

### 7.3 Subscriber Cables

#### 7.3.1 System Selection (Cable or Radio)

For the development of subscriber networks in Uganda, the expansion of subscriber cables in the urban area and the extension of subscriber networks to the rural areas are planned, taking into account the area characteristics.

The expansion of subscriber cables in the urban area is to rehabilitate the existing facility, replacing old cables by new cables. The object areas are the whole major towns of first priority except Kampala, Jinja and Entebbe.

For the rural development, telephone exchanges or public call offices (P.C.O) are provided in all counties, consisting of a metallic cable network and a radio subscriber system.

The local network expansion plan is drawn up for 78 exchanges covering 163 counties. The installation program by exchange is summarized in Table 7-3-1.

The implementation program is represented in the net number of lines or the number of subscribers installed, amounting to 219,127 lines and 16,628 subscribers to be connected by the radio subscriber system by year 2010.

The installation consists of the following works:

- (1) Installation of primary and secondary cable pairs;
- (2) Construction of Cable Ducts, Manholes and other Supporting facilities; and
- (3) Installation of radio subscriber systems (DMARS).

The system selection, i.e., cable or radio, is made from the following point of view:

- (1) The number of subscribers in a limited area is quite few (less than 350 subscribers);
- (2) Distance between subscribers to be connected and the exchange is more than 5 km.

Based on a result of the above study, the installation plan consisting of the number of cable pairs and the radio subscriber system (DMARS) is prepared.

Table 7-3-1 Local Network Expansion Plan (Cable and DMARS)

ASC	Existing	Phase-I		Phase-II		Phase-III		Total 2010	
		Add Cable (Pairs)	No. of SUB (DMARS)	Add Cable (Pairs)	No. of SUB (DMARS)	Add Cable (Pairs)	No. of SUB (DMARS)	Cable Pairs	DMARS SUB
Kampala	71,610	5,000	100	10,700	946	26,800	1,639	114,110	2,685
Jinja	8,200	3,100	30	4,800	1,439	7,200	704	23,300	2,173
Masaka		2,600	250	4,300	651	1,700	1,084	8,600	1,985
Mbarara		2,600	750	4,900	471	6,400	1,676	13,900	2,897
Fort Portal		6,700	530	500	763	2,600	1,543	9,800	2,836
Gulu		8,500	480	900	805	1,200	2,459	10,600	3,744
Mbala		10,000	200	1,300	2,019	1,500	2,502	12,800	4,721
Total	79,810	38,500	2,340	27,400	7,094	47,400	11,607	193,110	21,041

Phase-I : 1994/1995 – 1999/2000  
Phase-II : 2000/2001 – 2004/2005  
Phase-III : 2005/2006 – 2009/2010

### 7.3.2 Planning Criteria

The planning criteria set forth herein is for the basic design of a subscriber cable network for the Urban Area.

This criteria is based on the design principles of the Kamala, Entebbe and Jinja cable rehabilitation project implemented by IDA Credit.

The structure of a subscriber cable network is twofold. One is the cabinet system and the other is the direct service system. The cabinet system is adopted in principle as illustrated in Figure 7-3-1.

#### a) Cabinet System

The cabinet system uses cross-connecting cabinets on the cable line and makes jumper connection of primary and secondary cables in the cabinet. The main advantage of this flexible network is that the primary cable pairs can be saved and network can be developed, area by area, independently.

#### b) Direct Service System

The primary cable pairs are extended directly from the MDF to the DP.

This system is applied in the area nearest to the exchange and also in city centers.

#### (1) Cabinet Area

The cabinet area is a unit area to control the telephone facilities for their effective use and to realize suitable expansion in view of the demand in the area. To achieve this purpose efficiently, the areas must be defined on a long term basis. The cabinet area thus determined should contribute to the effective utilization of the system, through the administration of design, construction and maintenance.

#### a) Determination of Cabinet Area

Firstly, the exchange area is divided into provisional cabinet areas using rivers, railways, highways, etc., as boundaries. Subsequently, in consideration of the existing outside plant and roads, administrative blocks and connections of area, the cabinet areas are established in the final form in which the sum of demand estimates 15 years later from now will be 600.

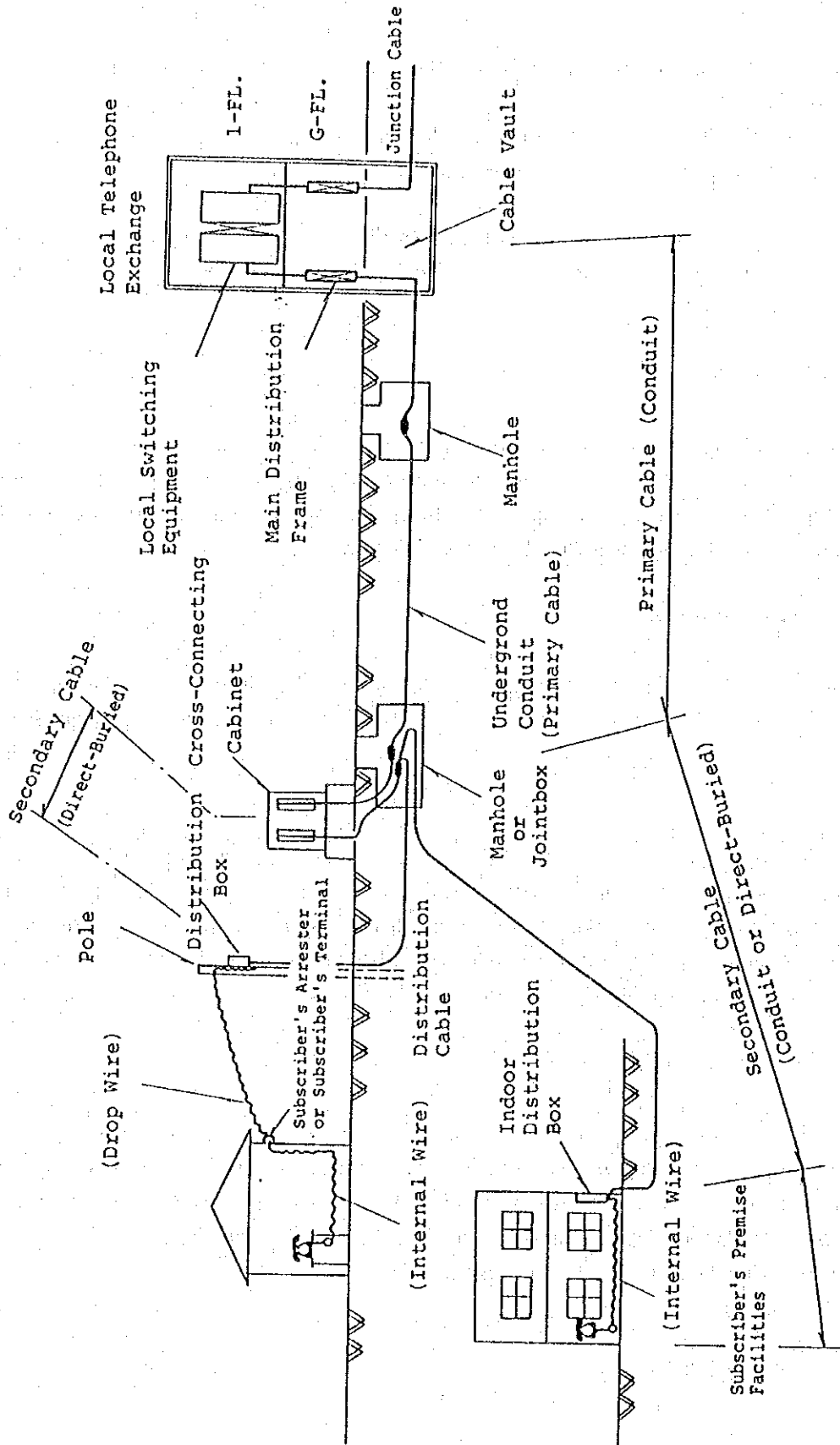


Figure 7-3-1 Layout of Local Telephone Cable Network

b) Location of Cabinet

One cabinet is installed in each cabinet area. The cabinet is to be located on the exchange side in the cabinet area. The cabinet location is required to be near to the manhole or joint box. Furthermore, the cabinet location must be the place where the secondary cable pairs can be economically distributed and where the cabinet relocation is not likely to be required in the future.

c) Cabinet Capacity

The cabinet of 1,600 pairs capacity is used when the total demand estimate for 15 years later is 600.

d) Terminal Block and Cable of Cabinet

The terminal block of the cabinet must have capacities for 200 pairs or 100 pairs. In either case, the stub cable is to be the jelly-filled cable. The terminal block stub cable connection to primary and secondary cables must be carried out in a joint box.

(2) Underground Duct System

In designing the underground duct system, utmost attention should be paid to cost saving. In consideration of its safety, maintainability and workability, the underground duct route must be selected on the basis of field survey results, city planning data and other relevant information. In addition, all technical implications in the construction and maintenance aspects must also be taken into full consideration.

a) Utilization of Existing Underground Facilities

The design should be carried out as in the following manner so as to achieve full utilization of the existing outside plant facilities.

- If there are sufficient vacant ducts other than spare ducts, the proposed cables are to be installed in such vacant ducts.
- When no vacant ducts are available, the replacement of an existing small pair cable with a large pair cable may be a solution. However, this depends on the individual cases.

Decision should be made after careful examinations of relevant factors, such as costs, and operational and installation conditions.

## b) Provision of New Underground Duct Route

In case the provision of new underground duct facilities is necessary, the appropriate route selection should be made in due consideration of the following:

- Roads which will allow the shortest underground duct route;
- Roads where the cabinets can be easily constructed;
- Roads which will not be ceased or discontinued by city planning, etc.;
- Roads not crossed by rivers, bridges, railroads and so on;
- Roads with few buried facilities and where underground plant construction work can be easily carried out;
- Roads which are wide and do not cause serious obstruction to the surface traffic during construction work;
- Unpaved roads.

## c) Number of Ducts

The number of required ducts consists of the number of duct cables and spare ducts.

## - Number of Duct Cables

The number of subscriber cables, which covers the demand 15 years ahead, is assumed to be the required number of cables to be accommodated in the ducts.

If both subscriber and junction cables exist in the duct route concerned, the total number of these cables is to be taken into account.

Then, the number of duct cables is calculated by multiplying the total required number of cables by the demand variation factor of 1.5 and raising fractions to the unit.

## - Spare Ducts

Spare ducts are to be provided as specified below, in accordance with the number of ducts.

<u>Number of Ducts</u>	<u>Number of Spare Ducts</u>
1 - 15	1
16 - 30	2
31 - 45	3
46 or more	4

- Ducts in Entrance Section

The minimum number of ducts entering into the exchange is 48. The number of ducts in excess of the minimum limit is to be determined by case-by-case computation. The said minimum number of ducts in the entrance section does not apply to the mobile exchange.

d) Type of Duct

The duct consists principally of the pipe of Polyvinyl Chloride (PVC). However, the steel pipe is also employed in case of shallow burying.

e) Duct Size

A duct having a nominal inner diameter of 100 mm is used.

f) Span Length between Manholes

The span length between manholes is to be so determined that it will best suit the cable branching, cabinet location, road shape, etc. Maximum length is as follows:

- a) Conduit Length for Local Cable : 200 m
- b) Conduit Length for Junction Cable : 250 m

(3) Manhole and Joint Box

a) Manhole

A Manhole is constructed at a place where cable jointing, cable branching, cable installation and maintenance work are necessary. A manhole is to be large enough to accommodate the following:

- Required number of ducts
- One or two workmen
- Splicing or jointing boxes
- PCM or other repeater housings

For the manholes where the duct route also serves as junction and trunk cable route, appropriate coordination with the junction cable network plan should be made in determining the type of manhole.

b) Joint Box

A joint box is to be provided between a manhole and a cabinet. Jointing between stub cable of a terminal block and primary/secondary cable is made in the joint box. A joint box must be located on the sidewalk. Or, when there is no sidewalk, it should be located at the edge of the roadway.

(4) Subscriber Cable Specifications

The type of cable to be installed, the number of cable pairs and the conductor diameter are determined by the following criteria:

a) Type of Primary Cable

The type of proposed cable is the jelly-filled, polyethylene insulated and sheathed, and twisted pair type cable. This type of cable is accommodated in the underground duct system.

However, the direct buried cable with steel tape armoring is employed for the following locations:

- At a place where the change of a cable route may be necessary as a result of road and/or river improvement plan.
- At a place where the underground cable system is not preferable because of the pending road planning.

b) Secondary Cable

The type of proposed cable is the jelly-filled, polyethylene insulated and sheathed, and pair type cable with steel tape armoring. Usually this type of cable is directly buried in the ground.

In the following cases, however, aerial cable, which is the polyethylene insulated and sheathed, self-supporting type cable, is used.

- At a place where the change of a cable route may be necessary as a result of road and/or river improvement plan.
- At a place where direct burying is not preferable because of the pending road planning.

c) Number of Pairs and Conductor Gauge for Local Cable in Conduit and Burial Application



Conductor Diameter (mm)	Conduit Application (Single Sheath)				Direct Buried Application (Armored)	
	0.4	0.5	0.63	0.9	0.5	0.63
Number of Pairs	-	10	-	-	10	10
	-	20	-	-	20	20
	-	30	-	-	30	30
	-	50	-	50	50	50
	100	100	100	100	100	100
	200	200	200	-	200	200
	300	300	300	-	-	-
	400	400	400	-	-	-
	600	600	600	-	-	-
	800	800	800	-	-	-
	1,000	1,000	1,000	-	-	-
	1,200	1,200	-	-	-	-
	1,600	1,600	-	-	-	-
	2,000	-	-	-	-	-
	2,400	-	-	-	-	-

(5) Transmission Requirements for Subscriber Cable Networks Attenuation Loss

In the design of a subscriber loop, the attenuation loss of a subscriber line shall be limited to 10 dB at 1,500 Hz in terms of the line length between MDF (Main Distribution Frame) and the farthest distribution point of a single cable route.

D.C. Loop Resistance

The maximum allowable loop resistance of subscriber cables shall be 1,500 Ohms.

(6) Combination of Different Conductor Diameters

A combination of different conductor diameters of primary and secondary cables may be desirable from the viewpoint of an economical design of the subscriber loop plant. However, from the technical and maintenance viewpoint, such combination in the primary and secondary cable sections should be avoided. In addition, all secondary cables in a cabinet should be of the same conductor diameter.

(7) Cable Distribution Design

The distribution design is made, based on the demand distribution map and by the following procedures and methods.

## a) Primary Cable

The required number of cable pairs is to be determined, based on the estimated demand 5 years ahead, following the undermentioned procedures:

- **Cable Units per Cabinet Area**  
Compute the number of cable units to be distributed to each cabinet area, based on the estimated demand 5 years from now.
- **Grouping of Units**  
Group by conductor diameter the cable units allocated to each cabinet along the primary cable route.
- **Cable Pairs**  
Determine the number of cable pairs that meet the number of cable units in a cable section. Use the large-pair cable for economic reasons and for effective utilization of duct.
- **Temporary Distribution Area**  
For the primary cable extending to the area where the demand will arise in the future, secure from the beginning the cable units in the capacity which will meet the estimated demand 5 years later from now. However, when the number of cables is to be increased, not to install the additional cable from the outset.
- **Free Units**  
Reserve the surplus cable pairs terminated to the MDF of the exchange in excess of the distributed cable pairs, at the terminal of a main cable as idle pairs or in the cabinet as free units.

## b) Secondary Cable

For secondary cables, the number of required pairs which meet the demand 15 years ahead is to be determined as described below.

- (1) **Distribution Area**  
Divide the cabinet area into several distribution areas along the cable route in consideration of the existing cable and road conditions.

- (2) **Units per Distribution Area**  
Allocate the cable units that meet the estimated demand 15 years ahead in the cabinet area to each distribution area in proportion to the demand in the area.
- (3) **Cable Pairs**  
Determine the number of cable pairs that meet the number of allocated units. As for the existing cable, examine whether the cable is defective or not and then to utilize it, if not defective.
- (4) **Reserve Units**  
When the undeveloped or unoccupied land exists in the cabinet area, reserve the number of cable pairs suitable for such land in the cabinet or on the cable route near the land.

c) **Cable Entrance**

The exchange entrance cable design is to comply with the long term planning and, as such, is to be rational and economical. In the design, emphasis is placed on the following points:

- (1) **Cable Vault**
  - **Selection of Duct**  
Ducts for entrance cables to the exchange must be so selected that they will not interrupt the installation of additional entrance cables in the future. At the same time, the duct must be selected from bottom to top so that there will be no excessive cable bending, nor cable crossing in the cable vault.
  - **Cable Arrangement**  
Arrangement on the cable frame and cable hook must be carried out from the bottom line up to the entrance duct.
  - **Cable Termination**  
The primary cable that enters into the exchange is to be terminated directly to the MDF.
- 2) **Main Distribution Frame (M.D.F.)**
  - **Capacity of cable pair termination at the vertical row of an M.D.F. is assumed to be 800 pairs.**

- Younger cable pair number should be allocated to the upper rung of M.D.F. and older number to the lower rung.

## 7.4 Rural Telecommunications

### 7.4.1 System Making

With a view to providing a stable system by means of digitalization as the final objective, the existing unstable analogue systems for the rural area should be abolished gradually and replaced with new digital systems.

In Uganda, a large number of people live in rural areas, with a large number of rural telephone subscribers.

Common patterns among them are:

- (1) The ability of subscribers to pay for telephone services is limited and it is hard to expect high profits from them because of high costs of system construction and maintenance.
- (2) The number of potential subscribers will be in the neighborhood of 20 - 60 for 5 or 10 years to come.
- (3) In many cases rural subscribers are accommodated in small sized switchboards, each being more than 10 km distant from the switching center. Meanwhile, those outdated analog switchboards are scheduled to be replaced sooner or later in preparation for digitalization.
- (4) After small sized analog switchboards have been withdrawn, distance to subscribers will consequently become more than 20 km from the host exchange. Therefore, line loss exceeds the standard value even if maximum conductor diameter cable or a telephone set specially designed for high loss subscribers is used.
- (5) Stable public electric energy is not provided at all or available only during limited hours.

To relieve those rural subscribers and residents, the system making should be proceeded with in accordance with demand trend in each area concerned.

In the period when the number of subscribers is relatively small, i.e., 30 or less than 300 in ultimate, the system making should begin with a radio subscriber system.

As the number of subscribers continues to increase, showing signs to reach a level of 350, the system making methodology should transfer to establishing RSU (Remote Switching Unit) at the suitable place in consideration of demand points in the area. This system selection is given in Figure 7-4-1.

Such system applications for individual area is illustrated under UGANDA TELECOMMUNICATIONS RURAL DEVELOPMENT in the SUPPORTING DOCUMENT.

#### 7.4.2 Public Call Offices (P.C.O.)

In the master plan, it is so planned that each potential town center has one public call office (P.C.O.), so that the people living within a radius of 20 kilometers can access to the telephone on foot or by bicycle as illustrated in Figure 7-4-2.

The population census shows that most of the rural centers have populations ranging from 10,000 to 25,000 and the potential demand ranges from 5 - 10 lines and in some case up to 100 lines, according to our sample survey results. For planning purpose the potential demand has been tentatively fixed at 20 - 60 subscriber stations for each rural center.

In the event of field surveys for establishing regional development plan, the more precise demand analysis is necessary.

The P.C.O.s to be located in each county have been selected in the study and indicated as DMARS Terminals in the Map of UGANDA TELECOMMUNICATIONS RURAL DEVELOPMENT (Supporting Documents).

DMARS configuration is shown in Figure 7-4-3.

LEGEND: FO: Fiber Optic Transmission System  
 R: Radio Transmission System  
 MSU: Main Switching Unit  
 RSU: Remote Switching Unit  
 DMARS: Digital Multiple Access Transmission System

No. of Subs.

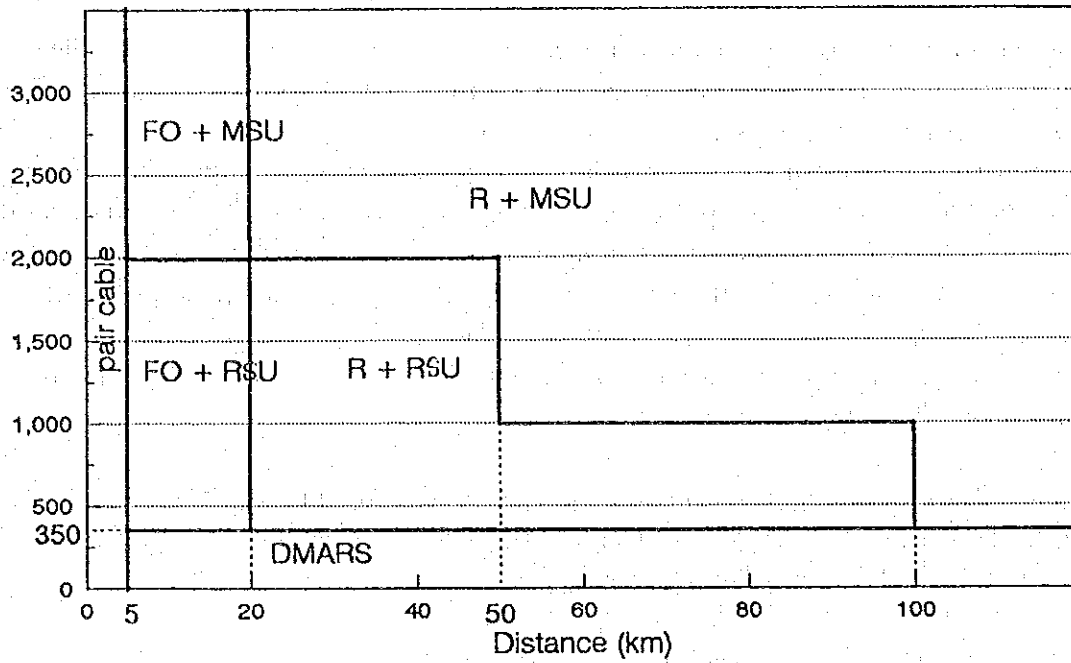
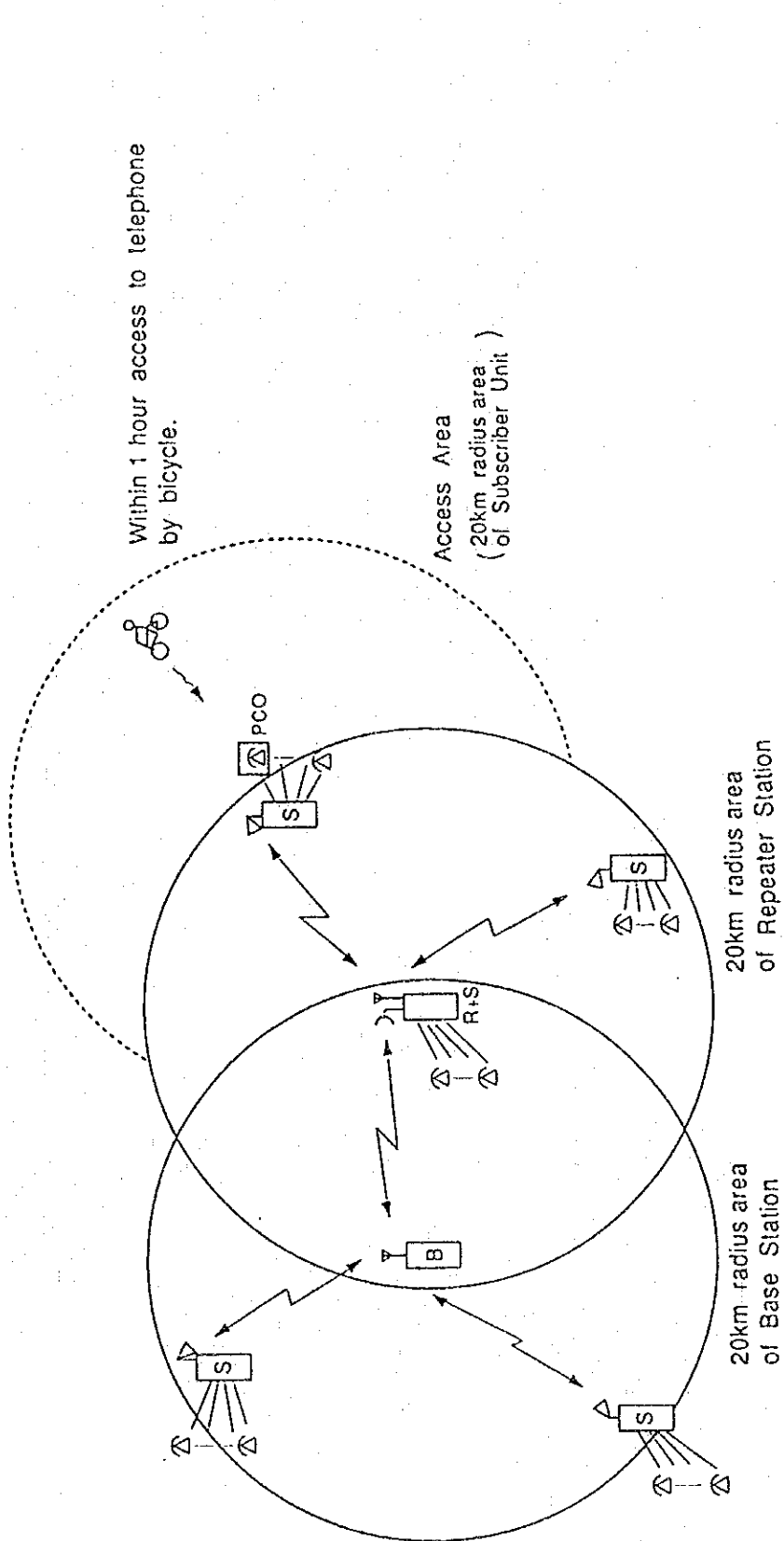


Figure 7-4-1 System Selection Chart



LEGEND : B . . . DMARS Base Station  
 R . . . DMARS Repeater Station  
 S . . . DMARS Subscriber Terminal

Note: Transmission range of DMARS is assumed to be within 20km.

Figure 7-4-2 Rural Telecommunications Network Configuration

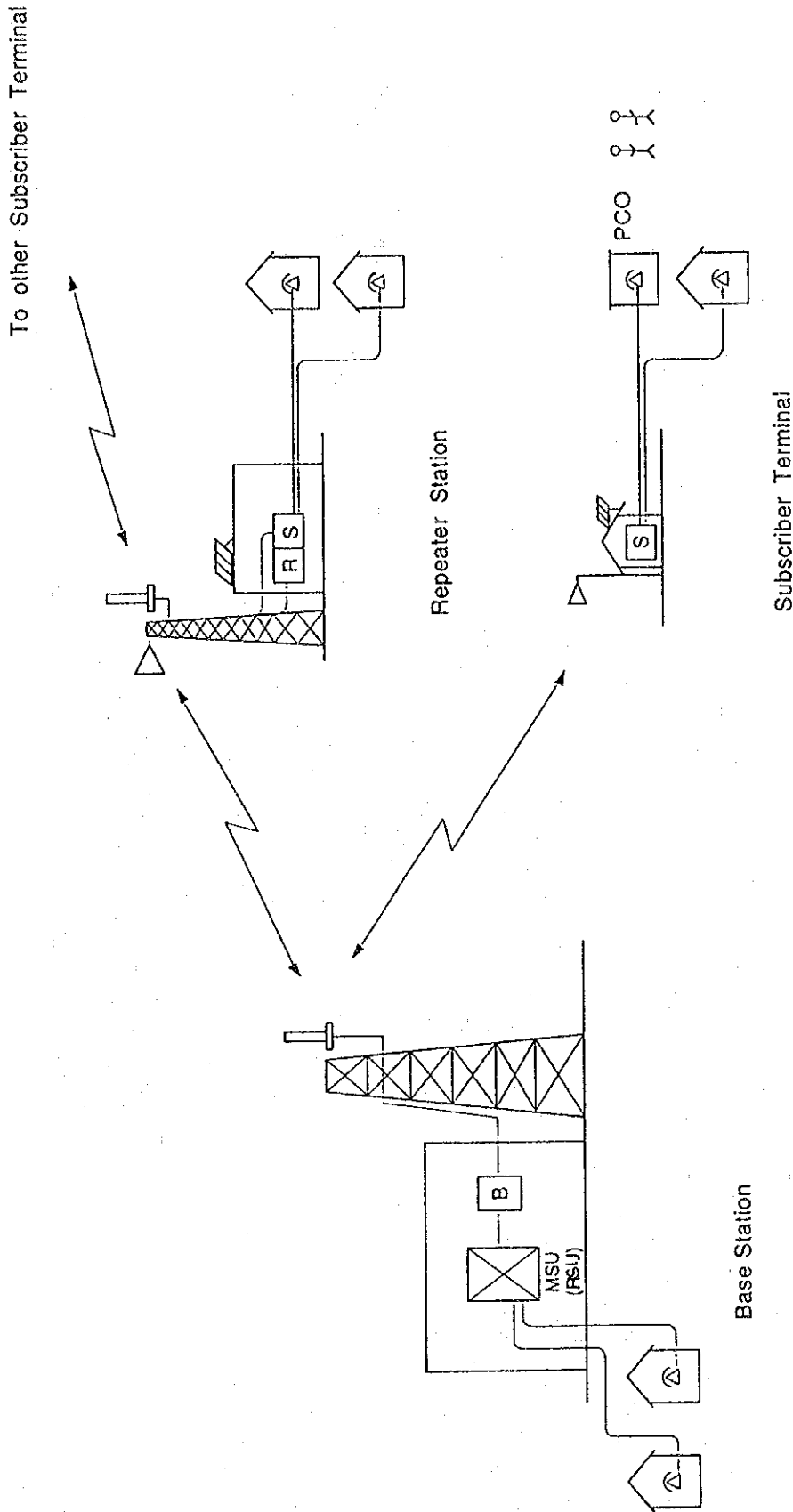


Figure 7-4-3 DMARS (Digital Multiple Access Radio System) Configuration



## **CHAPTER 8**

# **INTERNATIONAL NETWORK EXPANSION PLAN**



## CHAPTER 8 INTERNATIONAL NETWORK EXPANSION PLAN

### 8.1 Present International Telecommunications Services

#### 8.1.1 Telephone Service

At present, UPTC provides the international telephone services in collaboration with 189 countries, handling the following types of calls:

- 1) IDD (International Direct Dialing) call started in April 1990,
- 2) Operator assisted call and
- 3) Payphone (Prepaid Card) call.

The total of outgoing and incoming international telephone traffic is increasing, though the outgoing traffic decreased in 1991-1992, as compared with 1990.

The factors which affected the outgoing traffic are supposed to be the increase in rates of international telephone services enforced in December, 1989 and the change of tariff basis from Uganda shillings to US dollars effectuated in April, 1991 with an aim to avoid the foreign exchange losses.

On May 1, 1994, UPTC decreased the rates as shown in Table 8-1-2, and it is expected that the outgoing traffic will increase in coming years.

The growth of the international telephone traffic and the tariffs adopted are shown in Table 8-1-1 and Table 8-1-2 respectively.

Table 8-1-1 International Telephone Traffic (1,000 minutes)

	1986	1987	1988	1989	1990	1991	1992
Outgoing	2,128	2,479	2,610	2,974	4,480	4,193	3,470
Incoming	1,414	1,766	2,275	2,647	3,708	4,189	5,019
Total	3,542	4,255	4,885	5,621	8,188	8,382	8,489

Table 8-1-2 Tariff of International Telecommunications Services  
(December 1989 - April 1994)

	Telephone (US\$/min.)	Telex. (US\$/min.)	Telegram (US\$/word)
Region 1 (Africa)	3.00	2.00	0.23
Region 2 (Europe)	5.00	2.50	0.43
Region 3 (Asia, Others)	7.50	5.50	0.43

Revised Tariff of International Telecommunications Services  
(Effective from 1st of May 1994)

	Telephone (US\$/min.)	Telex (US\$/min.)	Telegram (US\$/word)
Region 1 (Africa)	1.00	2.00	0.23
Region 2 (Europe)	2.00	2.50	0.43
Region 3 (Asia, Others)	4.00	3.50	0.43

### 8.1.2 Telex Service

UPTC offers the telex service in collaboration with 199 countries. The demand of telex service has been gradually decreasing in recent years as is the world trend.

The telex service quality is not satisfactory due to the obsolete switching systems and the poor condition of subscriber lines between telex terminals and the switching systems.

The transition of the international telex and telegram traffic is shown in Table 8-1-3.

Table 8-1-3 International Telex And Telegram Traffic

	1987	1988	1989	1990	1991	1992
Telex (1,000 min.)	1,091	1,030	1,025	995	724	878
Telegram (1,000 words)	---	---	---	580	467	346

### 8.1.3 Leased Circuit

UPTC offers this service with two (2) international analogue leased circuits, of which users are SITA and PANA (Pan African News Agency).

Several banks request UPTC to offer digital leased circuit services; however, their demand is not satisfied yet so far.

### 8.1.4 Facsimile Service

Facsimile users are increasing in number little by little taking over the demand of telex and telegram services.

The facsimile service offered in this country is categorized in the following two types.

- 1) Customers bring their facsimile messages to the GPO (General Post Office) and entrust the transmission of their messages to UPTC operators.
- 2) Customers buy facsimile terminals or lease terminals from UPTC and transmit their messages by the terminals connected to their telephone lines. The customers' terminals must be those approved by UPTC.

### 8.1.5 TV Program Transmission

The television transmission service is offered on an occasional use basis by UPTC, because UTV (Uganda Television) operates their TVRO facilities, receiving TV programs directly from foreign countries.

UPTC is capable of setting up one (1) television circuit for Transmission and Reception through INTELSAT Atlantic Ocean Region Satellite.

### 8.1.6 Telegram Service

UPTC offers this service with the telex network. According to the past traffic data (see Table 8-1-3) the international telegram traffic is decreasing year by year.

## 8.2 Present Status of International Telecommunications Network

### 8.2.1 International circuits

At present, UPTC operates 115 telephone circuits directly connected with eleven (11) countries. With other 178 countries, telephone calls are connected through these eleven countries.

The total number of international circuits is 115 consisting of 105 circuits via INTELSAT routes and 10 circuits via terrestrial routes.

The number of international telephone and telex circuits including telegram circuits as of May, 1993 is shown in Table 8-2-1.

Table 8-2-1 Number of International Telephone and Telex Circuits  
(as of May 1993)

COUNTRIES	Telephone	Telex
UK	35	17
USA	35	9
FRANCE	9	10
GERMANY	6	5
ITALY	9	10
BELGIUM	3	
NETHERLANDS	4	
SWITZERLAND	4	
ETHIOPIA	2	
ZAMBIA	2	3
TANZANIA	6	5
KENYA		20
RWANDA		3
BURUNDI		3
<b>TOTAL</b>	<b>115</b>	<b>85</b>

### 8.2.2 Switching Equipment

#### (1) International Telephone Switching System

The existing International Telephone Switching system (E10B) that plays the main role in the International Telecommunication Network in Uganda was originally manufactured as digital National Transit Switch in 1981 and then modified with the function of International Gateway Switch. The signaling systems applied are "MFC R2" and "ITU-T No.5" and the circuits accommodated are all of analogue type through PCM MUX. It is not economically justifiable to add new functions to the existing system, taking into account its lifetime and additional investment. A computer system used for common data processing in UPTC is also employed for billing the telephone charge.

## (2) Telex Switching System

A telex switching system (NEDIX) has been in operation since 1980. Both the international telex service and the domestic telex service are operated with the same system.

In 1994 the system will be replaced with a new switch, while the subscriber line project financed by the World Bank was completed in 1993. Therefore, it is expected that the quality of telex service will be remarkably improved.

### 8.2.3 Transmission Equipment

Presently, the international transmission network is comprised of analogue satellite routes and analogue microwave routes.

#### (1) Satellite Communication Equipment

UPTC has been operating an INTELSAT standard "A" earth station (named MPOMA 1-A) since 1981. It permits access to the INTELSAT 335°E satellite over the Atlantic Ocean Region (AOR). UPTC operates international satellite links with eight (8) countries.

The following problems are observed in the existing Equipment;

- a) The Centralized supervisory system is obsolete and out of order. Spare parts are not obtainable from the manufacturer.
- b) ESC switching equipment is in the same condition as the Centralized supervisory system.
- c) HPA: IPA (Intermediate Power Amplifier) -B is also out of order and not repaired yet.
- d) Antenna Tracking and Control system is obsolete and needs urgent rehabilitation.

Although faced with these critical problems, UPTC is making efforts to maintain its operation.

Concerning the approach link there are two (2) routes. One is via an analogue microwave route and the other is via an optical fiber route established in April 1993. The former is being used for commercial operation.

## (2) Microwave Links

In order to communicate with neighboring countries, UPTC operates the microwave systems which were introduced using two (2) financial sources.

The major part of these systems introduced before 1975 compose a part of PANAFTEL (Pan-African Telecommunications Network) Link.

- a) Kampala - Kigari (Uganda - Rwanda) ---- (15 circuits)
- b) Kampala - Bujumbura (Uganda - Burundi) ---- (15 circuits)
- c) Kampala - Bukoba (Uganda - Tanzania) ---- (6 circuits)
- d) Kampala - Lusaka (Uganda - Zambia) ---- (2 circuits)
- e) Kampala - Addis Ababa (Uganda - Ethiopia) ---- (2 circuits)

These systems are being digitalized gradually.

The other microwave links were established recently under Kagera Basin Organization Telecommunication project. They also connect Uganda to Rwanda, Burundi and Tanzania through Masaka and Bukoba.

## 8.3 Problems in International Telecommunications and Solutions

### 8.3.1 Low Call Connection Rate (CCR)

The recent CCR of IDD calls is approximately 30% on an average for all destinations. This value is quite low and the shortage of international circuits on the satellite link is supposed to be a cause of this problem.

### 8.3.2 Difficulty in Circuit Expansion via INTELSAT

UPTC is faced with difficulty in increasing the international circuits to meet the international telephone demand. The existing standard "A" earth station conveying approximately 90% of international telephone traffic, is equipped with analogue FDM facility. INTELSAT has made an issue of this matter and requested UPTC to change the satellite carrier from analogue (FDM) to digital (IDR) and ceased to accept circuit augmentation with FDM.

Therefore UPTC is taking action to introduce IDR facility replacing FDM by utilizing the finance by INTELSAT and also to rehabilitate Antenna Tracking and Control system with the financial assistance by the World Bank. But this rehabilitation is estimated to be effective in extending the lifetime of the existing Earth Station only for five years or so.



### 8.3.3 Obsolete Switching Equipment

The existing international telephone switching system becomes extremely obsolete and it is difficult to maintain the system due to shortage of spare parts, which can no longer be obtainable from the manufacturer. UPTC have also difficulty in introducing the enhanced telephone services such as "international 800 dialing" (IFTC), "international operator direct connection" (IODC), credit card IDD, high grade routing and ITU-T signaling No.7, etc.

Taking into account the above circumstance, UPTC plans to introduce a new international switching system.

### 8.3.4 Grading-up of Leased Circuits Service

In many countries, demand for high speed digital leased circuits is increasing and generally satisfied. In Uganda, also, the same needs are arising from prominent banks. However, at present UPTC is not prepared to provide this type of service.

Hence UPTC needs to digitalize the transmission system for the earliest possible introduction of this service.

### 8.3.5 Large Outpayment in International Accounting

Approximately 30% of UPTC's international telephone traffic is routed through transit countries. Therefore UPTC is obliged to pay a large amount of transit charge. UPTC will take action on the following matters:

- a) To seek possibilities for lower international transit charges
- b) To establish direct telephone circuits with economically advantageous destinations.

### 8.3.6 Decrease of Outgoing International Telephone Traffic

Since 1991, the outgoing international telephone traffic has been decreasing while the incoming traffic keeps increasing continuously. It will be beneficial for UPTC that the incoming traffic exceeds the outgoing traffic; however, continuous sharp decrease of the outgoing traffic is not desirable. Therefore UPTC has introduced a new tariff so as to increase the outgoing traffic to such an extent that it will not exceed the incoming traffic.

## 8.4 Service Enhancement Plan

### 8.4.1 Telephone Service

Considering the worldwide trend in international telecommunications services, new telephone services, such as

- a) International Toll Free Call (ITFC or I800)
- b) International Operator Direct Connection (IODC)
- c) IDD call paid by commercial credit cards
- d) Add the international transit functions

are to be introduced in Uganda at an early stage of the First Phase of this plan.

### 8.4.2 Leased Circuit

UPTC is to provide digital leased circuit service up to 64 kbit/s to meet the needs of such users as the World Bank, Grindlays Bank, Bank of Uganda, etc.

### 8.4.3 International ISDN Service

International ISDN Service is to be introduced in Uganda at a later stage of the First Phase of this plan.

## 8.5 International Telephone Traffic Forecast

### 8.5.1 Demand Forecast

The transition of international telephone paid minutes until 1992 was as shown in Table 8-1-1. The outgoing paid minutes turned to decrease in 1991 and 1992. However, it is expected to turn to increase again sooner or later because the UPTC revised the telephone tariff and the economic situation seems to have been improved, with the exchange rate of US\$/Ush becoming stable. On the other hand, the incoming paid minutes have been increasing steadily year by year and this trend will be maintained for several years.

### 8.5.2 Outgoing Traffic Forecast

Analyzing the outgoing traffic trend until 1992, the demand is considered to be related with Gross Domestic Product, IDD user rate and tariff.

### 8.5.3 Incoming Traffic Forecast

Analyzing the incoming traffic growth until 1992, the traffic is estimated to maintain the trend of recent years.

The international telephone traffic is forecasted as shown in Table 8-5-1 and Figure 8-5-1.

Table 8-5-1 International Telephone Traffic Forecast

Demand / Year	1995	2000	2005	2010
Outgoing paid minutes (1,000 Min. / Year)	5,614	8,461	12,605	19,060
Incoming paid Minutes (1,000 Min. / Year)	5,770	9,288	13,647	20,052
Total	11,384	17,749	26,252	39,112

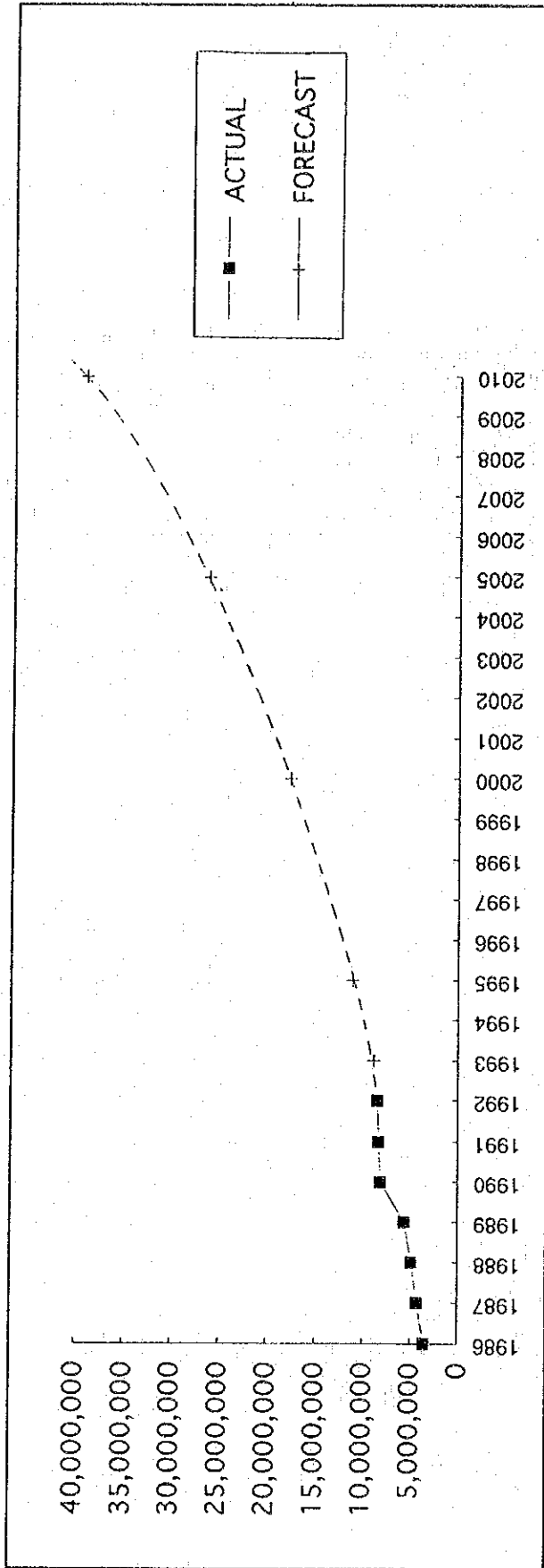


Figure 8-5-1 International Telephone Traffic Growth

#### 8.5.4 Forecast of Required Number of Circuits

Based on the forecasted monthly paid minutes at 22 major destinations, the busy hour traffic and the number of required circuits are calculated, based on ITU-T Recommendation E.506 as follows:

(1) Formula for the Busy Hour Erlang Calculation

$$A = \frac{M \times d \times h}{60 \times e}$$

A	:	estimated offered traffic in busy hour in Erlang
M	:	monthly paid minutes
d	:	day to month ratio (1/26)
h	:	busy hour to day ratio (0.1)
e	:	efficiency factor (0.65)

(2) Calculation of required number of circuits

With the loss probability (0.01) the estimated required number of circuits is calculated following Erlang B formula. The results are shown in Table 8-5-2. The required number means total number of 64 kbps digital circuits to be directly connected for each country.

Table 8-5-2 Forecast of Required Number of International Telephone Circuits

COUNTRY	1995			2000			2005			2010			INTELSAT	
	MONTHLY PAID MINUTES	NUMBER OF CIRCUITS	MONTHLY PAID MINUTES	NUMBER OF CIRCUITS	MONTHLY PAID MINUTES	NUMBER OF CIRCUITS	MONTHLY PAID MINUTES	NUMBER OF CIRCUITS	MONTHLY PAID MINUTES	NUMBER OF CIRCUITS	MONTHLY PAID MINUTES	NUMBER OF CIRCUITS	AOR	IOR
AUSTRALIA	5,117	4	8,012	4	11,811	5	17,582	6						
BELGIUM	13,920	6	21,494	7	31,733	9	47,368	11						
CANADA	39,882	10	62,344	13	91,934	17	136,946	22						
CHINA	5,863	4	8,902	5	13,308	5	19,988	7						
DENMARK	21,617	7	33,723	9	49,752	11	74,172	14						
EGYPT	8,447	4	12,944	5	19,177	6	28,799	8						
ETHIOPIA	8,834	5	13,723	5	20,266	7	30,265	8						
FRANCE	15,078	6	23,470	7	34,644	9	51,695	11						
GERMANY FR	37,359	9	79,283	15	86,041	16	128,228	21						
HONGKONG	5,791	4	12,699	5	13,258	5	19,822	7						
INDIA	25,294	7	38,719	10	57,380	12	86,207	16						
ITALY	25,179	7	38,869	10	57,487	12	86,072	15						
JAPAN	16,550	6	25,540	8	37,776	9	56,568	12						
NETHERLANDS	13,140	5	20,455	7	30,194	8	45,054	10						
PAKISTAN	5,081	4	7,762	4	11,509	5	17,305	6						
SAUDI ARABIA	7,916	4	12,277	5	18,138	6	27,105	8						
SOUTH AFRICA	24,639	7	38,843	10	57,166	12	84,061	16						
SWEDEN	23,267	7	36,396	9	53,662	12	79,912	15						
SWITZERLAND	14,016	6	22,081	7	32,503	9	48,264	11						
U.A.E	13,415	5	20,776	7	30,704	8	45,911	11						
UK	356,507	47	555,248	69	819,492	97	1,222,554	136						
U.S.A	167,355	26	262,282	37	386,536	51	575,186	71						
ZAMBIA	5,331	4	8,225	4	12,166	5	18,220	6						
ZIMBABWE	4,649	4	7,146	4	10,580	5	15,869	6						
Others total	85,325	16	132,764	22	195,991	29	292,501	40						
TOTAL	949,471	214	1,504,057	288	2,183,205	370	3,256,453	495						

## 8.6 International Telecommunication Development Plan

### 8.6.1 Development Target

- (1) Improvement of the existing services quality
- (2) Introduction of the enhanced telephone services
- (3) Increase of direct telephone circuits with additional destinations.
- (4) Digitalization of telecommunication network
- (5) Improvement of technical level in operation and maintenance

### 8.6.2 Technical Standard

- (1) Service Quality
  - International telephone CCR : 50 %
- (2) International Numbering Plan
  - International prefix number : 00    IDD
  - Booking number for operator assisted call
    - :0900            On-demand connection
    - 0901/0902    Booking
- (3) International Signaling System Plan
  - International :    ITU-T No.5, ITU-T R2, ITU-T No.7
  - Inter-connection with domestic : MFC/R2, ITU-T No.7
- (4) Carrier System in Future

International telephone service will be basically dependent on IDR satellite circuits operation with digital circuits. TDMA system is under studying at INTELSAT for the application in next generation. The introduction of this system is to be decided later.

Introduction of DCME will also be studied for the route having more than 60 circuits per carrier. For the route having 20 through 60 circuits, usage of LRE (Low Rate Encoding) may be considered for saving the number of satellite circuits.

### 8.6.3 Development Plan

- (1) In the First Phase (in 1994/95 - 1999/2000);
  - a) Rehabilitation of existing earth station (On-going)
    - Rehabilitation of Antenna Tracking and Control System
    - Introduction of IDR equipment to the earth station
  - b) Introduction of a new Switching System for the purpose of enhancement of functions such as:
    - Additional services
    - High grade routing
    - ISDN ( ITU-T Signaling System No.7 )
  - c) Digitalization of transmission link
    - Digitalization of the existing approach microwave links
    - Establishment of digital leased circuits
  - d) Improvement in operation and maintenance
    - Sufficient procurement of appropriate spare parts, consumable and maintenance tools
    - Preparation of operation manuals and related documents
  - e) Replacement of the existing Earth Station (MPOMA 1-A) accessing to the INTELSAT 335°E satellite over Atlantic Ocean Region with a new digitalized system after expiring of the effective period of the rehabilitation stated in a).
- (2) In the Second Phase (in 2000/01 - 2004/05);
  - a) Establishment of direct telephone circuits with Middle East, Asian and Oceanic countries, by introducing a new earth station pointing to INTELSAT Indian Ocean Region (IOR) satellite.
- (3) In the Third Phase (in 2005/06 - 2009/10);
  - a) Expansion of direct international circuits for Atlantic and Indian ocean region. Introducing new technology for Satellite communication.



## 8.7 Facility Provision Plan and Scale of Project

### 8.7.1 Facility Provision Plan

#### (1) Phase-1 Period (1994/95 - 1999/2000)

- a) To introduce a new international gateway switching system with the function of national transit switch.
- b) To rehabilitate the existing earth station mainly in Antenna Tracking and Control system. (On-going)
- c) To replace the existing earth station (MPOMA 1-A) with a new digitalized system and to introduce a new digital approach microwave link.

#### (2) Phase-2 Period (2000/01 - 2004/05)

- a) To introduce an earth station with digitalized systems accessing to the Indian Ocean Region satellite.

#### (3) Phase-3 Period (2005/06 - 2009/10)

- a) To introduce an independent international gateway switching system in order to cope with the increase of international telephone traffic.

The outline of Facility Provision Plan is shown in Figure 8-7-1.

## 8.7.2 Scale of Project Cost

According to the facility provision plan, the scale of estimated cost for the above is shown in Table 8-7-1.

Table 8-7-1 Project Cost Estimate

(x 1,000 US\$)

Year	Phase-1 1994/1995 -1999/2000	Phase-2 2000/2001 -2004/2005	Phase-3 2005/2006 -2009/2010
Switching System	(To be covered by Greater Kampala Network Expansion Project)	---	4,000
Earth Station	5,000	5,000	---

Figure 8-7-1 International Telecommunications Facility Provision Plan (1/2)

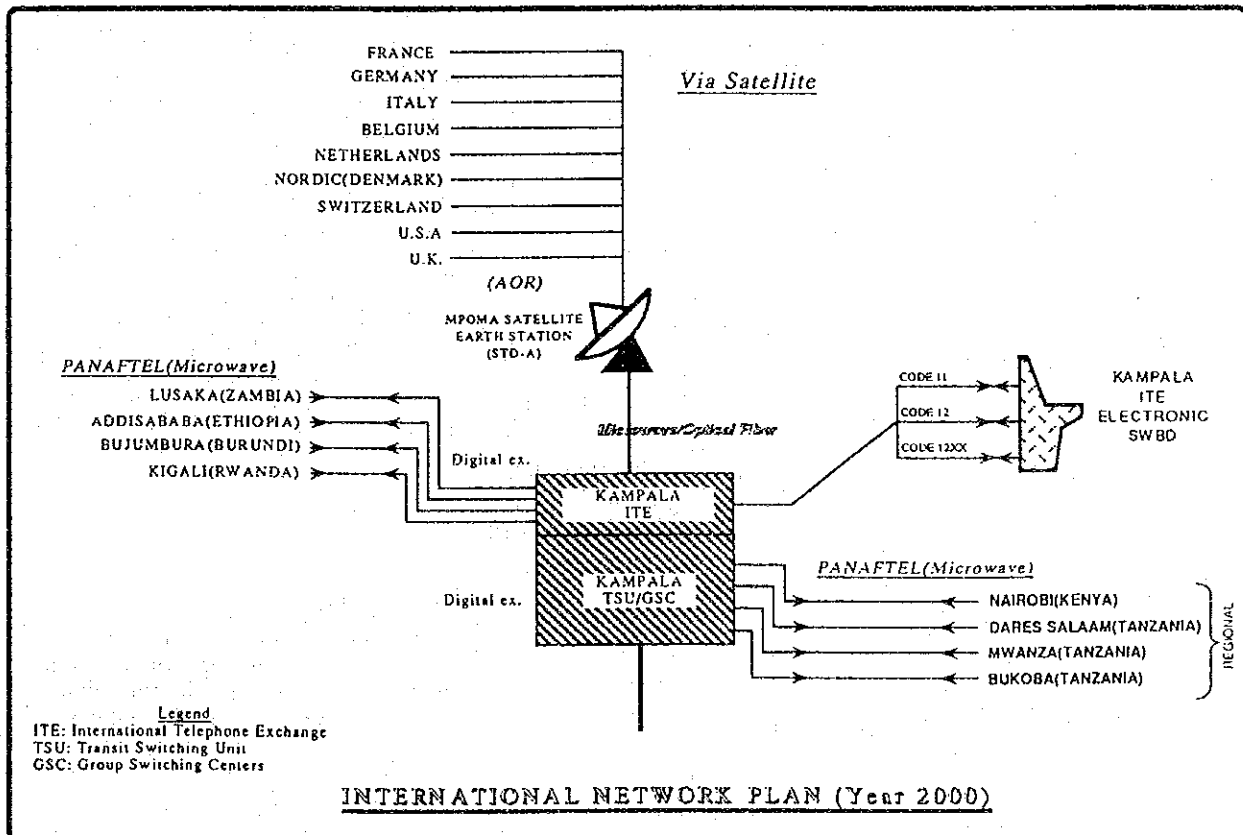
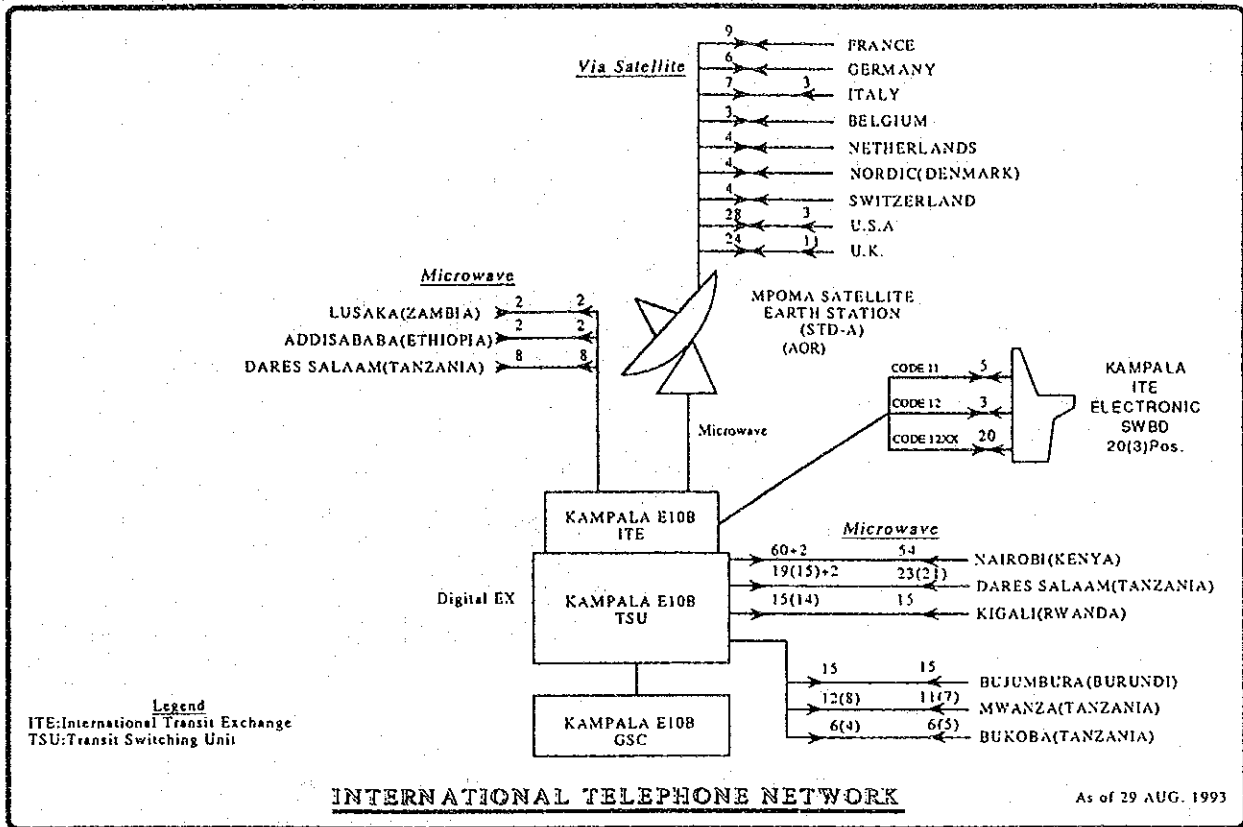
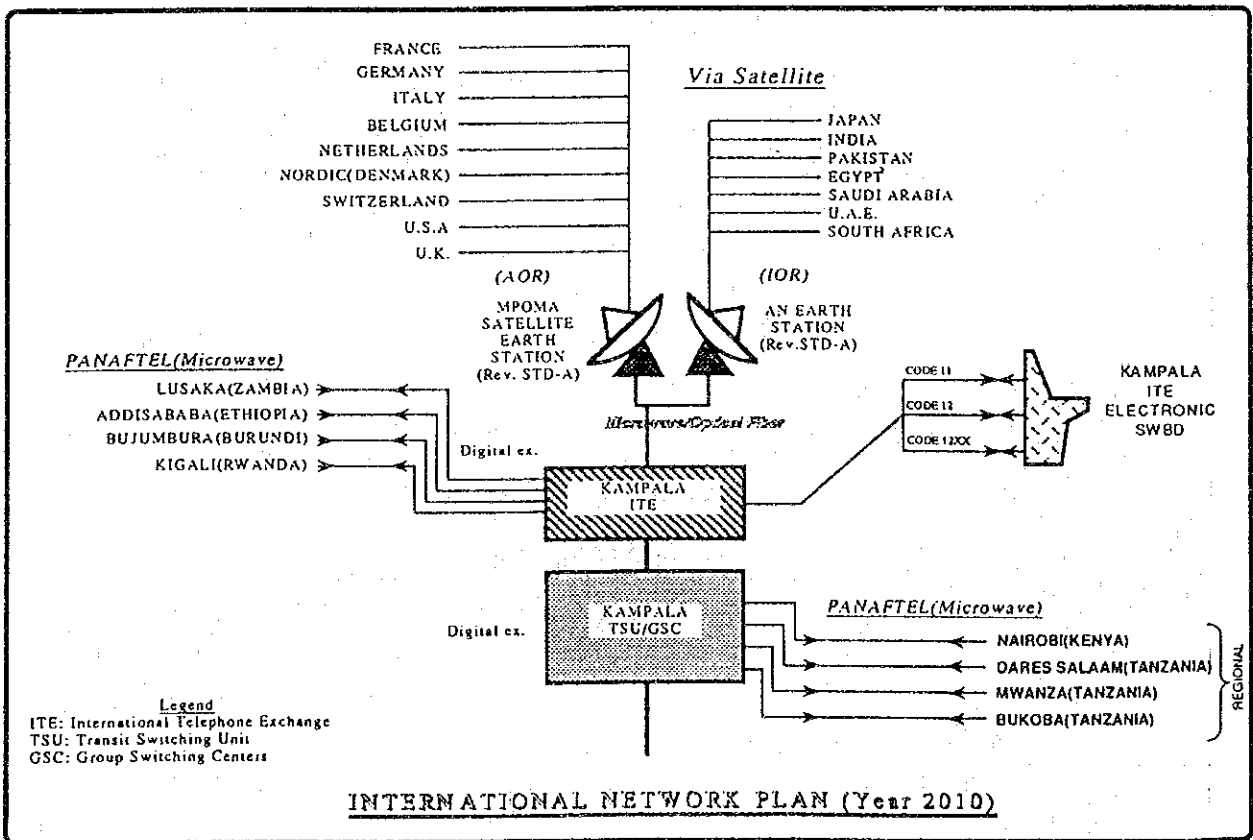
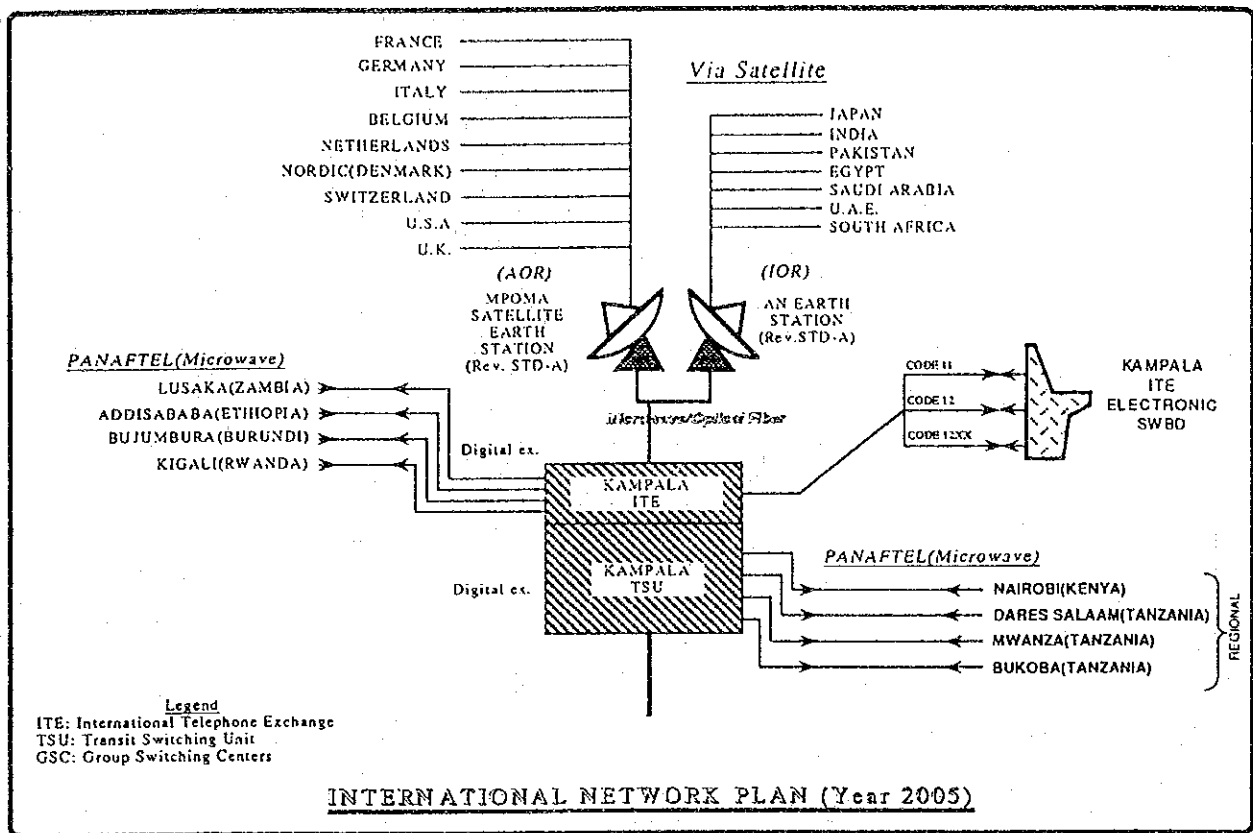


Figure 8-7-2 International Telecommunications Facility Provision Plan (2/2)



## **CHAPTER 9**

# **OPERATIONS AND MAINTENANCE PLAN**



## CHAPTER 9 OPERATIONS AND MAINTENANCE PLAN

### 9.1 Present Situation

#### 9.1.1 Operations of Network

##### (1) Operation of Automatic Switching System

In 28 exchanges, the automatic telephone switching systems are operated. Subscribers can dial directly for national calls through automatic exchanges. In several exchanges equipped with digital switching systems, the international subscriber dialling service is also available.

##### (2) Operation of Manual Switchboard

There are two operation types for manual switchboard as follows:

- a) 24 hours operation
- b) Daytime operation

At large scale (about 50 or more subscribers) manual exchanges, the operation is made on 24-hours basis. Usually, operators are working with three 8-hour shift.

At small scale (less than about 50 subscribers) manual exchanges, the operation is made only in the daytime from 8:00 to 17:00.

##### (3) Radio Call Service Operation

For telecommunications in rural areas, the HF radio systems are provided at post offices in small towns. When making calls, radio channels must be assigned by the central operators in Kampala. The operation hours at rural sites are the same as the manual switchboards depending on post offices.

##### (4) Telegram Transfer Operation

Telegrams can be sent at any post office or any authorized railway station or port. Telegrams thus accepted are transferred to the addressed post offices through telex, telephone and radio call links, and then delivered to the addressed persons' P.O.Boxes, though the delivery to the addressees was available 15 years ago.

## (5) Problems in Operations

In the telecommunications operation by UPTC, the following problems are found:

### a) Low call completion rate

The call completion rate of the automatic switching system is very low as follows:

- approx. 40% for local call
- approx. 30% for trunk call

This problem is caused mainly by the following reasons:

- Shortage of trunk circuits
- Wrong dialling
- Incomplete dialling

### b) No-operation at night in small exchanges

This situation is due to the policy of saving operation cost in light traffic hours. However, it is not convenient for subscribers, particularly in emergency cases.

### c) Noisy and inconvenient communication through HF radio

The communication by radio call services is too noisy and both-way communication is not feasible. Subscribers are required to understand how to make communications on this system. This system is not suitable for a public telecommunications network.

### d) No telegram delivery to the addressees' house

This situation is also due to the operation cost saving policy. No body knows when a telegram will be received by the addressed person.

## 9.1.2 Maintenance of Facilities

### (1) Maintenance of Cables and Switches

The maintenance conditions of local cables and switching systems, for example in kampala is as follows:

Kampala region is divided into seven maintenance zones, each being controlled by Zone Leader, in an effort to improve the services provided to subscribers. The fault will be attended as follows:

- a) A fault is reported to Customer Services Bureau by a subscriber concerned, either in person by calling the fault reporting number, 997. The fault is then given a reference number, which is noted on the maintenance card, E34A.



- b) Maintenance cards for Nsambya, Mbuya, Mengo, Kyambogo, Mukono and Lubowa zones are dispatched to Nsambya Yard twice a day. Those for Kampala Central are sent to Kampala Test Desk.
- c) At the test desk, the line concerned is tested, to check as to whether the fault is in cable or switch.
- d) Faults in cables are handled by zone leaders and faults in switches are handled by exchange staff.
- e) Once a fault is cleared, the maintenance card is returned to Customer Services Bureau.

Table 9-1-1 shows the fault clearance record in major towns during the period from August to October 1993. In Entebbe and Kampala Central, the percentage of faults cleared within 1 day is very low, compared with other towns. However, in November 1993, the situation of Kampala central region was improved as shown in Table 9-1-2 and Figure 9-1-1. One of the reasons for this improvement will be the transfer, in November, of most of subscribers of Kampala Central to the new cable network constructed under the World Bank project.

Table 9-1-1 Fault Clearance Rate in Major Towns  
(in August-November 1993)

EXCHANGE	TOTAL FAULTS	TOTAL CLEARS	CLEARS WITHIN					
			1 DAY		2 - 7 DAYS		8-31 DAYS	
ENTEBBE	517	492	33	6.7%	115	23.4%	344	69.9%
MBALE	901	830	175	21.1%	452	54.5%	203	24.5%
MASAKA	638	557	277	49.7%	143	25.7%	137	24.6%
FORT PORTAL	328	239	124	51.9%	61	25.5%	54	22.6%
KABALE	149	138	33	23.9%	60	43.5%	45	32.6%
IGANGA	154	138	89	64.5%	31	22.5%	18	13.0%
KAMPALA CENTRAL	8715	5128	215	4.2%	796	15.5%	4117	80.3%

Table 9-1-2 Fault Clearance Rate in Kampala Central Region  
(in November 1993)

ZONE	FAULTS B/F	FAULTS REPORTED	TOTAL CLEARS	CLEARS WITHIN						FAULTS C/F		
				1 DAY		2 - 7 DAYS		8 - 31 DAYS				
NAKIVUBO	61	74	75	15	20.0%	27	36.0%	8	10.7%	25	33.3%	60
NAKASERO	236	317	328	76	23.2%	82	25.0%	68	20.7%	102	31.1%	225
WANDEGEYA	96	154	134	37	27.6%	26	19.4%	17	12.7%	54	40.3%	116
NSAMBYA	140	165	129	39	30.2%	35	27.1%	20	15.5%	35	27.1%	176
MBUYA	143	153	137	34	24.8%	41	29.9%	22	16.1%	40	29.2%	159
MENGO	130	61	135	16	11.9%	8	5.9%	8	5.9%	103	76.3%	56
6TH STREET	86	105	118	29	24.6%	23	19.5%	31	26.3%	35	29.7%	73
PABX	151	168	225	46	20.4%	43	19.1%	43	19.1%	93	41.3%	94

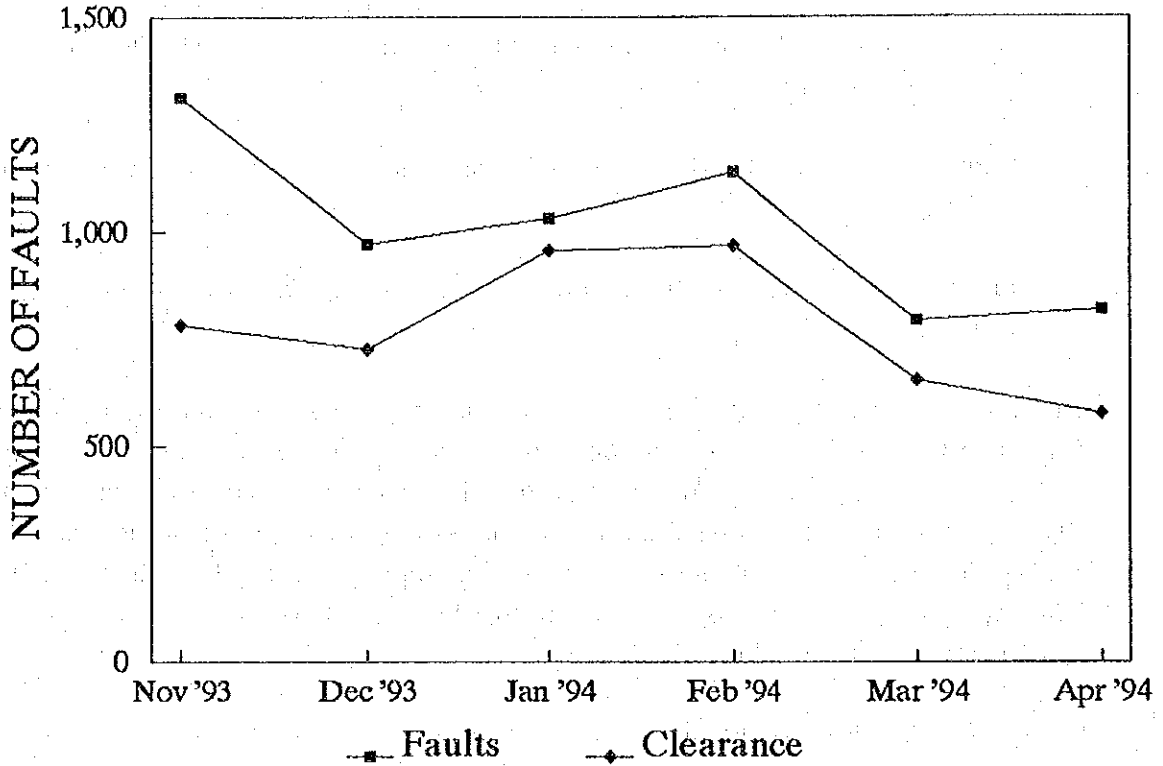


Figure 9-1-1 Number of Faults and Clearance in Kampala

(2) Maintenance of Transmission Links

The routine maintenance work for transmission links is being carried out by the team of each region under a regional telecommunications manager. If a serious problem is found, particularly in the radio or multiplex equipment, a special team will be despatched from Kampala.

The system availability record on each transmission link is presented in Table 9-1-3 and Table 9-1-4. The conditions of links are summarized below.

- a) **Microwave Links**  
Almost all the links are reliable with 99.9-100% availability except for Kampala-Mityana and Kampala-Kasese links.
- b) **UHF Links**  
Almost all the links are reliable with 90-100% availability except for Kampala-Kasese link.
- c) **VHF Links**  
Half the links are not so reliable due to frequent faults of radio equipment. Some links are sometimes out of order for one or two months.
- d) **Overhead Routes**  
About 30% of the routes are not so reliable because of faulty lines and equipment. Seven routes are out of order as of October 1993.

Table 9-1-3 System Availability (Microwave, UHF and VHF Links)  
(from August to October in 1993)

	System Availability (%)		
	August	September	October
<b>Microwave Links</b>			
1. Kampala - Nairobi	99.7	98.7	100.0
2. Kampala - Entebbe	100.0	100.0	100.0
3. Kampala - Masaka	99.9	100.0	99.9
4. Masaka - Mbarara	100.0	98.3	100.0
5. Mbarara - Kabale	100.0	100.0	100.0
6. Jinja - Kampala	100.0	100.0	100.0
7. Masaka - Bukoba	100.0	100.0	100.0
8. Kampala - Mityana	91.5	92.9	53.1
9. Kampala - Kasese	80.0	-	-
<b>UHF Links</b>			
1. Kampala - Mubende	98.8	100.0	100.0
2. Kampala - Fort Portal	74.5	99.1	98.6
3. Kampala - Lugazi	100.0	100.0	100.0
4. Kampala - Bombo	97.4	100.0	86.9
5. Jinja - Mbale	100.0	99.3	95.8
6. Mbale - Soroti	96.2	85.0	89.2
7. Mbale - Kumi	0.0	99.7	89.2
8. Mbale - Kapchorwa	100.0	100.0	100.0
9. Masindi - Kampala	100.0	98.9	100.0
10. Kabale - Kisoro	100.0	100.0	100.0
11. Kabale - Rukungiri	100.0	100.0	100.0
12. Tororo - Malaba	100.0	100.0	100.0
13. Kampala - Gulu	91.6	70.0	95.2
14. Kampala - Kasese	30.0	-	-
15. Kampala - Masindi		98.8	100.0
<b>VHF Links</b>			
1. Masindi - Kiboga	89.2	98.8	73.3
2. Masindi - Buliisa	100.0	100.0	100.0
3. Masindi - Kigumba	100.0	100.0	99.3
4. Masindi - Arua	2.2	16.2	12.9
5. Kampala - Semuto	92.8	61.3	90.0
6. Kampala - Kasangati	80.6	97.5	82.5
7. Masaka - Kalangala	100.0	100.0	25.8
8. Gulu - Moyo	30.0	0.0	0.0
9. Gulu - Kitgum	36.0	23.0	1.1
10. Mbarara - Rwakitura	100.0	100.0	100.0
11. Mbarara - Ibanda	100.0	100.0	100.0
12. Mbarara - Rushere	100.0	-	-
13. Mbale - Moroto	96.7	100.0	100.0
14. Mbale - Pallisa	99.9	34.6	0.0
15. Mbarara - Lyantonde			

Table 9-1-4 System Availability (Overhead Routes)  
(from August to October in 1993)

	System Availability (%)		
	August	September	October
<b>Overhead Routes</b>			
<b>Kampala Rural:</b>			
1. Bombo - Luwero	92.2	95.5	90.4
2. Bombo - Wobulenzi	100.0	71.0	100.0
3. Kampala - Kayunga	53.3	96.0	70.6
4. Kampala - Mpigi	80.0	73.8	91.5
5. Luwero - Nakasongola	89.7	87.1	46.7
<b>Masaka:</b>			
6. Masaka - Kalisizo	98.3	98.0	100.0
7. Masaka - Bukoto	96.0	100.0	89.5
8. Masaka - Kalungu	73.3	44.6	82.6
9. Masaka - Buyogo	72.6	47.9	79.0
10. Masaka - Lukaya	83.6	99.0	98.7
11. Masaka - Kyotera	89.5	76.8	96.7
<b>Gulu:</b>			
12. Gulu - Lira	95.8	67.0	81.3
13. Lira - Apac	40.0	22.6	52.0
14. Lira - Abokc	0.0	22.6	-
<b>Jinja:</b>			
15. Jinja - Kamuli	71.1	78.1	81.5
16. Jinja - Iganga	96.5	100.0	98.8
17. Jinja - Kaliro	96.6	96.5	92.5
18. Jinja - Bugiri	90.1	90.35	66.0
19. Jinja - Nkokonjeru	0.0	23.7	23.9
20. Jinja - Busesa	100.0	96.5	100.0
21. Kamuli - Bulopa	0.0	0.0	0.0
22. Kamuli - Namwenda	4.4	99.9	96.2
23. Kamuli - Buwenge	93.2	92.2	99.1
24. Jinja - Busembatya	96.6	0.0	65.4
<b>Mbarara:</b>			
25. Mbarara - Bushenyi	84.8	90.6	100.0
26. Mbarara - Ntungamo			
27. Mbarara - Kabwohc			
28. Mbarara - Kinoni			
<b>Mbale:</b>			
29. Mbale - Budadiri	0.0	0.0	0.0
30. Mbale - Busia	96.0	68.9	29.8
31. Mbale - Tororo	98.9	95.8	96.5
32. Mbaie - Bulucheke	96.4	100.0	96.9
33. Mbale - Manafwa	100.0	100.0	100.0
34. Mbale - Sironko	100.0	100.0	100.0
35. Busia - Lumino	-	0.0	0.0
36. Mbale - Bududa	-	-	0.0
37. Mbale - Mayenze	-	-	0.0
38. Mbale - Nakaloke	-	-	95.6
<b>Fort Portal:</b>			
39. F/Portal - Kasese	89.0	-	96.5
40. F/Portal - Kilembe	91.3	-	-
41. Hoima - Masindi	70.3	99.0	94.6
42. F/Portal - Kyenjojo	-	-	73.4

### (3) Problems in Maintenance

Some problems are found in the maintenance of telecommunications networks as follows:

- a) **Shortage of spare parts and materials**  
Especially in remote areas, spare parts and materials, such as telephone sets, drop wires, poles and spare units for equipment, are not sufficient. The problems of insufficient spare units are found mainly with respect to old equipment.
- b) **Difficulty of transportation**  
There are two types of transportation problems. One is shortage of maintenance vehicles. Another is no frequent transportation between remote sites and regional centers. These problems are mainly due to the small scale revenues from only 25,000 subscribers in the whole Uganda.
- c) **Old and unreliable systems**  
Almost all the switching systems (manual & automatic), local cables and overhead line terminals are very old, as well as the microwave system for the eastern route. Partial damages and unreliable conditions are found on them. They are left as they are without repair because spare parts are not available even in factories.
- d) **Shortage of test equipment and tools**  
Even in regional centers, test equipment and tools are not sufficient. Many test equipments are faulty and not repaired yet, making it difficult to test a faulty system.
- e) **Unskilled staff for routine maintenance**  
At remote sites, the technical maintenance staff is not well trained. It is difficult for them to undertake trouble shooting work, though such work is essential in routine maintenance.

## 9.2 Approach to Improvement

### 9.2.1 General Approach

Problems in operations and maintenance are basically categorized in "Personnel", "Physical" and "Financial". The general approach to improvement for each category is discussed below.

#### (1) Personnel Problems

There are three kinds of personnel problems as follows:

- a) Insufficient or improper skill
- b) Lack of or low morale
- c) Poor or incorrect management

Item a) can be solved by training present staff or by recruiting new staff. However, before taking actions, the analysis of the factors involved must be made carefully.

Item b) may not be solved by simple training or salary raising. Generally, such factors as the Corporate identity and job assignment will serve for improving the morale of employees.

Item c) must be solved by the management side. This problem will affect item a) and item b) also.

#### (2) Physical Problems

Physical problems will be caused with respect to the following:

- a) Facilities composing the network
- b) Test equipment and tools
- c) Workshop and storage
- d) Building and supporting facilities
- e) Area environment
- f) Transportation means

Items a) and b) are often closely related to the design, specifications and age of facilities. The solution must be found in the balance of such three things. **Currently many problems arise in the aged facilities.**

Items c), d) and f) cannot be solved only by the study of the physical factors. These problems may be relating with the personnel factor.

Item e) is a specific matter on each area. It may be difficult to find the best solution for this item.

### (3) Financial Problems

There are two types financial problems as follows:

- a) Too much cost for solution
- b) No budget due to improper decision

For the case a), other solutions must be found or the action shall be postponed until the situation will be changed.

**It seems that the most of all current problems cannot be solved in this case because of very small revenue for UPTC. It will be solved in the course of network expansion.**

For the case b), the problems may be solved if the proposal is presented well with sufficient data.

## 9.2.2 Specific Approach

### (1) Total Quality Control

The Total Quality Control (TQC) system started in the manufacturing industry has now been introduced in various sectors, including the construction, power, and retailing. In the service sector including telecommunications also it began to be employed. In Japan, NTT has introduced TQC and succeeded in solving many problems.

**For TQC activities, the following considerations are very important:**

- a) To be performed by all personnel.
- b) To be performed in every division.
- c) To be performed at every stage.
- d) To be performed comprehensively.

### (2) Quality Control Activities on Site

To solve the problems in operation and maintenance of UPTC, it was proposed to introduce QC activities. The QC activity basically consists of the following steps:

- Plan: To analyze causes of problems to find solutions.
- Do: To work out solutions.
- Check: To check and evaluate results.
- Action: To standardize actions to be taken for quality control.



In detail, activities be processed in seven steps as below:

Table 9-2-1 QC 7-step Problem Solving Formula

Step No.	Basic Steps	Action Items
1	Select Topic	<ul style="list-style-type: none"> <li>- Identify problems</li> <li>- Decide topic</li> </ul>
2	Understand Situation and Set Target	Understand situation <ul style="list-style-type: none"> <li>- Collect data</li> <li>- Decide characteristic to attack set target</li> <li>- Decide target (value and deadline)</li> </ul>
3	Plan Activities	<ul style="list-style-type: none"> <li>- Decide What to do</li> <li>- Decide schedule, division of responsibilities, etc</li> </ul>
4	Analyze Causes	<ul style="list-style-type: none"> <li>- Check present values of characteristics</li> <li>- List possible causes</li> <li>- Analyze causes</li> <li>- Decide Items to tackle</li> </ul>
5	Consider and implement Countermeasures	Consider countermeasures <ul style="list-style-type: none"> <li>- Propose ideas for countermeasures</li> <li>- Discuss how to put countermeasures into effect</li> <li>- Check details of countermeasures</li> </ul> Implement countermeasures <ul style="list-style-type: none"> <li>- Plan how to implement countermeasures</li> <li>- Implement countermeasures</li> </ul>
6	Check Results	<ul style="list-style-type: none"> <li>- Check results of countermeasures</li> <li>- Compare results with targets</li> <li>- Identify tangible and intangible benefits</li> </ul>
7	Standardize and Establish Control	Standardize <ul style="list-style-type: none"> <li>- Establish new standards and revise old ones</li> <li>- Decide methods of control</li> </ul> Establish control <ul style="list-style-type: none"> <li>- Familiarize relevant people with new methods</li> <li>- Educate those responsible</li> <li>- Verify that benefits are being maintained</li> </ul>

Source : "The QC Problem-Solving Approach", by Mr. K. Hosotani

## (3) Case Study of QC Activities at Kampala

In trial, a QC team was organized at Kampala and "how to improve fault clearance rate" was selected as the topic to be studied. During the second survey period, discussions were held between JICA team and UPTC maintenance staffs. At first, the cause of the delay of fault clearance were categorized as shown in Figure 9-2-1.

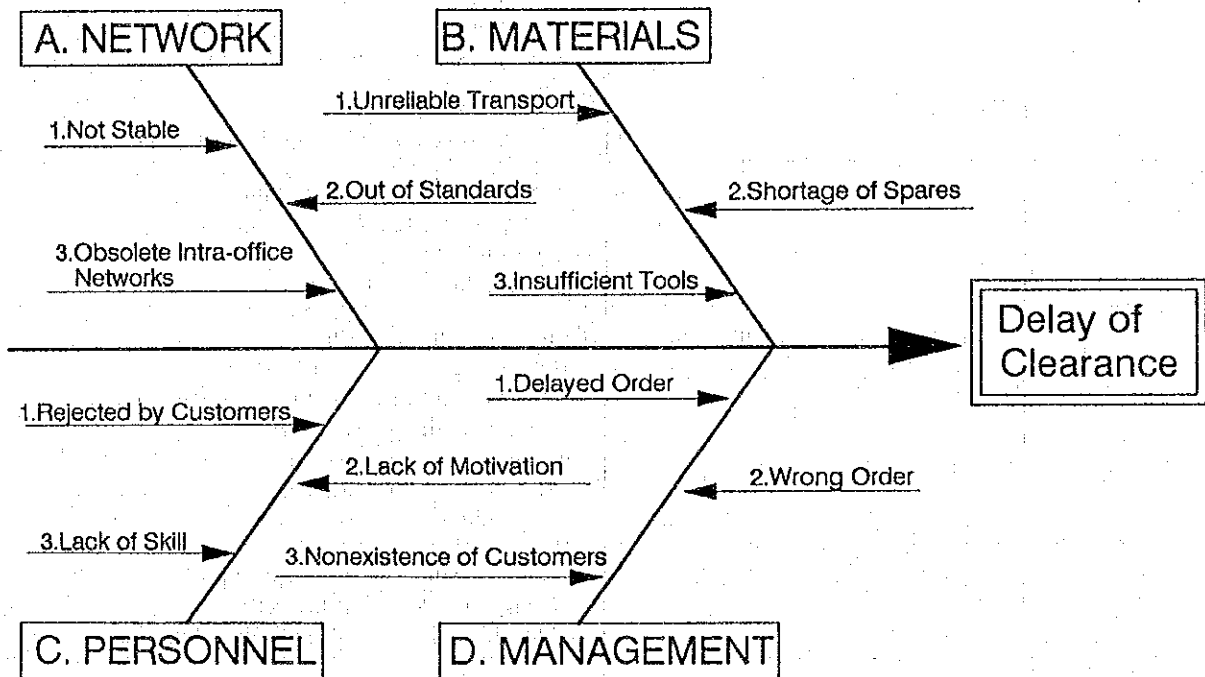


Figure 9-2-1 Cause of Fault Clearance Delay

To confirm the actual situation of delay, the detailed data was collected during July 1994 in Kampala. The results in case for delay over 24 hours are shown in Figure 9-2-2 and Table 9-2-2. 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

Problems of item 2) were specifically found in Nakasero and PABX maintenance teams, even though other problems were found in all teams.

## Cause of Delay

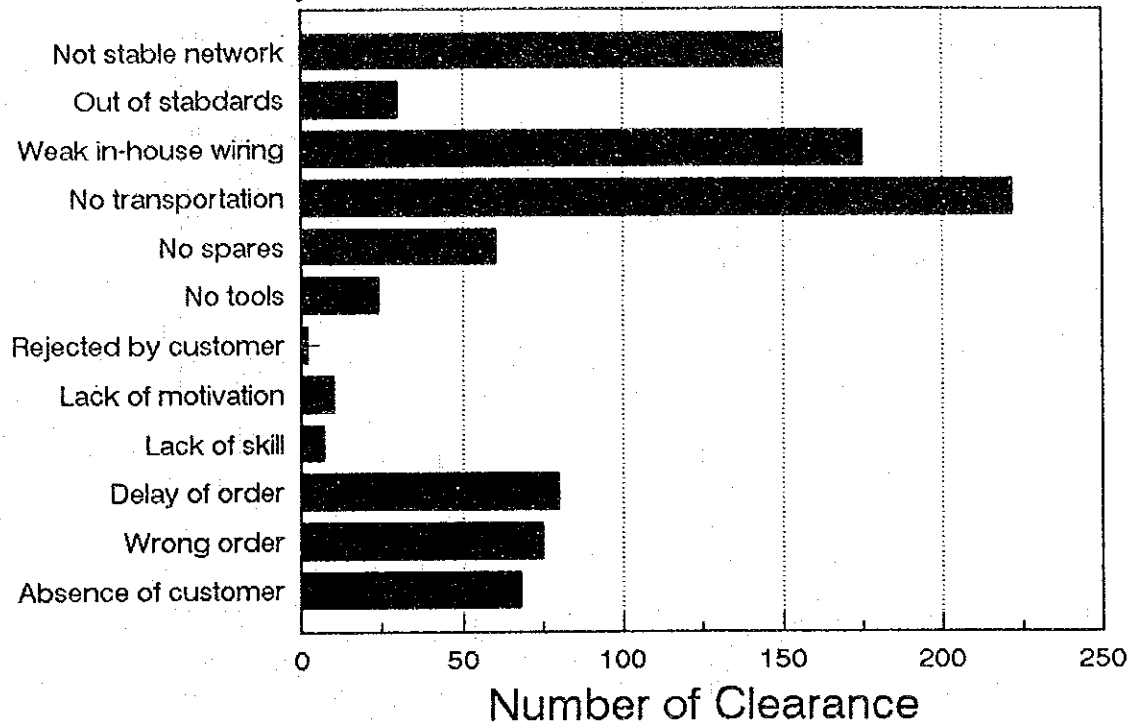


Figure 9-2-2 Causes of Fault Clearance Delay in Kampala (July 1994)

On Table 9-2-2, some zonal features can be known:

- 1) Rack of maintenance vehicles is a major cause of fault clearance delay in 6th-street, Wandegaya and Nsambya zones.
- 2) In Nakasero zone, there exist a number of old office buildings of which intra office wiring is extremely obsolete, making it difficult to repair faulty lines promptly.
- 3) A number of troubles due to delayed or wrong issue of repair order are observed in Mbuya and Wandegeya zones.

FILE:CAUSE--FLT.WK3

Table 9-2-2 Causes of Fault Clearance Delay in Kampala (July 1994)

Item	Sub-item	Nakasero	Mbuya	6th-street	Wandegeya	Nsambya	Mengo	PABX	Nakivubo	Total
A. Network	1) Not stable	45	28	6	2	26	13	21	9	150
	2) Out of std	3	6	1	9	9	1	1	0	30
	3) Weak in house	46	2	1	11	19	13	70	13	175
B. Matelials	1) No transport	22	36	19	48	39	20	9	29	222
	2) No spares	20	3	2	5	0	2	12	16	60
	3) No tools	0	3	0	1	0	11	0	9	24
C. Personne	1) Reject by customer	0	1	0	0	0	0	0	1	2
	2) Lack of motivation	0	9	0	0	0	0	0	1	10
	3) Lack of skill	0	0	1	0	0	2	4	0	7
D. Managem	1) Delay of order	5	21	5	24	3	3	2	17	80
	2) Wrong order	5	17	0	25	6	5	6	11	75
	3) Absence of customer	38	5	1	5	0	16	0	3	68
Number of Clearance over 24 hours		141	83	37	107	57	88	134	62	709

The action program to solve these problems is proposed as shown in Table 9-2-3. After introduction of the appropriate action, the effects must be observed by UPTC later.

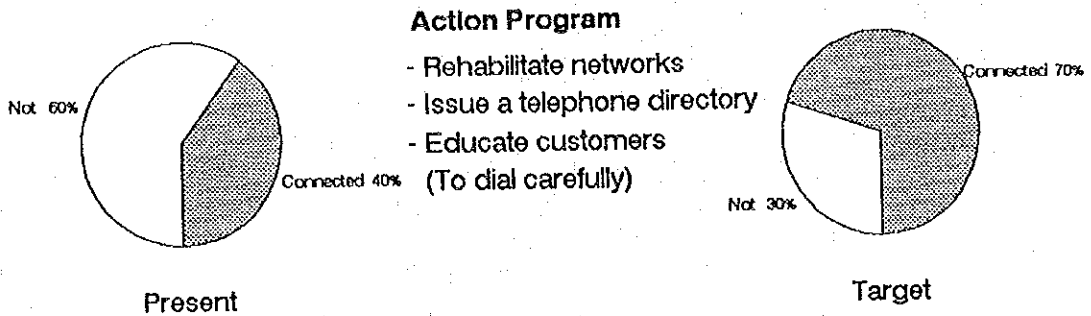
Table 9-2-3 Proposed Action Program to Solve Fault Clearance Delay

Cause of Problem	Action Program	Prompt	Later
<b>A. Network:</b>			
1. Not Stable	a. Replace faulty cables with new ones. b. Repair faulty switching systems.		X X
2. Out of Standards	a. Rearrange aerial cable lying to eliminate too long cable lines.		X
3. Old Wiring in Bldg.	a. Replace old wiring with new one.		X
<b>B. Materials:</b>			
1. Unreliable Transport	a. Replace old vehicles with new ones. b. Increase the number of vehicles. c. Repair vehicles speedily.	X X X	X
2. Shortage of Spares	a. Improve the spare parts management system. b. Permit local purchase of small parts.	X X	
3. Insufficient Tool Kits	a. Provide each technician with a tool kit.	X	
<b>C. Personnel:</b>			
1. Rejection by Customers	a. Provide maintenance staff with uniforms. b. Provide maintenance staff with special ID cards.	X X	
2. Lack of Morale	a. Provide maintenance staff with overcoats. b. Normalize the status of responsible positions (too many acting and casual staff being assigned for a too long periods).	X X	
3. Lack of Skill	a. Assign well-trained staff. b. Train maintenance staff in new technologies.		X X
<b>D. Management:</b>			
1. Delayed Order	a. Speedy issue of order to maintenance crew.	X	
2. Wrong Order	a. Confirm the status of the line in trouble (normal or disconnected).	X	
3. Inefficient Service	a. Prepare the registration list of subscribers with guide maps, and keep updating the prepared data. b. Introduce the computer system to modernize customer services.		X X
4. Absence of Customers	a. Confirm with customers reporting troubles the convenient time for repair work.	X	

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 9-2-3.

**CALL COMPLETION RATE**



**FAULT RECOVERY**

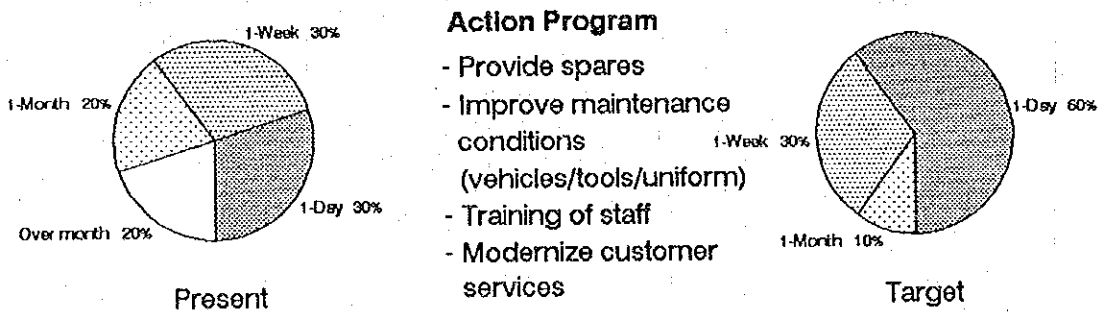


Figure 9-2-3 Service Grade Improvement

## **CHAPTER 10**

# **MANAGEMENT AND ORGANIZATION PLAN**





## CHAPTER 10 MANAGEMENT AND ORGANIZATION PLAN

### 10.1 Introduction

After the breaking up of East Africa Posts and Telecommunications Corporation (EAPTC) in 1977, the Government's caretaker company succeeded the Ugandan portion of the former's operations. However, no settlement of accounts had been made before the fiscal year 1984/85, when UPTC was created and subsequently succeeded to the caretaker company under the UPTC Act of 1983, due to the chaos caused by the civil wars in the country.

To grasp the current status of UPTC management, JICA study team collected and analyzed the audited financial statements for fiscal years 1984/85 through 1991/92 (which are all in the custody of UPTC) and the draft financial statements for 1992/93 (which were reported to The World Bank).

UPTC's development activities, as well as its recurrent operations, have become significant in the latest 5 years starting the fiscal year 1988/89. In this period, the commencement/materialization of various projects were performed; such as the Second Telecommunications Rehabilitation Project, the Northern Uganda Reconstruction Project and Kagera Basin Organization Project, etc. Therefore, the analysis for grasping UPTC's managerial and organizational issues is also focused on those 5 years.

## 10.2 Financial Performance of UPTC

UPTC's financial performance of the latest 5 years is summarized below, with a focus on Fiscal Years 1990/91, 1991/92 and 1992/93, when the rehabilitation/development investment were reopened on a large scale under the financing of The World Bank and other international/governmental organizations, as well as the Ugandan Government's capital contribution.

### 10.2.1 Undercapitalization

The UPTC's capital structure of Net Assets is shown in Table 10-2-1.

It is apparent that UPTC is placed in a serious condition of undercapitalization in terms of Equity. Such condition is caused mainly by the dependency of rehabilitation/development project funds on foreign loans, which have been availed of by the Government, without choice of UPTC, to meet the requirements for the realization of relevant priority projects. This issue coupled with foreign exchange losses has adversely affected the financial performance of UPTC and may continue to affect its development projects as well as business operations in the future, if it is not corrected by an appropriate support of the Government in addition to the efforts of the UPTC management to restore its sound financial foundation.

Table 10-2-1 Capital Structure of Net Assets

Fiscal Year	(in Million Shs.)					
	90/91		91/92		92/93	
Gov't Contribution	1,802		3,862		3,862	
Reserves	5,359		6,451		6,451	
Accumulated Loss	-7,051		-6,526		-3,061	
Total Equity	110	0.3%	3,787	5.8%	7,252	9.3%
Foreign Loans	32,169	99.6%	61,265	94.2%	71,124	90.7%
Pensions, etc.	19	0.1%	19	- %	19	- %
Total Source	32,298	100%	65,071	100%	78,395	100%

### 10.2.2 Foreign Exchange Losses

Foreign exchange gains and losses are contingent upon movements in the foreign currency markets as well as the reflected economic performance of Uganda. Due to this nature, during past three fiscal years, the foreign exchange losses were most disturbing factor to the Profit and Loss Account of UPTC as shown in Table 10-2-2.

Table 10-2-2 Adverse Effect of Forex Losses

(in Million Shs.)

<u>Fiscal Year</u>	<u>90/91</u>	<u>91/92</u>	<u>92/93</u>	<u>Total</u>	
Profit before					
Forex Losses(A)	13,239	16,322	7,471	37,032	
Forex Losses(X)	11,017	15,373	1,841	28,231	(A)x76%
O/W on Loans(Y)	6,654	13,448	660	20,762	(A)x56%
(Y) / (X)	60%	87%	36%	74%	
Net Profit	2,222	949	5,630	8,801	
Shs./ US \$	734.0	1133.8	1190.2	1190.2	
Devaluation %	71%	54%	5%	177%	
Cap. Investment(B) (Source of Funds)	11,566	16,728	12,907	41,201	
Foreign Loans	13,756	15,648	9,199	38,603	(B)x94%
Gov't Contribution (Increase)/	0	2,060	0	2,060	(B)x 5%
Decrease in Cash	-2,190	-980	3,708	538	(B)x 1%

There are two types of foreign exchange gains/losses incurred by UPTC. One is in respect to the international telecomms/postal operations. Another is in respect to the valuation of foreign loans at the prevailing rate at the end of each fiscal year. The former forex gains/losses are tied down with UPTC's operations and are its indivisible portion. The latter forex gains/losses are merely attributable to the financing adopted by the Government and not by UPTC's own choice out of the limited available sources, in most cases.

Consequently, if the big devaluation of Uganda Shilling continue to occur further, UPTC's profit projection would be unrecoverably hampered and its financial standing would fall into critical condition due to its heavy dependence on the foreign loans. It is difficult for UPTC's management to take such forex risks on the foreign loans which share 90.7% of the source of capital as of 30 June 1993 (See Table 10-2-1).

### 10.2.3 Deteriorating Key Financial Ratios

As a customary method of reviewing financial performance of entities having responsibility for profit objective, an analysis of the following key financial ratios was made based on the financial statements of UPTC:

- Ratio of Profit to Revenue = Profit / Revenue x 100
- Turnover Ratio of Net Assets (efficiency of investment)  
= Revenue / Net Assets x 100
- Ratio of Profit to Net Assets  
= Profit/Revenue x Revenue/Net Assets x 100

In order to eliminate the contingent factor in comparison, "Profit before foreign exchange losses" for each fiscal year was used for the calculation of the above stated ratios. The results are shown in Table 10-2-3.

Table 10-2-3 Key Financial Ratios for UPTC

<u>Fiscal Year</u>	<u>90/91</u>	<u>91/92</u>	<u>92/93</u>
Profit / Revenue	58%	44%	20%
Revenue / Net Assets	71%	57%	48%
Profit / Net Assets	41%	25%	10%

(1) Decline in Profit to Revenue Ratio

The major causes of sharp decline in "Profit/Revenue" are as follows:

- a) Pressure of increased Ordinary Recurrent Expenditures including Staff Costs:  
The ORE to Operating Revenue Ratio almost doubled from 22.2% (90/91) to 41.0% (92/93) in Table 10-2-6.
- b) Increase in Provision for Bad Debts:  
The Provision to Revenue Ratio soared from 12.8% (90/91) to 34.4% (92/93) in Table 10-2-6.

However Staff Costs have been kept just within the guidelines of the approved annual budget through the activities of Salary Review Technical Committee.

(2) Decline in Revenue to Net Assets Ratio

As indicated as Work in Progress in Table 10-2-8 hereinbelow, most of the capital investments are still in the process of completion as of 30 June 1993 and accordingly, they have been contributing little to the generation of revenues. Said status gave an adverse effect to this ratio.

Another big factor is "an alarmingly low" collection rate of billings as shown in Tables 10-2-4 and 10-2-5.

Table 10-2-4 Telephone Billings and Collection

Fiscal Year	(in Million Shs.)			
	90/91	91/92	92/93	93/94
Telephone Billings	20,202	31,401	29,911	30,374
-do- collections	N.A.	10,008	14,979	21,450
Collection Ratio	N.A.	32%	50%	70%
Average No. of Subs.	28,464	28,225	24,498	26,000
Billings per Sub.	\$967	\$982	\$1,026	\$982
Collection per Sub.	N.A.	\$319	\$514	\$693
Shs./US \$	734	1134	1190	1190

- Note:
- 93/94 estimates include 100% collection from the Government.
  - In addition to the above, Debt Swap of 14 Bn. Shs. (as of 30 June 1993) is being finalized with the Government.

Table 10-2-5 Telephone Debtors Analysis  
for Fiscal Year 92/93

Category	Subs.No.	Debtor 30/6/92	Billings	Collections	(in Million Shs.)	
					Adj.	Debtor 30/6/93
Private Firms/Res.	23471	32525	18443	10570	5633	34765
Parastatal/ Big Co.	104	7458	4415	2413	24	9436
Government	53	8741	5248	288	-352	14053
Embassies	38	3000	1805	1708	-	3079
Total	23666	51724	29911	14979	5305	61351

Category	Debtor 30/6/92	Billings	Collections	(%)	
				Debtor 30/6/93	Collect Ratio
Private- Firms/Res.	62.9	61.7	70.6	56.7	57.3
Parastatal/ Big Co.	14.4	14.8	16.1	15.4	54.7
Government	16.9	17.5	1.9	22.9	5.5
Embassies	5.8	6.0	11.4	5.0	94.6
Total	100	100	100	100	50.0

- Note:
- Debtors (at 30/6/92 & 30/6/93) and Billings have been reconciled with Financial Statements.
  - Collections came from "Consolidated Receipts and Payments Statement for the Year ended 30/6/93".
  - Numbers under "Adjustment" need to be verified.

As shown in Table 10-2-6 through Table 10-2-9, Telecomms Debtor reached 64 Billion Shs. as of 30 June 1993 and doubled from 32 Billion Shs. in the fiscal year 1990/91, while the total of Telecomms and Postal revenues grew by 56% only. It is observed that Telecomms Debtors stood at the equivalent amount to 21.9 months of monthly Telecomms and Postal revenues as of 30 June 1993, having been extended from that for 17.3 months as of 30 June 1991.

Table 10-2-6 Salient Financial Features and Ratios for UPTC

		IN US\$ MIL, % OR MONTHS								
		84/85	85/86	86/87	87/88	88/89	89/90	90/91	91/92	92/93
TLCM+PSTL RVNUE	(A)	31	247	841	2123	7639	14173	22466	35712	35053
MONTHLY OF (A)=	(B)	2.58	20.58	140	177	637	1181	1872	2976	2921
EXP EXCL PRV+INT	(M)	29.2	105	245	507	1824	3358	4986	10521	14375
MONTHLY OF (M)=	(N)	2.43	8.75	40.83	42.25	152	280	416	877	1198
STAFF COSTS	(P)	9	24	45	172	605	1090	1909	4409	6866
(P)/TTL REVNUE	%	29.0	9.7	5.1	8.1	7.9	7.6	8.3	11.9	18.1
PRV BD DBT/TTL REV	%	29.0	19.4	24.9	21.0	29.8	37.6	12.8	20.2	34.4
(M)/(A)	%	94.2	42.5	29.1	23.9	23.9	23.7	22.2	29.5	41.0
TLCM DBTR/(B)	MO	17.4	10.2	6.7	13.8	12.0	15.2	17.3	18.2	21.9
NET CREDITOR	(C)	122	81	1586	1686	2648	5998	9612	15179	13627
EXCL TAX+ACCRD CHG										
(C)/(B)	MO	47.3	3.9	11.3	9.5	4.2	5.1	5.1	5.1	4.7
(C)/(N)	MO	50.2	9.3	38.8	39.9	17.4	21.4	23.1	17.3	11.4
CURRENT RATIO	%	86.3	180.6	88.9	105.9	163.4	126.5	138.7	150.6	144.9
CURRENT ASST	(D)	94	263	827	2270	6222	11324	28736	52049	53738
EXCL DUE FR PT-ADM										
CURRENT LIAB	(E)	125	88	1697	1801	3100	7682	17202	24921	26511
W/ NET CREDITOR										
(D)/(E)	%	75.2	298.9	48.7	126.0	200.7	147.4	167.1	208.9	202.7

NOTE: (1) (M)=ORDINARY RECURRENT EXPENDITURES

(2) (M)/(A)=RATIO OF (1) TO TELECOMMS AND POSTAL REVENUES

(3) TLCM DBTR/(B)=TURNOVER PERIOD OF TELECOMMS DEBTOR IN TERMS OF (B)

(4) (C)/(B)=TURNOVER PERIOD OF (C) IN TERMS OF (B)

(5) (C)/(N)=TURNOVER PERIOD OF (C) IN TERMS OF (N)

(6) NET CURRENT RATIO IN WHICH "NET" DUES TO PT-ADM ARE APPLIED

Table 10-2-7 Profit and Loss Account for UPTC

	IN USH MILLION									
	84/85	85/86	86/87	87/88	88/89	89/90	90/91	91/92	92/93	
REVENUE:										
INTERNATIONAL CALLS						3243	7150	12229	19260	
OTHER TEL REVENUE	17	189	655	1731	3341	5131	8201	12218	31491	
TELEX REVENUE	9	45	110	302	633	1226	993	1586	883	
TELEGRAPH REVENUE	1	3	3	15	64	72	52	70	394	
POSTAL REVENUE	4	10	73	75	358	594	991	2578	2285	
OTHER REVENUE	0	0	42	10	34	149	396	1219	2788	
TOTAL REVENUE	31	247	883	2133	7673	14322	22862	36931	37841	
LESS EXPENDITURE:										
SALARIES/WAGES						209	397	1787	2212	2735
OTHER STAFF COSTS	9	24	45	172	396	693	122	2197	4131	
INTEREST	21	25	5	21	220	726	1052	1587	1690	
MISC FINANCIAL COST						33	204	330	546	256
TEL/TELEXES						398	552	830	673	1278
RENT/RATES						9	130	171	807	388
TRAVEL/ACCOMODATION						103	126	322	501	450
UTILITIES						10	56	91	140	305
MEDICAL EXPENSES						36	62	92	107	160
CONTRIBUTIONS						0	33	135	180	161
OTHER ADM EXPENSES						143	309	272	811	1046
AUTOMOBILE EXPENSES						156	324	354	652	968
GEN MAINTENANCE						139	334	136	1158	1569
OTHER OPER COSTS	20	81	201	335	192	138	344	537	928	
PRVSN FOR BAD DEBTS	9	48	220	447	2284	5383	2933	7465	12999	
DEPRECIATION CHRG	8	12	26	322	339	354	652	959	1035	
STOCK OBSOLESCENCE	11	0	0	0	0	0	0	0	0	
OTHER WRITE-OFFS	0	0	0	0	0	0	0	77	271	
TOTAL EXPENDITURE	78	190	497	1297	4667	9821	9623	20609	30370	
OPERATING PROFIT										
BEFORE FOREX LOSSES	-47	57	386	836	3006	4501	13239	16322	7471	
FOREX LOSSES	-71	0	-2509	1	-4662	-8245	-11017	-15373	-1841	
NET PROFIT (LOSS)	-118	57	-2123	837	-1656	-3744	2222	949	5630	
LESS TAX PROVISION										
ACCMLTD LOSS BR FWD	0	0	0	0	0	0	3764	427	1970	
PRIOR YR ADJUSTMENT	-47	-126	-36	-2153	-1042	-2145	-5639	-7052	-6098	
ACCMLTD LOSS CR FWD	39	33	6	274	553	250	129	4	-622	
ACCMLTD LOSS CR FWD	-126	-36	-2153	-1042	-2145	-5639	-7052	-6526	-3060	

Table 10-2-8 Balance Sheet for UPTC

	IN USH MILLION									
	84/85	85/86	86/87	87/88	88/89	89/90	90/91	91/92	92/93	
CURRENT ASSETS:	196	392	6913	8362	8046	17394	41362	80793	87877	
STORES	9	82	97	78	66	115	4259	4617	3395	
TELCM DEBTORS	45	209	943	2434	7614	17929	32347	54022	64054	
POSTL DEBTORS	0	0	0	0	0	14	14	14	14	
PRVSN - BAD DEBTS	-14	-63	-283	-730	-3015	-8398	-11330	-18795	-31794	
DUE FR OTHER PT-ADM	102	129	6086	6092	1824	6070	12626	28744	34139	
OTHER DEBTORS	42	11	15	146	888	452	248	1318	1808	
SHORT-TRM INVSTMNT	0	0	0	0	0	0	1019	6573	10215	
CASH/BANK BALANCE	12	24	55	342	669	1212	2179	4300	6046	
LESS CRRNT LIABLTS:	227	217	7783	7893	4924	13752	29828	53665	60650	
INCOME TX PRVSNS	0	0	0	0	0	0	3765	4192	5513	
DUE TO OTHER PT-ADM	215	201	7657	7750	4435	10486	19626	38194	41387	
DUE TO CMMWLTH TB	0	0	0	0	0	1253	2164	4201	4347	
OTHER T-CREDITORS	9	9	15	28	37	321	440	808	1197	
POSTL CREDITORS	0	0	0	0	0	8	8	720	835	
ACCRUED CHRGS	3	7	111	115	452	1684	3825	5550	7371	
NET CURRENT ASSETS:	-31	175	-870	469	3122	3642	11534	27128	27227	
NET FIXED ASSETS	95	92	2726	4228	4493	7011	8121	9777	11942	
WORK IN PRGRSS	28	36	41	2738	2485	2630	12559	26672	37454	
INTELSAT INVSTMNT	1	1	0	32	18	18	84	1494	1772	
NET ASSETS:	93	304	1897	7467	10118	13301	32298	65071	78395	
SOURCE OF CAPITAL:	93	304	1897	7467	10118	13301	32298	65071	78395	
GOV'T CONTRIBUTION	28	28	28	1802	1802	1802	1802	3862	3862	
RESERVES	35	34	2683	5359	5359	5359	5359	6451	6451	
LESS: ACCMLTD LOSS	-126	-36	-2153	-1042	-2145	-5639	-7051	-6526	-3061	
FOREIGN LOANS	146	261	1333	1333	5083	11760	32169	61265	71124	
DOMESTIC LOANS	10	12	0	0	0	0	0	0	0	
PENSIONS, ETC.	0	5	6	15	19	19	19	19	19	



Table 10-2-9 Source and Application of Funds for UPTC

	IN USH MILLION									
	84/85	85/86	86/87	87/88	88/89	89/90	90/91	91/92	92/93	
SOURCE OF FUNDS:										
NET PROFIT(LOSS)	-118	57	-2122	837	-1656	-3744	2222	949	5630	
ADJUSTMENTS:										
FOREX LOSS-LOAN	0	0	0	0	3067	5865	6654	13448	660	
DEPRECIATION	8	12	26	322	339	355	652	959	1035	
OTHERS	42	37	8	282	557	250	4	24	-622	
FUNDS FR OPERATIONS	-68	106	-2088	1441	2307	2726	9532	15380	6703	
LOANS	35	117	1059	2	683	811	13756	15648	9199	
GOV'T CONTRIBUTIONS	-4	0	0	1774	0	0	0	2060	0	
OTHERS	0	0	0	0	14	0	0	0	0	
TOTAL FUNDS INFLOW	-37	223	-1029	3217	3004	3537	23288	33088	15902	
APPLICATION OF FUNDS										
FIXED ASSETS	35	13	11	1813	138	2873	1637	2187	1220	
CAP WORK IN PRGRSS	0	4	5	31	154	145	9929	14541	11687	
INVESTMENTS	0	0	0	32	0	0	66	318	277	
REPAYMENT-LOAN	0	0	0	1	60	0	0	0	0	
CORP TAX PAID	0	0	0	0	0	0	0	0	510	
TOTAL FUNDS APPLIED	35	17	16	1877	352	3018	11632	17046	13694	
NET FUNDS INFLOW:	-72	206	-1045	1340	2652	519	11656	16042	2208	
WORKING CAPITAL:										
STORES(+)	7	73	15	-19	-12	49	4143	358	-1222	
DEBTORS(+)	-12	213	6475	1181	-631	8756	17838	31422	3706	
CREDITORS(-)	-77	-91	-7566	-109	2968	-8828	-12312	-23413	-5664	
SHRT-T INVSTMNT(+)	0	0	0	0	0	0	0	5554	3642	
CASH/BANK BAL(+)	10	11	31	287	327	542	1987	2121	1746	
TOTAL MOVEMENT	-72	206	-1045	1340	2652	519	11656	16042	2208	

#### 10.2.4 Billing and Collection in Telephone Service

In order to resolve the issue of alarming low collection rate, UPTC has been exercising the following measures:

(1) Subscriber Records Verification

The subscriber records verification was commenced on 16 March 1992 and ended 31 July 1992. The countrywide average performance was 52% completion or 15,268 verified subscribers out of 29,388. The following recommendations were made and implemented under the Board's approval:

- a) Cessation of all unverified lines and re-allocation to waiters
- b) Preparation of final accounts and demand for settlement in full
- c) Preparation of "blacklist"
- d) Those being ceased telephone service will not automatically repossess the former lines.

(2) Temporary Out of Service (T.O.S.) Exercise

Since 25 March 1992, T.O.S. has been exercised. Latest exercise against about 1,500 subscribers was conducted at around the end of October 1993. However, it is observed that some habitual slow payers are repeatedly included and the list appears that it is not reviewed in order to narrow down the issue that who are really bad subscribers before T.O.S. is exercised.

(3) Aging Analysis of Debtors

Efforts have been made by the Finance & Accounts Department and relevant departments concerned to grasp monthly status of Telephone Debtors. However, so far such efforts did not reach successful results of providing Aging Analysis of Debtors readily available for the use of the Management and telecomms operations of UPTC.

In order to grasp the bad subscribers, it is necessary to prepare a complete schedule of the aging analysis of Debtors of more than 90 days.

(4) Bills Adjustment Committee

In December 1991, this Committee was created in order to exclusively review claims from the subscribers with respect to overcharges and undercharges. Since then, 64 meetings were held until the end of November 1993. Since July 1993 the Committee has been held 4-5 times a month, being increased from about 3 times a month previously.

(5) Computerization

a) Installation of the automatic receptors (terminal) in GPO and other UPTC Offices in Kampala:

This project is financed by UPTC own funds and the initial installation took place on 9 December 1993. However, there is no confirmation of the commencement of operation. The situation is expected to be resolved shortly.

b) Computerized Subscriber Data System:

This project is financed by The World Bank. The procurement under this project has been changed to be made in combination with Billing System Modernization Project.

c) New Billing Center

The consulting services for this project is financed by The World Bank and the tender was announced in December 1993.

(6) Utilization of Professional Collection Agencies

The World Bank reiterated the utilization of professional collection agencies as recommended by its mission to UPTC in order to supplement UPTC's in-house collection efforts.

UPTC so far conducted newspaper advertisement of the tender in October 1993 and responses from several agencies have been gathered. With appropriate candidates agencies and deliberated implementation plan, the Finance & Accounts Department will submit them to the Management for approval for action.

(7) Customer Care Management Paper by Chief of Customer Services

This Management Paper was submitted to the Management in December 1993. In this Paper the recommendations on the following, among other things, have been made:

- a) Training
- b) Total quality culture
- c) Market segmentation
- d) Customer care - Offices

### 10.2.5 Import Duties and Excise Taxes on Telecommunications Equipment

Prior to the 1993/94 National Budget, UPTC used to import all telecommunications equipment tax-free. The 1993/94 Budget introduced taxes of 54% (average) on C.I.F. values on all telecommunications equipment.

While the many projects are being carried out with foreign loans from international institutions/ governments, it is customary, in such case, that no funds to defray said taxes are financed under the loans. The taxes are beyond the capacity of UPTC to pay.

On 24 November 1993, UPTC submitted an official request for waiver of the taxes to the Minister of Finance and Economic Planning through the Minister of Works, Transport and Communications. The latest information from a prominent government source indicated that the taxes were already waived for the imports under ODA, for example, for other sector's imports for Northern Uganda Reconstruction Project. This indication needs to be confirmed.

### 10.2.6 Other Issues Requiring Normalization

(1) Revaluation of Fixed Assets

The proper depreciation charges will enable UPTC to reinvest in equipment after useful lives of present equipment. For said purpose the revaluation of fixed assets will be required in the high inflationary economy of Uganda.

The World Bank has been strongly recommending revaluation of fixed assets from the viewpoint of the separation of postal services from telecomms services, and furthermore, from the standpoint of eventual privatization of UPTC.

It is The World Bank who conducts the revaluation according to Chief Accountant and Ministerial approval has already been secured.

(2) Managerial Accounting and other Management Information Systems

It appears that UPTC pays too much weight on Cash movements reports which are submitted to the Management. This treatment is understandable from the serious cash constraints of UPTC due to the existing collection problems. However, the treatment may hamper its recurrent operating activities by over-restricting the disbursements for general maintenance and other operational costs, training expenses, as well as own funds capital investments even under the approved budget.

It is observed that the managerial accounting and reporting system in a form of following up the implementation of budget execution should be firmly established to give the Management necessary information regularly on the strength and weakness of the Corporation's financial performance. Thus the Management can fulfill its inherent duties.

(3) Increased Staff Costs

It is suggested that the results of the staffing study (PT1 - PT6) by TESI be referenced for the solution of this issue.

(4) The following are the further items for which the data and information are collected:

- Purchasing and Payment Procedures
- Workshop Issues
- Telecomms Operations & Maintenance Issues
- Local & Overseas Training

## 10.3 Current Organization of UPTC

### 10.3.1 Organization

#### (1) Functional Organization Structure of UPTC

Figure 10-3-1 shows the functional organization structure for the whole UPTC. In a general view, UPTC consists of the board, managing director, eight departments and some special sections.

#### (2) Telecomms Operations & Maintenance Department

The telecomms operation and maintenance (TO/M) department has the largest number of staff. Figure 10-3-2 shows the simplified organization chart of this department.

#### (3) Regional Office Organization

In TO/M department, there are eight (8) regional offices. Figure 10-3-3 shows the Mbale Regional Office Organization as an example.

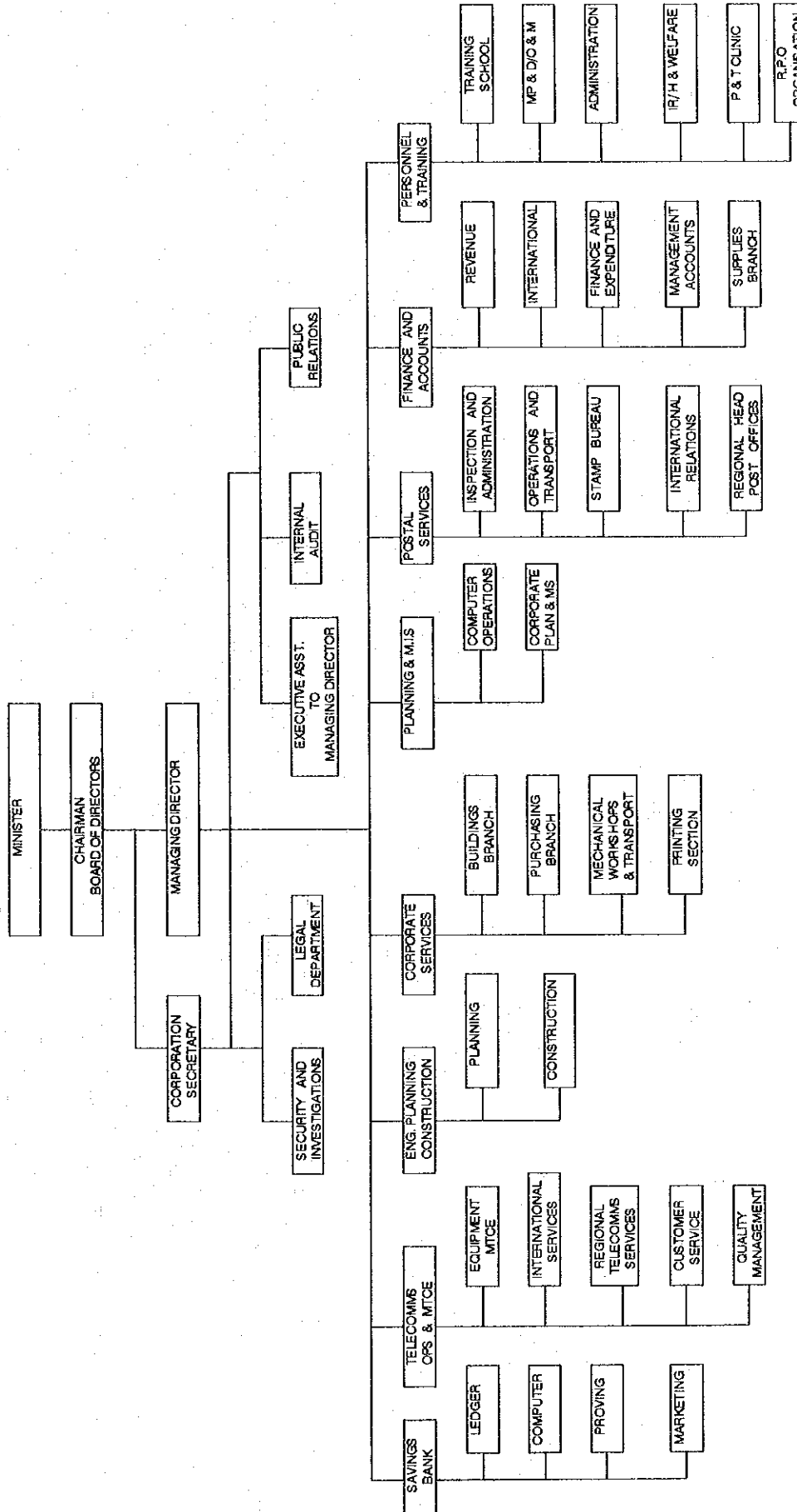
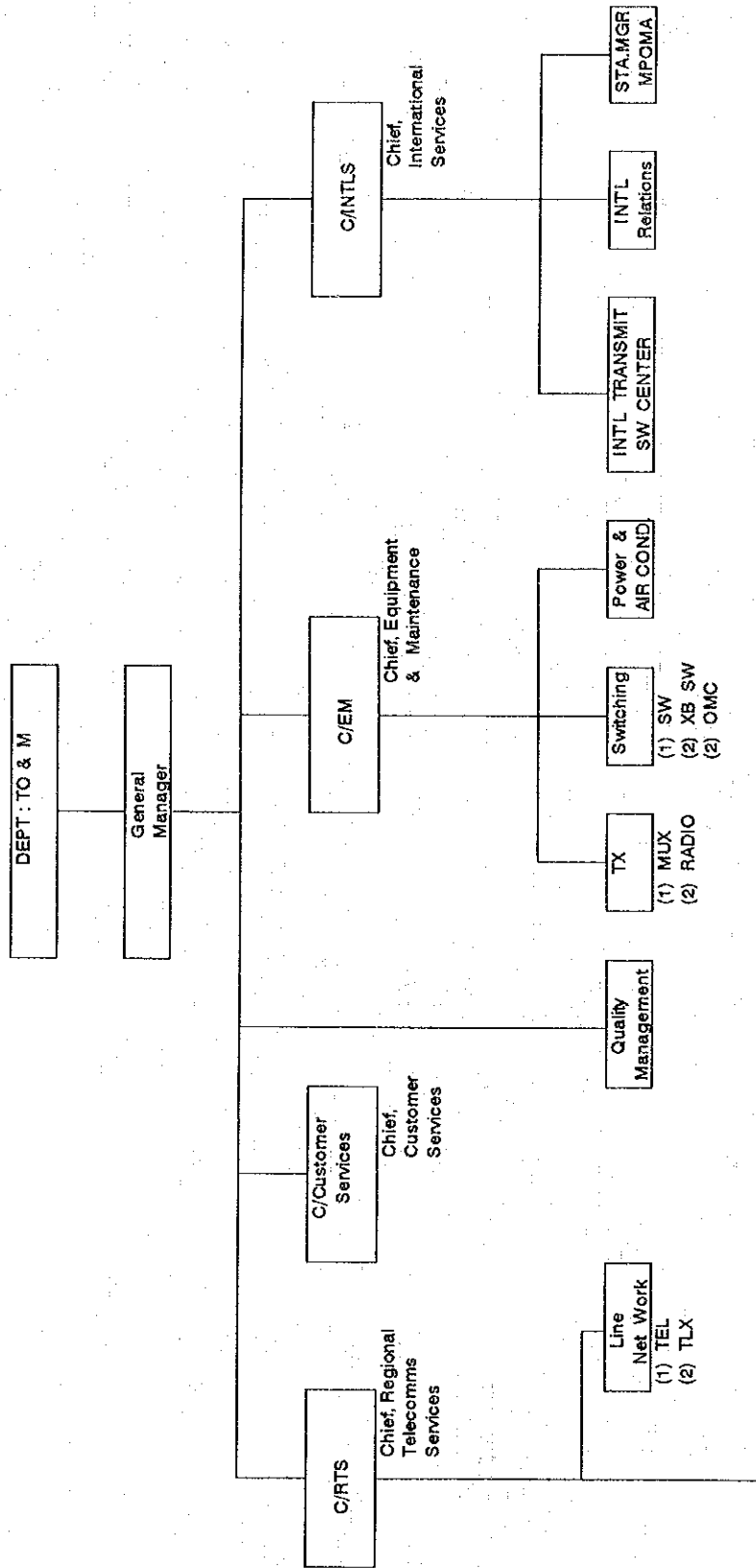


Figure 10-3-1 Functional Organization Chart of UPTC



8 REGIONAL TELECOMMS MANAGERS (RTM) :

KAMPALA CENTRAL, KAMPALA RURAL, MASAKA, MBARARA, FORT PORTAL, GULLU, MBALE, JINJA

Figure 10-3-2 Telecomms Operation & Maintenance Department



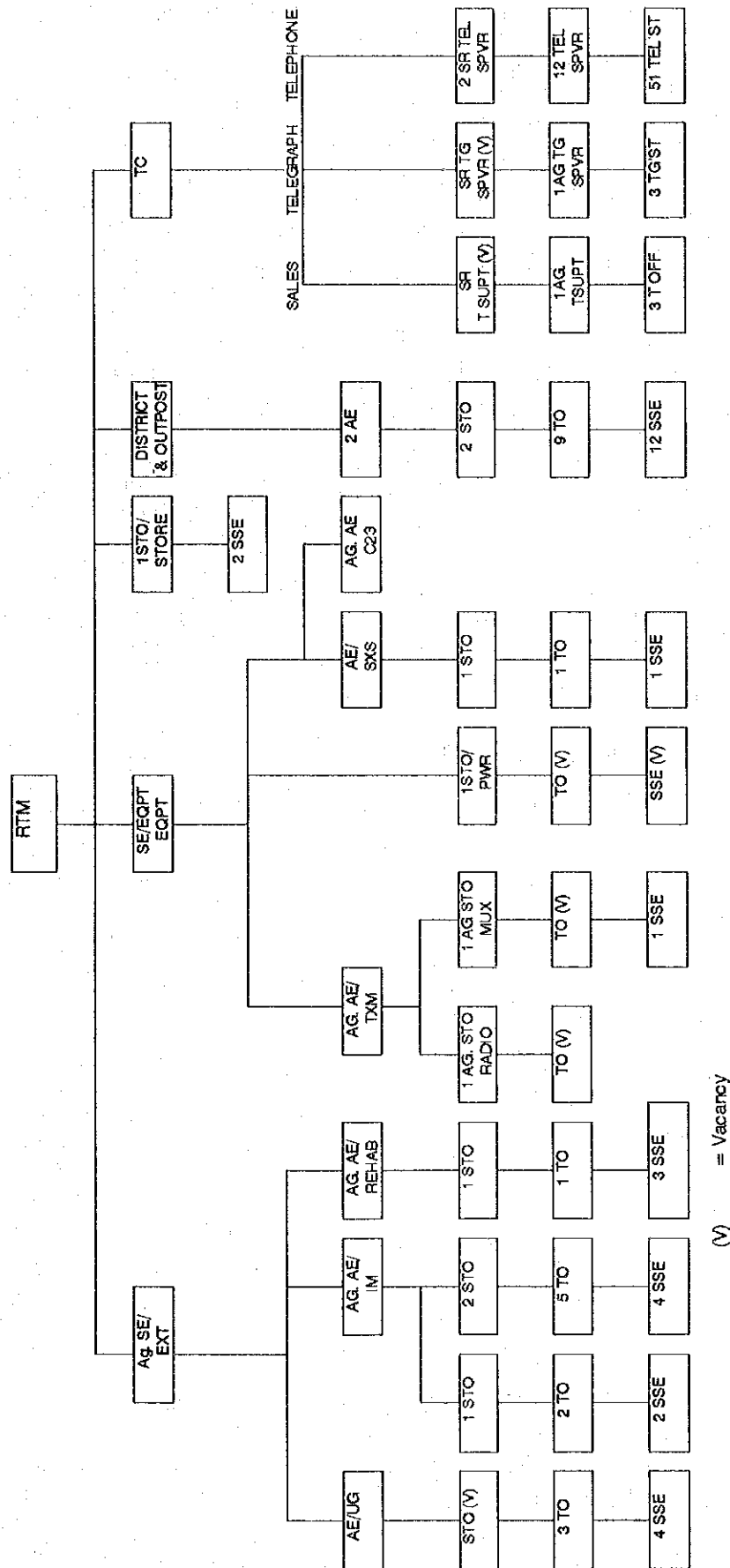


Figure 10-3-3 Mbale Regional Office Organization

## 10.3.2 Number of Staff

## (1) Authorized Establishment and Actual Number of Staff

Table 10-3-1 shows the number of staff by department in establishment and in actual.

Table 10-3-1 Number of Staff by Department

(as of 31 October 1993)

<u>Department</u>	<u>Authorized Establishment</u>	<u>Actual</u>	<u>Vacancy</u>
Office of MD	48	32	-16
Corp Secretary	250	370	120
Personnel/training	233	184	-49
Postal Services	710	473	-237
Savings Bank	55	37	-22
Finance/accounts	177	119	-58
Supplies Branch	52	32	-20
Corp Planning/MIS	69	46	-23
Corporate Services	292	248	-44
TO & M	1434	1110	-324
Eng'g Plan & Const	231	138	-93
TOTAL	3551	2789	-762

(Note) In addition to the above number of employees there are 566 casual employees.

## (2) Staff Distribution by Education Qualifications

Table 10-3-2 shows the number of staff by education qualifications in department.

Table 10-3-2 Staff Distribution by Education Qualifications

(as of 31 October 1993)

DEPT	MD & CS		P & T				POSTAL		FA & S		SB		CP & MIS		CORP.SVS		TO & M		EP & C		TOTAL
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
PH. D	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MASTERS	1	-	1	1	-	-	-	1	-	-	2	-	2	-	4	1	6	-	-	-	19
P. G.																					
DIPLOMA	4	1	1	-	-	-	1	-	-	-	-	-	1	-	1	-	-	-	-	-	9
1ST																					
DEGREE	2	2	16	4	12	2	11	2	4	-	7	-	4	-	23	1	15	-	-	-	105
UG.																					
DIPLOMA	9	2	-	2	8	12	8	14	1	1	-	-	7	1	46	3	3	1	-	-	118
A'																					
LEVEL	1	-	11	5	57	38	10	9	10	4	4	3	1	-	133	32	9	-	-	-	327
O'																					
LEVEL	15	9	48	36	70	51	26	17	9	3	4	24	20	3	400	106	41	11	-	-	893
PROF.																					
CERT	-	-	1	4	-	-	3	-	1	-	1	-	55	7	28	6	6	-	-	-	112
SUB-																					
TOTAL	32	14	78	52	147	103	59	43	25	8	18	27	90	11	635	149	80	12	-	-	1583
OTHERS	356		54		223		17		4		1		179		326		46				1206
TOTAL	402		184		473		119		37		46		280		1110		138				2789

## NOTES:

- (1) M = MALE F = FEMALE
- (2) Numbers in the "Others" row have not been broken down according to sex.
- (3) Also these numbers include the new recruits/dept. whose qualifications we are not certain of.
- (4) MD & CS = Managing Director and Corporation Secretary  
P & T = Personnel and Training  
FA & S = Finance and Accounts  
SB = Savings Bank  
CP & MIS = Corporation Plan and Management Information Systems  
CORP.SVS = Corporate Services  
TO & M = Telecomms Operations and Maintenance  
EP & C = Engineering Plan and Construction

### 10.3.3 Problems on Organization

(1) Slow Decision Making

Due to the complicated functional arrangements, any decision is made through many departments/divisions. For example, the payment procedures in respect of maintenance materials for local purchase be handled by general managers in three departments, such as TO&M, CS and F&A in an unnecessary overlapping of checking. Currently, the top management is spending much time for routine payment authorization activities which may eat up its time for making other important management decision.

(2) Lack of Interdepartmental Coordination

The communication and coordination, sometimes, are not closely carried out between departments. The basic data is not commonly used by persons belong to different department.

(3) No Immediate Succession

A successor is not immediately assigned to the vacant post for those who retired, died or dismissed. The vacancy of staff reaches 762. This is about 20% of the authorized establishment. Many routine works are delaying in each department.

(4) The Number of Actual Staff Exceeding the Established One

The number of actual staff (370) in Corporation Secretary is too much exceeding that established (250) due to serious condition of security. Same situation is found, sometimes, in a division level in some departments.

(5) Insufficiency in the Number of High Educational Personnel

The total number of staff qualified as diploma or higher grade is 251 in UPTC. This is only 9 % of the whole staff. It is difficult to assign proper persons for complicated jobs.

(6) Unsatisfactory Training System at Nakawa Training School

Training programs, facilities and instructors are not balanced at the training school of UPTC. The training materials and furniture are not sufficiently provided even though many large buildings have been constructed by The World Bank project. The number of instructors is also short. Therefore, the training program might be scaled down.

### 10.3.4 Staff Development Program and Training Arrangements

(1) The World Bank financed Staffing Study was undertaken (starting January 1994 for 3 months) by Telecom Eireann Services International (TESI), Ireland on the following scope:

- Staffing Study of UPTC Management (PT1:General Manager to PT6:Assistant Engineer), such as, Departmental Structure/ Span of Control, the present grading structure in relation to management responsibilities/ competence and the current staff levels with reference to productivity norms
- Exploring the feasibility of introducing performance related pay applicable for UPTC
- Recommending procedures for Career Development/Planning and Succession Planning
- Forecasting Staffing Requirements for the next 5 years
- Recommending a methodology suitable for on going Manpower Planning of UPTC

(2) Highlights of TESI's Study

- Results of Staffing Study (PT1 to PT6) did not suggest any drastic change in the number of Staff (PT1 to PT6) required for the next 5 years. However, the study results were utilized as reference information for estimating the number of telecomms staff for this Master Plan, as they were taken into account in the 94/95 budget .
- Upward review of existing delegated authorities for both budgeted and non-budgeted expenditures for Managing Director, Assistant Managing Director (new position), General Manager and Regional Telecomms/Postal Manager
- Introduction of a system of a Lead Manager (PT3 or above) for a specific Project Management for Capital Investment

(3) Training Arrangements being finalized with TESI in line with the basic approval secured from The World Bank:

- Training in Ireland of UPTC Trainers in the field of Management Development (including financial training, i.e., customer records/billing, internal audit, stores/purchasing, financial accounting and budgeting; strategic skills and computer skills) and Technical Training
- TESI's dispatch of Experts to UPTC for the training of UPTC managers and technical staff covering Management Development and Technical Training

#### 10.4 Approach to Realization of Management Reform

A careful review of the recent financial performance and current organization of UPTC will provide some useful hints in finding out the clue for solution of the UPTC's managerial and organizational problems. Based on such hints, the following points are suggested as essential items for the approach to be made by UPTC for realization of reform.

##### 10.4.1 Assistance and Guidance from the Government

(1) Relief from the Undercapitalization

A series of discussions with reliable sources of the Government suggested that the Government could extend an assistance to UPTC for a gradual relief from the undercapitalization in debt/interest capitalization, rather than a direct equity infusion or subsidy, except for the amount(s) which has been agreed upon as a direct equity infusion. This hints that the above would be only measure the Government could assist UPTC under the constraints of funds.

Targeted Equity Ratio to Net Assets is set as follows:

-	Fiscal Year 1999/2000	8.61	%
-	Fiscal Year 2004/2005	10.87	%
-	Fiscal Year 2009/2010	14.69	%

The details of calculation is explained in Chapter 12 Financial and Economic Evaluation.

(2) Unexpected Foreign Exchange Losses of a big magnitude relative to the foreign loans

As explained in Subitem 10.2.1, UPTC does not have any effective means to shoulder the Foreign Exchange Losses of this nature. And, the ultimate objective of this issue (UPTC's shouldering of foreign exchange risks) is to make UPTC responsible for the normal foreign exchange risks. Therefore, it is suggested that the Foreign Exchange Losses relative to a loan exceeding 50%, on a cumulative basis, of original proceeds drawn down in the course of a Development Project should be borne by the Government as the last resort entity.

(3) Accounting treatment study for Long-term Loans

Exchange gains/losses arising from the valuation of foreign loans have been recorded for the current accounting year despite the possibility of levelling-off in the value of Uganda Shilling against U.S. Dollar and other foreign currencies. An accounting treatment to defer the foreign exchange losses on the long-term portion of foreign loans becoming due more than one year from the balance sheet date will have to be studied, whether it can be adopted.

(4) Waiver of Taxes on the Importation of Telecommunications Equipment

As explained in Subitem 10.2.5, it is imperative for UPTC to secure waiver of taxes on the importation of telecommunications equipment under ODA, so that this Master Plan may become viable.

#### 10.4.2 Billings and Collection Issues

(1) Combined problems

As referred to in the Inception Report (See its Chapter 2 Item 2.2), and as clarified through the First Study in Uganda (See Item 10.2 of this Chapter), the accumulation at a very high rate of the provision for bad debts resulted in deteriorating UPTC's profitability and the huge piling up of telephone debtors due from subscribers caused UPTC to be suffered from a very serious working capital constraints under which the disbursements of the approved recurrent budget for the essential expenses such as maintenance and repair costs were hampered and delayed.

This problem is attributable to the ineffective billing system, insufficient follow-up actions for collection and low service grade (the respective rates of call completion and faults clearance). Therefore, an integrated approach to the reform is required. However, so far, the interlocking relation of the said factors has been giving further adverse effects to UPTC's telecommunications business, while the various correcting measures specified in Subitem 10.2.4 have been eagerly pursued by UPTC Management and staffs.

(2) Specific Measures by Category of Subscribers

- Enforcement, Write-Off or Confirmation of Long Time Outstanding Accounts and Identification of Collection Assignment to Specific Department

Reference shall be made to Table 10-2-5 Debtors Analysis for Fiscal Year 92/93. Except for the Accounts of 14,053 Million Shs. for the offices of the Government with which Debt Swap is being finalized, ending balance of all categories exceeds Billing for the year varying from 1.7 to 2.1 times of the latter. This means that there would be substantial amount of long time non-moving accounts. Such accounts should be reviewed with respect to each category and as the results confirmability, enforceability and need for write-off should be determined. Also the specifically assigned role of the Departments concerned, i.e., Legal, Finance & Accounts and TO&M, should be attached.

For such purposes, the schedule having the following format (Figure 10-4-1) will be useful, since no readily available data for the review exists at UPTC, though reliability for estimating Revenue and Collection has remarkably developed through the formation of FY 94/95 Budget, for instance.



Date : \_\_\_\_\_

Department : (in charge of Collection)		Subscriber's Name :	
Control Number :		Address :	
		Telephone Number :	
		Previous Year's Activity	Current Year's Activity
Opening Balance			
Billing	1 mo. before	/	
	2 mo. before		
	3 mo. or more before		
Total			
Collection			
Adjustment			
Ending Balance			
Confirmed by :		(Name & Designation)	(Signature)
Collection Enforcement Efforts made :		(Description) (Name/Designation/Signature)	
Recommendation for write-off		(Description) (Name/Designation/Signature)	

Figure 10-4-1 Format of Non-Moving Account Checking Sheet

## (3) Trial Calculation (Table 10-4-1 &amp; 10-4-2)

Suppose that the 90% collection ratio was achieved in FY 92/93 instead of 50% (Table 10-2-5), UPTC's Profit and Loss and Financial Position (Balance Sheet) for that year would be dramatically bettered as follows:

**ASSUMPTION:**

- 1) Collection Ratio: 90% (average)  
Private Firms/Residence 86.915, Parastatal/Big Co. 86.915%, Government 100% and Embassies 100%
- 2) Amount Collected: 26,900 Million Shs. (Increment in Cash Receipt of 11,900 Million Shs.)
- 3) Reversal of Provision for Bad Debts (Equivalent to the increment in Cash Receipt in Private and Parastatal Categories): 6,900 Million Shs.

**OBTAINING RESULTS:**

	<u>RATIO</u>	<u>ASSUMPTION</u>	<u>ACTUAL</u>
P/L	PRV BD DBT/ TOTAL REVENUE	16%	34%
	OPER PROFIT/ TOTAL REVENUE	38%	20%
	NET PROFIT/ TOTAL REVENUE	33%	15%
B/S	PRV BD DBT/ DEBTORS	48%	50%
	EQUITY RATIO	17%	9%
OVERALL	OPER PROFIT/ TOTAL REVENUE	38%	20%
	TOTAL REVENUE/ NET ASSETS	44%	48%
	OPER PROFIT/ NET ASSETS	17%	10%
	NET PROFIT/ NET ASSETS	15%	7%

## (Note)

1. PRV BD DBT : Provision for Bad Debts
2. OPER PROFIT : Operating Profit
3. DEBTORS : Excluding Other Debtors
4. EQUITY RATIO : Total Equity/Net Assets

Table 10-4-1 Profit and Loss for FY 92/93  
(Trial Calculation)

IN USH MILLION

	ASSUMPTION	ACTUAL	DIFFERENCE
REVENUE	37,841	37,841	
O/M EXPENSES	14,646	14,646	
INTEREST	1,690	1,690	
DEPRECIATION	1,035	1,035	
PRV. FOR BAD DEBTS	6,099	12,999	-6,900
OPERATING PROFIT	14,371	7,471	6,900
FOREX LOSS	-1,841	-1,841	
NET PROFIT	12,530	5,630	6,900
CORPORATE TAX	1,970	1,970	
ACCUMULATED LOSS BROUGHT FORWARD	-6,098	-6,098	
PRIOR YR ADJUSTMENT	-622	-622	
RETAINED EARNINGS	3,840	-3,060	6,900

(NOTE) In order to make a comparison clearer, the same amount of corporate tax is applied for the assumption case, too.

Table 10-4-2 Balance Sheet As of 30 June 1993  
(Trial Calculation)

IN USH MILLION

	ASSUMPTION	ACTUAL	DIFFERENCE
CURRENT			
STORES	3,395	3,395	-11,900
DEBTORS	52,168	64,068	6,900
PRV BAD DEBTORS	-24,894	-31,794	
OTHER DEBTORS	1,808	1,808	
CASH/S-T INVSTMNT	28,161	16,261	11,900
DUE FROM PT-ADM	34,139	34,139	
TOTAL	94,777	87,877	6,900
CURRENT LIABILITIES			
DUE TO PT-ADM	45,734	45,734	
ACCRUED EXPENSES			
AND OTHER	14,916	14,916	
TOTAL	60,650	60,650	
NET CURRENT ASSETS	34,127	27,227	6,900
FIXED ASSETS	51,168	51,168	
NET ASSETS	85,295	78,395	6,900
&SOURCE OF CAPITAL			
GOV'T CONTRIBUTION	3,862	3,862	
RESERVES	6,451	6,451	
RETAINED EARNINGS	3,839	-3,061	6,900
TOTAL EQUITY	14,152	7,252	6,900
LONG TERM LOANS	71,124	71,124	
PENSIONS, ETC.	19	19	
TOTAL SOURCE	85,295	78,395	6,900

- Monthly Report by Category of Subscribers

A monthly report for the management of billing, collection and outstanding debtors by category of subscribers shall be prepared and presented to the Management for review and instruction for necessary actions. Bad, doubtful or overdue accounts exceeding 90 days should be transferred to a Special Account established for such accounts ( Actions to be taken has been explained in the immediately preceding paragraph.

- Targeted Collection Ratio

The targeted collection ratio will reach 80% at the end of the first six years with the collection from the Government Offices being assumed to be 100% after Debt Swap of 14 Billion Shs., 85% at the end of the second five years and 90% at the end of the third and final five years.

The detailed targets are set as follows:

a) Government Offices (about 33 Offices)

UPTC's constant efforts in the negotiations with the Government for Debt Swap of about 14 Billion Shs. as of June 30, 1993 will now bear fruit.

Measures appropriate for each specific case will be devised and implemented under the approval and instruction of the Management through the activities of a steering team for which Chief Accountant ( Revenue /Credit Control) works as Secretary.

b) Parastatal and big companies (about 104 Firms)

A similar steering team to a) shall be formed for this purposes.

c) Embassies (about 38 countries)

Efforts should be made to clarify the position of old accounts, since there seems to be no problem for new accounts. This can be handled by the same team with the above b).

d) Private Firms and Residential

For the control of this category of subscribers, four teams will be formed to cover Kampala Central--Firms, Kampala Central--Residential, other regional exchanges--Firms and other regional--Residential.

### 10.4.3 Establishment of Managerial Accounting and other Management Information Systems

#### (1) Necessity for Managerial Accounting

While UPTC is regularly submitting a quarterly cash analysis financial report to the Management, in addition to that, it is strongly recommended that a regular accrual basis management report in a form of budget-actual comparison having the year-end forecast at that reporting point in time be submitted to the Management so that it may properly recognize the progress of the annual operations plan through the execution of the budget and formulate/implement any corrective measures or actions.

#### (2) Enhancement of Finance and Accounts Department, etc.

Enhancement of the required staff for this purpose in Finance and Accounts Department and the installation of several units of stand alone personal computers as auxiliary tools are also recommended.

### 10.5 Approach to Reform of Organization Structure

#### (1) Starting Number of Telecomms related Employees are assumed as follows:

Table 10-5-1 Number of Employee  
(As of 1 January 1994)

<u>Department</u>	<u>Staff No.</u>	<u>Casual No.</u>	<u>Total</u>
Telecomms Ops. & Mtce. Dept.	1110	209	1319
Eng. Planning/Const. Dept	138		138
Other Depts.	748	161	909
Total	1996	370	2366

Note : Separation of Postal Dept. is assumed.

1) Other Dept. Staff No. = 31/10/93 Staff No. x 70%

2) Other Dept. Casual No. = Budget x 65%

#### (2) Need for Approach to an Optimal Number of Staffs

As introduced in Subitem 10.3.4, there is a need to reduce the above starting number of employee, particularly overdue staffs and casuals, most of the latter being unskilled workers of "O" Level or below, to an optimal level through Staffing Study, Career Development/Planning and Succession Planning, etc.

(3) Staffing Plan for Master Plan (Figure 10-5-1 & 10-5-2)

As of 1st January 1994, the number of UPTC's Telecomms related employees stood at about 2,400 including casuals, with approximately 25,000 subscribers. This means every UPTC Telecomms staff is assumed to take care of 10 subscribers. Such operating efficiency can be said to be in the standard range among the low telephone density bracket yet on the track of the world trend.

Now that the Master Plan sets the targeted telephone density of a little over than 0.6% in year 2010, the standard operating efficiency covering that level is to reach some 25 subscribers per Telecomms staff.

It is recommended that the Master Plan should adopt the operating efficiency target of 35 subscribers per staff in anticipation of introduction of further advanced technology to telecommunications. Thus 4,500 staffs will be serving for 160,000 subscribers in year 2010.

It is imperative to continuously pursue the enhanced human resources development, which is dealt with in Item 10.7 hereunder, in order to achieve the above-stated efficiency target.

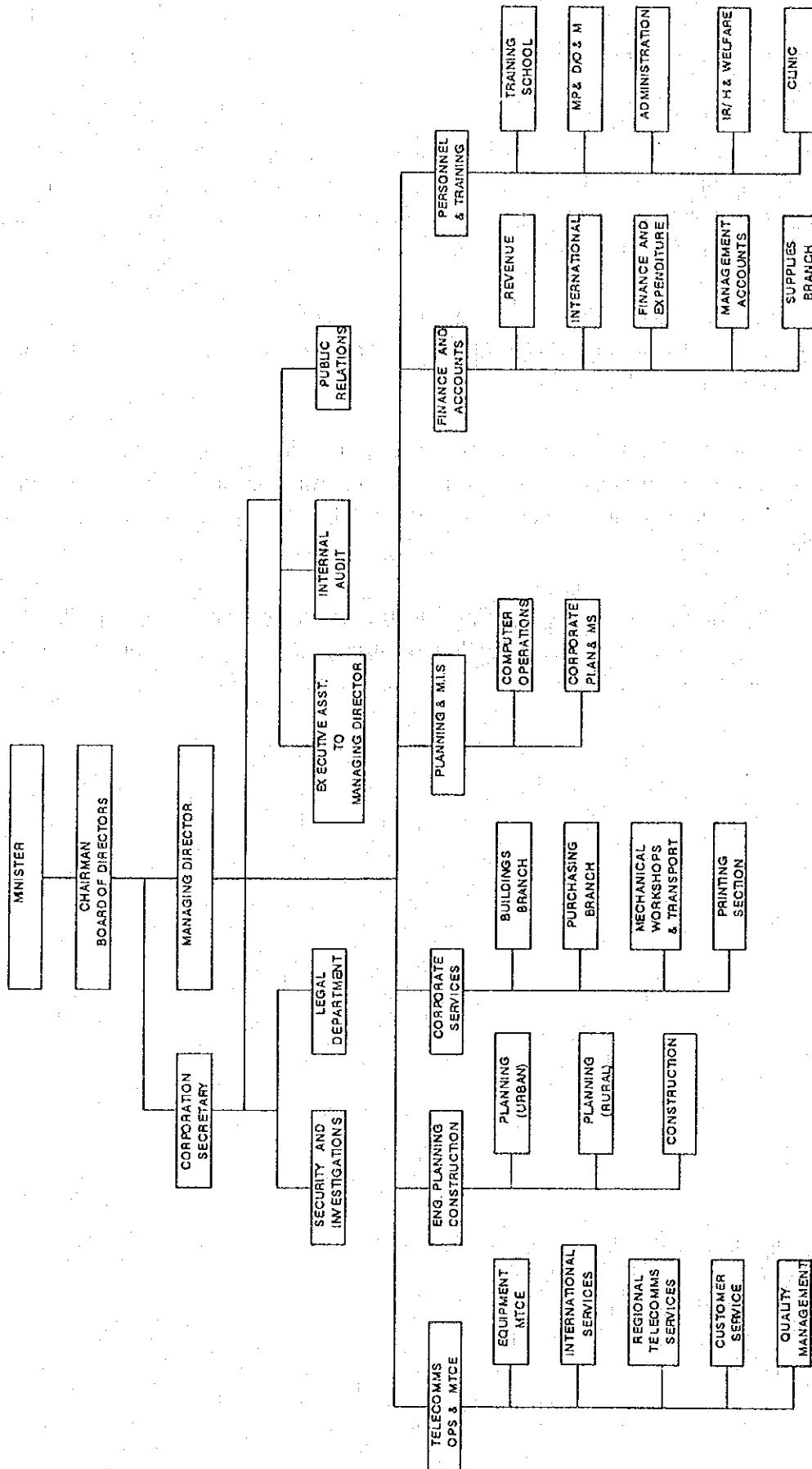


Figure 10-5-1 Recommended Organizational Chart of UPTC



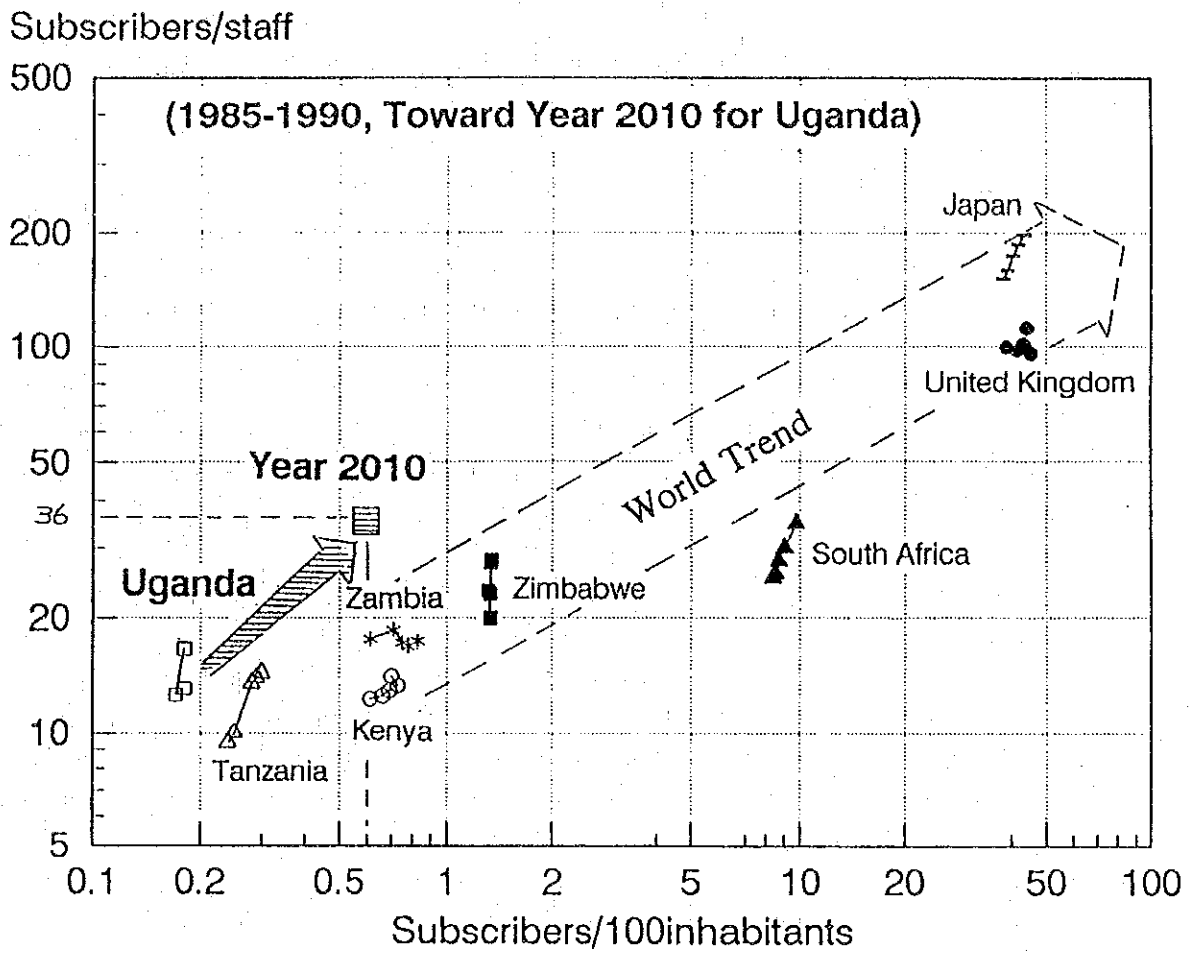


Figure 10-5-2 Telecomms Operation Efficiency

- (4) Need for Formulation of Enhanced Organization  
(for both quantitative and qualitative ways)
- a) Filling-up of vacant positions and normalization of positions currently occupied by acting officers

There are many such positions as falling under this category. As explained in the previous Sections, such irregularities have been weakening the strength of organization, sometimes discouraging motivation of staff and causing impediments in various stage of management from higher decision making to daily disposal of operations.

Also it is necessary to further look into some critical Departments, Divisions or Sections where the staffing is insufficient as compared with the job requirements. The organization of International Services and Mpoma Earth Station, among other departments and divisions, would need said review.

- b) For integrated development plans between/among urban and rural areas

From the viewpoint of realizing integrated rural and urban developments towards the objectives of this Master Plan to meet the contrasted requirements from these two category of areas in a concerted implementations of economic efficiency and fulfillment of basic human needs, creation of the two (2) Groups under the General Manager of Engineering Planning Department is recommended as follows:

- (1) Urban Planning Chief and staff having the responsibility on the development projects covering Kampala, Jinja and Entebbe.
- (2) Rural Planning Chief and staff having the responsibility on the development projects covering areas other than the Group described in (1) above.

The General Manager of Engineering Planning Development is the one to integrate or adjust (if necessary) the recommendations and propositions for the development originated from either Group and to formulate them into a feasible plan or plans and, furthermore, to submit such plan(s) for the approval of the Management.

The distribution of responsibility between the two (2) Groups shall be further reviewed and finalized based on the actual needs of UPTC.

## 10.6 Computerized Total Management System

- (1) Priority should be given to modernization of:

Billing and Collection System, Subscriber Data System and Payroll and Employee Data System, which are currently taken care of by a main frame computer, with unsatisfactory conditions.

- (2) Area currently handled by manual system

For areas currently handled by manual system, it is suggested that an organization be set up with key staffs so that the Computerized Total Management System can be smoothly adopted at an appropriate time in the future.

It is also recommended that by that time several units of personal computers for stand-alone use be installed for the expeditious disposal of work.

## 10.7 Human Resources Development Plan

For the Management and Organization Plan, the Human Resources Development Plan is the most important, particularly from the viewpoint of long range Master Plan.

To implement this plan, (1) enhancement for both equipment and instructors at Nakawa Training School for domestic training and (2) positive carrying out of overseas training are strongly urged. Said training should involve all types and levels of staffs from engineers, accountants to administration staffs, and from the General Managers to the Rank and File.

It is UPTC who generates source funds for this plan from its operations. Hence, it should be reiterated the successful solution of Billing and Collection Issues is the start of every development plan for UPTC.

## 10.8 Basis of Organization & Maintenance Costs Plan

For the Financial and Economic Evaluation under Chapter 12, Organization and Maintenance Costs are estimated, based on the analysis of past records, the forecast for FY 93/94 and the Budget for FY 94/95.

Details are explained in Table 10-8-1 and Table 10-8-2.

Table 10-8-1 BASIS OF ORGANIZATION & MAINTENANCE COSTS PLAN  
(Base Case)

						US \$'000
	NO. OF STAFF	STAFF COSTS	OVERHEAD COSTS(A)	OPERATION COSTS(B)	(A)+(B)	TOTAL
FY 94/95						
Direct Staff #(1)	1,520	6,764				
Indirect Staff #(2)	980	4,447				
TOTAL	2,500	11,211	2,574	6,802	9,376	20,587
FY 99/2000						
Direct Staff #(1)	2,000	9,675				
Indirect Staff #(2)	1,000	4,538				
TOTAL	3,000	14,213	3,890	11,707	15,597	29,810
FY 2004/05						
Direct Staff #(1)	2,750	14,064				
Indirect Staff #(2)	1,000	4,538				
TOTAL	3,750	18,602	4,620	15,666	20,286	38,888
FY 09/2010						
Direct Staff #(1)	3,500	18,877				
Indirect Staff #(2)	1,000	4,538				
TOTAL	4,500	23,415	5,487	20,965	26,452	49,867
ANNUAL GROWTH RATE : % p.a.						
Direct Staff #(1)	5.7	7.1				
Indirect Staff #(2)	Fixed	-				
#(3)						
TOTAL	4.0	5.0	5.2	7.8	7.2	6.1

## NOTES:

The above assumption is based on the analysis of the past records, the forecast for the results of operations in FY 93/94 and the budget for FY 94/95 of UPTC. The world trend and the neighboring countries records have been considered for the assumption.

- (1) Direct Staff:  
Number of Staff of TO & M and Eng'g Plan. & Const. Depts.
- (2) Indirect Staff:  
Number of other Depts' Staff (Personnel, Finance & Accounts, Corporate Services, Office of Managing Director, etc.) proportionately distributed to "Telecomms Group".
- (3) The annual growth rates (Base Year FY 94/95) are assumed as follows:
  - a) Number of Staff: Direct 5.7%, Indirect 1000(fixed) expect for 980 for FY 94/95 and 990 for FY 95/96, Total Staff Nbr. 4.0%
  - b) Staff Costs: Direct 7.1%, Indirect Zero, Total Staff costs 5.0%
  - c) Overhead Costs: 5.2%
  - d) Operation Costs: 7.8%, Total of c) & d) 7.2%
  - e) Total OM Costs: 6.1%

Table 10-8-2 BASIS OF ORGANIZATION & MAINTENANCE COSTS PLAN  
(Alternative B)

US \$'000

	NO. OF STAFF	STAFF COSTS	OVERHEAD COSTS(A)	OPERATION COSTS(B)	(A)+(B)	TOTAL
FY 94/95						
Direct Staff #(1)	1,520	6,764				
Indirect Staff #(2)	980	4,447				
TOTAL	2,500	11,211	2,574	6,802	9,376	20,587
FY 99/2000						
Direct Staff #(1)	1,860	8,734				
Indirect Staff #(2)	1,000	4,538				
TOTAL	2,860	13,272	3,128	8,983	12,111	25,383
FY 2004/05						
Direct Staff #(1)	2,280	11,175				
Indirect Staff #(2)	1,000	4,538				
TOTAL	3,280	15,713	3,802	11,863	15,665	31,378
FY 09/2010						
Direct Staff #(1)	2,750	14,064				
Indirect Staff #(2)	1,000	4,538				
TOTAL	3,750	18,602	4,620	15,666	20,286	38,888
ANNUAL GROWTH RATE : % p.a.						
Direct Staff #(1)	4.0	5.0				
Indirect Staff #(2)	Fixed	-				
TOTAL	2.7	3.4	4.0	5.7	5.3	4.3

## NOTES:

It is assumed that the Number of Staff and the Total OM Costs of BASE CASE at the time having 105,000 subscribers could be realized in FY 2009/10. On this basis the respective factors are further assumed:

- (1) Direct staff:  
Number of Staff of TO & M and Eng'g Plan. & Costs. Depts.
- (2) Indirect Staff:  
Number of other Depts' Staff (Personnel, Finance & Accounts, Corporate Services, Office of Managing Director, etc.) proportionately distributed to "Telecomms Group".
- (3) The annual growth rates (Base Year FY 94/95) are assumed as follows:
  - a) Number of Staff: Direct 4.0%, Indirect 1000(fixed) expect for 980 for FY 94/95 and 990 for FY 95/96, Total Staff Nbr. 2.7%
  - b) Staff Costs: Direct 5.0%, Indirect Zero, Total Staff Costs 3.4%
  - c) Overhead Costs: 5.2%
  - d) Operation Costs: 4.0%, Total of c) & d) 5.7%
  - e) Total OM Costs: 5.3%



## **CHAPTER 11**

### **PROJECT IMPLEMENTATION PLAN**





## CHAPTER 11 PROJECT IMPLEMENTATION PLAN

## 11.1 Projects for Network Expansion

Proposed projects for the network expansion during the master plan period are listed in Table 11-1-1, 11-1-2 and 11-1-3.

Table 11-1-1 Projects for Network Expansion (1/3)

No.	Project Title	Location	Volume (lines)	Phase
1	Ten-Town (Nine-Town)	Mbale Busia Malaba Kapchorwa Soroti Masindi Hoima Luwero Wobulenzi	3,000 450 450 450 900 1,000 1,000 900 600	1
2	Central & Western Rural Telecom(DMARS)	Mityana F.Portal	100 100	1
3	Mpoma Earth Stn Digitalization(IDR)	Mpoma	Rehabilitation &Digitalization	1
4	Entebbe & Kampala Rehabilitation	Entebbe KPL,RSU KPL-ETB	3,000 24,000 2 hops	1
5	Northern Uganda Rehabilitation (NURP)	Gulu KPL-GLU	3,000 8 hops	1
6	Greater Kampala Network Expansion	Kampala Mpigi Mukono	+ 16,000 800 1,800	1
7	Jinja Area Rehabilitation	Jinja/Kamuli /Kakira Lugazi Iganga KPL-MBL	6,300 600 1,000 8 hops	1
8	Mbale Area Network Expansion	Tororo Pallisa Kumi	2,000 400 500	1
9	Moroto Area Rehabilitation	Moroto Kotido SRT-MRT	600 100 3 hops	1
10	Gulu Area Network Expansion	Lira Apac Kitgum	1,000 500 500	1
11	Arua Area Rehabilitation	Arua Moyo Nebbi	1,500 200 500	1

No.	Project Title	Location	Volume (lines)	Phase
12	Fort Portal Area Rehabilitation	Fort Portal Kasese KP-FT-KS	2,300 2,300 10 hops	1
13	Mbarara Area Rehabilitation	Mbarara Kabwohe Ntungamo Kisoro KS-MB	(2000) 350 200 200 5 hops	1
14	Masaka Area Network Expansion	Masaka Rakai Kalangala	(2000) 200 50	1
15	International Network Expansion	Mpoma	Replacement of AOR antenna	1
16	Others for Network Expansion		Payphones Others	1

Table 11-1-2 Projects for Network Expansion (2/3)

No.	Project Title	Location	Volume (lines)	Phase
17	Kampala Network Expansion Project	Kampala	15,400	2
18	Kampala Rural Telecom. Project	Bombo Nakasongola Mityana Kiboga Entebbe	500 400 2,500 600 1,000	2
19	Jinja Area Network Expansion Project	Jinja Buikwe Nkokonjeru Nyenga Iganga Kaliro Bugiri	2,500 700 400 500 800 400 600	2
20	Mbale Area Rural Telecom. Project	Busia Soroti Kotido	550 1,000 500	2
21	Masaka Area Rural Telecom. Project	Masaka Lyantonde Kyotera Rakai Kalisizo Lukaya Nabusanke	4,500 400 500 200 300 200 400	2
22	Mbarara Area Network Expansion Project(1)	Mbarara Bushenyi Ntungamo Kabwohe Rwashamaire Rubaare	3,000 1,000 600 400 400 400	2
23	Kagadi Telecom. Development Project	Kagadi	600	2

NO.	Project Title	Location	Volume (lines)	Phase
24	Gulu Rural Telecom. Project	Aboke Moyo	900 600	2
25	International Network Expansion Project	Mpoma		2

Table 11-1-3 Projects for Network Expansion (3/3)

NO.	Project Title	Location	Volume (lines)	Phase
26	Greater Kampala & Suburban Area Network Expansion Project	Kampala Urban Wobulenzi Mubende Mukono Kayunga Entebbe	20,600 100 800 900 600 1,000	3
27	Jinja Area Urban Network Expansion Project	Jinja Lugazi Kakira Kamuli Iganga	3,700 300 300 300 1,500	3
28	Mbale Area Urban Network Expansion Project	Mbale Tororo Soroti	2,300 500 1,000	3
29	Masaka Town Telecom. Expansion Project	Masaka	2,000	3
30	Mbarara Area Network Expansion Project (2)	Mbarara Bushenyi Kabale Rukungiri Kisoro	1,500 1,500 3,500 800 600	3
31	Fort Portal Area Network Expansion Project	Fort Portal Kasese Masindi Hoima	1,700 700 900 300	3
32	Northern Network Expansion Project	Gulu Lira Kitgum Apac Arua Nebbi	100 800 500 200 1,500 400	3

Number of subscribers, line units and removed line units up to year 2010 are estimated as shown in Figure 11-1-1.

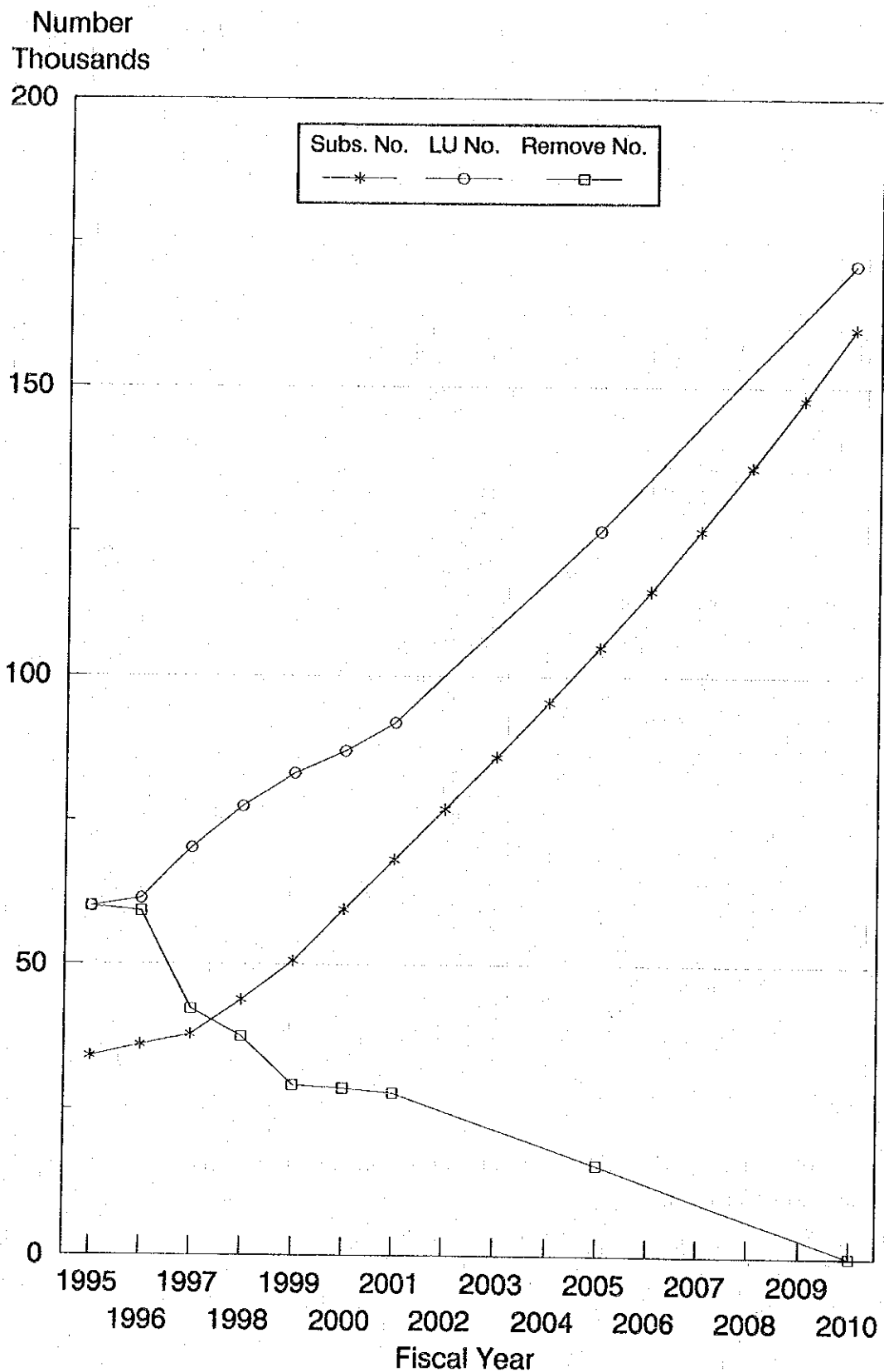


Figure 11-1-1 Number of Subs., LU and Removed LU