and telex, are to be provided by a public corporation or a 100% state own company until the network will be expanded to rural areas. If UPTC is privatized now, the appropriate network will not realized due to the following problems:

- a) Delay of rural telecommunications projects
- b) Difficulty of tariff control
- c) Problems on revaluation of capitals
- d) Un-matching to the national policy

The specific telecommunication services, such as data communication and mobile communication services, can be provided by private investors under control of the Ministry or UPTC.

(2) Opening of Terminal Equipment Market

At present, UPTC employs a rental system for terminal equipment in principle. In conjunction with the telecommunications network improvement, demand for terminal equipment will be diversified. To respond to such demand, a terminal equipment market is to be opened. This will also lead to service upgrading and reduction of operation and maintenance costs of UPTC. To realize the above, establishment of the technical standardization and reinforcement of type approval system are necessary.

(3) Institutional Reinforcement

In accordance with the network expansion, the organization of UPTC must be reinforced. It is proposed to study this problem, particularly with respect to the following departments:

- a) Planning, engineering and construction departments.
- b) Operation and maintenance departments.
- c) Customer service department.

12.3 Recommendations on Financial Matters

(1) Investments in Rural Areas

The telecommunications networks in Uganda are now concentrated in major cities. In order to provide the basic telecommunications services in the whole nation, it is recommended to extend the network up to each county center. For this purpose, approx. 20% of the total investment should be appropriated.

(2) Promotion of Revenue Increase

The financial performance of UPTC is expected to turn worse during several years to come. To cope with this problem, positive actions should be taken. Following actions are recommended:

- a) Review of tariff system (increase of monthly basic charge).
- b) Improvement of bill collection ratio (improvement of the billing and collecting system).
- c) Sales promotion in urban areas.
- d) Improvement in call completion ratio

(3) Fund Raising

The nationwide telecommunications network expansion requires an enormous amount of money. Because sales revenue is not sufficient for reinvestment, the foreign investment in the amount of 25 - 45 million dollars will be required annually during Phase-1 period ending in 2000. It is recommended to raise such fund from the following official sources of which loan condition is rather moderate:

- a) ODA loans from international agencies and foreign governments (15 - 30 million dollars per year).
- b) Grant aids from foreign governments (10 million dollars per year).
- c) Budget appropriation by the Government of Uganda (5 million dollars per year).

(4) Tax Exemption

Main equipment and materials for telecommunications network expansion projects have to be imported from foreign countries. In accordance with the tax revision in 1993, the import tax in the amount of approx. 50% of CIF price is to be levied on such equipment and materials. The materialization of telecommunications network expansion projects proposed in the Master Plan means the improvement of infrastructure which is indispensable for national development. Hence, an appropriate measure should be taken so that equipment and materials necessary for the materialization of the Master Plan can be exempted from the import tax.

12.4 Recommendations on Technical Matters

(1) Improvement in Call Completion Ratio

The call completion ratio in Uganda is as low as 30% - 40%, as compared with the ratio of advanced countries, approx. 70%. Improvement of call completion ratio will lead to not only service grade improvement but also revenue increase. It is recommended to take the following actions under the special task force team:

- a) Increase of transmission system capacity.
- b) Publication of telephone directory.
- c) Education of subscribers (PR on correct dialling method, etc.)
- d) Introduction of call waiting service.

(2) Reinforcement of Trouble Shooting System

The trouble shooting systems adopted for local cable networks in major cities are extremely inadequate. To improve the customer services, it is recommended to take the following actions:

- a) Preparation of spare parts.
- b) Improvement of work environmental conditions of maintenance teams (vehicles, tools, working clothes, etc.)
- c) Reinforcement of training of staffs (staffs in charge of window services and maintenance).
- d) Modernization of customer services window (introduction of computer systems).

(3) Human Resource Development Through Training

The training of the work force of UPTC is executed mainly in a training center in Kampala. However, this center now fails to function well due to shortage in training facilities, equipment and materials, as well as instructors. To expand the network as scheduled, some 100 personnel will have to be recruited every year. Hence, the improvement of the training center should be done urgently.

(4) Computerization of Office Work in UPTC

In accordance with the telecommunications network expansion, work volume for project management and financial administration will increase. To ensure smooth management and administration, it is recommended to introduce office automation in the UPTC. With the introduction of computer systems, data collection and analysis can be made speedily and correctly, leading to efficient business management.

(5) Employment of Consultant

In order to expand the telecommunications networks urgently as proposed in the Master Plan, 3 - 4 projects will have to be implemented every year. This requires the reinforcement of planning and construction departments. To achieve the above efficiently, it is recommended to employ foreign and national consultants, particularly with respect to the following:

- a) Detailed planning for some specific projects.
- b) Financial management and administration.

(6) Implementation and Review of the Master Plan

The proposed Master Plan has been prepared in consideration of the macroscopic social and economic trend in Uganda. In implementing individual projects, an appropriate revision should be made, taking into account microscopic characteristics specific to each objective area.

Further, in accordance with the variations with time in social and economic conditions in Uganda, the preconditions for the study should be reviewed and the Master Plan should be revised, wherever necessary. It is recommended to review the Master Plan every 5 years.

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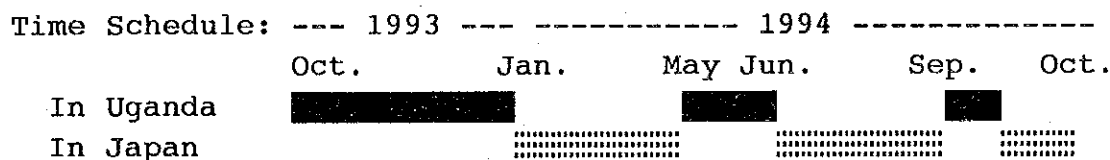
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SUMMARY

1. Introduction

1.1 Study Program

The Master Plan Study for Telecommunications Network was carried out by the Japan International Cooperation Agency (JICA) as a technical cooperation of the Government of Japan. This study will make up the "Master Plan towards Year 2010" for telecommunications network in Uganda to be executed by the Uganda Posts and Telecommunications Corporation (UPTC) under the Ministry of Works, Transport and Communications (MWTC). The outline of the study is as follows:



- Output of the Study:
- a) Demand Forecast
 - b) Development Strategies
 - c) Network Plan
 - d) Facilities Expansion Plan
 - e) Operation and Maintenance Plan
 - f) Management and Organization Plan
 - g) Project Implementation Program

1.2 Progress in the First Study in Uganda

During the three months period from 5 October, 1993 to 5 January, 1994, the JICA study team carried out the following work in Uganda together with UPTC counterpart personnel:

- a) Discussion on Inception Report
- b) Collection and analysis of information and data
- c) Field survey (to investigate demand and facilities)
- d) Demand forecast (outline)
- e) Study of development strategies
- f) Preparation of Progress Report

1.3 Progress in the First Study in Japan

During three months from 10 January to 25 March 1994, the JICA study team carried out the following work in Japan:

- a) Demand forecast (details)
- b) Study of basic policy for development
- c) Traffic forecast
- d) National network expansion plan (draft)
- e) National network facilities plan (draft)
- f) Study of operation and maintenance
- g) Management and organization plan (draft)
- h) Socio-economic analysis
- i) Preparation of interim report
- j) Technology transfer to UPTC counterpart person

1.4 Progress in the Second Study in Uganda

During the 1.5 months period from 15 May, to 7 July, 1994, the JICA study team carried out the following work in Uganda, together with UPTC counterpart personnel:

- a) Explanation and discussion on Interim Report
- b) Collection and analysis of information and data
- c) Field surveys (for priority projects)
- d) Discussion on network expansion plan
- e) Discussion on financial plan

1.5 Progress in the Second Study in Japan

During the three months period from 27 June, to 29 August, 1994, the JICA study team carried out the following work in Japan:

- a) Network facility plan (details)
- b) Operation and maintenance plan
- c) Management and organization plan
- d) Project formation
- e) Project evaluation
- f) Project implementation plan
- g) Preparation of draft final report
- h) Technology transfer to UPTC counterpart staff

1.6 Progress in the Third Study in Uganda

During the 0.5 month period from 31 August, to 16 September, 1994, the JICA study team carried out the explanation and discussion on Draft Final Report in Uganda, together with UPTC counterpart personnel.

1.7 Progress in the Third Study in Japan

During the one month period from 17 September to 30 October, 1994, the JICA study team carried out the preparation of Final Report in Japan.

2. Socio-Economy of Uganda

2.1 Geographical Situation

Uganda is an entirely inland territory of Africa and lies on the Equator. Uganda has 241,000 sq.km land area and a half part of Lake Victoria. The altitude of most area is 1200 through 1500 meters. The climate is better than other equatorial countries due to its altitude. Reasonable range of rainfall (750-2000 mm/year) and temperature (16-27 deg.C) is observed.

2.2 Demographic Trends

Uganda is presently estimated to have a population of about 16.7 million with a growth rate of 2.5% per year between 1980 and 1991. About 90% of the population was classified as rural. The most of urban population is in Kampala and Jinja. The growth rate of urban population is lower than African average but higher than the total population growth in Uganda.

2.3 Social Condition

Uganda consists of 4 regions, 39 districts and 163 counties. At present, the infrastructure is not well developed in many districts even in the headquarters town. Considering the major social conditions of road, electricity, trading, postal and telecommunications services, some district centers are classified as **Isolated**. They are Kiboga, Kapchorwa, Arua, Moyo, Nebbi, Kitgum, Kotido, Moroto, Bundibugyo, Kibale, Pallisa, Kisoro and Kalangala.

2.4 Economic Activities

(1) Gross Domestic Product (GDP)

In the period of 1987/88-1992/93, the average annual growth rate of the national GDP reached 5.1%, while it was 3.8% in the period of 1983/84-1992/93. The GDP per capita of US\$ 167 in 1992/93 has not reached the Sub-Saharan average. The World Bank reported that it is caused by the low productivity in the agriculture sector which accounts for 50% of the national GDP.

(2) Gross Regional Domestic Product (GRDP)

Although the GRDP has not been announced by the Government of Uganda, it is estimated based on several statistical data as shown in Table 2-1.

Table 2-1 GRDP by Region in 1992/93 (Current Price)

<u>Region</u>	<u>GRDP/Capita(Shs)</u>	<u>GRDP/Capita(US\$)</u>
Central	370,152	311
Eastern	146,395	123
Northern	116,640	98
Western	120,210	101
Whole Uganda	198,763	167

(3) Foreign Exchange Rate

The average exchange rate in 1992/93 was Shs 1,162/US\$, while that in 1991/92 was Shs 934/US\$. This means that the exchange rate is rather stable recently as compared with that in 1987-1991, during which the rates varied extremely adversely. The recent stable rate has led to the improved competitiveness in the export sector of Uganda.

2.5 National Development

(1) Rehabilitation and Development Plan (RDP)

The RDP consists of the following major programs:

- a) Economic recovery program 87/88-90/91
- b) Medium term structural adjustment program 91/92-94/95
- c) Public expenditure program

These programs are being executed with many efforts.

(2) Foreign Aid

To support the RDP of Uganda, the huge amount of Foreign Aid is provided every year as shown in Table 2-2.

Table 2-2 Gross ODA Amount to Uganda (Million US\$)

	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>
Bilateral	46	88	94	201	193	257
Multilateral	143	120	193	181	215	316
Total	189	208	287	382	408	573
Share of Grants	45%	63%	53%	69%	58%	54%

2.6 Future Trends

(1) Population Growth Rate

The national population growth rate will decrease from 2.5% to 2.3% per year up to the year 2010 due to several factors. The population of Uganda will reach 26 millions in the year 2010.

(2) Economic Growth Rate

In this study, the following GDP growth rates are used up to the year 2010:

- a) Optimistic growth rate: Average 7.3% per year
- b) Realistic growth rate: Average 5.6% per year

3. Present Telecommunications Services

3.1 Telecommunications Operators

The public telecommunications services are solely provided by UPTC as a common carrier in Uganda. Some government organizations are operating their own telecommunications networks. Some private companies have their own radio communication networks mainly using HF/VHF bands because of the insufficient network of UPTC.

3.2 Basic Telecommunications Services by UPTC

The historical data of basic telecommunications services is shown in Table 3-1.

Table 3-1 Basic Telecommunications Services by UPTC

<u>Item</u>	<u>1971</u>	<u>1980</u>	<u>1990</u>	<u>April 1994</u>
Telephone Exchange	62	105	101	98
Tel. Subscribers	14,417	20,626	26,672	30,462
Telegraph Office	46	65	15	15
Telex Exchange	1	1	2	1
Telex Subscribers	82	300	880	556

3.3 Telephone Service

The telephone density (0.17/100 inhabitants) in Uganda is lower than the average (approx.0.5/100 inhabitants) of Sub-Saharan countries even though their economic activities are not so different from those of Uganda. About 70% of telephone subscribers are concentrated in Kampala, Entebbe and Jinja. In other cities and rural areas, the telephone service scale is very small.

3.4 Non-telephone Services

(1) Telegraph Service

At present, telegrams are delivered only to P.O.Boxes in post offices, though 15 years ago, they were delivered up to the addressed houses.

(2) Telex Service

Around 90% of telex subscribers are located in Kampala while the remaining subscribers are in Jinja and other ten towns. The number of subscribers has decreased due to the growth of facsimile users.

(3) Data Communication Service

At present, many subscribers are in use of data communications with MODEMS connected to analog telephone lines. Several users, such as UEB, banks, petroleum companies and NGO's, intend to have high speed data links by digital lines.

(4) Mobile Communication Service

Mobile communication services will be provided in Kampala, Jinja and Entebbe areas by two private investors under the agreement with UPTC. The services will be commenced in 1994/95. UPTC itself has no plan to provide mobile communication services.

(5) Leased Circuits Service

There are a certain quantity of leased circuits for the government administrations and specialized agencies.

3.5 International Telecommunications Services

(1) Telephone Service

At present, the ISD (international subscriber dialling) telephone service is provided for communication with almost all the countries. The call completion ratio (30%) is not so high mainly due to shortage of circuits.

(2) Non-Telephone Service

The international telex service is provided only for major countries. The international TV program transmission is made when request by the Uganda TV. Receiving traffic is high but transmitting traffic is low (only 1-2 times per year).

3.6 Telecommunications Network by UPTC

(1) Outline of Network

In 1978, the telephone network connected 124 towns covering the whole country. However, many exchanges were damaged by civil wars in 1979 and 1987. In 51 towns, damaged manual exchanges have not yet been restored. At present, 98 telephone exchanges are working for 22,000 subscribers while the total capacity of switching systems is 65,000 lines. For rural communication, HF radio call systems are provided in 85 towns. The international links are connected through one earth station and three microwave routes.

(2) Switching System

In 28 major exchanges, automatic switching systems are operated. However, 18 of them are not so reliable because they are of old model (X-bar type). There are problems in maintenance and expansion due to unavailability of spare parts.

(3) Transmission Links

Some major exchanges are connected by microwave or UHF radio links while the eastern route microwave link is very old. Most of all manual exchanges are connected by VHF radio or open wire lines. Most of all VHF radio and open wire lines are not so stable. In 30 % of district centers, reliable trunk calls are not available.

(4) Local Cable Network

Most of the local cable networks were constructed during 1950-1970 and damaged by civil wars. In Kampala, Jinja and Entebbe, such cables have been rehabilitated under the World Bank project. However, the network in other towns are not rehabilitated yet because of shortage of budget. Stable telephone service cannot be provided by such old facilities.

(5) International Links

The number of international circuits is not sufficient to deal with present traffic. The call completion ratio is very low due to shortage of circuits.

3.7 On-Going Projects by UPTC

To rehabilitate the existing network, UPTC is executing the following major projects at present:

- a) Automatic exchanges (9 towns) by the loan from Korean Government for switching systems and by the own budget for transmission links and local cable networks (to be completed in 1995.)
- b) Rural telecommunications for central and western areas using Digital Multiple Access Radio System (DMARS) by IDA credit (under evaluation)
- c) Rehabilitation of Mpoma earth station (antenna system) by IDA credit (under contract negotiation)
- d) Digitalization of Mpoma earth station (IDR/D CME system) by INTELSAT finance (under contract negotiation)
- e) Replacement of switching systems (Jinja, Entebbe, and part of Kampala) and microwave links (Kampala-Mbale and Kenya) by suppliers credit (under evaluation)
- f) Kampala-Gulu new microwave link, switching system and local cable network under Northern Uganda Reconstruction Program (NURP) by IDA credit (under preparation)
- g) New Computerized Billing System (nationwide) by own budget (under evaluation)

The following projects have been completed in the 1993/94 fiscal year:

- h) Automatic exchanges (6 towns) by the grant aid of Irish Government (completed in 1993.)
- i) Rehabilitation of cable networks in Kampala, Jinja and Entebbe by IDA credit (completed in January, 1994.)
- j) Digital Telex Exchanges under Uganda-Germany Protocol (completed in March, 1994.)

4. Demand Forecast

4.1 Field Survey

To collect the socio-economic data for telephone demand forecast in sub-urban and rural areas, field surveys were carried out in 6 sample districts such as Mpigi, Soroti, Arua, Moroto, Rukungiri and Kabarole as shown in Figure 4-1.

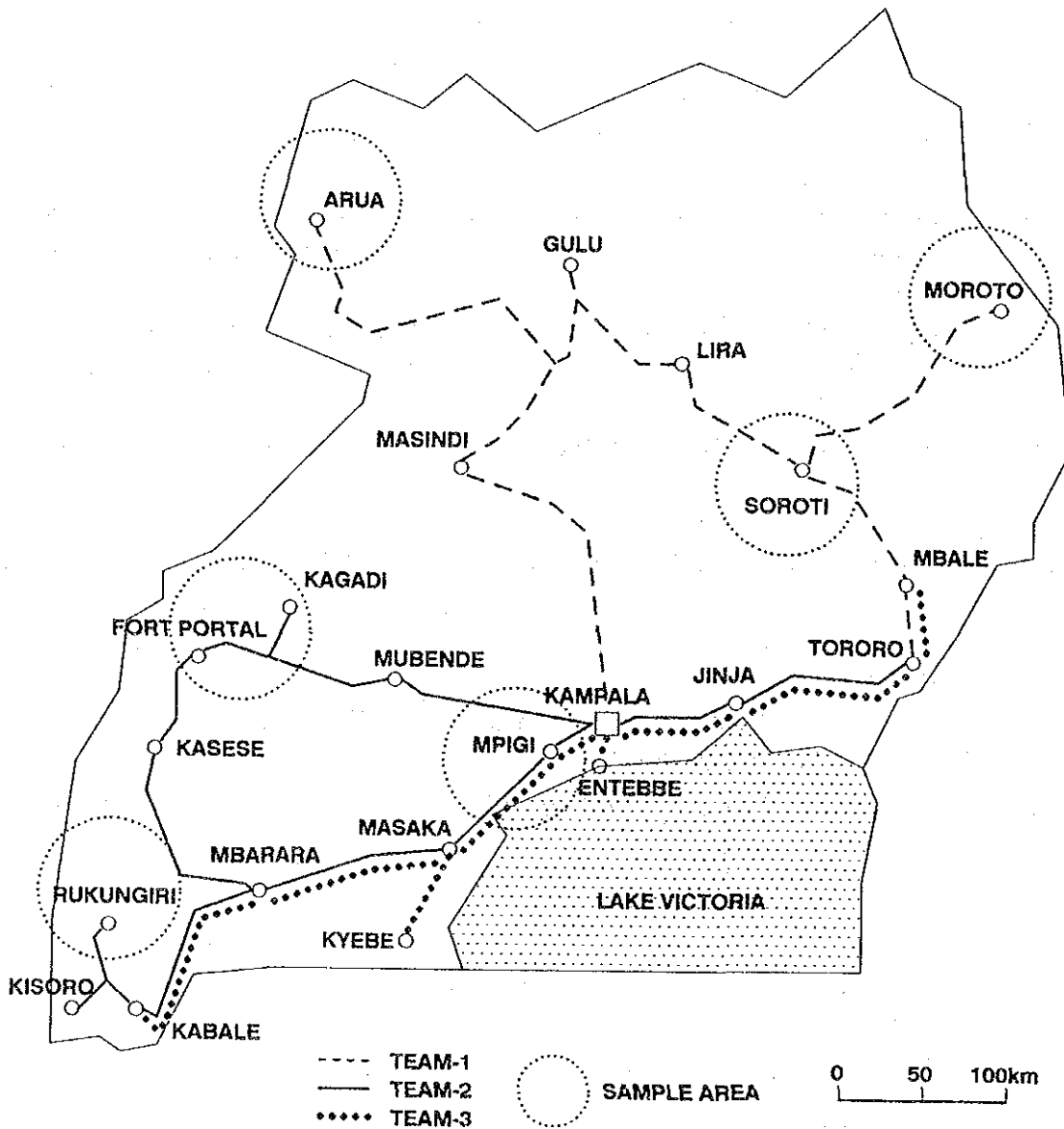


Figure 4-1 Sample Areas and Field Survey Routes

4.2 National Telephone Service Demand

The telephone service demand was forecasted mainly by the following two methods:

- a) ITU-model: by the data in 60 countries
- b) Uganda-model: by the data in sample counties

The ITU-model can forecast the total telephone demand, at present and in future, in relation to the national economic activity index, i.e., GDP. The Uganda-model can forecast the current and future telephone demand by county. The forecast results are as follows:

	Y-1993	Y-2000	Y-2005	Y-2010
a) ITU-mode (GDP7.3%up):	87,000	143,000	209,000	310,000
(GDP5.6%up):	87,000	126,000	167,000	224,000
b) Uganda-model:	73,000	118,000	164,000	227,000

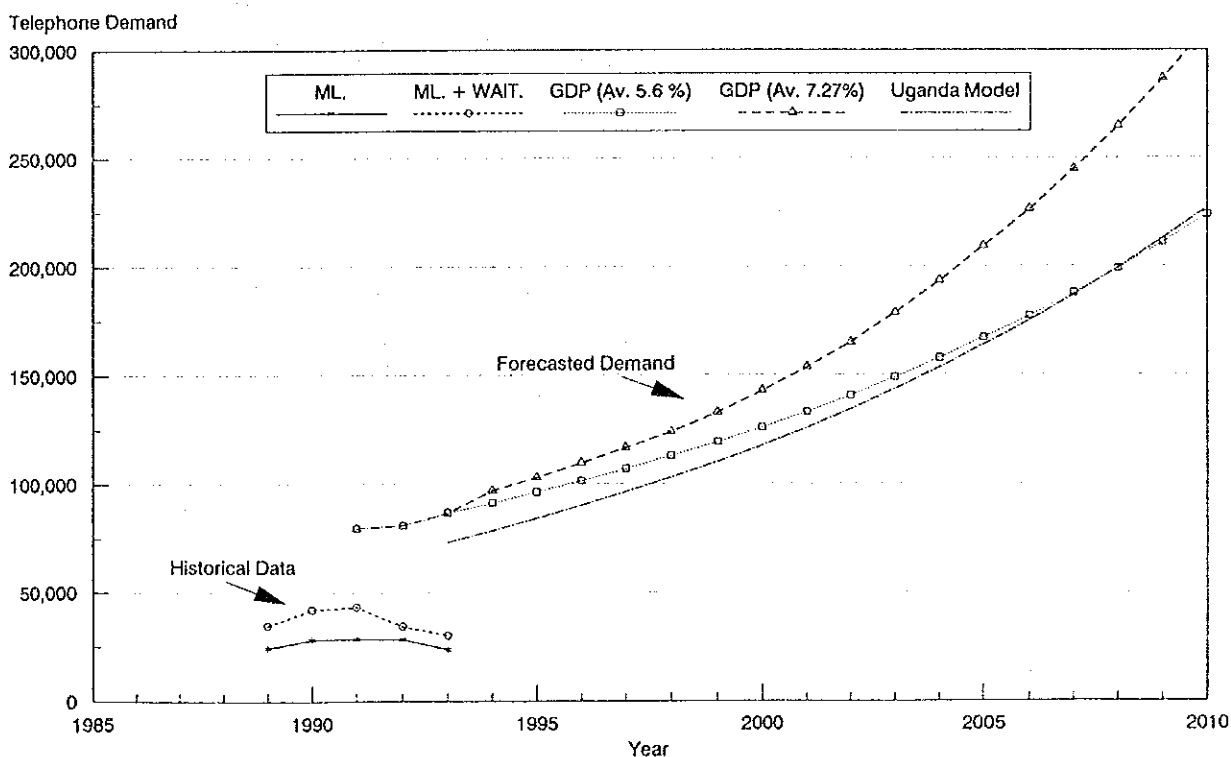


Figure 4-2 Forecasted Telephone Service Demand

Note: The historical Data is only for the existing service areas while the forecasted data is for the whole nation.

4.3 National Non-Telephone Services Demand

The demand for non-telephone services was forecasted by the following steps:

- Step-1: Survey at major administrations such as banks, public services, industries, transports and embassies, etc.
- Step-2: Analysis of world trend by developing regression models.
- Step-3: Comparison and evaluation on the forecasted results by step-1 and step-2.

(1) Data Communication Services

For data communication services, the demand for leased circuits and data terminal connection is forecasted as follows:

	<u>Y-1993</u>	<u>Y-2000</u>	<u>Y-2005</u>	<u>Y-2010</u>
a) Leased circuit:	28	99	190	326
b) Data terminal:(optimis.)	405	910	1,446	2,268
(realistic)	405	546	723	972

(2) Mobile Communication Services

For mobile communication services, the subscription demand for mobile telephone and radio paging services is forecasted as follows:

	<u>Y-1993</u>	<u>Y-2000</u>	<u>Y-2005</u>	<u>Y-2010</u>
a) Mobile telephone	318	999	1,810	2,958
b) Radio paging	756	1,012	1,330	1,797

5. Development Strategies

5.1 Review of the Existing Master Plan

In 1985, UPTC prepared the Master Plan with the assistance of ITU, aiming at the rehabilitation of telecommunications systems damaged by the civil war in 1979. This plan presents the Telecommunications Network Development 5-year Plan up to 1990, together with the telephone demand forecast for the period from 1985 to 2000. The annual average telephone demand increase ratio in main cities is estimated at 10%, while that in Kampala, 8%. That is, rather high ratios are forecasted, with the estimated number of subscriptions of 69,060 in 1990 and 177,956 in 2000. Under this plan, addition of 81,250 lines are planned to satisfy all the demand in 1990.

In accordance with this plan, a number of projects have been implemented. However, in 1985, a civil war broke out again and telecommunications facilities were damaged once more. With the resultant economic recession, the demand forecast presented in the plan has become unrealistic.

5.2 Problems in Telecommunications Services

(1) Network Expansion

In 1993, the telephone density is only 0.17 per 100 inhabitants, which is lower than the average value (0.5) of Sub-Saharan countries. Such low density is due to serious damages to telecommunications facilities caused by the civil wars and the delay of rehabilitation work. With such poor services, it is difficult to maintain normal economic activities and to support the national development.

In April 1994, the waiting list of telephone connection is approx.1,400 except Kampala, while the existing subscriber lines number 30,500 in total. In Kampala, the waiting list has cleared by the completion of the World Bank cable project. However, it will be increased again due to new applicants.

(2) Operation and Maintenance

The existing telecommunication facilities were installed 10 to 20 years ago, and are old-fashioned and aged. It is difficult to maintain satisfactory service grade without spare parts. And also, the call completion rate is 30-40% which is lower than the UPTC target value (60%). This situation invites the loss of revenue, adversely influencing the UPTC's financial performance.

About 30% of the existing subscriber lines are damaged and not repaired yet. In daily maintenance, only 25% of troubles can be remedied within 24 hours while its target is 60%. These problems are mainly caused by shortage of materials and transportation means for maintenance crews.

(3) Management and Organization

Speaking of the financial status of UPTC, the foreign exchange losses are most disturbing factor to the profit and loss account. Due to this, it is difficult for UPTC management to keep reasonable financial conditions.

In addition, key factors of financial status were also decreased during 3 years as follows:

	<u>1990/91</u>	<u>1991/92</u>	<u>1992/93</u>
- Profit/Revenue (before forex loss)	58%	44%	20%
- Revenue/Net Assets	71%	57%	48%
- Profit/Net Assets	41%	25%	10%

The major reason for the above decrease is much bad debts provision due to uncollected bill. This problem is attributed to the ineffective billing system and difficulty in cash collection.

5.3 National Development Policy

(1) Long Term Objectives

The Ugandan Government's long term objective for the economy is the building of an "independent, integrated and self-sustaining economy". Movement towards this objective implies increased emphasis on:

- promotion of inter-sectoral linkages, especially for agro-processing, and the use of local mineral resources in the manufacturing sector;
- efficient import substitution;
- efficient and sustained investment in export oriented industries, and expansion of external markets;
- development of a viable and resilient banking sector as a source of medium term investment funds for industrial development, as well as the development of an active capital markets;
- in addition to developing indigenous technology, a program to induce inflows of research and technology;
- rehabilitation, expansion and maintenance of economic infrastructure.

(2) Communication Sector Policy

Effective rehabilitation of communications infrastructure is a crucial element of Government's medium term strategy. Objectives in this sub-sector include:

- restoration and development of post and telecommunications services in both urban and rural areas;
- promotion of international communications links with neighboring countries.

(3) Role of Telecommunications in National Development

The role of telecommunications in national development is illustrated in Figure 5-1. As can be seen from the figure, telecommunications is a powerful support for the development of various sectors.

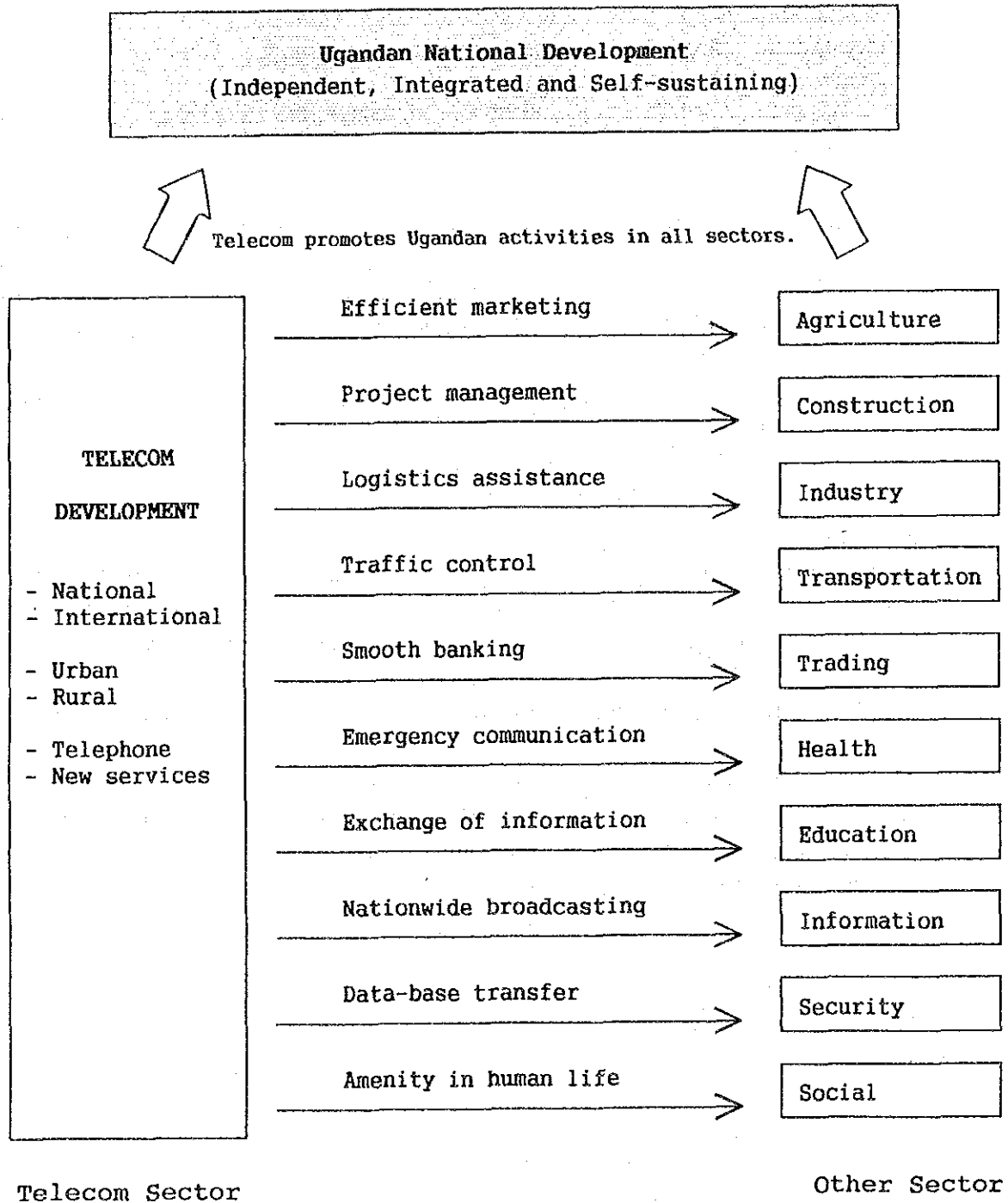


Figure 5-1 Role of Telecommunications in National Development

5.4 Basic Concept on Master Plan

(1) Objectives of Development

- a) To provide the basic telecommunication services in the whole country for keeping urgent communication means in times of emergency, such as natural disasters, sudden illness, accidents, etc., and for improving and rationalizing government's administrative services aiming at upgrading of the welfare of the people of Uganda.
- b) To support the national development focusing on the Government policy of an "independent, integrated and self-sustaining" economy.

(2) Development Phases

Phase-1 (1995-2000): Development of network

UPTC will develop the nationwide telecommunications network to provide the basic services for large and middle size towns. During this stage, the isolation problem in telecommunications will be solved on district basis. Advanced services will also be provided in the capital area.

Phase-2 (2000-2005): Enhancement of services

UPTC will enhance the telecommunications services in their volume and quality. The automatic telephone network must be expanded for 60% of county headquarters in rural areas. Advanced services will also be provided in major cities to support economic activities.

Phase-3 (2005-2010): Taking-off and self-sustaining

UPTC will take-off achieving the goal of service level and management capability. The network expansion will be executed by the own budget and bank credit. The automatic telephone network must be expanded for all counties (163 locations) to provide basic telecommunications services.

(3) Supply Policy

- a) To reach the Sub-Saharan level in 2005.
- b) To fulfil 70% of demand in 2010.
- c) To invest 0.5% of GDP every year.

(4) Management Policy

- a) To improve customer satisfaction
- b) To conduct effective and efficient operation
- c) To manage on commercial basis

5.5 Development Scenario

(1) Service Provision

Basic Telecommunications Services

<u>Type of Services</u>	<u>Present</u>	<u>Year</u>			
		<u>1994/95</u>	<u>2000</u>	<u>2005</u>	<u>2010</u>
<u>Telephone/Fax</u>					
- Manual switching	Yes	Yes	-	-	-
- Automatic switching	Yes	Yes	Yes	Yes	Yes
- Various functions*	Yes(50%)	Yes	Yes	Yes	Yes
<u>Telegraph</u>					
- Through P.O.Box	Yes	Yes	Yes	Yes	Yes
- Delivery to house	-	-	Yes	Yes	Yes
<u>Telex</u>					
	Yes	Yes	Yes	Yes	Yes
<u>Leased circuits</u>					
- Analog	Yes	Yes	Yes	Yes	Yes
- Digital	-	Yes	Yes	Yes	Yes
(for data communication)					

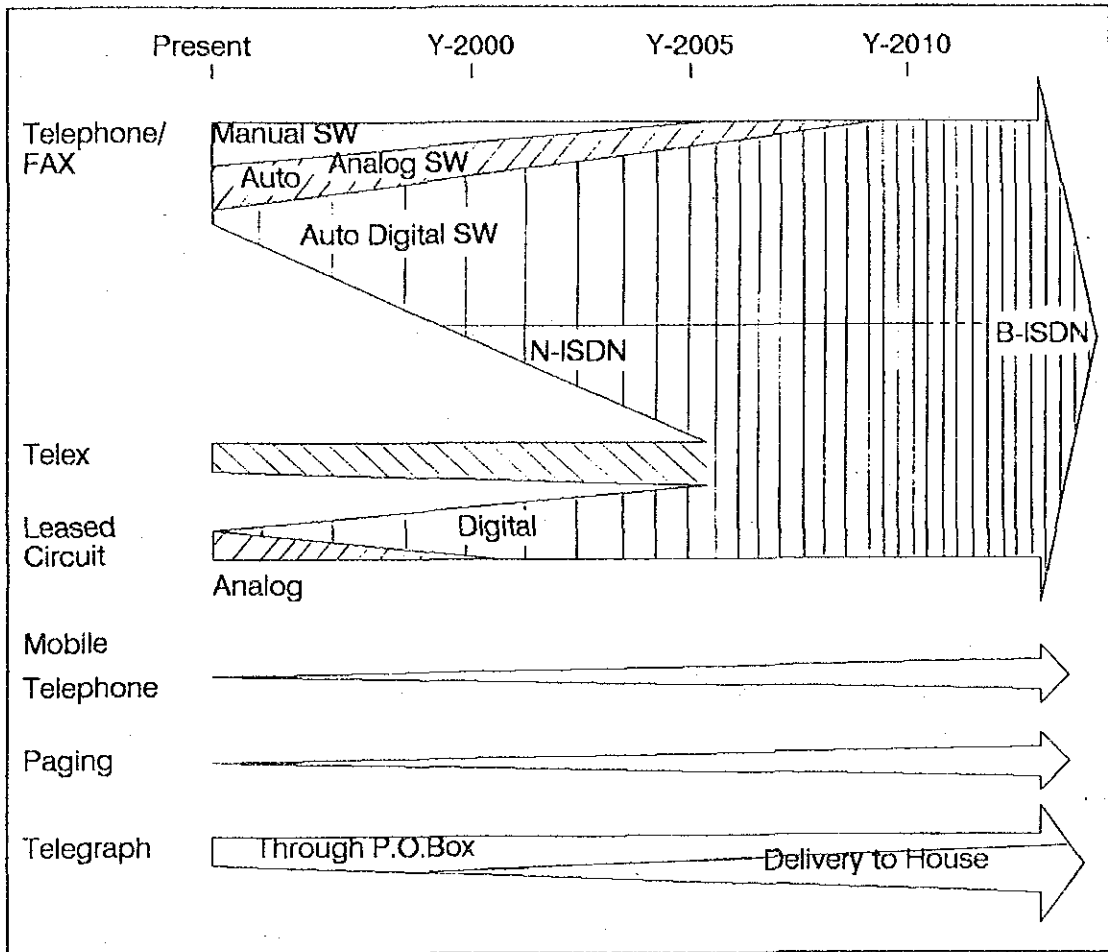
Note*: Various functions mean the special functions on switching system for telephone services, such as temporary transfer, call waiting services, etc.

Advanced Telecommunications Services

<u>Type of Services</u>	<u>Present</u>	<u>Year</u>			
		<u>1994/95</u>	<u>2000</u>	<u>2005</u>	<u>2010</u>
<u>ISDN</u>					
- Narrow band	-	-	Yes	Yes	Yes
- Broad band	-	-	-	-	?
<u>Mobile communication</u>					
- Telephone	-	Yes	Yes	Yes	Yes
- Paging	-	Yes	Yes	Yes	Yes
- Maritime radio comm.	-	-	Yes	Yes	Yes

Figure 5-2 shows the service provision plan for the above.

Service Provision



Ratio of Automatized Counties

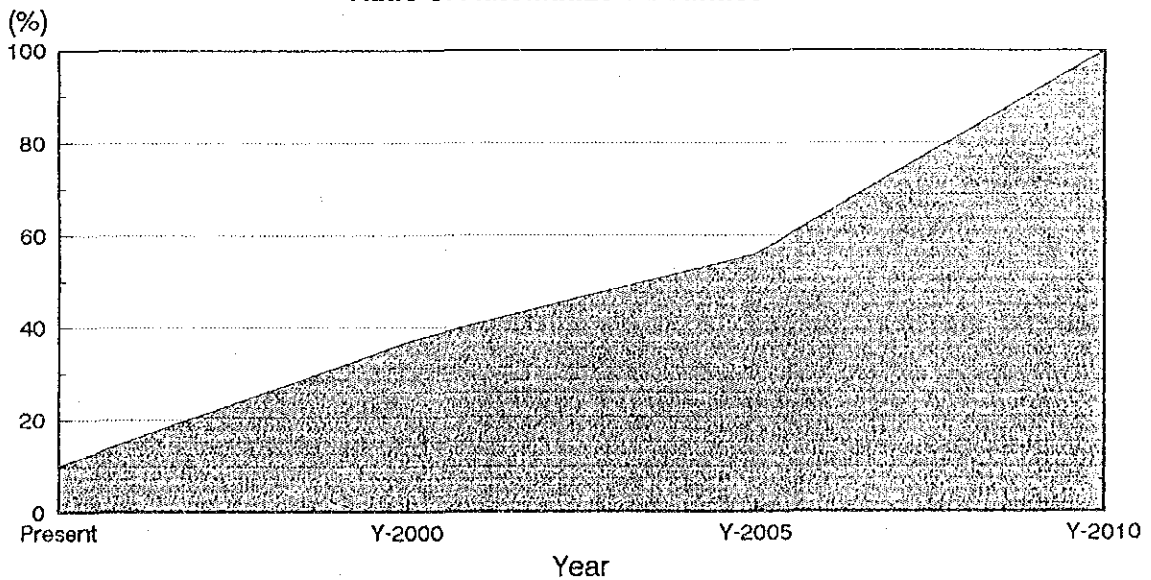


Figure 5-2 Service Provision Plan until Year 2010

(2) Supply Volume

Telephone Service

Based on the above-mentioned policies, the following supply targets are proposed for telephone service:

(Unit:1000 subscribers)

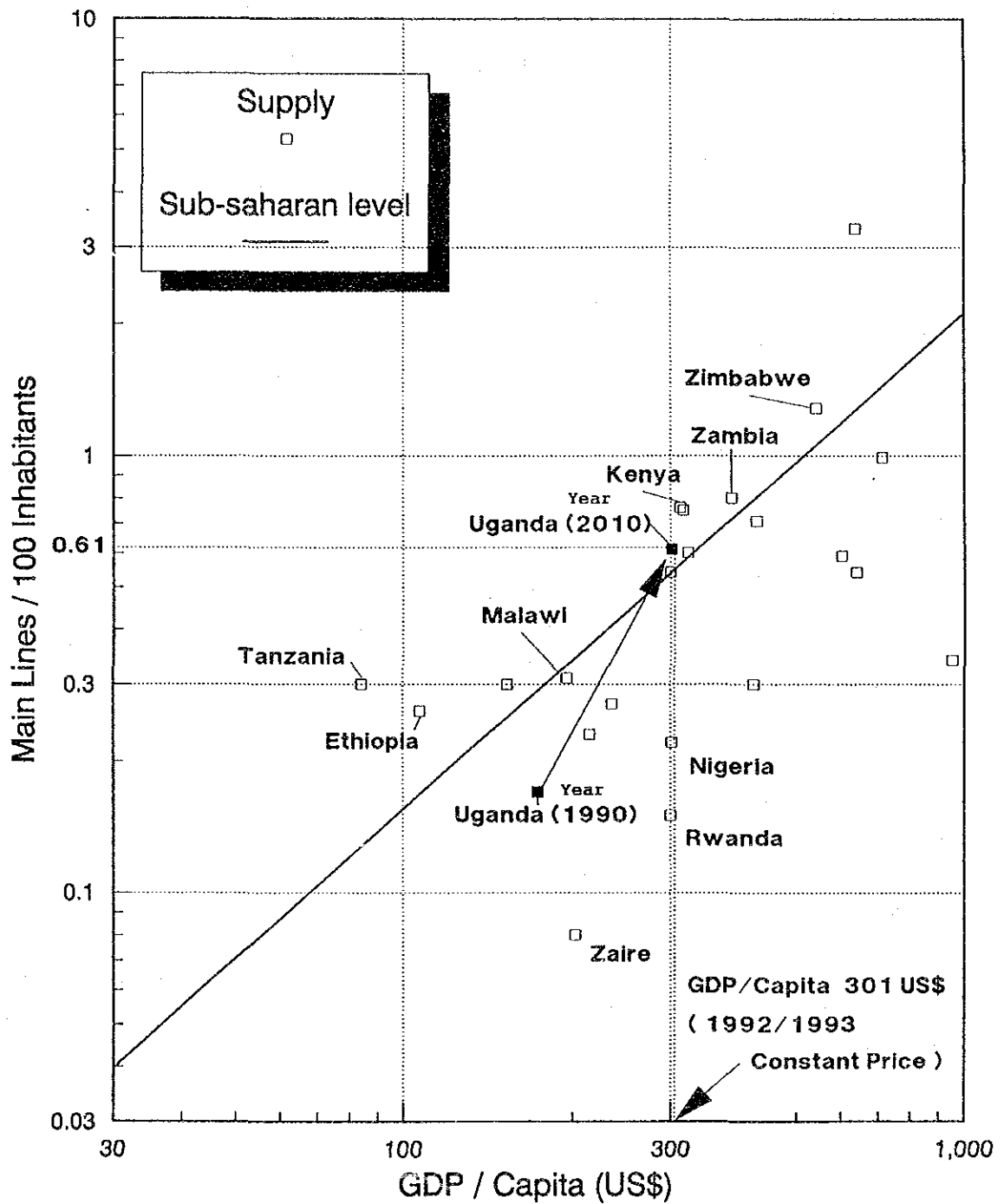
	Rehabilitation		Development		
	Fiscal Year 1992/93	1994/95	Phase-1 '99/2000	Phase-2 2004/05	Phase-3 2009/10
1. Demand (5.6% GDP growth)					
1) By ITU-model	87	98	126	167	224
2) By sample survey	73	-	-	-	-
3) By Uganda-model	73	84	118	164	227
2. Supply Guideline					
1) Sub-Saharan level	53	59	78	105	142
2) 70% supply to demand	-	59	83	115	159
3) 0.5% investment/GDP	-	-	71	109	160
3. Targets on Master Plan					
	24	34	65	105	160

For reference, the telephone service status in Sub-saharan countries in 1990 is shown in Figure 5-3. In each county, the supply volume be determined based on the following standard supply rate:

<u>Supply Rate</u>	<u>County Applied</u>
90%	Kampala and other municipalities
80%	Large demand (over 2000) counties
50%	Medium demand (400-2000) counties
10%	Small demand (less than 400) counties

By this supply, the telephone density will be improved as follows:

	Year	<u>1993</u>	<u>1995</u>	<u>2000</u>	<u>2005</u>	<u>2010</u>
Kampala		1.73%	2.58%	3.30%	4.96%	6.01%
Municipalities		1.32%	1.47%	3.49%	3.94%	4.51%
Other areas		0.02%	0.02%	0.04%	0.12%	0.19%
Whole Uganda		0.14%	0.18%	0.31%	0.45%	0.61%



Source:
 Yearbook of Common Carrier by ITU in 1993
 World Development Report by World Bank in 1992

Figure 5-3 Telephone Service Status in 1990

Telegraph Service

Telegraph offices are to be provided "in all county centers" by the year 2010 as a basic telecommunications service for the people. The delivery service will be under taken by county headquarters offices.

Other Non-telephone Service

The supply targets for ISDN and mobile telephone services are proposed as follows:

	<u>Y-2000</u>	<u>Y-2005</u>	<u>Y-2010</u>
a) ISDN lines:	800	1,300	2,000
b) Mobile telephone:	800	1,600	2,700

(3) Network ExpansionPriority

To solve the current problems in the telecommunications services, the network must be rehabilitated and expanded with the following priority:

- a) Replacement of old equipment
- b) Expansion to remote corners (isolated districts)
- c) Rehabilitation in semi-urban areas (middle size towns)

Especially, the new transmission link to Arua town must be constructed urgently, as well as the replacement of old switching and transmission systems in Kampala, Jinja and Entebbe.

Rural Telecommunications

To improve telecommunications services in rural areas, telephone exchanges or public call offices (PCO) be provided in "all county centers" by the year 2010. By this provision, everybody can access to telephones within 20 kilometers.

(4) Financial ProjectionFund for Investment

The investment cost must be covered by the following funds:

- a) Grant aid: For priority or un-profitable projects.
- b) Foreign loan: For large scale profitable projects.
- c) Own budget: For small scale projects.

Government Contribution

To provide the basic telecommunications services in the whole nation, UPTC must expand the telecommunications network to rural areas even though the revenue from subscribers there will not be so large. For the realization of normal financial management under such conditions, UPTC may require the following contributions from the Government:

- a) Financial assistance to cover un-expected foreign exchange losses.
- b) Tax exemption for imported equipment (Import tax (approx. 50%) is to be levied as from December 1993.)
- c) Financial assistance for rural telecommunications improvement.

Operation Revenue

To solve current financial problems, the following actions must be taken:

- a) Urgent introduction of the new billing system.
- b) Special actions for cash collection.

6. Network Expansion Plan

6.1 Fundamental Technical Plan

In consequence of the realization of national digitalization, the current 3-step hierarchy of the telephone switching network is to be modified to the 2-step hierarchy, eliminating group switching centers (GSCs). For small size telephone exchanges having less than 2,000 line units, remote switching units (RSUs) will be installed to save investment and maintenance costs.

6.2 Telephone Traffic Forecast

By the network expansion, the telephone traffic (OG+IC) per subscriber will be increased in future as follows:

	<u>Exchange</u>	<u>Present</u> (Erl/sub)	<u>Future</u> (Erl/sub)	<u>STD in Future</u> (%, Erl/sub)
a)	Kampala	0.08	0.14	20%, 0.028
b)	Others (large)	0.06	0.12	35%, 0.042
	(small)	0.06	0.12	60%, 0.072

6.3 National Network Expansion

To provide telephone service to 160,000 subscribers in the year 2010, the network expansion plan is proposed in Figure 6-1.

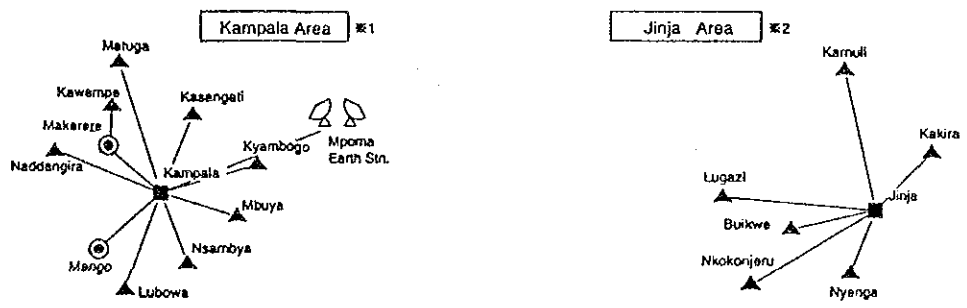
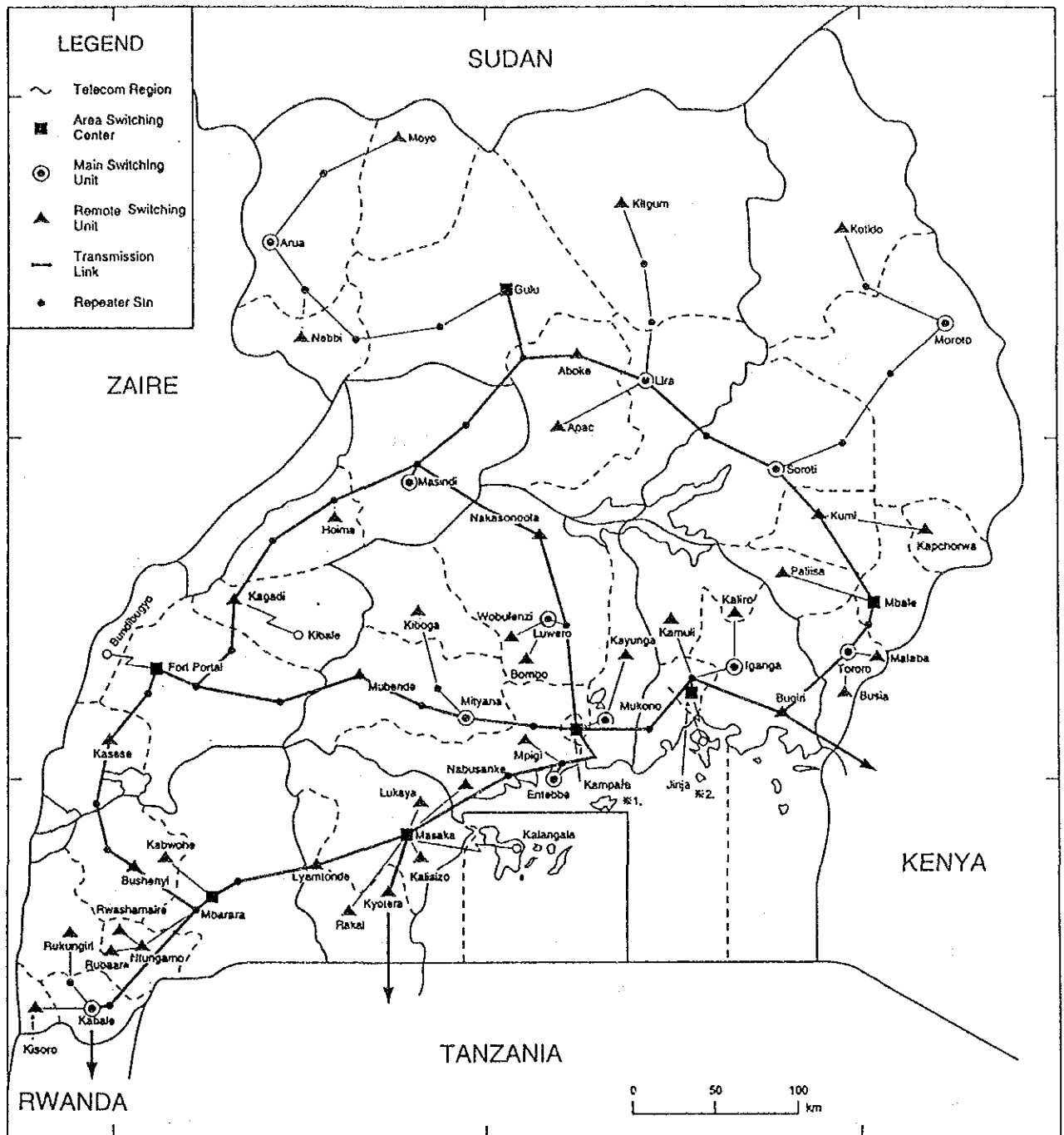


Figure 6-1 Telecommunication Network in 2010

7. National Network Facilities Plan

The provision of telecommunication network facilities was studied by county. Considering effective investment, the initial provision size must cover the necessity up to 5 years later. The provision plans for switching, transmission and subscriber lines facilities are proposed, based on this basic concept.

7.1 Switching System

The switching system provision plan is summarized below.

	<u>Existing</u> (April '94)	<u>Phase-1</u> ('94/95-99/00)	<u>Phase-2</u> ('00/01-04/05)	<u>Phase-3</u> ('05/06-09/10)
Expansion (LU)		77,350	42,750	50,900
Removal (LU)		45,390	7,140	5,100
Total capacity (LU)	57,630	89,590	125,200	171,000
Number of automatic exchanges	28	45	69	70

7.2 Transmission Network

The national transmission network plan in 2010 is proposed as shown in Figure 7-1. All the existing analog radio systems will be digitalized by the year 2010.

For a backbone network to connect among Area Switching Centers (ASCs), two (2) routes will be established in ring connection to ensure high reliability. For Jinja and Gulu, two (2) routes must be considered in the implementation stage even though only one (1) route is planned in Figure 7-1.

7.3 Subscriber Lines

The following two kinds of subscriber line systems are proposed to connect subscribers with exchanges:

- a) Metallic pair cables
- b) DMARS (Digital Multiple Access Radio System)

The required expansion volumes of these systems in each development phase will be as follows:

	<u>Existing</u> (April '94)	<u>Phase-1</u> (*94/95-99/00)	<u>Phase-2</u> (*00/01-04/05)	<u>Phase-3</u> (*05/06-09/10)
Cables (pairs)	79,810	38,500	27,400	47,400
DMARS (lines)	-	2,340	7,090	11,610

7.4 Rural Telecommunications

In rural areas, telecommunication services are provided by RSU, DMARS and PCO (Public Call Office).

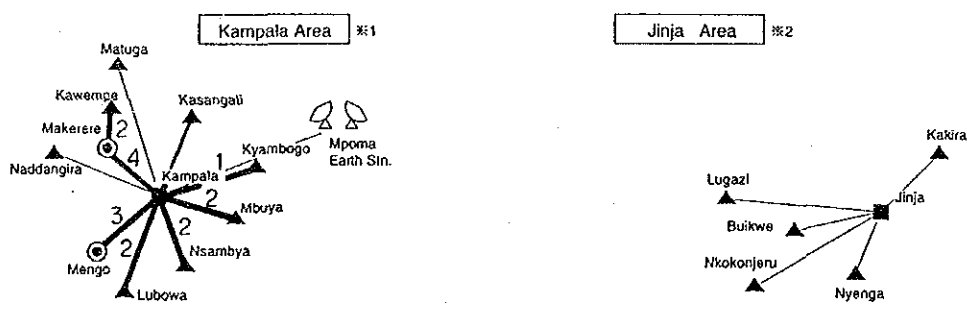
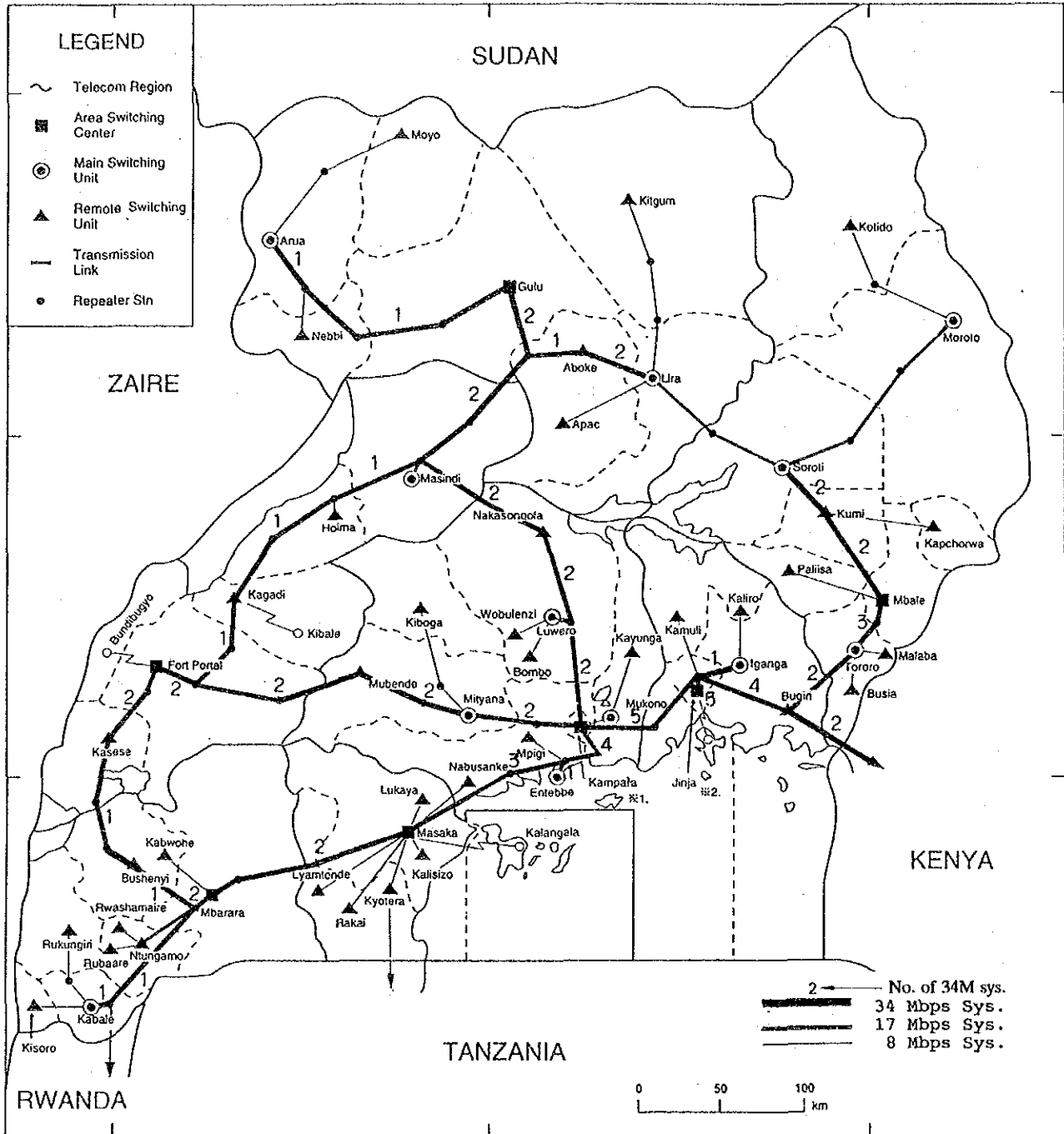


Figure 7-1 National Transmission Network Plan

8. INTERNATIONAL TELECOMMUNICATIONS PLAN

8.1 Present International Telecommunications Services

At present, UPTC operates 115 telephone circuits directly connected with eleven (11) countries and provides the international telephone services in collaboration with 189 countries, handling the following types of calls:

- 1) IDD (International Direct Dialing) call
- 2) Operator assisted call
- 3) Payphone (Prepaid Card) call

The telephone traffic is increasing; however, the call connection rate is low (approximately 30%). The tariff for IDD is on a one minute-one minute basis, and that for the operator assisted call is on a three minutes-one minute basis. The rates per minute are threefold depending on destinations. In April 1994, the rates were reduced from US\$3/5/7.5 to an international average, i.e, US\$1/2/4.

UPTC provides non-telephone type services such as telex, leased circuit, facsimile and telegram services. The demand for telex service has been slightly decreasing in recent years. Facsimile users are gradually increasing, taking over telex users.

8.2 Present Status of International Telecommunications Network

The existing International Telephone Switching system (E10B) which plays the main role of International Telecommunication Network is already digitalized and has also function of National Transit Switch. It is not recommended to add new functions to the existing system, taking into account its lifetime and necessary additional investment. Presently, the international transmission network is comprised of an analogue satellite route and analogue microwave routes.

INTELSAT standard "A" earth station (named MPOMA 1-A) has been operated since 1981. Although some critical problems exist, UPTC is making efforts to maintain its operation.

UPTC operates the old microwave systems established before 1975, some parts of which compose a part of the PANAFTEL (Pan-African Telecommunications Network) Link.

8.3 Problems in International Telecommunications

Problems involved in international telecommunications services are:

- 1) Low call connection rate.
- 2) Difficulty in satellite circuit expansion since the analogue system is adopted in Uganda.
- 3) Difficulty in introduction of new services due to obsolete switching equipment.
- 4) Increase in outpayment in international accounting.

8.4 Service Enhancement Plan

Considering the international telecommunications services trend, new telephone services, such as International Toll Free Call (ITFC or I800), International Operator Direct Connection (IODC), IDD paid by commercial credit cards, etc. should be introduced in Uganda at an early stage of the First Phase time frame of this plan.

Telex service should be improved in its service quality. UPTC is to provide digital leased circuit service up to 64kbit/s immediately to meet users' needs. Recognizing the importance of the facsimile service, UPTC should make plans to improve its service quality.

8.5 International Telephone Demand Forecast

The international telephone paid minutes are forecasted as shown in the following.

	<u>1995</u>	<u>2000</u>	<u>2005</u>	<u>2010</u>
a) Outgoing (1,000 Min./year)	5,614	8,461	12,605	19,060
b) Incoming (1,000 Min./year)	5,770	9,288	13,647	20,052

8.6 International Telecommunication Network Development Plan

In order to improve the quality of existing services and to introduce new services, the international telecommunication network will be developed as follows:

Phase-1 Period (1994/1995-1999/2000)

- 1) Introduction of Signalling System of ITU-T Recommendation No. 7.
- 2) Upgrading in function of existing equipment.
- 3) Digitalization of transmission routes.
- 4) Upgrading of operation and maintenance technology.

Phase-2 Period (2000/2001-2004/2005)

- 1) Expansion of ISD service to the Middle East, Asian and Oceania countries.

8.7 Facility Provision Plan

Figure 8-1 shows the outline of Facility Provision Plan.

Phase-1 Period (1994/1995-1999/2000)

- 1) Rehabilitation of the antenna tracking system of Mpoma Satellite Earth Station (under preparation).
- 2) Digitalization of Mpoma Satellite Earth Station (IDR Plan, under preparation).
- 3) Renewal of the existing international switching equipment (to be combined with domestic trunk switching equipment).
- 4) Renewal of facilities for Atlantic Ocean Region Satellite at Mpoma Satellite Earth Station.

Phase-2 Period (2000/2001-2004/2005)

- 1) New installation of facilities for Indian Ocean Region Satellite at Mpoma Satellite Earth Station.

Phase-3 Period (2005/2006-2009/2010)

- 1) Introduction of independent international gateway switching system in order to cope with the increase of international telephone traffic.

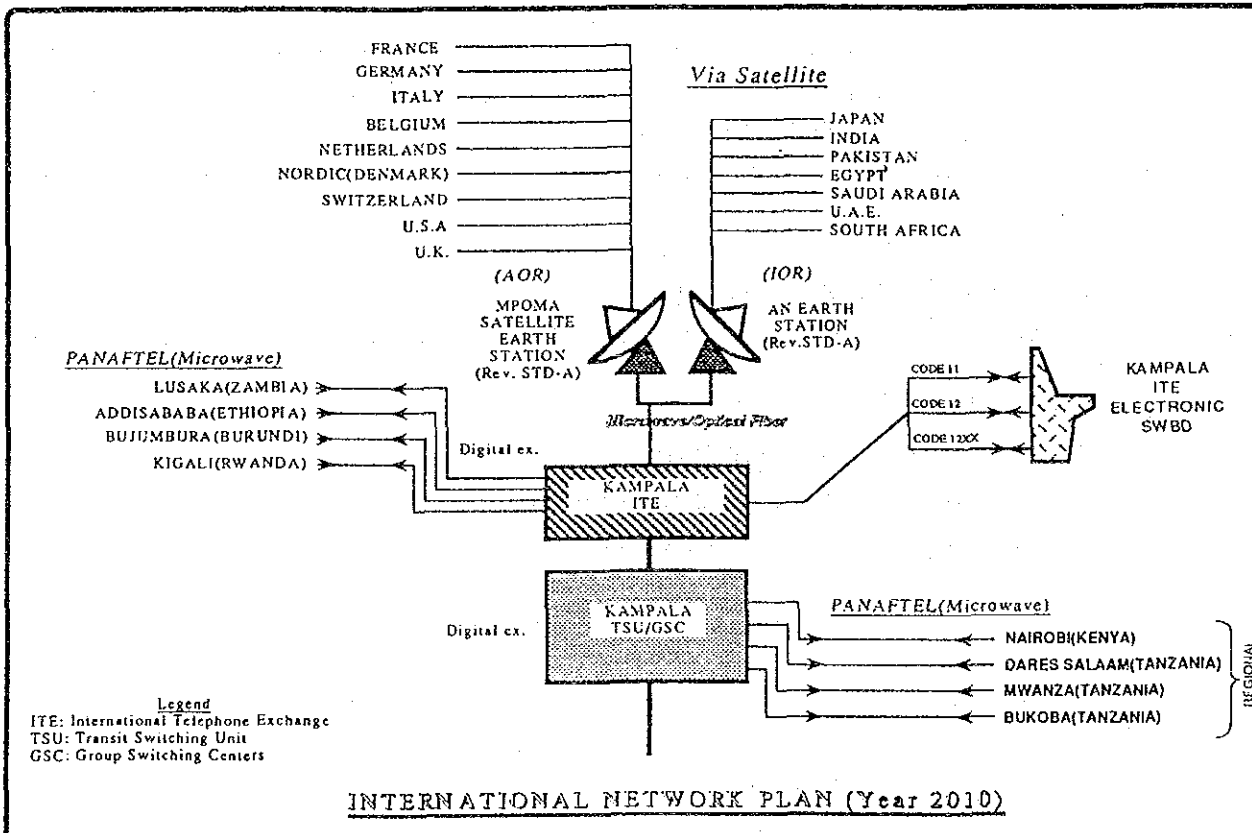
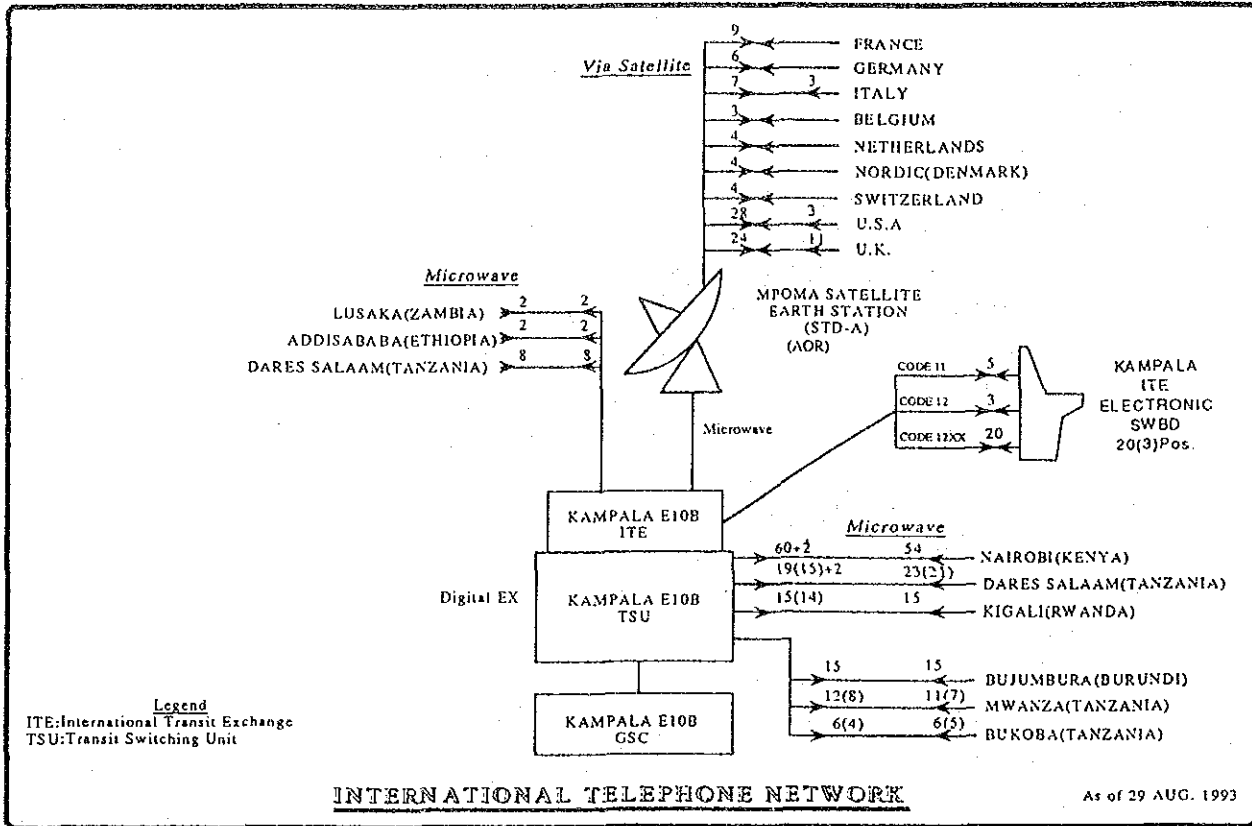


Figure 8-1 International Network Facility Plan

9. Operation and Maintenance Plan

9.1 Present Situation

(1) Operation of Network

At present, the automatic telephone switching service is provided only in major towns. In rural areas, there are some problems:

- a) Low call completion rate (30 - 40%)
- b) No-operation at night in small exchanges
- c) Noisy and inconvenient communication through HF radio
- d) No telegram delivery to each house

(2) Maintenance of Facilities

The fault reporting and recovery system is established in urban areas. However, such maintenance system is not so effectively functioned for the following reasons:

- a) Shortage of spare parts and materials
- b) Difficulty of transportation
- c) Old and unreliable systems
- d) Shortage of test equipment and tools
- e) Unskilled staff on maintenance

Figure 9-1 shows the faults and clearance during the latest 6 months in Kampala. The number of faults has decreased as a result of the cable network rehabilitation by a recently completed project. However, the clearance rate was not so improved.

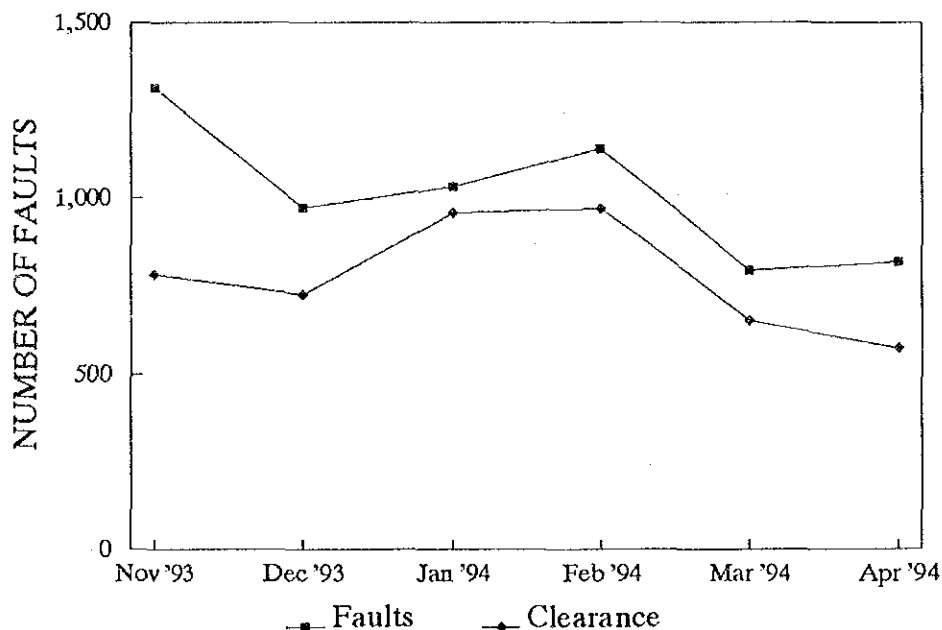


Figure 9-1 Faults and Clearance in Kampala

9.2 Approach to Improvement

(1) General Approach

To improve the current operation and maintenance capabilities, appropriate measures must be studied from the viewpoint of "Personnel", "Physical" and "Financial" aspects in general.

(2) Specific Approach

For the approach to specific problems, adoption of TQC (Total Quality Control) system is proposed.

For a case study, the local cable network maintenance system was analyzed. The study was started with the identification of problems and factors involved through discussions with the maintenance team in Kampala. The study results are summarized in Figure 9-2 and Figure 9-3. In total, major causes of fault clearance delay are as follows:

- 1) Unreliable transportation for maintenance work
- 2) Weak in-house wiring
- 3) Not stable network facilities
- 4) Delay of order by customer service office
- 5) Wrong order by customer service office

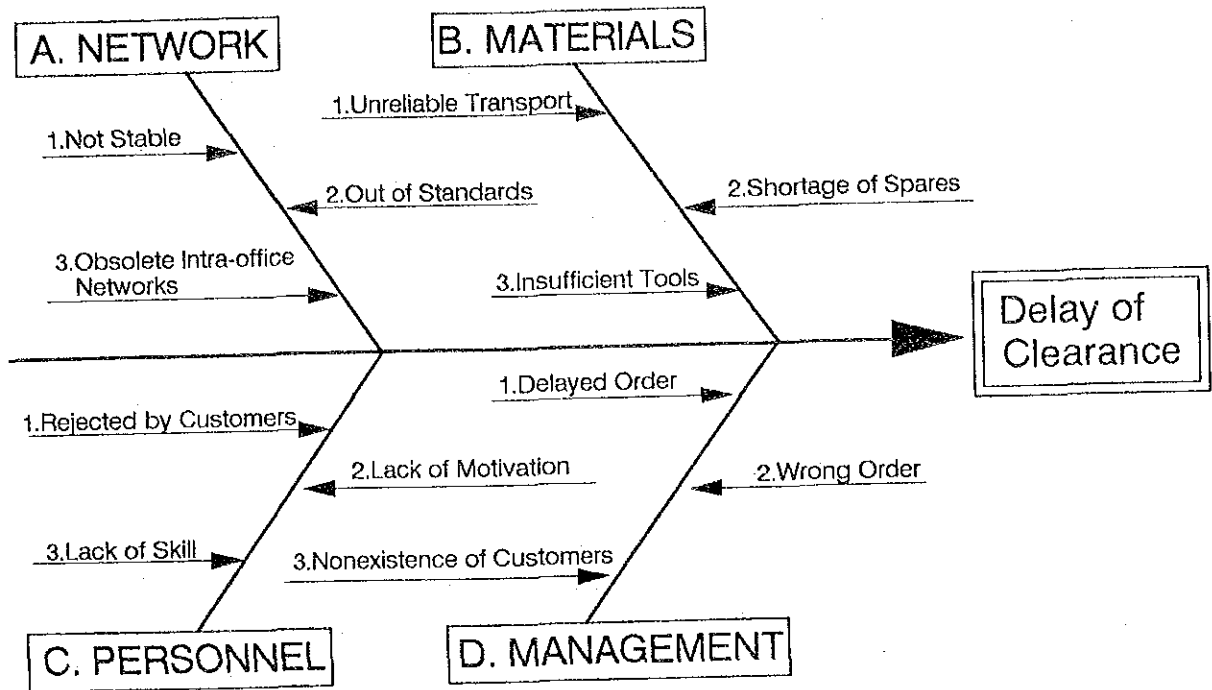


Figure 9-2 Cause of Fault Clearance Delay

Cause of Delay

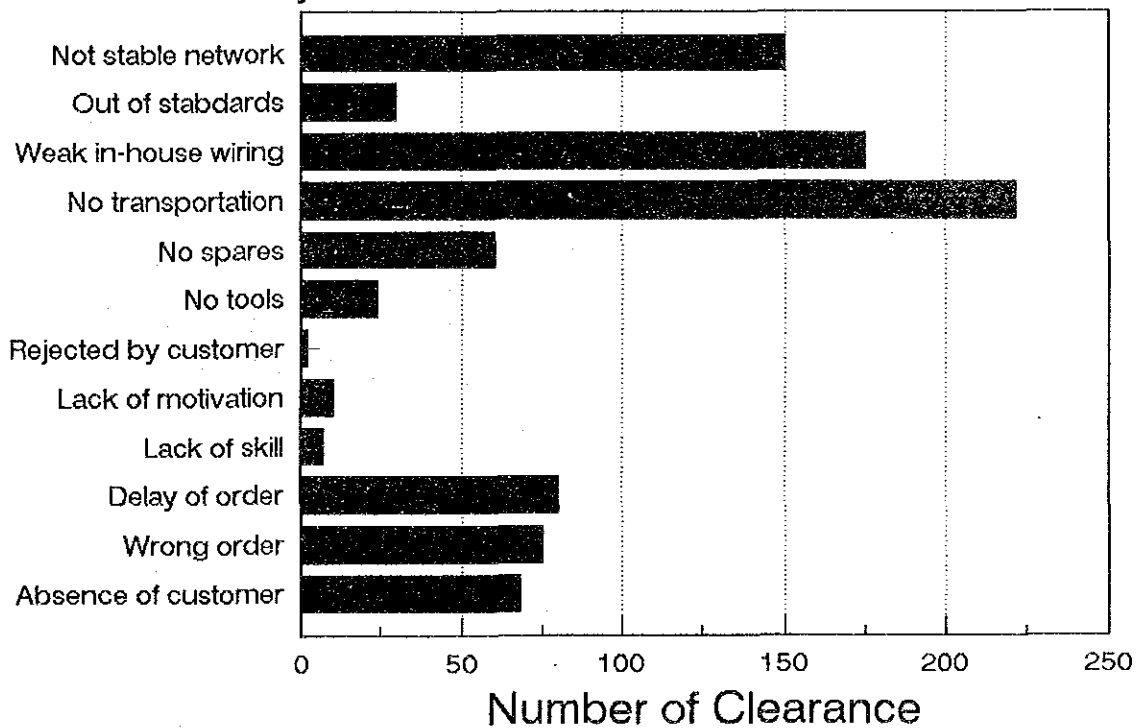
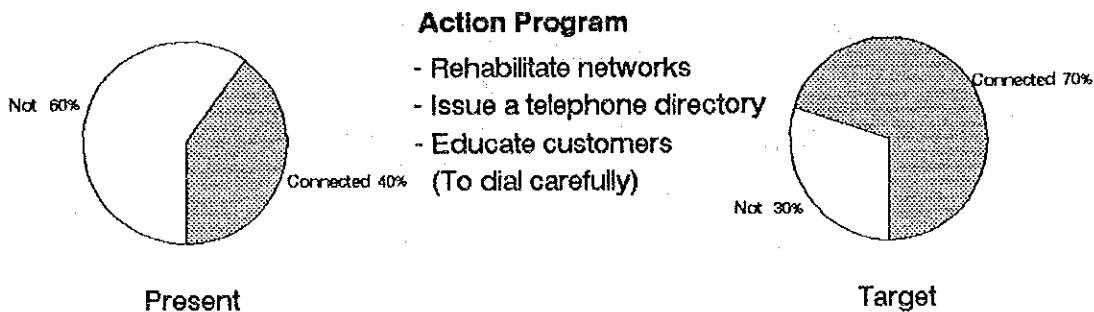


Figure 9-3 Cause of Fault Clearance Delay (August in Kampala)

9.3 Measures to be Taken for Service Quality Improvement

To discuss the service grade in connection with the operation and maintenance of the telecommunications systems, the study should be made from the viewpoints of two aspects: call completion rate and fault recovery rate. The target rates and actions to be taken to achieve the targets are shown in Figure 9-4.

CALL COMPLETION RATE



FAULT RECOVERY

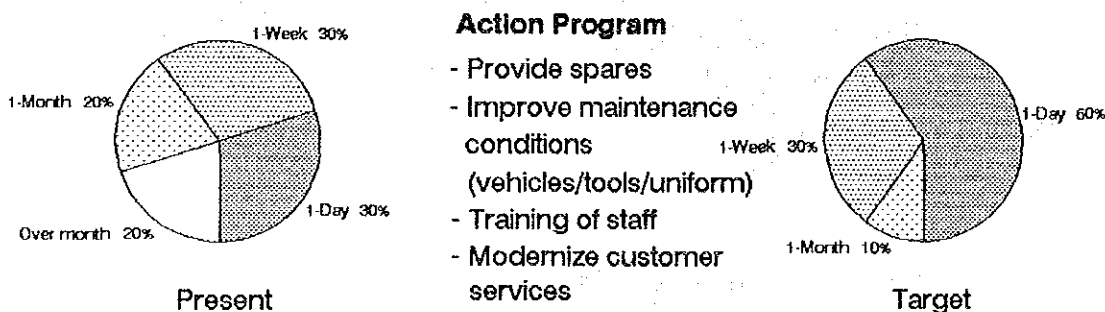


Figure 9-4 Service Grade Improvement

10. Management and Organization Plan

10.1 Financial Performance of UPTC

(1) Low Net Worth Ratio

Almost all the investments in facilities made by UPTC depend on foreign loans. As of 1992/93, the net worth ratio is as low as 9%, with the outstanding amount as much as 71 billion shillings (approx. 61 million dollars). UPTC will have to continue to repay huge amount of money including interests and exchange losses. Financially UPTC will have to be faced by very difficult situation in coming years.

(2) Exchange Losses

Most of accumulated debts are foreign loans and, therefore, exchange rate fluctuations have exercised serious effects on UPTC's financial performance. Exchange losses incurred during the 3-year period 1990/91-1992/93 corresponded to approx. 76% of the total profits on an average. The exchange rate fluctuation is beyond the control of UPTC and such large amount of loss has made it difficult for UPTC to execute the annual plans.

(3) Decrease in Key Financial Index

As described before, the key financial indexes decreased during the past three years. Major reasons for such decrease are:

- a) Low income from subscribers
- b) High operation cost

Especially, the low collection ratio is seriously affecting the UPTC's financial performance.

(4) Actions Taken by UPTC for Improving Bill Collection Ratio

The following actions are now being taken by UPTC to improve the collection ratio:

- a) Reconfirmation of subscribers
- b) Temporary disconnection of telephones of subscribers who have failed to pay charges
- c) Aging analysis of debtors (exceeding 90 days)
- d) Negotiations with debtors (Committee to deal with subscribers' complaints)
- e) Computerization plan (customer service office and new billing center)
- f) Entrusting the bill collection business to a third party
- g) Formulation of a customer service improvement plan

(5) Import Tax on Equipment

Main telecommunications equipments necessary for network expansion are imported by UPTC from foreign countries. As a result of the tax revision in 1993, the tax in the amount of approx. 50% of the CIF price is to be levied on all the imported telecommunications equipments. This means remarkable increase in investment costs, a serious problem for UPTC. To cope with this problem, an application for exemption of tax on equipment and materials to be imported under ODA from foreign governments is being submitted from the Minister of Works, Transport and Communications to the Minister of Finance and Economic Planning.

10.2 Current Organization of UPTC

(1) Organization and Number of Staff

At present, UPTC consists of 8 departments which are managed by the Managing Director. The number of staff is as follows:

	<u>Telecom</u>	<u>Postal</u>	<u>Total</u>
a) Permanent staff	1,996	793	2,789
b) Temporary staff	370	199	569
<hr/>			
Total:	2,366	989	3,355

(2) Problems in Organization Management

UPTC is now endeavoring to attain efficient management of its organization. Problems confronting UPTC in such endeavor are:

- a) Delay in decision making.
- b) Insufficient coordination among relevant departments.
- c) Delay in formal replacement of responsible persons.
- d) Over-staffing.
- e) Shortage in educated staff.
- f) Inadequate training facilities.

10.3 Approach to Improvement in Financial Performance

- (1) Support from the Government of Uganda
To improve the financial performance of UPTC, the support from the Uganda Government such as mentioned below is essential:
 - a) Increase of net worth ratio.
 - b) Compensation of the exchange losses due to large fluctuation of exchange rate.
 - c) Revision of exchange loss accounting system.
 - d) Exemption from import tax on the imported equipment and materials.
- (2) Promotion of Bill Collection
Reasons for non-payment of bills vary with subscribers who can be categorized into governmental agencies, large and small enterprises, households, etc. Countermeasures to be taken against this problem must be studied, through the analysis of reasons specific to each category.
- (3) Introduction of Managerial Accounting System
Under the current financial management system of UPTC, too much emphasis is placed on cash flow. For sound and systematic management and operation of the business, a managerial accounting system should be introduced, to enable efficient and effective management of budgets and their execution. In the future, a computer aided management information system should be established.

10.4 Approach to Institutional Reformation

- (1) Staffing Plan
As of January 1994, the number of staff of Telecommunications Division of UPTC is 2,400 including casual staff. Staff efficiency is 10 subscribers/staff in managing 25,000 subscribers. This figure can be said reasonable judging from the penetration ratio in Uganda, as shown in Figure 10-1.

When the penetration ratio in 2010 is set at 0.6%, the reasonable staff efficiency will be 25 subscribers/staff. Taking into account the improvement to be achieved by technology renovation, the target value is set at 36 subscribers/staff. This means the services are provided to 160,000 subscribers with 4,500 persons. To attain this target, human resource development through technical training is indispensable.

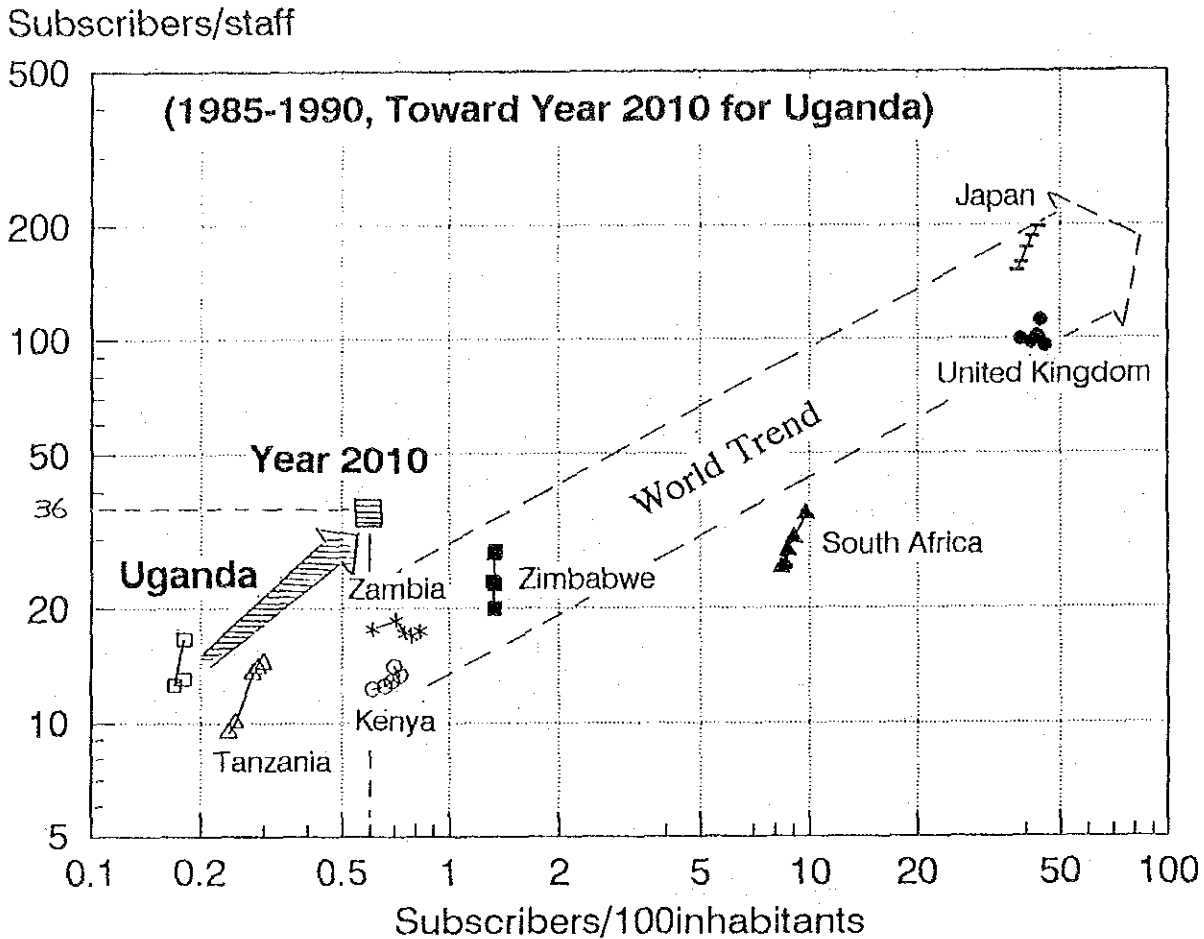


Figure 10-1 Operating Efficiency

(2) Institutional Reinforcement Plan

In order to achieve efficient and effective management of the institution, most important is to formally assign managers to respective departments and sections, replacing acting managers.

Further, in the Planning Department, two groups should be organized: one in charge of the urban areas and the other, rural areas, to ensure smooth execution of rapid network expansion. The organization thus reformed can easily respond to two different requirements: one to pursue efficient management and the other to satisfy social needs.

10.5 Privatization of UPTC

The Government of Uganda is now studying the feasibility of privatization of UPTC. Privatization of telecommunications business is an international trend and has been realized in a number of countries, mainly in developed countries. Privatization can serve for upgrading of services, justification of rates, easy fund raising, etc. At the same time, it involves some problems, such as difficulty in successful materialization, no provision of services in unprofitable areas, etc. Problems will be serious particularly in countries where telephone penetration ratio is low, with rural areas having no access to basic services. A deliberate study should be made in deciding the timing of privatization referring to Figure 10-2 below.

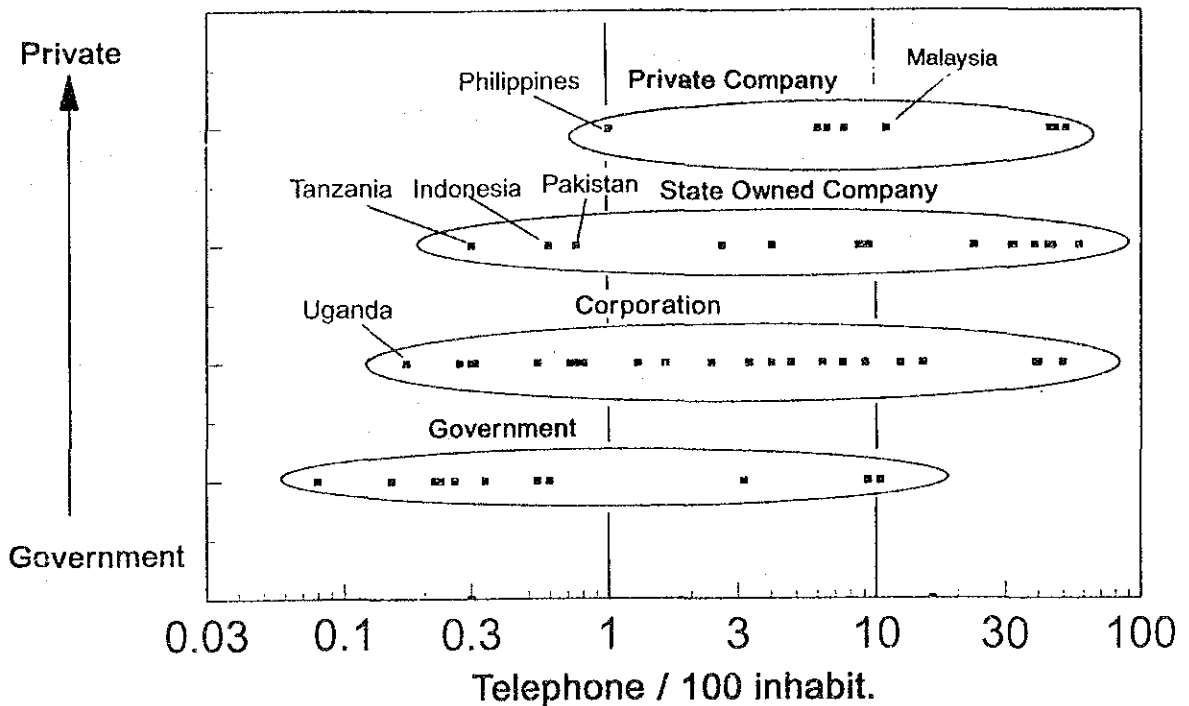


Figure 10-2 World Trend of Telecommunication Operation (in 1991)

In ASEAN countries with 5-10% telephone density, the privatization of telecom sector is realized step-by-step. There are some problems in these countries, e.g., delay of rural development in Philippines, and insufficient private funds in Indonesia, etc., while the privatization succeeded in Malaysia. In lower telephone density countries than 1%, the telecom infrastructure is developing under the responsibility of governments and not by private investors.

The telecommunications business by UPTC involves the following problems. To solve these problems, the cooperation of the Government of Uganda and considerable time span will be required.

- a) In addition to rural areas, approx. 30% provinces are not covered by reliable networks.
- b) The number of subscribers is as low as 30,000, leading to small annual revenues.
- c) The income level of the people is low, and large demand increase can scarcely be expected.
- d) Outstanding amounts of investments during past 10 years remain to be as much as 60 million dollars.
- e) On financial management, the government support is required to cover insufficient revenue until the year 2000.
- f) For expansion of telecommunications networks, grant aids and low interest ODA loans are necessary.

Judging from the above, it can be said that it is still premature to carry out privatization of basic services. Telecommunications services should be provided in the form of a public corporation until the above problems are expected to be dissolved. Table 10-1 shows the comparison results among various operation styles for UPTC.

On the other hand, advanced services, such as data communication and mobile communication, may preferably be licensed to private sectors, since subscribers of these services will be specific users in major cities and they can afford rather high rates.

Table 10-1 Telecommunication Operation in Development Stage for UPTC

		Government	Corporation	State Owned Company	Private Company
Customer Services					
Area...	Urban	●	●	●	●
	Rural	●	●	○	—
Type...	Advanced	—	○	●	●
	Basic	●	●	●	●
Subscriber..	High Income	●	●	●	●
	Low Income	●	●	○	—
Operator Management					
Government Assisted Funds...	Grant	●	●	○	—
	Soft Loan	●	●	●	—
Speedy Investment		—	○	○	●
Profit Generation		—	○	●	●
Management Efficiency		—	○	●	●
Benefit to Government					
Burden of National Budget		—	○	●	●
Income Tax Revenue		—	—	○	●
Interest on Long Term Loan, etc.		—	●	○	—
Synchronised Development		●	●	●	○
Overall Evaluation					
Good...	●	8	9	9	9
Medium...	○	0	5	6	1
Bad...	—	7	1	0	5
		Bad	Good	Good	Bad

11. Project Implementation Plan

11.1 Investment Cost

To achieve telecommunications network expansion and improvement in Uganda, the following investment cost will be required up to the year 2010 as shown in Figure 11-1.

	Exist. (1994)	Phase-1 (1994- 2000)	Phase-2 (2001- 2005)	Phase-3 (2006- 2010)	Total (1994- 2010)
New Provision (lines)		77,350	42,750	50,900	171,000
Total Capacity (lines)	57,630	89,590	125,200	171,000	
Investment Cost (Mil.US\$)		187	171	203	561
Cost/line (US\$/line)		2,420	4,000	3,990	3,280

11.2 Priority Projects

Priority projects to be implemented by 2000 are listed in Table 11-1.

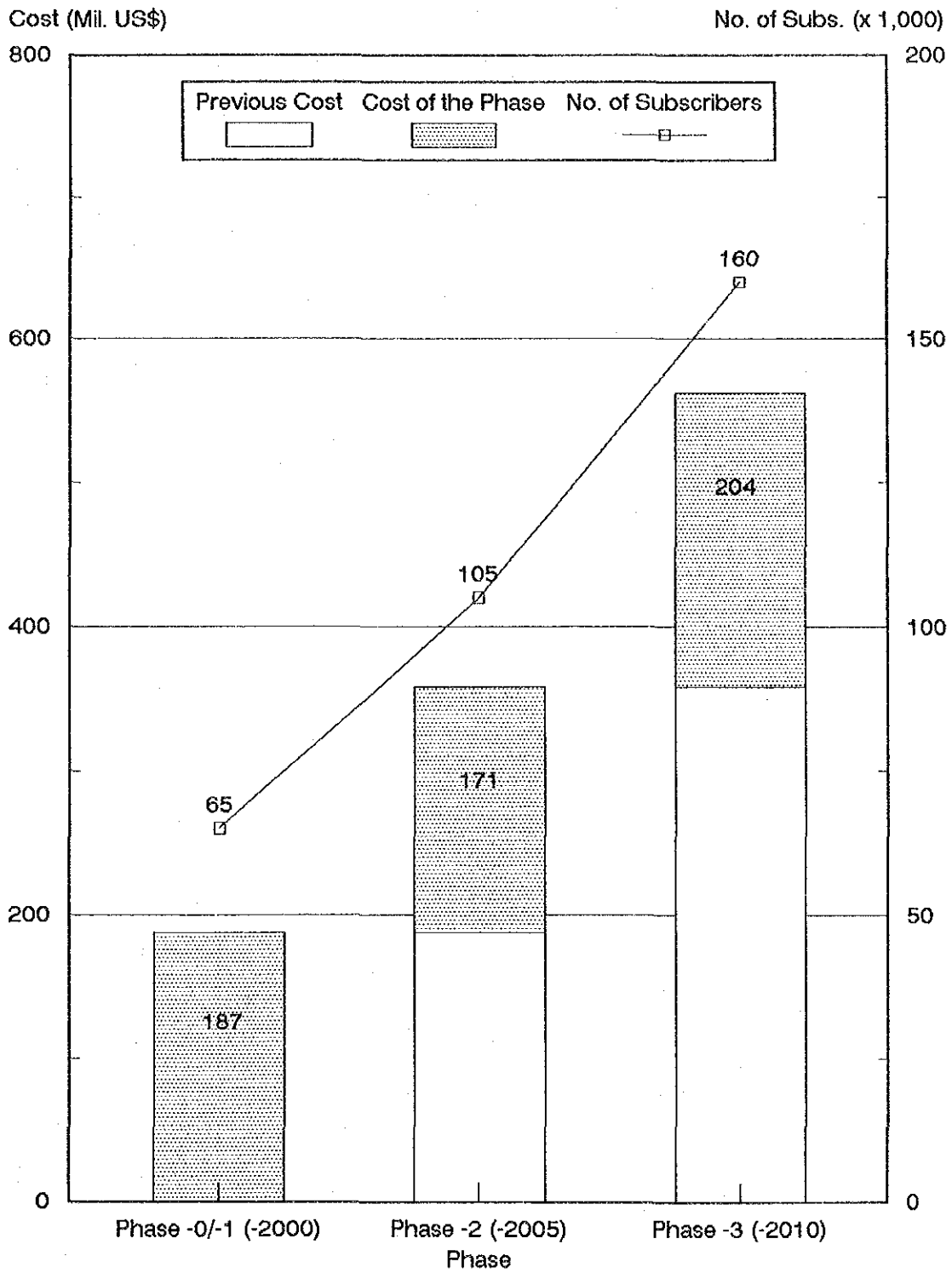


Figure 11-1 Investment Cost of Master Plan

Table 11-1 Priority Project List until Year 2000

No.	Project Title	Location	Volume (lines)	Components				Cost (Mil.\$)	Funding	
				SW	TRS	CBL	RSUB		Source	(Mil.\$)
1	Ten -- Town (Nine -- Town)	Mbale	3,000	X		X		23.6	Korea	7.0
		Busia	450	X	X	X				
		Malaba	450	X	X	X				
		Kapchorwa	450	X	X	X				
		Soroti	900	X	X	X				
		Masindi	1,000	X	X	X				
		Hoima	1,000	X	X	X				
		Luwero	900	X	X	X				
	Wobulenzi	600	X	X	X					
2	Central & Western Rural Telecom	Mityana F.Portal					X X	5.4	W/B (IDA-2)	
3	Mpoma Earth Stn Digitalization (IDR)	Mpoma	Rehabilitation Digitalization		X X			3.0	W/B & Intersat	
4	Entebbe & Kampala Rehabilitation	Entebbe	3,000	X		Exist		10.6		
		KLA, RSU	24,000	X		Exist				
		KPL--ETB	2 hops		X					
5	Northern Uganda Rehabilitation (NURP)	Gulu KLA--GUL	3,000 8 hops	X	X	X		11.9	W/B (NURP)	
6	Greater Kampla Network Expansion (Including INTS)	KLA, RSU	+ 16,000	X	X	Exist	X	16.3		
		Mpigi	800	X	X	X				
		Mukono	1,800	X	X	X	X			
7	Jinja Area Rehabilitation	Jinja/Kamuli	6,300	X		Exist		17.8		
		Lugazi	600	X	X	X				
		Iganga	1,000	X	X	X				
		KPL--MBL	8 hops		X					
8	Mbale Area Network Expansion	Tororo	2,000	X	Exist	X		5.7		
		Pallisa	400	X	X	X				
		Kumi	500	X	X	X				
9	Moroto Area Rehabilitation	Moroto Kotido SRT--MRT	600 100 3 hops	X		X	X	6.9		
10	Gulu Area Network Expansion	Lira	1,000	X	X	X		9.5		
		Apac	500	X	X	X	X			
		Kitgum	500	X	X	X				
11	Arua Area Rehabilitation	Arua	1,500	X	X	X	X	13.5		
		Moyo	200				X			
		Nebbi	500	X	X	X				
12	Fort Portal Area Rehabilitation	Fort Portal	2,300	X		X	X	19.3		
		Kasese	2,300	X		X	X			
		KP--FT--KS	10 hops		X					
13	Mbarara Area Rehabilitation	Mbarara	(2000)	Exist	Exist	X	X	11.7		
		Kabwohe	350	X	X	X				
		Ntungamo	200	X	X	X				
		Kisoro	200				X			
		KS--MB	5 hops		X					
14	Masaka Area Network Expansion	Masaka	(2000)	Exist	Exist	X	X	3.5		
		Rakai	200				X			
		Kalangala	50				X			
15	International Network Expansion	Mpoma	Replace of AOR		X			5.0		
16	Others for Network Expansion		Payphones Others					5.0		
17	Management Modernization	Kampala	Customer Service Training Center Maintenance Center Headquarter					18.0		
	Total		78,650					186.7		

(Note) SW: Switch, TRS: Transmission, CBL: Cables, RSUB: Radio Subscribers

12. Financial and Economic Evaluation of Master Plan

12.1 Preconditions in Evaluation

The proposed Master Plan aims to improve and expand the current obsolete and inadequate telecommunications networks, and to realize addition of 160,000 telephone connections by the year 2010, in an effort to satisfy the demand of all the people in Uganda for telecommunications services and powerfully support the national development. In order to improve the financial performance of UPTC which is now in difficult condition owing to an enormous amount of debts, and to obtain stable profits from its business in the future, it is a pressing need for UPTC to increase its income through urgent expansion of networks.

In view of the above, the financial and economic analysis of the Master Plan was made, on the basis of the low interest ODA loans and the Government's supports for the time being. For evaluation indexes, net worth ratio, FIRR and EIRR are used.

12.2 Revenue and Expenditure Plan

(1) Operation Revenue

At present the UPTC's main income is that from call charges from subscribers. An average charge per subscriber is approx. 1,000 dollar per year. According as the telephone network expands, the ratio of residential telephone will increase and, as a result, an average charge will decrease. The average annual charge in 2010 is estimated to be 700 dollars. The bill collection ratio is estimated to be 90% in 2010 in consequence of the improvement of bill collection system. As a result, the total income in fiscal 2009/2010 is estimated to be 102 million dollars, 4.1 times as much as the amount in fiscal 1994/1995.

(2) Operation Expenditure

The current operation expenditure per telephone subscriber is approx. 500 dollars, about 50% of which is personnel expenses. To decrease this figure is an important factor for improving the financial performance of UPTC. It can be achieved by addition of subscribers and improvement of staff efficiency. Through the study of examples in neighboring countries having 100,000 - 200,000 telephone subscribers, the operation expenditure per subscriber in 2010 is estimated at 310 dollars. As a result, operation expenditure in 2009/2010 will be suppressed to 50 million dollars in total. This means 2.4 times increase in operation expenditure against 4.7 times increase in the number of subscribers, as compared with the values of 1994/1995.

(3) Profit and Loss

On the other hand, the depreciation amounts will increase annually since enormous amounts of investments will be made for network expansion projects. In 1994/1995, the depreciation amount is approx. 2 million dollars covering past investments only, but it will amount to 36 million dollars in 2009/2010. Needless to say, "depreciation" is to be made to prepare for the future investments.

Profits and losses during the period from 1994/1995 to 2009/2010 calculated in consideration of the above are given in Figure 12-1. As can be seen from this figure, the balance will record a surplus in 1998/2000.

(x 1,000 USD)

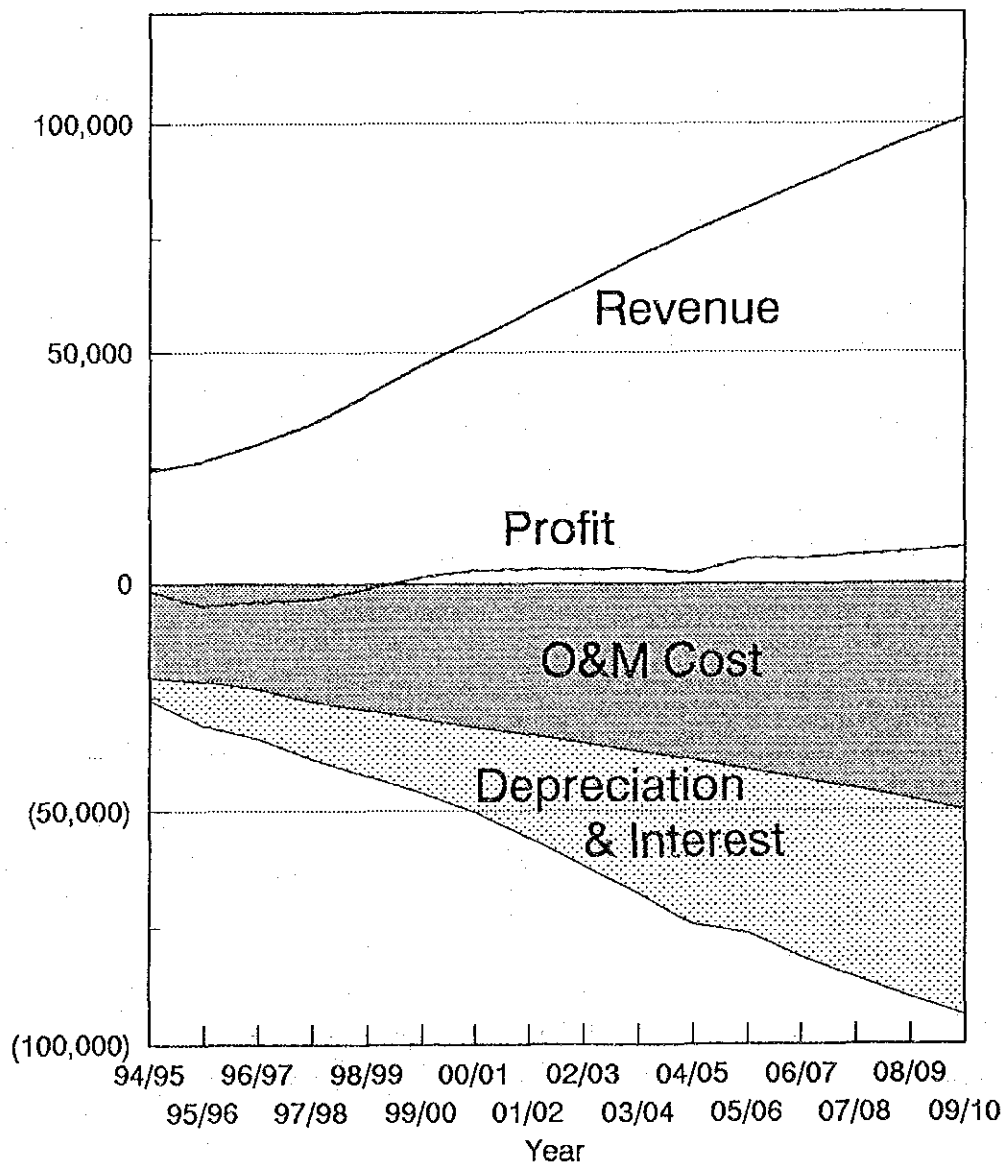


Figure 12-1 Profit and Loss until Year 2010

12.3 Fund Plan (Base Plan)

Cash flows during the Phase-1 period, and those in the final years of Phase-2 and Phase-3 are given below.

UNIT: 1000 USD

PROJECT YEAR ITEM	94/95 1	95/96 2	96/97 3	97/98 4	98/99 5	99/2000 6	04/05 11	09/10 16	TOTAL
SOURCE OF FUNDS									
CASH FROM OPERATION	819	454	2,949	5,391	10,265	15,204	30,585	43,138	350,959
LONG-TERM LOANS	8,698	16,100	24,150	25,900	30,590	26,250	20,556	32,576	397,348
EQUITY INFUSION	6,600	0	0	0	0	0	0	0	6,600
DEBT CAPITALIZATION	0	5,000	5,000	5,000	0	0	0	0	15,000
FOREIGN GRANT	0	6,900	10,350	11,100	13,110	11,250	0	0	52,710
SHORT-TERM FINANCE	0	0	0	0	0	0	0	0	115
TOTAL SOURCE OF FUNDS	16,117	28,454	42,449	47,391	53,965	52,704	51,141	75,714	822,733
APPLICATION OF FUNDS									
TELECOM. FACILITIES & EQUIPMENT, ETC.	11,672	23,000	34,500	37,000	43,700	37,500	34,260	40,720	562,272
INCREASE IN WORKING CAPITAL	-4,108	-1,427	0	0	0	0	317	0	-3,928
REPAYMENT OF: LONG-TERM LOAN	4,803	6,881	6,881	6,549	6,107	5,988	14,699	21,391	173,651
SHORT-TERM FINANCE	0	0	0	0	0	0	0	0	115
CORPORATION TAX PAID	3,750	0	0	0	0	0	954	1,977	15,142
TOTAL APPLICATION OF FUNDS	16,117	28,454	41,381	43,549	49,807	43,488	50,230	64,089	747,252
CASH SURPLUS	0	0	1,068	3,842	4,158	9,216	912	11,626	75,481
CASH FLOW	-6,600	-5,000	-3,932	-1,158	4,158	9,216	912	11,626	53,881

During Phase-1 period ending in 1990/2000, the balance between revenue and expenditure is in the red. In addition, a large amount of investment is required.

Therefore, it is so planned that approx. 30% (10-15 million dollars per year) of the necessary fund be raised by the budget of the Uganda Government and grant aids from the foreign governments. The remaining 70% (15-30 million dollars per year) will be covered by long term loans, i.e., foreign ODA loans.

Under the above conditions, FIRR will become 17%. Hence, the proposed Master Plan is evaluated to be appropriate for social and economic infrastructure improvement. The net worth ratio can also be improved.

12.4 Alternative Fund Plan

As described above, with the cooperation of the Government for the implementation of the Master Plan, the telecommunications networks can be expanded throughout the country, contributing to the financial performance improvement, and permitting investments by equity capital in and after 2000.

This evaluation, however, is based on the long term loans in the total amount of 400 million dollars during 16 years, foreign grant aid cooperation amounting to 50 million dollars, and the Government budgets amounting to 15 million dollars.

Judging from the fact that approx. 50% of the national budget is currently covered by foreign ODA loans, the above mentioned fund raising will be not easy.

In view of the above, two alternative plans are studied:

Alternative Plan-A

To shift unprofitable 3 projects from Phase-1 to Phase-2.

Alternative Plan-B

To extend the Phase-1 period up to 2004/2005.

(Phase-2 will end in 2010, with the target number of subscribers reduced to 105,000.)

(1) Alternative Plan-A

The cash flow statement of Alternative Plan-A is given below. The financial condition is not improved compared with the Base Plan.

UNIT: 1000USD

PROJECT YEAR ITEM	94/95 1	95/96 2	96/97 3	97/98 4	98/99 5	99/2000 6	04/05 11	09/10 16	TOTAL
SOURCE OF FUNDS									
CASH FROM OPERATION	819	454	2,949	5,391	10,265	15,138	30,377	43,832	349,722
LONG-TERM LOANS	8,698	16,100	24,150	21,700	21,070	24,500	23,580	39,760	399,558
EQUITY INFUSION	6,600	0	0	0	0	0	0	0	6,600
DEBT CAPITALIZATION	0	5,000	5,000	5,000	0	0	0	0	15,000
FOREIGN GRANT	0	6,900	10,350	9,300	9,030	10,500	0	0	46,080
SHORT-TERM FINANCE	0	0	0	0	0	0	254	0	254
TOTAL SOURCE OF FUNDS	16,117	28,454	42,449	41,391	40,365	50,138	54,211	83,592	817,214
APPLICATION OF FUNDS									
TELECOM. FACILITIES & EQUIPMENT, ETC.	11,672	23,000	34,500	31,000	30,100	35,000	39,300	49,700	562,272
INCREASE IN WORKING CAPITAL	-4,108	-1,427	0	0	0	0	345	0	-3,924
REPAYMENT OF;									
LONG-TERM LOAN	4,803	6,881	6,881	6,549	6,107	5,988	13,327	19,542	162,768
SHORT-TERM FINANCE	0	0	0	0	0	0	0	0	254
CORPORATION TAX PAID	3,750	0	0	0	0	0	1,240	2,394	18,952
TOTAL APPLICATION OF FUNDS	16,117	28,454	41,381	37,549	36,207	40,988	54,211	71,636	740,322
CASH SURPLUS	0	0	1,068	3,842	4,158	9,150	0	11,956	76,892
CASH FLOW	-6,600	-5,000	-3,932	-1,158	4,158	9,150	0	11,956	55,292

(2) Alternative Plan-B

On the other hand, the cash flow statement for Alternative Plan-B is as shown below. The financial condition will be improved in earlier stage than the Base Plan.

The total amount of long term loans is only 250 million dollars during 16 years. The rate of own budget will increase to 33 % in the year 2010. This plan will be easy to realize in terms of fund raising, though the nationwide network expansion will not be attained in the year 2010.

UNIT: 1000USD

PROJECT YEAR ITEM	94/95 1	95/96 2	96/97 3	97/98 4	98/99 5	99/2000 6	04/05 11	09/10 16	TOTAL
SOURCE OF FUNDS									
CASH FROM OPERATION	819	514	1,440	5,796	10,655	15,115	25,200	37,494	303,462
LONG-TERM LOANS	8,698	11,200	17,430	11,830	15,260	7,910	7,020	28,910	243,718
EQUITY INFUSION	6,600	0	0	0	0	0	0	0	6,600
DEBT CAPITALIZATION	0	5,000	5,000	0	0	0	0	0	10,000
FOREIGN GRANT	0	4,800	7,470	5,070	0	0	0	0	17,340
SHORT-TERM FINANCE	0	0	0	0	1,008	0	0	0	1,008
TOTAL SOURCE OF FUNDS	16,117	21,514	31,340	22,696	26,923	23,025	32,220	66,404	582,128
APPLICATION OF FUNDS									
TELECOM. FACILITIES & EQUIPMENT, ETC.	11,672	16,000	24,900	16,900	21,800	11,300	11,700	41,300	359,672
INCREASE IN WORKING CAPITAL	-4,108	-1,367	-441	-753	-984	351	0	0	-5,331
REPAYMENT OF:									
LONG-TERM LOAN	4,803	6,881	6,881	6,549	6,107	5,988	10,597	11,679	125,322
SHORT-TERM FINANCE	0	0	0	0	0	1,008	0	0	1,008
CORPORATION TAX PAID	3,750	0	0	0	0	463	2,675	4,168	31,188
TOTAL APPLICATION OF FUNDS	16,117	21,514	31,340	22,696	26,923	19,110	24,972	57,147	511,859
CASH SURPLUS	0	0	0	0	0	3,916	7,248	9,257	70,269
CASH FLOW	-6,600	-5,000	-5,000	0	0	3,916	7,248	9,257	53,669

12.5 Economic Evaluation

The economic evaluation was performed by assessing the economic benefits and costs of the Master Plan, dealing mainly with the calculation of Economic Internal Rates of Return (EIRR). There are two kinds of economic benefits, such as direct benefit for customers and indirect benefit for nations/UPTC. This study focused on the direct benefit.

The direct benefit was analyzed from the following viewpoints based on the data collected through the interview survey:

- a) Willingness to pay
- b) Shadow price in tariff structure
- c) Shadow price from transport substitute

The ratios of willingness to pay to the current fee known through the survey are as shown in the table below. As can be seen from the table, the urban and rural areas present different results.

<u>Items</u>	<u>Urban</u>	<u>Rural</u>
Call Charge	580%	216%
Installation Charge	142%	213%
Monthly Rental Charge	94%	250%

Referring to these economic benefits, EIRRs, the measures to assess the economic viability, are estimated as follows:

Economic Benefit Value	Premium to Financial Benefit	EIRR (IRROI) (%)
Willingness to pay	3.2	91.1
Shadow price (tariff)	2.2	45.7
Shadow price (transport)	1.2	6.0

The EIRR values in two items are much higher than the typical value (20%) for the infrastructure projects. This implies that the economic benefit is very high due to the greatness of people's demand for telecommunications services. Therefore, the implementation of the Master Plan is likely to contribute to enhancement of economic development and improvement of social welfare of Ugandan.

13. Financial Evaluation of Priority Projects

13.1 Preconditions in Evaluation

The financial evaluation was made on the priority projects to be implemented during the phase-1 period up to the year 2000. For each project, the Financial Internal Rate of Return (FIRR) was estimated in the following cases:

Loan Case: Long term loan: covers 70% of project cost
 Own fund: covers 30% of project cost

Grant Case: Grant aid: covers almost all project cost
 Own fund: covers preparatory work cost

13.2 Evaluation Result

The FIRR of each project is estimated as shown in the following table:

No.	Project Title	Capacity (lines)	Loan Case	Grant Case
1	Ten town rehabilitation	8750	n.a.	21%
2	Rural telecom	200	n.a.	n.a.
3	Earth station digitalization	-	106%	-
4	Entebbe & Kampala	27000	87%	-
5	NURP	3000	n.a.	32%
6	Greater Kampala	18600	19%	-
7	Jinja are rehabilitation	7900	29%	-
8	Mbale are rehabilitation	2900	n.a.	24%
9	Moroto area expansion	700	n.a.	21%
10	Gulu area expansion	2000	n.a.	29%
11	Arua area rehabilitation	2200	n.a.	35%
12	F.Portal area rehabilitation	4600	n.a.	48%
13	Mbarara area rehabilitation	750	n.a.	n.a.
14	Masaka area rehabilitation	250	n.a.	n.a.
15	Earth station replacement	-	147%	-

Note: n.a. (not applicable) means the project cannot get reasonable FIRR under the said condition.

The financial evaluation results of priority projects suggest that most of the projects are feasible based on the Grant scheme but not on the Loan scheme. The principal reason is the low income earning capacity due to a small number of subscribers. Projects in low-subscriber regions inevitably show a low return.

Severe loan conditions further complicate the situation. Application of more moderate loan conditions for low return projects is expected. FIRR can be kept at a reasonable level by implementing low return projects in combination with high return projects.

14. Conclusion and Recommendations

14.1 Overview of Master Plan

(1) Basic Policy in Telecommunications Network Expansion

- a) For rural areas, basic services shall be provided to meet the urgent communication needs for the public utilities and the people of Uganda.
- b) For urban areas, all services for national development and promotion of economic activities shall be provided.

(2) Key Indexes on Master Plan

Category	Item	F--Year	1994/95	1999/2000	2004/05	2009/10	Objectives
Socio-Economy	Population (x 1,000)		18,400	20,800	23,480	26,380	
	GDP/Capita ('93 US\$ Price)		176	202	236	280	
Telephone Supply	Demand (x 1,000)		84	118	164	227	Same as
	Supply (x 1,000)		34	65	105	160	Sub-Saharan level
	Telephone/100 inhabitants		0.18	0.31	0.45	0.61	
Service Provision	Network Expansion	Major Cities		District HQ	Major Counties	All Counties	Telecom service in all Sub-Counties
	Counties (Automatized)	10%		37%	56%	100%	
	New Services	Mobile Tel.		ISDN	ISDN	ISDN	
Service Quality	Call Completion Rate		40%	50%	60%	70%	Same as International level
	Transmission Quality	Noisy		Clear	Clear	Clear	
	Recovery in 24 hours		30%	40%	50%	60%	
Operation Efficiency	Number of Staff		2,500	3,000	3,750	4,500	Highest level among similar counties
	Subscribers/Staff		14	20	28	36	
Revenue	Charge/Subs (US\$)		1,000	960	850	700	Same as International level
	Collection Rate		72%	80%	85%	90%	
	Revenue/Subs (US\$)		720	770	720	630	
	Total Revenue (x 1,000 US\$)		24,500	47,400	76,400	101,500	
Expenditure	O/M Cost (x 1,000 US\$)		20,600	29,800	38,900	49,900	
	Other Cost (x 1,000 US\$)		5,100	16,200	35,500	44,100	
	Total Expenditure (x 1,000 US\$)		25,700	46,000	74,400	94,000	
Profit	Profit before Tax (x 1,000 US\$)		-1,200	1,400	2,000	7,500	
Investment			Phase - I	Phase - II	Phase - III	Total	
	Project Cost (Mil. US\$)		187	171	204	562	
	Switch + Cable		Urban	Sub-Urban	Rural + Urban		
	Transmission		Backbone	Spur Link	Rural		
	Fund Sources:						
	Credit (Mil. US\$)		70%	60%	70%		
Grant (Mil. US\$)		30%	0%	0%			
	UPTC (Mil. US\$)		0%	40%	30%		

14.2 Recommendations on Management

(1) Privatization of Telecommunications Services

The basic telecommunication services, such as telephone, telegraph and telex are to be provided by the public corporation or the 100% state own company until the network will be expanded to rural areas. If UPTC is privatized now, the appropriate network will not realized due to the following problems:

- a) Delay of rural telecommunications projects
- b) Difficulty of tariff control
- c) Problems on revaluation of capitals
- d) Un-matching to national policy

The specific telecommunication services, such as data communication and mobile communication services, can be provided by private investors under control of the Ministry or UPTC.

(2) Opening of Terminal Equipment Market

At present, UPTC employs a rental system for terminal equipment in principle. In conjunction with the telecommunications network improvement, demand for terminal equipment will be diversified. To respond to such demand, the terminal equipment market is to be opened. This will also lead to service upgrading and reduction of operation and maintenance costs of UPTC. To realize the above, establishment of the technical standardization and reinforcement of type approval system are necessary.

(3) Institutional Reinforcement

In accordance with the network expansion, the organization of UPTC must be reinforced. It is proposed to study this problem, particularly with respect to the following departments:

- a) Planning, engineering and construction departments.
- b) Operation and maintenance departments.
- c) Customer service department.

14.3 Recommendations on Financial Matters

(1) Investments in Rural Areas

The telecommunications networks in Uganda are now concentrated in major cities. In order to provide the basic telecommunications services in the whole nation, it is recommended to extend the network up to each county center. For this purpose, approx. 20% of the total investment should be appropriated.

(2) Promotion of Revenue Increase

The financial performance of UPTC is expected to turn worse during several years to come. To cope with this problem, positive actions should be taken. Following actions are recommended:

- a) Review of tariff system (increase of monthly basic charge).
- b) Improvement of bill collection ratio (improvement of billing and collecting system).
- c) Sales promotion in urban areas.
- d) Improvement in call completion ratio

(3) Fund Raising

The nationwide telecommunications network expansion requires an enormous amount of money. Because sales revenue is not sufficient for reinvestment, the foreign investment in the amount of 25 - 45 million dollars will be required annually during Phase-1 period ending in 2000. It is recommended to raise such fund from the following official sources of which loan condition is rather moderate:

- a) ODA loans from international agencies and foreign governments (15 - 30 million dollars per year).
- b) Grant aids from foreign governments (10 million dollars per year).
- c) Budget appropriation by the Government of Uganda (5 million dollars per year).

(4) Tax Exemption

Main equipment and materials for telecommunications network expansion projects have to be imported from foreign countries. In accordance with the tax revision in 1993, the import tax in the amount of approx. 50% of CIF price is to be levied on such equipment and materials. The materialization of telecommunications network expansion projects proposed in the Master Plan means the improvement of infrastructure which is indispensable for national development. Hence, an appropriate measure should be taken so that equipment and materials necessary for the materialization of the Master Plan can be exempted from the import tax.

14.4 Recommendations on Technical Matters

(1) Improvement in Call Completion Ratio

The call completion ratio in Uganda is as low as 30% - 40%, as compared with the ratio of advanced countries, approx. 70%. Improvement of call completion ratio will lead to not only service grade upgrading but also revenue increase. It is recommended to take the following actions under the special task force team:

- a) Increase of transmission system capacity.
- b) Publication of telephone directory.
- c) Education of subscribers (PR on correct dialling method, etc.)
- d) Introduction of call waiting service.

(2) Reinforcement of Trouble Shooting System

The trouble shooting systems adopted for local cable networks in major cities are extremely inadequate. To improve the customer services, it is recommended to take the following actions:

- a) Preparation of spare parts.
- b) Improvement of work environmental conditions of maintenance teams (vehicles, tools, working clothes, etc.)
- c) Reinforcement of training of staffs (staffs in charge of window services and maintenance).
- d) Modernization of customer services window (introduction of computer systems).

(3) Human Resource Development Through Training

The training of the work force of UPTC is executed mainly in a training center in Kampala. However, this center now fails to function well due to shortage in training facilities, equipment and materials, as well as instructors. To expand the network as scheduled, some 100 personnel will have to be recruited every year. Hence, the improvement of the training center should be done urgently.

(4) Computerization of Office Work in UPTC

In accordance with the telecommunications network expansion, work volume for project management and financial administration will increase. To ensure smooth management and administration, it is recommended to introduce office automation in the UPTC. With the introduction of computer systems, data collection and analysis can be made speedily and correctly, leading to efficient business management.

(5) Employment of Consultant

In order to expand the telecommunications networks urgently as proposed in the Master Plan, 3 - 4 projects will have to be implemented every year. This requires the reinforcement of planning and construction departments. To achieve the above efficiently, it is recommended to employ foreign and national consultants, particularly with respect to the following:

- a) Detailed planning for some specific projects.
- b) Financial management and administration.

(6) Implementation and Review of the Master Plan

The proposed Master Plan has been prepared in consideration of the macroscopic social and economic trend in Uganda. In implementing individual projects, an appropriate revision should be made, taking into account microscopic characteristics specific to each objective area.

Further, in accordance with the variations with time in social and economic conditions in Uganda, the preconditions for the study should be reviewed and the Master Plan should be revised, wherever necessary. It is recommended to review the Master Plan every 5 years.

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