社会開発協力部報告書

NO. 8

ザンビア共和国
マイクロウェーブ回線網建設計画
事前調査報告書

昭和56年1月

国際協力事業団

ザンビア共和国
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国 際 協 力 事 業 団

はしがき

ザンビア政府は、第2，第3次国家開発計画の一環として、国内の主要都市間を結ぶマイクロウェーブ幹線網の整備拡充を推進しており、昭和５５年９月、カウンダ大統領が国賓として来日した際に同計画に対するわが国の協力を要請した。この要請に基づき、日本政府は、５５年度内にフィージビリティ調査を行う用意があることを共同コミュニケで表明した。日本政府は、このコミュニケに従い、さしむき本プロジェクトの事前調査を行うことを決定した。

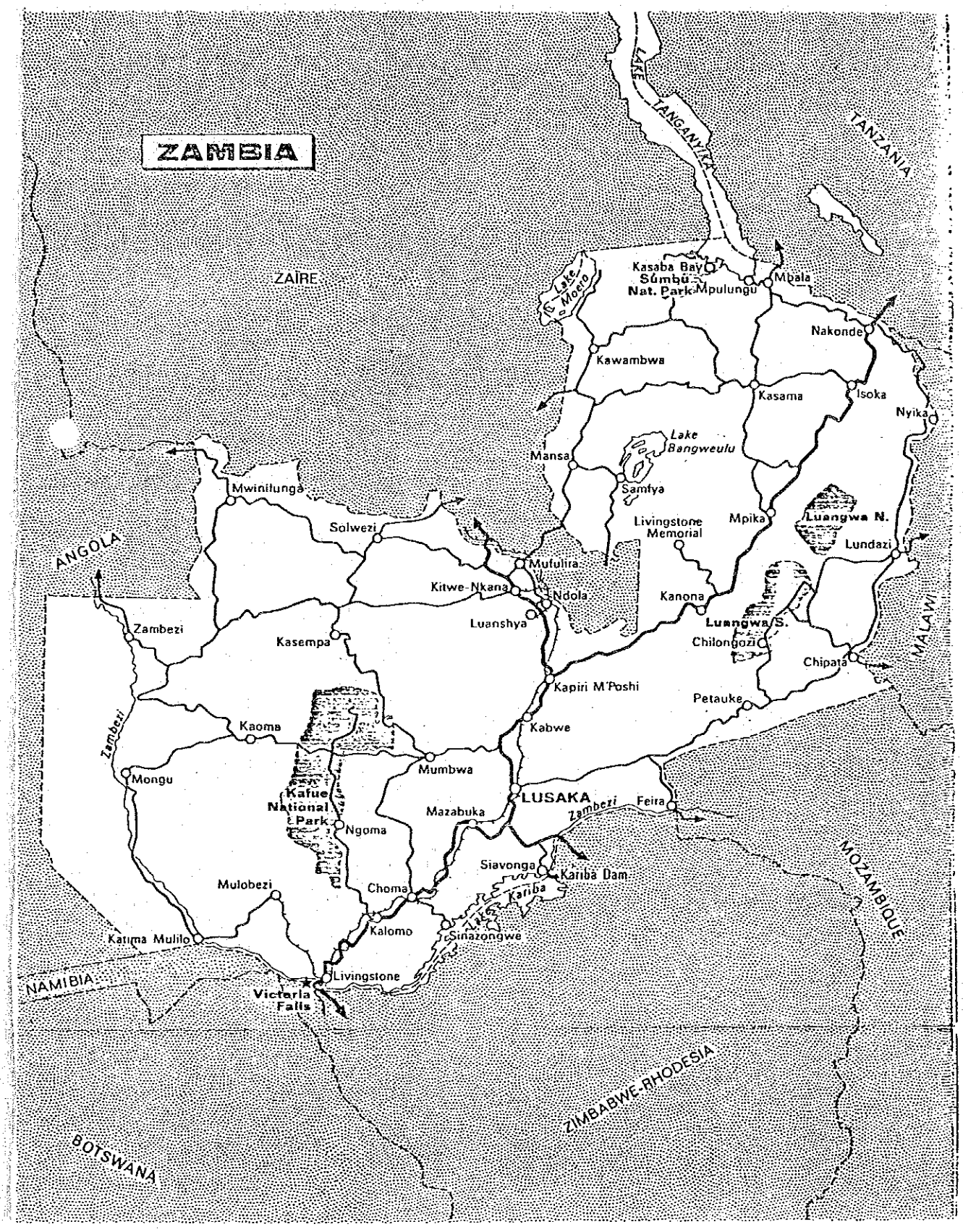
この決定に基づき、当事業団は、郵政省電波監理局無線通信部陸上課検査官長谷川徹氏を団長とする５名の事前調査団を昭和５５年１１月２６日から１２月１７日まで現地へ派遣した。

調査団は、電力運輸通信省（ＭＰＴＣ）、国家開発計画委員会（ＮＣＤＰ）および郵電公社（ＰＴＣ）の関係者と本プロジェクトの規模および内容について協議するとともに、現有通信施設の調査と建設予定マイクロウェーブルートの現地踏査を行って次の本格調査を円滑に、かつ効果的に実施するためのScope of workについてザンビア郵電公社の合意を取り付け、併せて所要資料の収集を行った。

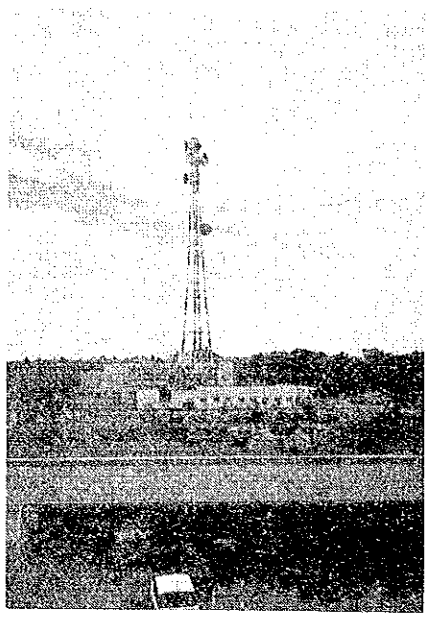
本調査報告書が、今後の本格調査の立案、検討および実施に際して参考となることを期待するとともに、今回の調査実施にあたり、多大のご協力をいただいたザンビア共和国政府、在ザンビア日本大使館および関係機関に対し厚くお礼申しあげる次第である。

昭和５６年１月

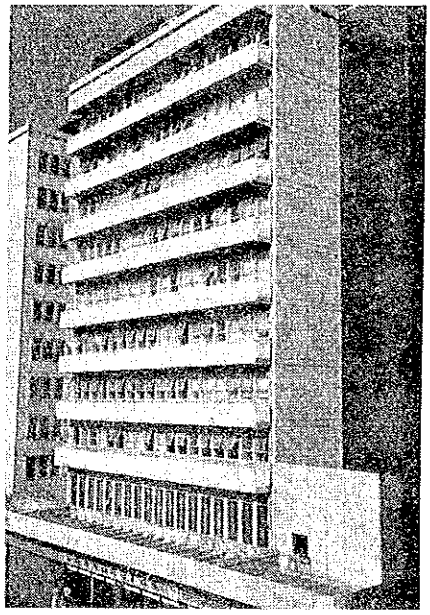
国際協力事業団
理事　中沢弋仁


ZAMBIA
ZAÏRE
LAKE TANGANYIKA
TANZANIA
Kasaba Bay
Sumbu Nat. Park
Mpulungu
Mbala
Lake Mweru
Nakonde
Kawambwa
Kasama
Isoka
Nyika
Lake Bangweulu
Mansa
Samfya
Mwinilunga
Solwezi
Livingstone Memorial
Mpika
Luangwa N.
Lundazi
ANGOLA
Mufulira
Kitwe-Nkana
Ndola
Kanona
Luangwa S.
Chilongozi
Zambezi
Luanshya
Kasempa
Chipata
MALAWI
Kapiri M'Poshi
Petauke
Kaoma
Kabwe
Zambezi
Mongu
Mumbwa
Kafue National Park
LUSAKA
Zambezi
Feira
Mazabuka
Ngoma
Siavonga
Kariba Dam
MOZAMBIQUE
Mulobezi
Choma
Kariba
Lake
Kalomo
Sinazongwe
Katima Mulilo
NAMIBIA
Livingstone
Victoria Falls
ZIMBABWE-RHODESIA
BOTSWANA

署名した議事録を交換する長谷川団長（左端）とウンゴマ郵電公社総裁（中央）



ルサカ電話局とマイクロウェーブ鉄塔



ウンドラ市にある郵電公社本部ビル

ルンダジ無線電報局のオペレータ

ルサカ市の郵電公社での会議

チパタ～ルンダジ間マイクロ中継所予定地の調査

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Ⅱ－3・SCOPE OF WORKS FOR FEASIBILITY STUDY ON MICROWAVE RADIO RELAY PROJECT IN THE REPUBLIC OF ZAMBIA

Ⅱ－4・BASIS FOR FEASIBILITY STUDY ON LS-CB, LUAPULA, NORTHERN PROVINCES RADIO RELAY SYSTEM

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1. 調査の目的

ザンビア政府の要請に基づき、同国の国内マイクロウェーブ回線網建設計画のフィージビリティ調査を実施するに先立ち、ザンビア側関係政府機関と協議して計画内容を確認し、本格調査のＳＣＯＰＥ　ＯＦ　ＷＯＲＫ原案の協議および所要資料の収集を目的とした事前調査を行うものである。

2. 調査団の編成

氏　名	担　当	現　職
長谷川　徹	総　括	郵政省電波監理局 無線通信部陸上課検査官
矢野常夏	回線計画	郵政省電波監理局 無線通信部陸上課第一技術係
鈴木喬	無線	日本通信協力㈱海外事業部技術部長
黒野宗雄	搬送	日本通信協力㈱海外事業部専門課長
伊藤昭雄	業務調整	国際協力事業団社会開発協力部 嘱託参事

3. 調査日程

月　日	曜日	行　程	調査内容
11／26	水	成田発 22:30 JL 423	
27	木	LONDON　着 06:20	
28	金	LONDON　発 QZ3705　23:00	
29	土	LUSAKA　着 12:50	大使館、ＰＴＣ打合せ
30	日	NDOLA	ＰＴＣ打合せ
12／1	月	ＰＴＣ 於：NDOLA	要請内容聴取、質問書提出、調査日程調整、S／W原案の打合せ

12/2	火	A班	
		KITWE	SOLWEZI−CHINGOLA−KITWE間調査
		B班	
		MANSA	MANSA現地調査
3	水	A班	
		NDOLA	KITWE−NDOLA間調査、PTCとS/W原案について協議
		B班	
		KASAMA	MANSA−KASAMA間調査
4	木	A班	
		LUSAKA	NDOLA−LUSAKA間調査
		B班	
		MBALA, MPULUNGU	KASAMA−MBALA−MPULUNGU間調査
5	金	A班	MASS MEDIA CENTER.地球局,
		LUSAKA	LUSAKA EX調査
		B班	
		MPOROKOSO	KASAMA−MPOROKOSO間調査
6	土	A班	
		LIVINGSTONE	LUSAKA−LIVINGSTONE間調査
		B班	
		KABWE	LUSAKAへ移動
7	日	A班	
		LUSAKA	移動, 打合せ
		B班	
		LUSAKA	資料整理
8	月	CHIPATA	移動
9	火	LUNDAZI	CHIPATA−LUNDAZI間調査
10	水	MFUWE	CHIPATA−MFUWE間調査
11	木	LUSAKA	S/W原案打合せ
12	金	PTC	S/W原案署名, N.C.D.P.表敬説明訪門
		於：LUSAKA	収集資料整理
13	土	LUSAKA	大使館報告, 収集資料整理

14	日	LUSAKA	収集資料整理
15	月	LUSAKA 発	M.P.T.C表敬訪門
		BR 212 22:15	大使館あいさつ
16	火	LONDON 着	
		06:10	
		LONDON 発	
		JL 424 14:30	
17	水	成田着 17:20	

4. 調査団の勧告

調査団は郵電公社総裁、同局長、同局次長等関係者と協議を重ね、その結果を付属資料－Ⅱに含まれる“MINUTES OF THE MEETING ON THE SCOPE OF WORKS FOR FEASIBILITY STUDY RADIO ON MICROWAVE RELAY PROJECT IN THE REPUBLIC OF ZAMBIA”にまとめ12月12日、調査団長と郵電公社総裁が同付属資料“SCOPE OF WORKS FOR FERSIBILITY STUDY ON MICROWAVE RADIO RELAY PROJECT IN THE REPUBLIC OF ZAMBIA”に署名した。

調査団と郵電公社との協議の結果、双方の合意により、調査団は郵電公社提案の“Microwave Radio Relay Project in the Republic of Zambia”（付属資料Ⅱ－4）にもとづいた本格調査の実施を日本政府に勧告するが、KITWE－MANSA間のマイクロウェーブ回線計画については、調査団はザイール国領土を横断することに伴う地理的条件及びMANSA地区はKASAMA－MANSAの回線計画があることを考慮して、調査の対象から除外することを提案し、郵電公社側はこれを了承した。

また、Mass Mediaに関連する計画のうちMass Media Centreが完成する1981年11月までにどうしても必要な最少限の設備については、（時期的条件から）本件調査範囲に含めることは時期的条件から不可能であるとの判断から、郵電公社自身で対処することを提案した。

5. 調査団の結論

調査団は以下に述べる理由からザンビア政府の本件援助要請は緊急かつ妥当なものと判断する。

すなわち、今回援助を希望する区間は現在、そのほとんどが短波による電信・電話回線、または、裸線による数回線の電話しかない所である。またザンビアのバックボーン回線であるLUSAKA－KITWE間のマイクロウェーブ設備は増加する需要に対し、その伝送容量が不足しており、設置以来相当の年数を経ているため老朽化が著しい。

同国の第三次国家開発計画に基づき、Rural 地区の発展及び農業経済の振興のため、マイクロウェーブによる電話回線及びテレビジョン伝送回線網の整備拡充は緊急を要するものであると認められる。

さらに、各地区における国家行政施設の整備拡充に対しての、電気通信施設の発展に立ち遅れが見られ、本件要請は妥当なものと認められる。

当初我が国に要請のあった回線の他に、新たにMANSA－MWENSE－KAWAMBWA－NCHE-LENGE, MANSA－SAMFIYA, MBALA－MPULUNG, LUNDAZI－CHAMA, CHIPATA－KAKUMBI－MFUWEの回線が郵電公社側から追加要請の提案があり、協議の結果、前述の回線はいずれも当初要請のあった回線と同じ地方に含まれるものであり、国家開発計画の観点から調査対象の範囲に入れることが適当である。

MASS MEDIA Television Linkに関しては、同センターの完成が1981年11月であることから、本件プロジェクトに全体を含めることは時期的に不可能である。従って、1981年11月までにはどうしても必要とされる最小限のものは、本調査の対象から除外し、郵電公社自身で対処することが適当であると判断し勧告した。郵電公社側では、外貨事情の関係から、無償援助を希望する旨の要望が出され、調査団はその要望を日本政府に伝えることで了承した。

本件調査は、事前調査であったが援助を希望する回線について、一部を除いて郵電公社自身ですでに調査した資料が用意されていたため、これらの資料に基づき一部フィージビリティ的な調査を行った。

また、調査の結果を早急に出して欲しいとの郵電公社側の強い要請もあり、次回の本格調査は前述のデータを日本に持ち帰り再検討し、疑問地区、未調査の区間に限って実施することとし、またその際、フィージビリティ・スタディーレポート案を持参して協議を行うことで双方合意を得たので、当初の計画していたスケジュールを短縮して調査を行うことが適当である。

6. フィージビリティ調査の概要

6－1 対象ルート

ザンビア郵電公社がフィージビリティ調査の対象として要請しているルートは、下記のとおりである。

1) MASS MEDIA～TELEVISION LINK
2) LUSAKA～COPPERBELT LINK
3) KASAMA～MANSA LINK
※4) MANSA ～MWENSE～KAWAMBWA～NCHELENGE LINK
※5) MANSA ～SAMFYA LINK
6) CHINGOLA～SOLWEZI LINK

7) KASAMA ～MBALA～MPULUNGU

8) KASAMA ～MPOROKOSO

9) CHIPATA～LUNDAZI ～CHAMA LINK

※10) CHIPATA～KAKUMBI ～MFUE

※今回の事前調査により新たに要求されたもの。

6--2 フィージビリティ調査の実施計畫

ザンビア郵電公社が整備拡充を予定している前述の調査対象ルートは一部を除き、すでに郵電公社による調査が完了している事が今回の事前調査で判明した。未調査のルートは等高線表示の地図が無い地域及び国境地帯である。

今回の事前調査団は、郵電公社が調査を行なったルートの報告書、関連地図、統計資料等を入手したので、次回フィージビリティ調査は次により行うこととする。

1) 国内作業による事前準備

事前調査を終了し帰国後、国内において、ザンビア郵電公社から入手した資料を解析し、レポートの素案を作成し、ドラフトレポートの印刷・製本を行なう。

2) 現地踏査

ドラフトレポート作成後、約1ケ月（往復旅行日を含む）の現地踏査を実施し、未踏査ルートの確認および資料の収集を行なう。そして調査終了後、郵電公社とフィージビリティ調査レポートのドラフトを固めるための協議を行なう。

3) ファイナルレポートの作成

本調査完了後、国内において約2ケ月間で、ファイナルレポートの作成および印刷・製本を行なう。

6－3 フィージビリティ調査の内容

1. 電気通信網拡充計画
2. 電気通信需要およびトラヒック予測
3. テレビジョンおよびラジオネットワーク拡張プラン
4. 現行の電気通信施設に対する技術基準
5. 電気通信業務の収入および支出
6. 現行の料金システム
7. マイクロウェーブ・ネットワークプラン
8. マイクロウェーブ・システムデザイン
9. 実施計画スケジュール
10. 保守および運用
11. プロジェクトコスト見積り

12. 経済評価

6－4 調査稼動予定

(1) 実施前作業

• 無線伝送路の机上検討	5名×1.0ヶ月
• 通信網計画の概案作成	2名×1.0ヶ月
• 経済評価	1名×1.0ヶ月
• 工事費の概算見積り	2名×0.5ヶ月

(2) 本 調 査

1) 総 括	1名×1.0ヶ月
2) 回線計画	1名×1.0ヶ月
3) 無 線	2名×1.0ヶ月
4) 経済評価	1名×1.0ヶ月
計	5名×1.0ヶ月

(3) 報告書作成および校閲

5名×2ヶ月

6－5 調査時期およびザンビア側の便宜供与

付属資料、"SCOPE OF WORKS FOR FEASIBILITY STUDY ON MICROWAVE RADIO RELAY PROJECT IN THE REPUBLIC OF ZAMBIA", VI. Undertaking of the Government of Zambiaによる。

6－6 参考事項

1. 調査に必要な機材

1) 文房具

2) 事務用品

携帯用螢光スタンド、ポラロイドカメラ、一般カメラ、製図用具、電卓

3) その他

薬品、ガスコンロ、湯わかし器、非常食、蚊とり線香、虫よけスプレー、荷造りひも、ビニールテープ、ガムテープ、工具類

4) 無線調査用機材

付　属　資　料 — I

I — 1　　一般概要

I — 2　　電気通信事業の運営

I — 3　　進行中のプロジェト

付属資料－Ⅰ

Ⅰ－1　一般概要

Ⅰ－1－1　地　理

ザンビアは南緯8度から18度のアフリカ大陸内の奥部に位置している内陸国である。国土面積は753,000㎢であり、これは日本の約2倍の広さを持つ。

1979年史の推定人口は5,650千人で、1969年に行なわれた国勢調査の結果と比較すると10年で約39％の人口増加率となる。人口密度は全国平均で7.5／平方粁であるが、コッパーベルト及びセントラルプロビンスが最も高い。

人種はバロツ族、ベンバ族、アチュワ族、トンガ族などで構成されているがヨーロッパ人およびアジア人も住んでいる。公用語は英語である。

Ⅰ－1－2　気　候

ザンビアは国土の大半は高原に位置しており平均標高は1,300米である。一年は三季に分かれ、5月から8月までは乾期の冬、9月から11月までが乾期の夏、12月から4月にかけて雨期となる。ルサカ地方における各月の温度と降雨量は下記の如くである。

■ルサカ地方年間気温表

月別		1	2	3	4	5	6	7	8	9	10	11	12
温度℃	平均	20.6	20.5	20.3	19.7	17.5	15.3	15.6	18.0	21.4	24.0	22.6	21.1
	最高	25.9	25.9	26.1	26.3	24.7	22.8	22.9	25.5	28.9	31.1	28.7	26.5
	最低	17.2	17.1	16.3	14.9	12.3	10.1	9.6	11.7	14.7	17.8	17.8	17.2
平均湿度（％）		81	84	77	72	70	67	55	47	44	41	63	78
降雨量（㎜）		217.7	196.3	105.9	20.6	3.6	0.3	0	0.3	0.5	14.7	91.2	186.4

ザンビアの雨期は日本のそれとは異なり、一日中雨が降り続くことはなく、毎日数時間豪雨が凄まじい雷鳴を伴なって大量の雨をもたらす。

Ⅰ－1－3　略　史

十九世紀の中葉までアフリカ大陸は、欧州人来踏の地であったが十九世紀中葉から末葉にかけて中央アフリカでザンベジ河の流域を宣教師兼探険家であるリビングストーンが踏破した。英国人セシルローズという政治家は当時の大英帝国主義の名のもとに南ローデシア・北ローデシア（現在のザンビア）を植民地とした。英国政府は南アフリカ株式会社の設立許可を彼に与え採鉱権を確保するなど国益を得ると同時にザンビア人に大きな強制力を及ぼした。しかし、南アフリカ株式会社だけで行政の責任をとる事が出来ず、1924年、北ローデシアは英国の直轄植民地となった。

北ローデシアはこの後約40年英国植民地として統治されたが、1964年10月24日にザン

ビア共和国として独立した。

Ⅰ－1－4　政　治

大統領が軍の最高指揮官を兼任している。国会は一院制で、カウンダ大統領のひきいる統一民族党（UNIP）が政権を握っている。カウンダ大統領は1969年8月、英・米などの西側資本に牛耳られてきた銅鉱業の国有化を断行するなど、民族主義政策を進めてきた。

1967年に中国と経済・技術協力協定を締結し、中国からの援助をうけてタンザニアと同国を結ぶタンザン鉄道を建設した。

カウンダ大統領のひきいるUNIPは独立以来政権を握っており、政権は比較的安定している。しかしながら、党の内外にカプウェプウェ氏のようにカウンダ大統領の一党民主々義政策や社会主義政策に反対する動きもあり、また、経済政策の失敗などによる社会不安が高まっている点に注目する必要がある。とくに、下層都市労働者やザンビア大学生の間で経済的な不満がうっ積しているので、これが反政府運動の温床となる危険性がないわけではない。

他方、外交関係では基本的には南部アフリカの少数白人支配体制に反対し、ザンビア内に基地を持つジョシュア・エンコモ氏のZAPU（ジンバブエ・アフリカ人民同盟）に保護を与えているものの、経済面ではジンバブエ・ローデシアおよび南ア共和国との間で南部鉄道ルートによる貿易に関し現実的な友好関係を有している。

Ⅰ－1－5　経済情勢

独立当初の国内総生産のうち鉱業部内への依存度は、47.6％と高くモノカルチャー経済の域を出ず、独立以降のザンビア経済は、常に銅を中心とする鉱業部門の動向によって大きく左右された。加えて内陸国であり、かつ南部アフリカの白人支配国家とブラック・アフリカとの接点に立つということで、①LMEの銅価格、②物資の輸送ルート、③周辺国との外交関係、という3つの要因が経済の成行きを規定してきたといえよう。

独立後の経済政策の基本は、銅への過度の依存から脱却し、産業の多様化を図ることであり、従って労働集約財を対象とした輸入代替工業化を促進することによって、雇用機会の創出と技術開発、さらには消費物資の輸入削減による貿易収支の一層の改善を目指した。独立以来、暫定開発計画、第一次・第二次開発計画が、いずれも産業の多角化と工業化の振興を政策目標においた。政府は、このような開発計画を推しすすめると同時に、ローデシア系企業の接収を手初めとして外資企業、民間企業、主要商業銀行等の国有化を行った。こうした急激な経済のザンビア化とそれをテコにした工業化は、1964年から70年代前半にかけて好調に推移した銅産業に支えられて順調に進展した。

1970年代前半を通じて、政府の財政支出は拡大した。財政積極策の他に金融面でも拡大策がとられ、さらに経済のザンビア化を貫徹するために多額の信用供与が行われ、これが国内経済を刺激した。その結果、国内需要に依存した産業、例えば農業・製造業・建設業が活発化す

るとともにアフリカ人に対する雇用機会も増大するに至った。ところが、1977年に入ると国内総生産は実質ベースで前年比4.2％減と落ち込み、続く78年には経済全体のスタグネーションが始まり、鉱業部門を始めとして、農業・製造業・建設・輸送の各分野が著しい停滞に陥いった。外貨準備は底をつき、1971年から開始された第2次開発計画は十分な実効をあげないまゝ頓挫し、第3次開発計画も当初予定の77年1月から3年ずれ込んでいる。しかも、この第3次計画自体は、第2次計画の焼き直しにすぎず、第2次計画は経済状況の悪化から殆んど実行されなかった。

1978年後半から79年に入ると、3年近く続いた経済のマイナス成長がようやく底入れを示し、鉱業・製造業および農業生産は付加価値ベースでようやく上向きに転じている。

政府は、1978年3月にＩＭＦから3億9,000万ドルのクレジット引出しを承認してもらった際、その引き換えとして、自国通貨クワチャの１０％切り下げに同意するとともに、所得政策の実施・財政引き締め政策を行うと約束している。緊縮財政は1979年度予算に反映され、補助金の削減や行政機構の再編が行なわれている。

1979年1月、第２６回国会における予算演説のなかで、Ｍ．Ｊ．ルミナ大蔵大臣は、対外均衡の達成を図るべく、輸入代金未払い分の解消と貿易収支の改善を政策の第一目標にする旨表明している。

Ｉ－１－６　対日関係

わが国のザンビア貿易は、日本がザンビアから銅を大量に輸入しているために、日本側の大巾な入超となっている。日本からザンビア向け輸出商品は食料品、軽工業品、せんい、重化学工業品、化学品、化学肥料、金属、鉄鋼、機械機器等である。主要品目では、化学肥料が食料の不足解消という事情を受けて、ザンビア向け輸出が1978年に比べて4倍にも増加している。

1977年末におけるザンビアの対日公的債務残高は、国連資料によると、1,938万5,486クワチャであったが、これは中国・米国・世銀・英国・カナダについて6番目に高い。1979年末における、日本からザンビアへの政府ベース資金協力の供与約束累計額は209億1,000万円で、その内訳は全額円借款であった。

民間ベースの経済協力では、78年度末で延払輸出は7,350万5,000ドル、海外投資は１２件4,443万3,000ドルであった。

技術協力としては、７８年末現在、５５人（国際協力事業団３７人、海外技術者研修協会14人、日本ＩＬＯ協会４人）の研修生を受入れ、また国際協力事業団ベースで１４人の専門家派遣を行った。

Ｉ－２　電気通信事業の運営

Ｉ－２－１　概　要

ザンビアの電気通信事業は電力・運輸・通信省（The Ministry of Power, Transport

and Communi Cations 以下ＭＰＴＣと略す）の管轄となっている。その組織は図－１のとおりである。

ザンビア郵電公社は Post and Telecommunications Corporation（以下 PTC と略す）と呼ばれ、その組織は図－２のとおりである。

Ｉ－２－２　既設設備の状況

Ｉ－２－２－１　総電話機数

１９８０年末のザンビアにおける総電話機数は６０,４６２台と発表されている。但し、加入者ライン数は３２,０００である。各都市の電話機数は表－１に示すとおりである。人口１００人あたりの電話機数は１台となる。

Ｉ－２－２－２　電話局数と交換機容量

現在各地で電話交換機の新増設工事が進行中である。既設および増設予定の交換機容量を表－２に示す。

Ｉ－２－２－３　トラヒックデータ

表－３および表－４はザンビア郵電公社が予測した１９８０年の各都市における市内電話トラヒックおよび市外トラヒックをあらわす。

Ｉ－２－２－４　長距離通信ネットワーク

ザンビアの通信ネットワークは、マイクロウェーブ・短波・裸線方式等により構成されている。幹線ルートのマイクロウェーブシステムとしては下記が存在する。

1. LUSAKA～LIVINGSTONE（6 GH_2 Upper・960 CH）
2. LUSAKA～KASAMA～NAKONDA（同上）
3. LUSAKA～COPPERBELT（2 GH_2・960 CH）
4. KITWE ～LUANSHYA（7 GHz・960CH）
5. LUSAKA～CHIPATA（2 GH_2・960 CH）
6. LUSAKA～MUNBAWA（7 GHz・960 CH）

尚、詳細を図－３および表－５に示す。表－６は現在工事中のルートおよび方式等を示す。既設の市外対地別回線数は表－７のとおり準備されているが、市外交換系の工事が遅れているため、実際にはかなり少い回線数で運用されているのが実状である。

Ｉ－２－２－５　電　報

電報取扱いサービスは約７０の都市町村で行なわれている。このうち１４の電報局は、GENTEX網にくり入れられているが残りの殆んどはSSB HF RADIOを使ったモールス通信方式である。

Ｉ－２－２－６　テレックス

約400加入者がストロジャータイプのテレックス交換機に接続されている。運用している

都市は、ルサカ、キトエおよびンドラである。1974年の積滞は約100加入であった。

Ⅰ－2－2－7　国際通信

1974年に地球局がムエンベシに開局した。通信対地および回線数を表－8に示す。マラウィおよびジンバブエへは陸上伝送路で運用している。

Ⅰ－3　進行中のプロジェクト

PTCは1975年から1980年にかけて、下記のプロジェクトを計画し実施中であるが一部遅延をきたしているものがある。

(1) 市内交換機、31,000端子の増設。このうち7,900端子分は古い交換機の取替えなので、増設端子数は実質23,000である。

(2) 市内ケーブル3,100対の増設。

(3) 市外電話回線を既設1,100回線から3,200回線に増設する。

添　付　図　表

図－1　MINISTRY OF POWER, TRANSPORT AND COMMUNICATIONS（MPTC）の組織図

図－2　POST AND TELECOMMUNICATIONS CORPORATION（PTC）の組織図

図－3　長距離通信ネットワーク

表－1　各都市における電話器台数および電話普及率（100人あたり）

表－2　電話交換機の既設数および新・増設予定端子数

表－3　市内電話局トラヒック

表－4　主要都市間のトラヒック

表－5　運用中のマイクロウェーブシステム

表－6　建設工事中のマイクロウェーブシステム

表－7　対地別回線数

表－8　衛星通信対地および回線数

ORGANISATION OF MINISTRY OF POWER TRANSPORT AND COMMUNICATIONS, AND DUTIES OF THE RESPECTIVE DEPARTMENTS/ DIVISION/SECTION

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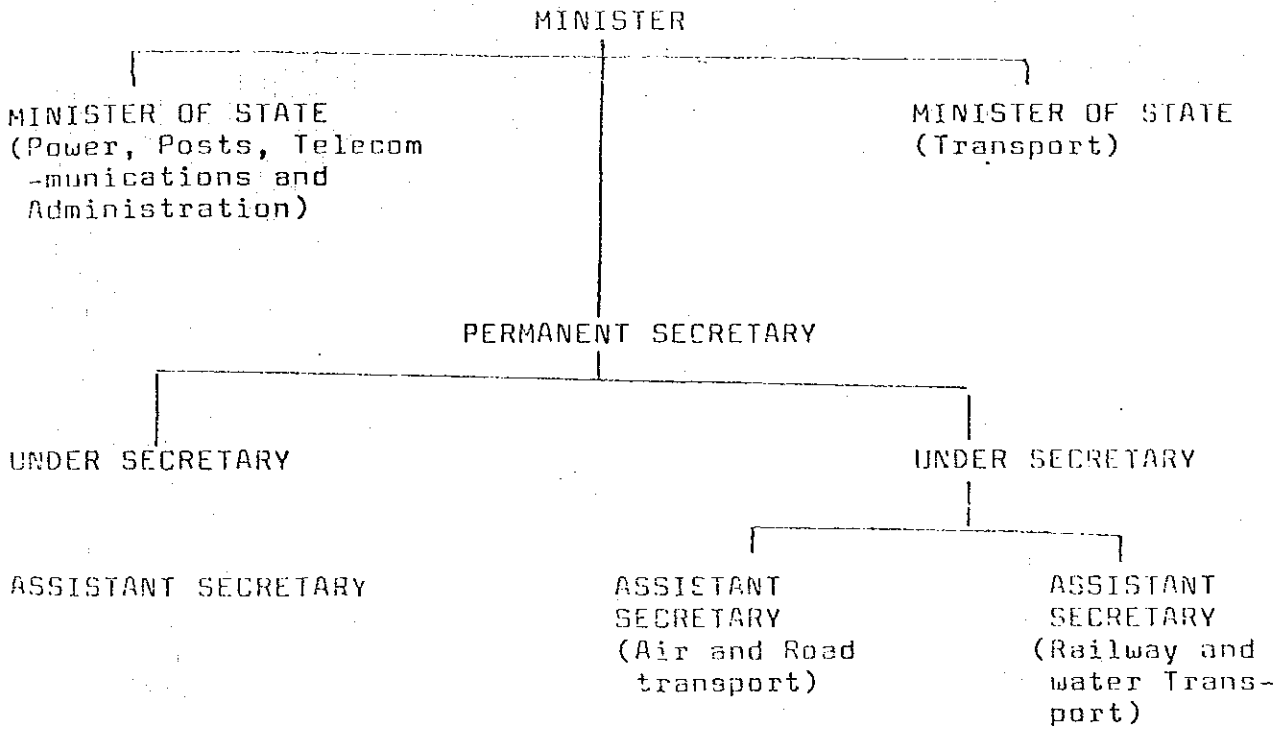
1. The ministry has two basic functions:

   a) Government policy formulation and recommendations.

   b) Link between Parastatals and Private Sector on one land and the Government on the other.

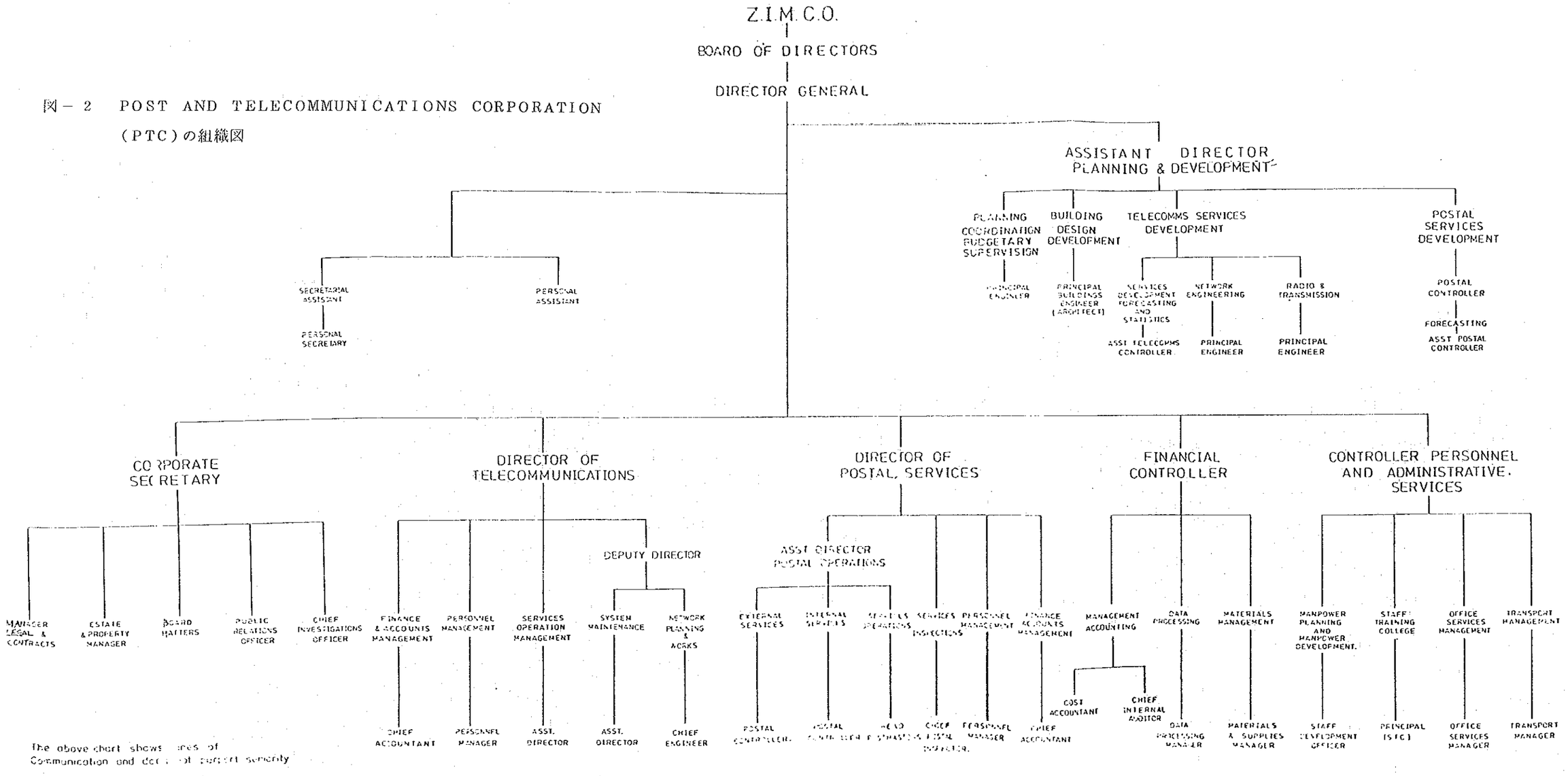
2. STRUCTURE



NOTE: The two Under Secretaries are adminstratively and functionally controlled by the Permanent Secretary but duties are divided as at Minister of State level.

図－1 MINISTRY OF POWER, TRANSPORT AND COMMUNICATIONS (MPTC)の組織図

図－2　POST AND TELECOMMUNICATIONS CORPORATION
（PTC）の組織図



The above chart shows lines of
Communication and does not portray seniority

IBRD 10940R
APRIL 1975

ZAMBIA
TELEPHONE NETWORK

EXISTING FACILITIES:
- Automatic Telephone Exchanges
- Manual Telephone Exchanges
- Microwave Systems
- VHF/UHF Radio Systems and Cables
- Landline Routes
- HF Radio Links
- Earth Station
- International Boundaries
- Provincial Boundaries
- Rivers

ONGOING WORKS:
- New Automatic Exchanges
- Automatic Replacing Manual Exchanges
- Automatic Replacing Automatic Exchanges
- VHF/UHF Radio Systems and Cables

PROPOSED PROJECT:
- New Automatic Exchanges
- Automatic Replacing Manual Exchanges
- Automatic Replacing Automatic Exchanges
- Automatic Exchanges Added in an Automatic Local Network
- Microwave Systems
- VHF/UHF Radio Systems

TANZANIA
Lake Tanganyika
Lake Mweru
Mporokoso
Mpulungu
Mbala
Senga Hill
Nakonde
Kasama
Mpika
Chinsali
Isoka
Lwangu
Mwense
NORTHERN
Lake Bangweulu
Samfya
Serenje
Shiwa N'gandu
Mkushi
Mkushi River
Chama
Lundazi
EASTERN
MALAWI
Chipata
Kazungula
Nyimba
REPUBLIC OF ZAIRE
ANGOLA
Mwinilunga
Solwezi
Kalumbila
Chingola
Mufulira
Chambishi
Ndola
Kitwe
Kalulushi
Luanshya
COPPERBELT
NORTH-WESTERN
Kasempa
Kabompo
Mumbwa
Chisamba
Chibombo
Lusaka
Luangwa
Petauke
Feira
ZAMBEZI RIVER
Luiana Swamp
Lukanga Swamp
Kafue River
Kafue
Mazabuka
Monze
Choma
Namwala
Gwembe
Siavonga
Kariba
LAKE KARIBA
Sesheke
Livingstone
WESTERN
SOUTHERN
MOZAMBIQUE
RHODESIA
ANGOLA
NAMIBIA
BOTSWANA
MILES
KILOMETERS
Atlantic Ocean
Indian Ocean
REPUBLIC OF SOUTH AFRICA
LESOTHO
SWAZILAND

図－３　長距離通信ネットワーク

表－1　各都市における電話器台数および電話普及率（100人あたり）

TOWN	NO. OF TELEPHONES	POPULATION ('000s) (1979 MID-YEAR ESTIMATES)	TELEPHONE PENETRATION PER 100 RESIDENTS
CHILILABOMBWE	1006	74	1.3
CHINGOLA	2811	183	1.5
KABWE	2688	284	0.9
KALULUSHI	797	57	1.3
KASAMA	1104	129	0.9
KITWE	8968	325	2.6
LUANSHYA	2024	156	1.2
MANSA	958	89	1.0
MBALA	421	114	0.3
MUFULIRA	2074	178	1.2
NDOLA	8229	394	2.0
SOLWEZI	636	68	0.9
LUWINGU	138	92	0.1
MKUSHI	394	67	0.2
MPIKA	238	69	0.3
SERENJE	129	62	0.2
CHIPATA	1320	196	0.6
CHOMA	893	119	0.7
KALOMO	332	38	0.3
LIVINGSTONE	2864	80	3.5
LUSAKA	19939	714	2.5
MAZABUKA	823	94	0.8
MONGU	613	119	0.5
MONZE	507	92	0.4
KATETE	99	101	0.09
MUMBWA	135	71	0.2
NAMWALAQ	120	42	0.3
PETAUKE	187	157	0.1
SESHEKE	15	64	0.02

注）上記電話器台数は、1980年を目標としたものであるが、実際には工事遅延により達成できないものも含んでいる。

表－２　電話交換機の既設数および新・増設予定端子数

1. LUSAKA GROUP (Group Switching Centre)

Exchange	Existing Capacity	New Capacity
Lusaka Main	4,000 lines	15,000 lines
Chelston	–	3,000 "
Kafue	200 lines	2,000 "
Chilanga	135 lines	500 "
Ridgeway	5,000 lines (retained)	–
Airport	–	500 "
Mumbwa	50 Manual	200 "

2. KITWE GROUP (Group Seitching Centre)

Kitwe	4,500	9,000 (1978)
Mufulira	1,500	3,000
Chingola	1,500	3,000
Luanshya	1,500	3,000 (1973)
Chambeshi	–	200 (1973)
Itimpi	–	200 (1978)
Ndola	4,000	10,000 (PL)*
Mpongwe	–	50 (PL)*

3. CHOMA GROUP (Group Switching Centre)

Choma	300	800
Gwembe	Manual	
Kalomo	100	200
Mazabuka	300	800
Monze	100	600
Pemba	50 Manual	100
Namwala	–	100 (PL)*

(PL)* – Planned.

4. CHIPATA GROUP (Group Switching Centre)

Chipata	300	800	
Chadiza	-	50	
Katete	50 Manual	150	
Nyimba	-	50	
Petauke	100 Manual	200	
Sinda	-	50	
Chama	-	50	(PL)*
Lundazi	-	150	(PL)*
Kakumbi	-	50	(PL)*

5. KASAMA GROUP (Group Switching Centre)

Kasama	1,000	1,500	
Chinsali	50 Manual	150	
Isoka	-	200	
Mpika	100 Manual	800	
Nakonde	-	50	
Luwingu	100 Manual	200	
Mporokoso	-	200	
Mbala	150	500	
Mpulungu	-	150	
Mungwi	30 Manual	150	
Kaputa	-	50	(PL)*

6. SOLWEZI GROUP (Group Switching Centre)

Solwezi	192	600	
Kabompo	-	100	
Zambezi	-	100	
Mwinilunga	-	100	
Chizera	-	50	(PL)*

* (PL) - Planned.

7. MONGU GROUP (Group Switching Centre)

Mongu	192	500
Lukulu	–	100
Kalabo	–	100
Senanga	–	100
Kaoma	–	100
Sesheke	–	100 (PL)*
Mulobezi	–	–

8. MANSA GROUP (Group Switching Centre)

Mansa	200	800
Samfya	–	250
Kawambwa	–	250
Nchelenge	–	100
Mwense	–	100

9. KABWE GROUP (Group Switching Centre)

Kabwe	1,900	4,000
Mkushi	100 Manual	200
Kapiri Mposhi	50 Manual	500
Serenje	50 Manual	300
Chibombo		50

* (PL) – Planned.

表－３　市内電話局トラヒック

LOCAL EXCHANGE	TRAFFIC IN ERLANGS
Chipata	43.36
Chingola	55.54
Choma	29.15
Kalulushi	79.19
Kitwe	235.51
Launshya	51.75
Livingstone	133.93
Lusaka	685.5
Mansa	30.04
Mazabuka	31.76
Mbala	11.68
Mufulira	84.81
Ndola	186.4

表－4　主要都市間のトラヒック

ROUTE		TRAFFIC IN ERLANGS
Chambishi	Kitwe	14.00
Chilanga	Lusaka	12.24
Chililabombwe	Kitwe	17.58
Chililabombwe	Chingola	36.20
Chingola	Kitwe	22.14
Chingola	Ndola	39.06
Chinsali	Kasama	2.74
Chipata	Lusaka	6.09
Chipata	Ndola	1,28
Chipata	Petauke	0.47
Chipata	Katete	2.32
Chisamba	Kabwe	2.40
Chisamba	Lusaka	5.88
Choma	Kalomo	1.57
Choma	Livingstone	22.14
Choma	Lusaka	25.84
Choma	Mazabuka	11.37
Choma	Monze	1.14
Choma	Pemba	1.75
Choma	Gwembe	1.26
Itimpi	Kitwe	6.33
Isoka	Kasama	1.26
Kabwe	Kapiri Mposhi	2.45
Kabwe	Kasama	0.72
Kabwe	Lusaka	73.46
Kabwe	Mkushi	0.11
Kabwe	Ndola	32.51
Kabwe	Serenje	1.06
Kabwe	Kitwe	30.47
Kafue	Lusaka	21.72
Kalomo	Livingstone	7.14
Kalulushi	Kitwe	19.39
Kanona	Kabwe	1.88
Kanona	Mpika	0.11
Kanona	Serenje	0.12
Kansenshi	Ndola	4.75

ROUTE		TRAFFIC IN ERLANGS
Kasama	Lusaka	5.66
Kasama	Luwingu	0.10
Kasama	Mpika	1.06
Kasama	Mbala	1.06
Kasama	Kitwe	1.50
Kasama	Mansa	1.91
Kasama	Mpulungu	0.72
Kasama	Nakonde	0.28
Kasama	Ndola	1.98
Kitwe	Luanshya	39.06
Kitwe	Livingstone	1.47
Kitwe	Lusaka	132.36
Kitwe	Mansa	2.66
Kitwe	Mufulira	66.18
Kitwe	Ndola.	132.37
Kitwe	Solwezi	5.61
Livingstone	Mongu	0.09
Livingstone	Lusaka	60.32
Livingstone	Ndola	2.12
Livingstone	Zimba	0.08
Lusaka	Solwezi	0.75
Lusaka	Mansa	3.99
Lusaka	Mazabuka	13.30
Lusaka	Mbala	0.47
Lusaka	Mongu	1.20
Lusaka	Monze	8.80
Lusaka	Mumbwa	7.47
Lusaka	Namalundu	0.47
Lusaka	Ndola	93.76
Lusaka	Ridgeway	106.32
Lusaka	Siavonga	2.50
Ndola	Mansa	1.38
Ndola	Solwezi	0.06
Ndola	Mufulira	24.91
Ndola	Shiwang'andu	0.39

表－５　運用中のマイクロウェーブシステム

S/NO	NAME OF THE ROUTE	TRANSMISSION SYSTEM	TRANSMISSION CAPACITY				NO. OF SYSTEMS	FRE-QUENCY	SERVICE PERIOD	MANUFACTURER
			TP	NO. OF TEL. CHLS. IN RF	T.V.	STB				
1.	LUSAKA-L/STONE	MICROWAVE	ONE	960	ONE	ONE	ONE	6GHZ	1974	NIPPON ELECTRIC CO JAPAN
2.	PAN AFTAL	MICROWAVE	ONE	960	ONE	ONE	ONE	6GHZ	21/9/78	NIPPON ELECTRIC CO. JAPAN
3.	LUSAKA-C/BELT	MICROWAVE	ONE	960	ONE	ONE	ONE	2GHZM	1967	G.E.C., U.K.
4.	KITWE-LUANSHYA	MICROWAVE	ONE	960	-	ONE	ONE	7GHZ	1977	NIPPON ELECTRIC CO. JAPAN
5.	LUSAKA-CHIPATA	MICROWAVE	ONE	960	ONE	ONE	ONE	2GHZ	JULY 1980	NIPPON ELETRIC CO. JAPAN
6.	LUSAKA-MUMBWA	MICROWAVE	ONE	960	ONE	ONE	ONE	7GHZ	-	NIPPON ELECTRIC CO JAPAN

UNDER CONSTRUCTION MICROWAVE LINKS

表－6　建設工事中のマイクロウェーブシステム

S/NO	NAME OF THE ROUTE	TRANSMIS-SION SYS-TEM	TRANSMISSION CAPACITY				NO. OF SYSTEM	FRE-QUENCY	DATE HE. COMP-LETED
			TP RF	NO. OF TEL. CHLS. TP RF	TV	STB			
1.	MUMBWA-MONGU	MICROWAVE	ONE	960 channels	ONE	ONE	ONE	7GHZ	MAY 1981
2.	CHINGOLA-CHILILABOMBWE	MICROWAVE	ONE	960 channels	-	ONE	ONE	2GHZ	AUGUST 1981

表－7　対地別回線数　　1980年末現在

対地名		自動即時	手動即時	待時
LUSAKA	KAFUE	56	4	-
	KITWE	384	50	2
	NDOLA	171	15	-
	LIVINGSTONE	165	-	2
	KABWE	97	3	5
	CHIPATA	82	4	3
	KASAMA	82	-	3
	CHOMA	78	-	-
	MONGU	59	-	2
	MAZABUKA	12	-	1
	MUMBWA	29	-	4
	PETAUKE	-	1	1
	MPIKA	-	1	1
	CHINGOLA	-	-	2
	NAMALUNDU GORGE	15	1	
	SIAVONGA	17	4	
	MBALA	-		1
	KAPIRI MPOSHI	-		1
KITWE	NDOLA	158		
	KABWE	32		2
	MANSA	53	4	1
	SOLWEZI	52		
	KASAMA	24		3
	KALULUSHI	85		
	LIVINGSTONE	10		
	CHINGOLA	134		
	MUFULIRA	160		

※一部未開通の対地も含まれる。

CONT. KITWE	LUANSHYA	173		
	CHILILABOMBWE	102		
	CHAMBESHI	20		
	MBALA			1
NDOLA	KABWE	16		
	LIVINGSTONE			2
CHOMA	MONZE	33		
	MAZABUKA	44		
	GWEMBE	15		
	PEMBA	15		
	KALOMO	52		
CHIPATA	CHADIZA	12		1
	KATETE	23		1
	SINDA	13		
	NYIMBA	14		
	PETAUKE	27	1	1
KABWE	KAPIRI MPOSHI	41		4
	NKUSHI	22		2
	SERENJE	28		1
	MUMBWA			
	CHIPATA		-	1
	KASAMA		-	2
	SERENJE		-	2

KASAMA	MPIKA	52		3
	LUWINGU	17		1
	MPOROKOSO	18		
	MPULUNGU	15		
	MBALA	22		2
	NAKONDE	13		
	MUNGWI	17		
	ISOKA	18		
	CHINSALI	15		
	MANSA	-		3
MANSA	MWENSE	13		
	NCHELENGE	13		
	KAWAMBWA	20		
	SAMFYA	20		
MONGU	KALABO	13		
	LUKULU	13		
	SENENGA	18		
	KAOMA	13		
SOLWEZI	ZAMBEZI	13		
	MWINILUNGA	13		
	KASEMPA	13		
	KABOMPO	13		
	MANSA	-		

表－８　衛星通信対地および回線数

1980年末現在

S/NO.	COUNTRY	BAND WIDTH (MHZ)	CAPACITY	S/G	G	CHL	TOTAL
1.	INDIA	10.00	252	1	3	9-12	4
2.	ITALY	2.50	48	1	4	1-6	6
3.	KENYA	2.50	36	1	4	1-12	12
4.	SOUTH AFRICA	5.00	72	1	3	1-12	24
5.	SOUTH AFRICA	5.00		1	2	1-12	
6.	UNITED KINGDOM	7.50		3	5	1-12	
7.	UNITED KINGDOM	7.50	192	3	4	1-12	48
8.	UNITED KINGDOM	7.50		3	3	1-12	
9.	UNITED KINGDOM	7.50		3	2	1-12	
						TOTAL RECEIVE CHANNELS	94

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Ⅱ－1　日本政府に対するプロジェクト援助要請書

Ⅱ－2　MINUTES OF THE MEETING ON THE SCOPE OF WORKS FOR FEASIBILITY STUDY ON MICROWAVE RADIO RELAY PROJECT IN THE REPUBUC OF ZAMBIA

Ⅱ－3　SCOPE OF WORKS FOR FEASIBILITY STUDY ON MICROWAVE RADIO RELAY PROJECT IN THE REPUBLIC OF ZAMBIA

Ⅱ－4　BASIS FOR FEASIBILITY STUDY ON LS－CB, LUAPULA, NORTHERN PROVINCES RADIO RELAY SYSTEM

Ⅱ－5　面会者一覧表

Ⅱ－6　POPULATION OF ZAMBIA

Ⅱ－7　SUBSCRIBER TRUNK DIALLING(S.T.D)CALL CHARGES

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Ⅱ－9　LIST OF DATA/INFORMATION REQUESTED

Ⅱ－10　入手資料一覧

Ⅱ－11　ISSUE OF SPECIAL NIGHT PERMITS:JAPANESE PERSONNEL ON THE MICROWAVE LINKS PROJECT

Ⅱ－1　日本政府に対するプロジェクト援助要請書

...ications should be addressed
Permanent Secretary

Telephone: LUSAKA 50433, 50613, 50559, 50458
Telegrams:

In reply please quote:
No. NCDP/101/64/3

REPUBLIC OF ZAMBIA

NATIONAL COMMISSION FOR DEVELOPMENT PLANNING

OFFICE OF THE PRESIDENT
NATIONALIST/MBITA RD
P.O. BOX 50263
LUSAKA

25th July, 1980

His Excellency the Ambassador,
Embassy of Japan,
LUSAKA.

Your Excellency,

ASSISTANCE FROM JAPAN - 1980 PROGRAMME

I write Your Excellency, to request through you, your Government possibility to consider extending to the Government of the Republic of Zambia, assistance in the form of a Yen Credit for the following important projects:-

1. Mass Media Project

This is an important project of top priority which is being implemented with the valuable Japanese Government assistance. This project is scheduled for completion by November, 1981. It has however, become aparent that the absence of the television link between the microwave terminal and the new mass media studio in Lusaka will make it impossible for the Commission of the project in November, 1981. It is therefore important and necessary that the Zambian Government urgently provides for this microwave link in time for the Commissioning of the mass media project in November, 1981.

It is estimated that this project will cost about K1 million mainly in the provision of the necessary equipment. As high priority, the Government of the Republic of Zambia is requesting the Japanese Government to consider giving Zambia financial assistance for this project under the Yen Credit.

2. Microwave Project (Telecommunications)

This is a very high priority project. It includes microwave links required to connect the new exchanges in various districts into the national net work. Please refer to Appendix A of the attached report. Appendix B gives more details on the exchanges group by group.

The Posts and Telecommunications Corporation has purchased a lot of equipment from Japan for various links including the following links:-

(a) Lusaka - Kitwe

(b) Lusaka - Livingstone

(c) Lusaka - Nakonde via Kasama

(d) Lusaka - Chipata

(e) Lusaka - Mongu

(f) Mwembeshi Earth Station.

The cost of the links above is estimated at K19 million. In the light of the urgency attached to the completion of the telecommunications project, it is requested that your Government considers the possibility of giving Zambia financial assistance under the Japanese Yen Credit. Please find attached detailed information of the projects.

3. Children's Programme at the University Teaching Hospital

As we explained, ours is a young population with nearly 50% of the inhabitants being less than 25 years of age. Health facilities, although improving, cannot cope with the increasing population and the programme we have started with you on this needs completion.

4. Central Veterinary Institute Research Programme

The Zambian Government wished to re-affirm its request for Technical assistance for this project whose details have already been given.

5. Food Aid

We wish to re-affirm our request for food assistance from the Japanese Government on a grant basis and conditions indicated in our earlier request.

2. May we also, Your Excellency, take this opportunity to express our sincere thanks and gratitude for the project aid given for the construction of the Sulphuric Acid Plant, whose implementation is moving as swiftly as possible. We trust the loan agrement will be signed soon and construction work started. We also wish to express our gratitude for the capital grant to the Children's Wing of the University Teaching Hospital. Work has already started and we are looking forward to its fulfilment as this will go a long way to relieve some of the problems of congestion, particularly in the children's section of the University Teaching Hospital. It will also improve the facilities of the Children throughout the country.

3. Finally, Your Excellency, accept the assurance of my highest consideration.

Yours sincerely,

L.S. Chivuno
AG. PERMANENT SECRETARY & DIRECTOR GENERAL
NATIONAL COMMISSION FOR DEVELOPMENT PLANNING.

...
...e Permanent Secretary

Telephone:
Telegrams: DEVPLAN

No. DD/117/86/1

REPUBLIC OF ZAMBIA

OFFICE OF THE PRESIDENT

NATIONAL COMMISSION FOR DEVELOPMENT PLANNING
MULUNGUSHI HOUSE, 2ND FLOOR
P.O. BOX RW268
LUSAKA

20th June, 1980

His Excellency the Japanese Ambassador
to Zambia,
Japanese Embassy,
LUSAKA.

Your Excellency,

REQUEST FOR ASSISTANCE FOR NEW MICROWAVE PROJECTS UNDER JAPANESE YEN CREDIT

I write to request on behalf of the Government of Zambia for the Japanese assistance for new microwave projects to be undertaken by the Posts and Telecommunications Corporation. I enclose, Your Excellency, the necessary papers to support this request for the Yen Credit. In addition to this request I also submit the following projects for consideration under the same Yen Credit.

(1) Rehabilitation of the old Nitrogen Chemicals of Zambia Plant.

We attache great importance to the rehabilitation of this plant because over the last ten years or so it has proved very helpful in enabling us to produce some of the fertilizer, especially ammonium nitrate, which we require for our agricultural industry. Already extensive studies have been undertaken by experts and we are satisfied with the reports submitted by them, together with the management of NCZ and Indeco. The amount required for this project is K10 million. It will mainly be utilised in refurbishing some of the old equipment which has deteriorated somewhat due to natural wear and tear, and also in part to the retraining of local manpower and generally increase the efficiency as soon as possible. Rehabilitation of the fertilizer plant will ensure that production can continue over the next ten years or so.

(2) Urea Plant

We, at the moment, are importing nearly 100,000 tonnes of urea per annum, costing nearly K30 million. The forecast of the consumption of this fertilizer is

going up due to the increase in population. We envisage establishing a plant with a capacity therefore of 150,000 tonnes, whose cost we estimate in the range of K40 million or so. Obviously this is a type of plant that could take two to three years to complete. We were fortunate that in 1965 the Japanese Consulting Institute produced a feasibility study for such a plant and the technology they proposed then and various aspects of the project are still applicable today. We realise, however, it may be necessary to update some of the data. We would therefore request on this project, three things:

(a) A commitment that the Japanese Government will work with us towards the fulfilment of this project and that they will be in a position to pledge finance over a period of two to three years covering the construction period. Disbursements of course will be spread out accordingly.

(b) That an expert mission is dispatched from Japan as soon as possible to update the information we have and what was prepared in 1965 on the urea plant.

(c) That it should be possible to commence construction of this plant later on this year or early next year.

We wish to emphasise that Zambia's priority now in development is on agriculture. Recently, His Excellency the President launched a massive 'Operation Food Programme' in May of this year, covering the period over the next decade. One of the most important inputs for its success is the availability of fertilizer. We have over the last ten years worked closely with the Japanese Government and Japanese technology and industry in the development of the chemical complex at Kafue. The rehabilitation of the old fertilizer plant and the construction of the urea plant is a natural development in the relization of the complex. We have no doubt that when the chemical complex has run its full course it will provide the necessary inputs, particularly of fertilizer, for Zambia and indeed the neighbouring countries who will soon form part of the economic union which was discussed recently by Heads of State in Lusaka in the subcontinent. For the urea plant the technology to some extent already exists from the present plant and the raw materials which are mainly coal is available and already in use at the old plant, and water and air are of course abudant.

(3) Agricultural Centre

We would appreciate assistance from the Japanese Government to help us establish an agricultural centre which is envisaged in the Operation Food Programme and the Third National Development Plan which we estimate would cost about K20 million. The purpose basically would be to establish rice production schemes in the Western, Luapula, Eastern, and North-Western Provinces of our country. We know and appreciate very much the tremendous success of the Japanese rice production over many years of experience. We would wish to establish rice production schemes utilising your technology, machinery, and expertise to ensure self-sufficiency in this crop. Our estimates are that by 1983 consumption will be in excess of 20,000 tonnes per annum. In regard to this project, we would request for:

(a) An expert team to prepare a feasibility study.

(b) To assess the areas in the four provinces which are suitable for the establishment of rice production schemes.

(c) The commencement and launching of those rice production schemes as a result of the studies carried out together.

In this project we also envisage a two to three year programme and the funds we are requesting for would have to be pledged and committed to ensure the fulfilment of the project over the period. Here again we would appreciate if a start could be made in 1980 and the commencement of production in 1981.

(4) Phosphoric Acid Plant

This project is intended to substitute our imports of 60,000 tonnes at the moment per annum of phosphates for the production of compound fertilizers at the present moment which we are utilising. We have some phosphate rock in the Luangwa District of our country and we think it should be possible from that to produce our own phosphoric acid which will enable us to make the phosphates we require without importing from outside. Obviously this plant will complete the chemical complex at Kafue. We therefore would appreciate your cooperation in:

(a) determining the feasibility of this project, and

(b) the financing and constructing of it.

We have no doubt that over the long term the country would be saving valuable foreign exchange as we could utilise local resources to make our own fertilizer compounds. It is difficult at this stage to put a cost or price to this plant, but we estimate that on completion it will cost K45 million. The construction of this would also be spread over two to three years.

(5) Commodity Aid

With the emphasis that the Party and Government is placing on agricultural development and also with the desire to implement fully the Third National Development Plan as spelt out in the Operation Food Programme, it is necessary to have the supporting services for this agricultural programme. It is in this connection therefore that we would appreciate if the Japanese Government would assist us by way of commodity aid for the equipment and vehicles which are required to support this programme. What we have in mind are the following:-

(a) Road Transport Vehicles, both large units and small commercial vehicles for the transportation of agricultural requisites, spares and supplies - approximately K5 million.

(b) 4-wheel drive vehicles for education mainly and cross-country driving, particularly by operative Government ministries to administer the food programme - approximately K3 million.

(c) 4-wheel drive Ambulances, particularly for rural health to cater for the state farms and production schemes envisaged in the food programme and also for peasant farming projects - approximately K5 million.

(d) Railway Wagons and Passenger Coaches which will be necessary for carrying the heavy cargo and materials, such as fertilizer and produce - approximately K5 million.

This commodity aid is of course urgently required to enable the various schemes that are envisaged to be off the ground. It will therefore be appreciated if the Japanese Government would indicate assistance in this area. Already we have been satisfied with the vehicles, ambulances, and rolling stock we have obtained in the past in support of our development programme, and it would assist us if we could continue with the same type of equipment to standardise and make it easy for spare parts and servicing of the same. If we were to utilise different equipment this will be a strain on our already over-

stretched resources, including manpower who will have to adjust to different equipment and models. It would be helpful therefore if the agricultural programme in which Japan would assist us could be on a continuous basis, so that it is easily identifiable and its contribution clearly visible to our people as well.

Your Excellency, when we know your Government's reaction to this request for 1980 project and commodity aid assistance, we will of course be submitting in some detail the background to the projects and how we arrive at the costs of some of them and the contribution they will make to our economy. As you know, we are going through a difficult period at the moment and it is our intention that we increase food production as we have the capacity to do so and with your cooperation it should be possible in the fields we have indicated to go a long way to realising our objectives.

May we also, Your Excellency, take this opportunity to express our sincere thanks and gratitude for the project aid given for the construction of the Sulphuric Acid Plant, whose implementation is moving as swiftly as possible. We trust the loan agreement will be signed soon and construction begin with the Japanese Contractor, Messrs. Kobe Steel Limited. We also wish to express our gratitude for the capital grant to the Children's Wing of the University Teaching Hospital. Work has already started and we are looking forward to its fulfilment as this will go a long way to relieve some of the problems of congestion, particularly in the children's section of the University Teaching Hospital. It will also improve the health and facilities of the children throughout the country.

Finally, Your Excellency, accept the assurance of my highest consideration.

Yours sincerely,

for L.S. Chivuno
ACTING PERMANENT SECRETARY,
NATIONAL COMMISSION FOR DEVELOPMENT PLANNING.

1. INTRODUCTION

1.1 Posts and Telecommunications Administration

1.1.1 Public Telecommunications services are provided jointly with Postal services by the Posts and Telecommunications Corporation under the provisions of the Posts and Telecommunications Act of 1975. The Corporation, under this Act is now vested with enough autonomy to run the telecommunications and postal services on commercial basis. The Act has achieved this goal by giving the Corporation adequate powers in such essential fields as planning, staffing and procurement.

1.1.2 The Act provides for the separation of finances and accounts between the postal and the telecommunications services. The Telecommunications Division no longer gives financial support to the Postal Division as was the case under the General Post Office. The surplus recorded by the Telecommunications Division are ploughed back into development.

1.2 The Project General

1.2.1 The Posts and Telecommunications Corporation had embarked on an ambitious Telecommunications Development Programme. The Programme which forms part of the Second and Third National Development Plan of Zambia will expand and improve the services to meet the bulk of demand in areas now being served and extend services to areas where telecommunications services are non-existent. It will also provide high quality telecommunications to other countries with the installation of microwave links to Tanzania, Malawi, Mozambique and Botswana, Zimbabwe and Angola in due course. The Programme also includes the construction of an international telex and international telephone transit centre which have improved international telex and telephone services respectively.

1.2.2 The following sources of funds have been used or are earmarked for use on the Project:-

a)	African Development Bank (1976)	K 3.2 million
b)	SIDA (1974-1980) SKr. 76 million	13.6 million
c)	IBRD 1975 (US Dollars 32 million)	26.6 million
d)	KFW (Federal Republic of Germany 1979 - Deustche Marks 16.3 M)	7 million
e)	Government Loans (up to 1980)	19 million
f)	PTC own resources (up to 1980)	20 million

Due to the current financial difficulties being faced by the country, the projected development of the telecommunications infra-structure has been slowed down. In order to complete the basic infra-structure that will extend telecommunications facilities to all district centres, a total of K74 million will require to be invested in the network over the next five years; K15 million of which will be obtained from IBRD, KFW and SIDA. It is also hoped that the Corporation would raise a further K10 million over the next five years to be reinvested in telecommunications development. A shortfall of K49 million will therefore be required to be met from other sources.

2. EXISTING AND ON-GOING PROJECTS

2.1 As of December, 1977 Zambia had about 60,000 telephone stations connected to 32,000 direct exchange lines, There is a large unsatisfied demand for telephone service as shown by a waiting list of about 13,000 lines.

2.2 Local Telephone Service

The Local Telephone Service comprises - local telephone exchanges of which 32 are automatic and the remainder are manual. The majority of the automatic exchanges are of the step by step type of equipment but these are currently being replaced by either the L.M. Ericsson's Crossbar exchanges or ITT/North SEC exchanges. It is hoped that a total of 53 new automatic exchanges will be operational by December, 1981. Buildings for these exchanges are ready and equipment is now being installed on a country wide basis. Local exchanges include; a 21,000 line network complex comprising - Lusaka Main 15,000 lines; Chelston 3,000 lines; Kafue 2,000 lines; Airport 500 lines; Chilanga 500 lines. Lusaka Main Exchange is scheduled for commissioning by the end of August this year.

2.3 Long Distance Service

A back bone microwave system connects the Copperbelt to Lusaka and Livingstone. It provides 960 high quality circuits serving about 96% of the subscribers in the country. In 1978 a new microwave link from Lusaka to Nakonde via Kasama was completed with a capacity of 960 channels including television capability. Spur routes go from this route to serve Isoka and Chinsali. Back bone microwave routes to Chipata and Mongu are currently under construction with the Chipata link scheduled for completion in July, 1980 and the Mongu link, which has been delayed due to lack of Kwacha, to be completed in June, 1981. Solwezi and Mansa are still served by 120 channel UHF equipment which is considered to be very inadequate. Other trunk lines are served by open wire systems of 2-12 channels capacity each. The majority of district centres are served by HF radio telephone and telegraph lines working either to Mbola or Lusaka.

2.4 Automatic Trunk Switching Exchanges

When the new development plan is completed all subscribers in the country will have access to the automatic trunk network. New group switching centres have been installed at Livingstone, Choma, Lusaka and Kitwe. The exchanges have increased the switching capacity to the exchanges in Kitwe and Lusaka from 200 to 1,200 lines at each exchange. A marked improvement in the trunk network has been noticed. However, due to the delays in the completion of the Lusaka local exchange, congestion still exists on certain routes as the final routing plan for the whole of Zambia cannot be fully implemented. It is hoped that extension work (funded by SIDA) on the group switching centres will be completed by December, 1980. Other group switching centres under construction are Mongu, Chipata, Kasama, Mansa and Solwezi to serve their respective areas. Equipment is already in the country and installation has started. All the group switching centres will be in operation by November, 1981.

2.5 International Telex Service

The telex network in Zambia is the most efficient means of communication available. The service which had 450 subscribers in 1975 has now a capacity of 2,000 lines after the extension which was completed in

in March, 1980. Zambian telex subscribers can access, automatically, any part of the world where automatic telex service exists. The Federal Republic of Germany last year allocated 2.3 million Deustche Marks for the purchase of teleprinters under Commodity Aid to Zambia.

2.6 International Telephone Service

Despite the completion of the Mwembeshi Earth Station in 1974, services provided to the public were still unsatisfactory due to the fact that the calls were handled on the manual to manual i.e. Zambian operators sought the assistance of operators in the distant exchanges in order to connect a call. A new international telephone exchange which offers Zambian operators easy access into the international network as they can dial calls by themselves from Lusaka, has now been completed. The number of effective calls has now increased by more than 100% since the exchange came into use. The service is reasonable, however, difficulties still exist in that human error and contact has not been completely removed. It is hoped that the Corporation can introduce international direct dialling (IDD) for Zambian subscribers when congestion in the national network is cleared and toll-ticketing equipment has been installed to improve the billing on automatically dialled international calls. It is hoped that funds for this equipment will come from SIDA. IDD from the U.K. to Zambia was introduced in March, 1980 and the results have been very encouraging.

3. NEW PROJECTS

3.1 There are many projects in the Third National Development Plan which have no sources of financing earmarked for them. In the formulation of the Third National Development Plan the telecommunications infra-structure was planned with the following requirements in view:-

3.1.1. to provide an efficient but cost effective telecommunications infra-structure to complement the agrarian revolution and support the rural reconstruction;

3.1.2 to provide basic services to all district centres in Zambia from which outlying areas can be fed

3.1.3 to provide high capacity microwave links with television capability to all provincial centres.

3.1.4 to up-grade the existing back bone microwave link between Lusaka and the Copperbelt as the system is now saturated.

3.2 The attached diagram in appendix A shows that all district centres in the country save for Chama, Lundazi, Kaputa and Sesheke have new exchanges under construction or completed. Due to financial difficulties that were being faced by the country in the last four years, the Corporation was forced to reschedule or delay some projects in order to concentrate the resources on the completion of the on-going projects. All the exchanges will be completed by December 1981, in stages, starting with Lusaka in July/August, 1980. Appendix B gives the capacities of new exchanges through-out-Zambia.

3.3 The microwave link between Lusaka and the Copperbelt is the main stay of the Zambian telecommunications network. The link was commissioned in 1966 using early generation microwave equipment. The normal life of such equipment is 10-15 years depending on the efficiency of the maintenance effort. It carries about 90% of all trunk traffic and generates about 95% of the total Corporation income. Due to the increase in traffic the link is now saturated with no spare capacity. The introduction of colour television has also placed more constraints on the link. It was designed to carry only black and white television. In view of the importance that this link plays in the economic life of the Nation and in view of its viability, it is strongly recommended to up-grade the link by construction of a new microwave link. The estimated cost of the link is U.S. Dollar 6.9 million - K5.6 million for an 1800 channel for telephony system with a colour compatible TV channel.

3.4 The following links are critical for the full utilisation of the new exchanges and the ZBS Mass Media Network.

3.4.1	Mass Media Television link, Lusaka	K1,000,000
3.4.2	Kitwe-Mansa (960+TV)	K3,000,000

3.4.2	or	
	Kasama-Mansa via Luwingu (960 + TV)	K3,000,000
3.4.3	Chingola-Solwezi (960 + TV)	K3,000,000
3.4.4	Kasama-Mbala (120)	K1,500,000
3.4.5	Kasama-Mporokoso	K1,500,000
3.4.6	Chipata-Lundazi	K3,500,000

3.5 In the allocation of funds consideration of the projects for Telecommunications links should be with the following priorities in mind:-

3.5.1	Mass Media Television link, Lusaka	K1,000,000
3.5.2	Lusaka-Copperbelt microwave link	K5,600,000
3.5.3	Kasama-Mansa (960 Chan. + TV)	K3,300,000
3.5.4	Chingola-Solwezi (960 chan. + TV)	K3,000,000
3.5.5	Kasama-Mbala (120 channels)	1,500,000
3.5.6	Kasama-Mporokoso (120 channels)	1,500,000
3.5.7	Chipata-Lundazi	3,500,000

NEW EXCHANGES IN ZAMBIA

1. LUSAKA GROUP (Group Switching Centre)

Exchange	Existing Capacity	New Capacity
Lusaka Main	4,000 lines	15,000 lines
Chelston	-	3,000 "
Kafue	200 lines	2,000 "
Chilanga	135 lines	500 "
Ridgeway	5,000 lines (retained)	-
Airport	-	500 "
Mumbwa	50 Manual	200 "

2. KITWE GROUP (Group Seitching Centre)

Kitwe	4,500	9,000 (1978)
Mufulira	1,500	3,000
Chingola	1,500	3,000
Luanshya	1,500	3,000 (1978)
Chambeshi	-	200 (1979)
Itimpi	-	200 (1978)
Ndola	4,000	10,000 (PL)*
Mpongwe	-	50 (PL)*

3. CHOMA GROUP (Group Switching Centre)

Choma	300	800
Gwembe	Manual	
Kalomo	100	200
Mazabuka	300	800
Monze	100	600
Pemba	50 Manual	100
Namwala	-	100 (PL)*

(PL)* - Planned.

4. CHIPATA GROUP (Group Switching Centre)

Chipata	300	800	
Chadiza	-	50	
Katete	50 Manual	150	
Nyimba	-	50	
Petauke	100 Manual	200	
Sinda	-	50	
Chama	-	50	(PL)*
Lundazi	-	150	(PL)*
Kakumbi	-	50	(PL)*

5. KASAMA GROUP (Group Switching Centre)

Kasama	1,000	1,500	
Chinsali	50 Manual	150	
Isoka	-	200	
Mpika	100 Manual	800	
Nakonde	-	50	
Luwingu	100 Manual	200	
Mporokoso	-	200	
Mbala	150	500	
Mpulungu	-	150	
Mungwi	30 Manual	150	
Kaputa	-	50	(PL)*

6. SOLWEZI GROUP (Group Switching Centre)

Solwezi	192	600	
Kabompo	-	100	
Zambezi	-	100	
Mwinilunga	-	100	
Chizera	-	50	(PL)*

* (PL) - Planned.

7. MONGU GROUP (Group Switching Centre)

Mongu	192	500
Lukulu	-	100
Kalabo	-	100
Senanga	-	100
Kaoma	-	100
Sesheke	-	100 (PL)*
Mulobezi	-	-

8. MANSA GROUP (Group Switching Centre)

Mansa	200	800
Samfya	-	250
Kawambwa	-	250
Nchelenge	-	100
Mwense	-	100

9. KABWE GROUP (Group Switching Centre)

Kabwe	1,900	4,000
Mkushi	100 Manual	200
Kapiri Mposhi	50 Manual	500
Serenje	50 Manual	300
Chibombo	-	50

* (PL) - Planned.

APPENDIX C.

POSTS AND TELECOMMUNICATIONS CORPORATION - ZAMBIA

PROJECT MEMORANDUM

1. SECTOR: Parastatal (Communications).

2. PROJECT PROGRAMME PROMOTER: Posts and Telecommunications Corporation.

3. TITLE OF THE PROJECT: International Airmail Exchange Office.

4. LOCATION: Lusaka International Airport, in Lusaka Urban District.

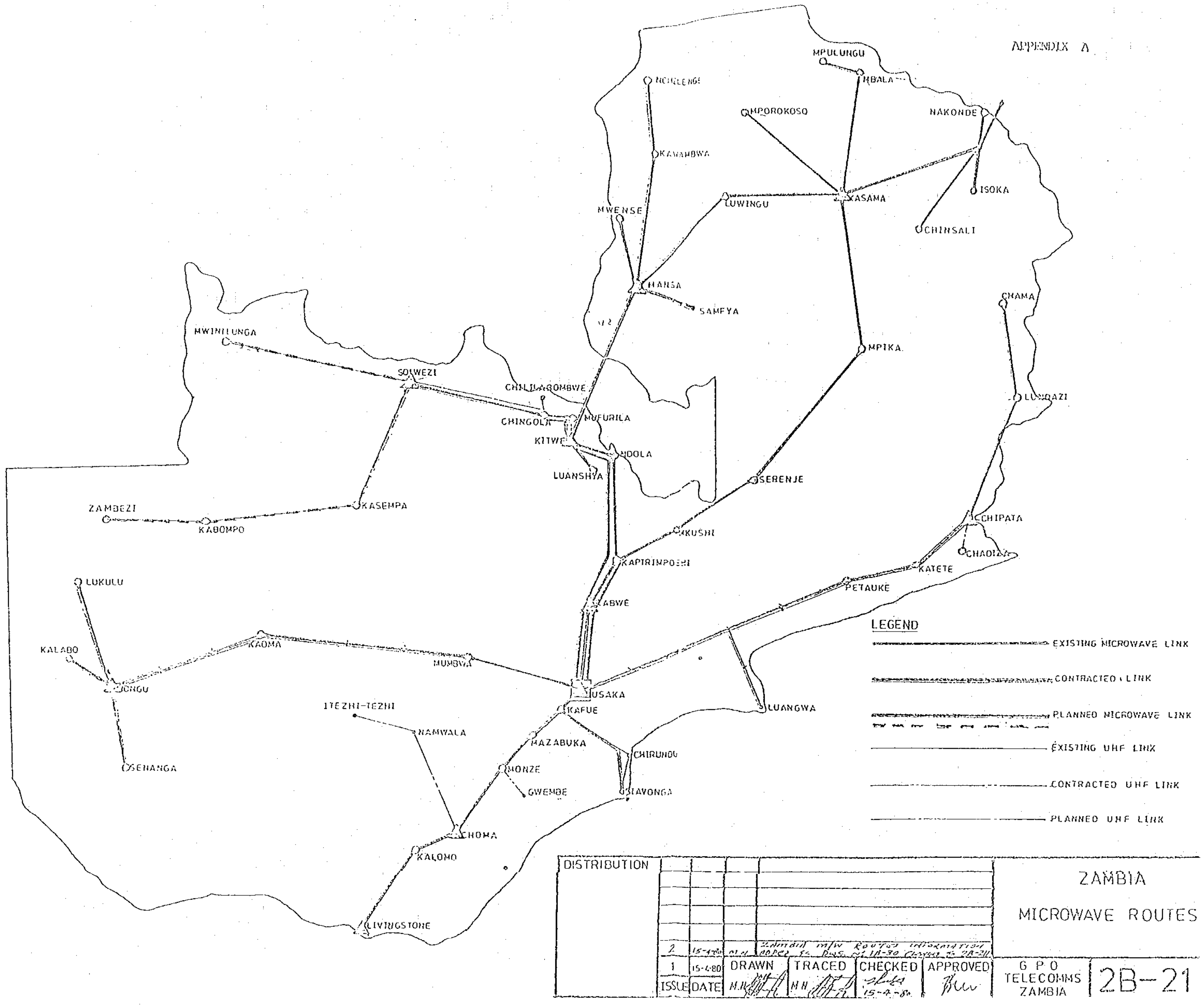
5. DESCRIPTION: A Centre for processing of outgoing, incoming and transit airmail.

6. JUSTIFICATION: In order to improve the handling of airmail correspondence in Lusaka, it is vital that a mail processing centre should be built and located at the International Airport. The present arrangements are most unsatisfactory as mail in transit has to be transported from the Airport to the City Post Office for re-sorting before being forwarded to the airport for despatch. This results into heavy delays. Furthermore, the capacity of the Lusaka Post office is no longer capable of handling the large quantities of mail. This results into confusion of international mail with local mail, and the consequence is further delays of mail prepared for transmission by air. There is need also to introduce simple mechanisation such as mailbag conveyers and belt conveyers for parcels, packets and letters.

7. PRIORITY: To be constructed in 1981 if possible. This project is included in the Third National Development Plan.

8. COST: K930,000.

APPENDIX A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MBALA
NCHELENGE
MPOROKOSO
NAKONDE
KAWAMBWA
KASAMA
ISOKA
LUWINGU
MWENSE
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MANSA
SAMFYA
CHAMA
MWINILUNGA
MPIKA
SOLWEZI
CHILILABOMBWE
LUNDAZI
CHINGOLA
MUFULIRA
KITWE
NDOLA
LUANSHYA
SERENJE
ZAMBEZI
KASEMPA
KABOMPO
CHIPATA
MKUSHI
CHADIZA
KAPIRIMPOSHI
KATETE
LUKULU
PETAUKE
KABWE
LEGEND
EXISTING MICROWAVE LINK
KALABO
KAOMA
MUMBWA
CONTRACTED LINK
MONGU
LUSAKA
ITEZHI-TEZHI
KAFUE
LUANGWA
PLANNED MICROWAVE LINK
NAMWALA
MAZABUKA
EXISTING UHF LINK
CHIRUNDU
SENANGA
MONZE
GWEMBE
SIAVONGA
CONTRACTED UHF LINK
PLANNED UHF LINK
CHOMA
KALOMO
LIVINGSTONE
DISTRIBUTION
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TELECOMMS
ZAMBIA
2B-21

Ⅱ — 2

MINUTES OF THE MEETING ON THE SCOPE OF WORKS FOR FEASIBILITY STUDY ON MICROWAVE RADIO RELAY PROJECT IN THE REPUBLIC OF ZAMBIA

12th December, 1980

MINUTES OF THE MEETING ON THE SCOPE OF WORKS FOR FEASIBILITY STUDY ON MICROWAVE RADIO RELAY PROJECT IN THE REPUBLIC OF ZAMBIA

The meeting was held on December 12, 1980, at the conference room of the Posts and Telecommunications Corporation, Lusaka, Zambia to discuss the draft of the Scope of Works for feasibility study on Microwave Radio Relay Project in the Republic of Zambia. Attending the meeting were:-

P.T.C

Mr. Philemon NG'OMA	*Director General*
Mr. S.W. MUNTHALI	*Director of Telecommunications*
Mr. G.L. MUTTI	*Deputy Director of Telecommunications*
Mr. E. De S. WICKRAMARATNE	*Financial Controller*
Mr. E. M. MUSONDA	*Regional Manager (South)*
Mr. E. MWESHI	*Principal Engineer*

Japanese Study Team

Mr. Tohru HASEGAWA (Leader)
Mr. Tsunenatsu YANO
Mr. Takashi SUZUKI
Mr. Muneo KURONO
Mr. Ako ITOH (Project Coordinator)

1. *Mr. Philemon NG'OMA Director General expressed his thanks to the members of the Japanese Study Team who were sent to Zambia in response to the request of the Government of the Republic of Zambia, and expressed the hope that the objectives of the Preliminary Study Team were attained.*

Mr. Tohru HASEGAWA, leader of the Japanese Study Team appreciated the cooperation extended by the Posts and Telecommunications Corporation to the Japanese Study Team in their two weeks survey work.

2. The Japanese Study Team submitted the draft copy of the Scope of works for feasibility study on microwave radio relay project to Mr. Philemon NG'OMA for consideration.

3. Mr. Philemon NG'OMA Director General and the Japanese Study Team discussed the draft of the Scope of Works, and noted:-

(i) that the proposed project was already delayed due to lack of funds and that the exchanges which the majority of the rural links in this project are supposed to serve, were in an advanced stage of installation.

(ii) and that most of the routes had already been surveyed by the Corporation and data was available for further study save for the the Lundazi - Chama and Kasama - Mporokoso links.

Considering the above, it was agreed that every effort should be made to save time on the feasibility study with a view to expediting the implementation of the project.

Further, the meeting noted that the Mass Media Project is scheduled for completion by November 1981. The new mass media complex requires to be connected to the P.T.C. Transmission Terminal at Lusaka by a new microwave link. Due to the expansion of the TV network as shown on diagrams in Annex I and II it is necessary to introduce a TV Switching Centre at the Lusaka P.T.C. Terminal.

The original proposal for the Mass Media Project included; the provision of extra equipment for the link to the Earth Station and provision of TV transmission capability on the link from Livingstone to Lusaka. Due to the difficulties that have been encountered in the funding of this project, a further review of the requirements have been made in order to provide the necessary basic facilities required for the completion of the Mass Media Project.

Considering the time constraint imposed on the provision of this new link i.e. the microwave link should be ready by November 1981, a list of reduced requirements has been prepared as per details shown in diagram 2B-213. This will provide:-

1. a 2 + 1 Television link from the Mass Media Complex to Lusaka T.E.

2. a 2 + 1 Television link from the Lusaka T.E. to the Mass Media Complex

3. Television Switching equipment at Lusaka T.E.

4. Associated modification works on the existing equipment at Lusaka T.E. for 3 above.

It is estimated that the above will cost 100,000,000 Yen. The exact figure will be known after the discussions with the Contractor but is not expected to exceed 100,000,000 Yen.

Even though the Corporation is in a position to provide the local currency equivalent of the above required sum, difficulties are envisaged in obtaining the foreign exchange component within the time-frame required for the implementation of this project. The Corporation therefore requests that further representations be made to the Japanese Government with a view to obtaining this money as a grant.

As a result of the exchange of views and discussions, both parties have agreed on the draft of the Scope of Works, hereto attached.

Lusaka, December 12, 1980

PHILEMON NG'OMA
DIRECTOR GENERAL
POSTS AND TELECOMMUNICATIONS CORPORATION

TOHRU HASAGAWA
LEADER
THE JAPANESE PRELIMINARY STUDY TEAM FOR MICROWAVE RADIO RELAY PROJECT IN THE REPUBLIC OF ZAMBIA

Ⅱ－3

SCOPE OF WORKS

FOR

FEASIBILITY STUDY

ON

MICROWAVE RADIO RELAY PROJECT

IN

THE REPUBLIC OF ZAMBIA

AGREED

BETWEEN

THE JAPANESE PRELIMINARY STUDY TEAM

AND

POSTS AND TELECOMMUNICATIONS CORPORATION

DATE:

PHILEMON NG'OMA
DIRECTOR GENERAL
POSTS AND TELECOMMUNICATIONS
CORPORATION

長谷川 徹

TOHRU HASEGAWA
LEADER
THE JAPANESE PRELIMINARY STUDY TEAM
FOR MICROWAVE RADIO RELAY PROJECT
IN THE REPUBLIC OF ZAMBIA

1. INTRODUCTION

In response to the request of the Government of the Republic of Zambia, the Government of Japan has decided to undertake a feasibility study of Microwave Radio Relay Project in accordance with laws and regulations in force in Japan as part of its technical cooperation programme.

Based on this decision, the Japan International Cooperation (hereinafter to be referred to as "JICA"), the official agency responsible for the implementation of the technical cooperation programmes of the Government of Japan, will carry out the works necessary for the study.

The present document sets forth the scope of works for the above mentioned study which is to be implemented by JICA in close collaboration with the Posts and Telecommunications Corporation (hereinafter to be referred to as "P.T.C") and other agencies concerned.

II. OBJECTIVES OF THE STUDY

The study aims to confirm the feasibility of Microwave Radio Relays Project which is defined as follows:-

1. Mass Media Television Link
2. Lusaka - Copperbelt Microwave Link (1800 + TV)
3. Kasama - Mansa (960 + TV)
4. Mansa - Mwense - Kawambwa - Nchelenge (120)
5. Mansa - Samfya (120)
6. Chingola - Solwezi (960 + TV)
7. Kasama - Mbala - Mpulungu (120)
8. Kasama - Mporokoso (120)
9. Chipata - Lundazi - Chama (120)
10. Chipata - Kakumbi - Mfuwe (120)

III. OUTLINE OF THE STUDY

The study will entail field surveys in Zambia and analysis works in Japan. Items to be covered by the study are as follows:-

1. Telecommunications development plan

2. *Telecommunications demand and traffic forecast*
3. *Television and radio broadcasting network expansion plan*
4. *Present technical standards of telecommunication facilities*
5. *Telecommunication service revenues and expenditures*
6. *Present tariff system*
7. *Microwave network plan*
8. *Microwave system design*
9. *Implementation schedule*
10. *Operation and maintenance*
11. *Cost estimate*
12. *Economic evaluation*

IV. *REPORT*

1. *Preparation of report*

The JICA will prepare and submit the following reports to the Government of Zambia;

(1) Draft report (5 copies)

After completion of the field survey, the draft report will be submitted to the Government of Zambia by a team from JICA during their stay in Zambia.

(2) Final report (15 copies)

Within two months after the return of the team, JICA will submit the final report to the Government of Zambia by a team from JICA.

2. *Contents of report*

The report will contain the following items:-

(1) Telecommunication demand and traffic forecast
(2) Microwave network plan
(3) Technical standards for the project
(4) Microwave system design
(5) Implementation schedule
(6) Operation and maintenance
(7) Cost estimate
(8) Economic evaluation
(9) Necessary information for promoting the project

V. SCHEDULE OF STUDY

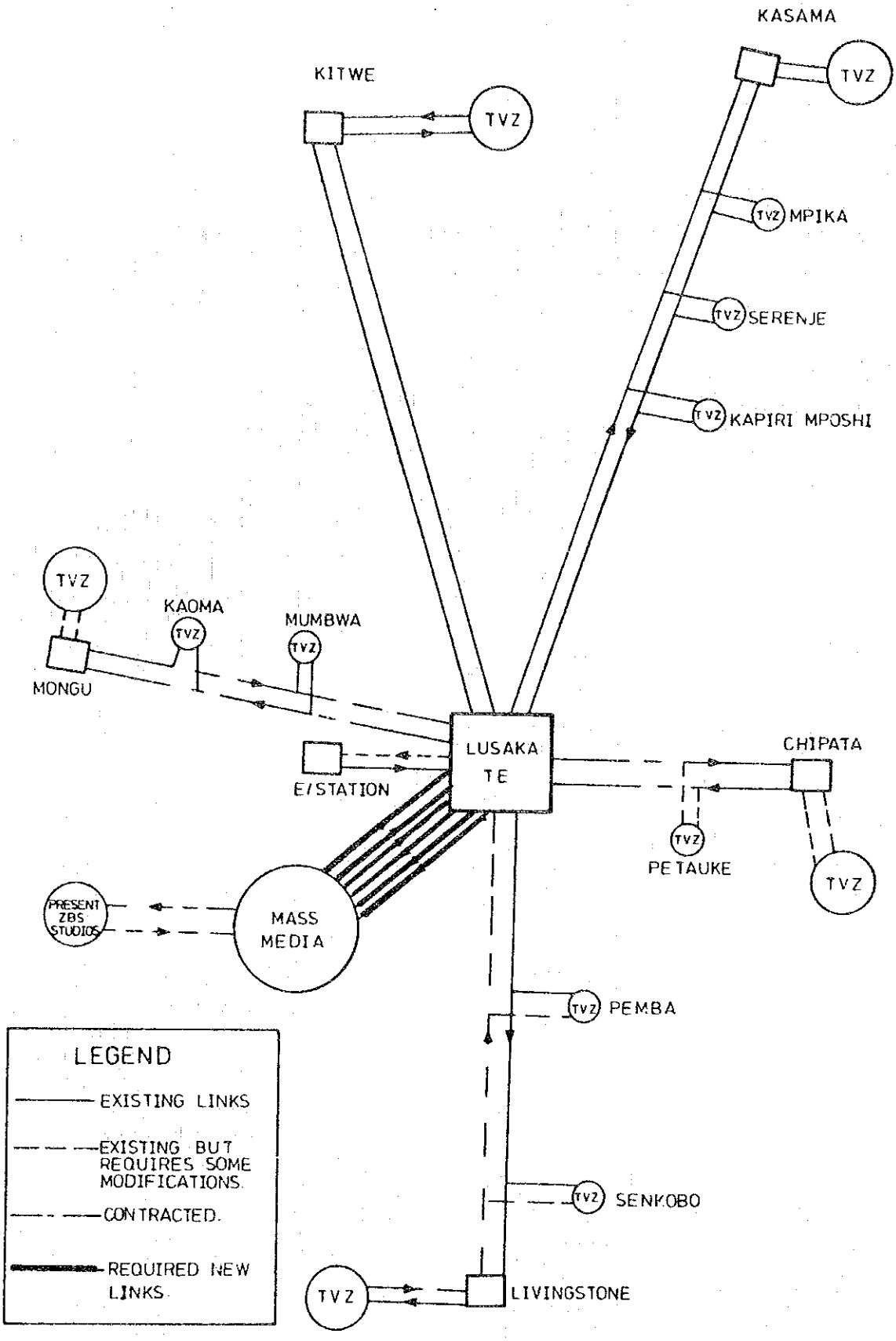
The study shall be undertaken in accordance with the schedule of study (refer to Annex III).

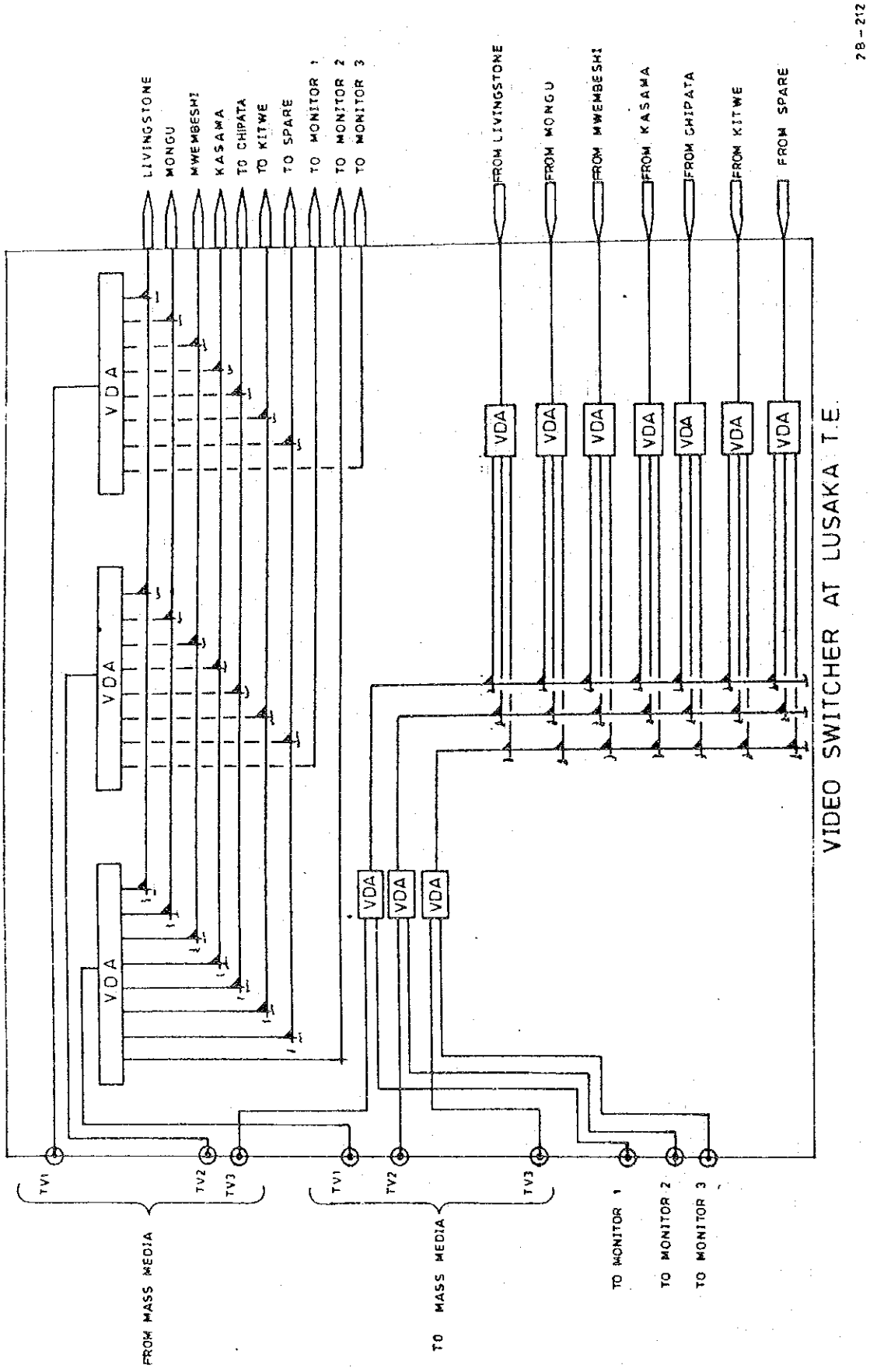
VI. UNDERTAKING OF THE GOVERNMENT OF ZAMBIA

1. To provide the team with data and information necessary for the study.
2. To exempt the team from the taxes and duties on the materials, equipment and personal effects brought into Zambia by the team.
3. To assign counterpart officials during the field survey.
4. To provide the team with suitable office space in PTC Headquarters.
5. To provide the team with appropriate number of vehicles with drivers.
6. To secure permission for entry into private properties and restricted areas for the implementation of the field survey.
7. To hire labourers as needed, but wages shall be chargeable to the team of JICA.
8. To provide the team with medical facilities when needed, but medical expenses shall be chargeable to the team.
9. To secure permission to bring out data and materials relating to the study from the Republic of Zambia to Japan.

TVZ NETWORK

Annex 1

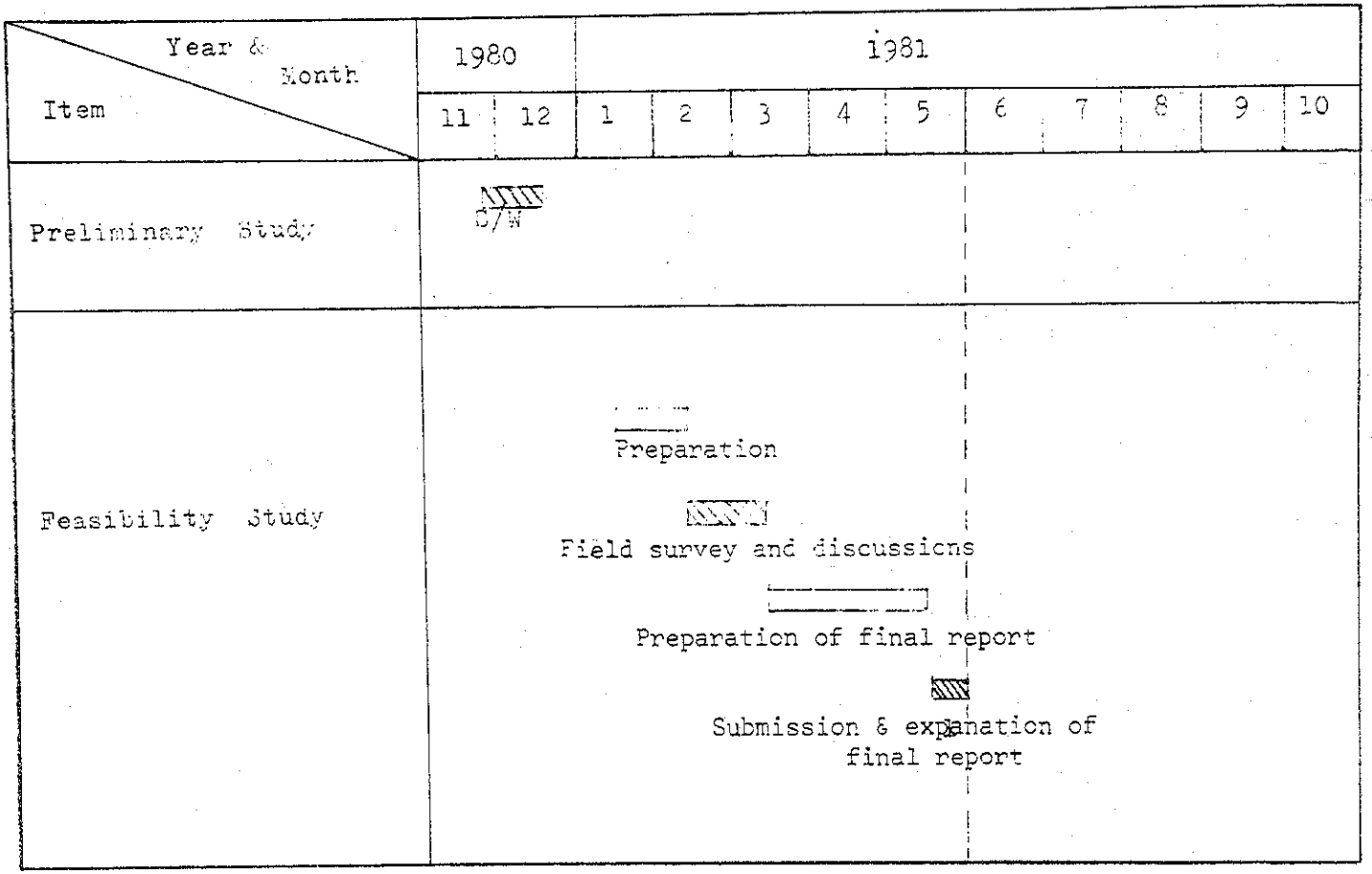



LIVINGSTONE
MONGU
MWEMBESHI
KASAMA
TO CHIPATA
TO KITWE
TO SPARE
TO MONITOR 1
TO MONITOR 2
TO MONITOR 3
FROM LIVINGSTONE
FROM MONGU
FROM MWEMBESHI
FROM KASAMA
FROM CHIPATA
FROM KITWE
FROM SPARE
VDA
VIDEO SWITCHER AT LUSAKA T.E.
TV1
TV2
TV3
FROM MASS MEDIA
TO MASS MEDIA
TO MONITOR 1
TO MONITOR 2
TO MONITOR 3

28-212

Annex

SCHEDULE OF STUDY



Remarks: work in Zambia

work in Japan

POSTS AND TELECOMMUNICATIONS CORPORATION

REPUBLIC OF ZAMBIA.

BASIS FOR FEASIBILITY STUDY

ON

LS-CB, LUAPULA, NORTHERN, EASTERN PROVINCES RADIO RELAY SYSTEM

CONTENTS

1. INTRODUCTION

1.2 LONG DISTANCE SERVICE

2. AIM OF THE FEASIBILITY STUDY

3. COPPERBELT - LUSAKA MICROWAVE RADIO SYSTEM

3.1 ROUTES MAKING UP THE LUSAKA - COPPERBELT LINK

3.2 REQUIREMENTS.

3.3 EXISTING FACILITIES

4. CHINGOLA - SOLWEZI TV CHANNEL REQUIREMENT

4.1 FUTURE REQUIREMENTS

4.2 ESTIMATED COST FOR THE CHINGOLA - SOLWEZI LINK

5. LUAPULA, NORTHERN AND EASTERN PROVINCES RURAL RADIO LINKS

5.12 ESTIMATED COST OF THE LUAPULA, NORTHERN AND EASTERN PROVINCES RADIO LINKS.

6. MASS MEDIA COMPLEX

APPENDIX A

TELECOMMUNICATIONS NETWORK PROPOSED

APPENDIX B

NEW EXCHANGES IN ZAMBIA

APPENDIX C

TRAFFIC FORECAST

APPENDIX D

ZAMBIA MICROWAVE ROUTES

APPENDIX E

DETAILED DESCRIPTION OF THE MASS MEDIA COMPLEX AND ITS ASSOCIATED DIAGRAMS

JAPANESE GOVERNMENT RADIO TRANSMISSION FEASIBILITY STUDY MISSION

1. INTRODUCTION

1.1 Local Telephone Service

The Zambian Local Telephone Service comprises local telephone exchanges of which 32 are automatic and the remainder manual. The majority of the automatic exchanges which used to be step-by-step type of equipment are currently being replaced by either L.M. Ericsson's Crossbar exchanges or ITT/North SPC exchanges. It is hoped that a total of 53 new automatic exchanges will be operational by December 1981.

When the new development plan is completed all subscribers in the country will have access to the automatic trunk network. New group switching centres have been installed at Livingstone, Choma, Lusaka and Kitwe; and other group switching centres under construction are Mongu, Chipata, Kasama, Mansa and Solwezi, and they are due to be operational by November 1981.

1.2 Long Distance Service

A back bone microwave system connects the Copperbelt to Lusaka and Livingstone. It provides 960 high quality circuits serving about 96% of the subscribers in the country. A new microwave link from Lusaka to Nakonde via Kasama was completed in 1978 with a capacity of 960 channels including television. Spur routes go from this route to serve Isoka and Chinsali. Backbone microwave route to Chipata was commissioned in July 1980, and that to Mongu is currently under construction and due for completion in May 1981. Solwezi and Mansa are served by 120 channel UHF system which is very inadequate. Other trunk lines are served by open wire systems of 2-12 channels capacity each. The majority of district centres are served by HF radio telephone and telegraph working either to Ndola or Lusaka which is very inadequate and unreliable.

The attached diagram in Appendix A shows that all district centres in the country save for Chama, Lundazi, Kaputa and Seshele have new exchanges under construction or completed. All the exchanges will be completed by December 1981. Appendix B gives the capacities of new exchanges throughout Zambia.

2. AIM OF THE FEASIBILITY STUDY

The aim of the feasibility study is to make it possible financially for the Telecommunications Division of the Posts and Telecommunications Corporation to meet its immediate tasks of implementing the telecommunications infrastructure of the country which was programmed with the following objectives in mind:-

(a) to provide an efficient but cost effective Telecommunications infrastructure to complement the agrarian revolution and support the rural reconstruction;

(b) to provide basic services to all district centres from which outlying areas can be fed.

(c) to provide high capacity links with television capability to all provincial centres.

(d) to up-grade the existing back bone microwave link between Lusaka and the Copperbelt as the system is new saturated and the equipment fairly aged.

With the above in mind, the projects that need immediate financing are the upgrading (up to 1800 channels) of the Copperbelt to Lusaka microwave link with TV capability, and TV extension from Chingola to Solwezi, the provision of telecommunications trunk facilities in the Northern, Luapula and Eastern Provinces, and most urgently of all the provision of interwork facilities with the new Mass Media Complex in Lusaka.

3. COPPERBELT - LUSAKA MICROWAVE RADIO SYSTEM

The microwave link between Lusaka and the Copperbelt is the main stay of the Zambian Telecommunications network. The link was commissioned in 1966 using early generation microwave equipment. The normal life of such equipment is 10 - 15 years depending on the efficiency of the maintenance effort. It carries about 90% of all trunk traffic and generates about 95% of the total Corporation income. Due to the increase in traffic the link is now saturated with no spare capacity. The introduction of colour television has also placed more constraints on the link. It was designed to carry only black and white television. It uses G.E.C. equipment and operates in 2 GHz frequency band. The link consists of terminal stations at Kitwe, Kabwe and Lusaka with intermediate stations at Kaloko, Katanino, Kapiri Mposhi, Mukumwanji and Kamaila. A spur serves Ndola, and Television studio links are provided at Lusaka and Kitwe.

3.1 The following links are routes which make up the present Lusaka - Kitwe microwave system:-

(i) One bothway telephony channel between Kitwe Telephone Exchange and Ndola TE.

(ii) One bothway Telephony channel between Kitwe TE and Lusaka TE.

(iii) One bothway Television channel plus the associated sound programme channel between Kitwe Broadcasting Studios and Lusaka Broadcasting studios.

(iv) One unidirectional television channel plus the associated sound programme channel between Lusaka and Kabwe.

A common standby exists between Lusaka and Kaloko.

The link between Lusaka and the Northern Province town capital at Kasama utilises upper 6 GHz frequency band and has been constructed using Nippon Electric Company's equipment. Both Lusaka - Copperbelt and Lusaka - Kasama microwave systems use the same radio path from Lusaka to Kapiri Mposhi. Since the proposed Lusaka - Copperbelt will utilize the upper six frequency band, with a carefully designed system the existing microwave repeater buildings and antennas at Lusaka, Kumaila, Mukumwanji, Kabwe and Kapiri Mposhi can be used for the new 1800 radio bearer.

The multiplex expansion programme which took place in 1978 covered Lusaka, Kabwe and all Copperbelt towns. But although the equipment was completely new its useful life however, is only limited to 15 years. Therefore, additional multiplex equipment might be required.

3.2 Requirements

The future requirement is for the 1800 Telephone channel bearer plus one television channel to be constructed between Lusaka and Chingola. The system should comprise of:-

(a) One bothway 1800 Telephone channel between Lusaka and Kitwe with a spur to Ndola.

(b) One bothway televisi on channel plus the associated sound programme between Kitwe ZBS studio and Lusaka ZBS studio with facilities at Kabwe Telephone Exchange to extract the TV signals.

(c) One bothway standby channel.

(d) One bothway 960 telephone channel via Mufulira between Kitwe and Chingola.

(e) One unidirection TV channel via Mufulira to Chingola from Kitwe.

(f) One standby channel.

(g) Facilities to provide transmission of television from Chingola to Kitwe and Lusaka on protection channel should be incorporated.

3.3 Existing Facilities

The following facilities exist:-

(a) Buildings at Lusaka, Kamaila, Mukumwanji, Kabwe, Kapiri, Katanino, Kaloko, Ndola, Kitwe and Chingola.

(b) Commercial power at ALL Telephone Exchanges and at the following repeaters:-

Kamaila, Mukumwanji, Kapiri and Kaloko.

Standby power at repeaters is provided by a generator of 12.5 KVA capacity except at Kaloko where its capacity is 20 KVA.

(c) Antennas and towers at Kamaila, and Kapiri, while towers only exist at Katanino and Kaloko repeaters.

In view of the importance that this link plays in the economic life of the nationa and in view of its viability, it is strongly recommended to up-grade the link by construction of a new microwave link. The estimated cost of the link is U.S Dollar 6.9 million - K5.6 million for an 1800 channel for telephony system with a colour compatible TV channel.

Traffic forecasts are attached in Appendix C.

Route map is in Appendix D.

4. CHINGOLA - SOLWEZI TV CHANNEL REQUIREMENTS

At the moment a 120 radio UHF sys tem connects these two towns. The link however, is very unreliable and the occurence of outages is very frequent. The weakest point in the system being power problem.

There are three repeaters on this link and each repeater is powered using one single phase generator only. This arrangement has proved to be very inadequate and troublesome - for if there is an engine failure on any of the repeater stations the whole link (Chingola - Solwezi) is also interrupted and since these repeaters are vey remotely situated from base maintenance areas the outages sometimes take a very long time to clear.

4.1 Future Requirements

The planned link is configured to have the following features:-

Bearer Capacity

(a) One 960 bothway telephone channels between Chingola and Solwezi.

(b) One unidirectional TV channel from Chingola to Solwezi.

(c) One 960 bothway standby telephone channel between Chingola and Solwezi.

Note:- Occasional TV from Solwezi to Chingola to be transmitted on protection channel.

Power

Power will be required at the repeater stations. Duel standby arrangement preferred.

Towers and Buildings

Towers might be required at repeaters but existing buildings with minor modifications can be used.

4.2 Funds for the Chingola - Solwezi high capacity microwave radio system are estimated to be K3,500,000.00.

5. LUAPULA AND NORTHERN AND EASTERN PROVINCE RURAL RADIO LINKS

The P.T.C is currently providing telephone exchanges and local distribution networks in the Northern and Luapula Province towns of Kasama, Mansa, Mbala, Luwingu, Samfya, Mpulungu, Mporokoso, Mungwi, Kawambwa, Mwense and Nchelenge and Eastern Province townsof Chipata, Chadiza and Kakumbi.

Further exchanges are proposed for Chienge, and Kaputa and Lundazi. The buildings for exchanges are under construction and the exchanges are scheduled for completion by mid 1981.

Mansa Group Switching Centre, is presently linked to Kasama Group Switching Centre by a 12 channel O.W.L. which is inadequate to cope with the present traffic let alone future traffic when all the other districts in the two Provinces have exchange facilities.

Kasama is connected to National Capital of Lusaka via a 960 radio bearer. The system is configured on 2 + 1 in the Lusaka - Kasama direction and on 1 + 1 in the other direction. This link was planned in such a way that it will link up with Tanzania Telecommunications network in the "Air" at Ilonda, a repeater only about 60 Kms from border with Tanzania.

Television signals from Lusaka to Kasama is carried over an independent channel, but shares the standby RF channel with Telephone signals. Facilities are also available for the transmission of TV signals from Kasama to Lusaka on the protection channel on occasional basis.

Mansa, Luapula Province, is linked to Kitwe by a 120 channel system.

Chipata is linked to Lusaka by a 960 channel capacity microwave bearer, which was installed and commissioned by NEC of Japan this year. This link is using 2 GHz frequency.

It is configured in the 2+1 syster from Lusaka to Chipata and in a 1+1 system from Chipata to Lusaka.

TV transmission is normally from Lusaka but Chipata also has a facility for occasional TV insertion.

Project funds are therefore required for the provision of (1+1) UHF/Microwave Radio Systems for 120 telephone channels between Mansa (Group Switching Centre for Luapula Province) and its outlying districts, Kasama (Northern Province Group Switching Centre) and its outlying districts, and also between Chipata (Eastern Province Group Switching Centre) and Chadiza, Kakumbi and Lundazi districts, frequency division multiplex equipment and associated power plants. Also funds are required for the provision of a 960 channel radio link from the Group Switching Centre at Kasama in the Northern Province to the Group Switching Centre at Mansa in the Luapula Province with a view to permit the extension of TV services to Mansa.

The Telecommunications Division has already carried out survey work of the areas, and sites for repeater stations have been chosen. The documents for this and other related requirements can be obtained from Radio and Transmission section of the Telecommunications Planning Group. The selected sites are as follows:-

(a) Luapula Province

Kitwe - Mansa

Mansa - Samfya

Mansa - Mwense

Mansa - Kawambwa

Mansa - Nchelenge

(b) Northern Province

Kasama - Luwingu - Mansa (960 Channel plus TV)

Kasama - Mbala

Kasama - Mpulungu

Kasama - Mporokoso (not fully surveyed)

5.2 Funds for these projects in the Northern, Luapula and Eastern Provinces are estimated to be K13,000,000.00.

6. MASS MEDIA COMPLEX INTERWORK FACILITIES

A microwave radio relay link for TV video signal (with sound) transmission between New Mass Media Station and Lusaka TE. The proposed microwave relay link consists of two (2) working and one (1) protection RF channels with an automatic protection switchover equipment, and is capable of transmitting up to (2) colour TV (PAL-B) video signals (with sounds) simultaneously for both directions between the new Mass Media Station and Lusaka TE.

The scope of work for this project involves the delivery, installation and commissioning of the microwave radio relay link between the New Mass Media Station and Lusaka TE. which is capable of transmitting - 2 colour TV video signals (PAL-B) with sound simultaneously in both directions. The proposed system configuration is obtainable from our Planning section.

The funds for this project are approximated at K1,000,000.00.

LEGEND

3rd. Z.N.D.P

- VILLAGES/TOWNSHIPS
- DISTRICT CENTRES
- PROVINCIAL CENTRES
- EXTG. EXCH. REPLACED OR EXTENDED.
- NEW EXCHANGES UNDERLINED
- EXISTING TRUNK BEARER
- NEW TRUNK BEARER
- 120/75 BEARER CAPACITY / YEAR OF COMPLETION.
- UG UNDERGROUND CABLE
- O-W OPEN WIRE ROUTE

Note 1 Lusaka consists of NXIE at main & chelston, MCR at airport, CROSSBAR at ridgeway, LME, ARM & International.

MCR Metaconto rural exchange
NXIE ITT / N exchange
ARM LME G.S.C.
ARF LME exchange
ME MOBILE exchange
MB MANUAL Board
S STROWGER exchange
ARK LME exchange

TANZANIA
ZAIRE
MALAWI
MOZAMBIQUE
ZIMBABWE
BOTSWANA
ZIMBABWE

Litongwe

ALSO SEE DRG. Nº 2D-69

SCALE :- 1: 4,000,000

DISTRIBUTION

ISSUE	DATE	DRAWN	TRACED	CHECKED	APPROVED
1	1.10.80	M Ngonda	M Ngonda		

ZAMBIA 3rd. NATIONAL DEVELOPMENT PLAN
TELECOMMUNICATION-NETWORK
PROPOSED

PTC ZAMBIA | 2B-69/1

APPENDIX B

NEW EXCHANGES IN ZAMBIA

1. LUSAKA GROUP (GROUP SWITCHING CENTRE)

Exchange	Existing Capacity	New Capacity
Lusaka Main	4,000 lines	15,000 lines
Chelston	-	3,000 lines
Kafue	200 lines	2,000 lines
Chilanga	135 lines	500 lines
Ridgeway	5,000 lines (retained)	-
Airport	-	500 lines
Mumbwa	50 manual	200 lines

2. KITWE GROUP (GROUP SWITCHING CENTRE)

Kitwe	4,500	9,000 (1978)
Mufulira	1,500	3,000
Chingola	1,500	3,000
Luanshya	1,500	3,000 (1978)
Chambeshi	-	200 (1978)
Itimpi	-	200 (1978)
Ndola	4,000	10,000 (PL)*
Mpongwe	-	50 (PL)*

3. CHOMA GROUP (GROUP SWITCHING CENTRE)

Choma	300	800
Gwembe	Manual	
Kalomo	100	200
Mazabuka	300	800
Monze	100	600
Pemba	50 Manual	100
Namwala	-	100 (PL)*

(PL)* - Planned

SOLWEZI AREA			CHANNELS
Solwezi	-	Mwinilunga	17
	-	Ikelenge	11
	-	Chavuma	16
	-	Kasempa	27
	-	Zambezi	27
	-	Kabompo	15
	-	Others	80
		TOTAL	193
MANSA AREA			
Mansa	-	Kawambwa	33
	-	Mwense	18
	-	Nchelenge	18
	-	Samfya	30
	-	Chilubi Island	11
		TOTAL	110
KASAMA AREA			
Kasama	-	Mporokoso	27
	-	Mpulungu	18
	-	Chozi	13
	-	Mbala	56
	-	Senga Hill	6
	-	Chinsali	27
	-	Nakonde	38
	-	Kaputa	12
	-	Malole	8
	-	Isoka	19
	-	Mungwi	16
	-	Mpika	78
	-	Shiwang'andu	5
	-	Luwingu	27
		TOTAL	350

CHIPATA AREA			CHANNELS
Chipata	-	Chama	17
	-	Lundazi	37
	-	Nyimba	14
	-	Kakumbi	11
	-	Sinda	15
	-	Katete	29
	-	Petauke	47
	-	Chadiza	25
		TOTAL	195

ROUTE	CCTS 1980 IN USE	CCTS 1985 PROPOSED	TOTAL 1980	TOTAL 1985
KeS - LsS	86	95	148	178
- LsM	62	83		
- KbS	10	12	10	12
- KSaS	10	12	10	12
KeM - LsS	41	87	113	165
- LsM	72	78		
NdGv- LsS	34	73	86	138
- LsM	52	65		
- KbS	8	12	8	12
KbS-NdGv	8	12	8	12
- KeS	16	30	16	30
-	-	-	-	-
LSM - NdGv	45	68	45	68
- KeM	68	86	148	166
- KeS	80	80		
LsS- NdGv	35	65	35	65
- KeM	50	65	158	150
- KeS	108	85		
KeS - LSI	33	55	56	89
KeM -	23	34		
NdGv	17	32	17	32
LSI - NdGv	17	28	17	28
- KeM	23	36	56	81
- KeS	33	45		
KeS - MsS	25	34	53	73
MsS - KeS	23	39		
Mansa - KSA	33	50	53	73
KSA - Mansa	20	23		

TRAFFIC FORECAST

CHINGOLA

ROUTE	CCT'S 1980 IN USE	CCTS 1985 PROPOSED	TOTAL 1980	TOTAL 1985
CA-KeS	67	105	CA-KeS 134	" 210
- KeM	23	34	CA-KeM 46	" 68
- Nd	15	27	CA-Nd 30	" 56
Nd-Ca	15	29		
KeM-Ca	23	34		
KeS-Ca	67	105		

TOTAL	1980	1985
CA-KeS	134	210
- Kem	46	68
-Nd	30	56

KITWE MAIN

ROUTE	CCT'S 1980 IN USE	CCTS 1985 PROPOSED	TOTAL 1980	TOTAL 1985
KeM-KeS	95	125	195	265
-Ca	23	34	46	68
-LYA	28	38	56	76
-LSI	23	34	46	70
- LsS	41	37	91	152
-LsM	72	78	140	164
-MUF	28	35	56	71
-NdGv	47	110	92	230
NdGv-KeM	45	120		
MUF-	28	36		
LSM	68	86		
LsS	50	35		
LsI	23	26		
LYA	28	38		
Ca	23	34		
KeS	100	140		

TOTAL	1980	1985
KeM-Kes	195	265
-Ca	46	68
-LYA	56	76
-LSI	46	70
-LsS	91	152
-LSM	140	164
-MUF	56	71
-NdGV	92	230

TRAFFIC FORECAST

LUANSHYA

ROUTE	CCTS 1980 IN USE	CCTS 1985 PROPOSED	TOTAL 1980	TOTAL 1985
LYA-KeS	83	120	138	240
-KeM	28	38	56	76
-NdGv	23	32	43	64
NdGv-LYA	20	32		
KeM -	28	38		
KeS	85	120		

TOTAL 1980	TOTAL 1985
LYA-KeS 168	240
-KeM 56	76
-NdGv 43	64

MUFULIRA

ROUTE	CCTS 1980 IN USE	CCTS 1985 PROPOSED	TOTAL 1980	TOTAL 1985
MUF-KeS	80	113	160	223
-KeM	28	35	54	70
-NdGv	23	29	46	68
NdGv-MUF	23	33		
KeM-	26	35		
KeS-	80	110		

TOTAL 1980	TOTAL 1985
MUF-KeS 160	223
-KeM 54	70
-NdGv 46	68

LUSAKA

ROUTE	CCTS 1980 IN USE	CCTS 1985 PROPOSED	TOTAL 1980	TOTAL 1985
LsS-KbS	47	45	97	95
LSM-	-	16	-	35
KeS-	10	12	26	42
NdGv-	8	12	16	24
KbS-NdGv	8	12		
-KeS	16	30		
-LSM	-	19		
-LsS	50	40		
LsS-KeS *	108	85	108	95
-KeM	50	35	50	65
-NdGv	35	35	35	65
LSM-KeS	80	80	80	80
-KeM	68	86	68	86
-NdGv	45	68	45	68

TOTAL 1980	TOTAL 1985
LsS-KbS 97	95
LSM- -	35
KeS- 26	42
NdGv- 16	24

Same figures 1980 1985

158 150

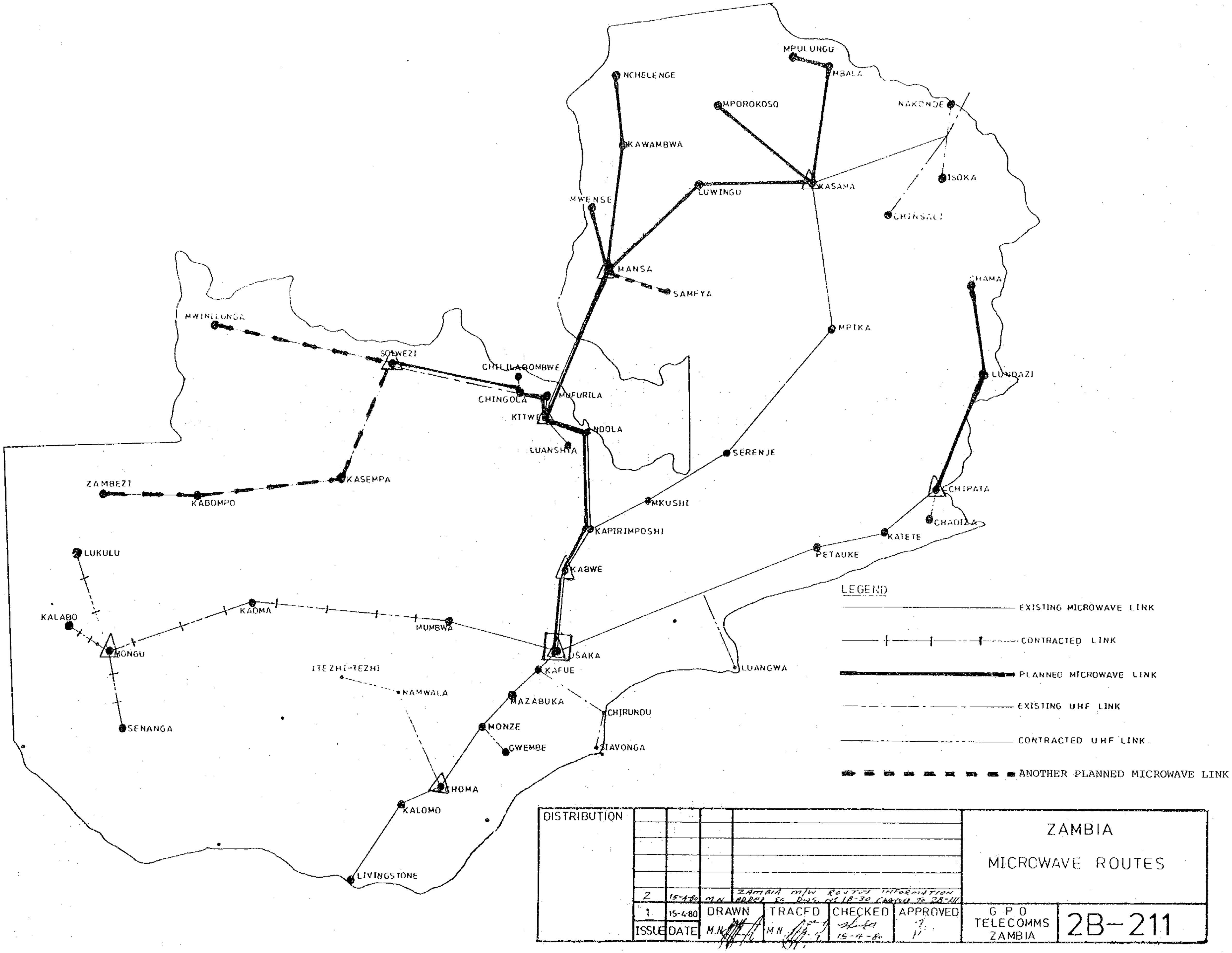
148 166

LS - COPPERBELT CHAN. REQUIREMENTS 1980/1985

ROUTE	CHANS. 1980	CHANS 1985 PROPOSED
LS-KE	659	829
LS-KB	97	120
LS-ND	200	328
TOTAL CHANS LS C/BELT	956	1277

C/BELT - LS CHAN. REQUIREMENTS 1980/1985

ROUTE	CHANS 1980	CHANS. 1985 PROPOSED
KE-LS	679	829
KE-KB	32	42
KE-LS(RSA)	25	42
ND-KB	16	24
TOTAL CHANS. CB - LS	752	937


MPULUNGU
MBALA
NCHELENGE
MPOROKOSO
NAKONDE
KAWAMBWA
ISOKA
MWENSE
LUWINGU
KASAMA
CHINSALI
MANSA
SAMFYA
CHAMA
MWINILUNGA
MPIKA
SOLWEZI
CHILILABOMBWE
LUNDAZI
CHINGOLA
MUFULIRA
KITWE
NDOLA
LUANSHYA
SERENJE
ZAMBEZI
KASEMPA
KABOMPO
MKUSHI
CHIPATA
CHADIZA
KAPIRIMPOSHI
KATETE
LUKULU
PETAUKE
KABWE
LEGEND
KAOMA
KALABO
MUMBWA
MONGU
LUSAKA
KAFUE
LUANGWA
ITEZHI-TEZHI
NAMWALA
MAZABUKA
CHIRUNDU
MONZE
GWEMBE
SIAVONGA
CHOMA
KALOMO
LIVINGSTONE
EXISTING MICROWAVE LINK
CONTRACTED LINK
PLANNED MICROWAVE LINK
EXISTING UHF LINK
CONTRACTED UHF LINK
ANOTHER PLANNED MICROWAVE LINK
DISTRIBUTION
2 15-4-80 M N ZAMBIA M/W ROUTES INFORMATION
1 15-4-80
ISSUE DATE
DRAWN M.N.
TRACED M N
CHECKED 15-4-80
APPROVED
ZAMBIA
MICROWAVE ROUTES
G P O
TELECOMMS
ZAMBIA
2B-211

REQUEST FOR FINANCING - MASS MEDIA PROJECT
MICROWAVE LINKS

The last five years have witnessed an unprecedented massive investiment programme in telecommunications. The programme has included new exchanges and a comprehensive network of microwave links spanning the whole country. In keeping with Government policy of extending television facilities to all provincial centres, all the microwave links into the provinces have been made broadband in order to carry television. In most instances had the necessity for television not been there a simpler link for telephony alone would have been installed. The provision of television for the provincial centres has therefore added a new dimension to the Corporation's operations. Initially television was only available on our line of rail links Livingstone to Lusaka and Lusaka to Kitwe. When the current development programme is completed the television network will be as shown in annex 1.

Lusaka	-	Kitwe	(1966)
Lusaka	-	Livingstone	(1974)
Lusaka	-	Kasama	(1978)
Lusaka	-	Chipata	(1980 Aug.)
Lusaka	-	Mongu	(1981 Aug.)
Lusaka	-	Earth Station	(1978)

In addition to the main terminals shown above the following places will have television transmitters with remote control capability.

Pemba	Kaoma
Senkobo	Mpika
Kapiri Mposhi	Petauke
Mumbwa	Serenje

The links from Lusaka to the provinces have a dedicated television channel, however in the reverse direction the protection channel has the capability for transmitting television on an occassional basis.

2. The microwave terminal in Lusaka will therefore require switching facilities for television which will give the Broadcasting Authority the flexibility and capability to receive into the Lusaka new studios independent programmes from the provinces and to transmit different programmes to selected centres, e.g. studios could be taping an international programme from Mwembeshi while at the sametime showing a children's educational programme from the Kitwe studios. Such an elaborate switching system does not exist at the moment.

3. Due to the expansion of the television network the link between the new mass media complex and the microwave link has to be upgraded to cater for the new requirements. These requirements are as shown in annex 2.

3 channels	Lusaka microwave terminal	-	New studios
3 channels	New studios	-	Lusaka terminal
1 channel	New studios	-	Old studios
1 channel	Old studios	-	New studios

The above requirements are the barest minimum to give the system security. The switching equipment at the Lusaka microwave terminal will give the capability for any of the three outgoing channels from the studios to be switched to any of the six microwave links shown in paragraph 1. In the reverse direction three oulying independent sources of programmes can be received for recording or live coverage. The cost of the switching and microwave link to the studios is K1,000,000. The existing link will be utilised to provide the link between the old and the new studios.

4. Telecommunications as an industry is univetsally recognised as a growth industry, with no determinable future point in time when a decline in expansion combined with technological improvement can be predicated to occur. Being based on high grade technology telecommunications are capital intensive. The Posts and Telecommunications Corporation has, in the past three years, had to share the economic predicament of the Government which it found itself in without capital to lend, after giving its approval to expansion programmes which were duly assigned to contractors and manufacturers abroad. The Government's contribution to the Corporation has, each successive year, been pruned down and the Corporation has had to finance the ongoing projects by very expensive capital from the overdraft facility. In order to reduce the financial burden on the Corporation, many projects had to be shelved especially those that would have minimum impact on the Corporation's revenue when completed. The Corporation is therefore not in a position to finance the above project in time for completion in November, 1981 when the Mass Media project is supposed to be commissioned.

Considering:

1. the urgency to have this project started this year if the new studios are to be connected to the television network via the Lusaka microwave terminal complex

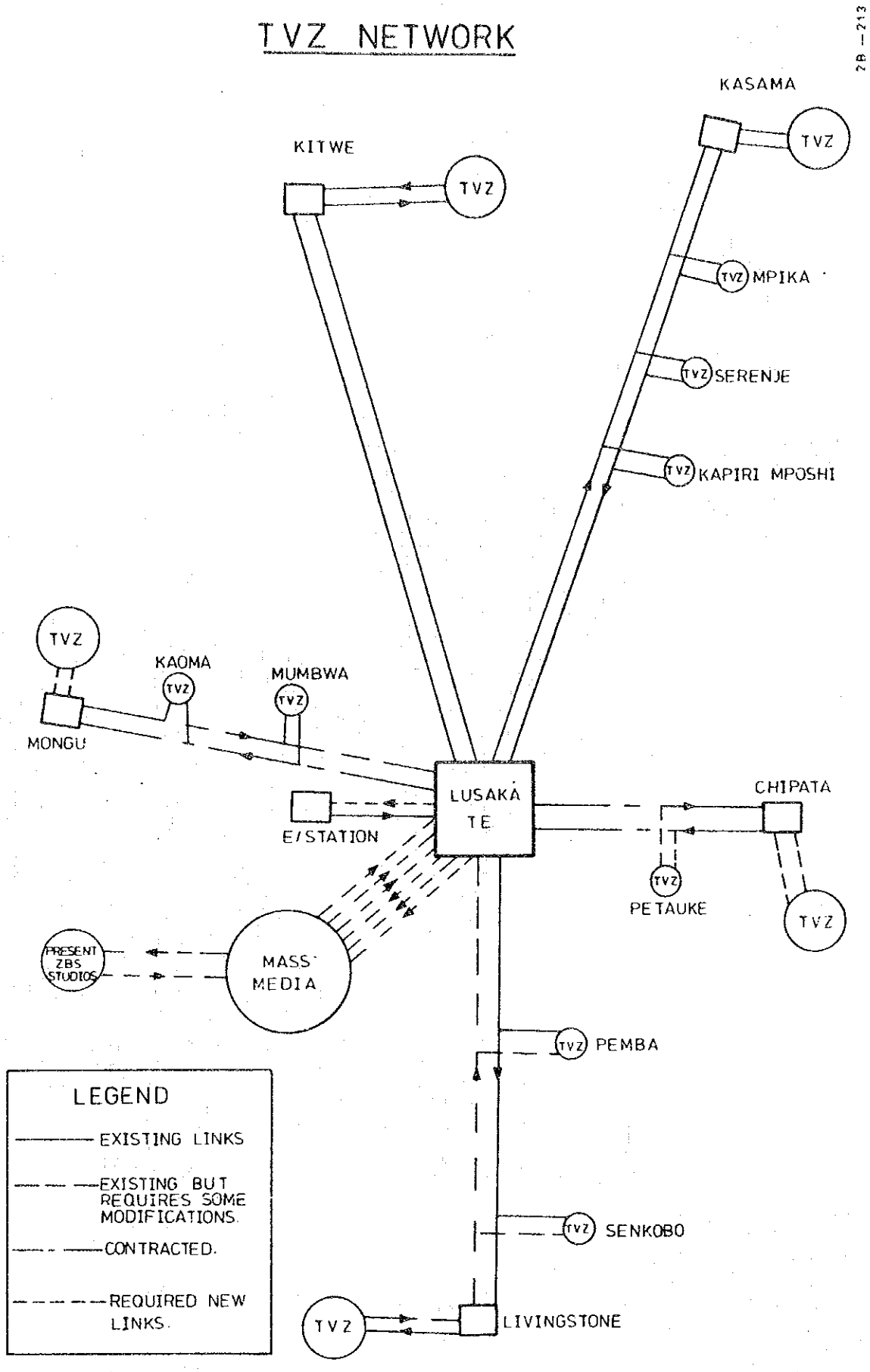
2. that the Corporation has no funds to undertake this project either in 1980 or next year (1981) due to the heavy burden of the ongoing projects on our finances.

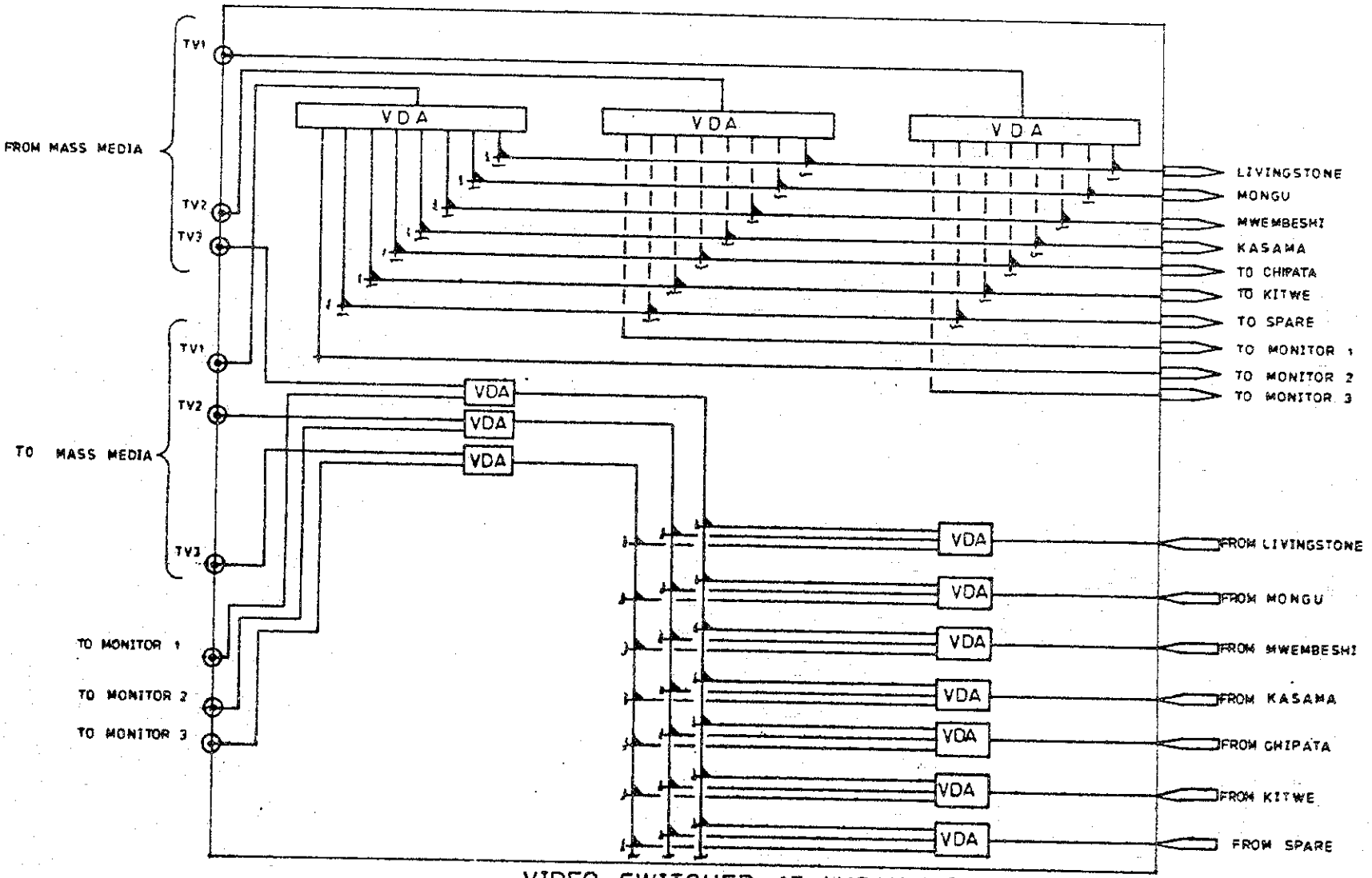
3. the importance that the Party and its Government attach to the Mass Media project.

4. the time factor if this project has to be ready by November, 1981 (12months manufacturing, 3 months shipping and installation)

It is recommended that the Government urgently take the necessary steps to secure funds for this project, either from its own resources or from bilateral aid (from Japan possibly). Nippon Electric Company of Japan who have supplied the majority of our microwave links we contracted for a quotation which they have already submitted. It is possible that they may be prepared to offer contractor financing. The intimation for contractor financing can only come from the Government as the Corporation's debt service ratio has risen to unacceptable levels due to the poor capital structure that it inherited.

Posts and Telecommunications Corporation,
Telecommunications Division,
P.O. Box 71660,
NDOLA.


TVZ NETWORK
2B — 213
KASAMA
TVZ
KITWE
TVZ
TVZ MPIKA
TVZ SERENJE
TVZ KAPIRI MPOSHI
TVZ
KAOMA
TVZ
MUMBWA
TVZ
MONGU
LUSAKA TE
E/STATION
CHIPATA
TVZ
PETAUKE
TVZ
PRESENT ZBS STUDIOS
MASS MEDIA
TVZ PEMBA
TVZ SENKOBO
TVZ
LIVINGSTONE
LEGEND
EXISTING LINKS
EXISTING BUT REQUIRES SOME MODIFICATIONS.
CONTRACTED.
REQUIRED NEW LINKS.



VIDEO SWITCHER AT LUSAKA T.E.

Ⅱ－5　面会者一覧表

12月1日　ＰＴＣにおいて

Mr. G.L.MUTTI Deupty Director (Telcom)

Mr. E.M.WESHI Principal Engineer

Mr. T.Z.ULU Senior Engineer

Mr. D.MWANZA Technician Transmission

Miss. Q.C.SHAMATUTU Senior Telecomms officier

Mr. J.T.H·ARDING Principal Engineer (Planning Budgets)

Mr. E.W.ICKRAMARATNE Financial Controller

12月3日　ＰＴＣにおいて

Mr. P.NG'OMA

Mr. S.W.MUNTALI

Mr. G.L.MUTTI

12月12日　LUSAKAにおいて

Mr.	P.NG'OMA	Director General
Mr.	S.W.MUNTALI	Director of Telecommunications
Mr.	G.L.MUTTI	Deputy Director
Mr.	E.MWESHI	Principal Engineer
Mr.	E.WICKKAMARATNE	Principal Controller (Financial)
Mr.	E.M.MUSONDA	Regional Managerr (South)

A班カウンターパート　12月2日～12月11日

Mr. E.MWESHI Principal Engineer

B班カウンターパート　12月2日～12月11日

Mr. T.ZULU Senior Engineer

Mr. D.MWANZA Techinican

POPULATION OF ZAMBIA

POPULATION OF PROVINCES AND DISTRICTS

Province	District	August 1969 Census			1979 mid-year estimates
		Male	Female	Total	Total
Central ... ... (Including Lusaka Province)	Feira	3,676	4,249	7,925	10,000
	Kabwe Town	34,326	31,648	65,974	139,000
	Kabwe Rural	62,887	59,683	122,570	145,000
	Lusaka City Council ...	137,946	124,479	262,425	599,000
	Lusaka Rural	42,691	40,934	83,625	115,000
	Mkushi	28,927	28,065	56,992	67,000
	Mumbwa	29,771	30,367	60,138	71,000
	Serenje	25,320	27,661	52,981	62,000
	Total	365,544	347,086	712,630	1,208,000
Copperbelt	Chililabombwe	23,506	21,356	44,862	74,000
	Chingola	53,878	49,414	103,292	183,000
	Kalulushi	16,763	15,509	32,272	57,000
	Kitwe	105,293	94,505	199,798	325,000
	Luanshya	49,890	46,392	96,282	156,000
	Mufulira	55,871	51,931	107,802	178,000
	Ndola Urban	84,430	75,356	159,786	307,000
	Ndola Rural	35,981	36,234	72,215	87,000
	Total	425,612	390,697	816,309	1,367,000
Eastern	Chadiza	15,053	17,168	32,221	41,000
	Chama...	13,400	17,487	30,887	39,000
	Chipata	69,712	78,946	148,658	196,000
	Katete	36,945	43,671	80,616	101,000
	Lundazi	41,831	50,416	92,247	116,000
	Petauke	57,174	67,712	124,886	157,000
	Total	234,115	275,400	509,515	650,000
Luapula	Kawambwa	26,415	28,291	54,706	58,000
	Mansa	38,564	41,778	80,342	89,000
	Mwense	25,124	27,850	52,974	55,000
	Nchelenge	27,590	29,165	56,755	60,000
	Samfya...	43,382	47,425	90,807	96,000
	Total	161,075	174,509	335,584	358,000
Northern	Chinsali	27,242	30,772	58,014	67,000
	Isoka	36,148	41,552	77,700	90,000
	Kasama	50,946	56,871	107,817	129,000
	Kaputa	14,368	14,057	28,425	32,000
	Luwingu	36,297	42,867	79,164	92,000
	Mbala	45,018	50,615	95,633	114,000
	Mpika	27,862	31,516	59,378	69,000
	Mporokoso	17,969	20,996	38,965	45,000
	Total	255,850	289,246	545,096	638,000
North-Western	Kabompo	15,452	17,924	33,376	42,000
	Kasempa	15,538	17,118	32,656	40,000
	Mwinilunga	24,592	26,806	51,398	65,000
	Solwezi	25,892	27,087	52,979	68,000
	Zambezi	28,115	33,209	61,324	77,000
	Total	109,589	122,144	231,733	292,000
Southern	Choma	47,566	50,414	97,980	119,000
	Gwembe	35,342	41,109	76,451	87,000
	Kalomo	38,039	38,532	76,571	63,000
	Livingstone Town	24,464	20,779	45,243	80,000
	Livingstone Rural	2,145	1,675	3,820	—
	Mazabuka	41,149	38,902	80,051	94,000
	Monze	38,276	41,049	79,325	92,000
	Namwala	17,810	18,790	36,600	42,000
	Total	244,791	251,250	496,041	602,000
Western	Kalabo...	43,014	50,826	93,840	121,000
	Kaoma...	23,653	27,284	50,937	66,000
	Lukulu	17,189	21,005	38,194	49,000
	Mongu...	41,082	48,413	89,495	119,000
	Senanga	41,468	47,134	88,602	115,000
	Sesheke	24,029	24,990	49,019	64,000
	Total	190,435	219,652	410,087	534,000
	Total Zambia... ...	1,987,011	2,069,984	4,056,995	5,649,000

Note—Urban populations are given in

POPULATION BY PROVINCIES AND URBAN AND RURAL AREAS

	1979 mid-year estimates	1974 Sample Census Final Results	1969 Census	1963 Census	1969–1974 Average annual growth rate (%)	1963–1969 Average annual growth rate (%)
Total Zambia	5,649,000	4,677,000	4,056,995	3,490,170	2.9	2.5
Provinces:						
Central (including Lusaka Province) ...	1,208,000	919,000	712,630	505,164	5.2	5.9
Copperbelt	1,367,000	1,046,000	816,309	543,465	5.1	7.0
Eastern	651,000	570,000	509,515	479,866	2.3	1.0
Luapula	358,000	321,000	335,584	357,018	−0.9	−1.0
Northern	638,000	584,000	545,096	563,995	1.4	−0.6
North-Western ...	291,000	242,000	231,733	211,189	0.8	1.6
Southern	602,000	534,000	496,041	466,327	1.5	1.0
Western	535,000	460,000	410,087	362,480	2.3	2.1
Large Urban Areas:						
Chililabombwe ...	74,000	56,000	44,862	34,165	4.7	4.6
Chingola	183,000	134,000	103,292	59,517	5.3	9.6
Kabwe	139,000	99,000	65,974	39,522	8.4	8.9
Kalulushi	57,000	41,000	32,272	21,303	4.7	7.2
Kitwe	325,000	251,000	199,798	123,027	4.6	8.4
Livingstone	76,000	58,000	45,243	33,026	5.0	5.4
Luanshya	156,000	121,000	96,282	75,332	4.6	4.2
Lusaka	599,000	401,000	262,425	123,146	8.9	13.4
Mufulira	178,000	136,000	107,802	80,609	4.7	5.0
Ndola	307,000	229,000	159,786	92,691	7.4	9.5
Total Urban (including small urban areas) ...	2,280,000	1,663,000	1,192,116	715,020	6.9	8.9
Total Rural	3,369,000	3,014,000	2,864,879	2,774,484	1.0	0.5
Percentage Urban ...	40.4	35.6	29.4	20.5		

SUBSCRIBER TRUNK DIALLING (S.T.D.) CALL CHARGES

S.T.D Calls do not have a 3 minute minimum charge as with trunk calls connected by the operator. Time is bought in metered units of 8 ngwee and the time allowed varies according to distance. The following table shows the time in seconds allowed for each metered unit on calls dialled by subscribers between the exchanges listed.

FROM \ TO	CHAMBISHI	CHILANGA	CHILILABOMBWE	CHINGOLA	CHOMA	GWEMBE	ITIMPI	KABWE	KAFUE	KALOMO	KALULUSHI	KASAMA	KITWE	LIVINGSTONE	LUANSHYA	LUSAKA	MAZABUKA	MONZE	MUFULIRA	MUMBWA	NDOLA	PEMBA	SOLWEZI
CHAMBISHI	U	10	30	30	7.5	7.5	U	20	10	7.5	30	10	U	7.5	30	10	7.5	7.5	30	10	30	7.5	20
CHILANGA	10	U	10	10	20	20	10	20	30	20	10	7.5	10	10	10	U	20	20	10	20	10	20	10
CHILILABOMBWE	30	10	U	30	7.5	7.5	30	20	10	7.5	30	10	30	7.5	30	10	7.5	7.5	30	10	30	7.5	7.5
CHINGOLA	30	10	30	U	7.5	7.5	30	20	10	7.5	30	10	30	7.5	30	10	7.5	7.5	30	10	30	7.5	20
CHOMA	7.5	20	7.5	7.5	U	30	7.5	10	20	30	7.5	6	7.5	20	7.5	20	30	30	7.5	20	7.5	30	7.5
GWEMBE	7.5	20	7.5	7.5	30	U	7.5	10	20	30	7.5	6	7.5	20	7.5	20	7.5	30	7.5	20	7.5	30	7.5
ITIMPI	U	10	30	30	7.5	7.5	U	20	10	7.5	U	10	U	7.5	30	10	10	7.5	30	10	30	7.5	20
KABWE	20	20	20	20	10	10	20	U	20	10	20	7.5	20	7.5	20	20	30	10	20	20	20	10	10
KAFUE	10	30	10	10	20	20	10	20	U	20	10	7.5	10	10	10	30	20	20	10	20	10	20	10
KALOMO	7.5	20	7.5	7.5	30	30	7.5	10	20	U	7.5	6	7.5	20	7.5	20	30	30	7.5	20	7.5	30	7.5
KALULUSHI	30	10	30	30	7.5	7.5	30	20	10	7.5	U	10	U	7.5	30	10	7.5	7.5	30	10	30	7.5	20
KASAMA	10	7.5	10	10	6	6	10	7.5	7.5	6	10	U	10	6	10	7.5	6	6	10	7.5	10	6	7.5
KITWE	U	10	30	30	7.5	7.5	U	20	10	7.5	U	10	U	7.5	30	10	7.5	7.5	30	10	30	7.5	20
LIVINGSTONE	7.5	10	7.5	15	20	20	7.5	7.5	10	20	7.5	6	7.5	U	7.5	10	20	20	7.5	10	7.5	20	7.5
LAUNSHYA	30	10	30	30	7.5	7.5	30	20	10	7.5	30	10	30	7.5	U	10	7.5	7.5	30	10	30	7.5	20
LUSAKA	10	30	10	10	20	20	10	20	30	20	10	7.5	10	10	10	U	20	10	10	20	10	20	10
MAZABUKA	7.5	20	7.5	7.5	30	30	7.5	10	20	30	7.5	6	7.5	20	7.5	20	U	30	7.5	20	7.5	30	7.5
MONZE	7.5	20	7.5	30	30	30	7.5	10	20	30	7.5	6	7.5	20	7.5	20	30	U	7.5	20	7.5	30	7.5
MUFULIRA	30	10	30	10	7.5	7.5	30	20	10	7.5	30	10	30	7.5	30	10	7.5	7.5	U	10	30	7.5	20
MUMBWA	10	20	10	30	20	20	10	20	20	20	10	10	10	10	10	20	20	20	10	U	10	20	10
NDOLA	30	10	30	7.5	7.5	7.5	30	20	10	7.5	30	10	30	7.5	30	10	7.5	7.5	30	10	U	7.5	20
PEMBA	7.5	20	7.5	7.5	30	30	7.5	10	20	30	7.5	6	7.5	20	7.5	20	30	30	7.5	20	7.5	U	7.5
SOLWEZI	20	10	20	20	7.5	7.5	20	10	10	7.5	20	7.5	20	7.5	20	10	7.5	7.5	20	10	20	7.5	U

NOTE: 1. Some Party line and coinbox telephones do not have access to the Subscriber Trunk Dialling (S.T.D.) Network and all trunk calls from these telephones are obtained with the assistance of the operator.

NOTE: 2. LOCAL calls are untimed and charged at one unit.

NOTE: 3. Party line subscribers on Kitwe, Choma, Kalomo, Ndola and Luanshya exchanges have access to the subscribers trunk dialling network. Party line subscribers at other exchanges will have this facility with the commissioning of the new exchanges in their areas.

NOTE: 4. U indicates untimed local call (1 unit).

CHARGES FOR CALLS VIA THE OPERATOR

FROM	Z	G	1	2	1	2	3	1	2	3	1	2	3	4	5	1	2	1	2	3	1	2	1	2	3
		Z	1		2			3			4					5		6				7		8		
			Lusaka, Kafue, Chilanga, Chirundu, Siavonga, Chirundu, Luangwa, Namulunda Gorge	Mumbwa	Kitwe, Ndola, Chingola, Chililabombwe, Itimpi, Kalulushi, Luanshya, Mufulira, Chambishi	Mansa, Samfya	Kawambwa, Nchelenge, Mwense, Mansanga	Livingstone, Zimba	Choma, Namwala, Gwembe, Chisekesi, Mazabuka, Kalomo, Pemba, Monze, Sinazongwe	Sesheke	Kasama, Luwingu, Mungwi, Chilubi	Mpika, Shiwa Ng'andu	Mbala, Senga Hill, Mpulungu	Isoka, Chinsali, Nakonde	Mporokoso, Kaputa	Kabwe, Kapiri Mposhi, Chibombo	Serenje, Mkushi, Kanona, Mkushi River	Chipata, Sinda, Katete, Mfuwe, Kasimanli, Chadiza	Lundazi, Chama	Petauke, Nyimba, Mwanjawantha	Mongu, Kalabo, Senanga, Limulunga Lukulu	Kaoma	Solwezi	Kasempa, Chisera	Kaboompo, Zambezi, Mwinilunga, Chavuma, Ikeleng, Chitokoloki
Lusaka, Kafue, Chilanga, Chirundu, Siavonga, Chirundu, Luangwa, Namulunda Gorge	1	1		C	E	F	F	E	C	F	F	F	G	G	F	C	E	F	F	E	F	E	E	E	F
Mumbwa		2	C		E	F	F	E	C	E	F	F	G	G	F	C	E	F	G	F	E	C	E	E	E
Kitwe, Ndola, Chingola, Chililabombwe, Itimpi Kalulushi, Luanshya, Mufulira, Chambishi	2	1	E	E		C	E	F	F	F	E	E	F	F	F	C	C	F	F	E	F	E	C	E	F
Mansa, Samfya		2	F	F	C		C	G	F	G	E	E	E	E	E	E	E	F	F	E	G	F	E	E	F
Kawambwa, Nchelenge, Mwense, Mansanga		3	F	F	E	C		G	G	G	C	E	E	E	C	F	E	F	F	F	G	F	E	F	F
Livingstone, Zimba	3	1	E	E	F	G	G		C	C	G	G	G	G	G	F	F	G	G	F	E	E	F	F	F
Choma, Namwala, Gwembe, Chisekesi, Mazabuka, Kalomo, Pemba, Monze, Sinazongwe		2	C	C	F	F	G	C		E	G	G	G	G	G	E	F	F	G	F	F	E	F	E	F
Sesheke		3	F	E	F	G	G	C	F		G	G	G	G	G	F	G	G	G	G	E	E	F	F	E
Kasama, Luwingu, Mungwi, Chilubi Island	4	1	F	F	E	E	C	G	G	G		C	C	C	C	F	E	E	E	F	G	G	F	F	G
Mpika, Shiwa Ng'andu		2	F	F	E	E	E	G	G	G	C		E	C	E	E	C	C	C	E	G	G	F	F	G
Mbala, Senga Hill, Mpulunga		3	G	G	F	E	E	G	G	G	C	E		C	C	F	F	F	E	F	G	G	F	G	G
Isoka, Chinsali, Nakonde		4	G	G	F	E	E	G	G	G	C	C	C		E	F	E	E	E	F	G	G	F	G	G
Mporokoso, Kaputa		5	F	F	F	E	C	G	G	G	C	E	C	E		F	E	F	F	F	G	G	F	F	G
Kabwe, Kapiri Mposhi, Chibombo	5	1	C	C	C	E	F	F	E	F	F	E	F	F	F		C	F	F	E	F	E	E	C	F
Serenje, Mkushi, Kanona, Mkushi River		2	E	E	C	E	E	F	F	G	E	C	F	E	E	C		E	E	C	G	F	E	F	F
Chipata, Sinda, Katete, Chadidza, Mfuwe, Kasimanli	6	1	F	F	F	F	F	G	F	G	E	C	F	E	F	F	E		C	C	G	G	F	G	G
Lundazi, Chama		2	F	G	F	F	F	G	G	G	E	C	E	E	F	F	E	C		E	G	G	G	G	G
Petauke, Nyimba, Mwanjawantha		3	E	F	E	E	F	F	F	G	F	E	F	F	F	E	C	C	E		G	F	F	F	G
Mongu, Kalabo, Senanga, Limulunga, Lukulu	7	1	F	E	F	G	G	E	F	E	G	G	G	G	G	F	G	G	G	G		C	F	E	C
Kaoma		2	E	C	E	F	F	E	E	E	G	G	G	G	G	E	F	G	G	F	C		E	C	C
Solwezi	8	1	E	E	C	E	E	F	F	F	F	F	F	F	F	E	E	F	G	F	F	E		C	E
Kasempa, Chisera		2		C	E	E	F	F	E	F	F	F	G	G	F	C	F	G	G	F	E	C	C		C
Kaboompo, Zambezi, Chavuma, Ikeleng, Mwinilunga, Chitokoloki		3	F	E	F	F	F	F	F	E	G	G	G	G	G	F	F	G	G	G	C	C	E	C	

Z = ZONE

G = GROUP

(1) CHARGE LETTER CONVERSION TABLE:

U.....K 8n local call
B..... 48n for 3 minutes
C..... 72n " " "
E.....1.44n " " "
F.....1.92n " " "
G.....2.40n " " "

(2) CHARGES FOR CALLS BETWEEN THE FOLLOWING EXCHANGES WILL BE 8n (U)

Kitwe-Kalulushi
Kitwe-Chambishi
Itimpi-Chambishi
Lusaka-Chilanga
Chisekesi-Monze
Kitwe-Itimpi
Itimpi-Kalulushi
Chambishi-Kalulushi
Monze-Lusaka

(3) CHARGES FOR CALLS BETWEEN EXCHANGES IN THE SAME GROUP, 48n FOR 3 MINUTES (B).
Chipata-Mchinji (B) 48n for 3 minutes.

(4) CHARGES FOR CALLS VIA THE OPERATOR
The three minute charge (minimum) for ordinary trunk calls within Zambia is based on group charging.

PRINCIPAL TELEGRAPH RATES

	Addressed to:	Ordinary rate per word K	Ordinary Minimum charge for 7 words K	n	
1.	Zambia	3	0	21	(7 words)
2.	Botswana Kenya Lesotho Malawi Mauritius Mozambique Namibia Rhodesia Seychelles Swaziland South Africa Tanzania Uganda	16	1	12	(7 words)
3.	Grenada Zaire (direct)	20	1	40	(7 words)
4.	Antigua Ascension Barbados Belize Bermuda Canada Cayman Island Cyprus Falkland Island Gibraltar Great Britain Guyana Haiti Hawaai Ireland Italy Jamaica Midway Montserrat Puerto Rico St. Helena St. Paul Island St. Kitts St Vincent Samoa U.S.A.	24	1	68	(7 words)
5.	Aden Australia Bahrain Brunei Caicos Island Doho (Qatar) Dominican Island Fiji Gambia Germany (Federal) Ghana Gilbert Island Hong Kong India Maldive Nauru New Zealand Nigeria Norfolk Island Pakistan Papua New Guinea Sierra Leone Singapore Solomon Island Sri Lanka Trinidad and Tobago Tonga Turks and Caicos	26	1	82	(7 words)
6.	Antilles	30	2	10	(7 words)
7	Sweden	32	2	24	(7 words)
8.	Bangladesh Luxembourg	34	2	38	(7 words)
9.	Israel Jordan Nepal Netherlands	36	2	52	(7 words)
10.	Albania Czechoslovakia Malagasy	40	2	80	(7 words)
11.	Vatican City	42	2	94	(7 words)
12.	Bulgaria China Greece Indonesia Macao Liechtenstein Spain Monaco	44	3	08	(7 words)
13.	Algeria Andorra Austria Belgium Egypt Finland Hungary Martinique Majorca Morocco Reunion Rodrique Island Somalia Switzerland Sudan Tunisia	48	3	36	(7 words)
14.	Bahamas Bolivia Brazil British Virginia Burma Canary Island Cook Island Columbia Cocos-Keeling Costa Rica Chile Cuba Christmas Island Dominican Republic Dubhai El Salvador France Germany (Demo.) Guadeloupe Khmer Republic Laos Liberia Mexico Norway Peru Poland Roumania San Marino Surinam Nicaragua Umm el Quaiwain Venezuela	50	3	50	(7 words)
15.	Faroe Island Greenland Libya Oman Perim Island Saudi Arabia Turkey Yemen (N) Yemen (S)	52	3	64	(7 words)
16.	Rwanda	53	3	71	(7 words)

CONTD NEXT PAGE

PRINCIPAL TELEGRAPH RATES (CONTD)

Addressed to:	Ordinary rate per word K n	Ordinary— Minimum charge for 7 words K n
17. U.S.S.R.	55	3 85 (7 words)
18. Azores Madiera Benin	56	3 92 (7 words)
19. Burundi Cameroon Comoros Island Ethiopia French Guinea Ivory Coast Niger Portugal Upper Volta	58	4 06 (7 words)
20. Denmark Iceland Panama Zone Zaire (via London)	60	4 20 (7 words)
21. Adele Island Angola Cape Verde French Polynesia Guam Niue Island New Caledonia New Hebrides Philippines Port Timor Principal Island Pitcairn Island Tokela Tuvalu St. Thome Johnston Island	64	4 48 (7 words)
Lebanon Korea (S)	65	4 55 (7 words)
23. Guatamela Iran Mongolia	68	4 76 (7 words)

Addressed to:	Ordinary rate per word K n	Ordinary— Minimum charge for 7 words K n
24. Equatorial Guinea Guinea Bissau	72	04 (7 words)
25. Argentina Paraguay Tristan da Cunha	76	5 32 (7 words)
26. Abu Dhabi Afars and Assas Ajam Fujairah French Southern Antarctic Sharjah Syria Thailand	78	5 46 (7 words)
27. Iraq Korea (N)	82	5 74 (7 words)
28. Canal Zone Mariana Island Marshall Island	84	5 88 (7 words)
29. Central African Empire Chad Gabon Guinea Republic Mali Mauritania Senegal	85	5 95 (7 words)
Caroline Congo Brazaville Japan	90	6 30 (7 words)
31. Afghanistan	92	6 44 (7 words)
32. Taiwan Vietnam (N) Vietnam (S)	98	6 86 (7 words)

NOTE:
The rate for letter telegrams [LT] and Government letter telegrams [LTF] are charged at half the ordinary rate. The minimum charge is for 22 words which includes the indicator LT or LTF. The same is applicable to Commonwealth Social telegrams [GLT]— minimum charge for 11 words which includes indicator GLT.