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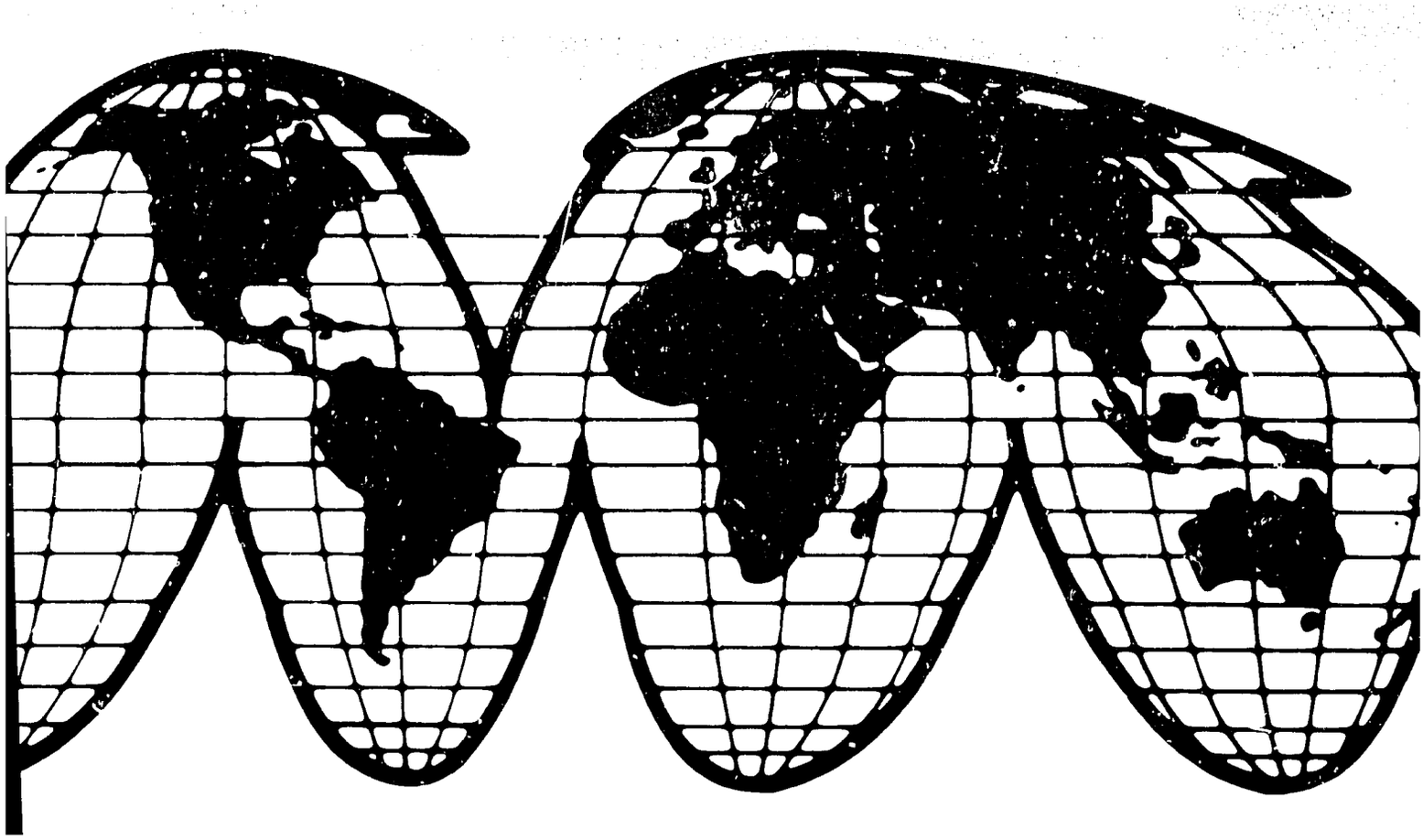

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TELECOMMUNICATIONS SECTOR SCOPING STUDY FOR SOUTHERN AFRICA

PHASE I - FINAL REPORT

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TELECOMMUNICATIONS SECTOR SCOPING STUDY FOR SOUTHERN AFRICA - PHASE ONE

EXECUTIVE SUMMARY

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EXECUTIVE SUMMARY

1.0 BACKGROUND

Telecommunications Services have traditionally been provided by state owned and private monopolies. These monopolies were justified by the notion that the infrastructure was a "natural monopoly" of large economies of scale. State control was justified because of the widely held belief of the strategic importance of the sector to national security and public safety . Less developed nations viewed the sector as a significant source of revenue and foreign currency, to support related and even unrelated national objectives.

Over the past forty years, the traditional structures of telecommunications have changed driven primarily by rapid technology advances and development and changes of the global economy. The rapid changes in technology have allowed the development of new, varied and sophisticated services. Furthermore, new systems and services offer greater efficiencies in the communication and management of information. These new technologies have challenged the notions of "natural monopoly" of telecommunications operations. In addition, the increasing market demand for new and diversified services and products have placed dynamic demands that para-statal organizations cannot adequately deliver.

Coinciding with the development of information technology (computers, automated systems, communications etc.) the global economy has incorporated the efficiencies offered by the new technologies into nearly every area of economic activity. The national economies that have developed efficient information management and communications systems have been rewarded with success in the competitive world marketplace. In less developed countries the lack of adequate infrastructure to support the communications systems has been acknowledged as a major inhibitor of economic growth.

In response to these changes, a worldwide trend towards liberalization has developed to enable the growth, diversity, and reduction of costs of telecommunications. This trend has involved changing the structures of telecommunications sectors in many countries. These changes include privatization, regulatory reform, and competition of operations. In less developed countries, the changes in the sector have been utilized to pursue broad-based economic goals of stimulating investment and economic development throughout the economy.

In the Southern Africa region, most countries have traditional para-statal organizations incorporating operating and regulatory functions. Several countries of the region have initiated restructuring involving separation of functions, liberalization, and some degree of privatization. The structure of the changes reflect the unique national goals and priorities of each country.

2.0 OBJECTIVES AND METHODOLOGY

The Scoping Study objectives include determining if, and in what role, USAID should get involved in the development of the telecommunications sector in Southern Africa. In addition, to develop a focus on enhancing U.S. private sector involvement in the development of the sector. The methodology utilized in pursuing the objectives involves the following:

- Assessment of the demand, supply and shortfall of telecommunications in the countries of the region
- Estimate of the economic impact of that shortfall of telecommunications.
- Identification of policy and institutional issues that affect telecommunications development in the region.
- Evaluation of the role of the private sector in stimulating and sustaining development.
- Assessment of the role of USAID in the development of telecommunications.
- Development of a strategy for USAID involvement in the sector in the Southern Africa region.

The methodology is implemented in two phases of study. Phase one consists of largely desk research and limited field work to perform initial analysis of sector development needs in the region and to identify gaps in the existing data and analytical resources. Phase two of the study will involve in-depth research and extensive field work to develop priority areas and structure for AID involvement in the development of telecommunications in the Southern Africa Region.

3.0 ANALYSIS OF CURRENT AND PROJECTED DEMAND, SUPPLY AND SHORTFALL IN TELECOMMUNICATIONS SERVICES IN THE SADC REGION

Demand evaluation for telecommunications services incorporating access, usage, new services and grade of service requires high quality data. In lesser developed countries available data concerning traffic, quality of service, service requests and grade of service is highly limited in both volume and accuracy. Determination of demand for telecommunications services can be pursued by compiling the installed connections, Direct Exchange Lines DEL's, waiting lists, unexpressed demand, and projections of growth based on econometric and comparative models.

The methodology applied in assessing the current and forecasted demand involved literature search, direct questionnaires and limited interviews. Information was collected, from the U.S., international and regional sources. Questionnaires were sent to the PTTs in all of the SADC region countries to obtain data on the telecommunications demand and supply for the years 1991 through 2000, including data on traffic loads and quality of service. Questionnaires were returned by eight of the countries which included data on supply and demand of (DELs) only. No information was obtained on other requested parameters. The returned questionnaires from the eight countries are included as Annex 1.1 to this section. Where demand figures were not obtainable (questionnaires not returned and follow-up ineffective) 1990 data and year 2000 estimates were obtained from the 10-year development plans and available country plans and ITU publications.

Due to the limitations of available data on traffic, quality of service, sector segmentation, and news service demand, urban and rural and regional and international traffic demand, the use of DELs produced the most useful picture of the telephone demand in the countries of the region. Direct Exchange Line figures were generally available and verifiable for both demand and supply, providing the only reliable baseline of comparison. It is a consistent unit of measurement for both supply and demand: Supply being the actual number of subscriber lines (DELs) available for service or projected to be available for service and demand being the estimated number of subscriber lines (DELs) that could be connected for service, if there was an adequate supply, based on waiting lists and forecasts at some point in the future.

In many developing countries, there can be an excess of switching capacity that cannot be used to create a DEL due to the unavailability of cable pairs to the subscriber desiring service. The actual capacity of a switching exchange vs. the number of DELs in service is referred to as the switching exchange *percent fill* or exchange *fill factor*. It is not practical to have a fill factor of 100% because at any given moment some switch ports are either out of service for maintenance or reserved for emergency backup. An average fill factor of 80% or slightly greater is normal. The fill factor will be lower at switch cutover (switches are usually sized for current demand and equipment for 3 to 5 years of growth) and will be the highest just before an expansion of the switch goes into service.

In general, telecommunications service in the SADC region is poor, based on the grade of service provided in most regions of the world. Waiting lists for telephone service are long and service start intervals are measured in years, in some cases in excess of tens of years. Maintenance, in general, is sub-standard with long service outages common. The regional network serving the SADC region is incomplete with service between some SADC countries being routed via Europe at high cost. The regional network appears to be well planned, however, and progress is being made in its implementation.

A good indicator of the level of telecommunications service in a country or region is the number of DELs in service per 100 of population. This measure is referred to as *telephone penetration* or *telephone density*. Exhibit ES-1 portrays telephone penetration in various areas of the world as compared to the SADC Region. The current world average is in the order of 16 to 17 DELs per 100 of population as compared with 1 per 100 for the SADC Region. Developed countries such as the U.S., Germany and the U.K. are around 50 or higher DELs per 100 of population. Thus it can be seen that the SADC Region has a long way to go to meet the expected service levels in most of the world.

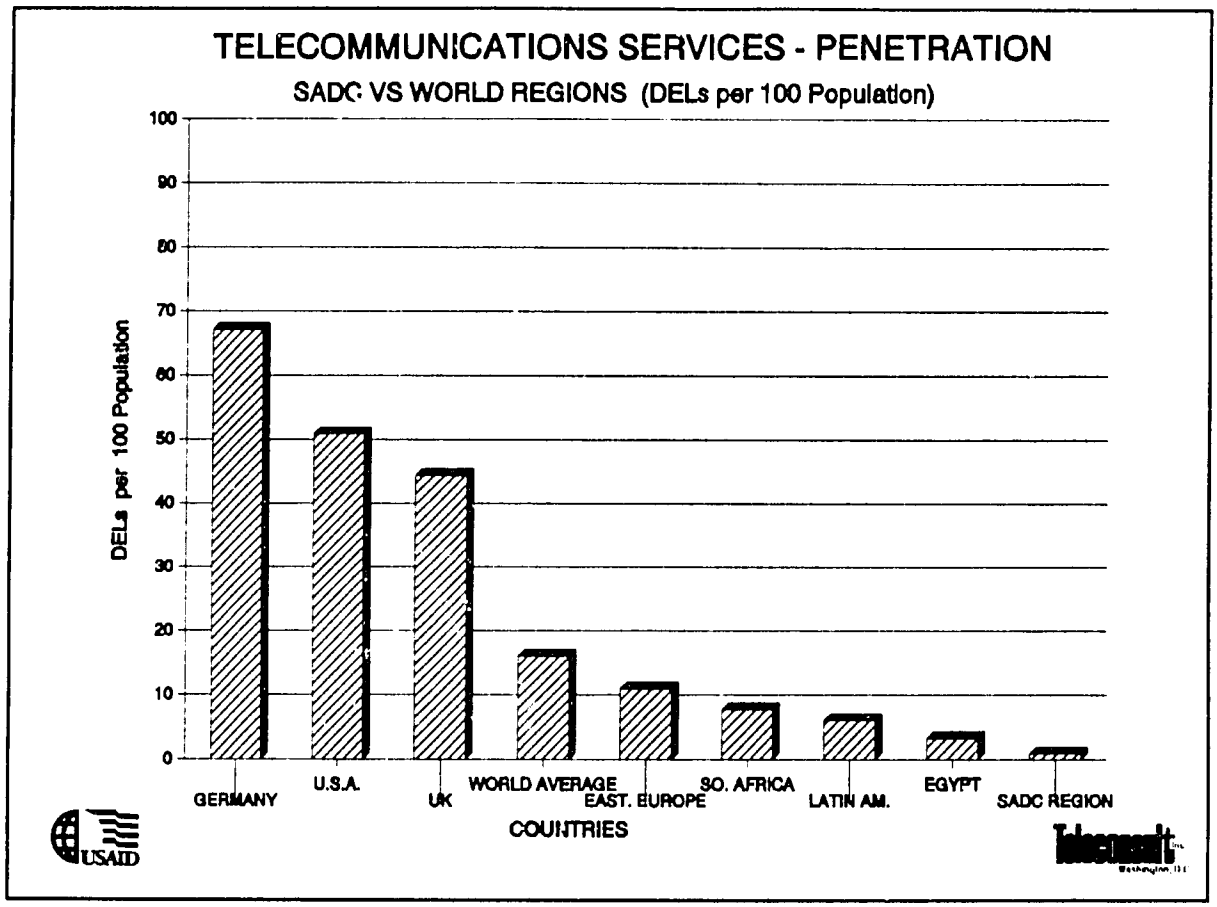

Exhibit ES-1

3.1 SUMMARY OF DEMAND

The data collected as a result of the data gathering activities includes the current (1990) demand in DELs and the year 2000 demand as reported by the telephone administrations. The demand for these two periods is summarized in the following bar chart, Exhibit ES-2.

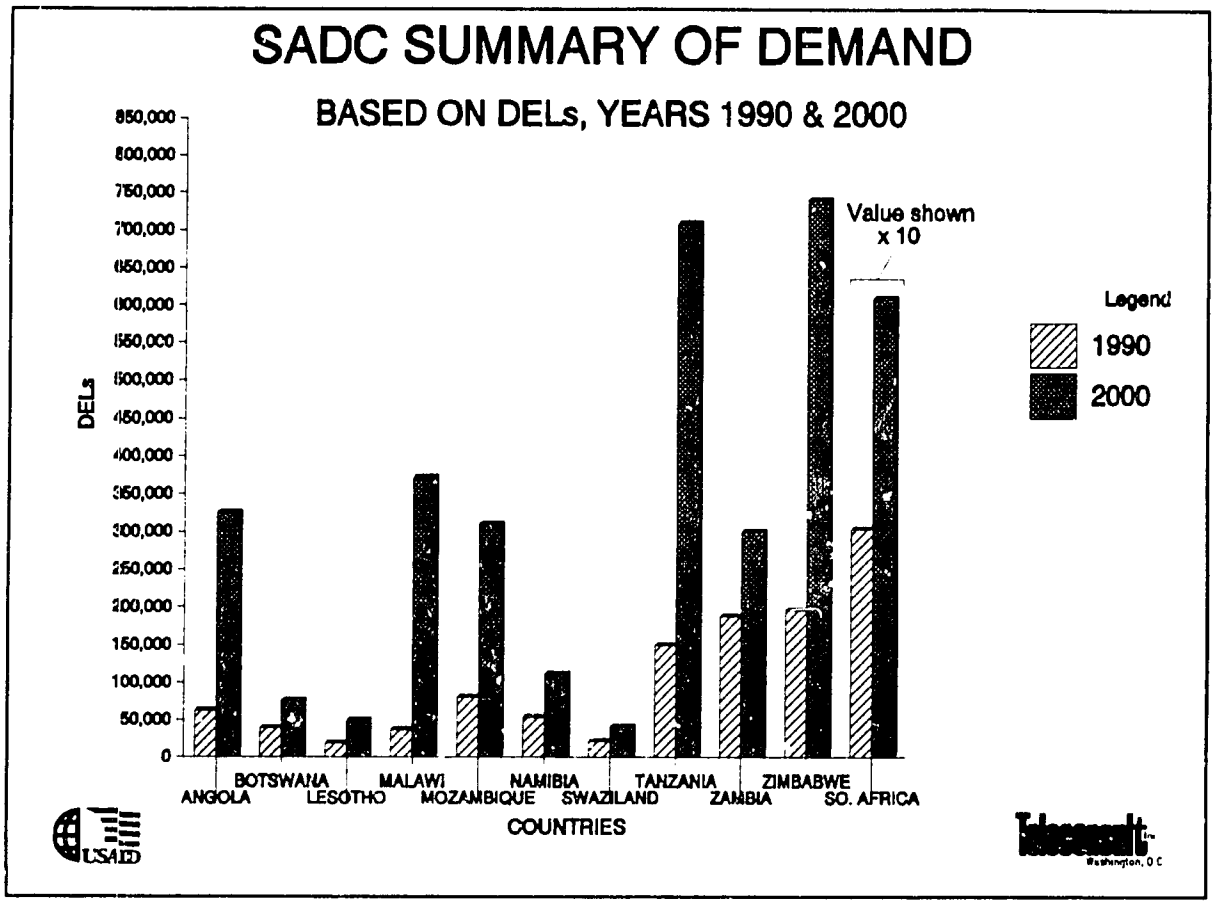

Exhibit 1-2

The 1990 demand is generally based on the number of DELs in service plus the waiting list. The actual demand is undoubtedly much higher, based on those potential subscribers that would apply for service if they thought that they could get a telephone within a reasonable time period and at reasonable rates (pent-up demand). Similarly, the projected demand for the year 2000 is considered conservative as it is primarily a projection of the waiting list and does not consider pent-up demand or stimulated demand (as telephones become more plentiful, their value to a potential business subscriber increases - more people to call - and more businesses will view a telephone as indispensable). However, even though conservative, the demand indicated by the telephone administrations is considered a reasonable goal for system growth based on the economics of the region.

3.2 SUPPLY OF TELECOMMUNICATIONS SERVICES

As in the demand sub-paragraph above, the major thrust of the telecommunications supply

study is on DELs available for service in the current year (1990) and projected to be in service for the year 2000. The current and projected demand for the SADC Region is shown in Exhibit ES-3.

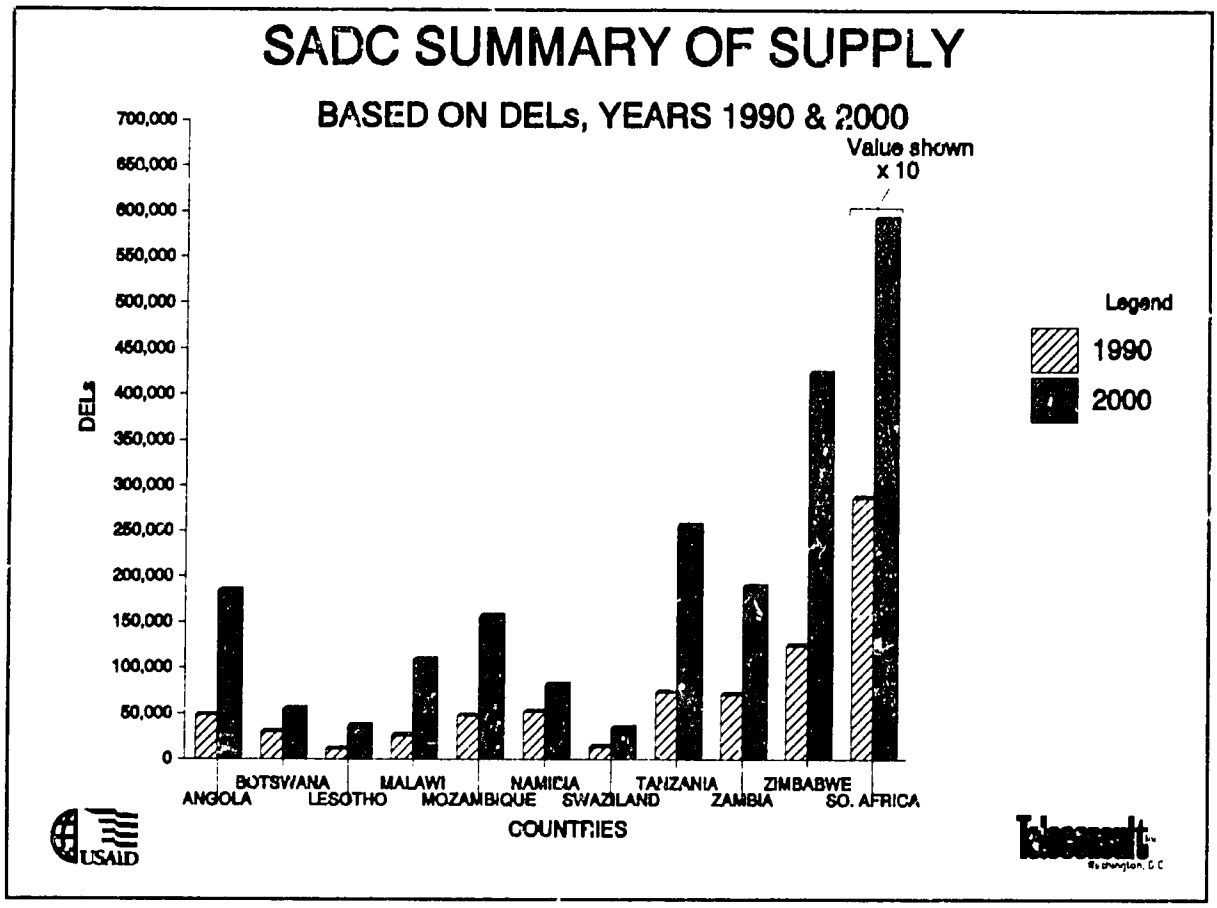

Exhibit ES-3

The year 2000 DEL supply figures are based on data provided by the telephone administrations, where available, or, where not available, they are based on an estimated annual percent increase in equipped DELs using past history and future projections of the economic climate for that country. The 1990 supply figures are essentially DELs in service while the projections for the year 2000 are estimates of what each telephone administration expects to produce over the ten-year period.

3.3 SHORTFALL OF TELECOMMUNICATIONS SERVICES

A bar chart summary of the shortfall by countries is shown in Exhibit ES-4. Exhibit ES-5 depicts both the supply of DELs and the demand for DELs in the year 2000 as a percent

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of the GDP for each country. 1% of GDP is considered a reasonable level of telecommunications investment for a developing country. It will be noted that the supply investment estimated totaling $700 million for the SADC countries, including RSA, is below this range or, at most, only slightly higher than that considered reasonable. On the other hand, the investment required to meet the demand is, for most countries, considerably higher than the range considered reasonable.

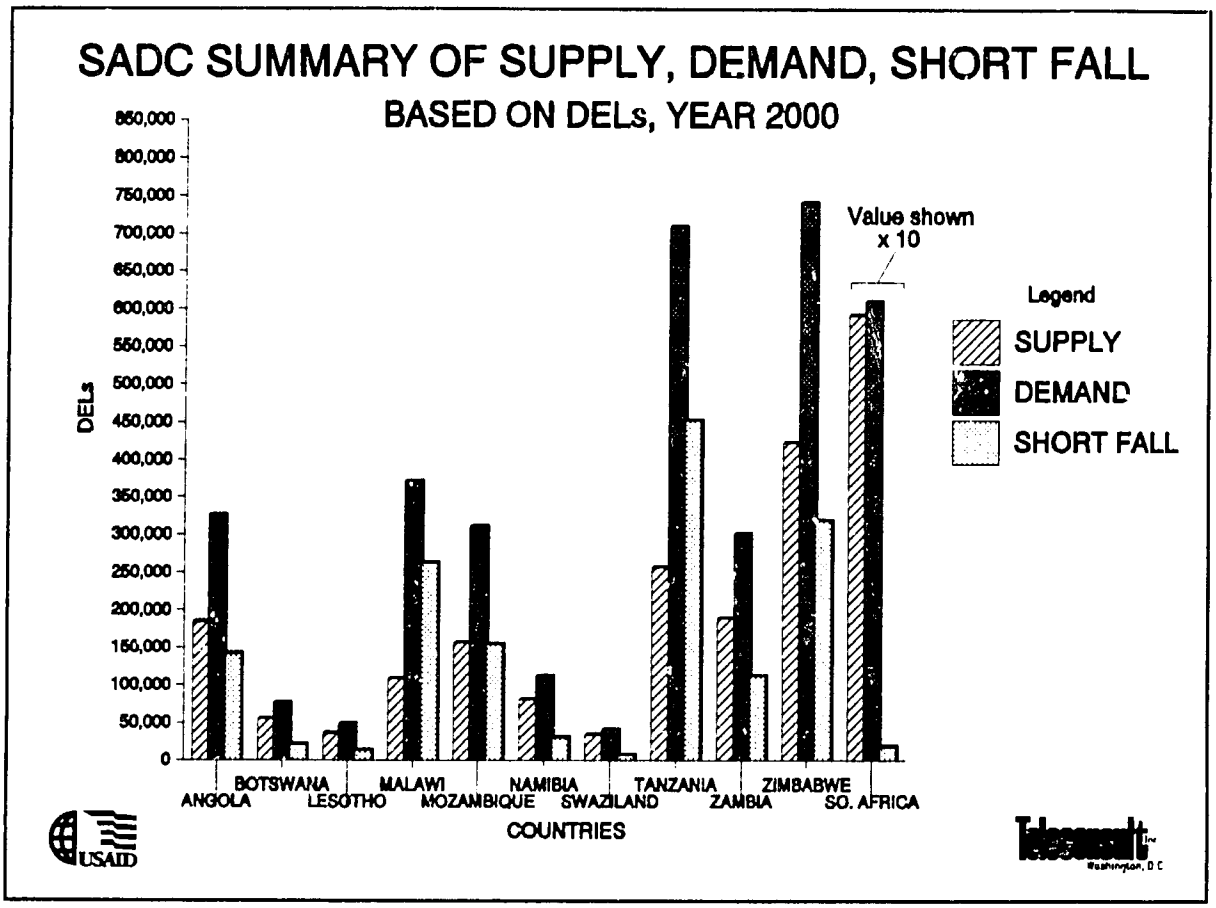

Exhibit ES-4

4.0 TELECOMMUNICATIONS IMPACT ON ECONOMIC DEVELOPMENT IN SOUTHERN AFRICA

The world is rapidly moving toward an economic system based on the continuous and ubiquitous availability of information. Recent advances in telecommunications technology have been an important vehicle in permitting information exchange to develop as a valuable

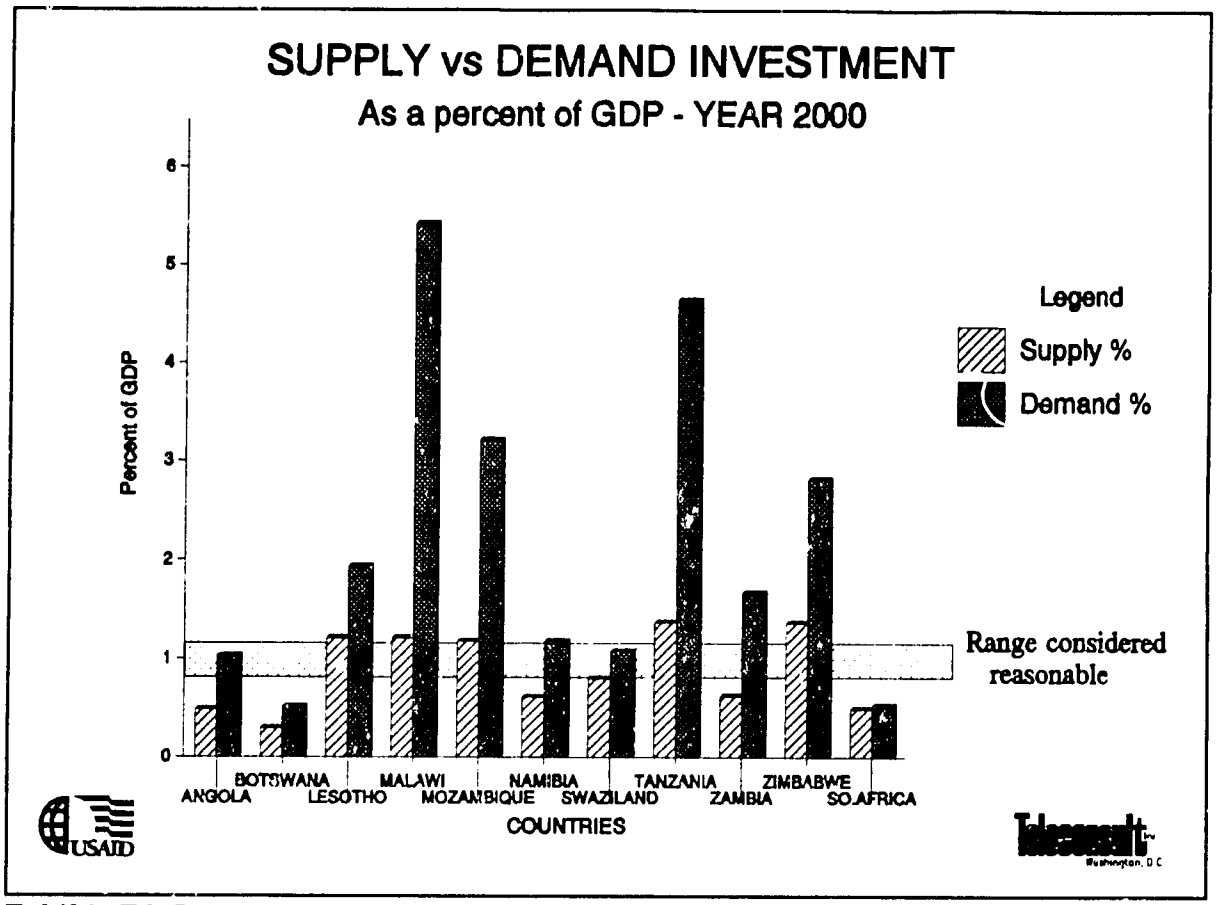

Exhibit ES-5

commodity. Countries and sectors equipped with the requisite telecommunications systems have been rapidly moving into post-industrial, information-based economy growth. For the developing world, a modern telecommunications infrastructure is not only essential for domestic economic growth, but a prerequisite for participation in increasingly competitive world markets and for attracting new investments. In the advanced industrial countries of Europe and North America, universal telecommunications services have penetrated every sector of society. In many developing countries the limited availability of service is constraining economic growth. This is particularly true of the SADC countries and the RSA, a region containing both the lowest level of telecommunications density and economic development in the world.

Economic development policies in the industrial countries increasingly include telecommunications as an essential component of the economic infrastructure.[1] This realization has been initiated by industry's demand for advanced telecommunications services

[1] NTIA, 1991; Schmandt *et al*, 1988

for competitive reasons. The lesser developed countries have begun to recognize that inadequate telecommunications services will be a disincentive to new investment and place existing industry at a competitive disadvantage. This is valid for a range of activities including: improved farm production, animal husbandry, export marketing for the mining industry, bank transfers and tourist arrangements, all vital sectors of the SADC and RSA.

The primary economic benefit of improved telecommunications is improved efficiencies in other productive sectors. Over 80 percent of the telephones in the lesser developed countries are connected to businesses or to government agencies. Few domestic businesses and no international activities could operate competitively without modern telecommunications. The primary benefits include reduced transport costs and transaction costs, improved marketing information and increased efficiency of industrial production. In all economic sectors, agriculture, manufacturing and services, advanced telecommunications systems are becoming an integral part of business operations. The lesser developed countries must accelerate their application of telecommunications technology or fall further behind in economic competitiveness.

A review of the methodology, models and data requirements utilized in similar studies on the relationship between economic development and telecommunications in other regions of the world is provided. Economic techniques make possible a more precise definition of the relationship between telecommunications and economic development by using both quantitative and qualitative indicators to analyze the impact of equipment cost, calling price, tariff levels, and other factors. The available procedures are reviewed to determine their potential applications to the SADC and RSA, and suggest the most appropriate methodology for further analysis of the region.

The study critiques and analyzes data on telecommunications services in the SADC and RSA; and estimates the evidence for, and consequences of, the inadequacy of these services. The object is to provide an overview of the current and projected shortfall in telecommunications in SADC and RSA and its effects on the economy. The report conducts a comparative analysis of telecommunications indicators, such as penetration, (number of direct exchange lines (DELs) per capita). It also examines the prices and revenues of telephone service in the SADC countries, and engages in some comparative analysis of the costs of providing service. The report attempts to estimate the economic cost of mismanagement of telecommunications, by examining the impact of rate structure, international settlements losses, and lost value added of "normal" telecommunications infrastructure. The level of investment needed to bring the country's telecommunications structure to a level comparable to or better than countries of similar economic size and structure is also estimated.

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4.1 METHODOLOGY FOR THE SADC REGION

The countries of SADC and RSA are among the least developed countries, both economically and in their use of telecommunications. A wide range of studies indicate that expanded telecommunications investment is essential, not only for growth, but also to remain competitive within the increasingly information-oriented global economy. Failure to develop telecommunications systems will only increase the development gap between the SADC and RSA and the world's industrial countries.

There are basically two distinct research methodologies to study the effects of telecommunications on economic development. One uses the macroeconomic or top-down approach. The other uses the microeconomic or bottom-up approach. Both have their advantages and disadvantages. Macroeconomic analysis, is based on national aggregate statistical data and provides an overview of the basic economic indicators. It can indicate but not fully explain causal relationships. Microeconomic analysis can substantiate the positive effects of telecommunications in a specific situation, industrial sector or region, but is dependent on small sample sizes making it difficult to expand to include a larger universe.

An effective economic model requires a valid, reproducible and accurate statistical time series over a significant period of time. This statistical series was not available for many countries within SADC and RSA. SADC and RSA contains countries at the lower range of the development spectrum. Over the past decades the region has moved through turbulent economic and political times. This has produced periods of economic regression and decline that can reduce the validity and confidence levels of statistical indicators. Over the past decade, the level of telephone density has remained stagnant for most countries in the SADC and RSA, (except for Botswana).

This report reviewed both the macroeconomic and the microeconomic approaches, and suggests the methodology for relating telecommunications and economic development within the SADC and RSA is to use existing macroeconomic data to define a "normal" or baseline relationship between telephone density and primary economic data. This norm can then be compared to the actual relationship between telephone density and other economic indicators in the SADC and RSA. Comparing the southern African countries with the international norm exposes the current gap in telecommunications development in the region and highlights the potential for telecommunications growth in each country. It is recommended that more detailed studies be developed for each country to confirm these initial assessments.

The data in this study are consistent with the proposition that telephones provide substantial growth and investment enhancing activity and thus facilitate economic growth.

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The analysis of the data in the Southern African Countries supports this relationship. Input-output studies of the economic impact of telecommunications also show that it makes substantial contributions to the efficiency of the economy. A quantitative study of the U.S. during the years 1963-1982 estimated efficiency gains of nearly US$ 80 billion for the 1982 economy.

Due to concerns about the availability and validity of data, this scoping study emphasizes pragmatic solutions which minimize the complexity of the problem but comport with the data available for the analysis. The team used a variety of data sources in developing the profile of the Southern African countries under study. One general characteristic to note is that South Africa skews the data. Since its level of development is much higher than the other countries. This is deceptive, however, because the data reflects primarily the white South African economy only. In addition, data within specific countries can also be misleading for similar reasons. In Zimbabwe for example, penetration in the white community far exceeds the rest of the country's telephone availability.

4.2 RESULTS

An initial assessment of the quantitative relationship between telecommunications development and economic growth was derived from the available data. Because of the difference in the size of the countries, the analyzes utilized the growth rate of GDP and telephones. As can be seen from Exhibit 2-11 and Exhibit 2-12, the relationship between the rate of growth of DEL per capita and growth in per capita GDP for the Southern African counties is positive.[2]

[2] The exception of Mozambique, which, with a civil war during the period, may be expected to exhibit anomalies.

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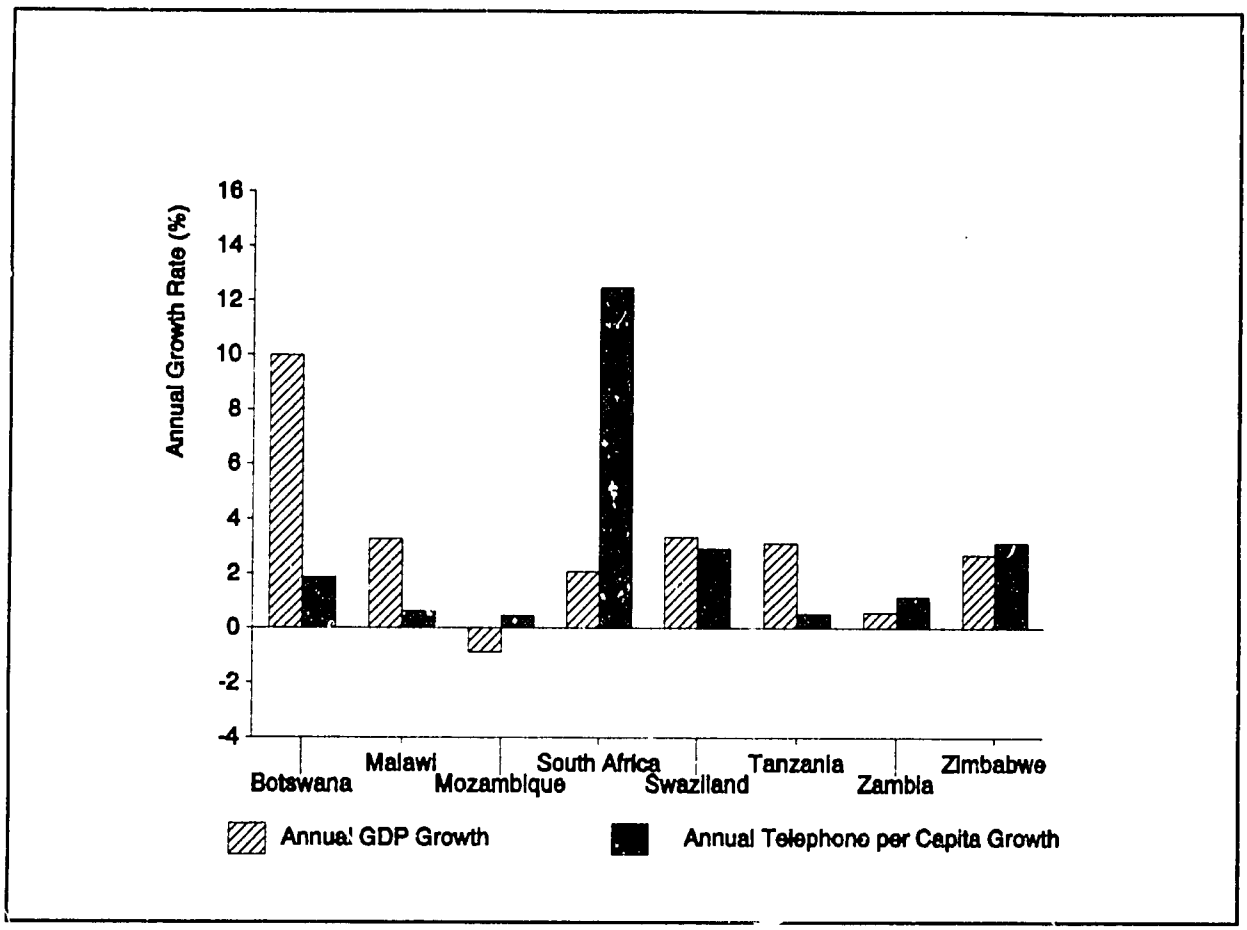

Exhibit ES-6 Telephone Growth per Capita vs. GDP Growth Rates (1983-1989)

Exhibit ES-7
Annual Telephone Growth per Capita vs. GDP Growth Rates (1983-1989)

	Annual Growth GDP	Annual Growth Telephones/Capita
Botswana	9.98	1.85
Lesotho	7.07	0.82
Malawi	3.26	0.61
Mozambique	-0.86	0.44
South Africa	2.06	12.47
Swaziland	3.33	2.94
Tanzania	3.13	0.52
Zambia	0.58	1.16
Zimbabwe	2.71	3.15

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4.3 CONCLUSIONS

Macroeconomic and microeconomic methods were both investigated for telecommunications. The generic models available, however, cannot be easily transferred to specific regions, countries or sectors. The microeconomic approach can produce significant results, particularly by displaying the influence of telecommunications on specific projects in the transportation and service sectors of the economy. However, a microeconomic analysis of telecommunications is flawed by the fact that valid and reproducible data of the sort required for an effective analysis is not available for the SADC and RSA countries.

After reviewing the various methodologies available to measure the potential impact of telecommunications on economic growth, and taking into account the data constraints, the report concludes that a direct Macroeconomic correlation model be defined for each country. The macro-model assists in determining the appropriate growth potential for telecommunications for each country, and the impact on economic growth. The demand model is designed to duplicate the judgment of an entrepreneur, viewing the Southern African countries in an independent, unbiased manner and suggesting a hierarchical ranking of investment beneficiaries for each country within the region. Substantial data development is required for each country to effectively utilize more complex modeling procedures. The report recommends that one or two countries within the region be selected to serve as a laboratory for more detailed analyses and data base development using the macro-model approach.

The results generated by economic models and analyses are only as valid as the initial data. Over the past decades the region has moved through turbulent economic and political times. This has produced periods of economic regression and decline that reduces the validity and confidence levels of data and hence statistical indicators. A World Bank survey of Sub-Saharan Africa found extensive problems with data collection and measurement procedures, particularly with historical records for even basic macroeconomic planning indicators. The survey indicated a higher level of manual data collection efforts than normal, negating the improved quality of computer software and hardware available within these countries.

4.3.1 Derived Conclusion in Southern Africa

Almost all of the discussions, both theoretical and empirical, depict a positive relationship between telecommunications and development. But, the strength of that relationship appears to vary depending upon the pool of data and the economic, technical and regulatory environments of the countries studied. The conclusion that can be drawn is that arguments about the existence of a positive relationship are substantiated. The important issues pertain to describing the relationship and delineating the reasons for variations in the

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strength of the relationship.

Neither investment in infrastructure generally nor investment in telecommunications infrastructure is sufficient for economic growth. Other conditions must be present. The region must have the human and capital resources as well as other infrastructure investments to obtain greater benefits from telecommunications infrastructure investment. The timing of the investment and the type of telecommunications investment relative to other modernization factors may well be of great importance. Also, installing new equipment that can provide a broader array of services will have a greater impact than marginal expansion of an existing network, providing that pre-conditions for modernization of other sectors of the economy are present.

Among the countries of the region evaluated, all indicated strong positive economic stimulus with investment in telecommunications infrastructure. The specific impacts per country were assessed with a reasonable level of confidence, however detailed analysis suffered from the limitation of data. The elasticity models discussed earlier show the great impact of telecommunications growth to stimulating GDP growth and subsequent growth of further investment resulting from GDP growth. The negative impact of the shortfall telecommunications growth is analyzed using the same model to offer estimates of GDP constraint due to lack of infrastructure investment. Although the literature review revealed no significant study of that area, the high elasticity coefficients of the reciprocal model provide confidence of their application. However accurate estimation of the negative impact of shortfall in telecommunications in the region requires significant national and regional research beyond the scope of the initial phase of the scoping study.

4.3.2 Policy Considerations

The existence of a positive, reciprocal correlation between telecommunications investment or penetration on the one hand and economic growth on the other seems fairly well established. This does not mean that any investment in telecommunications will automatically cause growth. As one of the authors of the DRI study wrote, "...simply going on a telecommunications equipment spending spree would not be sufficient to cause future economic growth. We must assume that the agents involved are rational actors, calculating to the best of their ability, cost effective means of realizing economic ends."[3] In other words, the investments respond to actual or potential demand, and must be targeted to provide telecommunication service when and where it is most needed.

[3] Mark Gold, personal correspondence, 9/11/92.

From a development perspective, the key issue is not merely the correlation between telecommunications and growth, but the institutional mechanisms which determine how and when investments in telecommunications are made. The DRI/McGraw-Hill study is based on time series data drawn from the U.S., a country with a regulated market economy in equipment and services, and telephone companies which are long-established, private, profit-motivated firms. For part of the period covered by the study (1978-1988), U.S. telephone companies were subjected to competition from other suppliers. Private firms also have a considerable amount of freedom to invest in their own telecommunications facilities. Thus, investments in telecommunications in the U.S. were steered by market prices, competition and other external forces ensuring that they were, on balance, cost-effective and responsive to demand. Under these circumstances, telecommunications investment is correlated with economic growth.

In developing countries, on the other hand, the institutional context of infrastructure investments is radically different. Often PTT management is restrained by political and institutional concerns which are not related to telecommunication services. Also, the Telecommunications Authority must often compete with other government departments for scarce capital, in a political arena in which economic efficiency considerations may be unknown or unrecognized due to the absence of well-organized capital markets and investment information services. Furthermore, in an atmosphere of political instability, even the best of capital investment plans are futile if they are constantly deferred or altered by unstable local and national politics. The existence of the telecommunications/economic growth correlation does not address these institutional considerations.

5.0 THE ROLE OF THE PRIVATE SECTOR IN TELECOMMUNICATIONS

Historically, the nations of the world have provided telecommunications through government-owned entities and government-regulated private monopolies. It was believed that competition in the area of telecommunications was not practical due primarily to complex logistical and national security issues. The concept of a "natural monopoly", the desire to generate fiscal revenue, the goal of "universal service", and national security have been the most widely used reasons for governments to be both owners and operators of their country's telecommunications infrastructure[4]

Governments, especially those of developing nations, have traditionally argued that telecommunications is a "natural monopoly". Historically, the installation of telecommunications networks has demanded large amounts of capital to initially establish service. The investment required initially is sufficiently large that in many markets,

[4] Ambrose, W.; Hennemeyer, P.; Chapon, J.P. "Privatizing Telecommunications Systems", Discussion Paper #10, International Finance Corporation. 1990.

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especially the SADC region, viable operation is possible only if one company serves the market place.

Once the basic network infrastructure has been installed, the marginal cost of adding new subscribers is generally negligible. This includes switching equipment, trunk lines and outside plant facilities. The addition of subscribers involves the extension of the local loop to the subscriber which, even in rural areas, involves a much smaller investment then that required for the network infrastructure. At a given network size, profits for a monopoly telecommunications provider can be substantial. Governments in developing countries usually take advantage of this fact to generate extra fiscal revenue. In general, however, to insure that basic telephone service provision becomes a "universal service", governments regulate tariff levels the monopoly may charge.

However, over the last decade, reform-minded regulators have placed into question the role of governments in operations and ownership of telecommunications entities. Consideration for privatization has expanded from a few industrialized countries to almost all corners of the world. There are several reasons for this movement.

First, governments have failed to provide reliable telecommunications services. In developing countries, the main problem has been poor service quality, with typical call completion rates (CCR) of under 50% when service is available. Long waiting lists for telephone services can take over ten years to be satisfied.

Large bureaucracies in state-owned telephone companies have resulted in large inefficiencies. The typical number of employees range between 50 and 100 per 1000 telephone lines in developing countries (including the SADC countries) compared to 0.2 per 1000 lines in the United States, Europe, and Japan. In addition, as technology has increased in complexity, these bureaucracies have been unable to recruit enough qualified technical and managerial resources.

Secondly, state-owned telecommunications companies usually lack the capital required to satisfy growing demands. Although telephone companies are known for their high profitability, large proportions of internally-generated funds are transferred to other non-profitable state-owned monopolies via the central governments. In order to utilize the required expansion funds, these telephone companies actually compete with other state-owned entities for government funds. There is usually very limited funding available from the government since other industries many times take higher priority in determining funding allocations from government.

Third, the concept of a "natural monopoly" has started to erode. Many developed countries have graduated from their industrial years into the "information age," new technologies have

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become available which can provide the public with innovative new services to improve the quality of life and boost national economies. Rapid technology development and deployment is constantly improving efficiencies, quality of service, increasing capacity of transmission, and allowing for introduction of new service offerings which improve the efficiencies of users in other industries. As a result, the cost of manufacturing, installation, and operations are diminishing significantly with time.

The net effect of these factors is to reduce risks and required investment levels necessary to build and operate new services outside the realm of the "natural monopoly". As a result, governments of both developed and developing countries have started to review and modify existing regulations to allow and encourage competition ("liberalization") and/or seek participation from the private sector for basic telephone services ("privatization") and for other basic and enhanced services (i.e mobile/cellular services, data networks).

In order to allow private sector participation in telecommunications, however, certain key areas have to be addressed in a restructuring plan. Most of these are related to regulation and government policies[5]. The most important are:

- **Telecommunications Law** - Most countries need to change their laws and some times their constitution (i.e. in Brazil) before the private sector is allowed to participate in the telecommunications sector.

- **Frequency Allocation** - A review of frequency allocation is necessary to reallocate certain frequencies required by new services, such as mobile cellular telephony, as well as to monitor unauthorized transmissions.

- **Technical Standards** - As new operators are allowed to compete with the dominant telephone service provider, interconnection technical standards have to be well defined, published, and verified so that interfacing services between different operators will be possible with minimum difficulty.

- **Foreign Investment Laws** - In many countries, especially those in the former Soviet bloc, governments need to legislate new laws that protect the interests of the private investors (i.e. profit repatriation, investment protection, etc.).

- **Government Policies** - Governments need to clearly state their policies regarding such important issues as rate structures, "Universal Service" requirements, rural telecommunications services requirements, and

[5] Ambrose, Hennemeyer, Chapon, pp. 7-8.

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competition.

- **Regulatory Structure** - In most countries, governments need to restructure their ministries or departments overseeing communications as well as their state-owned telephone companies before privatization and/or liberalization can occur. First, regulation and operations need to be separated from the state-owned monopolistic telephone company. Second, the telephone company needs to become autonomous and market-oriented so that its activities, capital requirements, and earnings are not tied to government operations and budgeting. Autonomy is required in the case of privatization and when competition is allowed in order to separate regulatory functions from the monopoly and to keep them in the state.

The key policy issues that promote private sector participation in telecommunications were identified previously. Exhibit ES-7 maps these key policy issues to the current and planned status for the Southern Africa Region.

5.1 EXPERIENCE OF PRIVATE SECTOR PARTICIPATION IN THE SADC REGION

The role of the private sector in the SADC region has been minimal. The only cases in the region where the private sector is participating or is contemplated for future participation are those identified in Exhibit ES-8. These countries are Botswana, Mozambique, Zambia, Zimbabwe, RSA and Tanzania. However, the tendency for the region is to increasingly involve the private sector in more areas than before.

In **Botswana**, Cable & Wireless is under contract to manage the state-owned telephone company. The contract has been under execution for most of the 1980s. The government is currently renegotiating its relationship with C&W. The main benefit to Botswana in this private sector arrangement is that C&W imports experienced technical and managerial human resources. During the tenure of C&W, efficiency has increased dramatically. This can be measured by the decrease in number employees per 1000 telephone lines from 85 in 1987 to less than 50 in 1989. In 1989, only Zambia and South Africa had a lower number of employees per line in the region (see Section II).

In **Mozambique**, Telecomunicaciones Do Mozambique (TDM), the state-owned telephone company has been divested from the post office (PTT). TDM is now an autonomous entity, restructured to respond efficiently to market demands as an autonomous entity. Private sector participation has been allowed in Mozambique to provide other services such as technical consulting and data communications. The drawback to private sector participation in Mozambique is that TDM, which is still a state-owned monopoly, has a 50% equity participation in all of the new service providers and could still flex its monopolistic muscles.

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SUMMARY OF KEY GOVERNMENT POLICIES REGARDING THE TELECOMMUNICATIONS SECTOR

COUNTRY	TELECOMM LAW	FREQUENCY ALLOCATION AND LICENSING	TECHNICAL COMPATIBILITY	FOREIGN INVESTMENT LAWS	EQUITY POLICIES	SECTOR POLICIES	TIES TO REGIONAL ORG.
ANGOLA	STATE MONOPOLIES, NO COMPETITION IN SERVICES.	REGULATION BY INDEPENDENT REGULATORY BODY.	CONFORMS TO CCITT RECOMMENDATIONS AND CEPT STANDARDS.	NO CURRENT INCENTIVES TO ATTRACT FOREIGN PRIVATE SECTOR INVESTORS.	STATE OWNERSHIP ONLY.	MERGE LOCAL AND LONG DISTANCE OPERATORS. DEVELOP SERVICES IN SAFE AREAS.	SATCC.
BOTSWANA	STATE MONOPOLY, NO COMPETITION IN SERVICES.	SELF REGULATED BY THE STATE OWNED MONOPOLY.	CONFORMS TO CCITT RECOMMENDATIONS AND CEPT STANDARDS.	FAVORABLE TO FOREIGN PRIVATE INVESTORS.	STATE OWNERSHIP ONLY.	TOP PRIORITY IS THE DEVELOPMENT OF RURAL AREAS.	SATCC, SATA, ARTC, PATU
LESOTHO	STATE MONOPOLY, NO COMPETITION IN SERVICES.	SELF REGULATED BY THE STATE OWNED MONOPOLY.	CONFORMS TO CCITT RECOMMENDATIONS AND CEPT STANDARDS.	LOW CORPORATE TAXES, WAIVERS ON IMPORT TAXES, LAND AVAILABLE TO FOREIGNERS.	STATE OWNERSHIP ONLY.	IMPROVE BASIC SERVICES QUALITY AND EFFICIENCY OF OPERATIONS FOR STATE MONOPOLY.	SATCC, PTA, SATA.
MALAWI	STATE MONOPOLY, NO COMPETITION IN SERVICES.	SELF REGULATED BY THE STATE OWNED MONOPOLY.	CONFORMS TO CCITT RECOMMENDATIONS AND CEPT STANDARDS.	DUTY DRAW-BACK, CAPITAL ALLOWANCES, REPATRIATION OF PROFITS AND DIVIDENDS. WORK PERMITS FOR EXPATRIATES	STATE OWNERSHIP ONLY.	DIGITALIZATION OF URBAN AREAS. INCREASE TELEPHONE PENETRATION IN RURAL AREAS.	SATCC, SATA, ITU, ARTC, RASCOM.
MOZAMBIQUE	STATE MONOPOLY FOR BASIC SERVICES; PRIVATE SECTOR COMPETITION FOR ENHANCED SERVICES.	REGULATION BY INDEPENDENT REGULATORY BODY.	CONFORMS TO CCITT RECOMMENDATIONS AND CEPT STANDARDS.	NEW LEGISLATION PROMOTES FOREIGN INVESTMENT IN PRIVATIZATION PROCESS, INCLUDING JOINT VENTURES.	JOINT VENTURES WITH THE PRIVATE SECTOR.	IMPROVE EFFICIENCIES VIA JOINT VENTURES. INCREASE RURAL SERVICES VIA SATELLITES.	SATCC, SATA, PATU, ITU.
NAMIBIA	STATE MONOPOLY, NO COMPETITION IN SERVICES.	REGULATION BY INDEPENDENT REGULATORY BODY.	CONFORMS TO CCITT RECOMMENDATIONS AND CEPT STANDARDS.	IMPLEMENTED LIBERAL FOREIGN INVESTMENT POLICIES, BUT POLICIES FOR NEW LAW STILL UNDER CONSIDERATION	STATE OWNERSHIP ONLY.	COMMERCIALIZATION OF INTERNATIONAL SERVICES TO REDUCE DEPENDENCY FROM RSA.	SATCC
SOUTH AFRICA	STATE MONOPOLY, NO COMPETITION IN SERVICES.	REGULATION BY INDEPENDENT REGULATORY BODY.	CONFORMS TO CCITT RECOMMENDATIONS AND CEPT STANDARDS.	FOREIGNERS OBTAIN FAVORABLE EXCHANGE RATES TO ATTRACT FOREIGN CAPITAL, BUT AT LOWER RATES FOR REPATRIATIONS.	STATE OWNERSHIP ONLY.	LIBERALIZE SECTOR, ALLOW COMPETITION, SATISFY BUSINESS COMMUNITY AND EXPAND SERVICES TO RURAL AREAS.	NONE.
SWAZILAND	STATE MONOPOLY, NO COMPETITION IN SERVICES.	SELF REGULATED BY THE STATE OWNED MONOPOLY.	CONFORMS TO CCITT RECOMMENDATIONS AND CEPT STANDARDS.	NO DETAILED INFORMATION AVAILABLE AT TIME OF WRITTING OF THIS TABLE.	STATE OWNERSHIP ONLY.	INCREASE AVAILABILITY OF URBAN AND RURAL SERVICES.	SATCC, SATA, PANAFTEL, ARTC, PATU.
TANZANIA	STATE MONOPOLY, NO COMPETITION IN SERVICES.	SELF REGULATED BY THE STATE OWNED MONOPOLY.	CONFORMS TO CCITT RECOMMENDATIONS AND CEPT STANDARDS.	INVESTMENT CODE 1990 ENCOURAGES FOREIGN INVESTORS. INVESTMENT PROMOTION CENTER ESTABLISHED.	STATE OWNERSHIP ONLY.	PROVIDE HIGH QUALITY SERVICES AT AFFORDABLE TARIFFS THROUGHOUT THE COUNTRY.	PATU, PANAFTEL, ITU, SATA, SATCC.
ZAMBIA	NEW PRIVATE MONOPOLY LAW FOR BASIC SERVICES; PRIVATE SECTOR COMPETITION FOR ENHANCED SERVICES.	CURRENTLY SELF REGULATED BY MONOPOLY. PLANED INDEPENDENT BODY.	CONFORMS TO CCITT RECOMMENDATIONS AND CEPT STANDARDS.	NEW PRIVATIZATION LAW PROVIDES INCENTIVES FOR FOREIGN INVESTORS IN TELECOMMUNICATIONS.	PRIVATIZATION OF ALL TELECOM. SERVICES.	DOUBLE LEVEL OF PENETRATION BY THE YEAR 2000 VIA PRIVATIZATION OF THE STATE MONOPOLY.	SATA, RASCOM, ITU, SATCC.
ZIMBABWE	STATE MONOPOLY, NO COMPETITION IN SERVICES.	SELF REGULATED BY THE STATE OWNED MONOPOLY.	CONFORMS TO CCITT RECOMMENDATIONS AND CEPT STANDARDS.	UNAVAILABILITY OF HARD CURRENCY AND ASSOCIATED CURRENCY RESTRICTIONS ARE BARRIERS TO FOREIGN INVESTORS.	STATE OWNERSHIP ONLY.	IMPROVE THE NETWORK OF EXISTING SUBSCRIBERS FIRST, THEN EXPAND TO NEW SUBSCRIBERS.	SATA, RASCOM, SATCC., ITU.

Exhibit ES-7 Summary of key policy issues regarding the telecommunications sector in the SADC Region.

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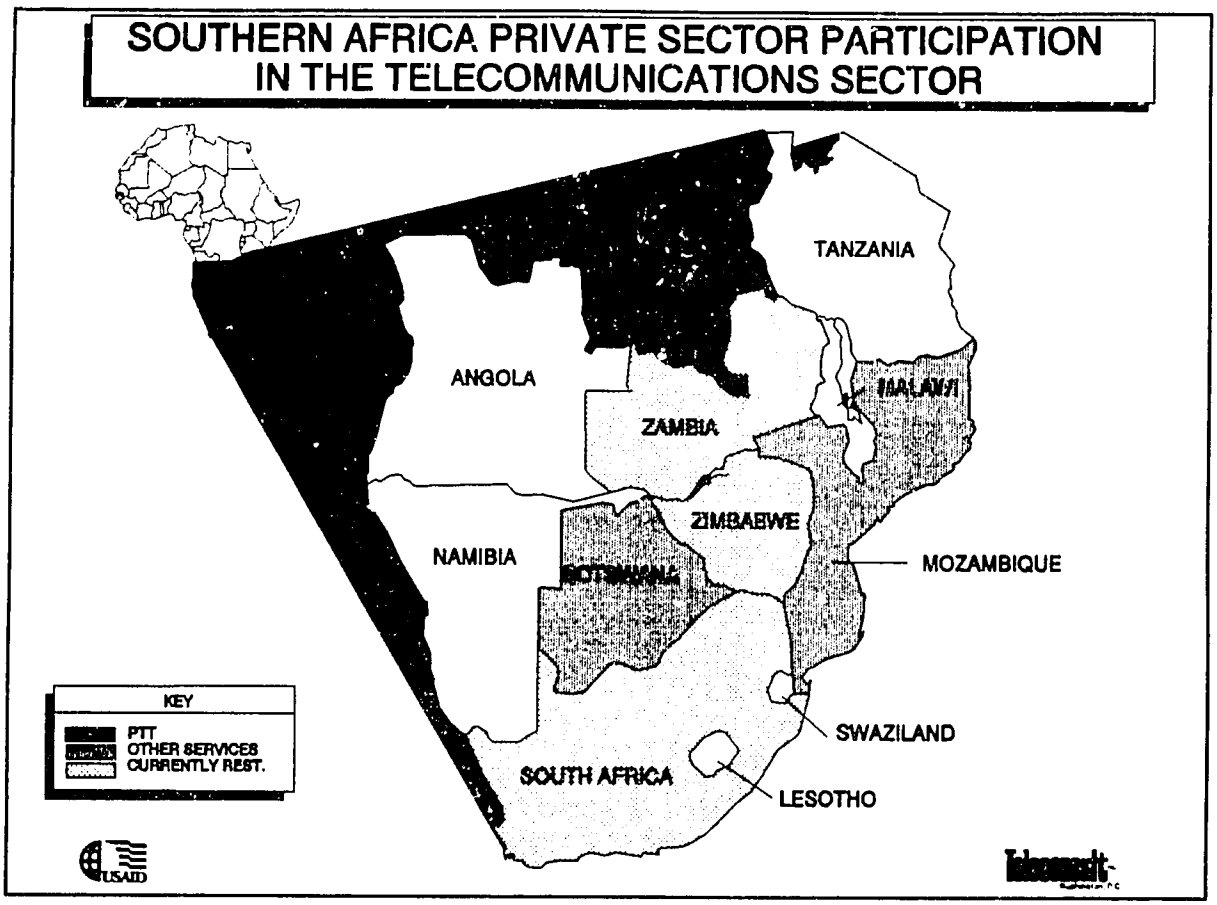

Exhibit ES-8 Private Sector Participation in SADC.

Another major constraint for Mozambique may be that future potential private investors may stay away from the country until civil unrest ceases through recently-established peace agreements intended to end its civil war. At the moment, it is too early to assess the impact of private sector participation.

In **Zambia,** no private sector participation in telecommunications is yet available. However, a new privatization law that permits privatization of the state-owned telephone company was recently approved. The law also covers other industries. The major constraint for the country is that the country lacks the major ingredients to attract private investors when compared to other investment opportunities in the world. That is, the perceived low market demand, low investments in other infrastructure, and country risks may force the government to take extra steps in promoting the country to potential investors.

In **Zimbabwe,** the Ministry of Information, Post and Telecommunications is working with the World Bank to restructure its telecommunications sector. The intent is to restructure

the sector and create a regulatory entity separate from operations of telecommunications services. It is also intended to divest telecommunications functions from postal functions. The government also envisions participation from the private sector in certain enhanced services, such as cellular telephony.

With the most developed economy in the region, the **RSA** may provide the highest potential returns to investors as compared to other opportunities in SADC. The RSA government has already divested telecommunications from the post office. In October 1991, Telekom was created as an autonomous telecommunications operating entity, responsible for its own operational revenues and returns. Due to financial constraints, Telekom has expressed great interest in exploring participation from the private sector to provide new services such as cellular telephony and for assistance in funding its large expansion requirements in the future.

The main constraint for private sector participation in the RSA is political risk. The African National Congress (ANC) opposes private sector participation in telecommunications. In fact, due to opposition from the ANC for private sector participation in cellular telephony, Telekom has decided to installed a new cellular system on its own even though it had expressed interest in attracting a private investor.

Based on the principal elements that affect investment decisions, it can be concluded that, in general, the **SADC Region** may have difficulty attracting private sector investors in the telecommunications sector. Without additional investment incentives, the attractive characteristics for the region do not appear sufficiently strong to counter the unattractive aspects of the region.

The attractive characteristics for the SADC region include:

- **Large Revenue Growth Potential** - In all countries of the region, the large unsatisfied demand for basic telephone services represent large revenue growth potentials as compared to the initial investment requirements.

- **Efficiency Gains** - The implementation of new qualified management, improved operations methodologies, and the rapid deployment of new technology and services can be expected to improve efficiencies significantly in the SADC region.

- **New Service Opportunities** - Services other than basic telephone services are not yet common in the SADC region. Business users can benefit from the provision of new enhanced services and alternative technologies, such as cellular telephony. The low capital requirements for these type of services as

compared to basic telephony may attract entrepreneurs and smaller companies which otherwise might not be able to compete against larger established operators in other more attractive markets. Small U.S. telecommunications operators and entrepreneurs have shown to be among the best competitors in the world.

- **Proximity to the RSA** - The emergence of the RSA into a democratic and open society will promote additional trade opportunities between the SADC countries and the RSA. This will, in turn, promote growth of telecommunications traffic in the region, increasing the potential for revenue growth. In addition, entrepreneurs from the RSA are potential investors that may contribute to "local" capital as counterparts to foreign private investors (i.e., from the U.S. and elsewhere).

Unfortunately, the potential constraints imposed on the private sector may be significant enough to obscure the attractive benefits that the SADC region may bring. These include:

- **Country Risks** - The perceived country risk by private investors for the region is relatively high when compared to other investment opportunities around the world. Economic and political instability in the region are probably the most important impediments in attracting private sector investors to the region.

  Another contributor to country risk is the uncertainty and timing in future regulatory structures. In order to allow private sector participation, new laws are required in most of the SADC nations. The separation of regulation away from operations of the dominant carrier will require the creation of a regulatory body, the formation of an autonomous operating telephone company, and the establishment of clear policies and regulations. Other factors that increase country risks include taxation treatment, foreign investment laws, frequency allocation, profit repatriation, and the establishment of technical standards (determined by historic donors).

- **Market Size** - One of the most important considerations to private sector investors is market size. Outside of the RSA, the two largest markets are Tanzania and Zimbabwe. With worldwide competition for scarce private investment capital, the market size for the remaining SADC countries might not be sufficiently large to attract the necessary investors.

- **Limited Funding Availability** - The SADC region will have difficulties attracting financing due to competition from other regions of the world. Additional difficulties to attract financing may also be attributed to the fact

that the region posts high country risks and contain small market sizes. Investors and financing institutions are directing attention to other parts of the world, such as Latin America, the former Soviet Republics (CIS), Eastern Europe, and their own home markets (i.e. U.S., Europe, Japan). Assistance from governments of developed nations might be necessary to minimize country risks and provide sufficient incentives to attract investors.

From the point of view of U.S. investors, the SADC region is not overly attractive for private sector investment. Although there are numerous entrepreneurs willing to take the risks of investing in the SADC region, most serious investors (i.e., the telecommunications operating and manufacturing companies) and financing institutions are directing their attention to other parts of the world. Unless a coordinated effort is established to promote the region, create sufficient incentives and to develop policies for sector reform, the private sector may never be a significant contributor to the Region's capital and managerial requirements in the telecommunications sector.

6.0 THE ROLE OF USAID ROLE IN TELECOMMUNICATIONS DEVELOPMENT

The Foreign Assistance Act of 1961, as amended, authorizes AID to administer two kinds of foreign economic assistance: Development Assistance and the Economic Support Fund. Although there are small telecommunications components within many of the development assistance programs, the majority of the large-scale telecommunications activities in AID are carried out within the framework of the Economic Support Fund. Each kind of assistance can take one of three forms; a loan on concessional terms, development grants or technical assistance.

Within the category of Development Assistance, AID programs are guided by the "basic human needs" mandate set forth in amendments to the Foreign Assistance Act. This mandate shifted an earlier AID emphasis on the promotion of large scale infrastructure projects (power plants, roads, dams, etc.) to focus on efforts directed at helping the least developed countries to meet their "basic human needs." These needs are for food, nutrition, rural development, population planning, health, education and resource development. These needs have, in some cases, been met through radio network and radio broadcast facilities. The AID Rural Satellite Program, under Development Assistance, combined a specific kind of telecommunications applications with development goals. The Development Fund for Africa falls within the Development Assistance category. The FY93 request for Africa is $776.6 million.

The second category of foreign economic assistance administered by AID is the Economic Support Fund (ESF). ESF is the most flexible form of U.S. assistance. Justification for ESF can be political, economic or strategic or any combination of these. The use of ESF

funds for Commodity Import Programs enables a country to purchase industrial and agricultural equipment, spare parts and new materials. There have been several telecommunications projects in the ESF category, many in Liberia, Madagascar and Egypt. The Egyptian telecommunications project is one of the larger ESF projects and it is also the only major telecommunications project now ongoing. ESF was also used in the rehabilitation and restoration efforts of telecommunications in Lebanon and Grenada.

An AID initiative entitled "The Partnership for Business and Development" seeks the participation of the American private sector in the effort to develop and sustain free-market principles and broad-based economic growth in developing countries.

The Partnership Initiative includes six activities:

1. The Capital Projects Fund: AID will seek legislative authority to create a fund to support sound capital projects of direct strategic relevance to U.S. trade competitiveness.

2. The Business and Development Network: A Washington and field mission-based network to provide advice, information, insight and counsel to American firms seeking to do business in countries in which AID operates.

3. The Business Advisory Council: Already authorized in the Foreign Assistance Act to provide AID with additional business perspective as the five other activities are implemented.

4. Emerging Sectors in Development: Pilots of a few select U.S. industries (e.g., environmental products, financial services, and telecommunications) that promise extraordinary economic development impacts springing from American private sector investment in the countries where AID operates.

5. Competitiveness Through Universities: Engaging the talents of America's best universities and business schools to address the challenges of emerging economy issues affecting American business.

6. Business Internship Programs for Emerging Markets: Assisting the American private sector to develop a cadre of young men and women equipped with the business skills for emerging markets and an understanding of business cultures in countries where AID operates.

The two activities with the greatest bearing on telecommunications are the activities of the Capital Projects Fund and the Emerging Sectors in Development. An Office of Capital

Projects and Engineering has been established in the AID Bureau for Private Enterprise. AID has launched an important trade and investment activity under the Capital Development Initiative for Central and Eastern Europe entitled "CDI Telecommunications Business Development Services." The project will stimulate the flow of U.S. investment capital and high technology exports to Central and Eastern Europe as well as promote privatization and private sector development.

The project is designed for the ten Central and Eastern European countries. However, project activities will first be initiated in CSFR, Hungary and Poland and then gradually expanded to other countries as economic reforms encourage and additional funding permits.

An innovative feature of the activities under the contract will be the preparation of enterprise profiles and investment memoranda for Eastern European telecommunications enterprises which will be provided to U.S. investors to facilitate match making and privatization, and to close the gap between East and West which has been hindering investment negotiations.

As CDI Telecommunications Business Development Services activities develop over the next few months, announcements in the "Eastern Europe Business Bulletin" will facilitate communications with U. S. investors. The U.S. Department of Commerce, International Trade Administration publishes this Bulletin to alert U.S. investors to trade and investment opportunities.

The Bureau for Europe implements another State/AID Telecommunications /Electronic Media Technical Assistance project, which provides for seminars addressing Telecommunications Policy, Laws and Regulations. Spectrum Management Workshops have been conducted in Bulgaria, Czechoslovakia, Hungary and Poland and meetings with telecommunications policy officials from those countries have been held in Washington. The U.S. Trade and Development Agency (TDA) has provided funds to study digital overlays for the telephone system in Czechoslovakia and to support a feasibility study of telecommunications. A U.S. consulting firm has reviewed the telecommunications sector in Hungary and has made restructuring recommendations after its evaluation, along with privatization considerations. A feasibility study has been completed for the expansion of the Polish telecommunications network and implementation of technology transfer for the production of telecommunications equipment in Poland.

AID has also recently established Capital Development Offices in Moscow, Russia and in Kiev, Ukraine to encourage organizational restructuring of state monopolies and to promote privatization. These offices will be part of the proposed AID Missions to be established in these two states.

An effort under the Emerging Sectors on Development is this current initiative to determine if AID should get involved in telecommunications in Southern Africa and, if so, to determine the particular role of AID In addition, attention will be given to enhancing the U.S. Private Sector's constructive involvement.

AID was one of the co-sponsors along with the Department of State, of a number of private sector telecommunications firms and Africa Communications magazine of AFCOM '92. AFCOM '92 was held in Washington, DC from March 30 to April 1, 1992 with the theme "Building Partnerships for the 90's and Beyond." This was the first U.S.-Africa Communications Conference. Its purpose was to develop U.S. African private/public sector partnerships, disseminate information on resource requirements for improving Africa's communications industry, facilitate opportunities for trade, investment and technology transfer and provide participants with an update on future communications projects and procurement opportunities. Nearly 200 delegates from African countries and the U.S. attended. Among them were PTT Ministries and key telecommunications decision makers from Africa as well as high level U.S. telecommunications authorities. Among the Southern Africa representatives were those from Zimbabwe, Botswana, Mozambique, Namibia, Zambia, Swaziland, Tanzania and the SATCC. AFCOM '92 was pronounced an outstanding success in meeting its objectives of stimulating greater U.S. private sector interest in the relatively underdeveloped but rapidly expanding African communications industry and served as a forum for the exchange of ideas about ways to initiate new partnerships and to enhance existing coalitions between African and U.S. communications industry groups.

6.1 BUREAU MANDATES

The AID Geographic Bureaus have no specific mandates for telecommunications other than the Bureau for Europe which is actively pursuing this sector in the Central and Eastern European countries. The Private Enterprise Bureau, through its Office of Capital Projects, is investigating telecommunications opportunities as well as other sectors in a number of countries including Russia and the Ukraine. The Office of Capital Projects also responds to requests for support from all AID Bureaus. The Near-East Bureau continues to support the telecommunications sector in Egypt and has recently approved an expanded Telecommunications IV Project which provides four new digital exchanges in the Cairo area along with associated outside plant construction. The African Bureau supports the SADC and in FY '92, provided $50 million for transportation, private sector development, agriculture and natural resources management, program development and evaluation. The

AID's new initiatives through the Capital Projects Fund and AID's many years of experience on capital projects, including telecommunications, recognizes that it should again participate in capital projects with the appropriate funding support of the Congress. Capital projects in past years received less attention and efforts were focused more on meeting the basic

needs of client countries. It is now recognized, as listed under Emerging Sectors in Development of the Partnership Initiative, that adequate infrastructure contributes to economic development and serves the growing needs of the dynamic private sectors.

The Capital Projects Office is currently evaluating program structure and development of infrastructure in Central and Eastern Europe and the Newly Independent States. Program initiatives include the assessment of the infrastructure needs, including telecommunications, analysis of U.S. industrial participation in the development. This new mandate is prompted by recent legislative activity. The U.S. Congress has passed legislation calling for the AID, working through the Capital Projects Office, to undertake a comprehensive study of the infrastructure needs in the NIS the CEE and Mongolia. The purpose of the effort is to:

a) Identify those sectors in the economies of these countries that are most in need of rebuilding.

b) Identify opportunities for U.S. firms to help develop the infrastructure in these countries, including an assessment of the export opportunities for U.S. high technology companies.

There is a need for a specific telecommunications mandate for Africa, especially for Southern Africa now that Angola and Namibia are independent and the conditions in South Africa are improving. System upgrade and expansions as well as privatization of certain telecommunications elements should be considered and supported by increased investment.

6.2 IDENTIFICATION OF BASIC ISSUES FOR AID'S CONSIDERATION IN BECOMING INVOLVED IN THE TELECOMMUNICATIONS SECTOR

It is recognized that telecommunications is a tool for development and that economic growth is dependent on an adequate telecommunications system. SADC has acknowledged that there is a shortfall of telecommunications services in the region and this has an impact on its economic development. The stated reason for this condition is under investment in the sector.

The SADC members are a significant economic group with over 80 million people and a combined GDP of about USD $27 billion (1989). The region has important natural resources with gold and minerals comprising 80 percent of the export value of the region. Individual countries have significant differences in population, geographic size, per capita income and resources.

Because of under-investment in the telecommunications sector, an opportunity for AID involvement and private sector participation exist. New Initiatives issued in December 1990

which include the Partnership for Business and Development has prompted AID to request Congress to authorize the Capital Projects Fund to support capital projects of direct strategic relevance to U.S. trade competitiveness. Under the section on Emergency Sectors in Development, telecommunications is identified as a U.S. industry that would trigger great development with the investment of the American private sector.

The Congressional Presentation for Fiscal Year 1993 requests $50 million for SADC from the Development Fund for Africa for improvements in the railways of the Transport Sector. Planning for the FY 1994 Annual Budget Submission contemplates a new project "Telecommunications Sector Development" depending on the outcome of the current Telecommunications Sector Scoping Study and the planned SADC Telecommunications Restructuring Seminar to be held early in 1993.

There is no current production of telecommunications equipment in the SADC countries. Competition can be expected from the current suppliers of equipment from Europe and from Japan. The SADC goal is to completely digitalize the sector and to prepare for the features of the Integrated Services Digital Network (ISDN). However, because of the high capital costs to initiate production of central office equipment in a SADC country, digitalization is unlikely to happen. However, joint ventures to produce value added or enhanced services, cellular communications, facsimile equipment, etc. is possible. AID should assist in exploring the investment climate, both local or imported material sources, availability of qualified human resources, repatriation of profits, and export opportunities.

AID, through the Trade and Development Agency (TDA), can assist U.S. business on feasibility studies and contract definition. In addition, the Department of Commerce sponsors trade missions, trade shows and seminars.

Improved telecommunications helps advance AID's goals in the social and political arenas by increasing the opportunities of the people to communicate readily and rapidly. Good communications improves national integration politically, urban to rural communities, business transactions, health and agricultural information and medical and disaster responses when incidents occur. Telecommunications can also serve local initiatives to strengthen democratic institutions which is another one of AID's initiatives.

The Africa Bureau of AID has established three focus areas for Southern Africa. They are:

1) Transportation (Railways, Roads and Ports)
2) Food Security (Agriculture and Livestock)
3) Trade and Entrepreneurship (Private Sector)

Any AID efforts in the telecommunications sector be included should probably either in the

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focus area of Transportation or Trade and Entrepreneurship.

6.3 REVIEW AND ANALYSIS OF POTENTIAL CONSTRAINTS ON AID'S INVOLVEMENT IN THE TELECOMMUNICATIONS SECTOR IN THE SADC REGION

There are a number of items which must be considered when participating in the telecommunications sector in Southern Africa. Among them are the peace agreement in Angola, the independence of Namibia, peace negotiations in Mozambique and the process toward the abolition of Apartheid in South Africa. These happenings help create the necessary conditions for stability and peace which are essential to attracting the involvement of AID and the private sector.

Although it has been anticipated that South Africa would be able to join SADC organization when the country has established itself as a truly non-racist and democratic country, this might take several years. A number of SADC countries belong to the Southern Africa Customs Union (SACU) including Botswana, Lesotho, Namibia and Swaziland. SACU is administered by South Africa and collects customs duties on member state's imports from outside the union and excise taxes on local production. Tariffs are very high - in some cases 100% - to protect domestic industry within SACU, including South Africa firms. These high tariff barriers have tended to discourage the smaller member states from seeking extra-union sources of imports and favor trade with South Africa. SACU revenues are distributed amongst the members on an agreed formula.

In addition, a number of SADC countries are members of the Preferential Trading Area (PTA) of Eastern and Southern African nations. Some SADC countries are also members of the Lomé-Convention which is a trade agreement between the European Community (EC) and 66 former dependencies including 45 African States. This agreement permits duty free entry into the EC for some agricultural and some manufactured products. These trade linkages must be considered by AID and their possible impact on contemplated efforts and programs.

As concerns the Development Fund for Africa (DFA), there are no constraints. However, programs for Angola are restricted to Non-Governmental Organizations (NGO) for humanitarian assistance and electoral support. The SADC appropriations language for FY93 is expected to reflect the request for $50 million for activities designed to improve competitiveness of the region's private sector through transport sector capital projects. In the case of South Africa, the AID program operates outside of South African Government channels. The FY93 request for $80 million will be handled through NGOs to support ongoing activities which promote human rights and a civil society, human resource development and private sector mobilization including housing. Projects are proposed in

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the areas of education and training.

6.4 IDENTIFICATION OF THE OTHER U.S. GOVERNMENT AGENCIES WITH AN INTEREST IN TELECOMMUNICATIONS

There are a number of U.S. Government Agencies interested in telecommunications in Southern Africa. Among them are the following:

Overseas Private Investment Corporation (OPIC)

OPIC is a self-sustaining U.S. Government agency that promotes economic growth in developing countries by encouraging U.S. private investment. OPIC operates in approximately 100 developing countries, providing financing and political risk insurance to a number of U.S. investors for telecommunications and other projects.

The Export-Import Bank of the United States (EXIMBANK)

Eximbank is the independent U.S. Government agency that facilitates the export financing of U.S. goods and services through a variety of grant, loan, and guarantee programs. It supplements, encourages, and does not compete with commercial financing. By neutralizing the effect of export credit risk that the private sector will not accept, Eximbank helps U.S. exporters compete in overseas markets on the basis of price, performance, delivery and service.

U.S. Trade and Development Agency (TDA)

The U.S. Trade and Development Agency promotes economic development by underwriting investment surveys in developing countries which helps U.S. firms to get involved in projects offering significant export opportunities. It is an independent agency which enhances U.S. exports to major infrastructure and industrial projects in the developing world by providing grants to enable U.S. firms to conduct feasibility studies of the projects. Experience has shown that U.S. participation in the planning stage of a major project can swing significant exports of goods and services to U.S. suppliers during subsequent project implementation. TDA will consider both public and private sector projects. TDA can provide funding on a non-reimbursable grant basis for studies and consultancies that determine the technical, economic, and financial feasibility of a project. TDA can also provide definitional studies and planning services for major projects in developing countries. Telecommunications is a sector in which TDA participates. TDA projects have assisted the international marketing efforts of U.S. telecommunications companies.

U.S. State Department

The State Department is the U.S. Government entity responsible for international treaties and is the government's signatory. As such, it is responsible for U.S. international telecommunications policy. The State Department has established the Bureau of International Communications and Information Policy (CIP). CIP's statutory role is to represent the United States in the International Telecommunications Union (ITU). Its role in the ITU includes formulating and leading delegations of interested government and private sector representatives. CIP supports the International Telegraph and Telephone Consultative Committee (CCITT), an organ of ITU. This committee develops telecommunications standards, known as CCITT Recommendations. Another committee is the International Radio Consultative Committee (CCIR). The State Department has established a Federal Advisory Committee to assist and advise the Department on matters concerning U.S. participation in the activities of the CCIR and its various study groups. CIP manages a telecommunications development fund to support international institutional development and other activities which promote international communications and information development.

The State Department also recommends funding allocations to the ITU and the United Nations Development Program (UNDP). These funds enable the ITU and the UNDP to provide consultants, training and support of telecommunications programs in the developing countries. The UNDP and the ITU have and are currently providing telecommunications assistance to the SADC Governments, however, this funding will be substantially diminished by the end of 1992.

Federal Communications Commission (FCC)

The FCC is responsible for the regulation of communications and the establishment of regulatory procedures, inputs from telecommunications users and the final adopted regulations. The FCC, with its considerable experience in developing and modernizing regulatory approaches to take into account changes in technology and market conditions, has made an effort to share that experience and expertise with a number of developing nations and emerging democracies. Two ongoing FCC programs have been particularly helpful in training developing country telecommunications experts:

1) Since 1960, the FCC has coordinated training in specific technical areas in response to requests from developing countries submitted through the ITU. Training programs are arranged with corporate entities, academic institutions and various government agencies. Over 200 training courses have been arranged in one year alone.

2) For several years, the FCC has cooperated with the U.S. Telecommunications Training Institute (USTTI) by sponsoring two courses and by sharing sponsorship of a third. These courses are Frequency Management and Infringements, Radio Spectrum Monitoring and Management, and Radio Spectrum Management and Computer-Aided Techniques.

U.S. Department of Commerce (DOC)

The Department of Commerce encourages, serves and promotes the nation's international trade. The DOC offers assistance and information to increase the U.S. competitiveness in the world economy. It develops policies and conducts research on telecommunications and assists in the growth of minority businesses. Its International Trade Administration promotes world trade and strengthens international trade and investment possibilities of the U.S. It manages trade fairs and exhibitions emphasizing telecommunications and promotes U.S. telecommunications products and services throughout the world market. It also assists private sector organizations on export financing.

The NTIA was formed in 1978 from the Office of Telecommunications in the Commerce Department and the Office of Telecommunications Policy (OTP) of the Executive Office of the President. It has a broad role in telecommunications and information issues for the DOC. Included among its broad goals is the formulating of policies to support the development and growth of telecommunications, information and related industries and furthering the efficient development and use of telecommunications and information services. NTIA provides policy management for the Federal use of the electromagnetic spectrum. It conducts seminars and training in spectrum management, both overseas and in the U.S. Telecommunications Institute. U.S.AID Missions can submit requests to NTIA for consideration of specific needs.

NTIA works closely with the U.S. Government agencies in support of telecommunications development activities. It also funds pre-feasibility and feasibility studies for capital projects, participates in and sponsors seminars and conferences on communications development and provides policy advice to developing nations.

The United States Telecommunications Training Institute (USTTI)

The USTTI is a unique joint venture of U.S. Government organizations and a broad spectrum of the U.S. communications industry. The Institute provides telecommunications training to less developed countries, as well as others, in the latest telecommunications subjects, technical and managerial. Instruction is provided by specialists from Telecommunications Corporations and the National Telecommunications and Information

Administration. The goal of this partnership is to share U.S. communications technology through tuition-free training courses for qualified telecommunications and broadcast professionals from developing countries. USTTI has over 30 private sector sponsors. In addition, the following U.S. Government agencies are represented on the USTTI Board of Directors: FCC, Department of State, NTIA and the U.S. Information Agency. USTTI has offered over 160 diverse courses free of charge to attendees from developing countries.

Very little is currently planned for the telecommunications needs in Southern Africa. However, the listing reveals a number of resources available to the SADC countries and to the region. There are areas of mutual interest and no discernable potential conflict with AID's objectives. Missions should consider forcefully presenting their telecommunications needs of their client countries to AID/W and to take advantage of those organizations which are in a position to provide feasibility studies and definitional missions. Training opportunities at USTTI might also be investigated for host country management and technical professionals.

6.5 ANALYSIS OF THE ROLE OF OTHER BILATERAL AND MULTILATERAL DEVELOPMENT AND FINANCE AGENCIES WITH A CURRENT OR PLANNED INTEREST IN THE TELECOMMUNICATIONS SECTOR IN SOUTHERN AFRICA

Among the multilateral development and finance agencies interested or active in Southern Africa are: The United Nations Development Program (UNDP) and its organization, the International Telecommunications Union (ITU); The World Bank; The African Development Bank (ADB); the Arab Bank for Economic Development in Africa (BADEA); and the European Economic Community (EEC).

The United Nations Development Program (UNDP)

The UNDP is the world's largest channel for multilateral technical cooperation to enhance the quality of life and raise economic productivity. The UNDP supports more than 4,500 projects in 150 developing countries and dependent territories. Expenditures for technicians, equipment, wages and services in UNDP sponsored programs exceed $10 billion annually (1991). The International Telecommunications Union (ITU) is the oldest agency in the U.N. system. The ITU sponsored the Independent Commission for Worldwide Telecommunications Development which produced the report, "The Missing Link." The report stated clearly that there will be no development without telecommunications, nor economic growth without telecommunications. The report stimulated increased technical cooperation and assistance by the ITU. The ITU is the driving force behind the PanAfrican Telecommunications Network (PANAFTEL). The PANAFTEL network is not yet completed in Southern Africa. Missing links exist to Angola, Mozambique and Namibia.

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World Bank - International Bank for Reconstruction and Development (IBRD)

The World Bank's main purpose is to provide finances for constructive purposes out of its own capital, funds borrowed in capital markets and retained earnings. The Bank extends medium or long-term loans averaging 20 years to help finance specific projects that lay the groundwork for economic progress. Most of its loans are to developing nations. The World Bank has been involved in financing telecommunications projects in Africa for about 40 years. Bank financing has constituted about 20 percent of total project costs, the rest has been financed from other multilateral sources, bilateral sources and internally generated funds. Telecommunications loans have, on the average, constituted about 3 percent of total Bank lending. Although telecommunications has not been one of the top priority sectors for the Bank in the past, the Bank is becoming increasingly aware of the critical role played by telecommunications in economic development.

The World Bank involvement has given two major benefits to the development of the sector. First, through competitive bidding, borrowers have been able to obtain competitive prices for equipment procured under Bank financing. It is estimated that International Competitive Bidding has, in many instances, resulted in cost savings of at least 30 percent. Borrowers have used those prices to negotiate prices for equipment obtained through other sources of financing when international competitive bidding was not the criterion for procurement. The economic rate of return for projects in which the Bank has been involved has averaged 25 percent.

Second, the Bank has initiated institutional reforms in the sector that were required to improve the efficiency of both the overall sector and certain operating entities. The World Bank has a concessionairy financing organization, the International Development Association (IDA) which offers loans to governments subject only to a service charge, with a payment term of 50 years. IDA loans are available only to the poorest of developing nations.

The African Development Bank (ADB)

The headquarters of the ADB is in Abidjan, Ivory Coast and has a membership of 50 African States. The U.S. is a contributor to its fund. The ADB aims to spur both economic development and social progress among its members on an individual and joint basis. It has five associated institutions through which public and private capital is channeled. They are: The African Development Fund; The Nigeria Trust Fund; the African re-insurance Corporation; the Sociéte Internationale Financiere pour les Investissements et la Developpment en Afrique (SIFIDA); and the Association of African Development Finance Institutions (AADFI). The ADB has been one of the donors of the recently completed Rural telecommunications Study. At the AFCOM-92 meetings held in Washington, DC in

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March and April 1992, the ADB representative encouraged applications for funds for the telecommunications sector in Africa. ADB is providing a loan of $15.9 million toward the National telecommunications project in Mozambique. The ADB is also financing digital equipment for the expansion of three telephone exchanges in Malawi.

The Arab Bank for Economic Development in Africa (BADEA)

BADEA was created by the Arab League summit in Algiers in November 1973. It supplies African countries with technical assistance. All members of the Organization of African Unity (OAU) are eligible as recipients except those African countries belonging to the Arab League. Objectives of BADEA are two-fold; to assist African countries with large balance of payments deficit by providing aid, and to sponsor Arab investments in Africa through investment guarantees. The headquarters of BADEA is located in Khartoum, Sudan. BADEA is providing a loan of $8.1 million toward the National Telecommunications project in Mozambique.

The European Economic Community (EEC)

The EEC is an organization of the European Community (EC) consisting of 12 full European members. Under the Lomé Convention, 60 nations in Africa, the Caribbean and the Pacific are affiliated with special trading and economic privileges. EEC contributed toward the SADC Rural Telecommunications Study.

Bilateral Development and Finance Agencies

There are a number of bilateral development and finance agencies active in both national and regional telecommunications efforts with the SADC countries. Among them are:

- Canadian International Development Agency (CIDA) - Funding for telecom was canceled after June 1992,
- Australian International Development Assistance Bureau (AIDAB),
- German Financial Institution for Reconstruction (KFW),
- Swedish International Development Authority (SIDA), and
- Norwegian Assistance and Development Authority (NORAD).

In addition to the above agencies, a number of countries have provided both grant and loan assistance. These countries are, and have been: France, Japan, Portugal, Italy, Belgium, Spain, Sweden and Norway.

The above agencies and countries have provided consultants, experts and specialists to perform a number of tasks such as:

- Identify project infrastructure for investment,
- Enhance use of regional networks,
- Prepare project cost estimation,
- Implement project monitoring and supervision,
- Conduct regional operational coordination and studies,
- Give training courses and seminars,
- Develop staff and institutions,
- Coordinate technical liaison with regional and international organizations, and
- Provide documentation and information.

7.0 CONCLUSIONS, RECOMMENDATIONS AND A SADC ACTION PLAN FOR USAID

7.1 INFORMATION REQUIREMENTS FOR THE PRIVATE SECTOR

The key issues considered by the private sector in making telecommunications investment decisions in developing countries include general conditions of a particular country, the current and planned regulatory framework, as well as specific conditions relating to investments in the telecommunications industry.

In general, private sector investors have similar types of concerns which do not dependent on the type of industry under consideration. Relating to telecommunications, these include:

- **Low Direct Labor Costs** - Investors in the SADC Region will require knowledge of the labor costs in the telecommunications field. In the case of privatization, the inefficiencies relating to the high number of employees in the telephone companies in the region will probably be a concern when investment decisions are required. The issue of labor contracts will be an important action item for any potential investor.

- **Well Educated Pool of Labor** - Investors will want to have an appreciation of the skilled labor pool available in a given SADC country and in the Region. U.S. investors have difficulties in relocating human resources to developing countries for long periods of time. This will probably be the case for the SADC Region. It should be noted that europeans have shown not to have much difficulty in relocating employees to developing countries, specially to Africa and the SADC Region.

- **Country risk** - Inadequate information on general political, economic and industry specific risks is probably the main reason why the SADC region is viewed as a high risk area. U.S. investors view country risks as one of the

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most important indicators in making investment decisions in developing countries.

- **Market Size** - Another important consideration for private sector investors is the size of the market. Most investors are aware of the large market potentials in the RSA. However, the SADC Region is not generally known as a particularly large market. It will be very important for investors to obtain accurate and reliable information regarding the market potentials in all areas of the telecommunications industry.

- **Levels of Foreign Investment** - The level of foreign investment in the region is viewed as an indicator on how "friendly" a host country is to foreign private investors ("success breeds success"). This is probably more true for U.S investors. When a U.S. investor arrives in the region, the level of U.S. investment versus European, Japanese, or local investors is the first impression he or she will obtain. This first impression will probably be a factor in determining investment decisions in the region. For U.S. investors, it is expensive to visit the area before any significant opportunity becomes available. Therefore, it will be important to provide these potential investors as much information on this and other characteristics of the Region.

- **Quality of Infrastructure** - For most private sector investors, the quality of infrastructure is very important. U.S. investors are used to reliable communications, widely available air, road, and marine transportation as well as comfortable hotel accommodations. For example, when Poland become attractive for U.S. investors, the Warsaw Marriott become the "business center" for most investors in all industries, including telecommunications. Daily flights to Warsaw have became common from several U.S. cities. U.S. investment, including telecommunications, in Poland has increased significantly since 1990 (over US$1 billion in telecommunications). Although it is difficult to determine how much did the quality of infrastructure influenced U.S. investors, it can be concluded that it was a principal facilitator in closing business agreements.

Information on laws and regulation is one of the first items private sector investors seek when contemplating investment in a developing country. This is the case in the SADC region. The basic information required includes:

- **Telecommunications Law** - Most countries have an existing law that designates the state as the only entity allowed to own and operate telecommunications infrastructure and services. In some countries, the laws

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are currently under modification to allow for privatization or some sort of private sector participation. Investors will need the latest copy of the telecommunications law and other related regulations, a copy of the proposed changes, an assessment of probable outcomes to these proposed changes.

- **Frequency Allocation** - Private sector investors require information on existing frequency allocations and plans for modifications. New services usually require new frequency allocation and sometimes reallocation of existing frequencies. Investors also seek information on frequency monitoring capabilities where they are contemplating investment in specific countries.

- **Technical Standards** - Local technical standards are very important to private sector investors. The SADC region has traditional adopted technical standards utilized by vendors from donor countries. Fortunately, the world has formalized and established telecommunications standards which are applicable to all nations. The U.S. has its own standards but complies with international standards when crossing borders to other nations. However, for new services, such as cellular and PCN technology, technical and operating standards have not yet been fully established. The U.S. industry currently has a competing cellular standard proposed by the European Community. It is important to provide information regarding proposed standards for new services in the Region.

- **Foreign Investment Laws** - This is another important information required by private sector investors. The law is used in determining the ivestment risk for a given country. It is important to provide interested investors with information on the laws of the SADC region as well as the RSA.

- **Government Policies** - The current and expected government policies for the countries in the Region and in the RSA are important to potential investors. In light of the changing dynamics of the in Region and the RSA, this issue becomes very important factor in making an initial assessment to invest in the telecommunications sector. For example, in the RSA, investors need to asses the policies promoted by the ANC. Any changes to current policies will affect the country's investment risk (up or down).

- **Regulatory Structure** - In most countries in the Region, governments need to restructure their ministries or departments overseeing communications as well as their state owned telephone companies before privatization and/or liberalization can occur. First, regulation and operations need to be separated from the state owned monopolistic telephone company. Second, the

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telephone company needs to became autonomous and market oriented so that its activities, capital requirements, and earnings are not tied to the state's operations and budget. Autonomy is required in the case of privatization and when competition is allowed in order to separate regulatory functions from the monopoly and keep them in the hands of the government. Most investors will not invest in a country if the regulatory framework is not clearly defined. This is an area where the World Bank is actively involved in and where USAID can contribute in the future.

In addition to general and regulatory information, private sector investors require information on market opportunities and other constrains that may affect potential investment results. The type of information that should be provided to private investors, including those from the U.S., should be matched to their primary industry objectives. These interests include:

- **Large Revenue Growth Potential** - Exporting U.S. telecommunications goods and services to markets that offer large revenue growth potentials. In many countries in the region, the large unsatisfied demand for basic telephone services represent a large revenue growth potential for the 1990s (relative to the initial investment).

- **Efficiency Gains** - The introduction of new qualified management, improved operations methodologies, and rapid deployment of new technology and services can improve efficiencies significantly to the point that a privatized phone company can become more profitable even before any new network expansion is materialized.

- **Investment Opportunities** - Information on opportunities in privatization of state owned telephone networks as well as other basic and enhanced services are of interest to investors. A short term (under a year), medium and long term assessment of investment opportunities will help the privates sector in evaluating its commitment to participation in the Region. Opportunities in basic services such as cellular as well as other enhanced services (i.e. VSATs, teleports, data communications) are of special interest to small and medium size U.S. business and entrepreneurs. Timely dissemination of investment opportunities to U.S. investors will be important in contributing to the success of any USAID initiative in the Region's telecommunications sector.

Information on additional constrains on potential private sector investors include:

- **Political and Labor Union Opposition** - When contemplating private sector participation in telecommunications, most developing countries face opposition from political fronts as well as from labor unions. This will probably be the case for the SADC Region. In the RSA, the ANC opposes private sector participation in telecommunications. This fact alone has already repelled potential U.S. investors in telecommunications from the RSA

- **Availability of Financing** - As mentioned in Section IV, insufficient availability of financing for telecommunications projects around the world creates an additional constraint to potential investors. Although debt and equity financing is possible for the Region, other regions of the world present more attractive returns for investors and financial institutions. Information on available financing for telecommunications projects in the SADC region is of great importance to U.S. and other private sector investors.

7.2 TELECOMMUNICATIONS TECHNOLOGY OPTIONS FOR SADC REGION

Most of the installed telecommunications infrastructure in the region is located in the major cities. It is in the large cities that switches and outside plant equipment are installed, serving residential areas and the lucrative business and government clients. However, the region is characterized by having a large rural population, about 2/3 of the total population,

The rural population is growing twice as fast as the urban population. With these demographic conditions, it is important to consider technologies that are cost effective in serving the rural population, not just those in urban areas.

Other constraints affecting the region (except RSA) are that economies are generally poor, demand satisfaction is among the lowest in the world, and not enough capital is available to upgrade the existing telecommunications infrastructure. With these constraints, the following provides a brief description of technologies that are available to provide basic telecommunications services to the area.

The most attractive technologies available to serve rural areas are those based on non-wireline technology, utilizing the natural frequency spectrum resources. These include satellite, cellular, and multi-access radio. With satellites, remote areas can be rapidly accessed with relative independence of transmission costs. Once a signal is received in a remote area, multi-access radio or cellular networks can be used to distribute the signal to the end user. Before the end of the decade, cellular technology will be complemented by personal communications systems (PCS) or mobile satellite telephones receiving signals directly from a satellite.

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For the Region's main urban areas, traditional telecommunications network technologies and topologies can be used to expand existing telecommunications networks.

An illustration of a sample network based on the above recommendations is shown in Exhibit ES-9.

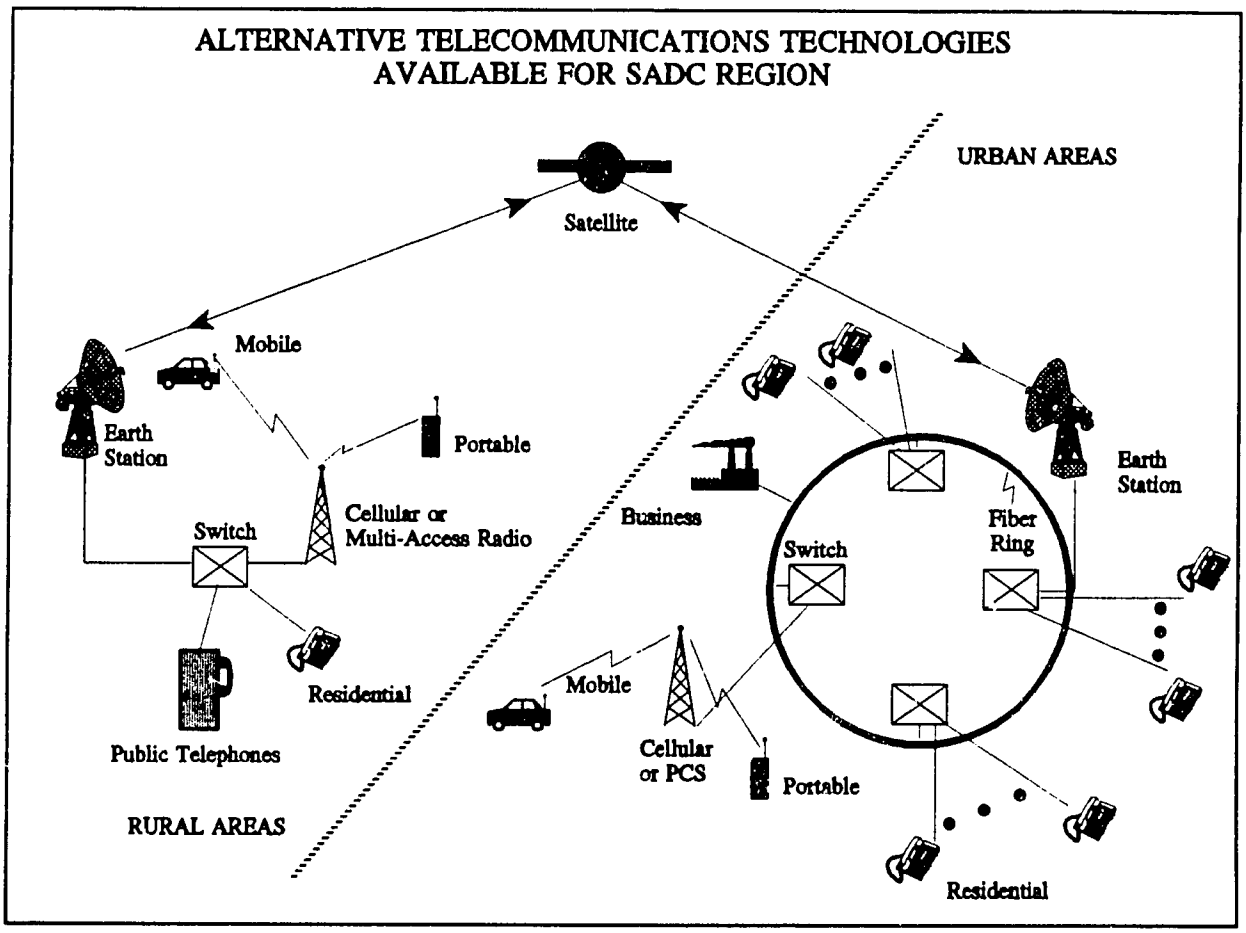

Exhibit ES-9 Alternative Telecommunications Technologies Available for the SADC Region

7.3 INVESTMENT INCENTIVES

There are a number of means which USAID and other financing institutions can mitigate the risks factors that hinder U.S. and other private sector involvement. Among the policy responses or programs that may facilitate private sector participation are:

- Providing technical assistance to host countries in restructuring state owned

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telecommunications entities in a manner that foster competition, and new services, e.g. franchising schemes.

- Providing technical assistance for privatization of existing state owned and operated telecommunications entities or other telecommunication service providers.

- Promotion of the Region's market opportunities via trade and reverse trade missions, project evaluation, corporate technical exchanges, and trade organization representation.

- Provide or facilitate debt, equity or financing guarantees for host country projects in which U.S. private sector entrants are participating.

These options can be effective, particularly in the context of refocusing the activities of the host country's PTT, the backbone of any country's telecommunications industry. The options outlined above are well-suited to encourage involvement of the more entrepreneurial elements of the U.S. telecommunications sector.

There are substantial barriers, however, to entry into the SADC markets. Many of the U.S. private sector investors are too small or otherwise not inclined to enter markets like those of the SADC Region as a consequence of the perceived political, regulatory and commercial risks of financing telecommunications ventures independently and of the substantial expense involved in risk assessment and risk management. These U.S. companies require access to capital information and insurance on a basis that will allow them to match the financial returns available in other markets.

7.4 NEXT STEPS FOR USAID

In order to promote the interests of the U.S. private sector in the SADC Region, Teleconsult recommends that USAID create a U.S. private sector incentive program for a minimum of two years. This program would provide financial, technical, and legal assistance in assessing opportunities for private sector participation in telecommunications. The program would also provide financial assistance to qualified U.S. investors. Exhibit ES-10 illustrates the structure of this program.

USAID would dedicate a Program Manager responsible for implementing and operating the program. Reporting to the Program Manager, the proposed structure would have a team of legal, technical and financial advisors. The Program Manager would report to the USAID Southern Africa Regional office in Harare, Zimbabwe. The location of the program, however should be in Maputo, Mozambique, next to the SATCC offices. The

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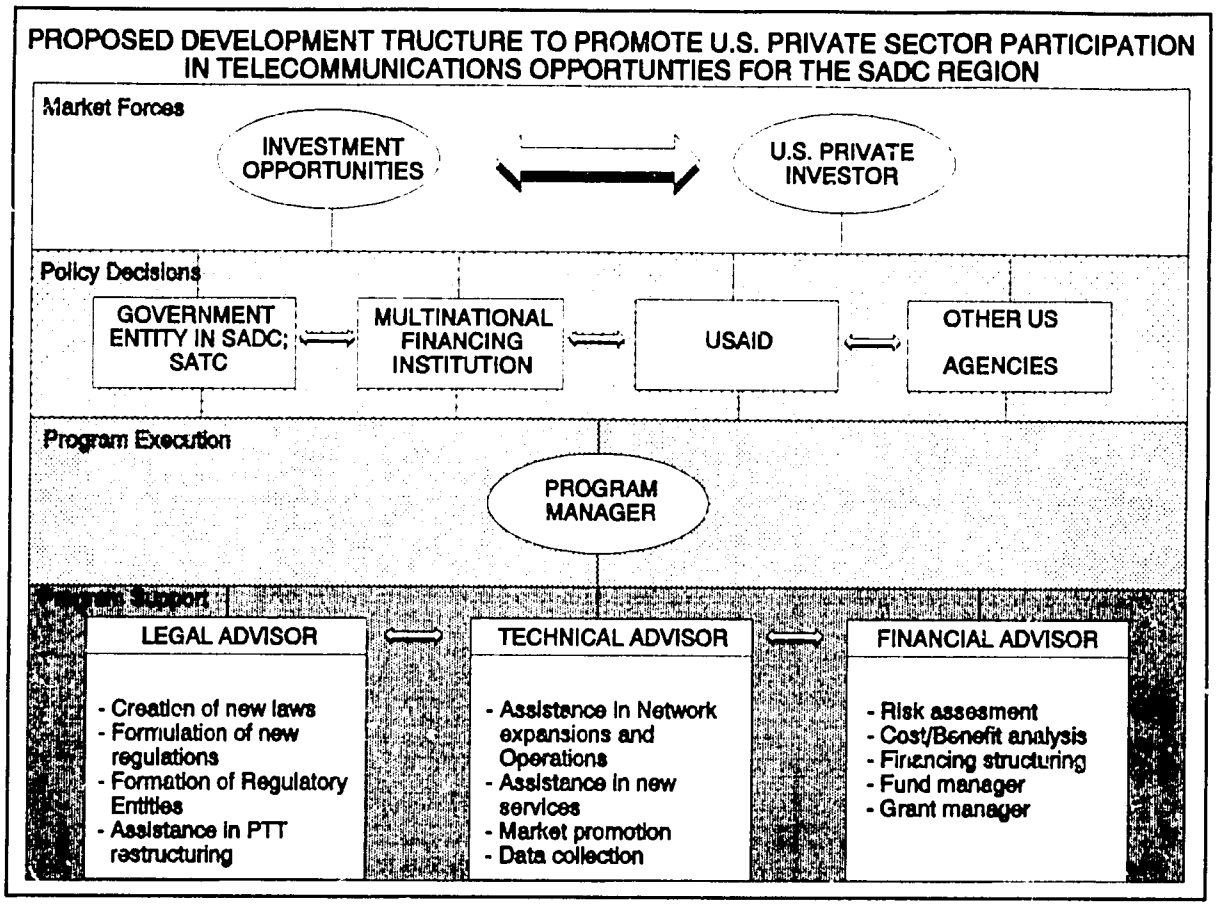

Exhibit ES-10 Structure of Proposed USAID Incentive Program to Promote U.S. Private Sector Participation in the SADC Region.

main functions to be performed by the Program are:

Legal Advice

- Advise host governments in the creation of new telecommunications laws
- Advise host governments in the formulation of new regulations.
- Advise host governments in restructuring their state owned and operated telecommunications entities.
- Advise U.S. investors on implications of existing and proposed laws as well as on the regulatory environment in the Region and in specific countries of interests.

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Technical Advice

- Provide assistance to host governments and private sector participants in the expansion of current infrastructure and the creation of new services and their respective infrastructure.

- Promote the Region and potential investment opportunities to U.S. investors. This would include trade and reverse trade missions, promotional publications, and issuance of public tenders via U.S. based publications (i.e. Commerce Business Daily).

- Continuously gather necessary data for use by the U.S. private sector to make investment decisions in the Region. These include economic, technical, and legal information as well as relevant and useful market intelligence.

Financial Management and Advice

- Provide risk assessment on a country and regional basis as well as on specific investment opportunities for the U.S. private sector.

- Provide cost benefit analysis to the U.S. private sector for project specific opportunities. Analysis should also include refining of macro and micro economic models relating telecommunications investments to growth in the economy (see Section II).

- Design financing structures on a project specific basis. Utilization of the Program's funds will be considered. These include the use of pre-investment technical assistance grants and the SADC Telecommunications Fund (Annex VI-1).

- Management of matching funds as well as of dedicated funds from the SADC Telecommunications Fund. Initial recommended funding is to dedicate US$10 million to the Fund. Leveraging this Fund with sources from other financing institutions (i.e. IFC, African Development Bank/Fund) and the private sector could generate funding in the order of US$50 million to $100 million for use by the private sector. Matching grants should be limited to under US$500,000, similar to those of USAID's Capital Development Initiative. Grant limits should be modified appropriately as experience is gathered in the program.

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In order to implement the proposed program, it will be necessary to establish the Program and the SADC Telecommunications Fund. Teleconsult proposes that Phase Two of this scoping study be used to design the details of the Program. A draft scope of work for Phase Two is included in Annex VI.2. The estimated costs for setting up the program (Phase Two) is estimated at approximately US$650,000 over a four to six months period. The Program cost is estimated at about US$3 million over a two year period. Including the US$10 million required for the SADC Telecommunications Fund, the proposed budget for USAID's private sector incentive program is estimated at about US$13,650,000 over a two and one half year period.

PREFACE

PROJECT BACKGROUND AND INTRODUCTION TO TELECOMMUNICATIONS

BACKGROUND

Telecommunications Services have traditionally been provided by state owned and private monopolies. These monopolies were justified by the notion that the infrastructure was a "natural monopoly" of large economies of scale. State control was justified because of the widely held belief of the strategic importance of the sector to national security and public safety . Less developed nations viewed the sector as a significant source of revenue and foreign currency, to support related and even unrelated national objectives.

Over the past forty years the traditional structures of telecommunications have changed driven primarily by rapid technology advances and development and changes of the global economy. The rapid changes in technology have allowed the development of new, varied and sophisticated services. These new systems and services offer greater efficiencies in the communication and management of information. These new technologies have challenged the notions of "natural monopoly" of telecommunications operations. In addition the increasing market demand for new and diversified services and products have placed dynamic demands that para-statal organizations cannot adequately deliver.

Coinciding with the development of information technology (computers, automated systems, communications etc.) the global economy has incorporated the efficiencies offered by the new technologies into nearly every area of economic activity. The national economies that have developed efficient information management and communications systems have been rewarded with success in the competitive world marketplace. In less developed countries the lack of adequate infrastructure to support the communications systems has been acknowledged as a major inhibitor of economic growth.

In response to these changes, a world wide trend towards liberalization of telecommunications has developed to enable the growth, diversity, and reduction of costs of telecommunications. This trend has involved changing the structures of telecommunications sectors in many countries. These changes in sector structure include privatization, regulatory reform, and competition of operations. In less developed countries, the changes in the sector have been utilized to pursue broad based economic goals of stimulating investment and economic development through out the economy.

In the Southern Africa region most countries have traditional para-statal organizations incorporating operating and regulatory functions. Several countries of the region have initiated restructuring involving separation of functions, liberalization, and some degree of privatization. The structure of the changes reflect the unique national goals and priorities of each country.

OBJECTIVES AND METHODOLOGY

The Scoping Study objectives include determining if, and in what role, U.S.A.I.D. should get involved in the development of the telecommunications sector in Southern Africa. In addition, to develop a focus on enhancing U.S. private sector involvement in the development of the sector. The methodology utilized in pursuing the objectives involves the following:

- Assessment of the demand, supply and shortfall of telecommunications in the countries of the region
- Estimate of the economic impact of that shortfall of telecommunications.
- Identification of policy and institutional issues that affect telecommunications development in the region.
- Evaluation of the role of the private sector in stimulating and sustaining development.
- Assessment of the role of U.S.A.I.D. in the development of telecommunications.
- Development of a strategy for U.S.A.I.D. involvement in the sector in the Southern Africa region.

The methodology is implemented in two phases of study. Phase one consists of largely desk research and limited field work to perform initial analysis of sector development needs in the region and to identify gaps in the existing data and analytical resources. Phase two of the study will involve in-depth research and extensive field work to develop priority areas and structure for A.I.D. involvement in the development of telecommunications in the Southern Africa Region.

The following report presents the results of the phase one effort. The report is structured around the task breakdown of the methodology as applied to the phase one effort.

Executive Summary

Preface

Section I Analysis of Current and Projected Demand, Supply and Shortfall in Telecommunications Services

Section II Telecommunications Impact on Economic Development

Section III Policy and Institutional Issues

Section IV The Role of the Private Sector in Telecommunications Development

Section V The Role of USAID in Telecommunications Development

Section VI Conclusions, Recommendations and a SADC Action Plan for USAID

Section VII Appendix - Glossary

TELEPHONE NETWORKS - AN INTRODUCTION TO STRUCTURE AND TERMINOLOGY

In order to better understand the report, a basic knowledge of the structure of telecommunications networks is advisable. The following provides a brief description of telecommunications network hierarchy, and introduction to terminology.

The telephone network is simply a collection of devices and transmission media connected in such a way that one telephone user can talk to any other within that network. Today's telephone networks are built around a standard hierarchy of such devices and media as illustrated in Exhibit P-1.

In Exhibit P-1, several terms arise which are unique to discussions of the telephone network. These are defined beginning with the lowest hierarchical level as follows:

- *Local Loop* - the local telephone system, or the "loop", is the collection of transmission paths between the end user (telephone sets and/or PBXs) and the telephone company's local serving central office. The local loop consists primarily of copper wiring often referred to as "outside plant". Although there are plans of outside plant being converted to optical fiber in the more developed countries.

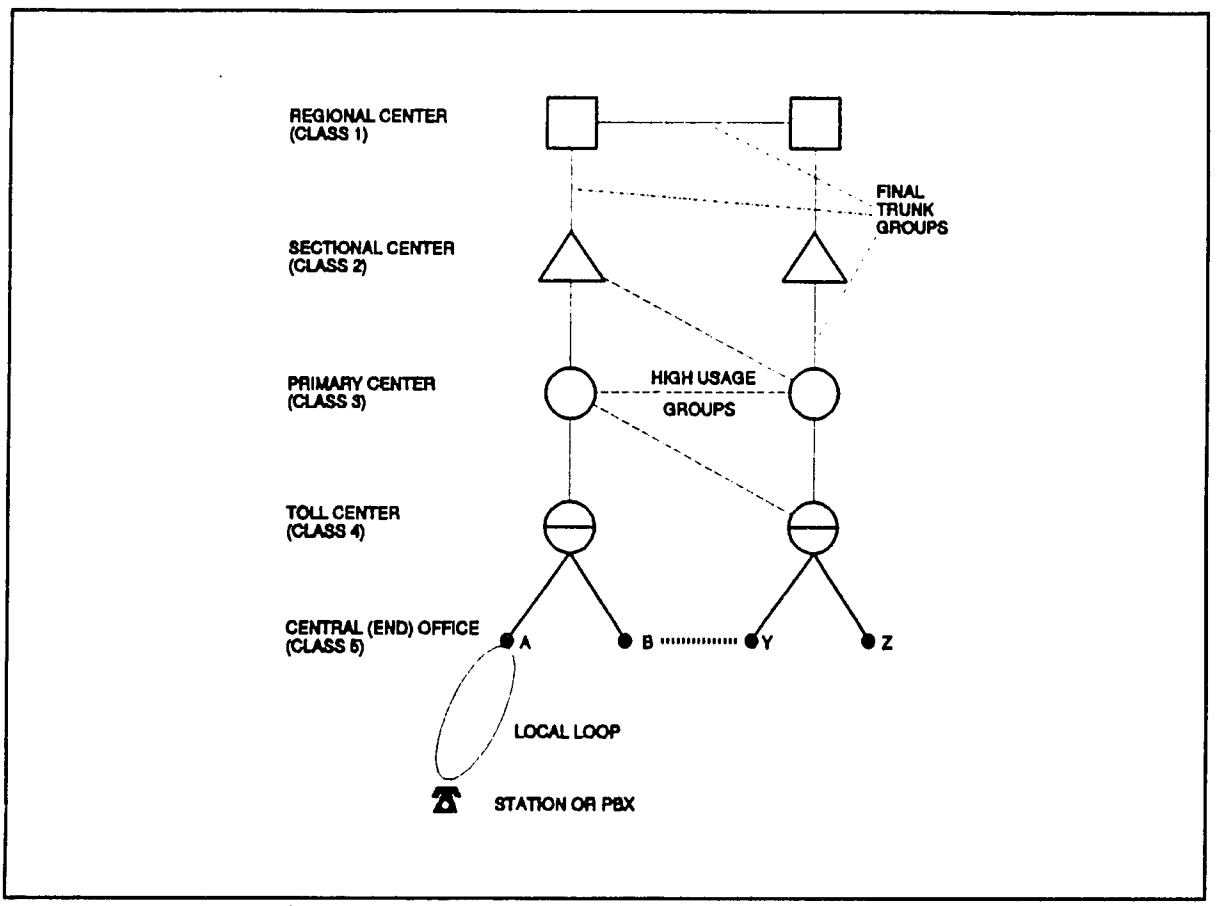

Figure 1 The classic telephone network hierarchy.

- *Central Office (CO)* - sometimes called the end office is named due to its proximity to the end users it serves. The CO is a Class 5 switch and is generally located at a central point in a service area and provides switched connections for all subscribers within the area.

- *Toll Center* - the toll center, or toll switch, is a Class 4 device which is the interface point to routing calls to/from the network outside of the local area. The name "toll" refers to the fact that calls routed thus are normally subjected to metered toll charges above the fixed charges generally applied to local connections.

- *Primary, Sectional and Regional Centers* - these are the Class 3, 2 and 1 switches, respectively. They serve as the interconnecting devices for the long distance network. These devices are interconnected in a meshed configuration to minimize the chance for outages due to single points of

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failure. It is at the Regional switch level where connections to international services happen.

- *Trunk* or *Group* - a trunk connects one telephone switch to another and usually contains numerous lines which have been collected from the local loops. In Europe, a trunk is sometimes called a *junction*.

To give an idea of the hierarchical nature of the telephone network, in the U.S. and Canada, there were approximately 12 Regional Centers, 70 Sectional Centers, 250 Primary Centers, 1500 Toll Centers, and 25000 Central Offices in 1988. The hierarchy of switches is sometimes simplified into two parts: the *exchange area* and the *long distance* system.

The exchange area contains only those facilities required to provide telephone services to a restricted group of users in a small geographical area. Exchange area connections are short and involve only a few switching offices. In Exhibit P-2, the exchange area is graphically illustrated. Note that it contains the end offices, toll offices and trunks as previously defined. It also contains *tandem* switches which provide intermediate switching within the exchange area. That is, a tandem office does not normally provide connectivity to the local loop or the toll network.

The long distance system contains the facilities required to connect telephone calls over large geographical areas. It contains the larger switching offices located further up in the hierarchy as discussed previously. The long distance system also contains many different types of transmission media other than the predominately copper environment of the local exchange areas. Satellite, microwave and optical fiber make up the transmission backbones of the long distance areas. Also, where trunks in the local exchange area may contain up to 100 embedded lines, trunks in the long distance segment of the network may contain many thousands. or tens of thousands, of channels.

Traffic

In telephony networks, or any network for that matter, traffic is a key consideration for initial design and engineering and, the overall health and performance of the network once it is operating. Traffic is simply a term which quantifies usage of the network.

The usage of a transmission channel or a switch connection within the telephone network forces us into the realm of traffic engineering. Usage can be divided and defined by two basic parameters: *calling rate* and *holding time*. Calling rate refers to the number of times a route or path is used per a given unit of time. Holding time is simply the duration of the usage of a path for a single call.

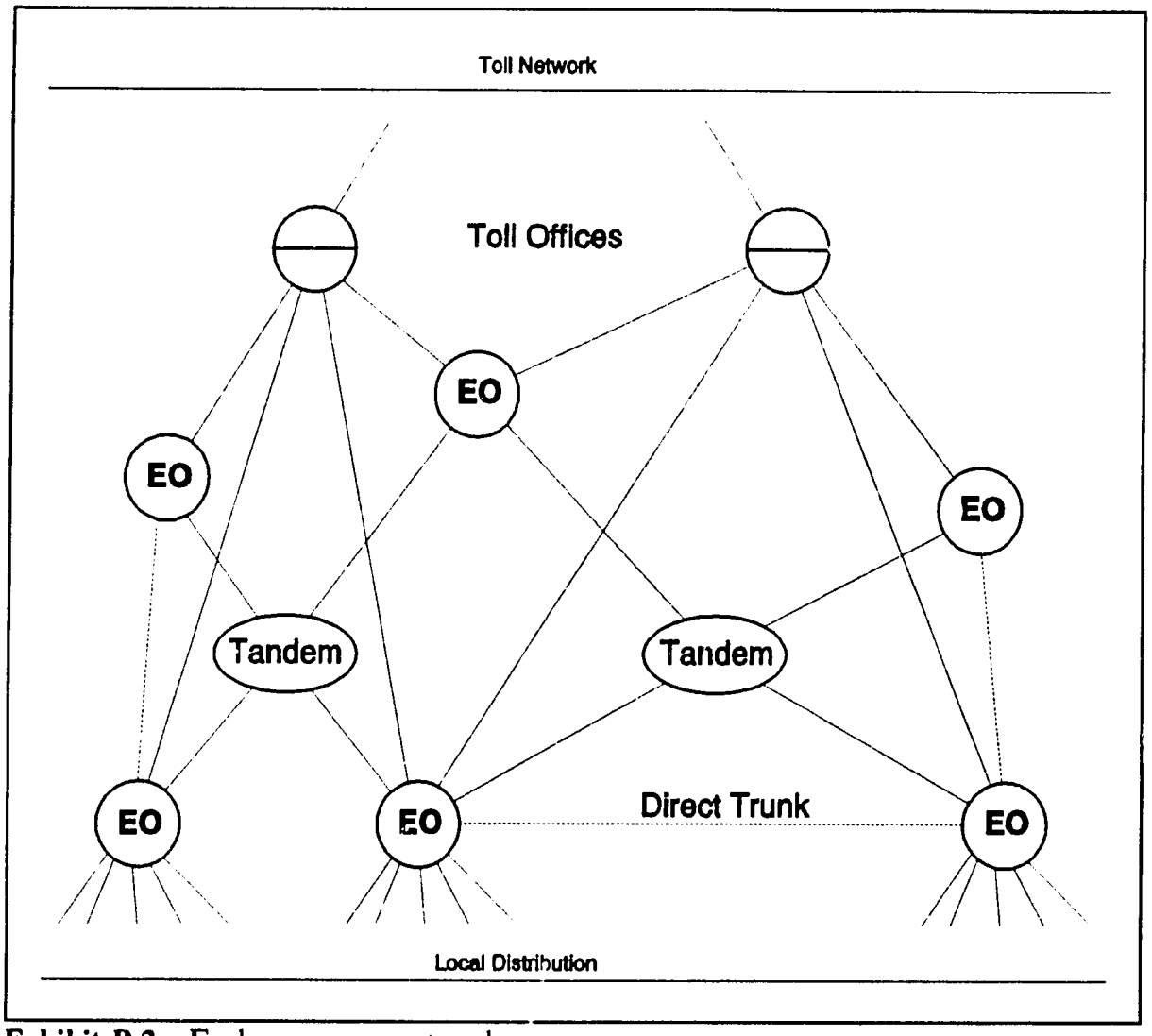

Exhibit P-2 Exchange area network.

Other definitions related to traffic engineering include:

- *Traffic Path* - a channel, time slot, frequency band, line, trunk, switch, or circuit over which individual communications pass in sequence.
- *Carried Traffic* - the volume of traffic actually carried by a given switch.
- *Offered Traffic* - the volume of traffic offered to a given switch.
- *Busy Hour (BH)* - simply denotes the busiest hour for traffic during a given period of time.

To engineer a network based upon its traffic patterns, the designer must have an information regarding the traffic intensity representative of a busy period of time. Since traffic is extremely random in nature, we must look for consistencies in its behavior to get a better grasp on network engineering. This consistency is usually provided by examining the busy hour (BH) patterns of the network. Exhibit P-3 depicts a typical day's worth of mixed residential and business traffic over the telephone network in the U.S. Standards provided by the International Telephone and Telegraph Consultive Committee (CCITT) define BH in two parts as follows:

- *Mean busy hour traffic* - the average of the BH traffic on the 30 busiest days of the year (CCITT Rec. Q.80).

- *Exceptionally busy days* - the average BH traffic on the five busiest bays of the year (CCITT Rec. Q.80 and Q.87).

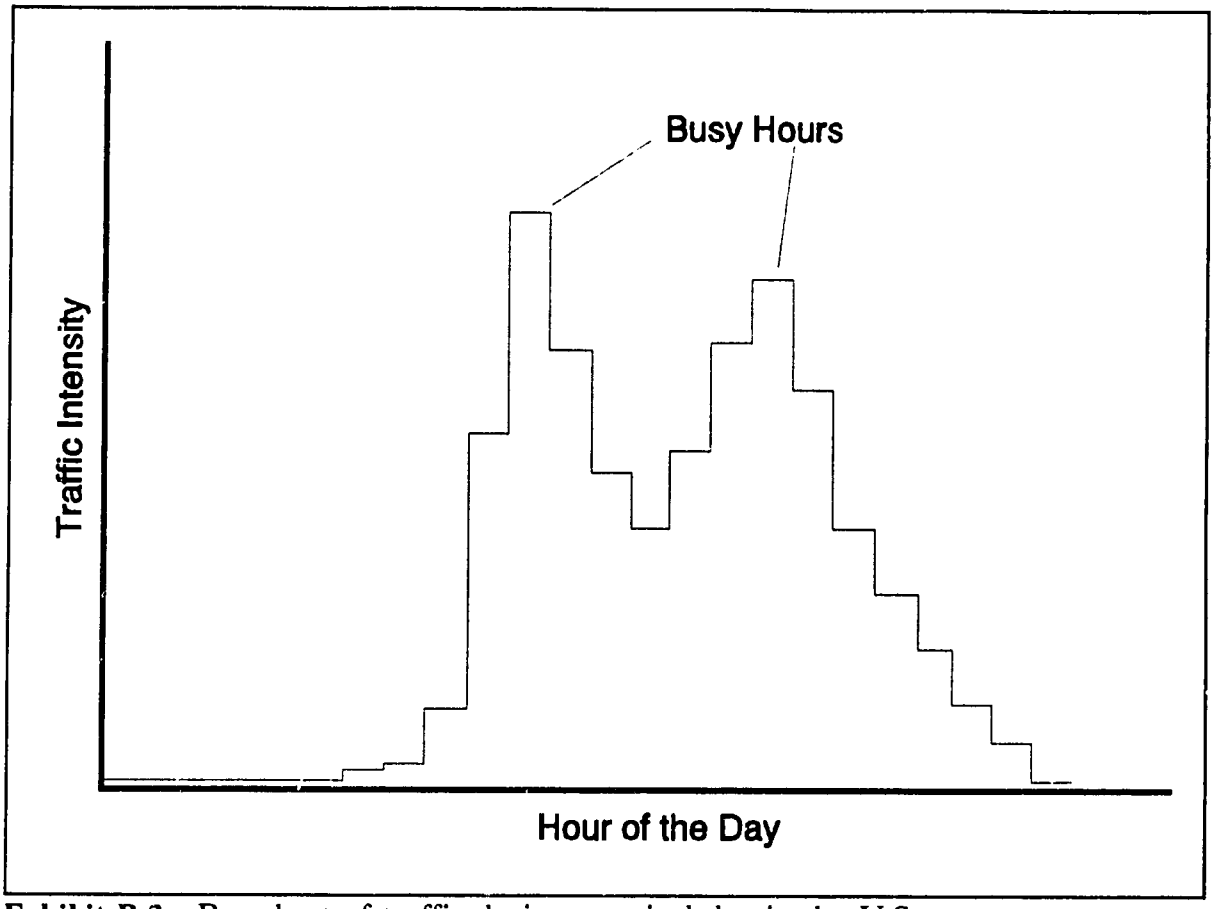

Exhibit P-3 Bar chart of traffic during a typical day in the U.S.

Based upon this seemingly simply set of parameters for traffic, the engineer must use a various theories, equations and formulae to devise an optimum network design. Various types of services provided over the network are designed differently depending upon the grade-of-service required, congestion specifications and percentage of blocked calls which can be tolerated. Obviously the more restrictive the requirements, the more detailed the design becomes and the most costly the service.

ECONOMIC IMPACT OF THE TELEPHONE NETWORK

The proliferation of installed telephones within a given community or nation directly affects the state of its economic development. In the U.S., Canada, Japan, and most of Western Europe where telephones are widespread, the economies are very much advanced. However, in Latin America, Eastern Europe, Africa and other developing areas, telephone penetration is very low and national economies are adversely impacted.

Measurements of telephone penetration in a given nation usually related to percentage of individuals with a telephone. That is, the number of telephone lines per 100 population serves as a barometer of economic health and advancement of a country. These lines, often referred to as DELs, or Direct Exchange Lines, vary in number from a level of over 70 per 100 in some Western European countries to lows of less than 1.0 in some areas of Africa. As a comparison, the U.S. currently boasts a penetration level of about 52 DELs per 100 population. The world average is about 17 DELs per 100 people.

Another measure related to the telephone network is telecommunications supplv and telecommunications demand. The *supply* is simply the total number of DELs available in any given country. One must be careful; however, when counting DELs not just to consider switch ports installed. A DEL is not complete until the actual medium is also installed which enables the switch to connect to the end user. This is often a limiting factor as many developing countries do not have the appropriate outside plant needed to connect to its population who might otherwise be subscribers.

Demand is simply the other side of the economic equation from supply. Telecommunications demand relates to the number of DELs which would actually be used were the proper equipment and plant installed to deliver such services. Predicting demand, as with supply, is not as straight-forward as one first thinks. The actual number of outstanding service orders in place may only reflect many years of individuals and/or businesses waiting to get service. With such long queues, most new service prospects tend to not even apply for a DEL. This creates a great hidden demand which would only be realized if and when new DEL capacity is installed. Thus, in many of the less-developed countries, demand generally out-strips supply many times over.

Investment in installing telephone and telecommunications infrastructures in nations that have low DEL numbers often significantly boosts their economies assuming competition is allowed to flourish and corporate and government corruption is kept to a minimum. Communications internal to a country boosts industrial production and stimulates consumers. Communications out of and into a country opens that market up to the benefits of international trade and technology. The opportunities afforded tend to feed on themselves so that, after a certain base investment to get things rolling, the economies of such countries become self-sufficient machines which dynamically support there own internal needs.

TELECOMMUNICATIONS SECTOR SCOPING STUDY FOR SOUTHERN AFRICA - PHASE ONE

SECTION I

ANALYSIS OF CURRENT AND PROJECTED DEMAND, SUPPLY AND SHORTFALL IN TELECOMMUNICATIONS SERVICES IN THE SADC REGION.

SECTION I

ANALYSIS OF CURRENT AND PROJECTED DEMAND, SUPPLY AND SHORTFALL IN TELECOMMUNICATIONS SERVICES IN THE SADC REGION.

1.1 OBJECTIVE AND OVERALL METHODOLOGY

The primary objective of Section 1 is to collect, and analyze data on the demand and supply of telecommunications services in the Southern Africa Development Community (SADC) Region and to provide an overview of the current and projected shortfall in telecommunications in the ten SADC countries and the Republic of South Africa (RSA). In addition, test the validity of the projected supply figures based on the capabilities of the PTTs and in view of country populations and gross domestic product estimates. The analysis is based on current condition and an estimated forecast of conditions in the year 2000. In addition, weaknesses in available data are highlighted and methodologies that can address those are developed.

1.2 DEMAND FOR TELECOMMUNICATIONS SERVICES

The nature of telecommunication systems set telecommunications demand apart form the demand for most goods and services. The attributes that set it apart include (a) the distinction between access and use, (b) the presence of access and call externalities, (c) option demand as an important component of access demand, and (d) the importance of the opportunity cost of time. The primary point of departure for modeling telecommunications demand is the distinction between access and usage.

Access to telecommunications services is determined by the number of installed network connections to customer premises. Access demand is the measure of required connections to customers. Telecommunications connections to the network are expressed as *Direct Exchange Lines (DEL's)*. Direct Exchange Line, is defined as an in-service or available subscriber line or main service line. It could be an individual or party line. In business use, a DEL can provide network connection to private business switchboards referred to as *private branch exchanges (PBX)*. It is a main subscriber service and does not include telephone extensions off a main line or stations working off a PBX. Further, a DEL is made up of a switch termination (telephone number), a cable pair(s) from the switch to the

subscriber's premises and a subscriber termination such as a telephone instrument or PBX termination.

Usage of telecommunications services is the amount of traffic carried by the network. Traffic is the aggregate of calls carried over the network along with the duration of the calls over time. In addition, holding time, that is, the average holding time per call is also included in the traffic calculation. Traffic can be expressed in call-minutes (C_m) or call-hours (C_h). The preferred unit of measure of telecommunications is traffic intensity, which is a measure of continuous occupancy of traffic circuits. Traffic intensity is measured in a dimensionless unit of *erlangs*. One erlang of traffic intensity on one circuit means the continuous occupancy of that circuit. For example, if a group of ten circuits had a call intensity of 5 erlangs, then half of the circuits are expected to be busy. Usage demand is the measure of the traffic carrying requirement on the network. Usage demand can be expressed in call minutes (C_m) or a measure of intensity, erlangs.

In addition to the demand for access, (DEL's) and usage (traffic) telecommunications demand can also include demand for "new services" from the traditional telephone service. New services can include enhanced telephone services such as multiparty conference calls, call waiting, call forwarding, and wake-up calling. Exchanged based private switching services or Centrex allows subscribers to configure private branch exchange services without purchasing PBX equipment. Other new services include message handling, electronic data interchange, voice mail, private networks, mobile communications, electronic mail and others.

Additional demands on telecommunications services may be in the form of improved Grade of Service (GOS) which represents service quality of the network. The grade of service can determine the type and quality of communications that can be carried over the network. Variable of GOS include loss probability, dialing tone delay, line noise level and others.

Current demand determination requires the compilation of the number installed lines, transfer lines, requests for service, current traffic values, new service requirements, and grade of service assessments.

Demand forecasts involve projecting new demand based on waiting lists, historical values, growth of similar telecommunications markets, economic predictors, forecasted industrial and housing starts.

1.2.1 Methodology of Demand Assessment in the SADC Region

Demand evaluation for telecommunications services incorporating access, usage, new services and grade of service requires high quality data. In lesser developed countries available data concerning traffic, quality of service, service requests and grade of service is highly limited and of limited accuracy. Determination of demand for telecommunications services can be pursued by compiling the installed connections, DEL's, waiting lists, unexpressed demand, and projections of growth based on econometric and comparative models.

The methodology applied in assessing the current and forecasted demand involved literature search, direct questionnaires and limited interviews. Information was collected, from the U.S., international and regional sources. Questionnaires were sent to the PTTs in all of the SADC region countries to obtain data on the telecommunications demand and supply for the years 1991 through 2000, including data on traffic loads and quality of service. Questionnaires were returned by eight of the countries which included data on supply and demand of Direct Exchange Lines (DELs) only. No information was obtained on other requested parameters. The returned questionnaires from the eight countries are included as Annex 1.1 to this section. Where demand figures were not obtainable (questionnaires not returned and follow-up ineffective) 1990 data and year 2000 estimates were obtained from the 10-year development plans and available country plans and ITU publications.

Due to the limitations of available data on traffic, quality of service, sector segmentation, and news service demand, urban and rural and regional and international traffic demand, the use of DELs produced the most useful picture of the telephone demand in the countries of the region. Direct Exchange Line figures were generally available and verifiable for both demand and supply, providing the only reliable baseline of comparison. It is a consistent unit of measurement for both supply and demand: Supply being the actual number of subscriber lines (DELs) available for service or projected to be available for service and demand being the estimated number of subscriber lines (DELs) that could be connected for service, if there was an adequate supply, based on waiting lists and forecasts at some point in the future.

In many developing countries, there can be an excess of switching capacity that cannot be used to create a DEL due to the unavailability of cable pairs to the subscriber desiring service. The actual capacity of a switching exchange vs. the number of DELs in service is referred to as the switching exchange *percent fill* or exchange *fill factor*. It is not practical to have a fill factor of 100% because at any given moment some switch ports are either out of service for maintenance or reserved for emergency backup. An average fill factor of 80% or slightly greater is normal. The fill factor will be lower at switch cutover (switches are

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usually sized for current demand and equipment for 3 to 5 years of growth) and will be the highest just before an addition to the switch goes into service.

In general, telecommunications service in the SADC region is poor, based on the grade of service provided in most regions of the world. Waiting lists for telephone service are long and service start intervals are measured in years, in some cases in excess of tens of years. Maintenance, in general, is sub-standard with long service outages not uncommon. The regional network serving the SADC region is incomplete with service between some SADC countries being routed via Europe at high cost. The regional network appears to be well planned, however, and progress is being made in its implementation.

A good indicator of the level of telecommunications service in a country or region is the number of DELs in service per 100 of population. This measure is referred to as *telephone penetration* or *telephone density*. Exhibit 1-1 portrays telephone penetration in various areas of the world as compared to the SADC Region. The current world average is in the order of 16 to 17 DELs per 100 of population as compared with 1 per 100 for the SADC Region. Developed countries such as the U.S.A., Germany and the U.K. are around 50 or higher DELs per 100 of population. Thus it can be seen that the SADC Region has a long way to go to meet the expected service levels in most of the world.

1.3 SUMMARY OF DEMAND:

The data collected as a result of the data gathering activities is included in Annex 1.1 to this section, by countries responding to the questionnaire (Angola, Malawi did not respond and only a partial response was obtained from RSA). This data, along with data developed for the three missing countries, is summarized in Table I. The Table indicates the current (1990) demand in DELs and the year 2000 demand as reported by the telephone administrations. The demand for these two periods is summarized in the following bar chart, Exhibit 1-2, and will be used in Sub-section 1.5 in calculating the telecommunications services shortfall

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SADC SCOPING STUDY
SUMMARY OF SUPPLY, DEMAND & SHORTFALL
Based on DELs, 1990 and 2000

TABLE I

	ANGOLA		BOTSWANA		LESOTHO		MALAWI		MOZAMBIQUE		NAMIBIA	
YEAR	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000
Population	9,700,000	11,020,000	1,300,000	1,800,000	1,800,000	2,270,000	8,200,000	11,100,000	15,700,000	21,500,000	1,800,000	2,090,000
GDP	$7,466,000,000	$0,830,000,000	$1,800,000,000	$4,166,000,000	$449,000,000	$512,000,000	$1,391,000,000	$1,950,000,000	$1,653,000,000	$2,370,000,000	$1,700,000,000	$2,194,000,000
Equipped DELs	77,224	229,951	34,342	68,407	21,734	45,000	40,649	135,036	83,203	194,875	59,645	101,158
Supply	48,052	183,961	29,832	54,726	10,900	36,000	25,972	108,029	47,439	155,898	51,925	80,926
Demand	62,467	325,365	38,736	76,014	18,834	48,953	36,614	370,884	80,311	310,173	53,467	111,444
Shortfall	(14,415)	(141,404)	(8,904)	(21,288)	(7,934)	(12,963)	(10,642)	(262,855)	(32,872)	(154,275)	(1,542)	(30,518)
(% of Supply)	30%	77%	30%	39%	73%	36%	41%	243%	69%	99%	3%	38%
Density / 100												
(Based on Supply)	0.50	1.67	2.29	3.04	0.61	1.59	0.32	0.97	0.30	0.73	2.88	3.87
(Based on Demand)	0.64	2.95	2.98	4.22	1.05	2.16	0.45	3.34	0.51	1.44	2.97	5.33
Avg invest / DEL		$3,000		$3,500		$2,500		$2,500		$2,500		$3,250
Investment per Year												
(For supply)		$45,818,100		$11,922,750		$5,816,500		$23,596,750		$27,918,000		$13,491,725
(For demand)		$98,844,675		$21,238,425		$9,867,438		$105,739,000		$76,128,313		$25,889,500
% of GDP												
(For supply)		0.48%		0.29%		1.14%		1.21%		1.18%		0.61%
(For demand)		1.03%		0.51%		1.93%		5.42%		3.21%		1.18%

	SOUTH AFRICA		SWAZILAND		TANZANIA		ZAMBIA		ZIMBABWE		ZIMBABWE - ABD	
YEAR	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000
Population	39,600,000	47,700,000	800,000	1,110,000	24,500,000	36,300,000	8,100,000	11,510,000	9,800,000	13,870,000	9,800,000	12,700,000
GDP	$100,000,000,000	$124,000,000,000	$665,000,000	$757,000,000	$3,910,000,000	$6,050,000,000	$2,216,000,000	$5,170,000,000	$6,182,000,000	$8,160,000,000	$6,182,000,000	$8,160,000,000
Equipped DELs	3,737,000	5,628,000	18,142	42,500	83,459	320,547	114,218	211,445	161,397	528,964	162,716	285,300
Supply	2,866,000	4,502,400	13,524	33,997	73,011	256,438	70,472	189,000	123,665	423,175	123,665	228,240
Demand	3,040,200	5,389,300	21,396	40,701	149,550	708,897	188,055	300,425	195,945	741,631	187,854	632,600
Shortfall	(174,200)	(866,900)	(7,872)	(6,704)	(76,539)	(452,459)	(117,583)	(111,425)	(72,280)	(318,456)	(64,189)	(404,360)
(% of Supply)	6%	19%	58%	20%	105%	176%	167%	59%	58%	75%	52%	177%
Density / 100												
(Based on Supply)	7.24	9.44	1.69	3.06	0.30	0.71	0.87	1.64	1.26	3.05	1.26	1.80
(Based on Demand)	7.68	11.26	2.67	3.67	0.61	1.95	2.32	2.61	2.00	5.35	1.92	4.98
Avg invest / DEL		200000%		$2,500		$3,500		$3,300		$3,000		$3,000
Investment per Year												
(For supply)		$378,200,000		$6,089,500		$82,980,800		$32,084,910		$110,270,100		$36,775,200
(For demand)		$594,925,000		$8,183,563		$280,931,788		$86,233,373		$229,692,525		$188,410,200
% of GDP												
(For supply)		0.31%		0.80%		1.37%		0.62%		1.35%		0.45%
(For demand)		0.48%		1.08%		4.64%		1.67%		2.81%		2.31%

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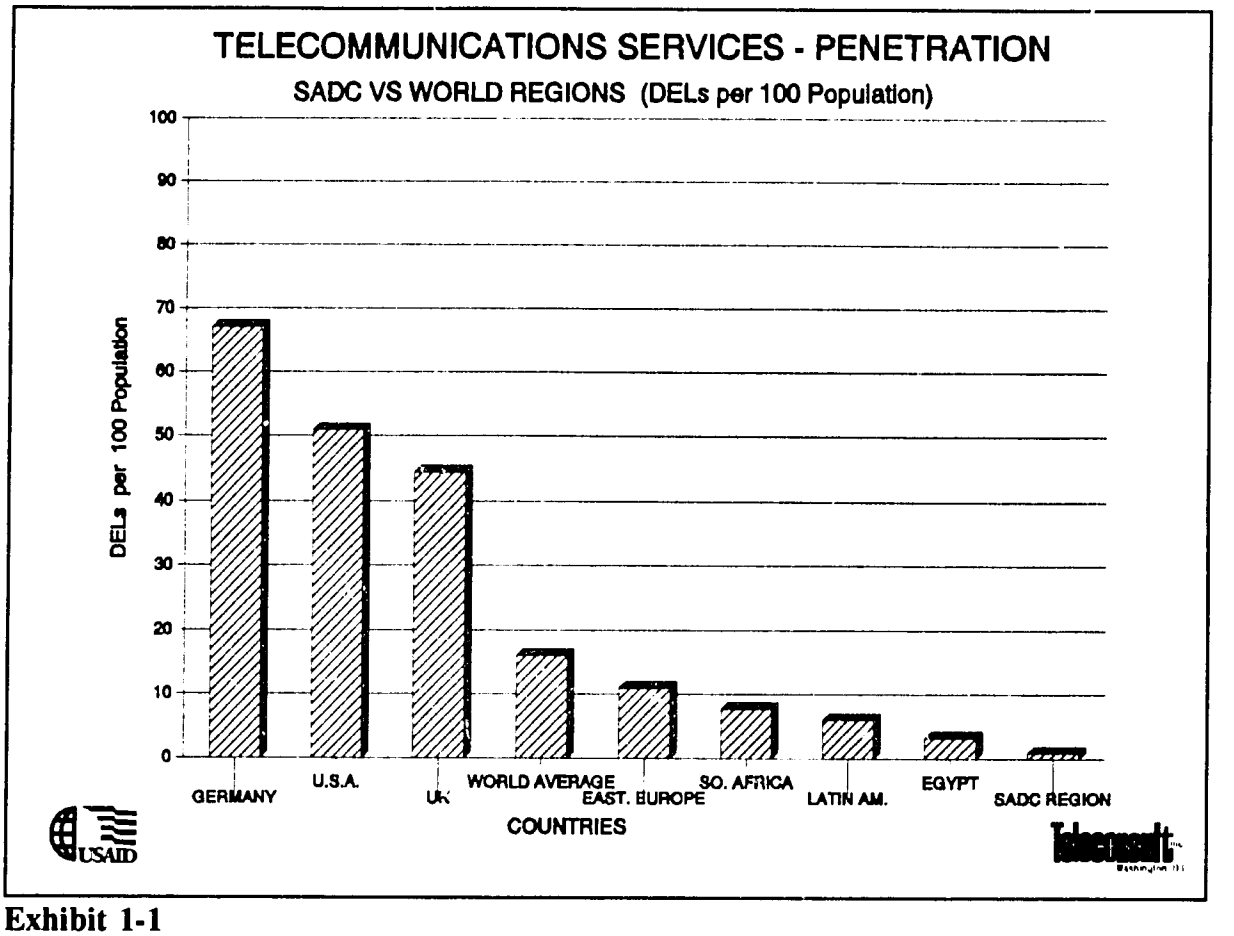

Exhibit 1-1

The demand is indicated in DELs for which data was obtained as discussed above. While the Terms of Reference specified that the demand be segmented by voice and data, rural and urban and by domestic, regional and international, the basic data for this degree of segmentation is not available without conducting an in-country demand study for each of the SADC countries. It is estimated that this would require at least one month of effort in each country. This of course is not practical within the time restraints of this project. However, such demand details, if they were available, would not materially impact the overall study results. For example: from a country development standpoint, the shortfall in plain old telephone service (POTS) in the urban areas is by far the major telecommunications obstacle to economic growth and this is best represented by the availability (supply) and demand of DELs. Data services, as required by business customers, will develop as an outgrowth of voice services, initially utilizing the cable facilities provided for voice services for which DELs are a good indicator. Regional and international traffic demands are

generated by DELs in service. A shortage of domestic DELs will severely limit the traffic that reaches the regional and international networks and will limit the access from these networks into the SADC countries. The SADC regional growth plans indicated, in the documents reviewed during the study, that plans are under way to care for the regional and international demand. Thus the major regional and international telecommunications service problem will be access to the SADC region country's subscribers, for which DELs are again the best measurement. In summary, the best indicator of telecommunications demand for the purposes of this study, and the only indicator which is readily available, is the number of Direct Exchange Lines.

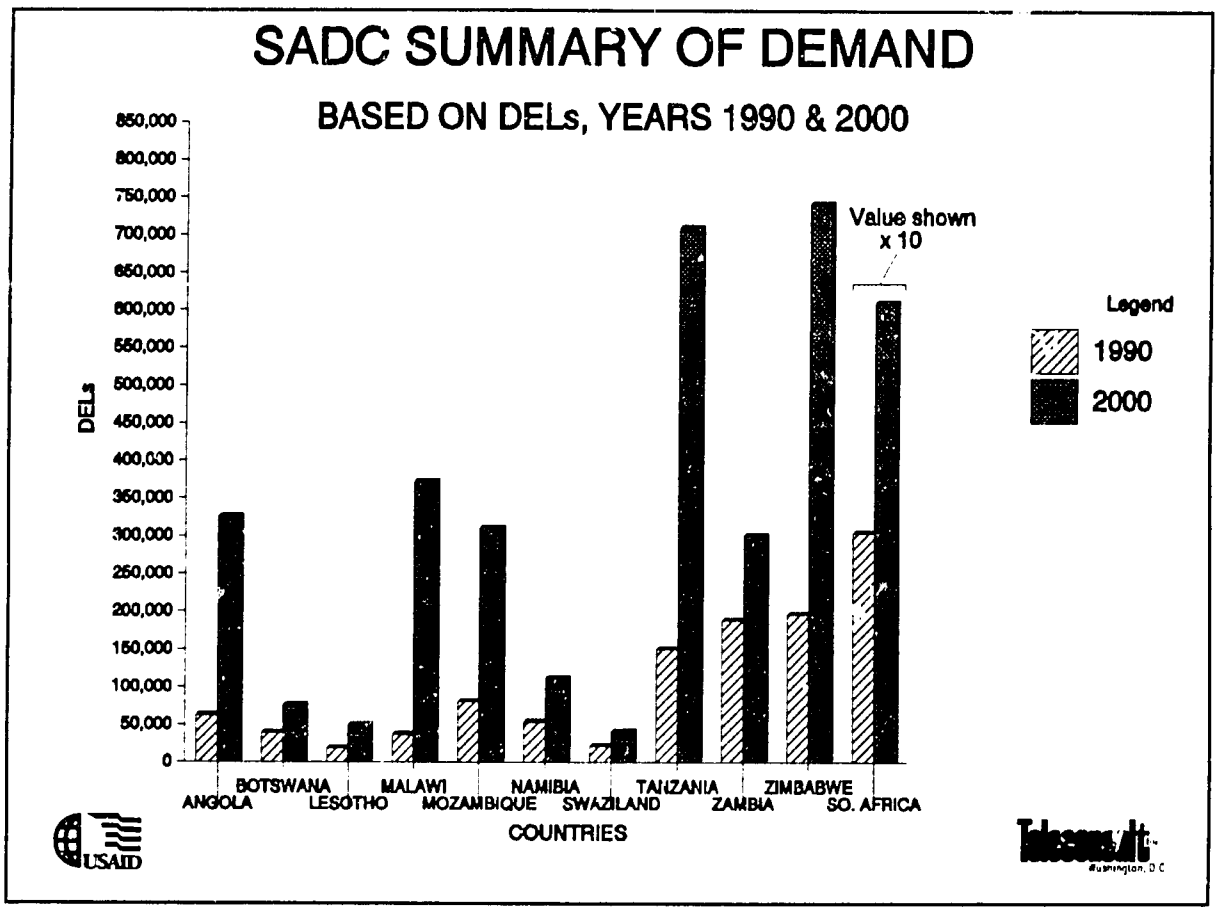

Exhibit 1-2

The 1990 demand is generally based on the number of DELs in service plus the waiting list. The actual demand is undoubtedly much higher, based on those potential subscribers that would apply for service if they thought that they could get a telephone within a reasonable time period at reasonable rates (pent-up demand). Similarly, the projected demand for the

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year 2000 is considered conservative as it is primarily a projection of the waiting list and does not consider pent-up demand or stimulated demand (as telephones become more plentiful, their value to a potential business subscriber increases - more people to call - and more businesses will view a telephone as indispensable). However, even though conservative, the demand indicated by the telephone administrations is considered a reasonable goal for system growth based on the economics of the region.

1.4 SUPPLY OF TELECOMMUNICATIONS SERVICES:

As in the demand sub-paragraph above, the major thrust of the telecommunications supply study will be on DELs available for service in the current year (1990) and projected to be in service for the year 2000. The current number of DELs used in Table 1 are the reported actual number in service. In a number of countries, the supply is considerably higher than the in-service DELs resulting in a low percent fill. (Fill is the percent of capacity (equipped DELs) that are connected to active subscribers (in-service DELs) and normally is in the range of 80 to 85 percent). This low fill may be due to a miss-match between switch terminations and outside plant pairs and. if so, could be rectified with improved planning procedures at reasonable costs; or it could be due to inaccurate plant assignment records which could be rectified, also at a reasonable cost as compared to new construction.

While the correction of this miss-match may seem obvious, experience has shown that it is not. For example; in many developing countries, switching system installations and additions are not well coordinated, if at all, with outside plant subscriber cable additions. In fact, they may be planned and provided by different groups or even different departments. Thus there may be switch capacity that can not be used because of no cable connections to the subscriber. This results in a low fill for the switch. In other cases, there may be excess outside plant that cannot be used because of a lack of switching equipment. This results in low cable fills. In either case, better coordination between the provision of switch capacity and the provision of outside cable plant can result in the availability of additional services and higher fills with less investment than the average cost of a DEL (which includes both switching and outside plant investments).

Another common situation, particularly in developing countries, is the lack of accurate cable assignment records. Subscriber telephone services are discontinued or moved and the cable assignment records are not corrected. This could result in many cable pairs being available for new services, except that the assignment records indicate that they are in use. A solution to this problem could be a physical check of all cables and an update of the assignment records. Such a task would be labor-intensive but could result in the "mining" of many copper cable pairs for new service (where switch fills are low) with a very small capital investment.

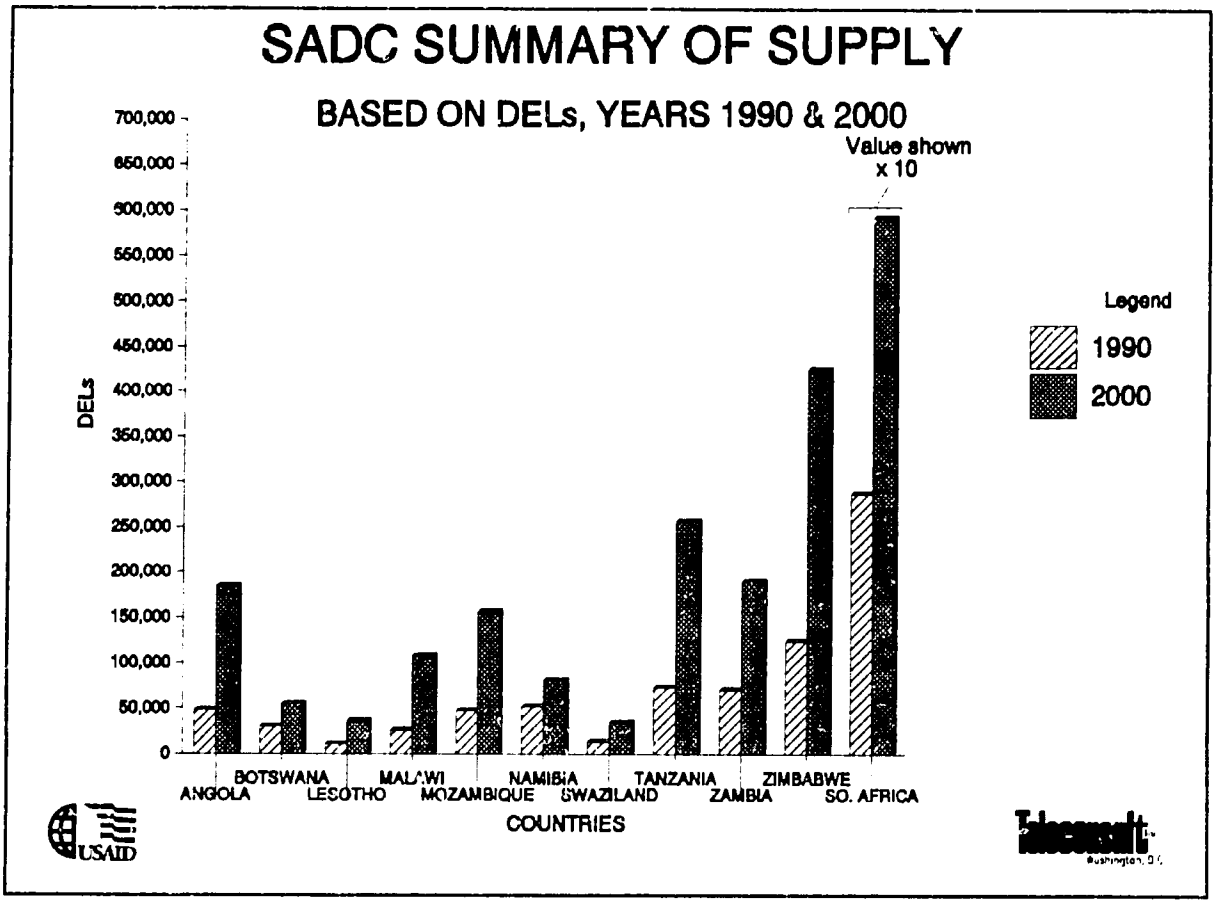

Exhibit 1-3

The year 2000 DEL supply figures are based on data provided by the telephone administrations, where available, or, where not available, they are based on an estimated annual percent increase in equipped DELs using past history and future projections of the economic climate for that country. A fill factor of 80% (which is considered reasonable) is used to develop the year 2000 DEL supply that would be available to satisfy the estimated demand in the year 2000. No breakdown between urban and rural DELs has been made since the majority of DELs now and projected for the year 2000 will be in urban areas, primarily for business use. The supply figures developed in this sub-section are indicated in Table I and in the Exhibit 1-3 bar chart and will be utilized in the following Sub-section to develop the indicated shortfall of telecommunications services. The 1990 supply figures are essentially DELs in service while the projections for the year 2000 are estimates of what each telephone administration expects to produce over the ten-year period. The

reasonableness of these projections will be discussed, by country, in the following paragraphs covering expected shortfalls of telecommunications services.

As was discussed for Demand, the segmentation of supply by voice and data, rural and urban and by regional and international is not practical for the same reasons as for the demand, and the use of DELs available (1990) or projected (2000) will be utilized for the measurement of supply. The DEL is considered the best overall indicator of the telecommunications health of each country.

1.5 SHORTFALL OF TELECOMMUNICATIONS SERVICES:

Table I, referred to above, also indicates the shortfall of telecommunications services based on the DEL demand and supply figures developed as covered in the foregoing sub paragraphs. This table includes year 1990 and year 2000 figures for population, Gross Domestic Product (GDP), and the investment figures required to meet the indicated demand. The investment figures are based on the estimated costs for added DELs for each of the SADC countries and are based on the best estimate of DEL supply costs for each country. These investment figures will be utilized in the analyses of the shortfall impact in Section 2.

Data was obtained for all SADC Region countries, with the exception of Angola and Malawi, from the visits, from replies to queries and from published data. Data for Angola and Malawi was developed from planning data publications obtained from these countries. As previously discussed, the data obtained is summarized by country in Annex 1.1. Table I, also previously referenced, depicts a summary of the data developed for the ten SADC countries. both current (1990) and for the year 2000. The 1990 population and GDP data is based on World Bank figures. Each country will be discussed separately as to the source of the data, the magnitude of the shortfall, estimates of the required investment to overcome the shortfall and some observations on the potential of the country in meeting a reasonable penetration level in the ten-year time frame. In general, the shortfall in 1990 varies from a low of three percent of supply (Namibia) to a high of over 165% of supply (Namibia) based on the data obtained from the countries. In the Year 2000, the estimated demand appears to grow faster than the estimated supply with the shortfall by countries ranging from a low of 20% of supply (South Africa and Swaziland) to a high where the estimated shortfall is in excess of twice the estimated supply (Malawi). As covered below, by individual countries. the telecommunications expenditures required to eliminate these shortfalls are, in many cases, prohibitive in view of the countries estimated GDP.

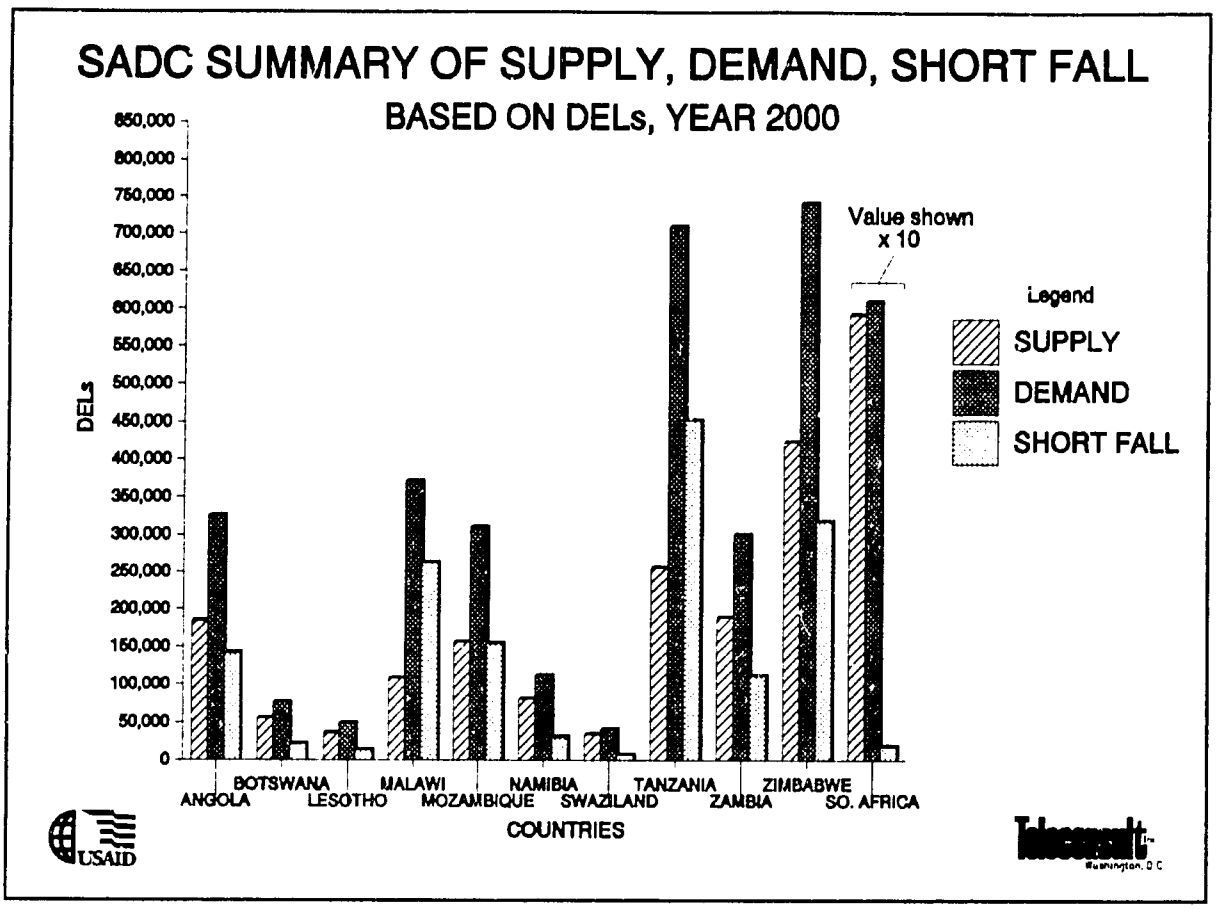

Exhibit 1-4

A review of the various projects identified in the Ten-year Development Plan indicate that by the year 2000, the SADC regional network, - that is the network that interconnects the SADC Countries - should be adequate to support the expected demand that will be placed on the SADC network (interconnecting the regional countries). However, based on the estimated supply and demand figures summarized in Table I, the interconnection of the regional network with the national networks will, in general, be inadequate by developing country standards. The penetration in each of the SADC countries in the year 2000 will be in the range of below 1 per hundred to slightly over 3 per hundred of population. RSA is projected to be in excess of 9 per hundred of population. A concerted training effort in management, technical and craft areas should enable some improvement in these penetrations. Progress will have been made in most SADC countries in providing data facilities, both on a dedicated line and public switched and packet switch basis although the

main thrust should be in providing adequate telecommunications service to the business community in order to positively impact the economic development of the region. A bar chart summary of the shortfall by countries is shown in Exhibit 1-4. Exhibit 1-5 depicts both the supply of DELs and the demand for DELs in the year 2000 as a percent of the GDP for each country. A range around 1% of GDP is considered a reasonable level of telecommunications investment for a developing country. It will be noted that the supply investment for most SADC countries is below this range or, at most, only slightly higher than the range considered reasonable. On the other hand, the investment required to meet the demand is, for most countries, considerably higher than the range considered reasonable. This will be discussed further for each country in the following paragraphs.

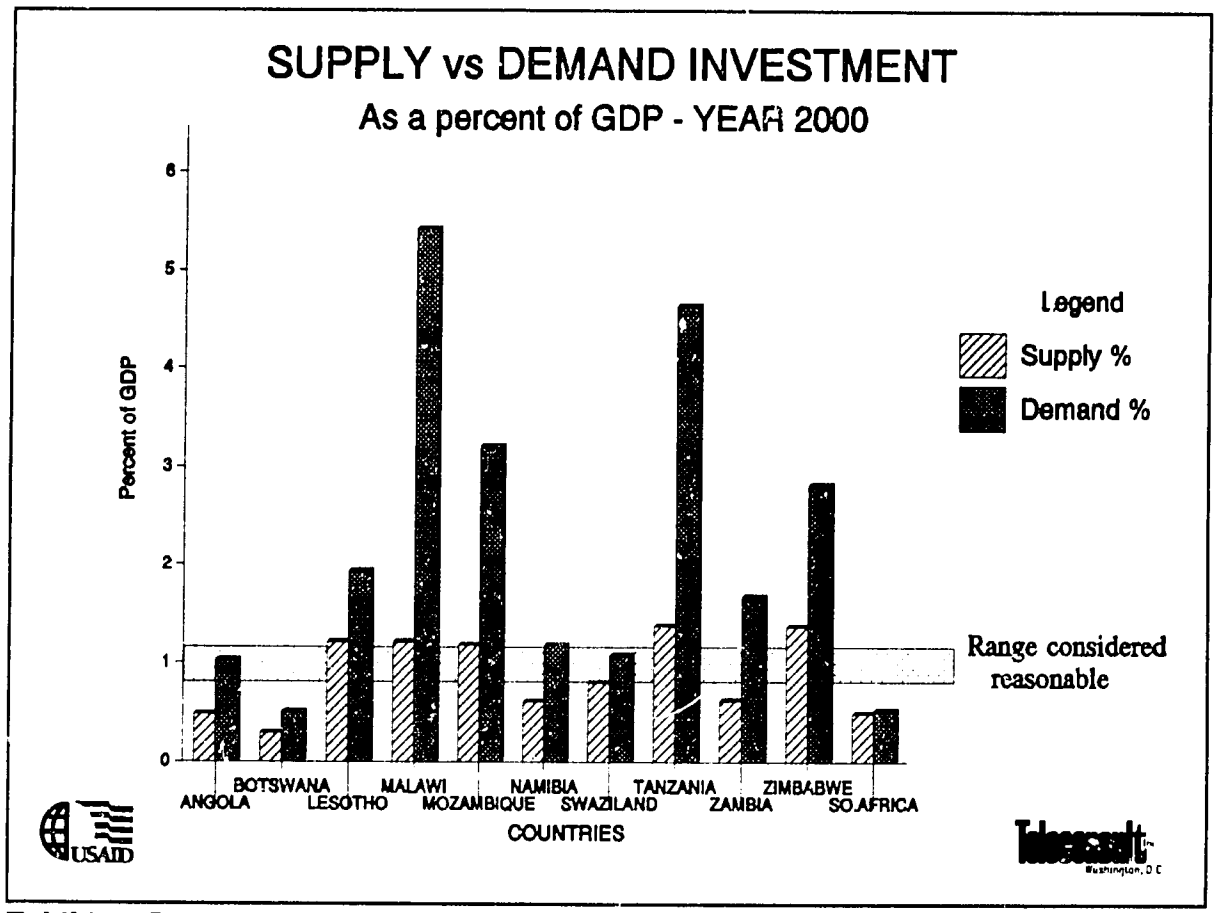

Exhibit 1-5

1.5.1 Angola

No year 2000 forecast demand data was obtained from Angola, although an estimate of equipped DELs (229,951) and supply (183,961) was made available. An estimate of year

2000 demand was therefor made by applying the average penetration of the other SADC countries to the year 2000 Angola population estimate to develop an expected demand of 325,365 DELs. While this demand is only a "best estimate", it is considered adequate for the purposes of this study as no better data could be obtained. The only alternative would be an extensive field visit to Angola to develop a demand figure which is not practical for this Phase I study. The information is shown on Table I (Angola) for the years 1990 and 2000. As indicated on the Table, the population of Angola is expected to increase from 9.7 million to 11 million during the ten-year study period. The Gross Domestic Product (GDP) is expected to increase from USD $7.5 billion to $9.6 billion during this same period. In 1990, the supply of Direct Exchange Lines (DELs) is 48,052 which represents a fill factor of 62.2% (percent of equipped DELs that are in service). Based on the estimated demand, there is a shortfall of 14,415 DELs in 1990. If the fill factor (62.2%) could be increased to around 80%, which is a reasonable fill, the shortfall could be almost entirely eliminated, possibly at very little expense. If the low fill is due to a shortage of cable pairs, or possibly due to inaccurate records, and the unfilled demand is essentially in the low-fill exchanges, it may be possible to provide a minimum of new cable plant or even just verify the cable records to better match the excess switching capacity with the cable plant. This could result in an increase in revenue at a very small investment or expense. The very low penetration of 0.5 lines per hundred population could thus be increased to as high as 0.64 per hundred as indicated on the Table. This technique, verification of cable records vs. actual, has been used in many developing countries to appreciably increase the exchange fill factor.

According to the Ten-Year Development Plan, there are a number of projects that will *directly increase the telecommunications services supply* for Angola. These are listed below to indicate that there is work "in the mill" which reinforces the estimated increase in supply. These proposed additions are included in ENATEL's TELECOM II project:

- Extensions/Rehabilitation of Outside Plant in Thirteen Communities - funded by ADB
- Integrated Telecommunications for the Municipalities of Cubal and Ganza - fully funded
- Technical Assistance to ENATEL in the Benguela/Lobito Region - fully funded
- Extension/Rehabilitation of Switching and Outside Plant along the Benguela Corridor

In the year 2000, it is reasonable to expect that Angola will have a DEL supply of 183,961 which will result in a telephone density of 1.67, a major improvement over 1990. This will require an expenditure in the order of $458 million or an average of $45.8 million per year. This equates to 0.48% of the projected GDP in year 2000 which is considered to be reasonable. In fact, to meet the estimated year 2000 demand, would require a doubling of investment and a resulting 1% of the projected GDP which is also considered within reason.

If this can be accomplished, Angola would have a telephone density of nearly 3 per 100 population which is higher than the estimated average density for the SADC Region in the year 2000.

1.5.2 Botswana

Data obtained from Botswana is included in Annex 1.1 and the pertinent information is summarized in Table I. As indicated, the population of Botswana is expected to grow from 1.3 million to 1.8 million and the Gross Domestic Product (GDP) is expected to increase from $1.8 billion to $4.2 billion during the ten-year study period. The supply at the beginning of the period is the number of DELs (Direct Exchange Lines) in service which represents a fill of 87% which is relatively high for a developing country. The demand, which is the sum of the DELs in service and the registered waiters, is indicated as 38,736 DELs with a shortfall of 8,904 and a density of 2.29 telephones per hundred population. This is a relatively high penetration as compared with the 1.11 density of the region as a whole and indicates that the Botswana telecommunications sector is reasonably well developed. It should be noted, however, that the demand is probably understated as it is based on registered waiters and does not include the demand stimulation that would be created if telephone service was more readily available, assuming reasonable prices.

According to the Ten-year Development Plan, the following projects have been identified for Botswana which will improve telecommunications network services and all are either funded or funds are being negotiated. There are no projects listed, however, that will improve the supply of DELs and thus reduce the shortfall.

- Expansion of Trunk Network - Digital Microwave from Ghanzi to Mamuno
- Completion of Trunk Network - Completion of ring from Ghanzi to Jwanebg with spurs to Hukunsti, Tshabong and Matokwe

In the year 2000, Botswana expects to have a supply of 54,726 DELs (based on a fill of 80%) which would result in a density of 3.0 which is only a slight improvement over the telecommunications situation existing in 1990 (although it is higher than the 2.15 average projected density of the region). If the year 2000 estimated demand of 76,000 DELs was satisfied, the penetration would increase to 4.2 per 100. The supply required to meet this demand would require an estimated expenditure of $212 million over the 10-year period. This is an average annual expenditure of $21.2 million which, in the year 2000, represents 0.5% of the GDP. This is considered to be reasonable and attainable. Although the demand is probably understated, as covered above, it would appear that the Botswana telecommunications sector shortfall is only slightly higher than in 1990 and the country has the potential of satisfying a large share of the estimated telephone demand by the year 2000.

1.5.3 Lesotho

The telecommunications sector in Lesotho is not as well developed as it is in Botswana, although the Ten-year Development Plan indicates that the LTC has an active seven-year construction program which gives high priority to the extension of the network into rural areas. While the population is somewhat higher, the GDP is about a quarter of Botswana's. The supply in 1990 of 10,900 DELs represents a fill of only about 50%. If this unused switch capacity could be utilized, the majority of the indicated demand of 18,843 DELs could be satisfied (87% fill). The low fill could be the result of inadequate outside plant cable facilities, either because of poor assignment records or due to delayed or un-coordinated subscriber plant. It is recommended that the cause of this low fill be investigated as it might turn out that very little additional investment would be required to meet the current indicated demand which could result in a substantial increase in the revenue flow to the telephone administration. The indicated penetration of 0.6 telephones per hundred population is very low and could be increased to 1.0 per hundred by increasing the fill as covered above.

Active projects in Lesotho, as indicated in the Ten-year Development Plan, *which would directly increase the telecommunications services supply* are:

- Rural Automatic Telephone Exchanges - Approximately 100 small (20 - 200 lines) exchanges will be established
- Rural Telecommunications System - Radio equipment to interconnect above exchanges
- Transmission Equipment for Replacement Exchanges
- International Switching Center and Expansion of Switch Network - Implementation urgent and funding required

The indicated DEL supply of 36,000 DELs in the year 2000 (based on an 80% fill) will leave a short-fall of almost 13,000 DELs and a penetration of 1.6. While this is a marked improvement over the 1990 situation, it will require an expenditure of some $58 million over the ten-year period or an average of $5.8 million per year. This represents 1.14% of the projected GDP in the year 2000 which is considered high for telecommunications infrastructure growth. (A figure of about 1% or less of GDP is considered to be reasonable and attainable). An even greater investment ($9.9M/yr. average) would be required to meet the indicated demand of 49,000 DELs which represents 1.9% of the GDP in the year 2000. It would thus appear that unless the telecommunications sector in Lesotho is given a much higher national priority, telecommunications services will lag considerably behind demand in the ten-year study period.

1.5.4 Malawi

No year 2000 supply and demand data was obtained from Malawi for this study. However, data from the Republic of Malawi, Telecommunication Development Plan for 1983-2002 was utilized to develop an estimate of Equipped DELs, Supply, and Demand figures for the year 2000. These are included in Table I.

The population of Malawi is expected to grow from 8.2 million in 1990 to over 11 million in the year 2000 and the GDP is expected to increase from USD$ 1.4 billion to almost $2 billion during this period. The telephone density in Malawi in 1990 was only 0.32 per hundred population which is relatively low for the SADC Region.

The switching fill for Malawi is about 64% and, if it could be increased without a major outside plant cable investment, the shortfall of 10,642 could be cut to less than half with a sizable increase in revenues. The demand, however, would appear to be greatly understated as the density per hundred, with no shortfall, would be only 0.45, a relatively low density for the SADC Region.

Active projects in Malawi, as indicated in the Ten-year Development Plan, *will have a very positive effect on increasing the supply of DELs* which will, in turn, improve the telecommunications services Malawi. These projects are:

- Chitipa District Rural Telecommunications - Fully funded
- Nkhata Bay Rural Telecommunications - Fully funded
- Lilongwe Exchange Digital Overlay - ADB funded
- Zomba Area Digital Overlay - ABD funded
- Rural Automatic Exchanges and Associated Transmission Equipment
- Multi-Access Radio Systems for Rural Telecommunications Development
- Provision of Telephone Service to Health Centers and Refugee Camps - funding is required

Based on the year 2000 data obtained from the Malawi Development Plan, a telephone penetration of almost 1.0 telephones per hundred population will be obtained in the year 2000. This will require an estimated investment of USD $236 million over the ten-year period or an average of $23.6 million a year. This equates to approximately 1.2% of the GDP which is considered high. The resulting penetration, however, is low for the SADC Region. Every effort should be made to increase the penetration and approach the estimated demand of 371,000 DELs. To actually meet the estimated demand would require an expenditure almost five times as great as planned and would be in the order of 5.4% of the estimated GDP. Thus Malawi is expected to have a major shortfall of telecommunications service throughout the next decade.

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1.5.5 Mozambique

The telecommunications sector in Mozambique is similar to the situation in Lesotho except that the population of Mozambique is an order of magnitude larger (Table I). The percent fill in 1990 was only about 57% which indicates that there is a large investment in switching equipment that is not generating revenue and the penetration was only 0.3 telephones per hundred population. Based on an indicated demand of 80,311 DELs, the installed switching equipment could take care of the demand with a fill factor of 96.5%. This high fill is not practical. However, a reasonable fill of say 80% would care for most of the indicated demand, leaving a shortfall of under 14,000 DELs. The reasons for the low fill could be due to destroyed cable plant during the recent conflict and should be investigated as it might be repairable at a relatively small increase in investment and a resulting substantial increase in revenue flow.

Several telecommunications projects have been identified by the Ten-year Development Plan *which would increase the supply of telecommunications services* in Mozambique, namely:

- Domestic Satellite System - Provides an additional six domestic earth stations. Fully funded.
- International Switching Center and Expansion of Switch Network - Implementation urgent and funding required
- Provision of Telecommunications Links to Rural Communities - Thirteen communities near border with Zimbabwe have been identified. Pre-feasibility study completed.

Based on the estimated supply in the year 2000 of 156,000 DELs and a demand of 310,000 DELs, there will be a sizeable shortfall in telecommunications services and a penetration of only 0.73 per 100. It would require an estimated investment of $280M to reach this penetration level in the year 2000 which represents 1.2% of GDP. This is high but attainable. To satisfy the indicated demand of 310,000 DELs would require an average investment of $76M per year which is 3.2% of the year 2000 GDP. This does not appear practical. If this large increase in investment were possible, the resulting penetration would be in the order of 1.4 telephones per hundred population which would be a desirable position, although low, for the Mozambique telecommunications.

1.5.6 Namibia

Based on the data obtained for Namibia, Table I, the telecommunications sector in Namibia is in the best shape of any country in the SADC Region with the exception of the RSA.

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Their current penetration is 2.9 telephones per hundred population and their fill factor is at 87%. Their indicated shortfall in telecommunications services is minimal at the present time. There were no projects in the Ten-year Development Plan that would directly increase the supply of telecommunications services in Namibia.

The situation in the year 2000 indicates an improvement with a penetration of 3.9, only slightly higher than in 1990. The approximate investment to meet this level is an average of $13.5M per year, which in the year 2000, equates to about 0.6% of GDP which appears reasonable. To meet the estimated demand of 111,444 DELs would require double the investment and would result in an investment that would be 1.18% of GDP and a penetration of 5.33 telephones per 100 population. Based on the obtained data, the shortfall in the year 2000 will increase from 3% of supply in 1990 to 38% of supply, which is an undesirable trend.

1.5.7 South Africa

The telecommunications system in South Africa is the best developed, most modern, and is the highest capacity of any country in Africa. The telephone penetration of between 7 and 8 DELs per hundred population, however, is well below the world average as indicated in Exhibit 1-1. The Project Team finally received some information from the RSA for 1992 and for the year 2000 telecommunications development. Published statistics from the ITU and the World Bank were used to obtain estimates of the current (1990) statistics. These were checked for reasonableness against the 1992 data provided by Telkom of the RSA. The 1990 data shown in Table I as compared with the Telkom 1992 data indicates an annual growth rate of approximately 7% which is considered reasonable.

Referring to Table I, the 1990 supply of DELs is about 77% of capacity and the estimated demand is only slightly greater than the indicated supply. In fact, the shortfall could be eliminated if the switching fill could be increased to around 81%. The true demand is probably much higher than indicated even though the penetration is the highest of any country in Africa.

The year 2000 projected population of 47.7 million is indicated on Table I. The GDP for the year 2000 of $124 billion was based on the GDP per capita remaining the same ($2600) and reflects the increase in population. The DEL supply for the year 2000 is based on the Telkom supply figure with an 80% fill factor applied. If these projections materialize, the year 2000 telephone penetration would increase to over 9 per hundred population. This would appear to be conservative when viewed in relation to the percent GDP of approximately 0.3 percent. In fact, the indicated investment required to meet the projected demand is only approximately 0.5% of the GDP, a reasonable figure. The average

investment per DEL used for the RSA was reduced to $2000 (from the $2500 - $3500 figure used for the SADC countries) since the industrialization of the RSA is at a higher level than in the other SADC region countries. The telecommunications shortfall as a percent of supply, however, will increase from 6% in 1990 to 20% in the year 2000.

1.5.8 Swaziland

The telecommunications sector in Swaziland is about average for the region with a penetration of 1.7 telephones per hundred and a fill factor of 75%. The current shortfall, however, is high, being over 50% of the existing supply. This will be reduced to about 20% of the supply in the year 2000 based on the data provided, which is good progress.

The Ten-year Development Plan has identified the following projects which would increase the supply of telecommunications services in Swaziland. These projects *will expand the digitalization of the switch network and will help to alleviate some of the telecommunications services shortfall.*

- Extension of National Switching Center and Associated Network Digitalization - Funded.
- International Switching Center and Expansion of Switch Network - Implementation urgent and funding required

Based on the year 2000 data, a penetration of 3.0 is expected which will require an expenditure in the range of $6M average per year which is about 0.8% of GDP, a very reasonable growth expenditure. In fact, an increase in expenditures of some $2M per year would permit Swaziland to meet their estimated demand in the year 2000. This would require an expenditure of about 1.1% of GDP and would result in a penetration of 3.7 in the year 2000. This is a telecommunications sector goal that Swaziland should try to attain in the ten-year period. It is considered entirely attainable.

1.5.9 Tanzania

Tanzania has the largest population, 24.5 million, of any country in the SADC Region with the exception of the RSA, but has a low telephone penetration of 0.3 per 100. Furthermore, it has a large indicated shortfall which is larger than the current supply (shortfall = 76,539 DELs, Supply = 73,011 DELs). Thus it would be necessary to double the capacity of the telecommunications system to meet the estimated current demand. The current fill factor is 87% which is considered reasonable.

The Ten-year Development Plan has identified the following projects that would *directly increase the supply of telecommunications services* in Tanzania:

- Telephone and Telex Transit Exchanges for Dodoma - 9000 line expansion and 2000 line Telex exchanges.
- Rehabilitation of the Telephone System in Dar-es-Salaam - Ten exchanges of 54,000 lines total, cable plant, fiber optic and digital microwave.
- Microwave Radio and Exchange at Songea - Digital MW from Dar-es-Salaam through Mtwara to Songea as part of PANAFTEL network, transit/local exchange at Songea.

The projected data for the year 2000 indicates an improvement in the telecommunications network with a penetration of 0.71 telephones per hundred population. This indicated level will require an average annual investment of $83 million over the period which equates to about 1.4% of the GDP in the year 2000. This is considered on the high side but could be possible with the right priorities established for the telecommunications sector infrastructure and private sector participation. On the other hand, to meet the year 2000 demand would require an average annual investment of $28.1M which is 4.6% of the GDP. This is not realistic and it is expected that the Tanzania telecommunications sector will have continued serious shortages throughout the ten-year study period. The shortfall as a percent of supply will be in the order of 176%, one of the highest in the region.

1.5.10 Zambia

The 1990 data for Zambia indicates a large telecommunications shortfall and a penetration of 0.87 telephones per hundred of population. The fill factor is low, at 61.7%, which indicates surplus switching equipment that is not earning revenue. If this fill factor could be increased to at least 80%, the shortfall would be reduced and the penetration increased to 1.2 per hundred. The reason for the low fill should be investigated as it might be possible to increase the fill at a reasonable cost with a sizeable increase in the revenue flow.

The Ten-year Development Plan has identified the following projects *which will n Zambia:directly increase the supply of telecommunications services* in Zambia.

- Expansion of the International Telephone Switching Center - 2000 trunk expansion and billing system.
- Expansion of National Telephone Exchanges - Expansion of 40 exchanges to meet year 2000 requirements.
- Upgrading E10B Digital Telephone Exchanges - Expansion of existing systems to meet growth.

- Upgrading NEAX-61 Telephone Exchanges - Expansion of existing systems to meet growth.
- Rehabilitation of Cable Distribution Network - Cable replacements and civil works.
- Rural Radio Telephone System - Installation of 30 rural Radio telephone subscriber systems for 3000 new subscribers.
- Subscriber Terminal Equipment - Will provide 140,000 telephone sets, 1,000 facsimile machines, 2,000 teleprinters and 250 PABXs.

The year 2000 data for Zambia indicates some improvement in the telecommunications sector with an expected penetration of 1.64. However, the shortfall will still be high at 111,425 DELs. The estimated investment to attain the 1.64 penetration is $32M per year average for ten years. This equates to 0.6% of the GDP which is considered attainable. To meet the indicated demand, however, would require an average annual expenditure of $86M which is 1.7% of the estimated GDP and would be difficult to attain. Thus it is expected that Zambia will have a continuing major shortfall throughout the ten-year study period, although progress will have been made in reducing the shortfall percentage of supply from almost 170% in 1990 to 60% in the year 2000.

1.5.11 Zimbabwe

Two entries are shown for Zimbabwe in Table I. The entry labelled ZIMBABWE reflects the data obtained from the telephone administration while the entry labelled ZIMBABWE-ADB shows the data obtained from the African Development Bank (ABD). The 1990 Zimbabwe data received from the telephone administration indicates a penetration of 1.26 telephones per hundred population, a fill factor of 76.6% and a shortfall that is about 60% of the indicated supply. The fill appears reasonable. Thus there is very little idle capacity that could be used to satisfy the shortfall. The penetration is a bit above the average for the region. Any greater penetration will require new construction. The ABD data is very similar for 1990.

As an indication of planning being done to increase the supply in future years, the Ten-year Development Plan includes the following projects *which will directly increase the supply of telecommunications services* in Zimbabwe:

- Subscriber Line Management Center - Establishes a Subscriber Line Management Center at Bulawayo.

- Supply of PABXs to Provide New Service and Replace Old Equipment - Approximately 500 units from 16 to 680 lines.

- Underground Cable for New Projects and Rehabilitation - For growth and to improve grade of service.

- Subscriber Radio Systems - ten subscriber radio systems, funding required.

The data for the year 2000 from the two sources is somewhat different, with the ADB data being the more conservative of the two. The situation as reflected by the telephone administration shows some improvement with an increased density to 3.0 telephones per hundred. However, it will require an annual expenditure average of $110M to reach this level. This equates to 1.35% of GDP which may be on the high side, but could be attainable. To meet the indicated demand of 318,500 DELs, on the other hand, would require an average annual expenditure of $23M over the ten-year period (2.8% of GDP in year 2000) which is unrealistic. The ABD data for Zimbabwe indicate a lower expected population as well as a lower DEL supply and a smaller demand. Based on this data, a density of 1.8 telephones per hundred is indicated which equates to nearly 0.5% of GDP which is well within reason. Again, the estimated expenditure to meet the indicated demand is at a level of 2.3% of the GDP which is also unrealistic. If this level of service could be reached, based on either scenario, the penetration would be of 5 telephones per hundred population, or higher, an exceptionally good level of service for the SADC region. The indicated supply plans, however, will result in a large shortfall in 2000 in the range of 75% to 175% of supply.

ANNEX 1.1

TELECOMMUNICATIONS SECTOR SCOPING STUDY FOR SOUTHERN AFRICA - PHASE ONE

SECTION I

RESPONSE TO QUESTIONNAIRES

(Angola, Malawi and RSA did not return questionnaires)

Southern Africa Telecommunications Scoping Mission
Data Sheet - Botswana

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
SUPPLY CAPACITY										
Manual Telephone Exchanges	6	6								
Automatic Telephone Exchanges	30	34								
Total Telephone Exchanges	36	40								
Total Telephone Trunks										
Total Installed (lines)	26,367	32,607								
Voice (x 1000)										
Data (x 1000)										
Video (x 1000)										
Manual Exchange Capacity	150	150								
Automatic Exchange Capacity	34,900	37,656								
Total Exchange Line Capacity	35,050	37,806	39,915	43,108	46,557	50,281	54,304	58,648	63,340	68,407
Connected Main Stations (x1000)	49,807	60,874								
Telex Exchange Capacity (lines)	1,024	1,024								
Connected Telex Subscribers										
Business	}									
Residential	}									
Urban	} 511	527								
Rural	}									
No. of Direct Exchange Lines (DELs)	31,198	36,807	39,015	40,091	41,901	43,577	44,801	48,092	50,672	54,726
Business	12,791	18,569								
Residential	18,407	18,238								
Urban										
Rural										
Fill Ratio (Percentage)	89%	97%	98%	93%	90%	87%	83%	82%	80%	80%
Type of Exchange Equipment										
– Step-by-Step (Lines x 1000)										
Urban										
Rural										
– Crossbar (Lines x 1000)										
Urban										
Rural										
– Digital (Lines x 1000)	31,048	36,656								
Urban										
Rural										

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Southern Africa Telecommunications Scoping Mission
Data Sheet – Botswana

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
DEMAND										
Registered Waiters for Telephones	7,368	8,911	9,936	11,078	12,352	13,773	15,357	17,123	19,092	21,288
Business										
Residential										
Urban										
Rural										
Registered Waiters for Data Services										
Business										
Residential										
Urban										
Rural										
Registered Waiters for Video Services										
Business										
Residential										
Urban										
Rural										

Southern Africa Telecommunications Scoping Mission
Data Sheet – Botswana

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
QUALITY OF SERVICE										
No. of billing complaints (per 100 sub/month)										
No. of Faults (per 100 sub/month)										
No. of days to clear fault										
Average collection time for bills										
EFFICIENCY										
Staff per 1000 DELs										
Operating Revenue per DEL										
Operating Expenses per DEL										
Operating Income per DEL										
TRAFFIC (Telephone)										
International Calls out (min. x 1000)										
Local – Urban Calls (unit x 1000)										
SATCC – Subregional Calls out (min. x 1000)										
TRAFFIC (Telex)										
Interurban calls (unit x 1000)										
International Calls out (unit x 1000)										
Call Completion %										
International										
Local										
Regional										

Southern Africa Telecommunications Scoping Mission

Data Sheet – Lesotho

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
SUPPLY CAPACITY										
Manual Telephone Exchanges	19	19	14	14	11	8	5	2	1	1
Automatic Telephone Exchanges	16	16	21	21	24	30	33	36	37	37
Total Telephone Exchanges	35	35	35	35	35	38	38	38	38	38
Total Telephone Trunks	667									
Total Installed (lines x 1000)	12.324									
Voice (x 1000)	12.275									
Data (x 1000)	0.049									
Video (x 1000)	N/A									
Manual Exchange Capacity	475									
Automatic Exchange Capacity	20,096	20,096	20,096	20,382	20,382					
Total Exchange Line Capacity	20,571	20,096	20,096	20,382	20,382	26,000	29,000	33,000	38,000	45,000
Connected Main Stations (x1000)	21.454									
Telex Exchange Capacity (lines)	623									
Connected Telex Subscribers	181	163	160	160	144					
Business	181	163	160	160	144					
Residential	..	..	..	..	..					
Urban	126	103	100	100	84					
Rural	56	60	60	60	60					
No. of Direct Exchange Lines (DELs)	12,275	12,500	14,688	17,053	19,918	23,2[illegible]4	27,172	31,737	37,037	43,222
Business	9,127	9,343	10,044	10,797	11,607	12,477	13,413	14,419	15,500	16,663
Residential	3,148	3,157	4,644	6,256	8,311	10,787	13,759	17,318	21,537	26,559
Urban	8,722									
Rural	3,553									
Fill Ratio (Percentage)	60%	62%	73%	84%	98%	89%	94%	96%	97%	96%
Type of Exchange Equipment										
– Step–by–Step (Lines x 1000)	0.15									
Urban										
Rural	0.15									
– Crossbar (Lines x 1000)	0.497									
Urban	0.146									
Rural	0.351									
– Digital (Lines x 1000)	11.778									
Urban	11.778									
Rural	..									

Southern Africa Telecommunications Scoping Mission
Data Sheet - Lesotho

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
DEMAND										
Registered Waiters for Telephones	6484	7004	7564	8169	8823	9528	10290	11114	12003	12963
Business	5116	5525	5967	6444	6960	7517	8118	8767	9469	10226
Residential	1368	1479	1597	1725	1863	2011	2172	2347	2534	2737
Urban										
Rural										
Registered Waiters for Data Services	8									
Business	8									
Residential	..									
Urban	8									
Rural	..									
Registered Waiters for Video Services										
Business										
Residential										
Urban										
Rural										

Southern Africa Telecommunications Scoping Mission
Data Sheet – Lesotho

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
QUALITY OF SERVICE										
No. of billing complaints (per 100 sub/month)										
No. of Faults (per 100 sub/month)										
No. of days to clear fault										
Average collection time for bills										
EFFICIENCY										
Staff per 1000 DELs										
Operating Revenue per DEL										
Operating Expenses per DEL										
Operating Income per DEL										
TRAFFIC (Telephone)										
International Calls out (min. x 1000)										
Local – Urban Calls (unit x 1000)										
SATCC – Subregional Calls out (min. x 1000)										
TRAFFIC (Telex)										
Interurban calls (unit x 1000)										
International Calls out (unit x 1000)										
Call Completion %										
International										
Local										
Regional										

Southern Africa Telecommunications Scoping Mission
Data Sheet - Mozambique

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
SUPPLY CAPACITY										
Manual Telephone Exchanges	47	47	32	10	0					
Automatic Telephone Exchanges	39	39	39	40	..					
Total Telephone Exchanges	86	86	61	50	40					
Total Telephone Trunks	3,200	3,200	3,627	4,054	4,480					
Total Installed (lines x 1000)										
Voice (x 1000)										
Data (x 1000)										
Video (x 1000)										
Manual Exchange Capacity	3,125	3,125	1,925	350	0					
Automatic Exchange Capacity	78,268	79,268	..	..	85,488					
Total Exchange Line Capacity	81,393	91,974	102,555	113,136	123,868	135,618	148,483	162,568	177,988	194,875
Connected Main Stations (x1000)	53	53	54	55	56					
Telex Exchange Capacity (lines)	2,306	2,525	2,744	2,963	3,182					
Connected Telex Subscribers	1,172	1,230	1,268	1,293	1,320					
Business										
Residential										
Urban										
Rural										
No. of Direct Exchange Lines (DELs)	25,874	53,000	54,000	55,000	56,000	74,560	89,090	105,670	133,490	155,898
Business										
Residential										
Urban										
Rural										
Fill Ratio (Percentage)	32%	58%	53%	49%	45%	55%	60%	65%	75%	80%
Type of Exchange Equipment										
- Step-by-Step (Lines x 1000)	17.17									
Urban										
Rural										
- Crossbar (Lines x 1000)	1,575									
Urban										
Rural										
- Digital (Lines x 1000)	33,634				85,488					
Urban										
Rural										

Southern Africa Telecommunications Scoping Mission
Data Sheet – Mozambique

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
DEMAND										
Registered Waiters for Telephones	32,000	51,680	71,360	91,040	110,841	118,418	126,515	135,165	144,400	154,275
Business										
Residential										
Urban										
Rural										
Registered Waiters for Data Services										
Business										
Residential										
Urban										
Rural										
Registered Waiters for Video Services										
Business										
Residential										
Urban										
Rural										

Southern Africa Telecommunications Scoping Mission
Data Sheet – Mozambique

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
QUALITY OF SERVICE										
No. of billing complaints (per 100 sub/month)										
No. of Faults (per 100 sub/month)										
No. of days to clear fault										
Average collection time for bills										
EFFICIENCY										
Staff per 1000 DELs	49									
Operating Revenue per DEL										
Operating Expenses per DEL										
Operating Income per DEL										
TRAFFIC (Telephone)										
International Calls out (min. x 1000)	7,764	8,929	9,821	10,804	11,884					
Local – Urban Calls (unit x 1000)	231,865	248,095	265,462	248,044	303,928					
SATCC – Subregional Calls out (min. x 1000)	1,079	1,079	1,111	1,144	1,179					
TRAFFIC (Telex)										
Interurban calls (unit x 1000)	2,209	2,319	2,435	2,557	2,685					
International Calls out (unit x 1000)	1,139	1,127	1,116	1,100	1,090					
Call completion %										
International										
Local										
Regional										

Southern Africa Telecommunications Scoping Mission
Data Sheet – Namibia

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
SUPPLY CAPACITY										
Manual Telephone Exchanges	134									
Automatic Telephone Exchanges	18									
Total Telephone Exchanges	152									
Total Telephone Trunks	3,800									
Total Installed (lines)	91,000									
Voice	81,000									
Data	10,000									
Video	N/A									
Manual Exchange Capacity	16,300									
Automatic Exchange Capacity	64,700									
Total Exchange Line Capacity	81,000	83,025	85,101	87,228	89,409	91,644	93,935	96,284	98,691	101,158
Connected Main Stations (x1000)	50,600									
Telex Exchange Capacity (lines)	1,800									
Connected Telex Subscribers	1,014									
Business										
Residential										
Urban										
Rural										
No. of Direct Exchange Lines (DELs)	53,924	58,117	59,570	63,240	64,825	68,730	70,450	74,620	76,485	80,926
Business										
Residential										
Urban										
Rural										
Fill Ratio (Percentage)	67%	70%	70%	72%	73%	75%	75%	78%	77%	80%
Type of Exchange Equipment										
– Step–by–Step (Lines x 1000)										
Urban										
Rural										
– Crossbar (Lines x 1000)										
Urban										
Rural										
– Digital (Lines x 1000)	20									
Urban	19.8									
Rural	0.2									

Southern Africa Telecommunications Scoping Mission
Data Sheet – Namibia

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
DEMAND										
Registered Waiters for Telephones	1,542	1,928	4,000	6,000	10,000	12,500	15,625	19,531	24,414	30,518
Business										
Residential										
Urban										
Rural										
Registered Waiters for Data Services	120									
Business	120									
Residential	..									
Urban	120									
Rural	..									
Registered Waiters for Video Services										
Business	N/A									
Residential	N/A									
Urban	N/A									
Rural	N/A									

Southern Africa Telecommunications Scoping Mission
Data Sheet – Namibia

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
QUALITY OF SERVICE										
No. of billing complaints (per 100 sub/month)										
No. of Faults (per 100 sub/month)										
No. of days to clear fault										
Average collection time for bills										
EFFICIENCY										
Staff per 1000 DELs										
Operating Revenue per DEL										
Operating Expenses per DEL										
Operating Income per DEL										
TRAFFIC (Telephone)										
International Calls out (min. x 1000)										
Local – Urban Calls (unit x 1000)										
SATCC – Subregional Calls out (min. x 1000)										
TRAFFIC (Telex)										
Interurban calls (unit x 1000)										
International Calls out (unit x 1000)										
Call Completion %										
International										
Local										
Regional										

Southern Africa Telecommunications Scoping Mission
Data Sheet – Zimbabwe

		1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
SUPPLY CAPACITY											
Manual Telephone Exchanges			9	8	6	4	2	1	0	0	0
Automatic Telephone Exchanges			94	95	97	99	101	102	103	103	103
Total Telephone Exchanges			103	103	103	103	103	103	103	103	103
Total Telephone Trunks			17,012	19,173	21,608	24,353	28,091	32,405	36,057	40,120	44,641
Total Installed (lines x 1000)			127,670	140,444	154,489	169,938	186,931	205,625	226,187	248,806	273,687
Voice (x 1000)			126,953	139,648	153,613	168,974	185,871	204,459	224,901	247,394	271,134
Data (x 1000)			717	796	876	964	1,060	1,166	1,283	1,412	2,553
Video (x 1000)			N/A								
Manual Exchange Capacity	678		536	476	357	238	119	60	0	0	0
Automatic Exchange Capacity	160,719		164,726	302,603	329,994	357,485	337,331	418,952	452,403	488,897	528,969
Total Exchange Line Capacity	161,397		165,262	303,079	330,351	357,723	387,450	419,012	452,403	488,897	528,969
Connected Main Stations (x1000)			297,000	321,235	334,085	347,447	361,346	375,800	390,831	406,465	422,724
Telex Exchange Capacity (lines)			4,162	5,270	5,797	6,378	7,016	7,717	8,489	9,338	10,271
Connected Telex Subscribers											
Business			3,001	3,794	4,184	4,592	5,051	5,562	6,112	6,723	7,406
Residential											
Urban											
Rural											
No. of Direct Exchange Lines (DELs)	123,665		124,752	258,646	309,746	325,346	333,646	356,646	446,395	468,395	513,595
Business			48,368	100,872	120,801	126,885	130,122	139,092	174,094	182,674	200,302
Residential			76,384	157,774	188,945	198,461	203,524	217,554	272,301	285,721	313,293
Urban											
Rural											
Fill Ratio (Percentage)			75%	85%	94%	91%	86%	85%	99%	96%	97%
Type of Exchange Equipment											
– Step-by-Step (Lines)				97,750	101,850	112,850	110,150	110,150	103,600	97,900	86,100
Urban (Exch.)			93	79	76	75	72	72	68	65	58
Rural (Exch.)			52	10	10	10	9	9	9	8	7
– Crossbar (Lines x 1000)			0								
Urban			0								
Rural (Exch.)			1								
– Digital (Lines)			22,340	160,896	207,892	212,496	223,496	246,496	342,796	370,496	427,496
Urban (Exch.)			3	13	16	17	19	21	24	27	32
Rural (Exch.)			1	5	6	6	7	7	8	9	11

Southern Africa Telecommunications Scoping Mission
Data Sheet - Zimbabwe

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
DEMAND										
Registered Waiters for Telephones		436,998	206,652	231,450	254,595	274,962	291,460	303,118	312,212	318,456
Business		19,407	22,318	24,996	27,496	29,696	31,478	32,737	33,719	34,393
Residential		70,442	81,008	90,729	99,802	107,786	114,253	118,823	122,388	124,836
Urban		61,321	70,519	78,981	86,879	93,829	99,459	103,437	106,540	108,671
Rural		285,828	32,807	36,744	40,418	43,651	46,270	48,121	49,565	50,556
Registered Waiters for Data Services										
Business		1,446	1,475	1,505	1,535	1,566	1,597	1,629	1,662	1,695
Residential										
Urban										
Rural										
Registered Waiters for Video Services										
Business										
Residential										
Urban										
Rural										

Southern Africa Telecommunications Scoping Mission
Data Sheet – Zimbabwe

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
QUALITY OF SERVICE										
No. of billing complaints (per 100 sub/month)	0.9	0.09	0.08	0.07	0.06	0.05	0.03	0.03	0.02	0.03
No. of Faults (per 100 sub/month)	21.6	18	16	12	10	8	8	6	6	4
No. of days to clear fault	2	2	2	2	1	1	1	1	1	1
Average collection time for bills	90	60	30	30	30	30	30	30	30	30
EFFICIENCY										
Staff per 1000 DELs	25	20	20	19	12	10	8	6	4	2
Operating Revenue per DEL	3009	3310	3641	4005	4405	4846	5331	5864	6450	7095
Operating Expenses per DEL	2609	2870	3157	3473	3920	4202	4622	5084	5593	6152
Operating Income per DEL	400	440	484	532	586	644	709	779	857	943
TRAFFIC (Telephone)										
International – No. of calls	773,540	850,894	953,983	1,029,581	1,132,540	1,245,794	1,370,373	1,507,410	1,658,151	1,823,966
Local – No. of Calls (Units)	357,994	393,793	433,173	476,490	524,139	576,553	634,208	697,629	767,392	844,131
Regional – No. of Calls (Units)	692,755	762,030	838,233	922,057	1,014,262	1,115,688	1,227,257	1,349,983	1,484,981	1,633,479
Call completion %										
International	40%	45%	60%	65%	70%	70%	70%	70%	80%	80%
Local	30%	35%	40%	45%	50%	55%	60%	65%	65%	70%
Regional	35%	37%	43%	55%	60%	63%	65%	65%	65%	70%

Southern Africa Telecommunications Scoping Mission
Data Sheet – Zambia

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
SUPPLY CAPACITY										
Manual Telephone Exchanges	5	5	5	3	3					
Automatic Telephone Exchanges	90	90	91	97	97					
Total Telephone Exchanges	95	95	96	100	100					
Total Telephone Trunks	16,252	20,252	20,252	20,812	20,812					
Total Installed (lines x 1000)	7.429	8.644								
Voice (x 1000)	7.3	8.5								
Data (x 1000)	0.123	0.138								
Video (x 1000)	0.006	0.006	0.006							
Manual Exchange Capacity	150	150	150	50	50					
Automatic Exchange Capacity	114,068	122,468	128,068	165,466	165,466					
Total Exchange Line Capacity	114,218	122,618	128,218	165,516	165,516	173,791	182,481	191,605	201,185	211,245
Connected Main Stations (x1000)	0.65	0.61								
Telex Exchange Capacity (lines)	4,504	4,504								
Connected Telex Subscribers	2,875	3,000								
Business	2,875	3,000								
Residential	..	..								
Urban	2,628	2,738								
Rural	247	262								
No. of Direct Exchange Lines (DELs)	70,472	71,345	76,930	107,858	112,551	121,650	127,750	143,703	150,900	169,000
Business	33,023	33,404								
Residential	37,449	37,941								
Urban	56,912	57,698								
Rural	13,560	13,647								
Fill Ratio (Percentage)	62%	58%	60%	65%	68%	70%	70%	75%	75%	80%
Type of Exchange Equipment										
– Electronic (lines)	15,574	15,378								
Urban	8,987	8,888								
Rural	6,587	6,490								
– Crossbar (Lines)	25,529	19,819								
Urban	20,446	14,681								
Rural	5,083	5,138								
– Digital (Lines)	29,449	36,148								
Urban	27,559	34,133								
Rural	1,890	2,015								

Southern Africa Telecommunications Scoping Mission

Data Sheet – Zambia

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
DEMAND										
Registered Waiters for Telephones	50,412	61,309	67,440	75,185	81,600	89,765	98,740	108,600	119,475	131,425
Business	10,542	13,467								
Residential	39,870	47,842								
Urban	28,981	46,825								
Rural	10,889	14,484								
Registered Waiters for Data Services										
Business										
Residential										
Urban										
Rural										
Registered Waiters for Video Services										
Business										
Residential										
Urban										
Rural										

Southern Africa Telecommunications Scoping Mission
Data Sheet - Zambia

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
QUALITY OF SERVICE										
No. of billing complaints (per 100 sub/month)										
No. of Faults (per 100 sub/month)										
No. of days to clear fault										
Average collection time for bills										
EFFICIENCY										
Staff per 1000 DELs										
Operating Revenue per DEL										
Operating Expenses per DEL										
Operating Income per DEL										
TRAFFIC (Telephone)										
International Calls out (min. x 1000)										
Local – Urban Calls (unit x 1000)										
SATCC – Subregional Calls out (min. x 1000)										
TRAFFIC (Telex)										
Interurban calls (unit x 1000)										
International Calls out (unit x 1000)										
Call Completion %										
International										
Local										
Regional										

Southern Africa Telecommunications Scoping Mission

Data Sheet – Tanzania

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
SUPPLY CAPACITY										
Manual Telephone Exchanges	172	193	203	203	203	203	203	203	203	203
Automatic Telephone Exchanges	49	49	51	52	55	55	76	76	76	76
Total Telephone Exchanges	221	242	254	255	258	258	279	279	279	279
Total Telephone Trunks	5,431	6,431	6,431	12,431	12,431	14,431	14,431	14,431	14,431	14,431
Total Installed (lines x 1000)										
Voice (x 1000)	76.4	84.8	94.8	106	121.9	140.2	157	177.4	200.5	226.6
Data (x 1000)	1.6	2.6	3.3	3.9	4.3	5.4	6.7	7.7	11.4	14.2
Video (x 1000)	N/A									
Manual Exchange Capacity	18,738	40,830	41,839	43,839	59,640	65,840	41,840	26,755	14,114	11,441
Automatic Exchange Capacity	87,520	87,520	87,520	87,520	118,520	150,526	174,520	219,895	267,968	309,106
Total Exchange Line Capacity	106,258	128,350	129,359	131,359	178,160	216,366	216,360	246,650	282,082	320,547
Connected Main Stations (x1000)	142.9	148.5	154.5	160.6	197.1	173.7	180.3	197.9	195.4	203.2
Telex Exchange Capacity (lines)	4,350	4,350	4,350	4,350	4,350	4,350	4,350	4,350	4,350	4,350
Connected Telex Subscribers										
Business	}									
Residential	}									
Urban	} 1796	2,760	3,300	3,900	4,300	5,375	6,719	7,327	11,371	14,214
Rural	}									
No. of Direct Exchange Lines (DELs)										
Business										
Residential										
Urban (Auto. Exchanges)	62,209	66,813	71,757	77,067	82,770	98,895	99,473	102,538	110,126	118,275
Rural (Magneto Lines)	14,160	18,032	23,043	28,819	49,110	51,305	51,551	74,839	90,378	106,295
TOTAL DELs	76,369	84,845	94,800	105,386	131,880	150,200	151,024	177,377	200,504	224,570
Fill Ratio (Percent)	72%	66%	73%	81%	74%	69%	70%	72%	71%	70%
Type of Exchange Equipment										
– Step-by-Step (Lines x 1000)										
Urban	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3
Rural	N/A									
– Crossbar (Lines x 1000)										
Urban	34.22	34.22	34.22	34.22	34.22	34.22	34.22	34.22	34.22	34.22
Rural	N/A									
– Digital (Lines x 1000)										
Urban	34	34	34	65	97	121	121	121	121	121
Rural	N/A									

Southern Africa Telecommunications Scoping Mission
Data Sheet – Tanzania

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
DEMAND										
Registered Waiters for Telephones	130,447	139,772	171,942	197,442	226,700	260,196	298,874	369,263	394,643	452,459
Business										
Residential										
Urban	106,226	112,160	140,464	161,557	185,791	213,660	245,709	282,565	324,950	373,693
Rural	24,221	27,612	31,478	35,885	40,909	46,536	53,165	86,698	69,693	78,766
Registered Waiters for Data Services										
Business										
Residential										
Urban	} 3307	4,035	4,923	6,006	7,327	8,939	10,906	13,305	16,232	19,803
Rural	}									
Registered Waiters for Video Services										
Business	N/A									
Residential	N/A									
Urban	N/A									
Rural	N/A									

Southern Africa Telecommunications Scoping Mission
Data Sheet –

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
SUPPLY CAPACITY										
Manual Telephone Exchanges	4	4	1	1						
Automatic Telephone Exchanges	19	22	24	26						
Total Telephone Exchanges	23	26	25	27						
Total Telephone Trunks	1,369	1,369								
Total Installed (lines x 1000)	17.3	19.2	21.1							
Voice (x 1000)										
Data (x 1000)										
Video (x 1000)										
Manual Exchange Capacity	120	120	30	30						
Automatic Exchange Capacity	17,300	19,280	27,500	38,200						
Total Exchange Line Capacity	17,420	19,400	27,530	38,230	38,945	39,662	40,378	41,094	41,810	42,500
Connected Main Stations (x1000)	14.3	16	17.6	19.4						
Telex Exchange Capacity (lines)	480	480	480	480						
Connected Telex Subscribers	264	230	200	180						
Business	264	230	200	[illegible]						
Residential										
Urban										
Rural										
No. of Direct Exchange Lines (DELs)	14,355	16,000	18,000	20,000	21,248	23,340	25,640	28,165	30,940	33,997
Business										
Residential										
Urban										
Rural										
Fill Ratio (Percentage)	82%	82%	65%	52%	55%	59%	63%	69%	74%	80%
Type of Exchange Equipment										
– Step–by–Step (Lines x 1000)	1.25									
Urban	1.10									
Rural	0.15									
– Crossbar (Lines x 1000)	13.10	13.10	13.10	9.12	7.50	7.00				
Urban	10.63	10.63	10.63	6.00	6.00	6.00				
Rural	2.47	2.47	2.47	3.12	1.50	1.00				
– Digital (Lines x 1000)	..	3.48	24.52	28.52	28.52	28.52				
Urban	..	3.00	18.00	22.00	22.00	22.00				
Rural	..	0.48	6.52	6.52	6.52	6.52				

Southern Africa Telecommunications Scoping Mission
Data Sheet

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
DEMAND										
Registered Waiters for Telephones	7,174	7,000	6,525	5,000	5,250	5,512	5,790	6,075	6,385	6,704
Business										
Residential										
Urban										
Rural										
Registered Waiters for Data Services	18	37								
Business										
Residential										
Urban										
Rural										
Registered Waiters for Video Services										
Business										
Residential										
Urban										
Rural										

Southern Africa Telecommunications Scoping Mission

Data Sheet – Tanzania

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
QUALITY OF SERVICE										
No. of billing complaints (per 100 sub/month)										
No. of Faults (per 100 sub/month)										
No. of days to clear fault										
Average collection time for bills										
EFFICIENCY										
Staff per 1000 DELs										
Operating Revenue per DEL										
Operating Expenses per DEL										
Operating Income per DEL										
TRAFFIC (Telephone)										
International Calls out (min. x 1000)										
Local – Urban Calls (unit x 1000)										
SATCC – Subregional Calls out (min. x 1000)										
TRAFFIC (Telex)										
Interurban calls (unit x 1000)										
International Calls out (unit x 1000)										

ANNEX 1.2

TELECOMMUNICATIONS SECTOR SCOPING STUDY FOR SOUTHERN AFRICA - PHASE ONE

SECTION I

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ANNEX 1.3

TELECOMMUNICATIONS SECTOR SCOPING STUDY FOR SOUTHERN AFRICA - PHASE ONE

SECTION I

DEMAND FORECAST METHODOLOGIES

DEMAND FORECAST METHODOLOGIES

BACKGROUND ON TELECOMMUNICATIONS FORECASTING

In telecommunications planning and development, as in many other industries, decision makers are cognizant of the fact that their planning problems are becoming increasingly more complex. A major set of planning problems pertains to the identification of future demand for services, while another major set of problems deals with the balancing of "means" and "ends"; weighing the desirability of objectives against their feasibility in terms of resources. From a simplistic viewpoint, planning would involve the management of resources by the extent to which they are scarce or abundant; the problem would then be a simple economic allocation of resources. However, if the problem of matching "means" and "ends" could be solved by mere allocation, them a formal planning process would not be necessary. In "real time" management, decision makers are faced with complications in the allocation of resources.

Planning operates in the "future mode" and as such involves the anticipation of subscriber demand and the marshalling of resources to meet it. In a real sense then, since planning is geared to meet the forecast, the forecast becomes all-important. The importance of good forecasts in today's environment can hardly be over-emphasized. How well the public is served is largely dependent upon the demand forecasts. A quality forecast is the important first step in managing change and establishing the planning parameters.

When discussing resources, one must bear in mind that a number of factors are involved and these will vary in their degree of scarcity. Undoubtedly, the most important factor is financial i.e. the investments required. One of the principal objectives of planning is to ensure that the investments destined to satisfy certain needs are distributed correctly in time.

Investments in telecommunications have three main aspects:

(a) They are large investments;

(b) The procurement and implementation of equipment is a lengthy process

(c) The lifetime of the equipment is considerable: usually more than 10 - 15 years and sometimes as long as 20 - 40 years.

The combined effect of these three aspects largely conditions the long-term state of the network and hence the decisions taken at any given period are generally considered, irreversible. An error in investment will be difficult to correct and may upset the overall stability of the network.

It is therefore essential that every important operation be undertaken within an overall development framework. This requires long-term planning in order to decide on the investments which will have the greatest influence on the structure within the given general network development scenario. Furthermore, to initiate operations at the appropriate times, medium- and short - term planning is necessary. The decisions generated in this way will need to be consistent with the objectives of the long-term equipment strategy.

The associated forecasting scheme should be organized on similar lines:

- it will be necessary to provide forecasts for the short-, medium- and the long--term, in accordance with the different planning levels. The forecasting methods may differ and vary in complexity depending on the intended application and the length of the forecast period;

- these forecasts, even if they derive from quite different models, will need to respect a certain consistency: it must be possible to incorporate short-term trends in the long-term development without too much adjustment.

In telecommunications, the geographical location of investment is particularly important. In relation to the geographical distribution of potential customers, incorrectly located spare capacity will be wasted or will lead to prohibitive operating costs.

Each type of investment is made at a different geographical level:

- Transmission: country, region (transit areas);

- Switching: all towns (local switching areas and toll centers);

- Distribution: districts, rural communities.

The existence of "service areas" at different levels in a hierarchical structure imposes a correlated need for hierarchical telephone demand forecasts at ever finer geographical levels. These forecasts will constitute the basis and principal justification for the investment decisions at each level. The results concerning the different geographical levels must be mutually consistent.

Stages of Network Growth

The choices of forecasting methods -- of short-, medium- and long-term techniques and of the structure of the general forecasting system to be used -- depend on the manner in which the network is developing. The network does not grow linearly and uniformly, but, instead, passes through three distinct phases:

- slow linear growth: starting phase;
- accelerated growth: rapid growth phase;
- decelerated growth: saturation phase.

Each phase corresponds to different social and economic conditions. It is important to analyze the type of development through which the network is currently passing before determining the forecasting system.

1. Starting Phase

The starting phase corresponds to a period of slow network development which is reflected by a low telephone density, as indicated by the number of lines per 100 inhabitants. The correlation between telephone density and the gross national product (GNP) per inhabitant shows that this phase corresponds to economically underdeveloped countries.

The principal component of telephone demand in this phase is the "professional demand", which comes mainly from the industrial and public administration sectors. It is therefore necessary to install the elementary telephone infrastructure which accompanies industrial development and without which such development would be hindered.

Studies carried out over a long period have shown that there is correlation between industrial production and professional demand. In some cases, the growth of the network which occurs with industrial growth, may be accelerated by increased use of the telephone within industrial companies. The general form of the curve is linear.

Residential demand -- telephones for private use -- remains small during this phase however, due to low incomes, insufficient consumer spending and the restricted usefulness of the telephone for social purposes, which reduces its attraction for potential users. The telephone is still considered a luxury, and not an everyday commodity, and priority is given instead to other consumer goods or simply to the purchase of food in countries with the lowest per capita income.

The development of the number of connections may be restricted by the lack of funds for the heavy investments required for the equipment of a telephone network. With only limited financial resources, developing countries give priority to the more fundamental sectors considered to be of greater strategic importance such as heavy industry, energy, transport. Forecasters must therefore take account of these considerations when formulating a methodology.

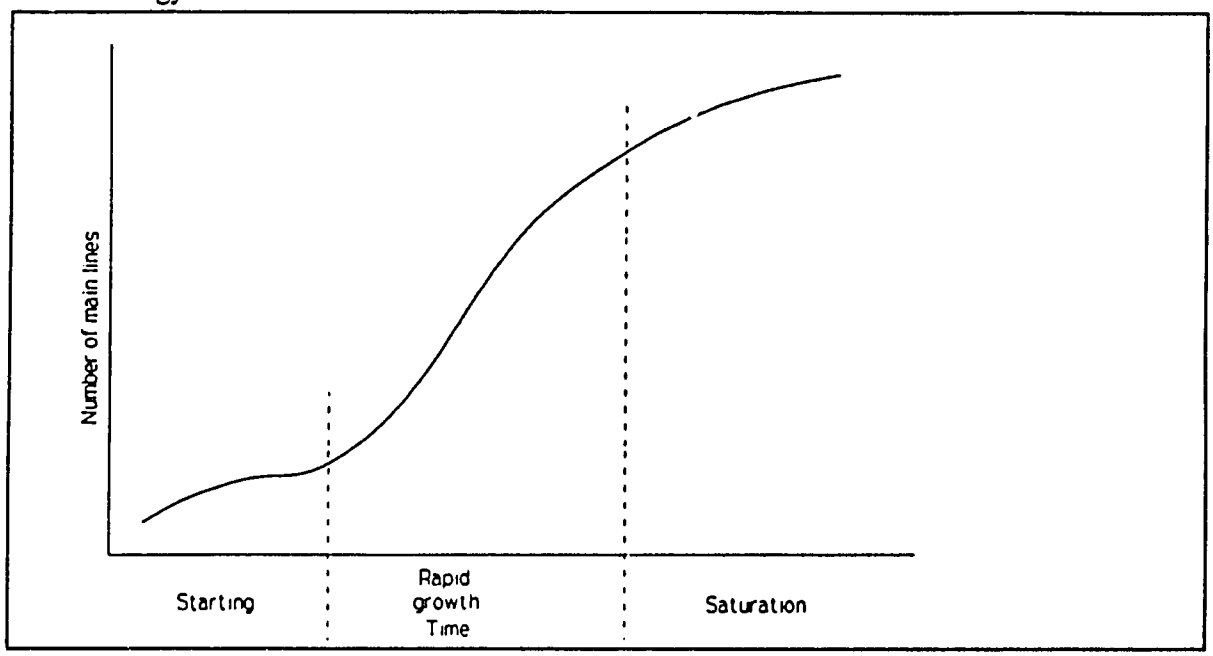

Figure 1: Three Phases of Network Growth

2. Rapid Growth Phase

In the context of more advanced economic development, the importance of the telephone network increases in both:

- the production sector, which demands a better quality of service and the infrastructure essential for economic development; and

- the private residential sector, where there is a change of attitude towards the telephone, in that it ceases to be a luxury and becomes an everyday item.

This phenomenon is due to the rise in the standard of living, the acquisition of other consumer products and a more widespread acceptance of the telephone by society in general, which increases its usefulness. This latter aspect explains the phenomenon of accelerated growth.

However, the potential demand for connections will not in itself increase the number of subscribers without a special investment effort, a long-term plan with specified marketing objectives and the financial means to achieve them. This rapid growth phase, whose driving force is the residential sector, is often characterized by the demand being much greater than the supply and the supply largely determining the level of expressed demand: an excessive waiting time may discourage possible customers while a reduction in this time induces a new demand. Thus the situation arrives in which the satisfaction of the demand has the effect of increasing the number of demands in hand. This continues until the network contains sufficient equipment.

This phase represents the stage of network definition. Forecasts will therefore be all the more important in that any serious forecasting errors may lead to costly planning errors. Strategic plans for equipping the network will be established on the basis of long-term forecasts.

The global forecasts to determine the overall cost of the investments to be programmed will have more weight than local forecasts and the "descending" type of forecasting will replace the "ascending" type. Local forecasts will only be applied within their allocation of overall resources and will have to be consistent with the forecasts established for the whole network, the latter being the more reliable in this phase.

3. Saturation Phase

Network development enters a new phase when the residential telephone density reaches the level of 80-100%. The network is then considered mature in that there is no longer a high level of potential demand. The development of the network now follows a stable growth rate with supply adapting to demand. The composition of the demand for connections undergoes a change. It is no longer made up mainly of new residential requests but becomes more diversified:

- transfers become a significant part;
- the residential demand becomes a demand for extra equipment such as for weekend homes, second or third lines;
- the professional demand may be renewed by the development of service industries whose vocation is information processing and which require a higher rate of telephone equipment per employee than do manufacturing industries.

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This new development phase leads to a modification in forecasting methods:

(a) it becomes necessary to observe local population movements more closely and at finer levels: urbanization, creation of industrial zones and migrations. The local forecasts become predominant and overall forecasts are then simply the sum of local forecasts;(b) new professional equipment philosophies need to be considered, mainly due to the introduction of new services such as teleconference calls, facsimile, cellular radio, etc.

Comparison of Growth Rates

The duration of the three phases may vary considerably from one country to another. Figure 2 shows different ways in which the number of subscribers may develop in time:

- Curve 1 depicts a well-established industrialized country; the first two phases have been completed and the current phase is characterized by a gradual increase in the number of subscribers and by high density;

- Curve 2 depicts a country which is in the final stages of network development and will soon enter the saturation phase;

- Curve 3 depicts a country which is embarking upon a spectacular process of network development; the saturation phase need not be taken into account except for long-term planning purposes;

- Curve 4 depicts a country with inadequate domestic resources; telephone development will continue to be very slow.

Forecast Indicators

Current Lines

The number of subscriber connections is measured by the number of main telephone lines i.e. the number of effective access possibilities to the general network. Some of the other terminology used in the context of line management include:

Transfer. This is linked to the mobility of customers and mainly concerns households. Transfer takes place when a subscriber changes residence and wishes to continue to have the telephone in his new home. He requests the transfer of his line, which leads to two actions: the outgoing transfer which corresponds to giving up the original line, as in a cancellation, and the incoming transfer corresponding to a new request.

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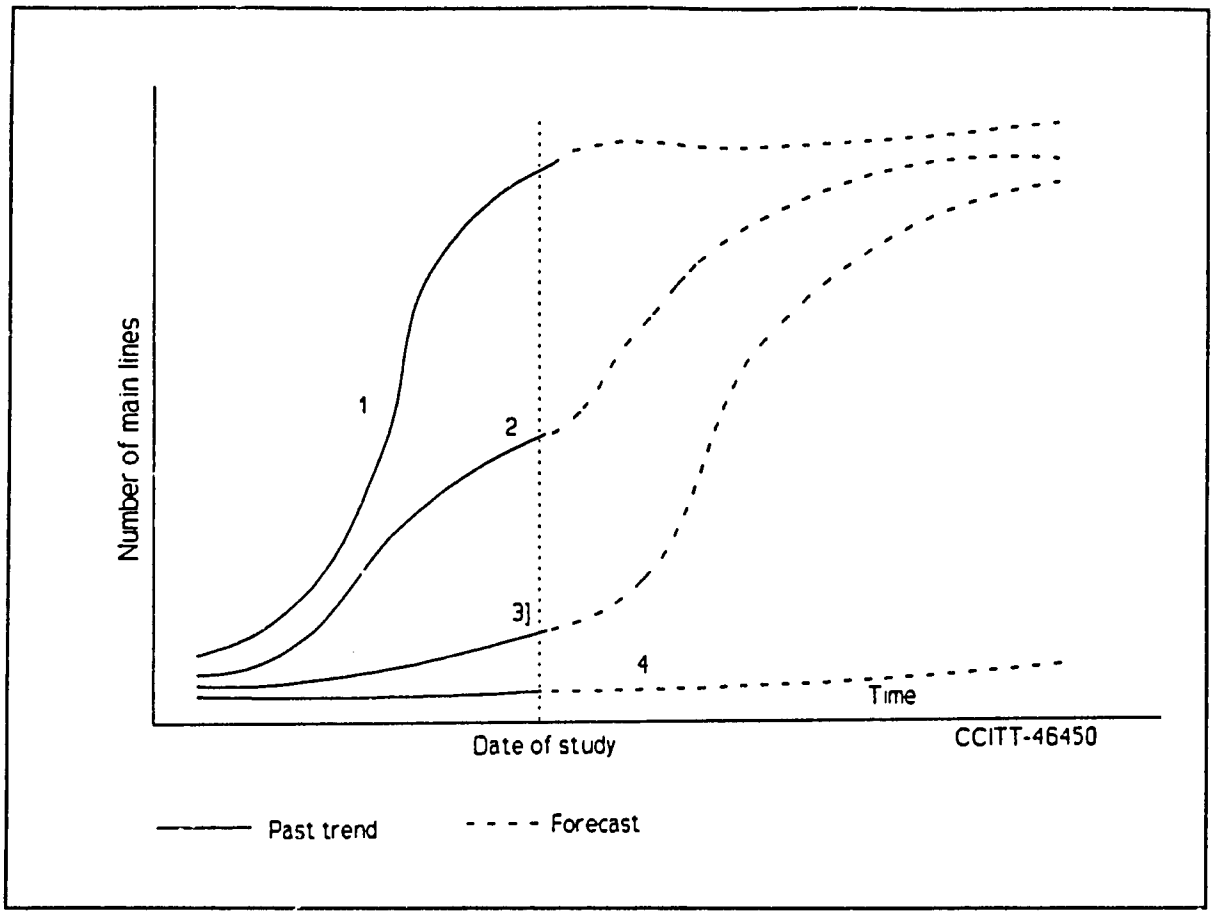

Figure 2: Example of the Three Phases of Growth

Cancellation. This occurs when an existing customer no longer wishes to subscribe to the telephone service.

New demands. These are requests for connection which do not arise from transfers. The new request is therefore an indication of the "natural" increase in the number of subscriber connections.

Demands (requests) in hand. These are requests for connection which have not yet been satisfied. They may be either transfers or new requests. The time spent waiting for a line connection, may be "normal" (an unavoidable minimum of several days in some countries), or longer (several weeks, months, or even several years) where demand is very much greater than supply.

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Waiting List

While the number of connections is a measure of the actual size of the network, the factor of greatest interest for forecasting purposes is the number of lines requested by customers, i.e. the size of the network which would result if the supply corresponded permanently and exactly to the demand. It will be assumed that in the past this quantity was adequately approximated, at a given instant, by the sum (L + I) of connected lines and requests in hand. The connected lines (L) represent the satisfied expressed demand, and the requests (I) represent the unsatisfied expressed demand.

The forecast of the demand may also be interpreted in terms of (L + I), the precise object of the planning exercise being to dimension the number of available lines so as to minimize the number of requests in hand.

Unexpressed Demand

The expressed demand depends in practice on the effectively available supply. If the latter evolves significantly, it may lead to a correlated evolution in the expressed demand without necessarily affecting the real potential demand. Thus, if the supply is far smaller than the real demand, potential customers will only be inclined to submit a request when connection becomes possible (e.g. when a new exchange is created). Other reasons for not filing an application include: lengthy, time-consuming, bureaucratic procedures associated with filing a request for a connection or perception that bribes would be required to obtain service. In this cases, and if the operating Administration wishes to catch up with the backlog of requests, the forecast indicator (L + I) have to be abandoned in favor of an indicator representing more accurately the actual demand and which is therefore capable of providing more realistic results. One such indicator is L + I + U, where U stands for unexpressed demand.

The level of unexpressed demand is difficult to measure and there is no one, foolproof way to do so. Much depends on conditions within the telecommunications environment in question, and on cultural factors that are always difficult to assess. Recent studies of unexpressed demand in Uruguay show that such demand, particularly in the rural areas, can be as high as 100-200% of the waiting list, or perhaps even higher.

METHODS OF FORECASTING SUBSCRIBER DEMAND

In the case of local telephone connections most administrations define demand for service as the number of working subscribers plus the waiting list increasing annually by a percentage known as the growth in demand. The more commonly accepted ways of providing macro forecasts of telephone demand are:

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(a) to base future demand on previous development trends, if possible, taking into consideration likely economic changes;

(b) to base expected demand on experience in another similar country at a similar period in its development; and

(c) to use a method based on one factor or a combination of correlated factors such as GNP per capita, use of electricity, number of motor cars, etc.

Micro forecasts for specific areas are usually based on market studies which may include street and business surveys and consultation with town planners, chambers of commerce, development agencies, etc. In any case, however, growth in developing countries normally has been governed by the supply and not the demand; and almost invariably there will be large waiting lists for services.

General Structure of a Forecasting System

The general framework of a forecasting system is based on:

- a hierarchical division of geographical units;
- a division of the market into segments.

The problem therefore, is to choose a technique for forecasting demand for lines defined by the indicator L + I + U (defined above) which may, in certain cases, be broken down into its various elements, new demand and transfers in a given geographical area (which may be the entire country), for a particular segment of customers (which may extend to the entire market).

Forecasts may be made:

(a) directly -- the variables (L + I + U) are evaluated without intervening calculations;

(b) indirectly -- the demand of the segment considered will be the product of two variables:

i) a demand ratio which would be the equipment penetration rate, the lines per 100 employees, or the density;

ii) the size of the segment.

The first (telephone) variable will require the telephone Administration to set up an information system. The second (social and demographic) variable will depend on the statistical system of the country or region.

The indirect method, which is more discriminating, needs for each customer segment the determination of equipment ratios for the selected target year, by a process of comparison with ratios of countries whose telephone networks are more highly developed. It implies, however:

(a) a firm decision to develop the network

(b) and the availability of the financial resources for doing so;

(c) a correspondence between the defined customer segments

(d) the existence of a statistical system providing the data from which the size of the various segments can be forecast;

(e) the ability of the national telecommunications Administration to measure the existing rate of telephone equipment penetration per segment.

Forecasting methods also depend on the target year selected:

▾ Short-term demand forecasting. Annual programming (target, one year) requires accurate information taking account of economic and other variables (for example, budget possibilities, list of outstanding requests).

▾ Short-term planning. The programming of investments (switching, transmission, etc.) and of extensions requires 3- to 5-year forecasts. Forecasts are usually made:

- ♦ using growth curves;
- ♦ or by constructing an econometric model.

▾ Medium/Long-term forecasting. The planning of large-scale investments (e.g. civil engineering) requires demand forecasts for the next 10 years, and sometimes for the next 20 to 25 years. In this case, the forecasting methods used are essentially based on international comparisons and an indirect forecast separating the telephony variable - equipment penetration ratio - and the demographic variable. Forecasting for a target of 10 years or more is essentially a guideline necessary to evaluate the equipment penetration ratio, the size of each customer segment and the size of the market as a whole.

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The different forecasting time scales require different methods. It is impossible to apply a single method for all forecasting contained in the period under study. This gives rise to certain difficulties:

- harmonizing forecasts made for overlapping periods using two different methods;
- avoiding discontinuities in the projected growth curve between two consecutive periods which do not overlap.

No ready-made solution to these problems exists. A subjective adjustment may be used in which a smooth curve is interpolated between the two curves resulting from the different methods, see Figure 3. Alternatively, more objective methods may be used. For example, the growth rate of the long-term model may be applied from the final point of the medium-term growth curve. This method is not necessarily better than the subjective graphical interpolation.

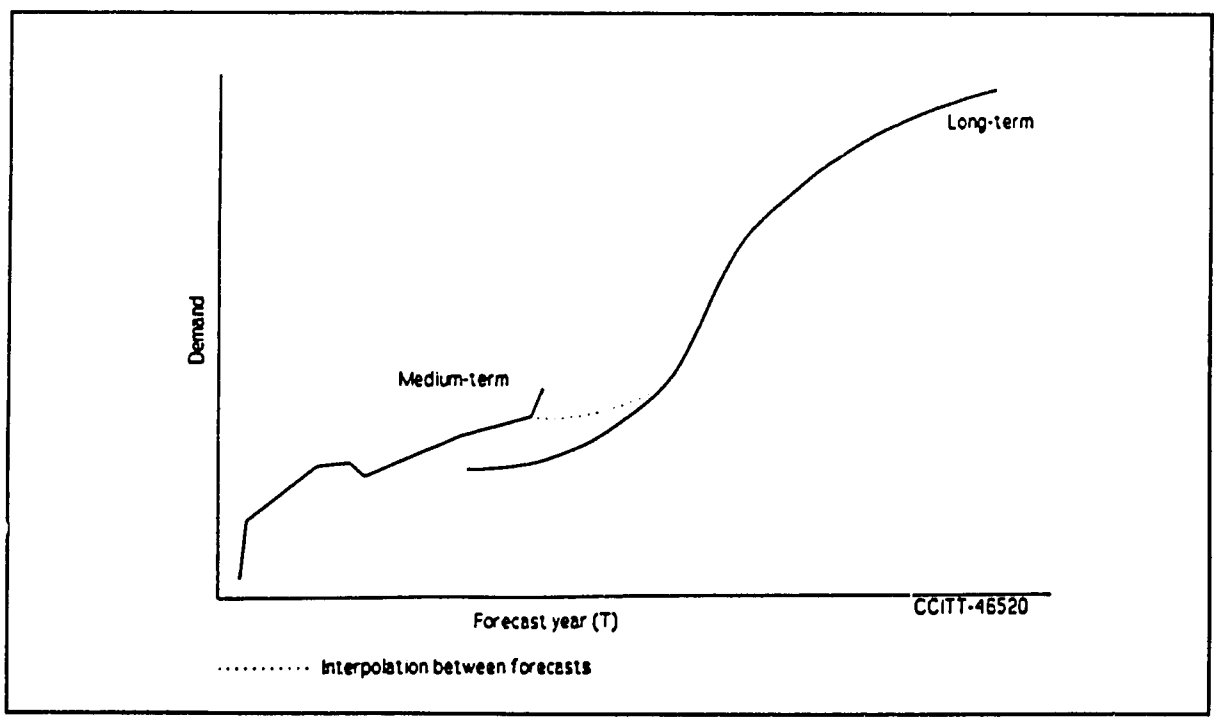

Figure 3: Harmonization of Forecasts

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Despite the subjective nature of the harmonization methods, it is important to avoid discontinuities which may give rise to undesirable irregularities in investment and to unjustified changes of policy.

Basic Methods

Growth Curves

There are special types of models which calculate demand estimations, made up by the growth curves which make use of 3 or 4 parameters (not necessarily the historical series), and the time t as explanatory variable. These models enable us to forecast based on a limited number of observations, and overcome, the shortage of historical data.

The growth curves are distinguished by an exponential growth at the beginning, and by an exponential decrease of the growth at the end, when the series converge to a level of saturation.

Examples of these growth curves are the logistic model, the Gompertz model and the Weibull model. One of the approaches to this demand study, will employ the logistic model, as it will be seen later. For various traditional forms of curves see Figure 4.

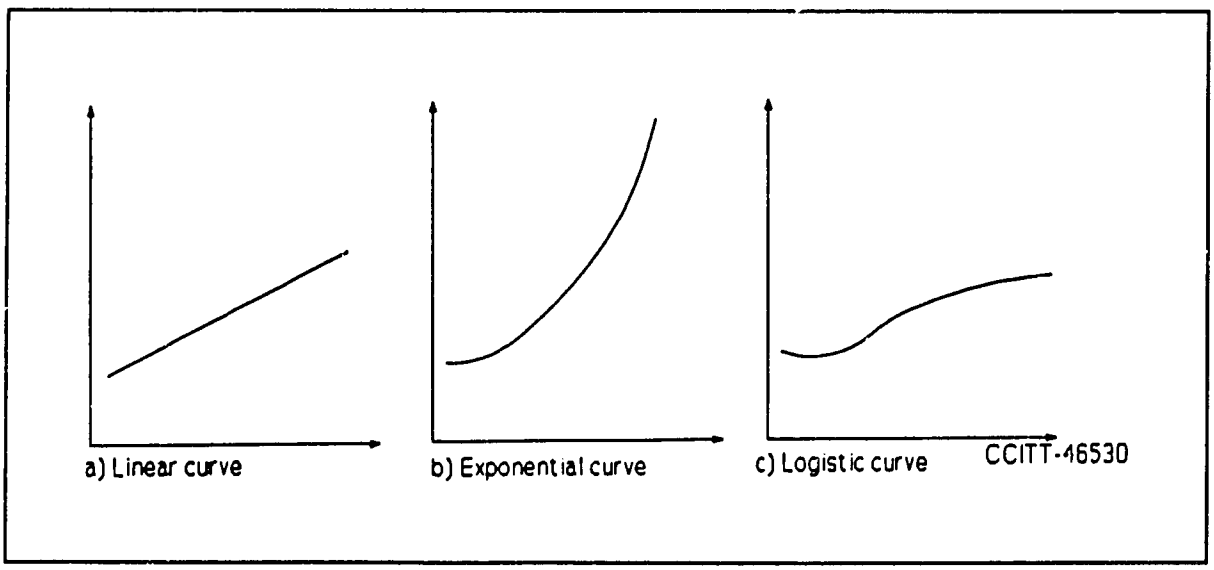

Figure 4: Growth Curves

Econometric Models

An econometric model is a quantitative relationship between a dependent variable and a number of so-called independent variables. The simplest example of the model is the linear relation, in which the dependent variable Yt (which varies with time) is easily calculated from the independent variables xi:

$$Yt = a1\ x1 + a2\ x2 + \ldots an\ xn + b$$

In the models used in practice, the dependent variable Yt, is calculated from the independent variables xi, representing the following measures:

- logarithm;
- annual growth rate;
- annual variation;
- delay operator (value of the variable at a time which is p periods beforehand).

The coefficients, a_i, of the postulated relation are evaluated by comparison with a previous statistical series (regression), which means, of course, that such a series must be available.

The dependent variable is the telephony variable. This may be the received demand for new lines Yt = L + I, or one of its components (new demand,transfer or cancellations), or an equipment penetration ratio (density) given either by segment or as an overall figure.

The independent variables depend on the specific characteristics of each customer segment. For example:

(a) in the case of the professional demand, they depend on:

iii) the level of industrial development;

iv) the level of commercial development;

v) the growth of telephone traffic per station.

(b) in the case of residential demand, they depend on:

i) development of facilities;

ii) individual's purchasing power;

iii) the cost of using the telephone (connection and call charges);

iv) supply conditions (average waiting time for connection, service quality).

Cramer's Model

Cramer's model is a behavioral model linking the probability that an individual has the telephone to the size of his income. It is applied to residential customer segments. It assumes that, for the category in question:

- incomes are distributed according to a log-normal probability density function;

the equipment penetration rate as a function of income is distributed according to a log-normal distribution. (See Figure 5.)

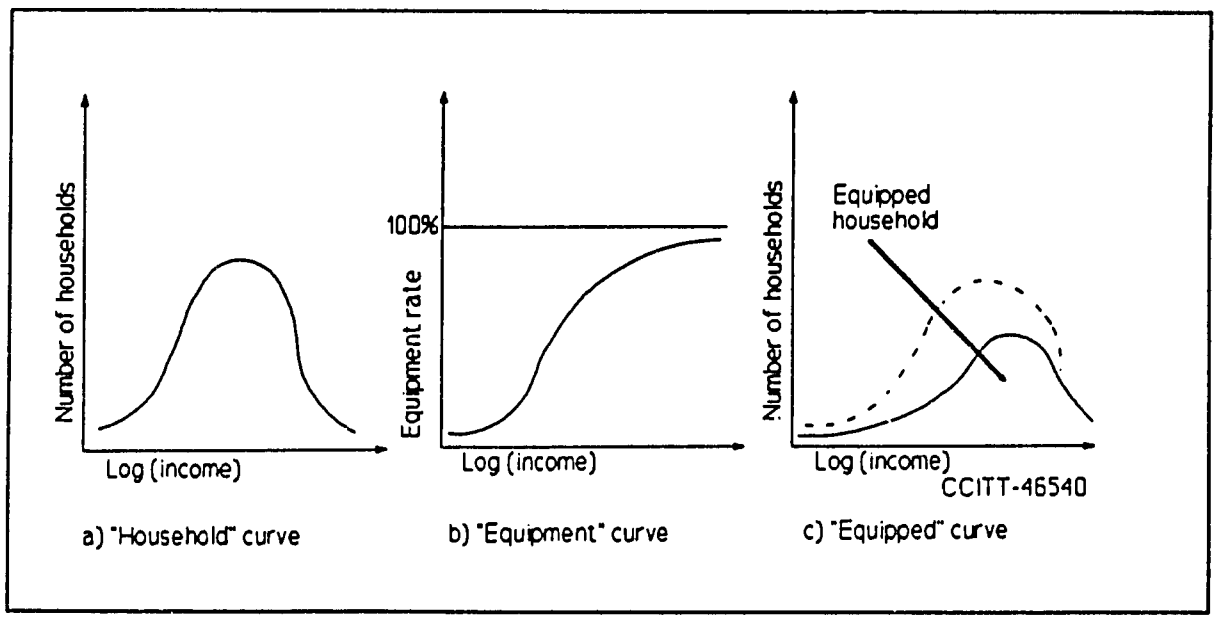

Figure 5: Cramer's Model

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Forecasting Residential Demand

One method of estimating demand for residential DELs is to base the forecast on the projection of future housing construction. The reasoning is quite straightforward -- new housing units, or new households, need telephones. The only factor the forecast of new housing construction must be corrected for is the percentage of households that -- for one reason or another -- would not want telephone service.

Another method, suitably applied when important data for the demand estimation is not available, makes use of the growth curves, determined by a few parameters. According to the base data available in this case, the logistic model was adopted.

The chosen method for forecasting, according to CCITT Recommendations, is to approximate the penetration growth with a curve. The curve which better reflects the three stages of the demand evolution (starting, rapid growth and saturation phase) for telecommunications services, is the logistic curve.

This curve corresponds to the following expression:

$$d = \frac{ds}{1 + a\,e^{-b(t-to)}}$$

Where:

d is the residential penetration.
$\mathbf{d_s}$ is the saturation penetration, value to which the penetration tends when time tends to infinite.
$\mathbf{t_o}$ is the base year (1989).
t is the year in question.
a and **b** are parameters that are determined for each region.

This method of estimating the evolution of the residential potential penetration, suggested by the CCITT, constitutes the essential telephone part of the demand forecasts. The predictions consist of a demographic part as well, that is the expected evolution of the houses. Considerations regarding house planning of formation of new families are not taken into account in this approach.

According to specific criteria mentioned below, a growth curve is determined for each region. These curves constitute the model according to which residential telephone

penetration increases. Once this is multiplied by the number of houses that are estimated for each year in question, we obtain the potential residential demand estimations.

Forecasting Business Demand

To develop forecast for the professional (business) demand, it is necessary, to estimate the potential demand for the base year. To do so, the information available consists of data related to the waiting list, including applications for Business lines and PBX, to the number of current subscribers, and to the number of employees.

The growth pattern for each region, is assumed to be parallel to the global one. Thus, a line between the global penetration ("business" lines/100 inhabitants) for 1989 and the one corresponding to the year 2000 can be determined, for every region. Combining these values with the population forecasts.

RELATIONSHIP OF GDP/GNP TO TELEPHONE DENSITY

Historical Background

Since the early 1960s, data on the relationship between telephone density and GDP/GNP per capita have been used as a tool in projecting telephone demand and supply. Simple statistical methods of correlation and regression have been applied to a number of countries and the results have been surprisingly consistent. Both CCITT and Siemens publish data on this relationship and Figure 6 was extracted from one such publication (1982).

Linkage between indicators of economic development and telephone density, has been demonstrated in at least two studies. In an investigation of thirty industrial and developing countries, conducted in the mid 1960s, the parameters a and **b** of the equation $y = ax + b$ were estimated separately for 1955, 1960, and 1965 via least squares regression. The three equations below are the results of this study:

$$1955 \log d = -3.0932 + 1.444 \log g$$
$$1960 \log d = -3.1171 + 1.432 \log g$$
$$1965 \log d = -3.1329 + 1.405 \log g$$

where log d is the telephone density per 100 population and log g is the GDP per capita. The correlation coefficients **r** for the variables GDP per capita and telephone density were over 0.90 -- indicating a strong association between the two variables.

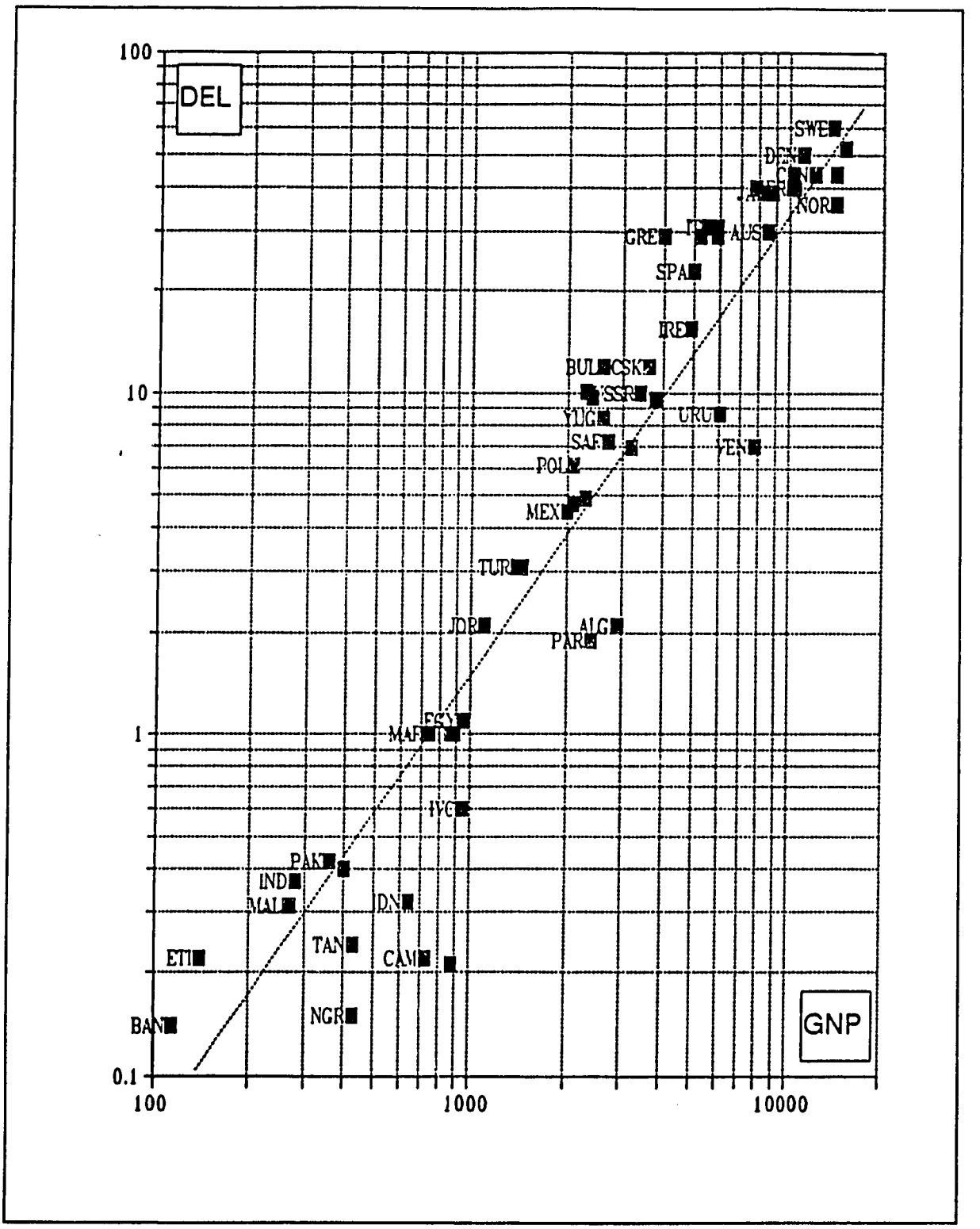

Figure 6: DEL Penetration Vs. GNP per Capita (1982)

In a study based on a similar methodology, researchers in Sweden plotted telephone density against GDP per capita growth in their country. The results obtained were strikingly similar to the results of CCITT studies:

$$1920\text{-}65 \log d = -4.6445 + 1.5476 \log g$$

with the coefficient **r** almost equal to 1 (0.99) -- an almost perfect correlation.

One method for the long-term projection of the telephone potential consists in establishing certain hypotheses concerning national economic development and then referring to the diagram to evaluate the corresponding theoretical telephone density. It may be necessary to correct assumptions about whether the starting point is behind or ahead of the "normal" average. There will need to be a certain willingness on the part of the Administration to develop the network if the difference between the real and theoretical levels of equipment is not to increase.

ANNEX 1.4

TELECOMMUNICATIONS SECTOR SCOPING STUDY FOR SOUTHERN AFRICA - PHASE ONE

SECTION 1

DATA GATHERING VISITS

DATA GATHERING VISITS:

The Phase One study started on May 28, 1992 with Task 1. The initial tasks, 1-1 and 1-2, were essentially data gathering tasks consisting of the obtaining of as much information on the SADC countries as possible from sources in the U.S., Washington, DC and NYC, and in field trips to Geneva and key countries in the SADC Region. The data gathered from these various sources was summarized and analyzed to obtain the best possible view of current demand and current supply in telecommunications services in key SADC countries, segregated by voice, data and video, rural and urban, and domestic, regional and international wherever possible (Task 1-1). Similarly, projected demand and supply were developed for the year 2000 in the same categories. This data is summarized and analyzed in Subtask 1-3.

In support of the Southern Africa Telecommunications Scoping Mission, Eduardo Paz and Richardson J. Franklin of Teleconsult visited three SATCC member countries, Mozambique, Zambia and Zimbabwe. The team also visited South Africa. The visits took place between June 15 and July 3, 1992 and are highlighted in the following paragraphs.

ZIMBABWE

Meetings were held with Mr. Donald E. Greenberg at the USAID mission in Harare. The purpose of the meeting was to provide briefing for the Teleconsult Team, further discuss the role of USAID in the region, and to offer any assistance which would facilitate the gathering of the data required for the mission.

The Team also met with Margo Ellis, USAID Program Manager - Harare, who presented a brief overview of the funding plan for the Southern Africa Regional Program which at present has no money ear-marked for telecommunications through FY 1992. However, in view of the recognition of the paramount role which telecommunications plays on the economic and social development of countries, projections indicate that funding for telecommunications projects could be provided as early as FY 1993. The amount which could be allocated to the telecommunications sector has not been specified although preliminary estimates are in the order of $2 million for FY 1993 and $3 million for FY 1994 out of a budget of $50 million for each year.

Further meetings were also held with: Charlie Schiebel, Engineer, who gave an overview of the technical problems hampering the further development of telecommunications in the region; and Mr. Steve Spielman, Deputy Director, who expressed his concerns about the mission and outlined the schedule for the mission and submittal of timely and informative reports to USAID.

The Team also had the opportunity to meet briefly with Stephen J. Brushett, Senior Operations Officer, World Bank Mission in Zimbabwe, who provided a general overview on the current relationship between the Posts and Telecommunications Corporation (PTC) and the Ministry of Posts and Telecommunications. He also indicated that the World Bank was in the process of providing consultations on the Restructuring of the PTC.

Next, the team met with Mr. D.F. Dandato, Senior Deputy Post Master General - Telecommunications of the PTC. Mr. Dandato provided a technical view of the development and the role of the telecommunications sector in Zimbabwe, and indicated the extensive investment which would be required for the modernization and digitalization of the telecom network. Insight was also given into the possible scenarios involving the restructuring of the telecommunications network and how the system may absorb private participation. The willingness of the PTC to accept private investment (local and foreign) in value added services such as data networks and cellular was expressed. However, it was noted that, for the foreseeable future, the Public Switch Telephone Network (PSTN) and the International traffic service will remain under the direct ownership of the PTC.

The Data Collection Sheets were reviewed with Mr. Dandato and, as promised by Mr. Dandato, the completed sheets were subsequently faxed to Teleconsult's home office.

The team also had an opportunity to visit Mrs. Sarah L. Kachingwe, Permanent Secretary in the Ministry of Posts and Telecommunications. Mrs. Kachingwe expressed the willingness of the government to endorse restructuring of the PTC provided that the appropriate regulatory framework is in place. She foresaw the eventual involvement of the private sector (local and foreign) as investors in a newly restructured PTC.

Mrs. Kachingwe also expressed her concern and desire for the provision of universal telecommunication service in Zimbabwe. However, the high infrastructure cost of providing rural service has been recognized. The government will have to face the issue of cross-subsidization, which is not viewed favorably by investors due to the high cost and low return commonly associated with providing rural services.

MOZAMBIQUE

The team met with Mr. Gerard L. Mutti and Mr. Tayoub, both telecommunications experts for The Southern African Transport and Communications Committee (SATCC) headquartered in Maputo. The SATCC program was discussed in great detail as were the problems - drought, low investment, poor maintenance and the physical deterioration on many of the regional telecommunications infrastructures, technical and management training, and the lack of equipment standardization in the sub-region - facing the

development of telecommunications in the region. The briefings indicated that the PANAFTEL microwave network extending throughout the SATCC region and into the Preferential Trade Area (PTA) is just about complete with SATCC save for a corridor between Zimbabwe and Mozambique which is being affected by the adverse military situation in Mozambique and other minor connections.

The opportunity for the SATCC member countries to realize savings in the procurement of equipment and services through volume discounts and pooling was discussed and is being developed as a possible strategy within SATCC in the future. The SATCC members also indicated their hopes that the membership within SATCC and eventually the PTA will become more harmonized and inter-connectivity problems will be further reduced.

The visit to the SATCC headquarters allowed the Team to get a first-hand look at the vital role which this office is playing in the development of telecommunications in the region. However, it was learned that the funding for the telecommunications Director, which was funded by the Canadians, will not be extended beyond September 1992.

Meetings were also held with the officials from Telecomunicaçôes de Moçambique (TDM), who pointed out that the telecommunications network through Mozambique has been adversely affected by the guerilla insurgency. With this situation, providing telecommunications services to rural areas and villages is precarious at best. However, despite the hardships, TDM continues its program to modernize and digitalize the telecommunications network. The first phase of the digitalization program began in 1989, today there are 25 digital exchanges throughout the country with 10 digital exchanges being located in Maputo.

The insurgency problem has forced TDM to rely on a limited capacity DOMSAT network for a sizable amount of intra-country telephone services. To alleviate this problem present TDM plans call for a submarine fiber-optic cable running along the coastline and connecting the major cities, north of Maputo, along the route. This cable will eventually link with a cable to Djibouti. This fiber cable route is of major interest to TDM.

As may be expected, given the present condition on the ground, the adverse effects of the drought, and general disruption of civilian life, TDM's bill collection has suffered tremendously outside the Maputo area. It is hoped that once a treaty is signed the revenue "drain" will be sealed and a greater amount of revenue will be collected.

Another problem facing TDM is the shortage of trained technical people, namely engineers, technicians and managers. The recently completed $12 million Training Facility, donated by the Italians, should improve the technical expertise. However, there is a need which may be best met by an International Agency such as USAID for the provision of scholarships

and/or fellowships to TDM personnel to accredited engineering, accounting, finance and business management baccalaureate programs in the United States.

TDM has also recognized the value of the subscriber, and the need to provide the subscriber with reliable and quality service. In support of this effort a Customer Service Center has been established to be responsive to customer complaints and ensure customer satisfaction.

The management personnel from TDM did not foresee any problems with a restructured entity in which private participation in the different divisions of the company was possible. Once the appropriate regulatory structures were in place, private participation could be in the form of joint-ventures or possibly direct purchases of equity.

The Team also discussed the Data Collection Sheets with technical personnel from TDM and the completed sheets were subsequently faxed to Teleconsult's home office.

A meeting with USAID officials in Maputo; Timothy Born, Regional Railways Project Coordinator; Cheryl McCarthy, Program Officer; and Lucy Tamlyn, Second Se^Avestor in a cellular network. Mr. Musonda indicated that the Board was not against the idea of a joint-venture between a local and international group with the possibility of the PTC as an investor. Also with the new Privatization Law, competition will be allowed. It was felt by the PTC that a cellular Network could help in alleviating the shortage of telephone services to rural areas.

In recognition of the important role which telecommunications plays in a country's economic development. The PTC is focusing its energy into the provision of telephone services for the mining, agricultural, and tourism business sectors. These three sectors are pivotal to Zambia's economy, and are in-turn dependent on reliable and quality telephone services. the PTC would like to expand the network so that social services health and education could be enhanced in the rural and outlying areas.

GENEVA, SWITZERLAND

Mr. Mark Burke of Teleconsult visited the ITU in Geneva and obtained a number of documents pertaining to the telecommunications sector in Southern Africa. Many of these documents contained supply and demand data that was useful in testing the reasonableness of the data obtained from the various countries.

TELECOMMUNICATIONS SECTOR SCOPING STUDY FOR SOUTHERN AFRICA - PHASE ONE

SECTION II

TELECOMMUNICATIONS IMPACT ON ECONOMIC DEVELOPMENT IN SOUTHERN AFRICA

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SECTION II

TELECOMMUNICATIONS IMPACT ON ECONOMIC DEVELOPMENT IN SOUTHERN AFRICA

2.1 INTRODUCTION AND OVERVIEW

The world is rapidly moving toward an economic system based on the continuous and ubiquitous availability of information. Recent advances in telecommunications technology have been an important vehicle in permitting information exchange to develop as a valuable commodity. Countries and sectors equipped with the requisite telecommunications systems have been rapidly moving into post-industrial, information-based economy growth. For the developing world, a modern telecommunications infrastructure is not only essential for domestic economic growth, but a prerequisite for participation in increasingly competitive world markets and for attracting new investments. In the advanced industrial countries of Europe and North America, universal telecommunications services have penetrated every sector of society. In many developing countries the limited availability of service is constraining economic growth. This is particularly true of the SADC countries and the RSA, a region containing both the lowest level of telecommunications density and economic development in the world.

Economic development policies in the industrial countries increasingly include telecommunications as an essential component of the economic infrastructure.[1] This realization has been initiated by industry's demand for advanced telecommunications services for competitive reasons. The lesser developed countries have begun to recognize that inadequate telecommunications services will be a disincentive to new investment and place existing industry at a competitive disadvantage. This is valid for a range of activities including: improved farm production, animal husbandry, export marketing for the mining industry, bank transfers and tourist arrangements, all vital sectors of the SADC and RSA.

The primary economic benefit of improved telecommunications is improved efficiencies in other productive sectors. Over 80 percent of the telephones in the lesser developed countries are connected to businesses or to government agencies. Few domestic businesses and no international activities could operate competitively without modern telecommunications. The primary benefits include reduced transport costs, reduced transaction costs, improved marketing information and increased efficiency of industrial production. In all economic sectors, agriculture, manufacturing and services, advanced telecommunications systems are

[1] NTIA, 1991; Schmandt *et al*, 1988

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becoming an integral part of business operations. The lesser developed countries must accelerate their application of telecommunications technology or fall further behind in economic competitiveness.

This section provides a review of the methodology, models and data requirements utilized in similar studies on the relationship between economic development and telecommunications in other regions of the world. Economic techniques make possible a more precise definition of the relationship between telecommunications and economic development by using both quantitative and qualitative indicators to analyze the impact of equipment cost, calling price, tariff levels, and other factors. The available procedures are reviewed to determine their potential applications to the SADC and RSA, and suggest the most appropriate methodology for further analysis of the region.

The study critiques and analyzes data on telecommunications services in the SADC and RSA; and estimates the evidence for, and consequences of, the inadequacy of these services. The object is to provide an overview of the current and projected shortfall in telecommunications in SADC and RSA and its effects on the economy. The report conducts a comparative analysis of telecommunications indicators, such as penetration, (number of direct exchange lines (DELs) per capita). It also examines the prices and revenues of telephone service in the SADC countries, and engages in some comparative analysis of the costs of providing service. The report attempts to estimate the economic cost of mismanagement of telecommunications, by examining the impact of rate structure, international settlements losses, and lost value added of "normal" telecommunications infrastructure. The level of investment needed to bring the country's telecommunications structure to a level comparable to or better than countries of similar economic size and structure will be estimated.

2.2 LITERATURE REVIEW OF THE RELATIONSHIP OF TELECOMMUNICATIONS AND DEVELOPMENT

Governments and public agencies in most countries, both developed and less developed, spend large sums of money on infrastructure. The purpose of infrastructure investment is to positively influence economic activity in terms of employment, value added, productivity, capital formation and income. Infrastructure investment also may help with the social and political integration of a region.

Investments in physical infrastructure generally fall into four broad categories: utilities; communications; transportation and land development. These can be desegregated into a number of subcategories:[2]

Utility Investments
- Water Supply
- Electricity Supply
- Natural Gas Supply
- Sewage Disposal
- Garbage Collection

Communications Investment
- Telephone Services
- Postal Services
- Cable Services

Transportation Investment
- Roads
- Railways
- Airports
- Ports and Shipping Canals

Land Development:
- Drainage Improvement
- Flood Control
- Irrigation
- Pest Control
- Erosion Control

Most of these investments have certain characteristic in common. They tend to have some attributes of public goods in that they require a high initial investment with a relatively low marginal cost once the investment is in place. The provision of service from these industries also provides benefits to a large percentage of businesses and households of a region and typically has some form of external economies.

Most infrastructure investment can positively affect the economy in three ways. First, it can reduce the cost of production. Second, it can increase revenues. Third, it can increase employment through both direct and indirect effects.

Most analysts show a positive correlation between infrastructure investment and economic development.[3] Three different methods ordinarily are used to estimate the effect of infrastructure investment on economic development: production functions; factor

[2] Diewert, pp. 1-2. Also see, Bruinsma, in Peschel (ed,), pp. 212-214. This should be viewed as a representative not a definitive list. In addition to quibbling over the specifics of the definition of physical infrastructure, some analysts would include such items as investment in human infrastructure, the legal system and the education system.

[3] For examples see Aschauer, pp. 177-200; Bruinsma, *et al*, in Peschel; Nicholas, in Peschel; Tyler in Polishuk and (eds); Mills, and Carlino. These are a sample of many studies showing greater and lesser positive economic effects of infrastructure investment.

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movements; and trade flows.[4] Sometimes the results are expressed in term of a benefit/cost ratio.

The idea that infrastructure investment is correlated with economic development is appealing and intuitive. To imagine an economically developed country without a substantial infrastructure is difficult. However, to state a precise relationship between the two is difficult. For example, Nicholas Balabkins points out that investment in infrastructure must occur before what economists call final demand.[5] Final demand refers to the output of goods and services to the end user. Others, such as Hirshman, state that development may cause the investment in infrastructure.[6] Another example is provided in a study by Robert Ford and Pierre Poret. They examined the relationship of decreases in total factor productivity to changes in the level of infrastructure investment for 11 countries. They found that in half the countries investment in infrastructure increased and in half it decreased while total factor productivity decreased in all countries.[7]

Although these, and other studies, are seemingly contradictory, they indicate that the relationship between infrastructure investment and economic development is complex.

A number of researchers point out that infrastructure by itself is not a sufficient condition for economic growth. Other factors include sufficient legal, regulatory, constitutional and commercial conditions for development. Infrastructure supports and stimulates economic activity where the environment allows such activity. Restrictive policies concerning private property, taxation, labor relations and foreign trade and currency exchanges can inhibit the effect of infrastructure investment upon economic development. Conversely, insufficient infrastructure development will prevent economic activity where appropriate legal and regulatory structures exist.

Two other factors complicate the relationship between infrastructure and growth. First, there may be decreasing returns to infrastructure investment. The contribution of infrastructure to growth may depend more upon the targeting of the investment than an increase in the ubiquity of the investment. For example, the addition of a traffic lane to the roads of a country with a highly developed highway system will have less of an effect than building roads in a region that does not have any.

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[4] Bruinsma, *op. cit.*, pp. 215-216

[5] Balabkins, p.110.

[6] Bruinsma, p.224.

[7] Ford and Poret.

Second, the ability of infrastructure to exert a strong influence on economic development requires that the infrastructure investment be maintained once it is in place. A road that deteriorates to the point where it is difficult to traverse does not exert as much economic stimulus as one in good repair that can be traveled easily and does not cause excessive maintenance on cars and trucks. Nicholas Balabkins attributed the inadequacy of Nigeria's economic development in large part to its inadequate electric power system. He states that as a strategic input to economic development, electric power supply my be regular and must increase with demand from industry and agriculture.[8]

Telephone service is a sub-category of infrastructure investment. The previous discussion of the relationship between infrastructure investment and economic development generally applies to telephone service as a sub-category of infrastructure investment. Some developing countries invest as much as 0.61 percent of their gross domestic product (GDP) in telecommunications. In the 1970's the average was 0.25 percent (developed countries average 0.8 percent of GDP during the same period). Based on world norms one group studying the issue suggested that developing countries invest not less than 0.5 percent of GDP in telecommunications infrastructure in order to sustain the infrastructures support of GDP.[9]

Investment in telecommunications presents its own set of conditions. Because of the nature of telecommunications services and the benefits derived from them, measuring the benefits or placing economic values on the benefits is more difficult with telecommunications investments than other infrastructure investments.

Telecommunications is both a cause and consequence of economic development. This creates problems in precisely defining its contribution to the development process. The benefits of expanding telecommunications in a developing country appear in varying levels. These benefits could include: a rural farmer using a telephone call to replace a time consuming trip to the village; a medical provider able to request urgent supplies; a farmer ordering replacement parts for a damaged irrigation water pump; or directing handiwork products to market by the best transport facility. Since these indirect benefits can not be quantified, they are not included in normal cost/benefit evaluations, resulting in an under-investment in telecommunications systems in developing countries.

Telecommunications investments affects economic development in the same general way as other infrastructure investment. It can reduce the cost of production. It can increase revenues. Finally, it can increase employment through both direct and indirect effects.

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[8] Balankis, p.111.

[9] Dickenson, p.75.

Telecommunications, however, will affect revenues and cost in more indirect ways than many other types of infrastructure investment. The reason is that many of the benefits of increased telephone service are derived from increases in information and knowledge. For example, industrial development requires cooperation and coordination of a series of operations. Increases in information and knowledge result in more efficient cooperation and coordination. Commerce is essentially an information processing activity. Effective buying, selling and brokerage rely on access to current information on the availability and price of goods and services. Telecommunications increases the available information thereby, increasing the efficiency of commercial activity.

This section reviews several studies which analyze the relationship between economic growth and telecommunications. In keeping with the basic methodological distinction introduced above, the reviews are divided into macroeconomic and microeconomic studies. (Many other studies not discussed or summarized in the text are listed in the bibliography.)

2.2.1 Macroeconomic Studies

Macroeconomic approaches take two forms. One is the study of broad statistical correlations between telecommunications and other economical indicators. The other is Input-Output (I-O) analysis.

One indication of the benefits of telecommunications investment is the strong correlation between telecommunications development and overall economic development. A long series of studies, initiated first by Jipp (1963), demonstrated the positive relationship between measures of GNP or GDP per capita and telephone density indicators, including DEL or lines per 100 inhabitants. The data for all countries, from the least developed to the most industrialized, generally fall within a small band along a straight line on a logarithmic chart. The telephone density is assumed to be related to GDP per capita by the following relationship:[10]

$$D_{i,t} = \alpha Y^{\beta}_{i,t} \text{ or}$$

$$\log D_{i,t} = \alpha + \beta \log Y_{i,t}$$

Di,t_1 is the telephone density in DELs/100 and $Y_{i,t}$ is the GDP per capita for the country i in year t, respectively. Where α is the intercept and β is the slope, an indication of the rate at which telephone density varies relative to GDP. The available time series data since 1955

[10] ITU, May 1988.

suggests that as GDP increases telephone density increases at a faster rate. The basic ITU data for a large number of countries indicated that a consistent pattern emerged:

1955 Log D = -3.093 + 1.444 Log Y
1960 Log D = -3.117 + 1.432 Log Y
1965 Log D = -3.133 + 1.405 Log Y
1978 Log D = -3.726 + 1.351 Log Y
1984 Log D = -3.985 + 1.317 Log Y

The high correlation coefficients obtained [0.91 to 0.96] confirms a strong cross country relationship between the variables. The regression lines have consistent and similar slopes, [parameter β] suggesting that the rate at which telephone density varied with GDP remained relatively constant, with small changes due to higher average income levels, over the time frame examined for the collective countries. A more detailed analysis indicates the rate at which telephone density increases, relative to per capita GDP, is higher among the more developed countries, and lower among the lesser developed countries. The conclusion is that the more developed a country becomes, the faster the telephone service grows, compared to the rest of the economy.

An ITU quantitative study using a macroeconomic cross sectional analysis of 113 countries provided a generic summary which indicated that during the 1973 to 83 period:[11]

1. As economic development proceeds from the $100 to $2,000 per capita level, the shares of economic activity changes sharply from an agriculture to industrial and finally service economy. The agriculture sector declines from 63 percent to 2 percent, Industry grows from 3 percent to 35 percent and services grow from 35 percent to 63 percent. Improved telecommunications are an essential catalyst for this change and an essential ingredient for continued operations.

2. The growth of telephone density (measured in DELs) has increased 1.3 to 1.6 times the growth of GDP, with the less developed countries DEL increasing at the higher rate.

3. The incremental contribution of a telephone to GDP is higher at the lower end of the development spectrum. At the GDP per Capita of $100 per year, an additional telephone line can contribute statistically $12,000 to GDP.

[11] ITU, *op. cit.*, 1988

Several explanations for the correlation between telephone penetration and GDP have been advanced. Telephones can be seen as a stimulant of economic growth; that is, consumption of telephone service actually causes increases in GDP. It is also possible that as economics become more highly developed they need more communications relative to less developed economies. In other words, development makes the economy more "information and communication-intensive," requiring disproportionate increases in telecommunications infrastructure and usage.

Telecommunications can also reduce transactions costs, widening the scope of markets and thereby increasing competition and efficiency. Another interpretation is that the growth in telecommunications is simply a passive consequence of development. The advanced nations have more telephones because they are able to afford them. In this view, telephones are a consumption item like televisions and radios; growth in penetration will only follow, and cannot precede, the attainment of higher levels of wealth.

Recent research addresses this relationship and has come up with some fairly conclusive findings.

A study by Andrew Hardy[12] was one of the first to attempt to test for causality. Hardy analyzed the correlation between GDP and number of telephones per capita using data from 45 countries for the period 1960-1973. Time-lagged offsets of one year were used in order to see whether increases in telephone penetration predicted GDP growth, or whether GDP growth predicted telephone penetration. His study found that "causality" ran in both directions at statistically significant levels. That is, telephone penetration was both a cause and a consequence of GDP growth. Hardy's evidence, however, showed diminishing returns. The size of the effect of telephone penetration was inversely related to the prior level of telephone development. The strongest two-way correlation occurred in the least-developed economies, and the weakest effects occurred in the economies which already had a high level of telephone development.

In another approach to related telephone infrastructure to economic development, one study statistically analyzed the relationship between telephone density and per capita GDP for ten Latin American countries. The study showed a strong correlation between these variables, suggesting a strong relationship between investment in telecommunications infrastructure and economic development. The study, however, pointed out that correlation is not causation. It is possible that the use of telecommunications merely reflects economic growth.[13]

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[12] Hardy, 1980

[13] Tyler, p.94.

A subsequent study by DRI/McGraw-Hill (1991) conducted a more detailed test of the causal relationship between telecommunications and GNP. The study was limited to data from the United States during the years 1958 to 1988. The DRI/McGraw-Hill study departed from earlier research by taking as its relevant variable telecommunications investment rather than telephone penetration levels (DEL). The investment variable was derived from total domestic consumption of telecommunications equipment (SIC code 3661) as reported by the Bureau of Economic Affairs. The use of an "investment" variable is an important difference, because in developed countries such as the U.S.A., changes in telephone penetration are minimal; the telephone has already saturated the consumer market. Furthermore, a significant part of a developed country's telecommunications investment growth is in areas that would not be reflected in telephone penetration statistics (for example, compute networks, intra-office LAN's and PBX's or video conferencing). This may also be true of developing countries. For example, investing in additional trunk lines and central office equipment may make the existing telephone system more efficient and reliable without necessarily increasing penetration. Using investment as a variable is thus a more thorough approach to the study of telecommunications and development.

The DRI/McGraw-Hill study used a two-year lag to offset the two variables. Two standard statistical tests for the direction of causality were used: the Granger test and the modified Sims test.

The results were positive in both directions. The inclusion of GNP or total industrial output variables in a specification for telecommunications improved the prediction for the time process of telecommunications investment. Conversely, the inclusion of telecommunications investment variables in a specification for GNP or output improved the prediction for the time process of GNP or output. The authors conclude that the results "suggest a feedback process in which telecommunications investment enhances economic activity and growth while economic activity and growth stimulated demands for telecommunications infrastructure investment."[14]

The most recent published evidence by Norton (October, 1992) shows that, statistically, telecommunications investments cause growth in the financial sector and, hence, GDP growth.[15] He assumes transactions cost play a significant role in the economy and applies a model developed by Hirshleifer in which the transaction costs are considered explicitly. Based on this model, Norton developed a theoretical framework to estimate telecommunications role in financial markets and growth.

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[14] 1991, p. 533.

[15] Whether telecommunications "cause" growth, however, is a controversial point. See the critique of the DRI/McGraw-Hill study in Appendix C of NTIA and the references cited therein.

In the Results section (below), we examined this relationship with respect to the Southern African countries for which we had sufficient data. This showed that telephone investment is a cause of GDP growth and telephone usage (both proxied by DELs) is driven by GDP growth. The team rejects the notion that telecommunications is the sole driver of GDP, but considers that it is a necessary condition for growth.

Clearly, telecommunications and the economy interact in a complex manner. It is the author's view that, as demonstrated in this document, telecommunications is a powerful driver of development.[16]

2.2.2 Input-Output Analysis

An Input/Output (I/O) model is a method of analysis which represents the economy by a set of linear production functions describing the relationship between all sectors. The output of each sector is equal to the amount of inputs in that sector which must be consumed by all other sectors. An I/O matrix lays out, for each industry sector, the amount of final demand and the amount consumed in the production of all other sectors.

Telecommunications is an input to every other industry in the economy. As inputs to production processes, telecommunications has different impact on different productive sectors. Exhibit 2-10 shows how much of the total output of the telecommunications industry is consumed by each of the other major sectors of the economy.

Exhibit 2-1
Telecommunications Output Distribution (Percent Total Sales)

Output sector	Japan	Colombia	Korea	Philip's	USA
Agriculture	00.3	01.8	00.3	02.7	00.4
Mining/Mfg.	34.8	17.8	18.2	48.5	21.5
Services	47.4	51.6	49.9	16.6	68.2
Household	12.4	28.8	30.1	32.2	09.6

Exhibit 2-1 shows that the agricultural sector makes up the lowest percentage of total telecommunications output in representative countries.

[16] See Leff, 1984, for telecommunications role in transaction cost reduction.

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In a report commissioned by BellCore, DRI/McGraw-Hill (1991) used input-output modeling to measure efficiency gains attributable to telecommunications. The study used data from the U.S. during the period 1962-1983. It showed that telecommunications represents a fairly small portion of a business's total inputs (an average of 3 percent) but it nevertheless results in large efficiency gains. DRI/McGraw-Hill's calculations show that the 1982 U.S. economy experienced $34.8 billion in net savings due to other industries' substitution of telecommunications for other inputs. The report also measured $46.5 billion in resource savings due to increased efficiency in the supply of telecommunications service and equipment.

The largest efficiency gains were in telecommunications-intensive service industries such as wholesale and retail trade, miscellaneous and personal services, finance and insurance. The average industry increased its telecommunications consumption by 167 percent between 1962 and 1983. The service sector accounted for 75 percent of the increase in consumption.

Several existing input/output models indicate the level of impact of telecommunications on every other productive sector of the economy, and conversely the impact of each sector on telecommunications. However, the level of discreet data required for an I-O model is substantial, and only advanced developing countries contain a database sufficiently segmented to use the input-output model approach. The data available for the SADC and RSA does not permit an I-O approach to economic impact analysis.

2.2.3 Microeconomic Studies.

The U.S. National Telecommunications and Information Administration (NTIA) recently sponsored a major proceeding on telecommunications infrastructure.[17] The relationship between telecommunications and economic development, particularly in rural regions, was a major concern of this report. After reviewing hundreds of submissions regarding case studies as well as a broad survey of the relevant academic literature, the NTIA concluded:

> "The availability of adequate, reliable telecommunications facilities can facilitate economic development [but]...telecommunications does not obviate the importance of a well-educated, hard working labor force, reasonable tax rates, affordable real estate and other factors."

NTIA argues for "an integrated approach" in which telecommunications policy is used in conjunction with other tools. The NTIA report cites a study of infrastructure investments

[17] NTIA, 1991.

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in Mexico which concludes that "if infrastructure investments, labor market planning and educational planning are unconnected, they are likely to yield conflicting or undesirable results."[18]

Parker *et al* (1992) conducted a statistical test of the impact of technology upgrades on economic development. Their study of the states of Washington and Oregon in the United States tested the hypothesis whether counties with a more modern telecommunications infrastructure have better economic performance than counties with poorer telecommunications infrastructure, after controlling for differences in population density. His two measures of the quality of telecommunications infrastructure were:

1. The extent to which multiparty telephone service was replaced by single-party service.

2. The extent to which electromechanical switches were replaced with electronic switches.

Economic performance was measured using unemployment rates and per capita income.

Parker's analysis sets out several reasons why a less modern telecommunications infrastructure is likely to discourage business activity. Multiparty telephone lines do not provide the privacy necessary for business transactions and are frequently unavailable for incoming and outgoing calls. Single party lines are of better technical quality and most importantly, permit data and facsimile transmissions. Electronic switching is economically advantageous because (at least in the American context) it is more reliable, reduces the time for call set up and makes possible a variety of advanced information and transaction processing features which can make businesses more efficient.

The results of Parker's study were mixed. In one state, single party lines had no significant correlation with the economic indicators, whereas in the other state it did. The results for the presence of electronic switching also were not consistent in the two states. Taken together, Parker's two measures of telecommunications infrastructure explain 12-20 percent of the variance in economic performance. This relationship, while less than dramatic, is statistically significant at the five percent level. One reason for the limited nature of Parker's results was the small sample size of counties with non-electronic switches and large numbers of multiparty lines.

[18] Looney and Frederickson, 1981.

A study of telecommunication investment in Kenya identified nine mechanisms through which efficiency of business firms could be improved through more extensive telecommunications services. These are presented below:[19]

1. Increased telecommunications services allow better access to markets which results in increased sales. The cost of production was estimated to increase at the same time as output increased. However, the increase in costs generally is offset by revenue gains due partly to better capacity utilization and the realization of scale economies. The study, encompassing nine companies, estimated that profits increased on average by 2.8 percent of gross revenues.

2. In three of the nine companies, sales price is estimated to increase as a result of improved communications with customers.

3. Access to good telephone service allowed three firms to reduce the cost of selected inputs. It allowed greater search and information capabilities that were translated into lower cost of production.

4. Increased communications reduced the need to hold larger than otherwise necessary inventories of raw materials, semi-finished goods, fuel and spare parts. Although compared to total business turnover, the gains were small but worthwhile.

5. Four of the nine firms experienced significant savings in vehicle use. They were able to dispatch and organize movements between locations more efficiently and were able to more effectively deal with breakdowns.

6. Larger firms were believed to have reduced idle time because of a machine breakdown, parts shortage, raw material deficiency, etc. Continuous manufacturing processes were found by the study to be particularly susceptible to machine breakdown. Better telephone service provided better access to skilled engineers as well as spare parts with attendant savings.

7. A particular cost problem across a wide range of businesses in Kenya is the scheduling of deliveries to geographically remote customers. Telecommunications deficiencies increased the costs of distributing products

[19] International Telecommunications Union, 1983.

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to and from firms. This problem leads to diminished of the delivery capacity in manufacturing firms.

8. The deficiencies in telephone service caused labor in the form of messengers, drivers and related categories of personnel to be used as a substitute for telephone service. Even though wage levels for unskilled workers is relatively low, the cost is about 1 percent of gross business revenue.

9. Management is a valuable and scarce resource. Where management requires outside information, it lost 1 to 1.5 hours per day due to inadequacies in telephone service. The study estimated that this coupled with other time wastage due to inadequate telephone service cost the average business between 0.2 percent and 0.5 percent of its gross revenues.

The average savings for the nine firms in the study attributable to better telephone service was five percent of gross revenues.

The trade-off between telecommunications and transportation may yield substantial benefits in certain situations. Michael Taylor *et al.* examined the relationship of telecommunications use to energy consumption, particularly for oil importing, developing countries. He suggested that development of telecommunications systems could be used as an instrument to reduce vehicle mileage. He estimated that such a strategy could save oil importing developing countries about $18 billion per year in oil import costs.[20]

Heather Hudson examined the use of telecommunications in Alaska to link village health aids to hospitals for consultation, supervision, administration and training. The total annual system cost for the medical network was $875,100. It connected 75 villages to 10 hospitals. Telephone consultations with a doctor made it possible to treat patients in the village rather than transferring them to a hospital. Hudson estimated that such consultations saved a minimum of $500 per patient.[21]

Improved telecommunications service can be instrumental in providing more efficient administration and reducing administrative costs. C.R. Dickenson states that telecommunications are essential to effective administration and maintenance of public safety and security. They provide warning and information in times of national disaster. They are essential in the operation of health and other social services where semi-trained

[20] Tyler *et al.*

[21] Hudson. 1982.

staff often need to obtain advice and assistance. Even though these benefits are difficult to quantify, they are necessary for economic development, social and political integration.[22]

Some economists have suggested a consumers surplus approach to measuring the economic impact of telephone infrastructure investment. One such effort was a case study of the benefits of telecommunications in India. The study focused on rural telephone service. A large sample of village telephone users were interviewed about the purpose and urgency of their last long distance telephone call. Using data from respondents about the destination, the study estimated the consumer surplus of these calls. Consumer surplus in this case was measured as the potential benefit represented by the difference between the cost of the call and the total cost of traveling personally to convey the message. The consumer surplus ranged from 5.16 rupees for calls up to 20 kilometers to 30.25 rupees for calls over 100 kilometers.[23]

Another common approach is to use a benefit/cost ratio to estimate the contribution of telephone service to the economy.

One such analysis in Egypt attempting to measure benefit cost ratios also focused on the village and individual level. In this study, the benefits from telephone usage were divided into four major components:

1. The difference between the cost of a telephone call and the cost of an alternative means of communication,

2. The time saved by using a telephone as measured by the number of working hours saved,

3. An indirect measurement of monetary losses avoided in emergencies as a result of the use of telephone service, and

4. An indirect benefit using wages of operators to measure increases in the efficiency of capital and capital equipment.

The benefit/cost ratios for the villages in the study averaged 185 to 1. It was 69 to 1 for the trade sector; 85 to 1 for the service sector and 126 to 1 for owners of capital equipment.[24]

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[22] Dickenson, p. 75.

[23] Kaul, 1981.

[24] Kamal, 1981.

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The benefit/cost ratio approach was undertaken in studies of the magnitude of benefits obtainable from telecommunications investment in the Philippines and Costa Rica. These studies involved sample sizes of 200 and 300 businesses, respectively. The measurement of benefits essentially was the same as that used in the study or Kenya. Costs were obtained by amortizing the investment requirements of the telephone network over twenty years and adding the cost of operation, maintenance and debt servicing.[25]

The results of the studies showed high benefit/cost ratios for business users. In the Philippines, the benefit/cost ratios ranged from 20 to 1 to 25 to 1 for business users. In Costa Rica, the benefit/cost ratio was 48 to 1 for business users.

The Costa Rican study also undertook to measure the benefit/cost ratio for residential users. At 5 to 1, it was significantly less than for business users but the study claimed it was amply high to justify the investment made. Of particular note, the benefits exceeded costs for all social classes including unskilled labor. The study implied that residential telephone service could increase commercial activity in the home, thereby increasing the benefits to residential users.

One final and seemingly important conclusion of the study relating to business use is that the absence of telephone service made the establishment of modern business with more than 50 employees impossible.

2.2.4 Country Studies

As part of the literature search, several representative country studies were surveyed for assessing the economic impact and characteristics of telecommunications investment. Summaries of the findings of these studies indicate great impact of telecommunications on major economic indicators.

Egypt

A benefit/cost analysis is utilized to determine if the benefit of providing telecommunications service exceeds the cost. The minimum benefit for a user is the cost of using the service. In most cases the benefits far exceed the cost, and the excess amount is defined as the consumer surplus. The normal approach is to define the tariff rate charged to the user as the cost. A study used cost figures based on the tariff rate to examine the

[25] Jonsher, 1986.

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economic benefits of availability of telephone service in 146 villages in Egypt.[26] The average tariff cost of providing telephone services was $ 38 per year and the benefit was determined at $3,300 per year. The resulting benefit/cost ratio of 3300:38 or 90:1 [indicating that the benefits are 90 times greater than the cost of providing the service] appears impressive, but may not reflect the actual cost. Several independent sources indicate that the direct and indirect cost of providing telecommunications services to remote villages, including financing and depreciation, is closer to $1600 producing a cost/benefit ratio of 3300:1600 or closer to 2:1 Since the benefits appear to be twice the cost, this is a less dramatic but still positive investment.

Yemen

A number of studies have been developed to analyze the benefits of telecommunications to the transportation sector of developing countries. The improvement in the reliability and efficiency of the transport system is a major aim of most countries. A methodology to quantify the effects of the availability of telecommunications on transportation was developed by the ITU for Yemen.[27] This study considered the direct benefits obtained from the use of telecommunications and the losses incurred from the lack of available transport. It was found that the costs of transporting goods can be substantially reduced by effective telecommunications. Reduction of transport costs due to delays caused by mechanical failure or breakdowns of vehicles, or by loses of perishable goods, were in the ratio of 8:1 [each dollar of telecommunications added, reduced transport costs by $8]. The installation cost of the telecommunication system was estimated to be about 10 percent of the expected transportation savings per year. The operating expenses of the telecommunication equipment are about 1% of the annual benefits.

Vanatu

A study to assess the socio-economic benefits of expanded rural telecommunications for Vanatu was produced by the ITU [28]. Based on a survey of small business and households on different islands, the study concluded that increased rural telecommunications would produce:

- Increased business productivity;

[26] Kamal, 1983.

[27] ITU, March 1988.

[28] ITU, August, 1988.

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- Increased agriculture production;
- Improved administrative efficiency in government;
- Travel and time savings by substituting telecommunications;
- Increased social well being of telecommunications users.

Development economists have observed, numerous examples indicating the direct relationship of improved telecommunications on the economic growth of a country. The following examples are indicative of the positive relationship between improved telecommunications and economic growth.[29]

a. The introduction of telephone service into the rural agriculture villages of Chichicastenango, in Guatemala allowed small farmers to obtain information on the current prices of fruits and vegetables in Guatemala City, the main market, and at Puerto Barios, the main export point. The more current information allowed the farmers to increase the price charged for their agriculture produce by 50% in Guatemala City and 75% in Puerto Barios. They were also able to negotiate with several exporters simultaneously for the highest price for their products. Prior to obtaining telephones the farmers only provided products to one exporter at a fixed price.

b. A chicken farmer in Bacuramonga, Colombia was able to arrange direct delivery of eggs and chickens to residential and commercial markets outside his local area after the introduction of telephones. He was able to respond on a daily basis to changing market requirements and arrange direct delivery of a perishable product.

c. The program to extend the banking system in rural Costa Rica included expanded telephone service. This permitted rural farmers to more effectively determine the market price for their products at several locations, instead of depending on only one local market, or trucker. They were also able to purchase fertilizer and other goods at lower prices from competing markets.

d. The installation of solar powered roadside telephone service in Egypt permitted truckers to call for emergency repairs, or replacement vehicles, which would be of critical importance for vehicles containing perishable commodities under the hot desert sun.

e. In El Salvador, the Interior Minister required daily information from the major cities and provinces. Due to the inadequate and damaged telephone service, a weekly trip

[29] Saunders, Warford and Wellenius, 1983.

by 42 Interior employees to San Salvador, the capitol city, was required. When the telephone service was repaired to the rural areas, many time consuming and dangerous trips were eliminated.

f. In San Pedro Sula, Honduras, exporters are able to arrange deliveries of bananas to the docks to meet the arrival of cargo ships. This limits the exposure time for the highly perishable commodity and increases the productive output of the farmers.

g. In Puentarenas, Costa Rica, a new international tourist hotel opened before adequate telephone connections were installed. The hotel had an excellent beach and other resort facilities. However, the hotel had a low occupancy rate since most travelers required access to continuous telephone communications to the outside world, for business or personnel needs. The unexpected delay caused the initial hotel developers to sell the hotel at a loss. The new owners were able to obtain world class telephone service and the hotel is now operating at maximum capacity during the peak season, and at 60% capacity in off peak periods, with a strong business clientele.

2.2.5 Electrification

Electrification is considered by many to be a necessary tool for economic development. The relationship between economic development or income and the supply of energy is almost considered to be self-evident. Even so, this relationship has been the subject of large number of studies in both developed and developing countries. As is the case with telecommunications, these studies can be classified as macroeconomic and microeconomic in nature. Both will be presented here. The studies discussed are only a small sample of the studies that have been performed but they are generally representative in kind and in results.

Most macroeconomic studies hypothesize that gross national product and gross domestic product or income is a function of energy supply or energy consumption. One early study by Fremont Felix examined the relationship between national income per capita and total commercial energy consumption for 153 countries existing in 1961. Using simple regression analysis, he showed a strong correlation between these variables.[30]

A study by Darmstadter *et al.* a few years later looked at the correlation between energy consumption and national income using both time series and cross-sectional data. They used per capita GNP and total commercial energy consumption per capita as variables.

[30] Felix, pp. 81-102.

They found that the relationship between GNP and energy consumption held both in both cross-sectional and historical analysis. The higher a nation's output on the international scale, the higher, in general, its level of energy consumption. Also, GNP rises in direct but not necessarily proportionate relation with energy consumption over time.[31]

R. J. Pachauri shows a simple correlative relationship between gross national product per capital and per capita energy consumption for 36 countries in various stages of development. He also presents additional data on per capita GNP and energy consumption for selected developed and developing countries. These data compare the total energy supplied by fuel wood to GNP per capita. He shows a strong inverse relationship between reliance on fire wood and per capita GNP. He also states that energy consumption in developing countries often is underestimated because the reliance on fire wood and other such energy sources is not taken into account. He thinks that overall energy consumption does not change that much with development, particularly in rural areas, but that the aggregate effect is a shift to commercial sources from non-commercial sources.[32]

The relationship between economic development and energy consumption is not disputed. However, the relationship is not as simple as that presented in most studies. Almost all the studies state that correlation is not causation although almost all also indicate a causal relationship. Nevertheless, causation may flow both ways. As incomes rise, residential, commercial and industrial sectors tend toward more energy-intensive activities and equipment.[33]

In addition, as with investment in the telecommunications infrastructure, investment in the energy infrastructure, particularly centralized electric power generation, is not sufficient to induce economic development. Electrification alone is unlikely to entail development and can, in fact be costly and ineffective. To obtain the economic development benefits of electrification requires investment in a set of infrastructure services. It also requires other preconditions for growth such as capital formation in energy intensive equipment.[34]

A final note, electrification and investment in other energy infrastructure with the accordant increase in energy intensive production methods, can result in an increase in fuel imports.

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[31] Darmstadter

[32] Pachauri, pp. 2-7. For other studies on the relationship between economic development and energy supply or consumption see Baughman, Tyner, Goldeberg.

[33] Siddayao, p. 52.

[34] Munasinghe, pp. 2-3.

This can result in a financial squeeze for some developing countries that reduces the rate of investment and the rate of economic development. Such a scenario argues for the use of energy efficient systems.

Microeconomic studies look at the impact of individual projects. One such study by Saunders *et al.* looked at the social and economic impact of rural electrification in certain areas in Costa Rica and Columbia. They surveyed residents in the two areas and categorized them into users of electricity, non-users where electricity was available and non-users where electricity was unavailable.[35]

Their data showed that users of electricity had significantly higher living standards than non-users. Although meaningful, the results may confirm pre-existing conditions. Electricity users in general had higher levels of education and higher levels of income prior to the introduction of electricity. Where electricity was used in agriculture, it primarily was used in livestock production which the study stated generally is more energy intensive.[36]

Another study attempted to measure the benefits and internal rates of return of electrification projects in 13 developing countries from 1975 to 1984. The results are summarized below:[37]

Country	Incremental Revenues	Internal Rate of Return (% of total benefits)
Bangladesh	<5	11
Columbia	55-100	8-13
Egypt	65-85	3-10
India	<10	17-70
Ivory Coast	1	5
Malaysia	100	17
Morocco	100	6
Philippines	50	16-22
Syria	95	8
Thailand	30-60	12-15
Tunisia	60-65	8-12
Yemen (Arab. Rep.)	100	16-18
Yemen (PDR)	40-85	13-15

[35] Saunders.

[36] Saunders, pp. 151-156

[37] Munasinghe, p. 86.

The benefits were calculated from cost savings and increased productivity for industrial, commercial, agricultural and household uses of electricity. Most of the gains came from substituting centralized electric power for liquid fuels, gas, coal, biomass, animal waste or muscle power. Munasinghe also notes that a number of benefits from electrification are difficult to quantify. He succinctly lists these as:[38]

1. Modernization, dynamism, and attitude changes,
2. Quality of life, community services, and participation,
3. Income redistribution, and social equity,
4. Employment creation, and
5. Other sociopolitical effects such as improved political stability, better national cohesion.

Munasinghe also discussed the quality of supply in relation to economic development. Quality of supply was measured in terms of outages and voltage variation. He used the concept of consumer surplus to measure the benefits of increased quality of supply. He found significant increases in consumer surplus as the quality of supply improved.[1]

Rosenberg discusses the use of electricity in the development of the steel and aluminum industries. Both of these industries are energy intensive but they require a specific form of energy, electricity. He shows that the advent of central generation stations allowed for the development of electrically based technologies that resulted in the efficient production of these commodities.[39]

Little has been done to compare the economic development benefits of various infrastructure investments, particularly a comparison of electricity and telecommunications investments. Such studies may provide insight due to the synergistic nature of these investments.

The infrastructure literature reviewed here stresses that investment in any one area will not be sufficient for economic development. A set of investments must be made for a region to fulfill its economic development potential. When and where the investments are made also play an important role in economic development. Thus, an approach that generates a program and time table that raises the general level of infrastructure investment may be the most beneficial. An important part of such a program would be the telecommunications

[38] Munasinghe, pp. 85-88

[39] Rosenberg, pp. 289-294.

infrastructure. It can increases the efficiency of other infrastructure investments. It also can be substituted for some high cost infrastructure investments thereby, lowering the overall investment needs.

2.3 METHODOLOGY FOR THE SADC REGION

The countries of the Southern Africa Development Community (SADC) and the Republic of South Africa (RSA) are among the least developed countries, both economically and in their use of telecommunications. A wide range of studies indicate that expanded telecommunications investment is essential, not only for growth, but also to remain competitive within the increasingly information-oriented global economy. Failure to develop telecommunications systems will only increase the development gap between the SADC and RSA and the industrial countries.

There are basically two distinct research methodologies to study the effects of telecommunications on economic development. One uses the macroeconomic or top-down approach. The other uses the microeconomic or bottom-up approach. Both have their advantages and disadvantages. Macroeconomic analysis, which is based on national aggregate statistical data, provides an overview of the basic economic indicators, can indicate but not fully explain causal relationships. Microeconomic analysis can substantiate the positive effects of telecommunications in a specific situation, industrial sector or region, but is dependent on the small sample size analyzed and more difficult when expanded to a larger universe.

An effective economic model requires a valid, reproducible and accurate statistical time series over a significant period of time. This statistical series was not available for many countries within the SADC and RSA. The SADC and RSA contains countries at the lower range of the development spectrum. Over the past decades the region has moved through turbulent economic and political times. This has produced periods of economic regression and decline that can reduce the validity and confidence levels of statistical indicators. Over the past decade, the level of telephone density has remained stagnant for most countries in the SADC and RSA, except Botswana.

This report reviewed both the macroeconomic and the microeconomic approaches, and suggests the methodology for relating telecommunications and economic development within the SADC and RSA is to use existing macroeconomic data to define a "normal" or baseline relationship between telephone density and primary economic data. This norm can then be compared to the actual relationship between telephone density and other economic indicators in the SADC and RSA. Comparing the southern African countries with the international norm exposes the current gap in telecommunications development in the

region and highlights the potential for telecommunications growth in each country. It is recommended that more detailed studies be developed for each country to confirm these initial assessments.

Extensive studies from the 1960's to the present have documented a strong correlation between GDP per capita and telephone density indicators. The data for all countries generally fall within a small band along a straight line on a logarithmic chart. Recent statistical tests for the direction of causality by Hardy (1980), DRI/McGraw-Hill (1991) and Norton (1992) show that the growth of telecommunications investment or penetration is a statistically significant predictor of economic growth, and vice-versa: indicators of economic growth are significant predictors of telecommunications investment. Telecommunications is thus considered to be both a cause and a consequence of economic growth, according to Norton (1992).

The data in this study are consistent with the proposition that telephones provide substantial growth and investment enhancing activity and thus facilitate economic growth.

The teams analysis of the data in the Southern African Countries supports this relationship. Input-output studies of the economic impact of telecommunications also show that it makes substantial contributions to the efficiency of the economy. A quantitative study of the U.S. during the years 1963-1982 estimated efficiency gains of nearly US$ 80 billion for the 1982 economy.

Due to concerns about the availability and validity of data, this scoping study emphasizes pragmatic solutions which minimize the complexity of the problem but comport with the data available for the analysis. The team used a variety of data sources in developing the profile of the Southern African countries under study. One general characteristic to note is that South Africa skews the data. Its level of development is much higher than the other countries. This is deceptive, however, because the data reflects primarily the white South African economy only. In addition, data within specific countries can also be misleading for similar reasons. In Zimbabwe for example, penetration in the white community far exceeds the rest of the countries telephone availability.

The team worked extensively with the published and electronic version of the data available on the Southern African countries. Several data deficiencies were found. As noted above, the team found several areas where the data series did not agree with one another. The electronic version of the ITU data did not always agree with its published version of the database. Several of the data items are not reported for specific countries and, in some cases the country did not report for some or all the years.

2.3.1 Telecommunications and Development in Southern Africa

An overall sense of telecommunications and relevant economic variables are illustrated in Exhibit 2-2 through Exhibit 2-10 in Annex II.2 to this section. They highlight the relationship and interrelationship of population, GDP, imports, exports, number of telephones, prices and demand deposits (the money supply) in each of the target countries (except for Angola and Namibia where severe gaps in the available data forced their exclusion). To develop these charts, the mean of the data series for each country was used to index the variable to 100 in order that they could be displayed relative to one another Thus, the series is plotted relative to its relationship from the mean. Missing data were derived by interpolating between differing years.

The analysis of Exhibits 2-2 through 2-10 presents a compelling picture for understanding the importance of telecommunications in developing countries. With little exception, the increased trend in measures of economic activity corresponds to the trend observed in telecommunications growth. The economic measures analyzed cover changes in prices, gross domestic product (in 1985 dollars), import and export growth and population. The correlation that is observed between the index of telecommunications and economic activity incorporate two effects. The first is that enabling conditions must be present before a telecommunication infrastructure can be put in place and made operational. These include pricing policies, network engineering and planning, and training. A plan which focused on economic growth would tend to emphasize the institutional requirements attendant with large investment activities. Second, once in place or planned, the growth in telecommunications supports continued investment and economic growth, as suggested by Exhibits 2-2 through 2-10.

Since all measures are presented in the figures are indexed, they are on the same scale of measurement and thus are directly comparable. The indexes show that telecommunications is growing faster than population. The implication is that the access externality commonly associated with a telecommunications system is growing. This externality will provide the impetus for further usage, and ultimately, for further investment. The very low penetration rates of telephones in these countries indicates, that with proper planning and institutional structure, that the growth in this externality will continue to accelerate.

While this study has been designed to examine the SADC and RSA as an aggregate, we wish to caution the reader that any study of the countries within the SADC region must be conducted with extreme caution. This is a disparate set of countries. Their different economies have suffered through a differing variety of civil wars, embargoes, affiliations and apartheid. Any results derived from aggregate analysis of these countries should be reviewed carefully.

2.4 RESULTS

An initial assessment of the quantitative relationship between telecommunications development and economic growth was derived from the available data for the Southern African countries. Because of the difference in the size of the countries, the analyzes utilized the growth rate of GDP and telephones. As can be seen from Exhibit 2-11 and Exhibit 2-12, the relationship between the rate of growth of DEL per capita and growth in per capita GDP for the Southern African counties is positive.[40]

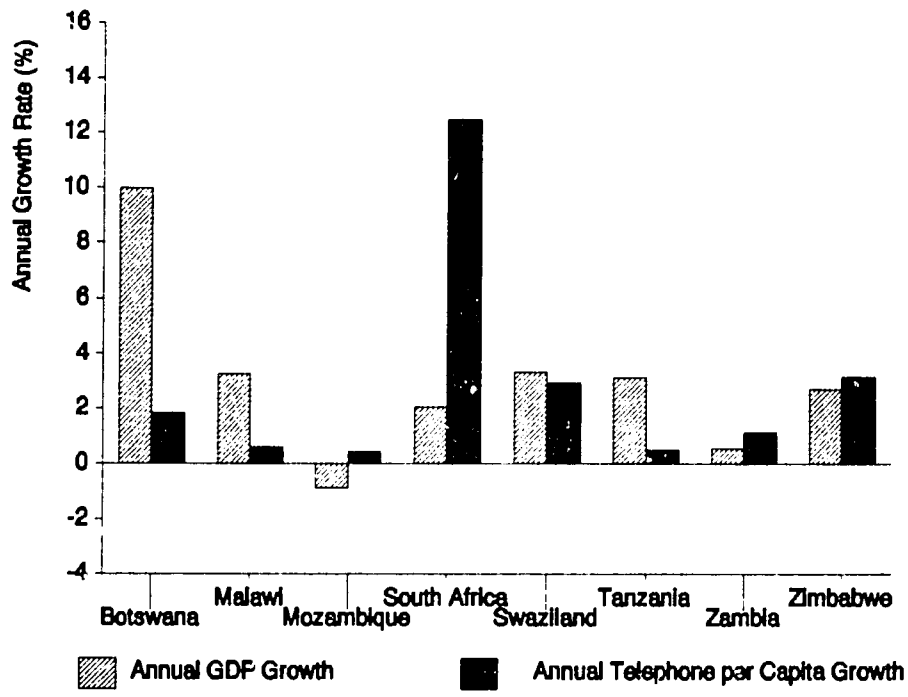

Exhibit 2-11 Telephone Growth per Capita vs. GDP Growth Rates (1983-1989)

[40] The exception of Mozambique, which, with a civil war during the period, may be expected to exhibit anomalies.

Exhibit 2-12
Annual Telephone Growth per Capita vs. GDP Growth Rates (1983-1989)
(Respective data points for Exhibit 2-11)

	Annual Growth GDP	Annual Growth Telephones/Capita
Botswana	9.98	1.85
Lesotho	7.07	0.82
Malawi	3.26	0.61
Mozambique	-0.86	0.44
South Africa	2.06	12.47
Swaziland	3.33	2.94
Tanzania	3.13	0.52
Zambia	0.58	1.16
Zimbabwe	2.71	3.15

2.4.1 GDP and Telephone Penetration

The close correlation between telephone density and GDP per capita, as indicated on the Jipp Curve provided in Exhibit 2-13 provided in the Annex II-2 was used to derive the imputed level for each SADC country.[41] The gap between "normal" and actual is indicated in the table of Exhibit 2-14 and the countries within the SADC region are considerably below the normal telephone density and are considered underdeveloped in telcom.

Total GDP is the cumulative impact of the capital, labor and other assets within each country. A linear relationship between the contribution of one additional telephone to the GDP of the country was derived and is displayed in the table of Exhibit 2-14 for the SADC countries. The data indicates that the contribution of one additional telephone to increased GDP is exceptionally strong for the lesser developed countries with a GDP below $ 1000 per year. The lower the degree of development the greater the effect an additional telephones will have on the economy. The correlation between the impact of additional telephone calls on the GDP is not as strong, due to the variance in telephone tariff levels, international and domestic calls, etc.

[41] ITU, March, 1988.

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Exhibit 2-14
Telecom Contribution to GDP of SADC

Country	GDP/P Calc	GDP/P WB:1990	DEL/100 1990	DEL/100 Normal	Add Tel to GDP $	Add Call to GDP $
Angola	770	800	0.50	2.27	1685	1.67
Botswana	1385	2040	2.29	7.62	960	0.95
Lesotho	249	530	0.61	1.32	2300	2.25
Malawi	170	200	0.32	0.36	5550	5.55
Mozamb-ique	105	80	0.30	0.12	12000	12.50
Namibia	944	1000	2.88	3.04	1440	1.45
Swazi-land	83	810	1.69	2.29	1640	1.62
Tanzania	160	110	0.30	0.17	11000	11.50
Zambia	274	420	0.87	0.98	2750	2.60
Zim-babwe	631	640	1.26	1.69	1950	1.95
SADC	336	663	0.61	1.76	4128	4.20 [42]

Investment Led GDP Growth

These early analysis were based on simple regression analysis and cannot account for the time lag associated with investment in infrastructure and the impact on GDP as well as the resultant impetus to further investment from GDP when the infrastructure is in place. To in corporate those factors we must move beyond the analysis of the simple regression analyses of the past. Models of elasticity are utilized to identify the percentage change in of GDP with percentage change in DEL.

[42] Values for RSA intentional left out for clarity

Two models were estimated with the available data:

$$\mathbf{Log(GDP) = + Log(DEL_{-1})} \qquad (1)$$

$$\mathbf{Log(DEL) = + Log(GDP)} \qquad (2)$$

Model (1) analyzes the growth rates of GDP with telephone penetration lagged one period. The working hypotheses is that DELs represent a proxy for investment in telecommunications and will take one period to manifest this impact; i.e., if telecommunications investment has an impact on the growth of GDP,this will most likely occur with a time lag.

Model (2) is in the current period and has no lags; i.e. growth in GDP should have an instantaneous impact on telephone penetration, if population and other exogenous variables are held constant.

The results of this two equation system are indicated in Exhibit 2-15. The results confirm the hypothesis that telecommunications investment drives growth and , conversely, GDP growth drives telecommunications lines.[43]

Exhibit 2-15
Model of Elasticity for Telephones versus GDP

Country	Elasticity Model (1)	R^2	Elasticity Model (2)	R^2
Botswana	0.75*	0.89	1.21*	0.94
Lesotho	0.25*	0.81	3.11*	0.62
Malawi	0.47*	0.95	1.91*	0.94
Mozambique	0.20	0.10	-0.15	0.05
South Africa	0.31*	0.85	2.99*	0.84
Swaziland	0.55*	0.79	1.39*	0.53
Tanzania	0.49*	0.98	2.18*	0.96
Zambia	0.06*	0.89	13.98	0.53
Zimbabwe	0.77*	0.84	1.22*	0.92

* Indicates significant at the 95 % level.

[43] Obviously, it would be preferred to have the actual investment figures for model 1 and telephone usage data for the second model.

These first model indicates the percent change in GDP one year following the percent change investment in DEL's.[44] These elasticity figures indicate that there is significant impact on GDP growth with investment in telecommunications infrastructure. The values of elasticity vary with the level of economic development. The lesser developed countries receive a greater impact on GDP with investment in the telecommunications infrastructure. The second model shows the accelerating element of GDP to encourage investment in expansion of lines once the infrastructure is in place.

The primary assumption is that new telecommunications investments are a necessary but not sufficient condition for economic growth. Many factors other than telephone investment are critical to growth, but the lack of this investment will limit growth no matter what resources are dedicated in other areas of the economy.

These two models mimic the investment world, and can be thought of as a system of inter-relating forces. Initial investment in telecommunications infrastructure can lead GDP growth and with the infrastructure in place the GDP growth pushes further expansion of the infrastructure. The close correlation between telephone density and GDP per capita, as indicated by the numerous correlation studies which have been conducted have been upheld by this analysis.

At this stage the results are suggestive, but for these countries in particular, give the extremely low penetration per capita, a much more elaborate analysis is required before one can identify time path of the telephone's relationship with GDP. That is , the countries discussed in the study are on the extreme left side of a traditional saturation curve (S-curve). Consequently, comparisons with countries who are further along the S-curve (more industrial countries) is speculative at best. Nonetheless, these countries by virtue of their position the S-curve are more likely to benefit from any activity which encourages and promotes communications.[45]

2.4.2 Efficiency of the Telephone Companies

The effectiveness of investment in telecommunications is affected directly by the efficiency of the telecommunications operator/s. In most of the counties of the region, the network operational structures are burdened by inefficiencies, causing the cost per line as well as cost of operation to reduce the stimulating effect of the telecommunications investment.

[44] Two year lag models were not supported by available data.

[45] Linstrone and Sahal.

With the data available, one method of examining the efficiency of the companies is to examine the employees per DEL (main station). The more employees, *ceteris paribus*, the less efficient the company. A summary is shown in Exhibit 2-16.[46] When compared with South Africa, all of the other telephone companies can improve their efficiency in terms of the employees per DEL. Individual country efficiency of telephone provision are provided in Exhibits 2-17 through 2-25 in the Annex to this section. A caution is in order, these results should be statistically corrected for relevant variables, such as size of the company, geographical size of the area serviced, and other relevant variables. In any expanded study these results should be compared to the world averages with the appropriate statistical corrections. This information does indicate, however, where to begin to explore for problems.

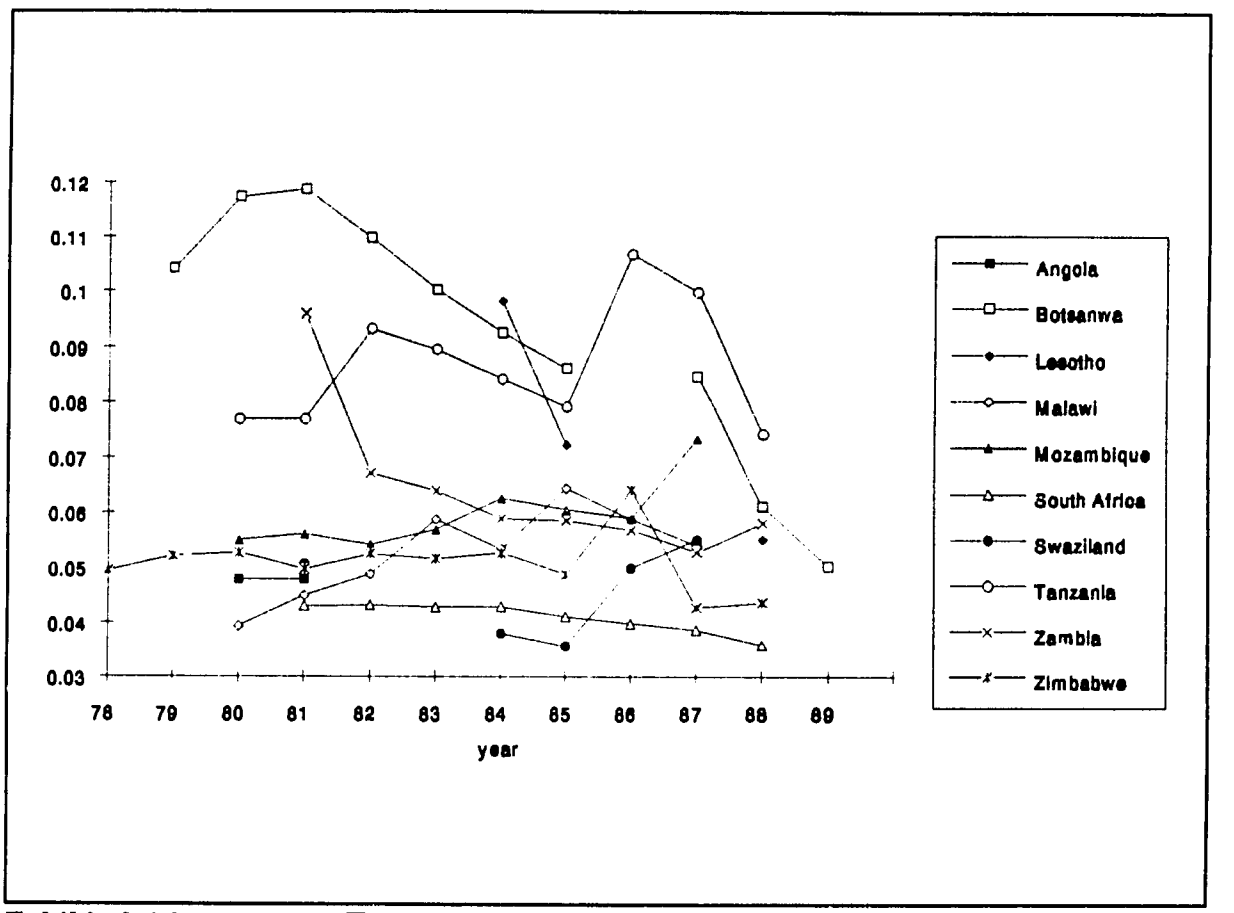

Exhibit 2-16 Employees per DEL

[46] Source: ITU data. As with the other data examined, these data have missing or inconsistent items. The obvious error were eliminated from this figure.

2.4.3 International Settlements Impact

One of the difficulties in the developing world is to raise hard currency for telecommunications investment. This, however, is a double edged sword. The under investment in the network means that quality will deteriorate or, at best, not be improved. The lack of quality and market penetration means that hard currency is lost from international settlements

In general, the Southern African countries' international prices are higher than the rest of the world, which produces more international traffic into the country. Thus, through the international settlements process, the country "earns" hard currency.[47] If calls can not reach the local switch, as is often the case in these countries, the incoming call is not connected, then no settlements are owed. The blocked call costs the receiving country hard currency in lost revenue.[48]

We estimate the results of this inefficiency by assuming that the ratio of the traffic maintains its current mix of inward and outward movement and accounting rates remain the same. We further assume each DEL added will allow additional international traffic. In addition, each dollar investment in the improvement of the network (expanding the size of the central office, increasing the speed through digitalization, etc.) will generate additional international traffic.[49,50] Without a more detailed analysis given the time constraints of the study, we conservatively estimate that this will increase the settlements by ten percent per year.

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[47] See Johnson, 1987 and Alleman *et al*, 1989 for details on the international settlements process.

[48] Out going calls in some countries are taken directly to the international gateway switch. Thus, outgoing calls are not blocked which give rise to an outflow of hard currency! The blocked incoming call may be the result of congestion on the network caused by low revenue producing exchange traffic

[49] In correspondence with one of the authors, a individual in charge of traffic and revenue forecasting for a South American telephone company noted the surge in international telephone traffic once the network quality had been improved.

[50] This is in addition to the gains from improvements in the network discussed in the ITU document, Saving in Foreign Exchange, which is only concerned with the increase in foreign currency produced by improved communications among businesses.

Exhibit 2-26 for Swaziland indicates the increased settlements over the simple trend as a result of the improvements.[51]

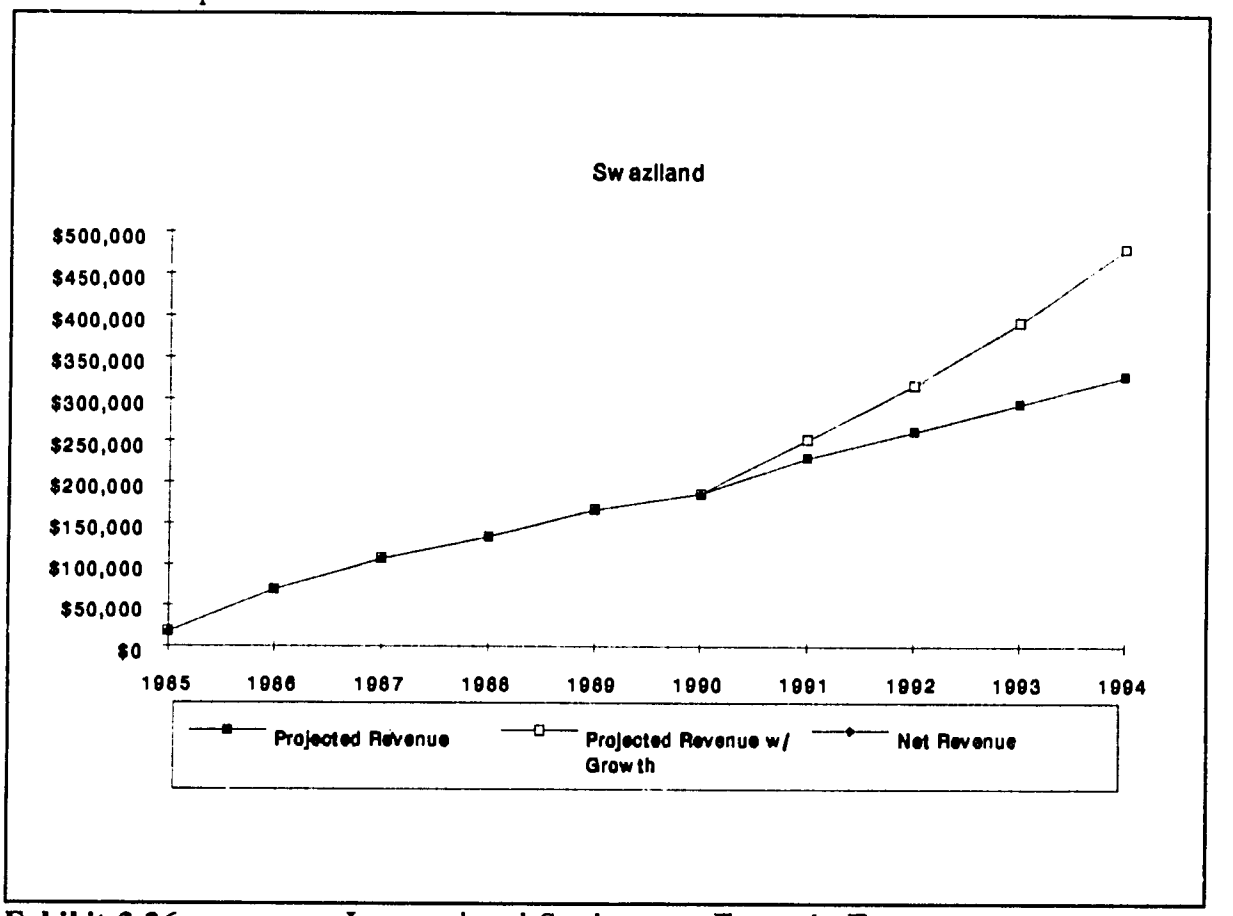

Exhibit 2-26 International Settlements Example Forecast

[51] Obviously, the increased hard currency is a positive benefit of such an improvement in the economy, but the telephone calls, themselves -- both inward and outward, represent a improvement in the economy. Consumers are now able to purchase services which were heretofore unavailable to them.

Exhibit 2-27
Projected Settlement Expansion in 1994

COUNTRY	1994 GDP GAIN
Angola	$ 183,048
Botswana	$ 152,323
Lesotho	$ 106,779
Malawi	$ 182,873
Mozambique	$ 132,370
Namibia	$ 222,632
South Africa	$5,517,748
Swaziland	$ 152,518
Tanzania	$ 540,322
Zambia	$ 203,632
Zimbabwe	$ 419,875
TOTAL	**$7,814,121**

The results are indicate the gain in foreign exchange is $7.8 million, even excluding South Africa the gain is $2.3 million.

If the regional network is developed additional savings are generated. This is a result of not having to carry the traffic to London or Paris -- with all of the implications for international settlements and hard currency loss (to London or Paris) for at least one of the countries in the region.

More precise estimates of the impact cannot be estimated within the scope of this project; however, a more detailed analysis of the settlements impact is recommended. In particular, the analysis should model the trade-off of investments in network improvements versus, for example, the expansion of the network with respect to its foreign exchange impact.

2.5 CONCLUSIONS AND FURTHER ACTIONS

A primary objective of this review is to formally define the interaction between telecommunications and economic growth, and apply the most appropriate methodology for the SADC and RSA. Macroeconomic and microeconomic methods were both investigated for telecommunications. The generic models available, however, cannot be easily transferred to specific regions, countries or sectors. The microeconomic approach can produce significant results, particularly by displaying the influence of telecommunications

on specific projects in the transportation and service sectors of the economy. However, a microeconomic analysis of telecommunications within the SADC and RSA is flawed by the fact that valid and reproducible data of the sort required for an effective analysis is not available for the SADC and RSA countries.

The Macroeconomic approach indicates the impact of telecommunication on the economy in general. Procedures can include: regression analysis, benefit/cost, input-output or econometric modeling techniques. Although effective telecommunications econometric models have been developed for other regions, their application would not be appropriate for the countries in SADC and RSA due to the deficiencies in data. An approach is a simple correlative model for determining the potential gap between projected demand and supply for telecommunication services. A demand model would support this approach by providing an indication of the potential demand and associated costs and benefits for each country expanding telecommunications operations.

After reviewing the various methodologies available to measure the potential impact of telecommunications on economic growth, and taking into account the data constraints, it is recommended that a direct Macroeconomic correlation model be defined for each country. The macro-model will assist in determining the appropriate growth potential for telecommunications for each country, and the impact on economic growth. The demand model is designed to duplicate the judgment of an entrepreneur, viewing the Southern African countries in an independent, unbiased manner and suggesting a hierarchical ranking of investment beneficiaries for each country within the region. Substantial data development would be required for each country to effectively utilize more complex modeling procedures. However it is recommended that one or two countries within the region be selected to serve as a laboratory for more detailed analysis and data base development.

The macroeconomic model determines the level of investments required to meet telecommunications objectives. The macro models also provide the basis for estimating direct and indirect telecommunication multipliers. These multipliers provide the mechanism for assessing the linkage of telecommunications investment on employment, growth in domestic output, and on trade. These models also provide the means for preparing alternative simulations and predictions and ultimately, for assessing the speed in which charges occur.

The results generated by economic models and analyses are only as valid as the initial data. An effective economic model requires a valid, reproducible and accurate statistical time series over a significant period of time. This statistical series may not be available for many countries within the SADC and RSA. The SADC and RSA contains countries at the lower range of the development spectrum. Over the past decades the region has moved through

turbulent economic and political times. This has produced periods of economic regression and decline that can reduce the validity and confidence levels of statistical indicators. Over the past decade, the level of telephone density has remained stagnant for most countries in the SADC and RSA, except Botswana. A World Bank survey of Sub-Saharan Africa found extensive problems with data collection and measurement procedures, particularly with historical records for even basic macroeconomic planning indicators. The survey indicated a higher level of manual data collection efforts than normal, negating the improved quality of computer software and hardware available within these countries.

2.5.1 Derived Conclusion in Southern Africa

Almost all of the discussions, both theoretical and empirical, depict a positive relationship between telecommunications and development. But, the strength of that relationship appears to vary depending upon the pool of data and economic, technical and regulatory environment of the countries studied. The conclusion that can be drawn is that arguments about the existence of a positive relationship are substantiated. The important issues pertain to describing the relationship and delineating the reasons for variations in the strength of the relationship.

As stated earlier, neither investment in infrastructure generally nor investment in telecommunications infrastructure is sufficient for economic growth. Other conditions must be present. The region must have the human and capital resources as well as other infrastructure investments to obtain greater benefits from telecommunications infrastructure investment. The timing of the investment and the type of telecommunications investment relative to other modernization factors may well be of great importance. Also, installing new equipment that can provide a broader array of services will have a greater impact than marginal expansion of an existing network, providing that preconditions for modernization of other sectors of the economy are present.

Among the countries of the region evaluated all indicated strong positive economic stimulus with investment in Telecommunications infrastructure. The specific impacts per country could be assessed with a reasonable level of confidence, however detailed analysis suffered from the limitation of data. The elasticity models discussed earlier show the great impact of telecommunications growth to stimulating GDP growth and subsequent growth of further investment resulting form GDP growth. The negative impact of the shortfall telecommunications growth can analyzed using the same model to offer estimates of GDP constraint due to lack of infrastructure investment. Although the literature review reviewed no significant study of that area, the high elasticity coefficients of the reciprocal model provide confidence of their application. However accurate estimation of the negative impact

of shortfall in telecommunications in the region requires significant national and regional research beyond the scope of the initial phase of the scoping study.

2.5.2 Policy Considerations

The existence of a positive, reciprocal correlation between telecommunications investment or penetration on the one hand and economic growth on the other seems fairly well established. What implications does this have for development policy? "Causality" in this type of test simply means that one variable is statistically a good predictor of the other variable. It does not mean that any investment in telecommunications will automatically cause growth. As one of the authors of the DRI study wrote, "...simply going on a telecommunications equipment spending spree would not be sufficient to cause future economic growth. We must assume that the agents involved are rational actors, calculating to the best of their ability, cost effective means of realizing economic ends."[52] In other words, the investments respond to actual or potential demand, and must be targeted to provide telecommunication service when and where it is most needed.

Perhaps the best way to describe the relationship is in negative terms: if there are inadequate telecommunications facilities then it is likely that economic growth will be stunted. But this does not necessarily mean that spending more on telecommunications will automatically increase growth. This conclusion is supported further by studies of telecommunications and economic development conducted at the micro level. In these more concrete case studies, we can see that telecommunications does not promote economic growth in and of itself: rather, the economic impact of new investment is strongest when the absence or inadequacy of existing telecommunications facilities acts as a barrier or bottleneck to private economic activities.

From a development perspective, the key issue is not merely the correlation between telecommunications and growth, but the institutional mechanisms which determine how and when investments in telecommunications are made. The DRI/McGraw-Hill study is based on time series data drawn from the United States, a developed country with a regulated market economy in equipment and services, and telephone companies which are long-established, private, profit-motivated firms. For part of the period covered by the study (1978-1988), U.S. telephone companies were subjected to competition from other suppliers. Private firms also have a considerable amount of freedom to invest in their own telecommunications facilities. Thus, investments in telecommunications in the U.S. were steered by market prices, competition and other external forces ensuring that they were, on

[52] Mark Gold, personal correspondence, 9/11/92.

balance, cost-effective and responsive to demand. Under these circumstances, telecommunications investment is correlated with economic growth.

In developing countries, on the other hand, the institutional context of infrastructure investments is radically different. Often the PTT management is restrained by political and institutional concerns which are not related to telecommunication services. Often the Telecommunications Authority must compete with other government departments for scarce capital, in a political arena in which economic efficiency considerations may be unknown or unrecognized due to the absence of well-organized capital markets and investment information services. Furthermore, in an atmosphere of political instability, even the best of capital investment plans are futile if they are constantly deferred or altered by unstable local and national politics. The existence of the telecommunications/economic growth correlation does not address these institutional considerations.

2.5.3 Further Actions

The results generated by economic models and analyses are only as valid as the initial data. An effective economic model requires a valid, reproducible and accurate statistical time series over a significant period of time. This statistical series may not be available for many countries within the SADC and RSA. The SADC and RSA contains countries at the lower range of the development spectrum. Over the past decades the region has moved through turbulent economic and political times. This has produced periods of economic regression and decline that can reduce the validity and confidence levels of statistical indicators. Over the past decade, the level of telephone density has remained stagnant for most countries in the SADC and RSA, except Botswana. A World Bank survey of Sub-Saharan Africa found extensive problems with data collection and measurement procedures, particularly with historical records for even basic macroeconomic planning indicators. The survey indicated a higher level of manual data collection efforts than normal, negating the improved quality of computer software and hardware available within these countries.

The team worked extensively with the published and electronic version of the data available on the Southern African countries. Several data deficiencies were found. As noted above, the team found several areas where the data series did not agree with one another. The electronic version of the ITU data did not always agree with its published version of the database. Several of the data items are not reported for specific countries and, in some cases the country did not report for some or all the years. The team used it best judgment when it found discrepancies in the data between two data sources or interpolated or extrapolated, as the case warranted and it was possible, to estimate missing data points

Data deficiencies cannot be overcome within the context of this scoping study. The following suggestions, however, will help others to define what kind of data collection should be undertaken and how to go about it. The ITU should verify the accuracy and completeness of the data it receives from the PTTs and telephone operating authorities. Two tests of the validity could be used:

a. Examine the internal consistency of the data. Statistical analysis could be performed on the series based on all the countries in the data base, to set the bounds of reasonableness for the data.

b. Compare the country's data submission against the previous year's submission. This obviously has not been done in the past, and was the area were the team detected the most data discrepancies.

The data available included the United Nations population projections, the International Monetary Fund's International Financial Statistics, United Nations national income accounts, and World Bank Development Reports. Telecommunications specific data is available from the International Telecommunications Union by country and region.

Certainly, data limitations are likely to exist in some areas. In areas where forecasts are unavailable, economic forecasts can be made based upon regional forecasts and the characteristics of that country. Further, in instances where data limitations are present, such as the unmet demand for telecommunications, secondary data sources are examined. It is also recognized that the quality of data from many developing country source is often less than robust. In all cases country source data were thoroughly examined for inconsistencies and attempts made to adjust the data to reality or find alternative data sources. This is especially true of wait list data which often may not reflect unmet demand.

Although limited economic and demographic data of each country and region are available, the project built a database using the relevant data available. The database contains output by sector, population by age group, urban population, and international financial statistics. Telecommunications data are available for each country from the International Telecommunications Union. This limited data on the economic activities in the South African countries limits the quality of the estimates of the estimate excess demand: however, it may be sufficient to estimate a **qualified** excess demand.

2.5.4 Next Steps

Further activity is warranted to develop econometric and forecasting models for the region. Models of greater accuracy can serve to pinpoint investment for maximum impact GDP. Usage variables were not applied in the initial analysis due to the lack of sufficient and traffic data. What is required is to address the requirements for developing econometric and forecasting models of lines and usage (consumption, traffic) for both residential and non-residential (business) customers. Forecasts of business and residential telecommunications demand and revenue are critical to the planning process. This analysis concentrates on generalized methods for forecasting these services.

Four major points need to be addressed:

- The econometric estimation methodology,
- The data requirements,
- The integration of the separate estimations, and
- The forecast of the results of the estimations.

Econometrics Methodology

We must develop econometric estimates of the demand for telecommunications services based on the data which we believe currently available. It proposes to develop the following estimates:

Usage (Business)

The demand for usage for business depends on economic conditions and prices and on the number of lines the business has. These decisions can be viewed as interdependent. The choice of the number of lines is a functions of the expected usage; usage is dependent on the number and availability of lines. The modeling of the joint decision of usage and the number of lines can be represented by a **discrete - continuous choice model**. Moreover, for larger business users, telecommunications services such as privates lines, X.25 and 900 services, etc. will influence the demand for both standard business lines and voice usage. Thus, these variables will be included in the estimation. It is assumed that usage drives demand for lines and other telecommunications services this, in turn, drives the usage in a feed-back loop type of model.

Lines (Business)

A similar set of models is envisioned for business lines with the following modification. For business customers, data permitting, the model will predict the probability distribution of the number of lines. This reflects the likelihood that businesses change the number of lines more frequently than do residential customers. Thus, it is of interest to predict additional inward and outward movement, not only in terms of new customers, but also in terms of additional lines (+/-) for existing customers. These models are expected to be functions of tariffs and economic variables. Business telephone models tend to look at the demand for lines and usage of derived demands.

- Quantity of Business Telephone Lines Additions Demanded
- Quantity of Business Telephone Lines Canceled

Usage (Residential)

The model of residential usage is viewed as conditional on the model of inward and outward line movement (see below) and is hypothesized to be a function of prices, demographics and community of interests. Models can be estimated at a per household level or at an aggregate level.

Lines (Residential)

The team has developed and reviewed access models (models of lines). There is a substantial history within the United States surrounding the modeling of inward and outward movement (connections and disconnections of service). These models have been hypothesized to be functions of one time charges (installation charges), recurring charges (monthly line charge), consumer characteristics (income, location) and seasonal indicator variables. For USAID and the Telecommunications Administrations, we would propose to develop lines models to cover overall growth of lines, disconnects, and new requests. In addition, an overall aggregate line function will be developed. This aggregate model will provide a check on the forecasts of the components (see discussion on linkages).

- Quantity of Residential Telephone Additions Demanded
- Quantity of Residential Telephone Lines Canceled

The total and net telephone lines would be derived from the estimates above, and verified by developing "stand alone" equations for both demands.

Data Requirements

Data requirements include basic demographic and economic variables, tariffs, supply constraints (if applicable) such as waiting lists and capacity measures and data on each line component. Specifically, the data required include the following variables by **business / residential, for each region of the country, by months or quarters:**

Lines
New Connections
Disconnections
Wait Lists
Usage by Exchange
Usage by Distance
International Usage
Private Line and Other Telecommunications Services Demand

The **prices** for the above data are also required. In addition, employees by companies would be desired. The longer the period of the data, the more desirable for the estimation -- five to eight years would be best. However, if the regional / national data is good, less longitudinal data will be necessary.

The economic / demographic data required by **regions for months or quarters** include:

Populations / Households
Gross Domestic Product
Inter-Regional Trade, if available
International Exports and Imports

Firm specific factors required will include:
Industrial code
Size of business (employees)
Location of business

Price, cross-price (where appropriate) and income elasticities will be estimated for each service or component.

Issues

The appropriate modeling framework depends on a review of the available data and on USAID's and the Telecommunication Administration's specific objectives. The models depend on the level of detail available. If the data comes from customer billing records, a

micro analysis of inward and outward movements may be warranted. If the objective is to develop robust forecasting models, the use of more aggregate information may be warranted.

For forecasting line movement, monthly or quarterly data is preferred over annual information.

Outputs and Reports

The primary output from the proposed analyses are:

- Econometric forecasting models of lines and usage, by appropriate level of detail
- Price, cross-price and income elasticities for the models
- Sensitivity assessment of the models

The modeling, estimation, and forecast development of lines and usage could be completed in no more than two months from the receipt of the data for any one country. All models will be developed in a microcomputer environment; resulting equations and supporting data will be made available to USAID and the Telecommunications Administration, so that the USAID and Telecommunications Administration can utilize the analysis internally.

The models will include:

The Demand for Residential Usage
The Demand for Business Usage
    The probability that a business will take the service.
    Given the business purchases the service, how many lines and what level of usage, and revenues would be generated.
The Derived Demand for Total Usage
Cross-Elastic Estimations for Other Telecommunications Services
Quantity of Residential Telephone Additions Demanded
Quantity of Residential Telephone Lines Canceled
Quantity of Business Telephone Lines Additions Demanded
Quantity of Business Telephone Lines Canceled
Derived Demand for Total Residential Lines
Derived Demand for Total Business Lines
Derived Demand for Total Lines
Derived Demand for Net Additions (Additions less Cancellations)

The technical details of the estimation procedures are not described here, rather they will be described upon acceptance of the conceptual framework.

Qualifications:

The project's primary outputs would consist of models and direct and cross-price elasticities for a set of telecommunications services. In addition, data permitting, forecasts will be developed for all telecommunications residential and business services.

It is likely, should limitations exist, that they center on the data and not on the modeling framework. Since we have not had an opportunity to review the data associated with this project, it is premature to comment on the quality and completeness of the data. One of our first tasks will be to analyze and evaluate the data for model appropriateness and specification. The actual models that we utilize must take into account the scope and limitations inherent in the data. We will report on the nature and consequences of data limitations as they pertain to this project.
Particular care must be exercised when there is no significant history on the structure and characteristics of telecommunications demand. This appears to be the case for the Southern African countries. However, we have the advantage of being able to utilize results from other closely associated studies of the demand for services to guide our model assessment.

In the case of residential and business demand, longitudinal data may be available. Although, the lack of longitudinal data does not presents great difficulty, the fact that it is available enhances the estimations. We will develop a model of the drivers ("causality") of the demands for services, this will allow us to use the forecasts of the drivers to forecasts the demands. For example, if we find that demand is dependent on GDP per capita, then forecasts of GDP per capita can be used to forecast the demands. We have enough information to develop these structural models as indicated above.

Summary

The methodology will provide:

Estimates of the own and cross-elasticity of demand for the telecommunications Services including:

The Demand for Residential Usage
The Demand for Business Usage
Derived Demand for Total Usage
Cross-Elastic Estimations for Other Telecommunications Services

Quantity of Residential Telephone Additions Demanded
Quantity of Residential Telephone Lines Canceled
Quantity of Business Telephone Lines Additions Demanded
Quantity of Business Telephone Lines Canceled
Derived Demand for Total Residential Lines
Derived Demand for Total Business Lines
Derived Demand for Total Lines
Derived Demand for Net Additions (Additions less Cancellations)

ANNEX II.1

TELECOMMUNICATIONS SECTOR SCOPING STUDY FOR SOUTHERN AFRICA - PHASE ONE

SECTION II

SELECTED SOURCES OF AFRICAN TELECOMMUNICATIONS DATA

SELECTED SOURCES OF AFRICAN TELECOMMUNICATIONS DATA

Africa Telecommunications Development Conference (ATDC - 90), Harare, Zimbabwe, 6 - 11 December, 1990, Vol. I Final Report, Vol. II Working Documents.

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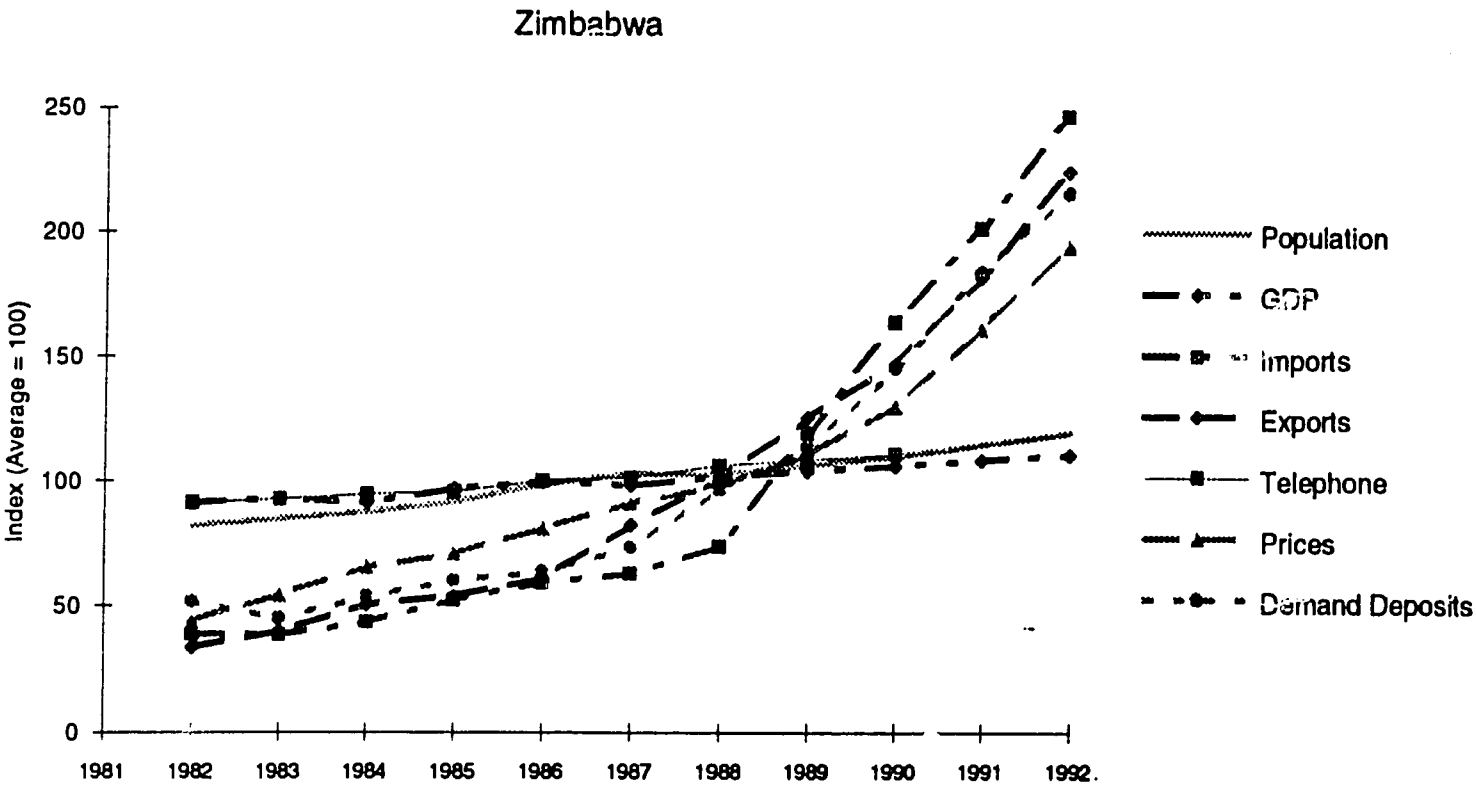
ANNEX II.2

TELECOMMUNICATIONS SECTOR SCOPING STUDY FOR SOUTHERN AFRICA - PHASE ONE

SECTION II

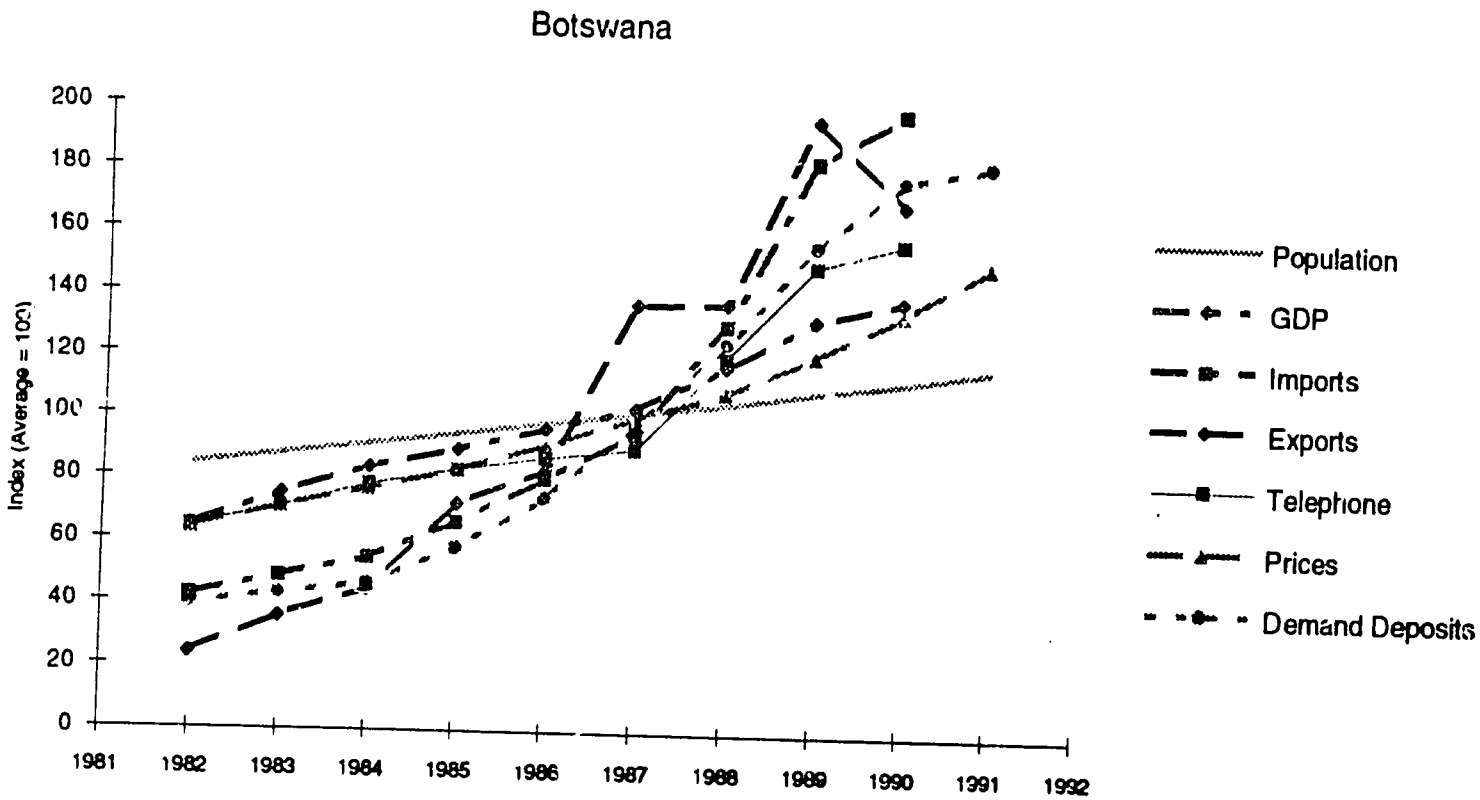
SELECTED AND SUPPLEMENTAL EXHIBITS



Indices of Econmic Variables

Exhibit 2-2

151



Indices of Econmic Variables

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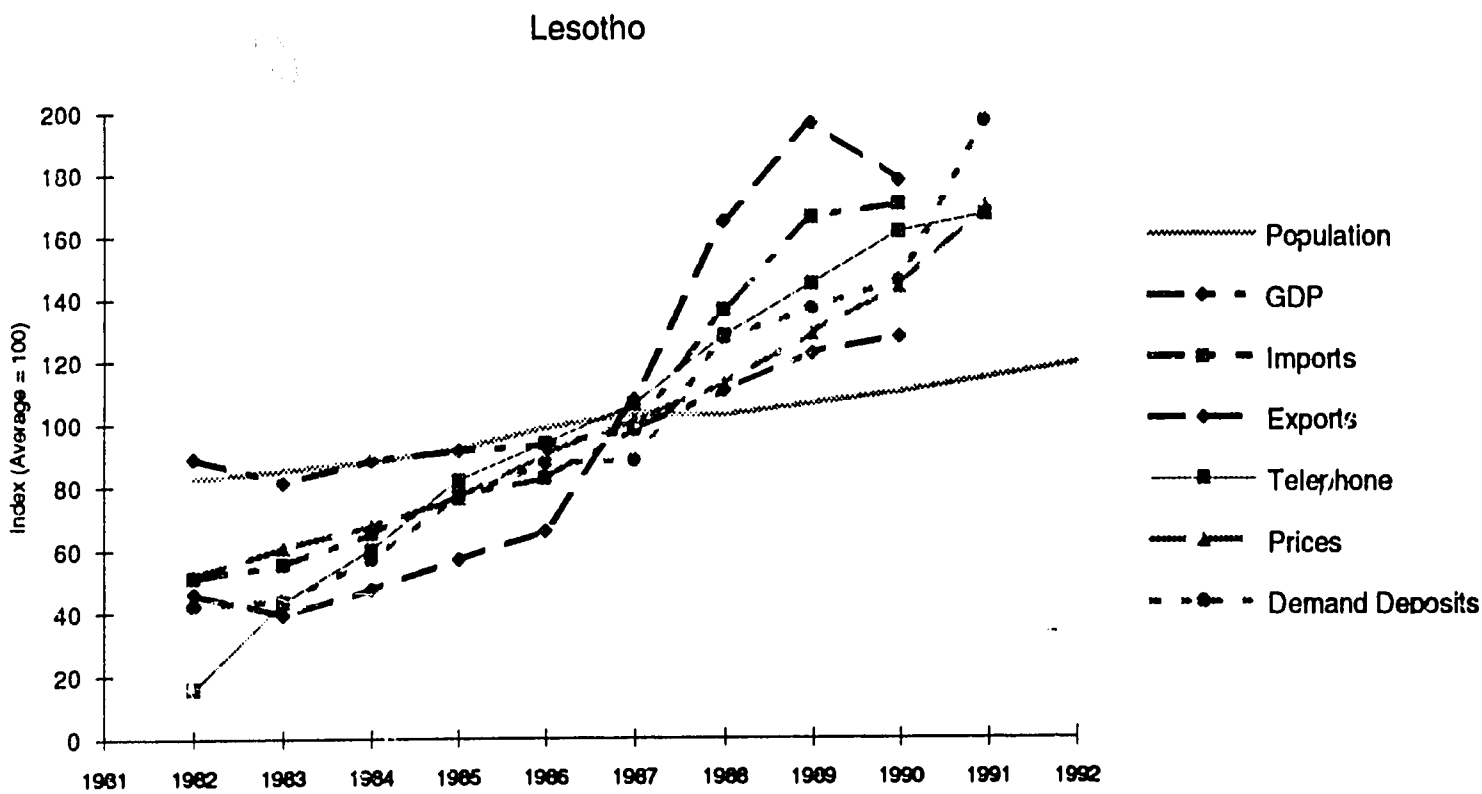

Indices of Econmic Variables

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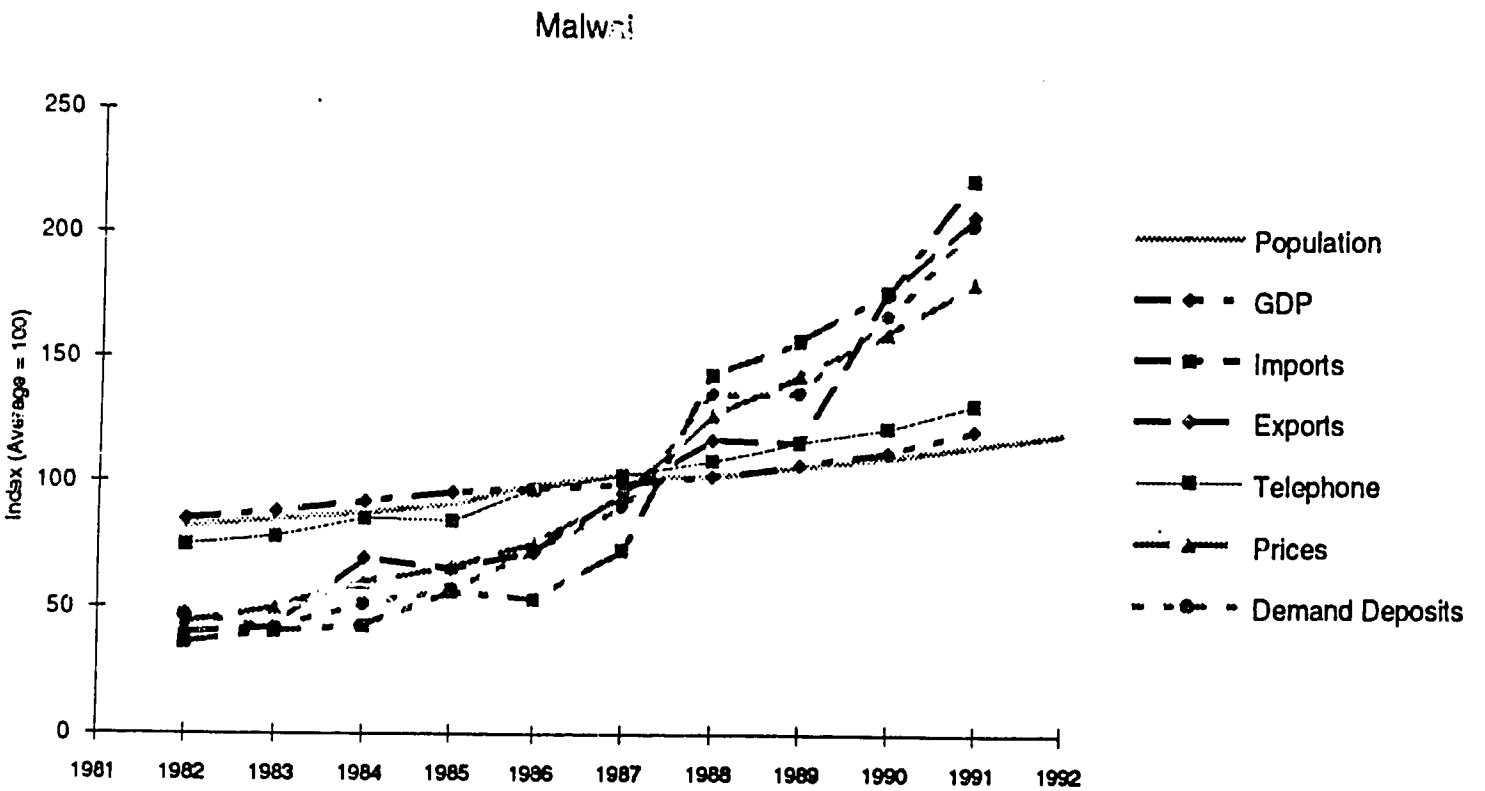

Indices of Econmic Variables

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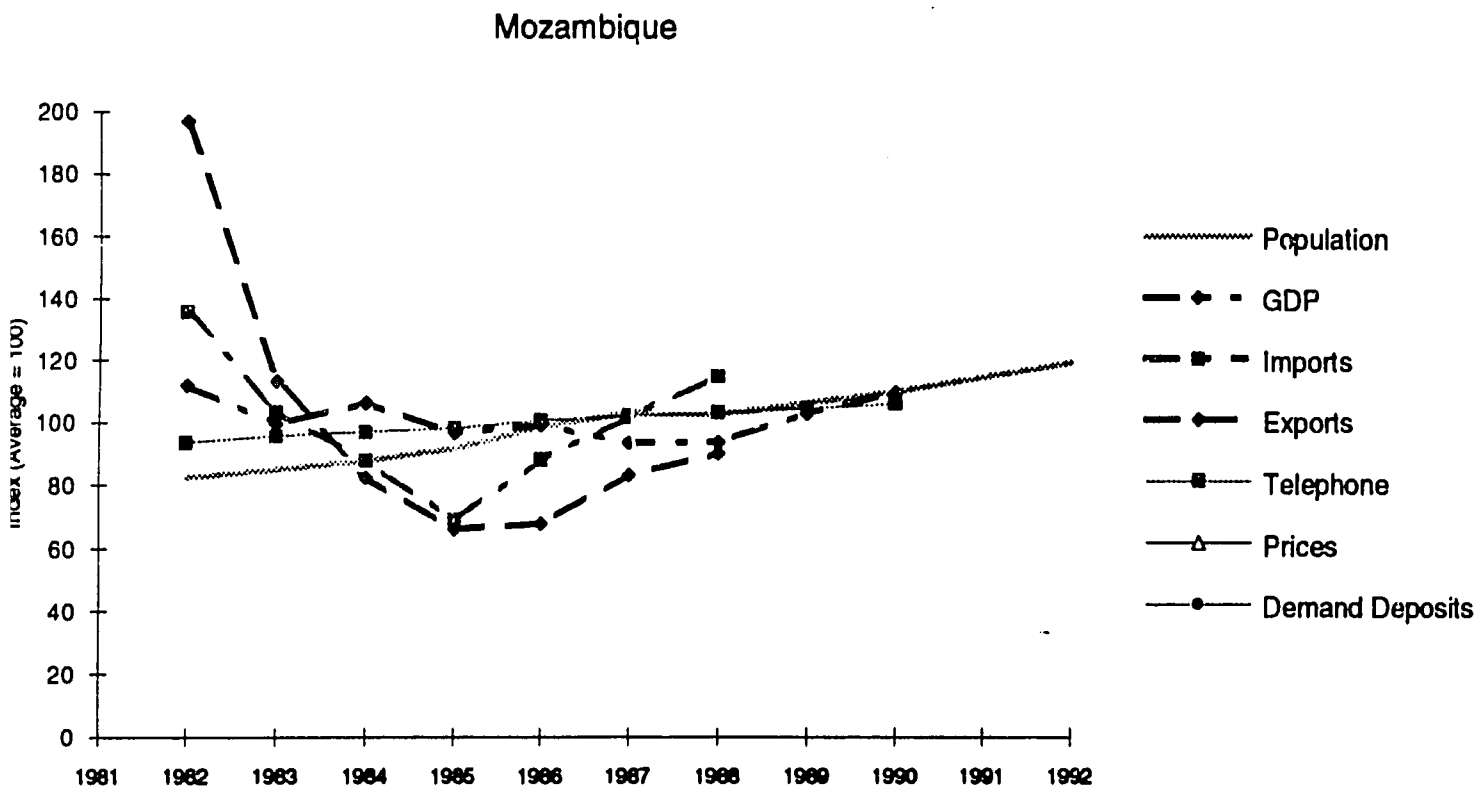

Indices of Econmic Variables

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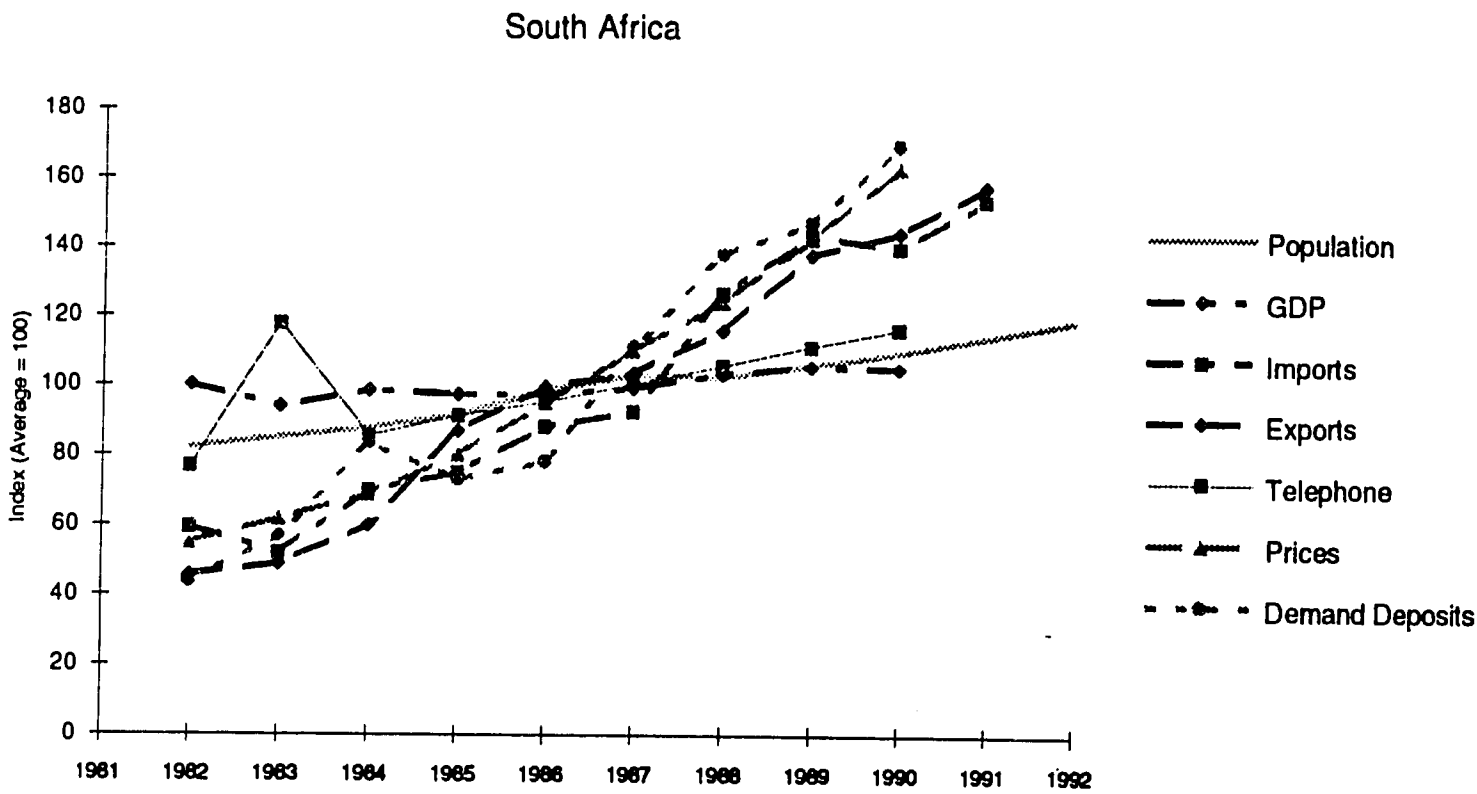

Indices of Econmic Variables

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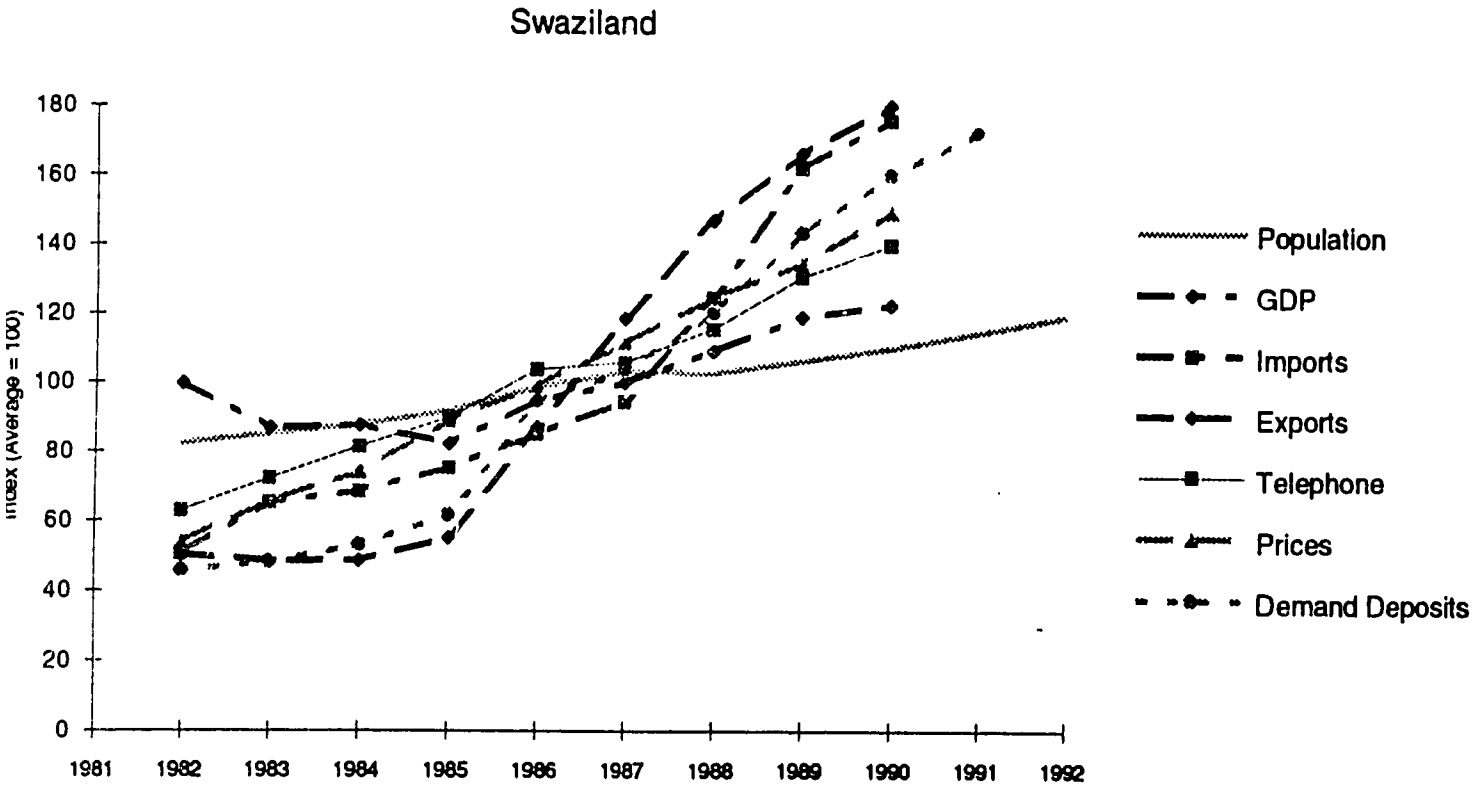

Indices of Econmic Variables

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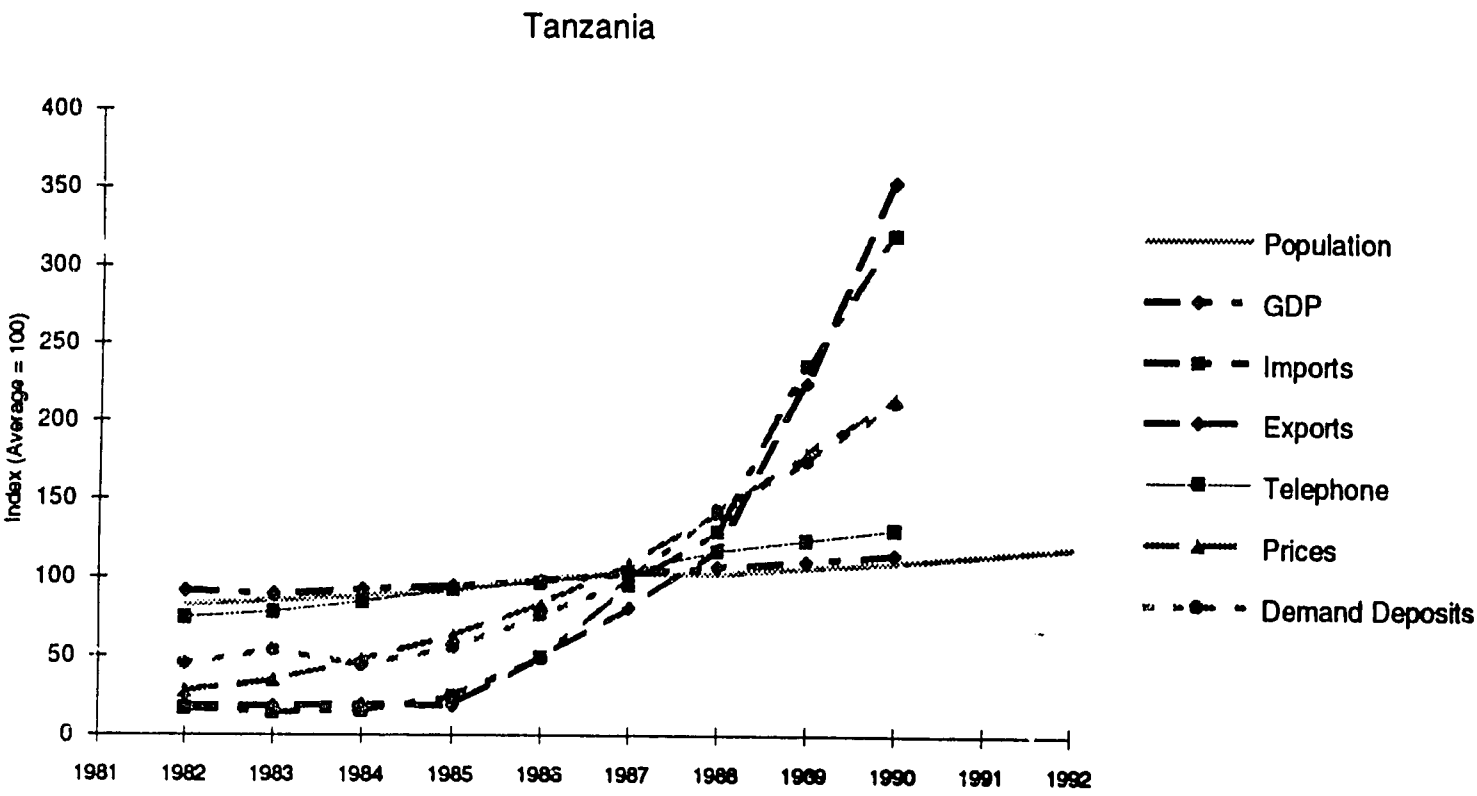

Indices of Econmic Variables

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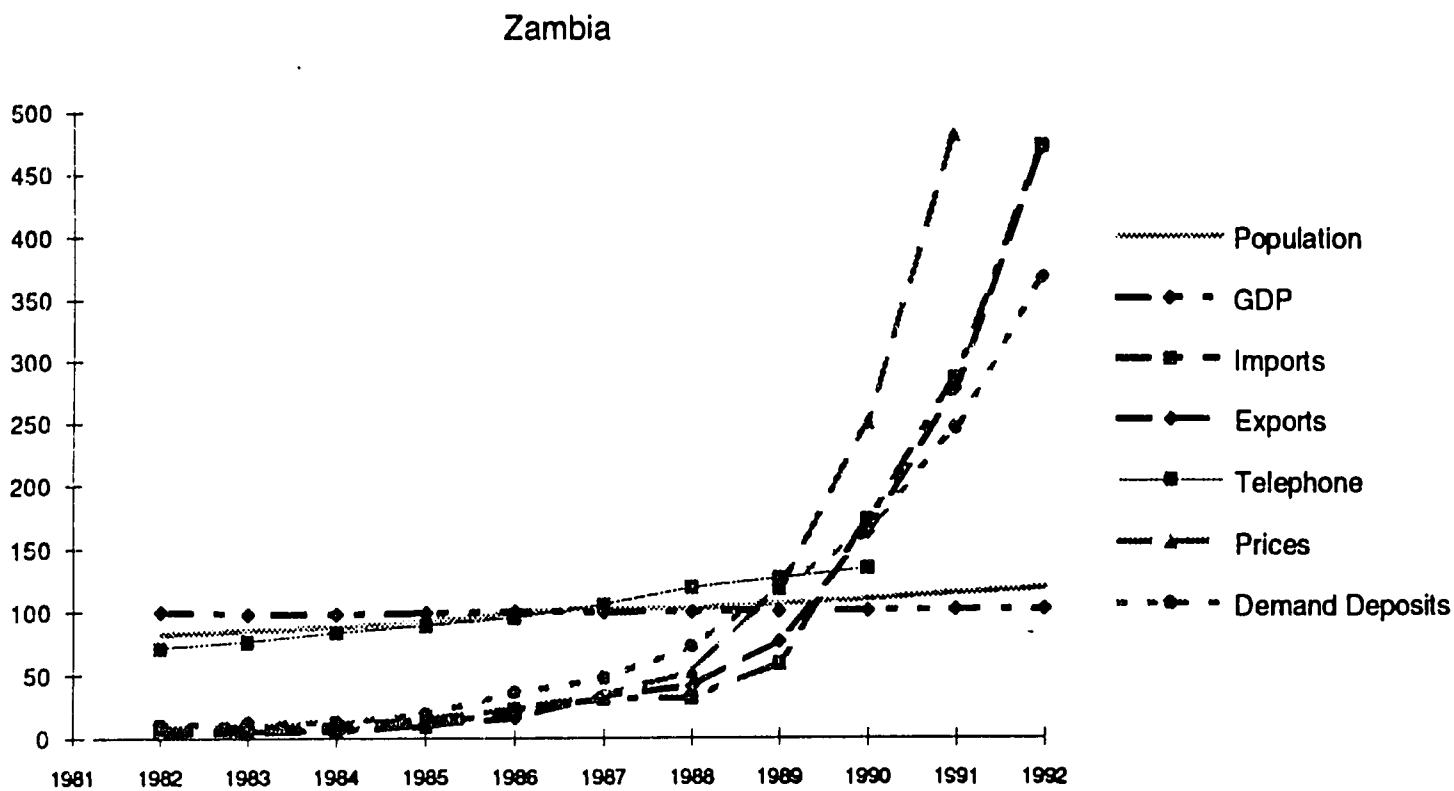


Indices of Econmic Variables

Exhibit 2-10

Exhibit 2-13 Source: Saunders, Warford, and Wellenius, *Telecommunocations and Economic Development.* World Bank, 1983

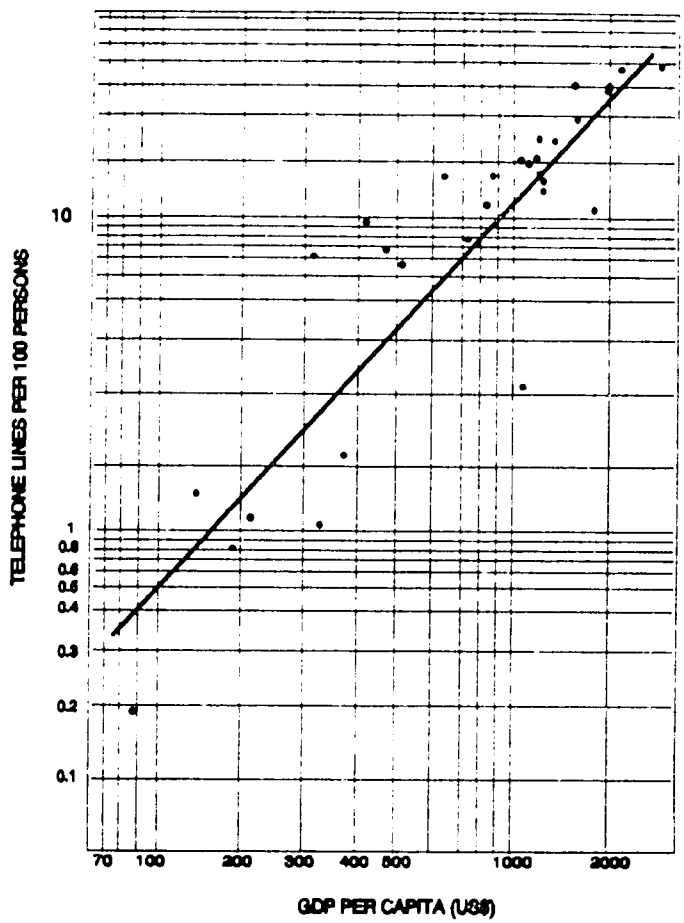
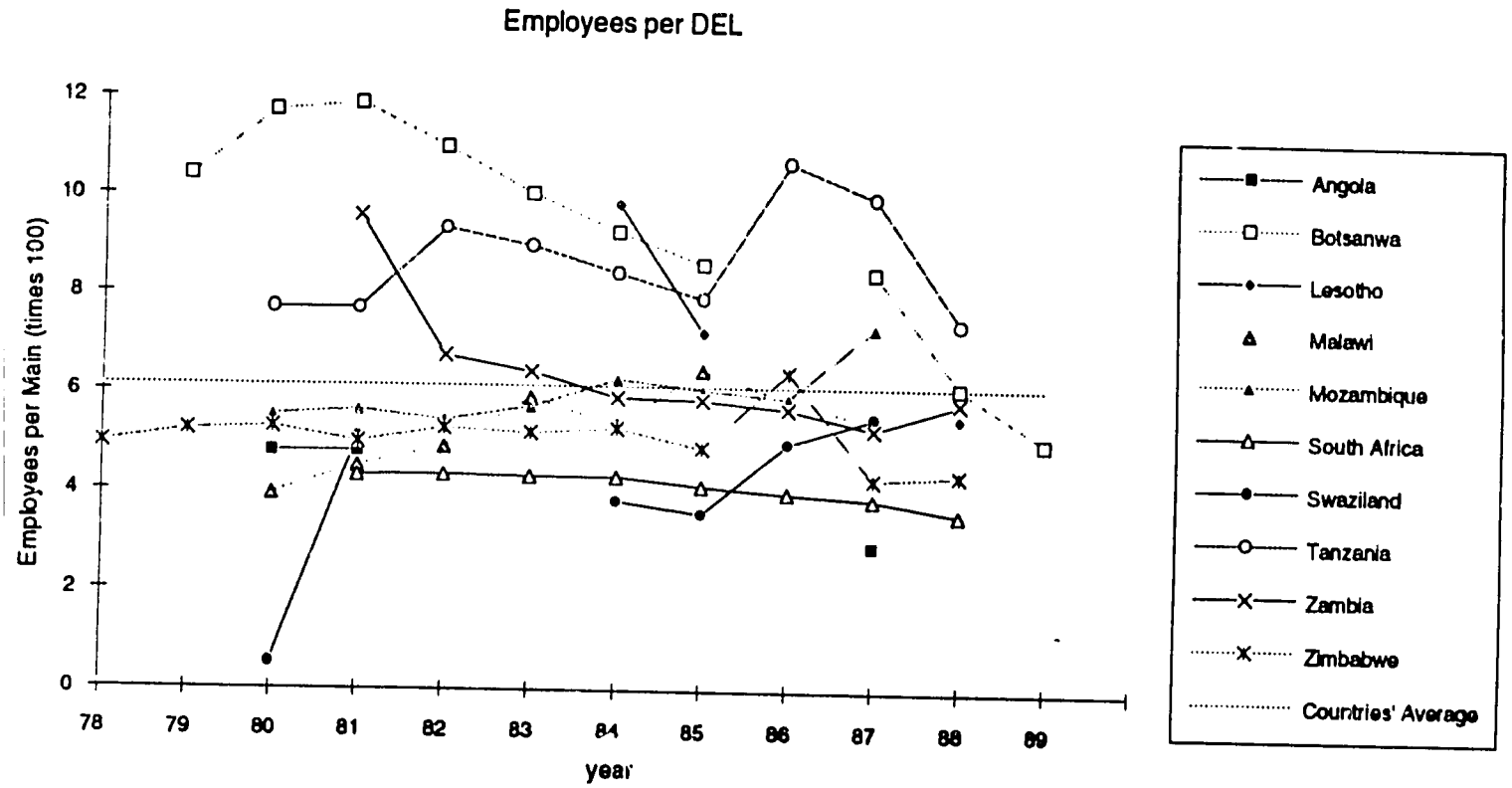
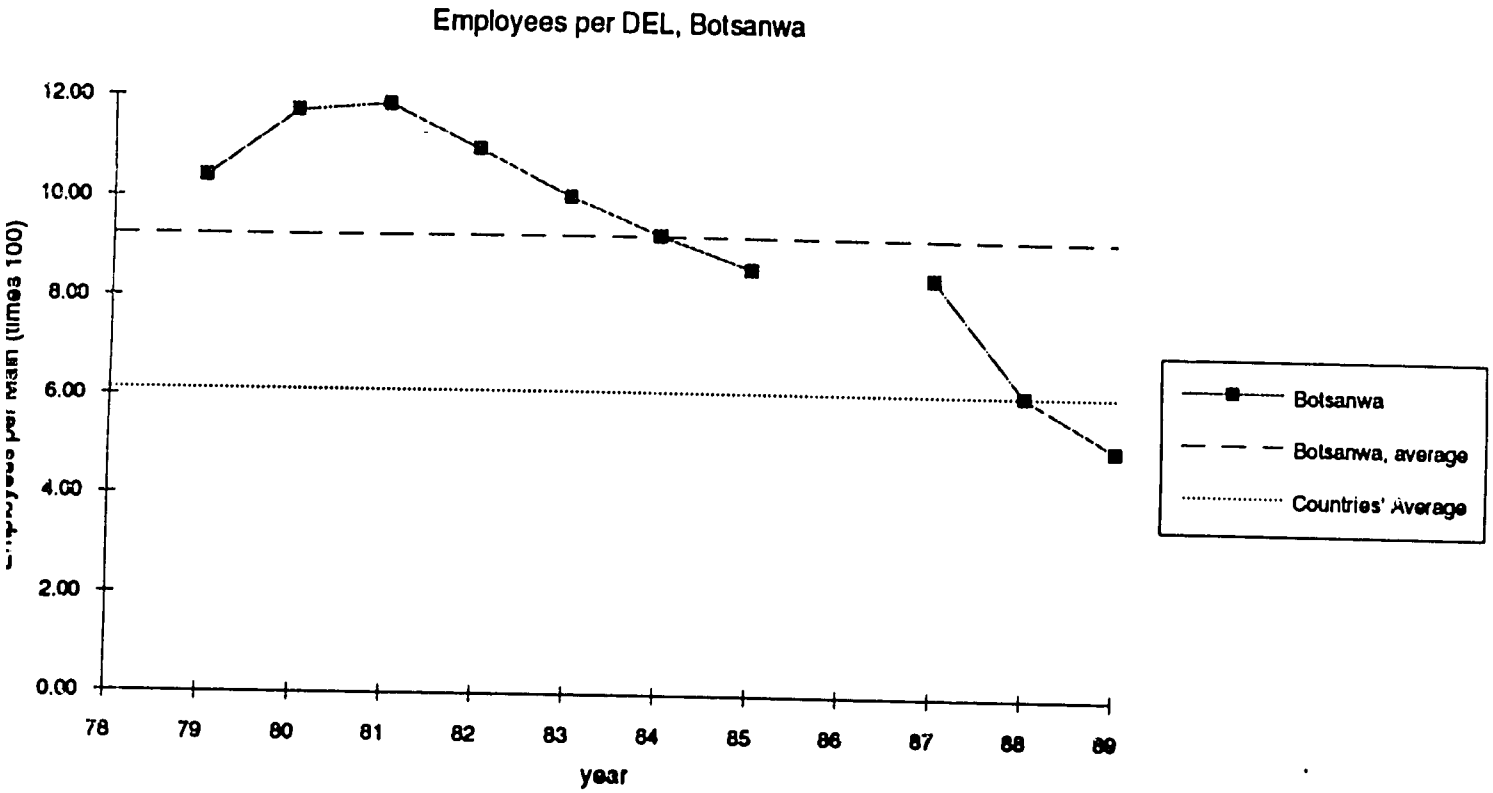


Exhibit 2-13 Correlation of GDP to Telephone Density



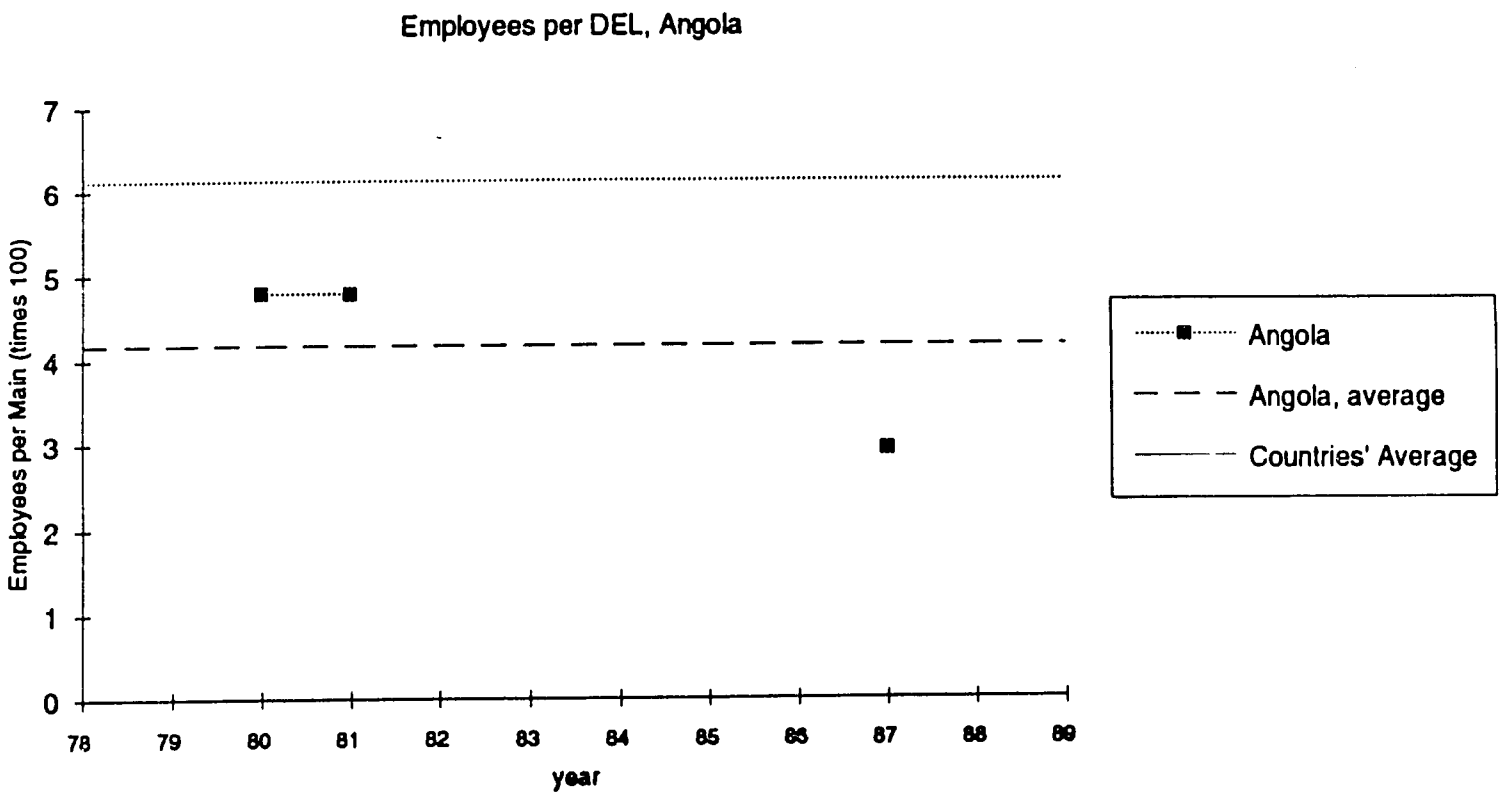
Efficiency of Telephone Provision: Comparison

Exhibit 2-16 (repeated)

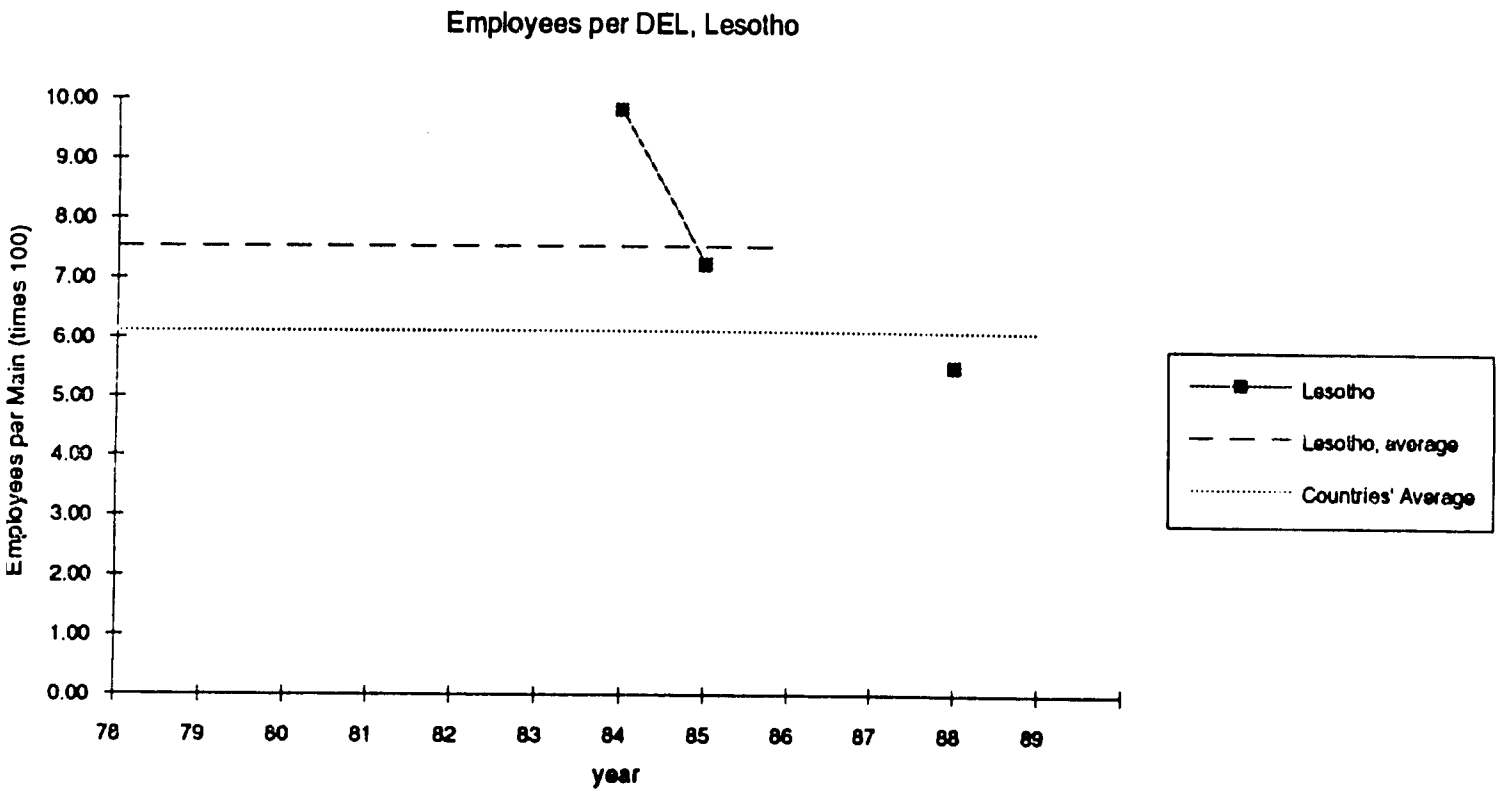


Efficiency of Telephone Provision

Exhibit 2-17

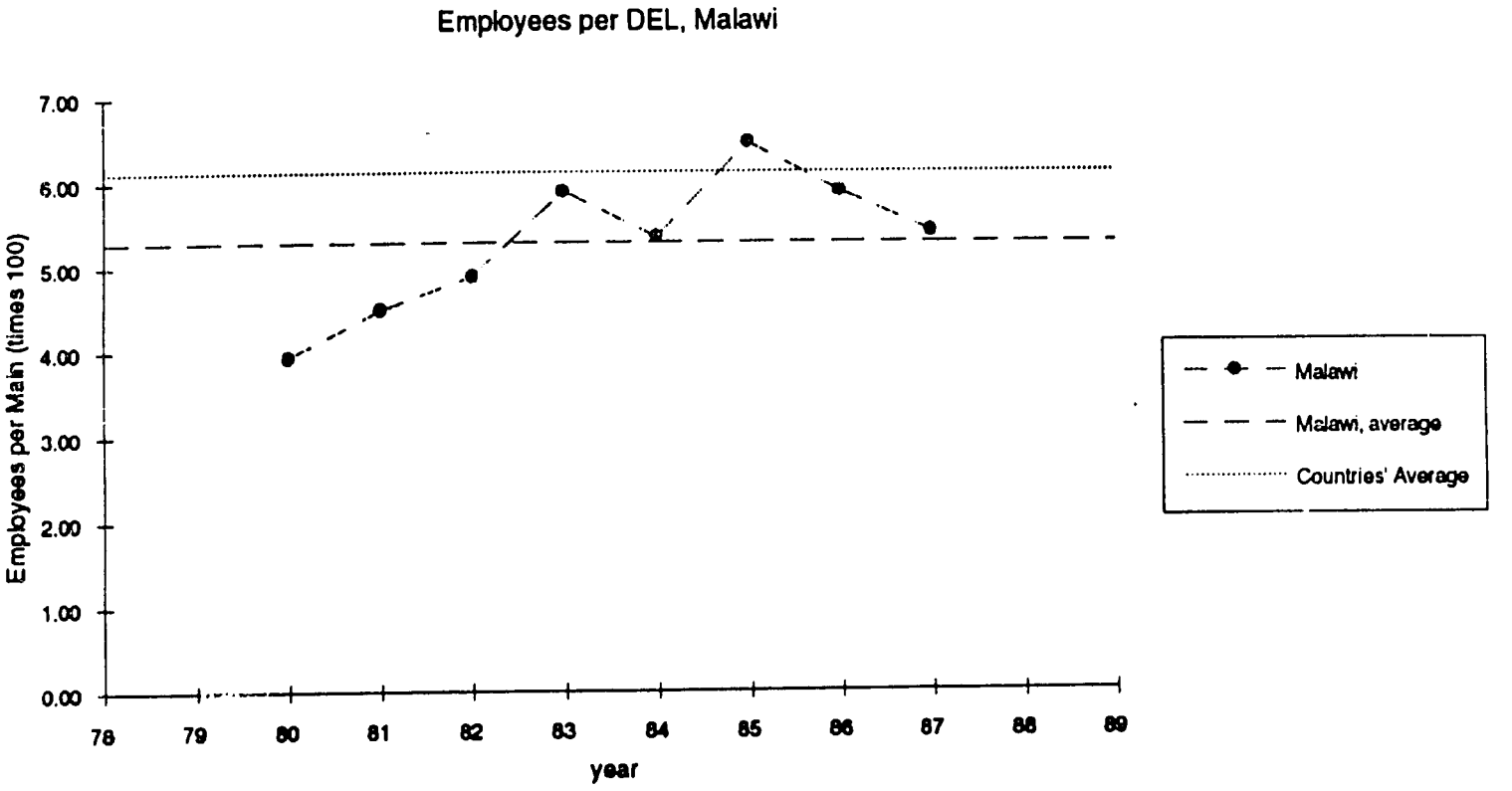


Efficiency of Telephone Provision
Exhibit 2-18



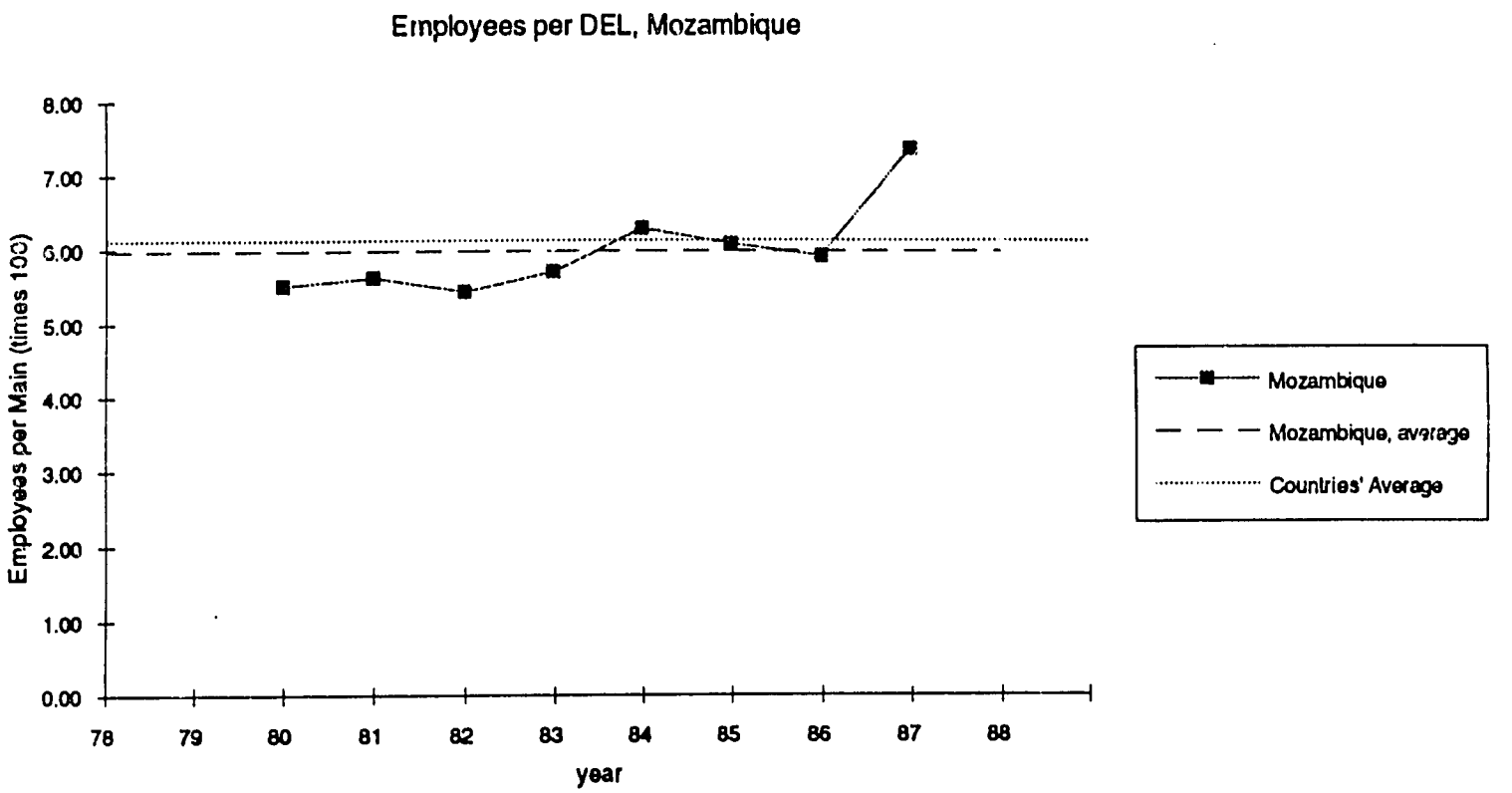
Efficiency of Telephone Provision

Exhibit 2-19



Efficiency of Telephone Provision

Exhibit 2-20



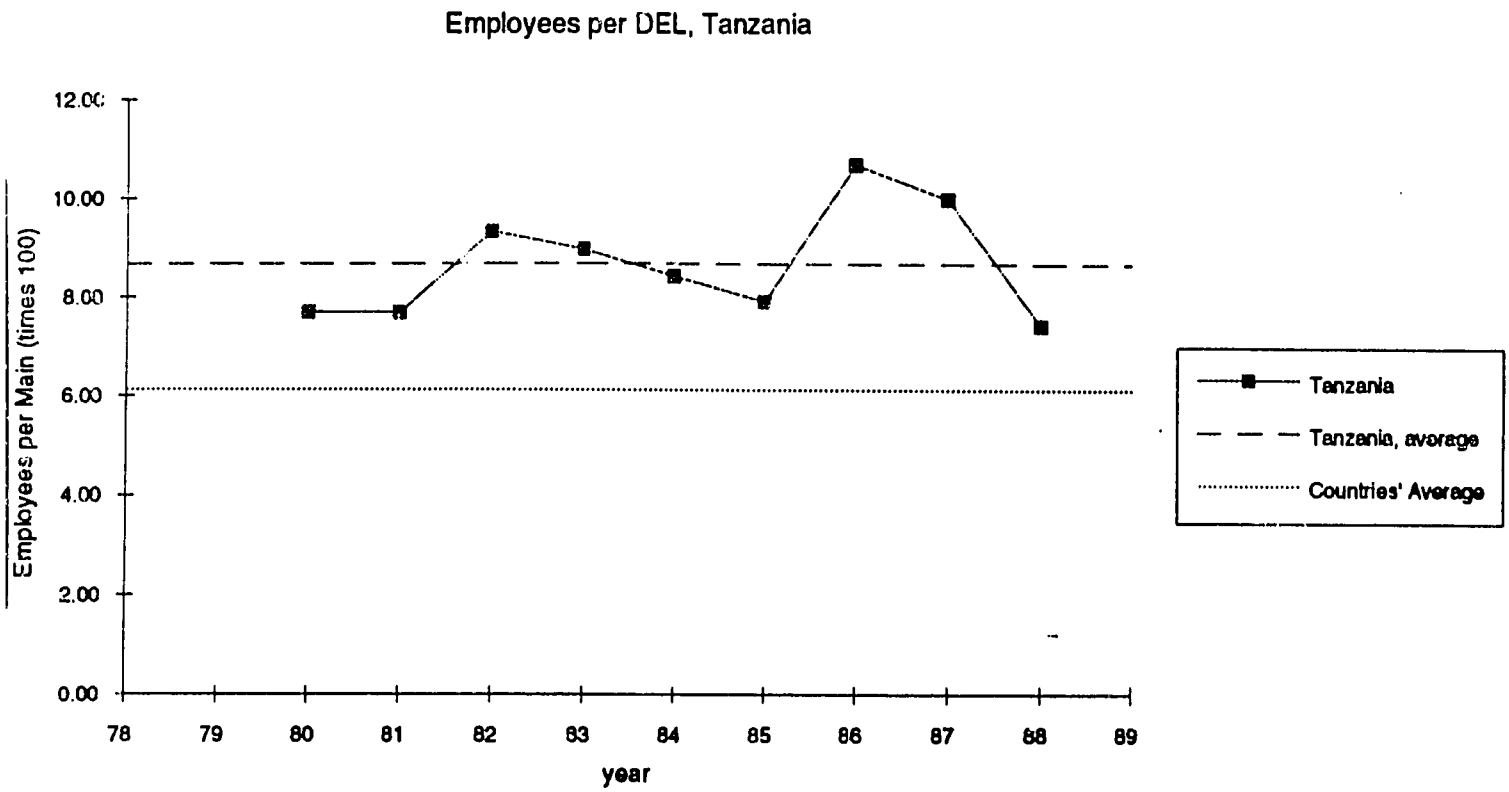
Efficiency of Telephone Provision

Exhibit 2-21

Efficiency of Telephone Provision

Exhibit 2-22

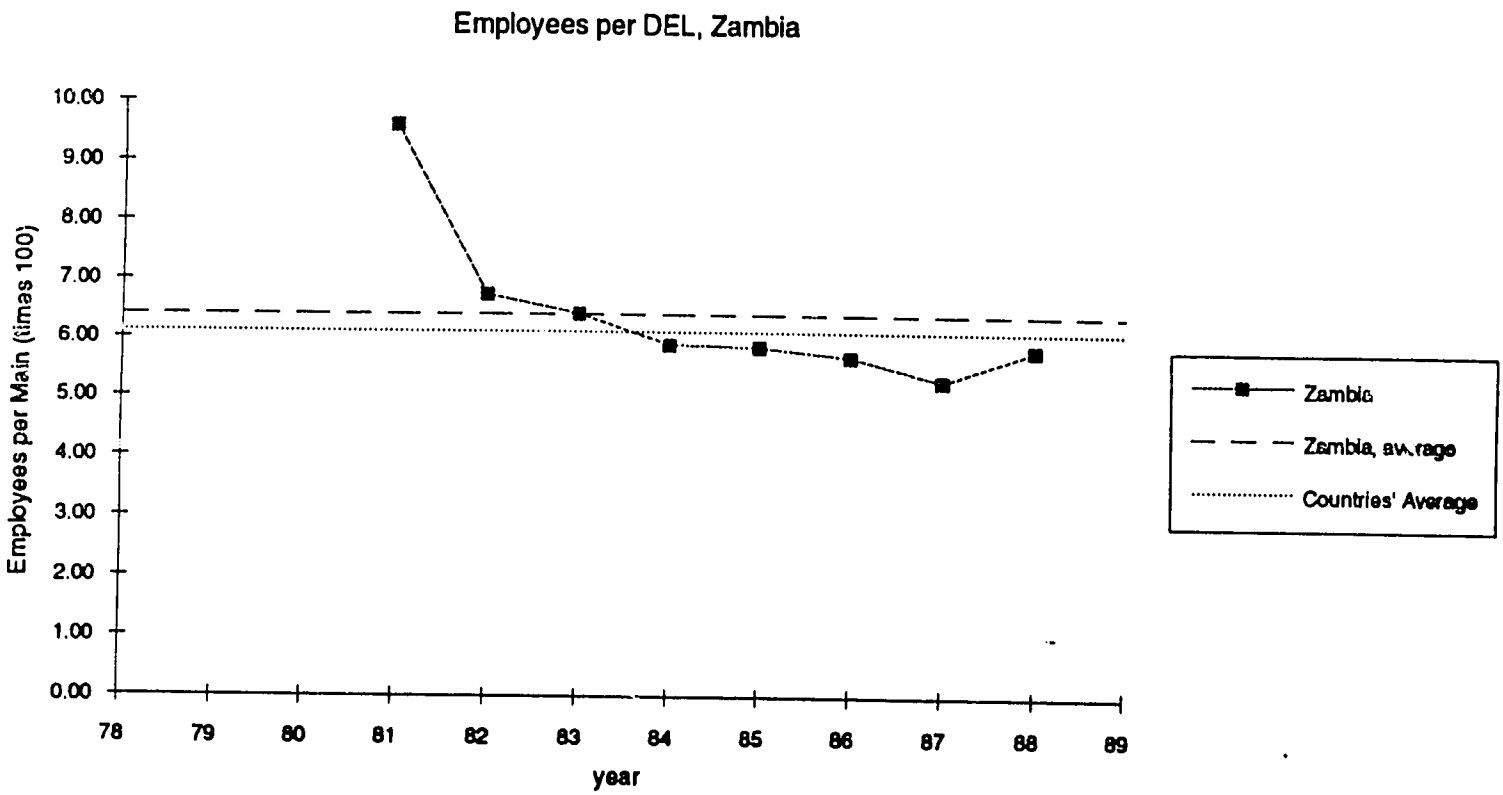
197



Efficiency of Telephone Provision

Exhibit 2-23

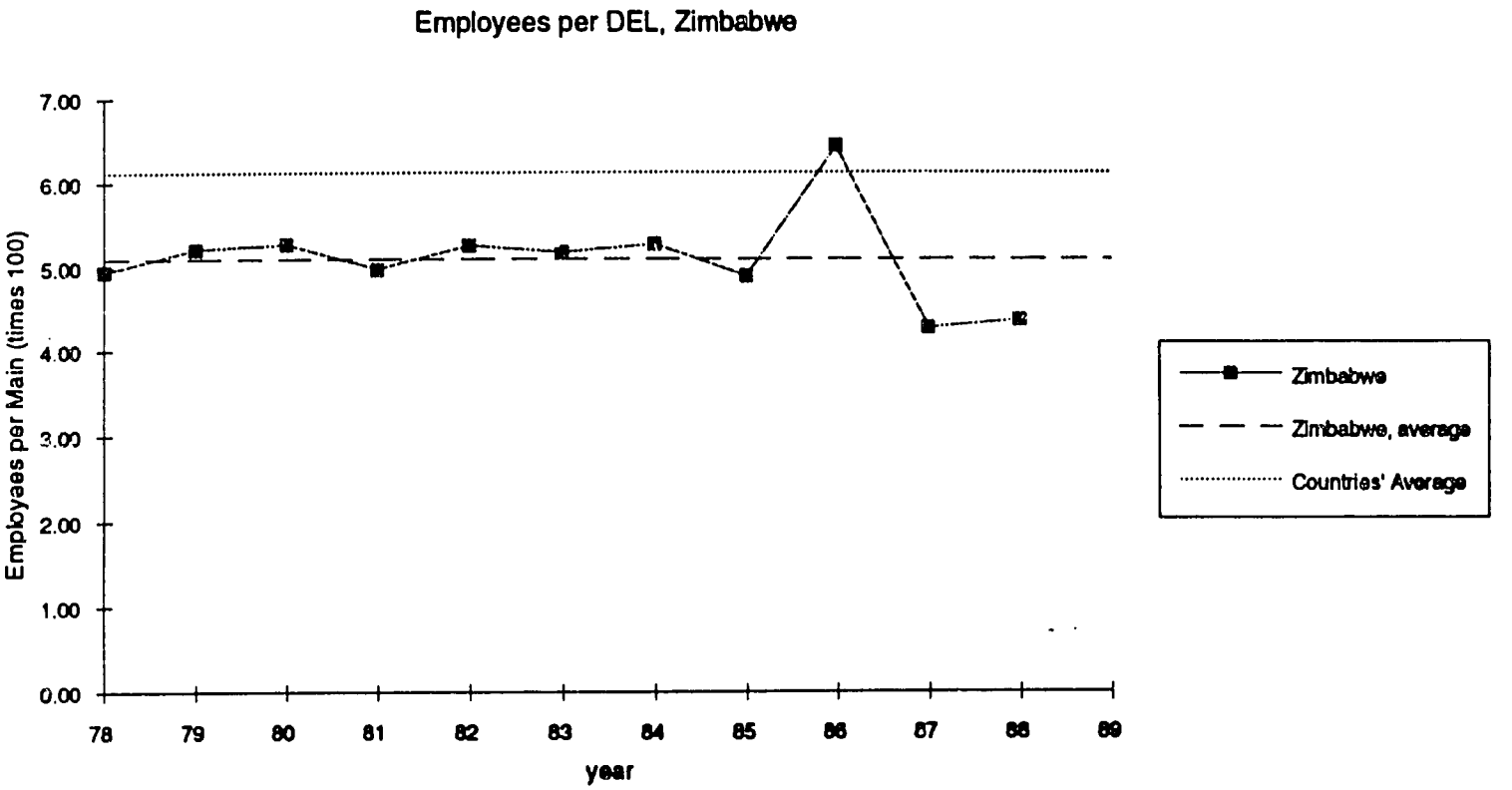
198



Efficiency of Telephone Provision

Exhibit 2-24

199



Efficiency of Telephone Provision

Exhibit 2-25

TABLES OF INFORMATION AND DATA

Exhibit 2-28

International Telephone Traffic to and from the United States and Southern Africa

1985

Country	Originating in the United States				Terminating in the United States		
	Number of Messages	Number of Minutes	US Carriers' Revenue	Paid Out to the PTT	Number of Messages	Number of Minutes	US Carriers' Revenue
Angola	7,417	87,776	$23,424	$214,172	4,377	76,529	$413,173
Botswana	9,181	108,153	$72,468	$177,103	10,598	103,775	$112,748
Lesotho	11,086	124,397	$79,763	$91,804	8,005	77,230	$57,920
Malawi	19,879	234,768	$69,850	$228,541	17,178	152,531	$152,531
Mozambique	2,892	31,178	$9,269	$76,103	3,057	40,315	$65,266
Namibia	7,313	76,015	($24,360)	$113,066	1,083	11,779	$18,466
South Africa	1,244,110	10,817,192	$315,284	$13,977,327	1,066,180	9,723,807	$13,013,939
Swaziland	14,171	144,588	$83,609	$106,465	11,656	117,729	$88,297
Tanzania	39,036	372,753	$207,408	$268,503	30,644	314,584	$235,938
Zambia	34,675	295,381	$196,488	$206,636	44,809	444,087	$303,147
Zimbabwe	62,436	637,059	$95,171	$770,341	70,360	555,640	$711,543
Total	1,452,196	12,929,260	$1,128,374	$16,230,061	1,267,947	11,618,006	$15,172,968

201

Exhibit 2-28

International Telephone Traffic to and from the United States and Southern Africa (continued)

1986

Country	Originating in the United States: Number of Messages	Originating in the United States: Number of Minutes	Originating in the United States: US Carriers' Revenue	Paid Out to the PTT	Terminating in the United States: Number of Messages	Terminating in the United States: Number of Minutes	Terminating in the United States: US Carriers' Revenue
Angol	6,649	80,592	$68,940	$192,928	2,972	49,248	$89,966
Botswana	12,845	137,263	$85,376	$238,598	15,195	102,900	$126,182
Lesotho	14,764	163,799	$85,931	$117,760	11,161	103,834	$78,830
Malawi	25,983	314,639	$81,736	$313,262	21,656	187,313	$187,313
Mozambique	4,066	43,466	$36,209	$106,464	4,263	50,745	$92,745
Namibia	11,326	123,919	($35,900)	$155,275	911	10,728	$14,202
South Africa	1,472,490	12,554,543	$1,256,014	$12,261,471	1,171,307	10,609,404	$10,622,720
Swaziland	21,558	228,760	$103,742	$163,706	14,489	125,934	$94,568
Tanzania	54,891	519,863	$214,520	$383,674	33,155	333,307	$249,980
Zambia	49,132	503,069	$245,368	$359,707	36,355	309,651	$232,238
Zimbabwe	96,698	980,189	$274,558	$934,230	94,471	776,010	$776,030
Total	1,770,402	15,650,102	$2,416,494	$15,227,075	1,405,935	12,659,074	$12,564,774

Exhibit 2-28

International Telephone Traffic to and from the United States and Southern Africa (continued)

1987

Country	Originating in the United States: Number of Messages	Originating in the United States: Number of Minutes	Originating in the United States: US Carriers' Revenue	Paid Out to the PTT	Terminating in the United States: Number of Messages	Terminating in the United States: Number of Minutes	Terminating in the United States: US Carriers' Revenue
Angola	6,167	75,138	$71,264	$173,210	5,160	67,541	$138,312
Botswana	19,411	213,853	$300,441	$198,739	24,510	187,464	$164,304
Lesotho	20,055	222,523	$107,031	$160,962	13,880	112,345	$88,650
Malawi	33,228	387,757	$104,545	$388,659	26,384	230,237	$230,237
Mozambique	5,500	58,860	$42,849	$150,870	4,258	42,748	$78,213
Namibia	17,168	180,957	$307	$172,715	1,280	14,405	$14,409
South Africa	1,853,955	14,762,670	$1,294,520	$14,518,892	1,280,486	11,695,166	$11,735,420
Swaziland	26,075	269,777	$126,329	$193,331	14,000	115,561	$86,241
Tanzania	72,749	692,267	$292,470	$505,210	27,645	250,302	$187,392
Zambia	62,998	643,507	$315,447	$461,190	52,438	412,094	$304,798
Zimbabwe	123,222	1,269,805	$580,568	$978,292	102,231	869,514	$754,493
Total	2,240,528	18,777,114	$3,235,771	$17,902,070	1,552,272	13,997,377	$13,782,469

Exhibit 2-28

International Telephone Traffic to and from the United States and Southern Africa (continued)

1988

Country	Originating in the United States				Terminating in the United States		
	Number of Messages	Number of Minutes	US Carriers' Revenue	Paid Out to the PTT	Number of Messages	Number of Minutes	US Carriers' Revenue
Angola	6,345	72,523	$77,000	$159,905	5,071	64,000	$104,899
Botswana	38,970	383,578	$317,088	$288,733	25,714	177,175	$122,883
Lesotho	26,947	282,403	$166,889	$204,967	14,091	101,380	$76,372
Malawi	45,530	511,980	$133,617	$515,520	32,977	277,699	$278,389
Mozambique	7,290	71,953	$92,578	$145,329	3,964	39,193	$63,808
Namibia	22,738	223,768	($1,541)	$215,148	7,603	73,679	$72,866
South Africa	2,499,745	17,306,245	$1,601,721	$16,952,415	1,431,140	13,080,021	$13,119,581
Swaziland	35,965	334,879	$153,440	$242,574	22,142	147,429	$108,617
Tanzania	83,531	788,242	$459,547	$559,440	27,960	225,051	$168,258
Zambia	79,809	734,634	$336,433	$541,569	65,367	523,502	$391,765
Zimbabwe	175,353	1,579,460	$822,072	$1,136,606	115,789	1,034,742	$775,852
Total	3,022,223	22,289,665	$4,158,844	$20,962,206	1,751,818	15,743,871	$15,283,290

Exhibit 2-28

International Telephone Traffic to and from the United States and Southern Africa (continued)

1989

Country	Originating in the United States: Number of Messages	Originating in the United States: Number of Minutes	Originating in the United States: US Carriers' Revenue	Terminating in the United States: Paid Out to the PTT	Terminating in the United States: Number of Messages	Terminating in the United States: Number of Minutes	Terminating in the United States: US Carriers' Revenue
Angola	9,480	101,687	$112,620	$217,127	3,653	50,012	$87,800
Botswana	70,339	583,966	$325,965	$444,344	64,786	348,737	$260,931
Lesotho	28,386	314,922	$195,553	$229,168	15,971	113,764	$85,408
Malawi	59,620	570,421	$134,654	$584,523	48,061	325,553	$326,782
Mozambique	9,484	94,290	$120,602	$190,945	3,995	29,252	$51,057
Namibia	71,596	577,606	$17,610	$550,335	36,383	341,204	$341,204
South Africa	3,036,852	19,382,976	$1,131,027	$19,607,429	1,466,441	13,416,331	$13,356,507
Swaziland	47,463	384,968	$182,479	$276,815	27,656	151,122	$109,701
Tanzania	96,646	895,575	$523,450	$636,578	25,451	187,673	$141,638
Zambia	103,471	851,172	$397,361	$630,428	96,501	697,925	$521,790
Zimbabwe	272,373	1,888,710	$1,041,494	$1,347,020	152,364	1,260,614	$941,933
Total	3,805,710	25,646,293	$4,182,815	$24,714,712	1,941,262	16,922,187	$16,224,751

Exhibit 2-28

International Telephone Traffic to and from the United States and Southern Africa (continued)

1990

Country	Originating in the United States				Terminating in the United States		
	Number of Messages	Number of Minutes	US Carriers' Revenue	Paid Out to the PTT	Number of Messages	Number of Minutes	US Carriers' Revenue
Angola		117,003	$126,775	$252,272	4,034	65,740	$96,440
Botswana	90,832	718,976	$490,237	$514,748	85,358	406,020	$304,202
Lesotho	34,946	293,501	$244,883	$197,509	19,917	113,474	$85,110
Malawi	79,959	646,621	$179,736	$663,308	58,833	373,987	$371,406
Mozambique	18,76	170,016	$226,172	$318,018	45,029	90,623	$162,584
Namibia	73,069	591,459	$105,243	$575,139	30,503	290,810	$280,493
South Africa	3,687,061	22,409,206	$3,452,843	$21,826,007	1,643,898	15,006,344	$15,032,084
Swaziland	62,030	436,688	$272,086	$315,321	33,655	177,056	$129,655
Tanzania	129,770	1,166,679	$704,282	$821,872	28,717	180,816	$135,977
Zambia	135,024	1,031,839	$548,016	$780,765	109,976	692,135	$519,118
Zimbabwe	379,050	2,331,968	$1,634,122	$1,683,025	224,750	1,520,346	$1,139,569
Total	4,701,376	29,913,956	$7,984,395	$27,947,984	2,284,670	18,907,351	$18,256,638

Source: Federal Communications Commission

ANNEX II.3

TELECOMMUNICATIONS SECTOR SCOPING STUDY FOR SOUTHERN AFRICA - PHASE ONE

SECTION II

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TELECOMMUNICATIONS SECTOR SCOPING STUDY FOR SOUTHERN AFRICA - PHASE ONE

SECTION III

POLICY AND INSTITUTIONAL ISSUES IN THE SADC REGION

(DEVELOPED BY PRICE WATERHOUSE)

SECTION III

POLICY AND INSTITUTIONAL ISSUES IN THE SADC REGION

3.0 INTRODUCTION

This section presents a country-by-country overview of issues facing each of the nations under the SADC umbrella. For each country, key information is offered related to economic impacts of telecommunications and other important facts regarding telecommunications in the following general areas:

(1) Highlights/Overview,

(2) Background,

(3) Economic and Telecommunications Objectives,

(4) Sector Structure,

(5) Ownership Options,

(6) Regulation,

(7) Competition and,

(8) Regional Organizations

The countries are covered in alphabetical order beginning with Angola in the following section.

3.1 ANGOLA

National telecommunications services have been considerably impaired as a result of the 16 -year civil war which ended in 1991 and which threatens to rekindle. More recently, telecommunications policy at the government level has not been given the necessary attention because of election campaigning since the end of the war and subsequent events following the 1992 election. Therefore, a state of uncertainty persists in the telecommunications sector. In early 1992, the government directed the two telecom operators to merge into one. However, such a merger has yet to be effected. Consequently, two telecom companies remain in practice. The larger operator continues to specialize in national telecommunications, while the smaller one focuses on international services.

3.1.1 Background

The national telecommunications operator, Empresa National de Telecomunicoes (ENATEL) has always been state-owned. Originally, it was a department linked to the postal service, but was separated from the post office and incorporated in 1980. Empresa Publica de Telecomunicacoes (EPTEL), the operator responsible for international telecommunications, was originally a private company owned by Marconi, who sold its stake to the government in 1976. Both operators are regulated by the government body, Direcao Nacional de Correios e Telecomuniacoes (DNCT).

3.1.2 Economic and Telecommunications Objectives

The objectives of the telecommunications sector are rather vague. In fact, consultants were commissioned as part of a study to clarify the aims of the sector. Broadly speaking, the objectives are to provide national and international basic telephony. The development of a national network had been severely constrained by the violence of the civil war, so the focus had been on developing a network in those geographic areas considered to be safe. This resulted in virtually no telecommunications services being provided to rural areas.

Furthermore, little investment in telecommunications was made during the war since funds were being diverted to sectors of higher priority, such as defense and food. This means that the telecommunications sector has depended upon external funding, notably from the African Development Bank (ADB) and Swedish International Development Authority (SIDA), in order to expand. Finally, the Angolan telecommunications sector faces an extreme shortage of skilled manpower required to develop a fully viable telecommunications infrastructure.

3.1.3 Sector Structure

As stated previously, there are two distinct telecommunications operators, EPTEL and ENATEL. EPTEL looks after international telecommunications while ENATEL handles national telecommunications services. Both are wholly-owned by the state.

The operations of both companies report to the Ministry of Communications, where a Vice Minister is responsible for all communications, including postal services. Supervision and regulation are conducted through DNCT. DNCT also controls and manages the radio frequency spectrum and issues licenses to entities functioning in the field of telecommunications. Its departments consist of:

- Studies, Development and Planning
- Telecommunications
- Radio communications
- Postal services
- Personnel.

In November 1991, the government approved a plan to merge EPTEL and ENATEL to form one telecommunications operator to be known as Angola Telecom. Two reasons were cited for the formation of a single operator:

(1) To make better use of the limited pool of skilled labor, and

(2) To enable the more profitable EPTEL to subsidize the less profitable ENATEL.

A presidential decree was issued in March 1992 stating that the Board of Directors (BOD) of Angola Telecom should be nominated within one month of the decree. The BOD has not been formed to date, but will be comprised of representatives from the Ministry of Communications, the Ministry of Finance and the labor union. Apparently, there are on-going disputes over specific nominations to the BOD, which have been left unresolved given the events which have dominated Angola in recent months. Only after the BOD is formed can a decision be made regarding who should occupy the position of the Director General of the newly-formed Angola Telecom. Therefore, despite agreement that only one telecommunications operator is necessary, two operators continue to exist and function as separate entities due in an unstable Angola.

The structure of the sector is likely to change once things settle. Consultants from Danish Teleconsult International have recommended that:

(1) The telecommunications sector operate as a separate and independent sector from all other economic sectors under its own government body, such as a Secretariat of Telecommunications reporting directly to the President.

(2) DNCT become Instituto Nacional de Correios e Telecomunicacoes (INCT).

(3) Posts and Telecommunications be separated to form Instituto de Telecomunicacoes de Angola (ITA) out of INCT.

(4) ITA be responsible for supervision and control of concessions, assistance and advice to the Secretary, preparation of laws and regulations, elaboration of objectives of the sector and control of their fulfillment and the control and management of frequencies.

(5) Angola Telecom be made fully autonomous.

(6) The Ministry of Finance be involved throughout the process on a larger scale.

These recommendations are awaiting final approval.

3.1.4 Ownership Options

Future developments regarding private ownership are nearly impossible to predict at present given the political situation. The most probable scenario for the telecommunications sector, however, is that the new organization, Angola Telecom, will be formed as a wholly-owned state enterprise. It could be chartered as a limited-liability company and maybe, as a later step, be partially privatized with the government being the majority shareholder. Foreign involvement is not being ruled out either since the local economy has limited capital resources. However, the government has not yet considered whether to give incentives to foreigners to invest in Angola.

Regardless, Marconi, may also be interested in holding an equity stake in the operator once again. Even though Marconi has not owned any part of EPTEL since 1976, it has continued a relationship with the company in the form of a maintenance contract to supply spare parts for equipment and to provide a skilled team to manage the maintenance program. Marconi has also recently agreed to install a domestic satellite link for ENATEL.

3.1.5 Regulation

Presently, telecommunications regulation is enacted by DNCT, and is therefore separate from the operators.

3.1.6 Competition

Currently, there is a competitive market for the supply of handsets and walkie-talkies. In addition, the government plans to issue licenses to private operators to supply, install and maintain customer premises equipment. However, the basic network will remain a monopoly under Angola Telecom. There are a number of private networks, but they are too small to be able to offer competitive commercial services to the public.

3.1.7 Regional Organizations

DNCT deals directly with SATCC. However, it has mixed feelings toward the organization since it has not been especially satisfied with services provided by SATCC. It has used SATCC consultants to try to resolve some of its problems but has found the solutions offered to be unsatisfactory. DNCT does admit, however, that it may have contributed to any misunderstandings due to its lack of communication with SATCC. SATCC has proven most useful to Angola in finding less expensive funding than the country could otherwise have obtained.

3.2 BOTSWANA

Botswana boasts the finest telecommunications network in southern Africa. The Botswana Telecommunications Corporation (BTC) has been a parastatal since 1980, is the only parastatal to pay dividends, and is run by Cable and Wireless, who have held a management contract for the past 13 years. Construction of a $100 million terrestrial digital microwave network looping around the country and interconnecting with Namibia is well underway. Its completion is the focal point of the country's capital development program. The most critical consumer issue for Botswana is the high prices which must be paid to obtain telecommunications services.

3.2.1 Background

Botswana has been independent from South Africa since the late 1960s. The discovery of diamond resources in 1972 created great wealth, much of which was maintained in government reserves. Much of the country is occupied by the Kalahari desert, shared by Botswana and Namibia. Historically, the only major urban area in Botswana was Francistown, but the recent establishment of Gaborone as the national capital has increased population concentration there as well. Other population centers tend to be small villages broadly dispersed throughout the country.

The telecommunications network is run by the parastatal organization, Botswana Telecommunications Corporation (BTC). BTC is managed by Cable and Wireless (C&W) under a long-term contract. In keeping with the composition of the country, rural service is a top telecommunications priority. In an effort to maximize nationwide service, the current focus of network development is a terrestrial digital microwave network, twisting through the country with an arm in the west connecting to Namibia.

3.2.2 Economic and Telecommunications Objectives

In seeking to maximize its independence from South Africa, Botswana needs to develop a market/economic niche of its own. The diamond industry generates income to support government provision of basic staples (e.g., food distribution during droughts), but does not by itself provide for technology and economic development. In reality, diamonds contribute to the dual nature of the economy, and the government recognizes the need to use this wealth to create an environment in which the private sector can be stimulated to lead sustainable development.

BTC has contributed a great deal to developing such an environment by providing world class services to business enterprises. Specific telecom-intensive industries with great development potential for Botswana are tourism and financial services. Although hotel and airline reservation systems have not been extensively implemented, they hold the potential to make primary tourist destinations more accessible. Development of an international financial services industry in Botswana is aided not only by ease of data communications but

also by the strength of the Pula and relaxed foreign exchange regulations. An additional application of telecommunications technology is in the area of border control, where systems are being developed to stop cars stolen in South Africa or Namibia from entering Botswana.

BTC's other role in supporting development is in providing broad telecommunications access within the population. Their mandate is to provide service to every town or village with a population of 500 or more. Service to small communities includes a public telephone (the first priority for new service initiation) and possibly telephone service to the police department, clinic, and/or school. Generally, once the public telephone is installed, demand grows quickly and BTC receives many requests for a second public phone.

BTC is moving towards meeting this objective with the construction of the digital microwave network, supported by a fiber optic backup network for the southeastern corridor between Gaborone and Francistown. As new links in the microwave network come into service, existing equipment is re-deployed to provide new service to other villages. Additionally, a packet-switched network, initially driven by the demand from the financial services sector, is currently being tested by foreign telecommunications company users. Options for providing cellular and radio service are currently under review by the Ministry of Works and Telecommunications.

3.2.3 Sector Structure

The sector is dominated by BTC, which is the only parastatal to pay dividends to the government. BTC was created in 1980 by the Telecommunications Corporation Act where the legal rights of the corporation are detailed in a section of that act, called "Telecommunications Regulations."

For the past 13 years, BTC has been managed, through a management agreement, by Cable and Wireless (C&W). Botswana's government and BTC management agree that independence from C&W is a long term objective, and the transition process has begun with the first-time appointment of a CEO who is a citizen, and not an expatriate.

3.2.4 Ownership

Botswana has an open policy regarding private sector involvement in the country, which includes a Training and Investment Promotion Association designed to stimulate the private sector. However, there is little private participation in the telecommunications sector to date. Besides such equipment suppliers as Ericsson and A.B. Nera, the only form of private sector participation in the telecommunications sector is the management contract with C&W. Currently, there is no private provision of PABX's in the country either.

There is a great deal of interest in cellular network development in Botswana, both from the private sector and from BTC. The Ministry of Works, Transport, and Communications is currently reviewing options for cellular network development, including the possibility of

licensing a private service provider. BTC has also expressed an interest in developing urban cellular networks in Gaborone and Francistown and argues that insufficient population density will render cellular operations in Botswana not sufficiently profitable to be sustained by private operators.

In-country views of privatization are mixed. Both BTC and its parent ministry recognize the potential benefits of private ownership with a share offering being particularly attractive because of the possibility of spreading ownership broadly among the population. The key perceived risk is domination of the company by another operator (probably C&W). Within the Ministry of Finance and Development Planning, opposition to privatization is largely based on a reluctance to give up a government enterprise which generates both profits/dividends and foreign exchange.

Views pertaining to the feasibility of privatization in Botswana provide an interesting contrast to the rest of the region. Where, in many SADC countries, key decision makers from telecommunications operating companies and parent ministries view privatization as infeasible due to lack of interest from buyers; in Botswana, one of the key perceived risks of privatization is domination of the sector by another operator (i.e., too much interest from a buyer). Significant exposure to a potential buyer (C&W) and a well-developed investment plan designed to meet rural service targets are largely responsible for this viewpoint.

3.2.5 Regulation

One of the most frequent complaints about telecommunications service in Botswana is the price. BTC's aggressive approach to network development is very expensive, and the entire program, while financed through government on-lending and private sector loans, is ultimately paid for through tariffs.

To change tariffs, BTC proposes new rates to its parent ministry, which reviews the proposal and then circulates it through the cabinet. Cabinet discussions enable all ministers to provide input into the final decision, which is ultimately made by agreement of the ministers. This process may take six months to a one year to complete.

There is no formal regulatory mechanism for tariffs (e. g. , price caps) and no attempt to relate tariffs to costs. As in most SADC countries, the operating company is self-regulating in that it assumes responsibility for spectrum management and handling customer complaints. There is no external review of investment programs, service quality, or sector dynamics (e.g., since there is basically no competition).

3.2.6 Competition

With no operators other than BTC, there is no opportunity for competition within the sector and no plans to explicitly stimulate competition. The closest threat of competition to BTC comes from the possibility of licensing a private cellular operator. There is an argument

against such competition based upon the small size and low population density of the country.

3.2.7 Regional Organizations

Botswana participates in SADC, SATA, ARTC, and PATU. Additionally, Botswana is part of the Southern Africa Customs Union, which affects purchasing policies.

Regional telecommunications organizations are more useful for the Ministry than for BTC as they are viewed as a forum for relevant issues providing technical expertise. Within BTC, such expertise is provided by C&W, reducing the need for centralized expertise provided by regional organizations. Accordingly, regional forums are viewed largely as opportunities to market to other operators within the region. As BTC becomes more independent from C&W, regional forums will probably gain in importance.

3.3 LESOTHO

The telecommunications sector in Lesotho is dominated by Lesotho Telecommunications Corporation (LTC), a wholly-owned government parastatal. LTC holds a monopoly on core telecom services while peripheral areas have been liberalized. LTC acts as a regulator of the industry as well as the main telephone operator in Lesotho. It also exerts significant influence over its parent Ministry in the area of policy formulation. Past government policy has placed more emphasis on transportation issues than telecommunications so telecommunications policy is oftentimes vague at best. The government's inaction stance on telecommunications policy has contributed to an acute lack of funding for the industry which, in turn, has greatly impaired telecommunications development in the country.

3.3.1 Background

LTC was created under the Telecommunications Act of 1979, when postal and telecommunications operations were first separated. Subsequently, LTC received over 15 years of technical assistance from Sweden. This support has since ended, contributing to a gradual decline of LTC's services. Little is being done to remedy this situation due to a lack of funds both from international donor agencies and the government, and to instability at senior management levels at LTC.

3.3.2 Economic and Telecommunications Objectives

Currently, telecommunications services are predominantly provided in the city of Maseru. Since telecommunications is considered essential to the growth of trade and the economy, the government has identified other key townships for development in an attempt to build up areas besides Maseru. As part of such a decentralization strategy, the LTC plans to expand service into rural development towns, in addition to improving the basic *quality* of all existing services. Additionally, LTC hopes to improve the *efficiency* of its services. It would like to be able to reduce the number of employees per line and increase the number of lines per 1000 people as they are the key measures of service efficiency.

Unfortunately, the government seems to place higher priority on transportation than on the telecommunications sector, thereby limiting the amount of funding available to LTC. The government has been very slow to guarantee loans and has given no approval to various telecommunications investment programs. In addition, over the last three years, external donors have reduced their level of investment, exacerbating the shortage of government funds.

The main obstacle to development of the country's network infrastructure, then, appears to be a chronic shortage of cash. To cope with the shortage of capital for investing in new equipment and line expansion, LTC is trying to position itself to become more service-oriented where before it had been primarily technologically-driven. To this end, it has set

up a customer service unit to deal directly with customer issues. This lets its customer base know what services LTC has to offer and, in the process, build customer satisfaction.

Poor planning has also hindered telecommunications development. For instance, the current exchange capacity in the country is 22,000 lines with only about 12,000 of those lines being utilized. Despite the apparent excess capacity, there is a 25,000-person waiting list due to poor planning for outside plant and other infrastructure. Such planning deficiencies can be largely blamed on a high turnover of civil servants in senior company positions and with discontinuity at the level of General Manager. Since Sweden ceased its involvement in 1986, there have been three General Managers, one which served only in an acting capacity.

Uncertainty about the future and an unwillingness of the government or LTC to take any initiative have not helped the planning process either. There are efforts to try to improve this situation, however, as ITU recently provided seven consultants to help LTC develop a master plan for the 20-year period 1991-2010.

3.3.3 Sector Structure

LTC is the sole provider of telecom services to the general public in Lesotho and is wholly-owned by the Government of Lesotho. It split from postal operations in 1980 to form a corporation in accordance with the Telecommunications Act of 1979. LTC still uses the post office as a collection agent for telephone accounts, but the arrangement is not working as well as initially envisioned. LTC's major customers include manufacturing companies which export products like those in the textile and tourism industries.

LTC has a Board of Directors (BOD) consisting of ten members. Except for the Managing Director and two others, the members are primarily civil servants occupying senior positions in various related government Ministries (e.g., Transport and Communications, Finance, Planning, Information and Broadcasting). The position of Managing Director is also part of the civil service and is appointed every two years. The BOD is chaired by the Minister of Transport and Communications and is accountable to the Council of Ministers in Parliament. It is involved in the setting of tariffs, as well as in the procurement of higher value items for the government.

LTC enjoyed over 15 years of continuous technical assistance from Sweden until it ended in 1986 when the Swedish General Manager left. Although LTC has been making a profit since his departure, the utility has steadily declined in the level of service it provides, despite the fact that the structure of the sector has remained unchanged.

Lesotho's government has not provided a very conducive environment for telecommunications growth either. The attitude of the government does not seem very reactive to recommendations made by Lesotho nationals working in the telecommunications sector. Instead, more weight is given to the advice of ex-patriate experts brought in through funding from international donor agencies.

3.3.4 Ownership

It is difficult to assess the likely direction of LTC ownership in the future, given the current political uncertainty in Lesotho. The World Bank has indicated that it would like to see the implementation of a privatization program by the new government. The current government has actually begun this process by naming a number of privatization candidates which currently represent a drain on the government, such as Lesotho Airways and Lesotho Bus and Freight Corporation but did not include LTC.

The government has also adopted an investment policy designed to promote development in the private sector. Corporate taxes are relatively low (around 15%), waivers are granted on customs duties on imported goods and land can be purchased by foreigners. In addition, the Lesotho National Development Corporation (LNDC) has been established to attract foreign investors to Lesotho, especially from places other than South Africa from where the country would like to reduce its economic dependence.

3.3.5 Regulation

LTC is both the regulating and operating entity for telecommunications issuing licenses on behalf of the Government of Lesotho and managing the radio frequency spectrum.

3.3.6 Competition

LTC holds a virtual monopoly in the telecommunications sector. However, it has begun to liberalize the sector by deregulating small niche markets, such as the provision and installation of fax machines. However, all such equipment still must be authorized by LTC.

LTC does permit the installation of private networks, but will only provide a license an organization to use its own network solely for internal purposes. Therefore, private networks are not available for commercial operations. Besides, organizations with private networks have made no indication that they would wish to compete with LTC in providing network services as it not likely be profitable anyway given the small size of the marketplace. Currently, banks are the largest operators of private networks.

3.3.7 Regional Organizations

The telecommunications sector has had little interaction with regional organizations, such as SATCC, PTA, and SATA. There is interest in an organization which could provide technical input, standards and bulk purchasing, but only if membership proved to be cost effective and beneficial.

3.4 MALAWI

The major telecommunications player in Malawi is the Department of Posts and Telecommunications (DPT) under the Malawi government. As the name indicates, telecommunications and postal operations are provided together under DPT. This setup is unlikely to change in the near future, but there is a possibility that DPT may soon become a parastatal. Currently, DPT regulates telecommunications with primary thrust towards the improvement of services in urban centers through digitalization and increased penetration of services into rural areas.

3.4.1 Background

Malawi has enjoyed relative stability in terms of economics and politics. However, government policies in the past have produced heavy government involvement in all economic activities including telecommunications and postal services. This is beginning to show signs of change as the government reduces its interventionist role in business affairs and begins privatizing some of its parastatals.

3.4.2 Economic and Telecommunications Objectives

DPT has placed a high priority to providing quality telecommunications services to its subscribers. To this end, it has begun an investment program to digitalize its exchanges in Lilongwe and Zomba. Another principal objective of DPT is to increase the penetration of telecommunications infrastructure into rural areas. The target for the 1980-1992 period was to ensure that no one had to travel more than sixteen kilometers to gain access to a telephone. This goal was achieved in the central and southern areas of Malawi, but not in the northern region where logistical problems relating to highland geography hampered efforts to expand the network. The new target for the year 2000 is to reduce the distance for telephone access to ten kilometers.

The main problems encountered by DPT in reaching its goals include its procurement process and the sourcing of funds. There is no manufacturing base within Malawi to produce telecommunications equipment since the domestic market is considered too small to support such an operation. Consequently, all telecommunications equipment has to be imported requiring the use of convertible currency to complete transactions. Therefore, purchases of equipment must first be sanctioned by the government, thus slowing the procurement process quite substantially.

The Ministry of Finance sources funding for telecommunications development. However, the process takes time since the telecommunications sector is heavily dependent on foreign aid for development. Frequently, there is lag between the time a decision to invest in a project is made and the time the implementation takes place due to the long process necessary to secure financing.

The sector's major users include the tobacco industry, the tea industry, financial institutions and the government. DPT has developed its services specifically to meet the requirements of these large, primary users of its services.

3.4.3 Sector Structure

Telecommunications operations are run as a government department together with the postal services. The Postmaster General is empowered under the Post Office Act to regulate and operate telecommunications services in Malawi. He reports directly to the Minister of Transport and Communications. The Ministry of Transport and Communications has little interaction with actual operations, but does direct overall policy for the sector.

More critical to the DPT is the Department of Economic Planning and Development (EPD). EPD prepares the public sector investment program including the capital expenditure plan for the telecommunications sector. Telecommunications capital expenditures represent about five percent of the total national capital budget. DPT, in consultation with EPD, determines which development projects will receive funding appropriations. Once a project is part of the national budget, the Ministry of Finance solicits financing from various international agencies. Besides capital budgeting, EPD also plays a role in the telecom tariff setting process. It reviews tariff proposals presented by the DPT and examines the impact on macroeconomics before making final recommendations.

Postal and telecommunications operations are likely to remain together for the foreseeable future. The reasons cited for this are that historically they have always been linked and the arrangement seems to work. Often the first sign of rural development is the request for a postal agency. As activity increases, telephone service soon follows. Thus, postal and telecommunications operations usually share the same premises and associated office facilities.

DPT claims that its postal operations are self-sufficient, in that revenues cover operating costs. However, DPT does not produce separate accounts for postal and telecommunications operations so there is no easy way to verify DPT's claim. It should be noted, however, that DPT does generate a profit through its overall operations.

3.4.4 Ownership

As a part of a government department, the telecommunications sector is bound by the rules and regulations of the civil service regarding operations and funding for capital and recurrent expenditures. Over the last few years, the government has been increasingly concerned over the operational efficiency of DPT and has raised the issue of converting the department into a parastatal. Additionally, the Government of Malawi has signed a loan agreement with the African Development Bank which contains a condition stipulating that

DPT become a parastatal. This conversion will likely occur within the next three-to-four years.

Furthermore, the government has decided to reduce its role in economic activities, in general, and therefore welcomes initiatives from the private sector along these lines. The government has been active in the last year in enacting enabling legislation to promote private sector development and foreign investment and has introduced the Investment Promotion Act. This law provides for a duty draw-back system, generous capital allowances, a liberal exchange mechanism for repatriating profits and dividends, and availability of work permits for expatriates who can remit two-thirds of their salaries.

The government currently controls and owns a number of organizations which, in other countries, are usually part of the private sector due to their commercial nature. To lessen its influence on the economy, the government has embarked on a privatization program to divest itself of these non-traditional operations. Consequently, several parastatals have already been released to the private sector. For those parastatals it wishes to retain, the government is trying to build their commercial orientation and self-sufficiency, so that the companies can be gradually phased out of the national budget.

DPT has been pegged for retention since many in the government believe that the telecommunications sector is too strategic to be privatized. Fears revolve around concerns that the government would lose its control over development of the network and that a privatized telecommunications operation would forsake unprofitable areas of the business, such as rural access. Also, the private sector in Malawi is too small to absorb the entire telecommunications operations of DPT and hence, privatization would require foreign investment of some kind. Fears have been expressed that a foreign investor would repatriate its share of the profits, thereby draining Malawi's hard currency reserves and ultimately harming the country's fragile economy.

A stock flotation of DPT is presently a viable alternative to a negotiated sale since there is no stock exchange system in Malawi. The general public, therefore, would have no access to ownership through the buying and selling of shares.

3.4.5 Regulation

The Post Office Act empowers the Postmaster General to regulate the telecommunications sector, including control over radio licenses and radio bands. Malawi has a monitoring station which reports to the International Frequency Registration Board (IFRB) of ITU. Thus, DPT acts as both a regulator and operating entity. In the event that the DPT becomes a parastatal, the government would likely retain its role as regulator, splitting it from the operating function.

3.4.6 Competition

DPT holds a monopoly in all facets of telecommunications, except customer premises equipment. The private sector is currently supplying some users with PABXs and fax machines but all such equipment must be approved by the Postmaster General to ensure compatibility with DPT's network. Despite liberalization, private sector involvement is still limited with companies like Plessey, Ericsson and Bitronics maintaining presence in Malawi.

A few organizations, such as the railroad, have their own internal telecommunications networks, but these networks are too small to operate commercially. Besides, government policy does not presently encourage competition on the network level anyway.

3.4.7 Regional Organizations

Malawi is very active in SATCC, SATA, ITU, and ARTC. In fact, the Principal Secretary of the Ministry of Transport and Communications is a member of the coordinating committee of SATCC. Malawi is also part of the RASCOM satellite consortium, and houses the Multi-Country Training School which serves Botswana, Swaziland and Lesotho.

3.5 MOZAMBIQUE

The most interesting components of Mozambique's telecommunications sector are:

- Its private sector participation in the form of joint ventures with Telecomunicacioes de Mocambique (TdM) and,
- The sector reorganization currently being implemented providing an impetus for development of a regulatory framework.

TdM is involved in six joint ventures with Portuguese and Swedish partners, providing services such as directory production, consulting, outside plant installation, alarms and security systems, data transmission, and terminal equipment. Other private sector involvement comes in the form of private firms providing terminal equipment licensed by TdM.

The dual objectives of the reorganization of the telecommunications sector are to consolidate finance and operations functions within TdM and to establish sector regulation and oversight functions within the government. Organizationally, this is to be accomplished by converting TdM from a state to a public enterprise and replacing the National Directorate for Posts and Telecommunications (NDPT) with an independent regulatory body, the National Communications Institute (ICM). Critical functional issues associated with such organizational changes include developing a skilled work force within TdM and formulating regulatory policy to guide the ICM.

3.5.1 Background

The most dominant factors in the general environment in Mozambique are war and the famine. These crises are draining government resources, leaving little to devote to managing state enterprises, including TdM. Accordingly, the government is currently working towards reducing the burden of state enterprises.

Law 17/91 set up a Program of Economic Rehabilitation, requiring all state enterprises to cease to exist in their current form, becoming either public enterprises or candidates for privatization. Each state enterprise must formulate a plan to reorganize into either a public or private enterprise and submit a proposal to the Council of Ministers. Enterprise transformations began in early 1993.

3.5.2 Economic and Telecommunications objectives

The objectives of the Economic Rehabilitation Program are to improve operating efficiency and profitability of state enterprises by transforming them into public or private enterprises. Either way, the enterprises themselves would be responsible for financing operations, thereby reducing the management burden on government. The key difference between an

entity operating as a state enterprise and the same entity operating as a public enterprise is that management of the public enterprise has greater autonomy in cost and revenue management, financing, and budgeting.

Rural service is a high priority where it is TdM's objective to integrate all major towns by linking provincial capitals to district exchanges. Unfortunately, the war has delayed development of terrestrial rural network links. Accordingly, near-term priorities for technical network development focus on satellite, cellular, and radio communications. A joint venture, preferably with a foreign partner, is anticipated for domestic cellular service, and both cellular and radio transmission are being considered for maritime communications.

The other major problem faced by TdM in improving the network is staff constraints. End users are most likely to complain about delays in installation and repairs, operator service, and service quality. Although both line and switching capacity are nearly sufficient, low connection rates attributable to a shortage of qualified staff keep penetration rates low and waiting times long.

3.5.3 Sector Structure

The sector is undergoing a current reorganization consistent with overall economic policies. According to law 15/91, all state enterprises are subject to review to determine their near-term disposition. Original recommendations to either privatize or convert state enterprises to public enterprises were due by November 1992.

The telecommunications and postal enterprises are currently separate, but until January 1993, were administered by a common government organization, the NDPT. The NDPT has been disbanded as part of the reorganization of the sector and many of its functions transferred to the newly-created regulatory body, ICM. TdM and its parent ministry comprise the major players in the sector and their operations are fairly free from interference from the rest of the government.

3.5.4 Ownership

In keeping with recommendations made in association with law 17/91, the telecommunications entity is to be converted to a public enterprise, in which case it would remain owned by the government. Factors contributing to the decision to commercialize rather than privatize include network development requirements and difficulties associated with the war.

Beside the main operations, TdM is a participant in six joint ventures, five of which are joint ventures with Portuguese partners and the sixth with Swedtel. The joint ventures participate in the following segments of the telecommunications sector:

- Directory services

- Data transmission
- Terminal equipment
- Outside plant network (particularly underground cables)
- Alarms and security systems
- Telecommunications consultancy

TdM's stake in each of the joint venture companies is 50%, with the balance owned by the foreign partner.

3.5.5 Regulation

Mozambique is developing a new regulatory structure for the telecommunications sector since ICM began operations in January 1993. ICM replaces NDPT and is responsible for all forms of regulation of the sector. Shortage of qualified staff is a major constraint for ICM so they are being supported by expertise provided by Portugal (which has a similar regulatory body) and Sweden.

To date, TdM is largely a self-regulating entity. As in most SADC countries, there is no formal licensing process for the dominant carrier; and no external regulation of service quality, network investment, customer relations, new product introductions, or competition. Tariffs are currently revised every six months and are subject to approval by the National Committee on Salaries and Prices. One of the first functions assumed by ICM was radio spectrum management. Because of the staffing constraints, the appropriate individuals from TdM are being transferred to ICM to perform this function.

ICM is also responsible for sector oversight and research. This includes reviewing investment plans, promoting competition, and stimulating key new markets, such as maritime communications. The future of price regulation remains uncertain, although TdM is currently working to develop an automatic tariff adjustment mechanism for inflation. No automatic adjustment for exchange fluctuations is anticipated. It is anticipated that ICM will analyze tariff proposals and will have substantial influence in the approval process. ICM will generate revenues by charging licensing fees to radio broadcasters, import fees on equipment, and other fees to operators as appropriate. It is expected to be self-financing.

3.5.6 Competition

There are no formal obstacles to competition in the Mozambican telecommunications sector. Joint ventures are well accepted by TdM, since foreign direct investors require local partners, but foreign equipment manufacturers may sell directly in Mozambique (once equipment has been licensed). Theoretically, all joint venture markets are completely open to competition from anyone wishing to participate. In practice, however, TdM's domination of the telecommunications sector may be a significant obstacle to other firms interested in entering these markets.

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For example, TdM's access to information provides a competitive advantage to its directory subsidiary. More intricately, the outside plant company in which TdM holds an interest is likely to win more contracts to do outside plant work than its competitors because TdM is the only entity purchasing these services.

In addition to the anti-competitive nature of TdM's involvement in joint ventures, competition in the sector is damaged by the TdM's current self-regulating status (e.g., radio spectrum management, licensing competitors). It is unclear whether the ICM will eventually regulate competition within the whole telecommunications sector, or just within each segment of the sector. In the absence of formal oversight, however, competition is unlikely to flourish.

3.5.7 Regional Organization

TdM is involved with many of the international organizations active in the region, including SATA, PATU, SATCC, and the ITU. Coordination with neighboring countries is largely beneficial to Mozambique due to its scarce access to the coast.

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3.6 NAMIBIA

Current developments in Namibia include:

(1) the recent (as of August 1, 1992) transition of the country's telecommunications function from a government department into a holding/operating company structure,

(2) the not-yet-completed separation of telecommunications from postal services and,

(3) the definition of a regulatory framework for the industry.

Competition is virtually nonexistent in the market, and does not appear to be a priority of the government. Privatization may be a long-term option, but current priorities seem to be focused around commercialization and development of international links to reduce dependence on South Africa. There are no plans to regulate prices or de-monopolize the sector.

3.6.1 Background

The telecommunications sector has recently been reorganized from a government department into a parastatal. Accordingly, Telecom Namibia is not presently included in budgeting or long term planning efforts. The telecommunications sector will support the government budget by providing tax revenue, interest income, and, eventually, dividends, but the revenue impact of the reorganization has not been quantified.

Until this year, telecommunications in Namibia was provided by the government through the Department of Posts and Telecommunications of the Ministry of Works, Transport and Communication. The recent reorganization created a government-owned holding company (Namibia Post and Telecom Holdings Limited) which, in turn, owns two operating companies (Telecom Namibia Limited and Namibia Post Limited).

Telecom Namibia is responsible for telecommunications services, while Namibia Post has responsibility for postal services and the postal service bank. Issues remaining unresolved include whether the bank will be separated from the postal service and how shared facilities will be divided.

3.6.2 Economic and Telecommunications Objectives

The most pervasive theme of the Namibian economy is the recency of independence from South Africa. Long-term planning is preempted by the need to organize and mobilize resources in the short-term to cut economic ties. This includes the need to review policies and procedures and make the economy representative of priorities of the Namibian

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government rather than an extension of South Africa. Government objectives presently focus on attracting foreign investment and development of productive (i.e., manufacturing) economic sectors.

From a policy standpoint, international network development is a critical issue. Currently, all international traffic is routed through South Africa. This arrangement hinders independence because of both transmission and currency issues since, without South Africa, Namibia would be unable to communicate internationally. Also, under this scenario, South Africa receives most of the revenue generated by Namibia's telecommunications traffic. While the current network expansion initiatives will facilitate international traffic within the region (a microwave link is being constructed to link to Botswana), direct satellite access is the top priority.

A second priority for network development is replacing outdated manual switching equipment with new switches utilizing new digital technologies. This will improve transmission quality and allow for increased switching capacity as the network expands. Less immediate priorities include providing service to the northern part of the country along the border with Angola and the Caprivi Strip and, forming a joint venture to develop a cellular/mobile network.

An administrative priority for Telecom Namibia is to develop an effective, automated billing system. The billing system is not presently adequate to meet the information needs of the company and will likely distort tariff development procedures. The system requires manual transfers of data, and hinders billing and collection. Billing is done based on a pulse system, where pulses are measured by external equipment. The rate of pulses is accelerated for different distance bands, thus reflecting a differential pricing structure, captured in the operating, rather than the billing system.

3.6.3 Sector Structure

The reorganization should provide greater autonomy to the operating companies regarding investment planning and financing decisions. Such planning will be executed at the operating company level and will be approved by the holding company. The government, as the sole shareholder, will have representation on each of the Boards.

The holding company will resolve any necessary settlements between the postal and telecommunications operating companies. Although the exact nature of such settlements is presently undefined, it is expected that the most significant will be a direct subsidy of postal operations from Telecom. This subsidy will be handled by the holding company on a pre-tax basis. Other settlements may include reimbursement from Telecom to Posts for billing collection functions performed by local post offices and reimbursements from Posts to Telecom for transmission services such as telegraph.

Consistent with the general approach toward foreign investment within the country, Telecom Namibia is open to possibilities of joint ventures with foreign partners in some industry segments, particularly cellular/mobile service. Development of these lines of business, however, is not an immediate priority.

It is expected that the company will have sufficient autonomy to raise its own funding but, due to the advantages of international donor funding, this will probably continue to go through the Namibian government according to donor terms. The next step in the commercialization process is development of performance contracts between the government and the company.

3.6.4 Ownership

Telecom Namibia is owned by Namibia Post and Telecom Holdings Limited, which is, in turn, owned by the government. There are no current plans to privatize the company, but the government intends to keep open its long-term options. Although not directed by long-term privatization objectives, the recent reorganization and pending commercialization of the company might be viewed as early preparation for privatization.

Prior to reorganization, the company was a wholly-owned government department. While the government remains the ultimate owner, assets have been officially transferred to the company as both debt and equity. The company is required to pay interest to the government on the debt (2/3 of total assets) and dividends based on the equity investment (1/3 of total assets), although these requirements will not be strictly enforced until after an initial transitional period.

According to the Ministry of Finance, general government policy is to retain ownership of all enterprises which cannot be better provided by the private sector. Due to constrained capital and expertise, opportunities for the local private sector to improve service provision appears limited. Accordingly, the government has implemented liberal foreign investment policies (investment requirements, repatriation of profits, loose exchange regulations and a taxation policy still under consideration), but is wary of selling off key services to foreign investors. A local stock market is being developed by private investors, but the larger Namibian companies are expected to keep their listings on the Johannesburg exchange in South Africa.

3.6.5 Regulation

Reorganization of the government department into parastatal holding and operating companies has focused attention on the need for a regulatory framework. The National Communications Commission (NCC), initially established to regulate broadcast communications, will also assume responsibility for telecommunications regulation. The regulatory structure follows the FCC model of the U.S. where the NCC is an independent

government body supporting itself through licensing fees and regulating television, radio, and telecommunications industries.

The scope of regulatory functions performed by the NCC is of some interest. The NCC is responsible for radio spectrum management and equipment licensing, but will have no jurisdiction over tariffs, industry structure, competition, investment planning, or customer service. Some of these issues (e.g., investment) will presumably be addressed by the performance contract. Due to the lack of qualified staffing available for radio spectrum management within NCC, this function will be performed by Telecom Namibia as an agent for the NCC.

Notably, there are no plans to implement a mechanism for regulating telecommunications prices in Namibia. The legal framework establishing the operating company guarantees an exclusivity period, and so creates an unregulated monopoly. The only involvement government has in setting rates is through its role as majority shareholder.

3.6.6 Competition

The only segment of the market where competition presently exists is in the terminal equipment market. The government licenses providers of PABXs and fax machines, but all network users must rent handsets from Telecom Namibia. Subscribers may purchase additional handsets and use them in place of the Telecom Namibia handset, but cannot opt not to rent one.

No competition is anticipated in the near-term for services provided by Telecom Namibia. A packet switching network exists, but there is no market for resale of services in the value-added segment. Telecom Namibia does not believe that competition in the cellular/mobile segment is feasible.

3.6.7 Regional Organizations

Areas where regional coordination may be perceived to offer the greatest benefits include harmonization of technical standards, settling border disputes (e.g., radio spectrum management at the border), and consolidating research and training functions. Bulk purchasing arrangements are not likely to be useful, as the economics of purchasing are distorted by international donor arrangements.

A final role identified for SATCC is to ensure that projects are completed, consistent with earlier findings, and implemented.

3.7 SOUTH AFRICA

Telkom SA Limited is the leading telecommunications operator in South Africa. It serves two distinctly different markets, the business community which expects state-of-the-art, world class service, and the rural community which requires basic access to telecommunications. The entire telecommunications sector is in the process of reorganizing, whereby the regulatory function is being separated from operations. The precise nature of the new regulatory mechanism has yet to be agreed upon.

Telkom has a virtual monopoly, but the government does plan to liberalize the telecommunications sector to allow competition, especially in peripheral services such as mobile telephony. The government is also not ruling out competition at the base network level in some regions, either. Other smaller, government-run telecommunications operations do exist in the regions known as the "homelands." In manufacturing, telecommunications equipment is a separate industry from telecommunications operations and sustains several South African firms.

3.7.1 Background

In 1991, Telkom was converted from a government departmental body to a wholly-owned corporation of the government. The government debated whether or not to take the corporation one step further and privatize Telkom, but for now, has decided to see how Telkom fares as a corporation before proceeding with privatization.

3.7.2 Economic and Telecommunications Objectives

Telkom's mission statement reads:

"We are dedicated to being Africa's leading and most respected provider of excellent telecommunications and information services and products that satisfy the needs of our clients whilst fulfilling our social responsibility and maintaining a sound financial structure."

Telkom's objective for its services are two-fold, in order to meet the very different needs of the two market segments:

1) to satisfy the sophisticated requirements of the business community; and

2) to expand the network into rural areas to increase penetration.

In addition, a third objective of Telkom is to improve its financial footing. The company inherited a high debt-to-equity ratio (around 3:1) from its days as a government department. Telkom is aware that it needs to increase revenues in order to cover debt, and hopes to do so through increased marketing of its services and more efficient utilization of its existing

network. A constraint to this however, is that Telkom is now in the middle of a major program to convert its analog equipment to digital, requiring huge capital outlays.

Several obstacles stand in the way of Telkom reaching its objectives. They include:

- the large debt servicing requirements;
- the agreement at incorporation that there would be no labor reductions as a result of commercialization. Telkom has a work force of around 66,000;
- the high transmission costs to cover the large geographic areas required to reach pockets of urban development and rural centers;
- the scarcity of commercial/business expertise for filling management positions and,
- the difficulty of changing Telkom's culture from being technologically-driven to being more market/customer-oriented.

Telkom does not manufacture its own equipment, nor is it contemplating doing so, since there are already a number of manufacturers of telecommunications equipment in South Africa, some of which compete both domestically and internationally. About 90% of Telkom's equipment is purchased from South African companies.

3.7.3 Structure

Prior to October 1991, the Department of Posts and Telecommunications (SAPT) was responsible for running both telecommunications and mail handling operations in South Africa. Telecommunications operations, therefore, fell under a government department which acted as both operator and regulator. As of October 1, 1991, the "Post Office" split into two companies; SAPO, handling the postal side, and Telkom SA, handling the telecommunications business.

Telkom is simply an operating entity and is not permitted by the Post Office Amendment Act to make regulations or issue licenses. SAPT itself remains as a skeleton operation, responsible for administering legislation contained in the 1991 Post Office and Radio Acts. The restructuring of SAPT was discussed for several years before it was actually implemented, due to the opposition raised by various quarters in parliament, as well as by POTWA, the post office union. The restructuring had its foundation in a 1989 report by Wim de Villiers, entitled *"Strategy, Policy and Structure of the Post Office."*

Telkom SA Limited remains wholly-owned by the government, but operates as an independent, autonomous company. Accordingly, it is subject to corporate taxation, is allowed to make dividend payments to its shareholders (i.e., to the government), and must

comply with the disclosure requirements of the Companies Acts. Telkom has a Board of Directors which includes a Managing Director (who is the only Executive Director), reporting to the Minister of Transport and Posts & Telecommunications.

All members of the current Board were appointed by the government after the incorporation of Telkom and are business executives with varied backgrounds (e.g., none are civil servants). The Board is responsible for setting the strategic direction and policy of Telkom and ensuring that these plans and policies are carried out. It also makes recommendations on tariffs for approval by the Minister.

Besides the Board of Directors, there is also an Executive Management Board consisting of the Managing Director and Senior General Managers. Appointments to these positions are made by the Board of Directors in agreement with the government. All current members, except the Senior General Manager of Finance (who was recruited from the private sector), previously held senior positions in the SAPT. The Executive Management Board is responsible for the day-to-day management of Telkom in accordance with the plans and policies set forth by the Board of Directors.

Telkom, has redefined its core businesses and has reorganized itself to address corporate clients, client services, international services, and information services. Staff and line functions have also been refocused so that they support operational divisions. These divisions now have direct responsibility for profit and loss, through the management of product revenue and profit generating activities. The delegation of authority has been completely revised to empower staff to make decisions directly, and thereby make real contributions to the company.

Telkom now has a somewhat remote relationship with SAPO, based solely on commercial issues. Currently, SAPO has a contract to cover the settlement of Telkom accounts with the post office and another to cover the provision of telephone and data services by Telkom to the post office. There is no direct cross-subsidy from the telecommunications operation to the postal operation. However, the government does use dividends and taxes raised from Telkom to help offset the budgeted losses of the postal company over its first five years as a corporation. Telkom itself receives no subsidy from the government so there is no telecommunications component to the national budget. The government, through the Ministry of Finance, does, however, act as a guarantor of loans to Telkom as necessary.

As previously indicated, Telkom does not serve the "homelands" - Transkei, Ciskei, Venda and Bophatswana. Instead, each homeland has its own telecommunications operation functioning as a department of the local government ministry, and is linked to the local postal service. Their networks are compatible with Telkom's since Telkom provided extensive assistance in their development. Unfortunately, penetration in the homelands remains very low, and equipment is old and obsolete. The fate of the departments of posts and telecommunications in the homelands is not certain. One possibility is that they be merged into Telkom directly as either a division or subsidiary.

3.7.4 Ownership Options

Currently, the government is the sole shareholder in Telkom SA. The issue of whether to privatize Telkom or not is highly sensitive and very political. In the early 1990s, the government was very pro-privatization, but has since backed down from this stand and become more cautious. The result was the commercialization of Telkom instead of its outright privatization, a move which should still provide Telkom with sufficient flexibility to greatly improve the efficiency and productivity of operations.

Also, with the removal of direct government control, Telkom should be able to focus on providing quality service to as many people as possible, while still maintaining a sound financial base. Privatization will not likely occur until a new representative government takes office and, of course, any new government policies which are adopted. It should be noted, however, that current legislation specifically disallows privatization as an option.

Nonetheless, the planned structure of the sector, once fully implemented, will be conducive to privatization. Not only is there a fully functional stock market in South Africa, ready to handle privatization transactions, but the government has set up a policy unit under the Ministry of Economic Coordination of Public Enterprises charged with the responsibility of monitoring the government's privatization program. So far, this unit has been involved in privatizing three organizations - Iscor (steel), National Sorgram Breweries, and Abattoirs. The unit has also become involved in commercializing wholly-owned organizations of the state.

The government does welcome foreign investment in Telkom, although it is sensitive to the size of a holding that a foreign investor may want to take. The involvement of foreign organizations in the management of performance of Telkom is not considered necessary to promote telecommunications development, since South Africa has a sufficient base of skilled resources. Rather, the government is encouraging foreign investment to gain access to precious hard currency. It does so by enabling foreigners to obtain more favorable exchange rates for convertible currencies being brought into the country than current commercial rates while, at the same time, stipulating that dividends for repatriation be exchanged at the lower commercial rates.

3.7.5 Regulation

Regulation of the telecom sector is in a state of transition. SAPT is currently performing the regulatory role as necessary, while the Minister of Transport and Posts & Telecommunications is empowered to enact government policy. SAPT also administers radio frequency spectrum management, and investigates complaints of radio interference but does not regulate broadcasting.

The government's initial intention was to form a separate regulatory body similar to the Office of Telecommunications in the UK, or to the FCC in the U.S. This body would devise

and regulate legislation governing Telkom and its competitors. SAPT would be responsible for ensuring, through legislation, that the regulator has the appropriate powers to perform its duties.

The Minister of Transport and Posts and Telecommunications is currently deciding on the structure of the regulator. Coopers & Lybrand has recently produced a report on the sector, making recommendations on its policy, regulation and restructuring. A decision is likely to be reached sometime in 1993. At the same time, a white paper on the establishment of SATCOM, the South African Telecommunications Commission, is being prepared for parliament. It seems likely that SATCOM, if put into place, will report directly to parliament.

3.7.6 Competition

Telkom still enjoys a monopoly in the telecommunications sector. However, the government is considering opening the market to competition in certain areas of operation, such as mobile telephony.

At this point, the government appears reluctant to permit competition at the base network level. However, Transtel, a business unit of the company Transnet, is anxious to see this field of operations liberalized, since it feels that it is in a good position to compete with Telkom. Transtel, under a legislative directive, has been operating its own self-contained, full-featured network, which is about 3% of the size of Telkom's. Transtel's physical network infrastructure mirrors the railway system in South Africa and so is capable of serving most urban and rural areas in direct competition with Telkom.

Since Transtel has already invested heavily in the development of its network, it would like to make better utilization of its capital investment by being allowed to offer telecommunications services to users outside of current Transnet parameters. It sees itself as providing supportive operations in cooperation with Telkom versus outright replacement of Telkom services. It would exploit its existing underdeveloped network to whatever extent possible in fulfilling client needs, but would need access to Telkom switches in order to complete some routing.

Transtel sees particular opportunities to provide niche services, such as a back-up service for business users who use Telkom as their primary vendor for long distance telecommunications. Transtel believes that basic network service should not necessarily be deregulated, but at least only regulated to allow for fair competition. In an effort to alleviate government concerns, Transtel would be prepared to share the social economic burden of providing services to rural areas on a pro rata basis.

The area of telecommunications operations most likely to be opened for competition is in mobile telephony. Here to, Transtel believes that it is in a strong position to compete with

Telkom, as its radio base is currently greater than that of Telkom. The market should be sufficiently large to support more than one provider of this type of service.

Pay phones have already been deregulated, in that private operators are now allowed to set up pay phone bureaus in competition with Telkom. As a result, many such bureaus have been springing up in shop fronts and offices, and are proving to be very popular. Their popularity may be attributed to Telkom's poor record in providing dependable and convenient pay phone services. Telkom is making an effort to improve its reputation by replacing or upgrading outdated phones with new equipment.

Telkom is also starting to experience foreign competition, most notably from the U.S., on some of its international routes. For instance, International Discount Telecommunications has developed a technology which gives users in South Africa a link to the U.S. to take advantage of competitive U.S. call rates to overseas countries.

Deregulation of PABX maintenance and reticulation took place in 1987. Users are required to purchase their first standard telephone from Telkom. Since PABX's are classified as telephone attachments, they must be purchased in addition to the standard package from Telkom. This regulation is perceived as unfair by the National Association of Business Voice Users (NABVU), which is calling for changes. NABVU advocates giving the user the choice of equipment.

The government has established a Competition Board which promotes general competition in all industries. The Board plays a pivotal role in implementing the Maintenance and Promotion of Competition Act 1979, by trying to ensure ease of market entry by new players and fair competition from the parastatals. It is also a principal coordinator of deregulatory efforts.

3.7.7 Regional Organizations

South Africa is not a member state of SADC, and therefore, has not been part of SATCC. SAPT and Telkom have also not been in contact with SATA or PTA. They were, however, unwelcome members of ITU, and therefore had only very limited contact with the organization, primarily for administration purposes and spectrum management.

However, SAPT has interacted with other telecommunications administrations in the Southern Africa region, but usually only on a minimal scale. It has provided technical assistance to regional countries for satellite earth station operations and repairs, principally for Swaziland, Mozambique, Zambia and Lesotho.

Telkom is in the process of normalizing its membership in ITU, since it is anxious to become openly active in developing the region. It would actively support a regional body to improve investment policies, maintenance, operational cooperation and training.

3.8 SWAZILAND

The telecommunications sector in Swaziland is dominated by the public enterprise, Swaziland Posts and Telecommunications Company (SPTC). SPTC presently has inadequate network capacity, resulting in a substantial waiting list for service initiation and massive switch congestion causing poor transmission quality for those subscribers lucky enough to have service.

SPTC has some development programs in their preliminary stages in place. However, the Government of Swaziland is currently seeking donor financing to fund a comprehensive development program to include increasing switch capacity through digitalization and phasing in additional line capacity and connections. The plan also calls for increasing public telephone access to provide anyone access to a telephone within ten kilometers. The final component of the network development plan is a rural development program which is still only at the feasibility study stage.

The telecommunications sector is in a state of transition where SPTC's parent ministry has been restructured and the new ministry staff who oversee telecommunications have had little previous experience within the sector. Furthermore, internal conflict persists on whether to separate the postal and telecommunications operations. Many view the separation as a prerequisite for increased private sector participation. Finally, the absence of performance agreements is seen as an obstacle to formulating long-term policy and investment planning, due to the lack of accountability of SPTC management without such agreements in place.

3.8.1 Background

Swaziland is one of two remaining kingdoms in Southern Africa. As a small, land-locked country, with 80% of its population located in rural areas, it shares many of the same problems facing most in the SADC region. Situated between South Africa and Mozambique, Swaziland depends heavily on the stability and safety of its role as a trade route between the two for economic survival. Seeing that both South Africa and Mozambique are undergoing significant change, independent economic development is a key objective for Swaziland. Within this context, the transference of functions currently under the auspices of government to the private sector has increasing appeal.

One of the key organizations involved in setting objectives and policy with regard to public enterprises is the Public Enterprise Unit (PEU) of the Ministry of Finance (MOF). PEU is responsible for government oversight of 24 public enterprises, including SPTC. PEU is generally supportive of privatization, where appropriate, as a tool to improve service provision and relieve the budgetary burden faced by the government.

PEU is, accordingly, very supportive of the fledgling stock exchange in Swaziland which was developed within the private sector. Recently the government supported the stock exchange by selling its shares of a local sugar enterprise, Simunye, on the market. While Simunye was

not technically a public enterprise, divestiture of government-owned shares still represented a move toward privatization.

3.8.2 Economic and Telecommunications Objectives

Strong, sustainable economic development is a primary objective of the national government of Swaziland. Responsibility for formulating policy to support this objective is shared between several ministries, with the MOF and PEU taking leading roles.

Within the telecommunications sector, objectives are less focused on ownership issues and more on service issues. The primary challenges facing SPTC are to improve service quality and availability in urban areas, while increasing network access to rural populations. Top priorities for SPTC are network expansion and digitalization. More than 7,000 residential and nearly 4,000 business customers are waiting for telephone connections that do not exist. The primary objective for SPTC, therefore, is to increase capacity to reduce switch congestion, and increase call completion and network penetration rates. Secondary objectives include improved efficiency in billing systems and identification of new lines of business for SPTC to enter.

While there is no formal long-term planning for telecommunications development, a three-pronged, short-term plan is being implemented. The first aspect of this plan is to expand and upgrade the network. As of September 1992, there was only one digital switch in Swaziland. The telecommunications development program plans to remedy this situation by increasing switch capacity in urban areas by replacing existing equipment with digital switches. This will free lower capacity switches for relocation to less concentrated areas. The second aspect of the program involves rural telephone automation, with a plan to install four digital radio concentrator systems to service rural areas. The program is still in the feasibility study stage, however. The final facet of the plan, already underway, is to expand penetration of public telephone service so that everyone has access to a telephone within ten kilometers of where they may be within the country.

3.8.3 Sector Structure

Although the sector appears to follow a very traditional structure, it is presently in a state of flux. Telecommunications services and equipment are provided by the SPTC, which is a public enterprise incorporating both posts and telecommunications services. The SPTC was established by the Posts and Telecommunications Corporation Act of 1983 as a corporation under the direct authority of the Ministry responsible for communications, but also closely tied to the Ministry of Finance.

By statute, the Ministry of Finance is entitled to one seat on SPTC's Board of Directors and is to be consulted on issues pertaining to SPTC finances. MOF responsibility for working with SPTC lies within the PEU, which monitors financial performance and requirements, and the general direction of the sector.

The current tenuous nature of the sector stems from three recent developments. The former Ministry of Works and Communications was divided last spring into two ministries; the Ministry of Public Works and Construction and, the Ministry of Transport and Communications. This transition resulted in chaos within the new ministries as new roles were defined and new staff became familiar with their responsibilities. Transition within the ministries has been paralleled by transition within the SPTC. The SPTC is led by a new Managing Director, who was appointed on an acting basis following last year's retirement of the previous Managing Director and, a new Chief Financial Officer, who was appointed last summer.

Finally, the roles of both the government and the company are to be defined and solidified through a formal performance contract, which is currently under development and should be implemented later during 1993. The study to formulate the performance contract will also produce recommendations regarding the possible separation of postal and telecommunications operations. The implementation of other corporate policy within SPTC is also pending execution of the performance contract.

3.8.4 Ownership

SPTC is owned by the government, and will likely remain so for quite awhile. Major obstacles stand in the way of privatization, such as:

- the current structure, whereby telecommunications operations are bundled with postal operations,
- the absence of a regulatory framework or organization and,
- the fear that private operators may cease unprofitable (e.g., rural) operations or leave Swaziland altogether.

The privatization of SPTC is a highly controversial issue. PEU, as a general champion of privatization for the country, views SPTC as a prime candidate for privatization, while SPTC's parent ministry is not convinced that privatization should ever be considered. In between these rival viewpoints lies that of SPTC management, which sees privatization as a long-term option, but as a low priority issue relative to other concerns such as development of performance contracts and possible separation of postal and telecommunications operations.

The only private sector involvement in telecommunications today is in the customer premises equipment market, where private suppliers from Europe and Asia, licensed by SPTC, can sell equipment. Cellular service, traditionally a segment considered for private sector involvement, has not yet been developed, and there are no plans for it in the near future.

3.8.5 Regulation

Informal regulation in Swaziland is similar to regulation in other SADC countries. Tariffs are reviewed by the cabinet, with the greatest input coming from the Ministry of Finance (PEU). SPTC is responsible for radio spectrum management and is self-regulating in establishing sector structure and relationships with end users. Investment programs generally require government support for financing (e.g., loan guarantees or on-lending) and are therefore subject to Ministry of Finance or Ministry of Economic Development review, but these reviews are more financially-oriented than focused on service quality or expansion.

3.8.6 Competition

The telecommunications market in Swaziland has no competition, except in the area of customer premises equipment.

3.8.7 Regional Organizations

Swaziland is part of the Southern African Customs Union, and participates in several regional telecommunications organizations, including SATCC, SATA, PANAFTEL, ARTC, and PATU.

3.9 TANZANIA

The telecommunications sector in Tanzania consists of the parastatal Tanzania Posts and Telecommunications Corporation (TPTC). Services provided by TPTC have traditionally been poor, but they have just signed an agreement to implement a Telecommunications Restructuring Program (TRP) which will involve separating the postal operations from those of telecommunications, establishing a regulatory body, probably the Ministry of Communications and Transport, and improving the network. TPTC's major focus is in developing basic voice telephony.

3.9.1 Background

Since Tanzania's independence in the 1960s, through the mid-1980s, the country maintained a socialist economy and thus experienced significant isolation from the rest of Africa and the rest of the world. This served to constrain Tanzania's telecommunications development primarily due to a lack of convertible currency needed for importing essential materials unavailable domestically. In addition, TPTC is currently a limited, inefficient operation since the business concepts of efficiency and financial self-sufficiency were not favored during the period of socialism. Hence, major investments are required to make telecommunications a profitable and universal service throughout Tanzania.

3.9.2 Economic and Telecommunications Objective

TPTC's objectives are to provide high quality, affordable services throughout the country, i.e., the mainland and Zanzibar, in an efficient manner. However, TPTC has not nearly achieved these objectives yet. Currently, its penetration rate is 0.3 per 100 population, while the average access distance on the mainland is 210 kilometers (but is significantly less for Zanzibar). A considerable amount of time and money are spent by businesses on bypassing the telecommunications network provided by TPTC and finding alternative methods of communication.

Productivity and business are significantly affected by the quality and range of services provided. TPTC's primary focus is on basic voice telephony. Despite the fact that telecommunications is seen as necessary to facilitate the growth of other economic sectors, TPTC has no current plans to go into data transmission, which will continue to impede operations for businesses.

TPTC's main obstacle to improving services is its dependence on foreign funding of its capital development plan. Tanzania has suffered from a shortage of convertible currency, forcing the government to carefully allocate its scarce reserves. Other sectors, notably agriculture and transportation, have had priority over telecommunications in accessing those reserves. Therefore, the telecommunications sector has become dependent on donors for its hard currency financing. This, in turn, has caused delays in beginning many projects to improve telecommunications in Tanzania, including the current US$186 million TRP.

Another constraint has been the cost of the infrastructure itself. Costs are quite substantial since all equipment and materials except poles are imported and the long distances between urban centers increase cabling requirements.

Compounding all of this is the fact that telecommunications technology is a rapidly changing field. Equipment quickly becomes obsolete, or at least superseded, thereby requiring continual upgrading or replacement of equipment along with retraining of manpower. TPTC intends to digitalize its network, but the task is so large that it will probably take at least 15 to 20 years to complete.

TPTC has also experienced working capital problems in the past. Its billing system and collections have been particularly poor. For example, bills for international calls are presently sent separately from those for national calls. Due to delinquency problems, a lawyer is necessary to enforce most account collections.

TPTC does not have a manufacturing division. In the telecommunications sector, only poles are made in Tanzania. From time to time, however, the pole manufacturer cannot meet TPTC's demand, necessitating the importation of poles from Kenya or Australia. Tanzania Cables Limited manufactures cables for the electricity utility and has considered producing cables suitable for TPTC. But, it eventually decided against it since it believes the market in Tanzania to be too small. The government has no plans to enter into the manufacturing of telecommunications equipment and supplies.

3.9.3 Sector Structure

Telecommunications services are provided solely by TPTC. TPTC is wholly-owned by the Government of Tanzania and was established under the 1977 Posts and Telecommunications Act. Its parent is the Ministry of Communications and Transport, which is responsible for setting strategy for the telecommunications sector. The Ministry of Finance also plays a role in the sector by sourcing funds for capital development, by assessing the acceptability of loan conditions and, by ensuring that such conditions are met. TPTC operates profitably, and therefore, does not require budgetary assistance from the government. In fact, the telecommunications business tends to subsidize postal operations in Tanzania.

TPTC recently gained full responsibility for determining its own tariffs. Tariffs are examined twice per year and need management and board approval before being reviewed and ratified by the Ministry of Communications. Tariffs are based on the costs borne by TPTC, as advised in a study performed by consultants a few years ago. Tariffs for international services are quoted in U.S. dollars, but billed in Tanzanian shillings.

The structure of the sector is likely to change significantly by 1995, since TPTC has just signed an agreement to implement the TRP, a program being funded by a variety of donors. This program will involve separating the postal service and telecommunications entities into two separate parastatals. The split is scheduled to take place by January 1, 1994.

Therefore, steps are already being taken to facilitate the process. For instance, TPTC is reorganizing so that each of the two businesses has its own support staff, such as accountants. The 1993 budget format has also been modified to reflect two entities, and an inventory and evaluation of the assets is being performed.

3.9.4 Ownership

Tanzania is adopting a cautious approach to restructuring the telecommunications sector. The TRP will result in the formation of a separate entity dealing solely with telecommunications. As of now, this entity will remain 100% owned by the government under the Ministry of Communications and Transport (MCT). However, the new entity will be subject to a Memorandum of Understanding with MCT in an attempt to incorporate it more fully and reduce dependence on the government. This memorandum is effectively a performance contract stipulating operational and financial targets over a five-year period. It also requires that the performance be audited by an independent body. Penalties and bonuses will be made as appropriate, based on actual performance results.

The restructuring will enable TPTC to divest its non-core activities, such as printing, building management, and construction. The government's intention is that telecommunications should no longer be a burden on the economy, and in fact, should become a profitable organization, paying taxes and providing a reasonable return on investment to its shareholders.

Privatization has not been ruled out completely as an alternative for TPTC, however. Depending on the success of the TRP, the government may consider selling TPTC. By first strengthening the operations of TPTC, the government hopes to obtain a better price for the company in any future sale.

Foreign participation in telecommunications is not being excluded as a possibility either. Such foreign involvement could take the form of equity ownership, or alternatively, management contracts with or without an equity stake. TPTC has already been approached to consider such arrangements. However, some members of the community are wary of foreign ownership since they believe that a foreigner would concentrate on profit at the expense of developing service throughout the country, thereby hurting the indigenous population.

Since the mid-1980s, and especially since 1990, the government has tried to encourage private (both local and foreign) sector involvement in the economy in general. It has established an investment Promotion Center to develop the private sector by facilitating the process of investing in Tanzania and implementing the Investment Code of 1990. Moreover, the government has embarked on reform of its parastatals, whereby they either become self-sufficient or are liquidated.

It has privatized about 30 parastatals and is in the process of partially privatizing Air Tanzania Corporation, as evidenced by the government's advertising for joint venture shareholders. Additionally, USAID is funding a project to strengthen financial institutions in Tanzania and stimulate private sector development. Hence, the economic climate is now much more conducive than it previously was to operating a business based on sound commercial principles.

Despite the strides in private sector development, telecommunications is still specifically restricted from private participation. There still are no definitive plans to privatize TPTC in the short- to medium-term.

3.9.5 Regulation

TPTC acts as a regulator of the telecommunications sector as well as an operator. It is currently empowered under the 1977 Act and subsequent amendments to issue licenses for all operations within the sector.

However, under the TRP, the regulatory role of TPTC will be moved under the MCT. A separate unit within the MCT will likely be established along the lines of the FCC in the U.S. The details and timing of this change have not yet been worked out, but should occur prior to separating the postal and telecommunications businesses. Shortly, consultants will begin a study to recommend the appropriate telecommunications regulatory environment for Tanzania.

3.9.6 Competition

TPTC enjoys a monopoly in the economy as directed by current law. Moreover, the provision of the base network is likely to remain a monopoly. There are a number of private telecom networks run by such organizations as the Tanzania Railway Corporation, TAZARA, Tanzania Pipeline Corporation, the police, and the army. However, these networks are quite modest is size and, apart from the army's, cover a small geographic area. It is therefore unlikely that these organizations would wish to commercialize their networks as a prohibitively expensive capital investment would be needed.

Other peripheral areas of telecommunications are becoming more liberalized as well. In 1991, the customer premises equipment market was liberalized. There are now several private operators, in addition to TPTC, supplying, installing and maintaining handsets, PABXs and other customer premises equipment. These operators are under license from TPTC. At this point, it is unclear whether TPTC will continue to compete with the private sector in this market, or whether it intends to eventually divest itself of this activity.

Two other areas will probably be opened to the private sector also, namely, cellular radio and pay phones. TPTC is in the process of evaluating seven potential cellular radio

operators. This is an area that TPTC has not entered and probably will not do so in the foreseeable future. Private sector involvement in pay phones may occur later.

3.9.7 Regional Organizations

TPTC is a member of SATCC and has been involved in PATU, PANAFTEL, ITU, and SATA. It is committed to the idea of regional cooperation in telecommunications development, but admits that implementing such endeavors can be difficult.

3.10 ZAMBIA

The telecommunications sector is on the brink of reorganization with uncertainty about how and when it will actually happen. It is now likely that the company, Posts and Telecommunications Corporation Limited (PTC), will be split into its component activities of postal services and telecommunications, and the telecommunications operation privatized. The considerable investment required to rehabilitate and expand the network, together with a lack of government funds to do so, are key factors propelling this course of action.

3.10.1 Background

The telecommunications sector, represented by PTC, has evolved from a departmental body, to a wholly-owned parastatal of the government, to a subsidiary of ZIMCO (a holding company also wholly-owned by the government). The government has traditionally dominated the running of the economy. ZIMCO exemplifies this in that it alone represents about 80 percent of all economic activity. However, circumstances are forcing the government to change its approach, and now it would like to develop the private sector business community, with or without foreign participation, to be the dominant force driving the economy.

3.10.2 Economic and Telecommunications Objectives

The telecommunications mission of Zambia is quoted below:

> "To provide and maintain universal high quality telecommunications and information services to the expressed satisfaction of customers and to operate a viable business which creates maximum shareholder value while rewarding our human resource competitively. "

Based on this, PTC has set some broad objectives for building high quality service (e.g., target for clearing faults by 1994), for improving financial growth (e.g., 25% return), and for providing attractive labor compensation. It also plans to increase its penetration level from 0.83 lines per 100 population to 1.6 by the year 2000. PTC does, however, face many obstacles in being able to attain its goals, including a lack of available hard currency to fund the importation of equipment and materials (except cables, which are produced internally by ZAMEFA).

One impediment confronting the government in developing the private sector is PTC's implicit policy of enhancing voice versus data communications despite the appeals from the business community for data transmission. Presently, businesses are unable to rely upon the telecommunications network to meet their needs, which is hampering efforts to improve the general business environment in Zambia.

Additionally, since Zambia is a land-locked country heavily dependent upon imports, the majority of business activity takes place on an international scale. Tariffs for international communications are considered quite high, thereby providing another dis-incentive to business development in the country.

3.10.3 Sector Structure

Telecommunications operations are run by PTC, which is also currently responsible for postal services. As a limited liability company, PTC is required to comply with the Companies Acts. PTC is a wholly-owned subsidiary of ZIMCO, which, in turn, is 100% owned by the Government of Zambia. ZIMCO is a holding company with over 400 subsidiaries which comprise about 80% of the Zambian economy.

ZIMCO controls PTC through the Board for Administration and Management. The parent ministry for ZIMCO is the Ministry of Communications and Transport, and is responsible for telecommunications legislation. The government does not subsidize PTC so it is not included in the national budget. PTC, in fact, determines its own budget, in line with ZIMCO group policies.

The structure of the sector is highly likely to change because, in September 1992, the government announced that postal and telecommunications operations were to be split into two discrete entities. The postal services will revert back to being a department of the Ministry of Communications, while telecommunications will be privatized. The announcement surprised many in the community, since the government had originally planned for all strategic parastatals (ZCCM, ZECO and PTC) to remain state-controlled and owned. The severe lack of foreign funds to maintain and develop the telecommunications network seems to be a major factor in the change in government policy towards PTC.

There probably still exist dissenting factions within the government regarding a PTC privatization, which would have to be resolved before a privatization plan could be implemented. This is evidenced by the fact that the PTC announcement came from the Ministry of Commerce and Trade, which is responsible for Zambia's privatization program, and not from the Ministry of Communication and Transport. Considerable resistance by the unions is also anticipated. Therefore, the mechanics and timing of both the reorganization and the privatization still have to be carefully developed.

However, the government is generally an advocate of privatization. It has established a unit within the Ministry of Commerce, called the Zambia Privatization Agency (ZPA), to steer and monitor its privatization program. It has already started to privatize 17 companies during the first phase of the program. Advertisements have appeared in the local press for interested parties to come forward to register and receive documentation on the companies for sale.

The next step will be to evaluate bids, and then award sales to the most appropriate bidders. The highest bid will not necessarily be the winning bid, since other factors, such as credibility and continued employment of the existing workforce, are also important in the evaluation exercise. Admittedly, these "first-phase" companies are relatively easy to privatize in that they are small and already have a commercial orientation. Sale of the telephone company would require a much more complex and lengthy process.

3.10.4 Ownership

Currently, PTC is wholly-owned by ZIMCO, which in turn is wholly-owned by the Government of Zambia. This arrangement will probably change in the short-to medium-term, since, as stated previously, privatization of PTC is highly likely. However, the purchase of a capital intensive business, like PTC, will require significant financial resources on behalf of the investor(s). Therefore, an existing foreign telecommunications organization will likely be sought to take a large position in PTC, in lieu of spreading ownership among the residents of Zambia through small shareholdings, such as occurred when British Telecom was privatized. The capital base in Zambia is simply too small to support a stock flotation of PTC shares.

3.10.5 Regulation

The roles of regulation and operation are already split between the Ministry of Communications and Transport and PTC. The government feels that telecommunications are so strategic that it does not wish to relinquish its regulatory and legislative authority over the sector. With the liberalization of the sector, the Ministry of Communications and Transport will probably play a more prominent role as regulator.

Telecommunications tariffs require ratification from the Ministry of Communications and Transport, after approval has been given by the Board of Directors of PTC (there is a representative of the Ministry on the PTC board). Whether or not this process will change when PTC is privatized has not been addressed.

PTC has a separate division to manage radio spectrum frequencies. Some believe, however, that this should be performed by a separate, independent body. This issue will likely be addressed through formal channels at a later date.

3.10.6 Competition

Current legislation gives monopoly power to PTC for the provision of telecommunications services. However, there have been efforts to amend it to allow and enable competition in the sector. In fact, as of January 1, 1993, PTC is no longer involved in providing customer premises equipment. In September 1992, the Ministry of Communications and Transport was searching for suitable suppliers of customer equipment to register for operation in

Zambia. PABXs and fax machines are already supplied by private companies but, PTC still holds a monopoly on telephone sets.

Several organizations have their own internal private network - Zambia Rail, Tasama Pipeline, ZESCO and TAZARA. They probably do not wish to compete with PTC in providing basic network services, however, due to the small size of the market and the large amount of capital investment required to expand and upgrade their networks.

3.10.7 Regional Organizations

The Zambian telecommunications sector has been actively involved in the regional organizations SATA, RASCOM, ITU, and SATCC.

3.11 ZIMBABWE

The major player in the telecommunications sector is the Zimbabwe Posts and Telecommunications Company (PTC), a parastatal. Major features of PTC operations are that telecommunications and postal operations are merged into a single organization and that they work very closely with their parent, the Ministry of Information, Posts and Telecommunications. While private participation in the sector is currently limited, the PTC uses contractors where feasible (especially for outside plant installation and maintenance) and hopes to introduce private participation by pursuing joint venture opportunities with foreign partners in the near future.

Other than cabinet approval requirements for rate changes, no regulatory framework or mechanisms exist. A World Bank-funded study to investigate the feasibility of separating postal and telecommunications operations, develop a regulatory framework, and implement cost-based tariffs is pending.

High levels of network congestion and backlogs in processing new service orders result from inadequate investment over the past decades. Old switching equipment suppresses capacity due to disrepair and use of lower capacity, outdated technologies (step-by-step switches). The strategy for future network development is to improve service to existing subscribers first, expanding network line capacity once switching issues have been resolved.

3.11.1 Background

Zimbabwe's telecommunications network was designed in the 1950s to reflect technology and traffic patterns at that time. Little investment in the network during the sixties and seventies has left the country with poorly functioning and outdated equipment, configured to meet obsolete needs. During the 1980s, the PTC began a program of investment, severely constrained by limited foreign exchange availability. Government allocation to the PTC of foreign exchange for 1991 funded only 20% of the foreign exchange required for network maintenance with the other 80% remaining unfunded. The amount of hard currency generated through international settlements, which is all transferred directly to the government, is unknown.

Today the country has extensive penetration into traditionally under-served markets, but service is uniformly poor. Rural service targets have been met, due in part to party lines, installed during the 1950s and serving large commercial farmers, and 100 automatic exchanges dedicated to service centers at population growth points. Outside plant requirements are staggering but, increased installations would do little to improve service since the primary constraint is insufficient switching capacity. International service is a final area of unmet need since its demand far exceeds that faced by network designers 30 to 40 years ago.

3.11.2 Economic and Telecommunications Objectives

There is a move towards overall economic liberalization, with restructuring of entities to enable them to function on a commercial basis and increase private participation where the private sector is viewed as capable of providing the required services. These include the Dairy Marketing Board and the state-owned mining company. Other than these cases, there does not appear to be government policies promoting privatization. Foreign investment is welcome, although the unavailability of hard currency and associated currency restrictions are substantial barriers.

Telecommunications service within the country is difficult to obtain (70,000 residential customers and nearly 20,000 business customers are currently on the waiting list). Accordingly, great demand exists for public telephone service. Once lines are installed, call completion is difficult due to high levels of switch congestion, particularly in urban exchanges.

There is a growing awareness that poor telecommunications is an obstacle to development. This is reflected in the five-year telecommunications plan, which is included in the Public Sector Investment Program (PSIP). Its major components are:

- Digitalization of network, beginning with international exchanges
- Completion of remaining zone exchanges
- Provision of public telephones for high density areas
- Completion of links between rural and zone exchanges
- Expansion of satellite links across the Indian Ocean

3.11.3 Sector Structure

The sector is dominated by PTC, a parastatal combining postal, telecommunications, and banking (Post Office Savings Bank) operations led by the Postmaster General under the general supervision of the Ministry of Information, Posts, and Telecommunications. In 1991, the subsidy from telecommunications to postal operations reached US $15 million (30% of the net income from telecommunications).

The relationship between the PTC and the government is very close. Ministry of Finance approval is required for all capital plans and most of the funding for telecommunications investment comes from on-lent loans by the World Bank or African Development Bank. The PTC keeps all the income it generates (the company is authorized to invest funds on local capital markets), but not for foreign exchange. Foreign exchange generated is remitted to the government, which makes an allocation to the PTC from aggregate foreign exchange

reserves. This restricts investment and network upgrades which have to be paid for in hard currency. Information pertaining to the hard currency generating power of the company is not available.

While there is no telecommunications manufacturing sector in the true sense, Zimbabwe does have a plant where equipment can be assembled. This has historically reduced the need for foreign exchange, since component parts can be imported for local assembly. There is hope for a joint venture to initiate manufacturing of digital equipment. Limited participation by other vendors is permitted in the customer premises equipment market, but all equipment must be licensed by the PTC.

3.11.4 Ownership

The company has been a parastatal since 1970, when it was formed by a series of Acts governing postal, telecommunications, savings bank, and broadcasting services. The most common form of private sector involvement within the sector comes from contractors performing functions for the PTC. These include outside plant installation and maintenance (80% of new outside plant capacity was installed by private contractors). Contractors unfortunately have less experience than PTC and are perceived as learning at the expense of PTC.

Several opportunities exist for expanding private sector/foreign involvement in this area in the future. These include a joint venture for cellular service (preferably with a foreign partner to provide capital and foreign exchange) and resale of services on the packet-switched network under development. The PTC is also looking toward a possible joint venture in the manufacturing segment.

Privatization of telecommunications in Zimbabwe is considered a very long-term option. It is not considered as a short-term possibility because of several factors, including:

- current bundling of telecommunications with postal operations,
- dependence on the ministry for capital planning, financing, and tariff approval,
- large need to invest in the network to reduce congestion and improve service quality,
- absence of a functional regulatory framework and entity,
- public perception of the need to keep telecommunications under government control (to ensure service to rural areas) and,
- uncertainty as to interest of foreign operators in investing in the sector.

Preliminary plans to address some of these issues is imminent (separation of telecommunications and postal services, tariff setting procedures, and a regulatory framework are addressed in the upcoming World Bank study). Greater awareness of the privatization process (e.g., use of concession agreements to enforce network expansion targets) should address other concerns.

3.11.5 Regulation

The telecommunications sector in Zimbabwe is informally regulated. Tariff changes are recommended by the PTC to its parent ministry, who presents it to the cabinet for approval. After review and negotiations, the cabinet makes final tariff decisions, to be implemented by the PTC. This process takes approximately a year to complete. The forthcoming World Bank funded study calls for development of a regulatory framework to monitor tariffs, service quality, network investment, competition within the sector, relationships between operators, and disputes between operators and end users.

Radio spectrum management and addressing consumer complaints are two regulatory functions performed by the PTC. There is no regulatory framework to address technical issues, including level of investment, service quality, or network expansion, and no regulatory entity is in place to monitor the sector.

3.11.6 Competition

There is limited competition within the customer premises equipment market but all equipment not provided by the PTC must be licensed by the PTC. In the residential consumer segment, handsets are rented from the PTC by the end user. Consumers may use alternative licensed handsets, but are still required to rent a handset from the PTC.

In the PABX market, PTC competes with private providers to supply government organizations. The PTC does not compete in the market to provide PABXs to non-government entities which is served exclusively by private providers. All PABX users (government and non-government) are required to rent handsets from PTC, even though the handsets may be supplied by private PABX providers. In such cases, separate handsets for internal and external calls are used.

There is no competition in basic services and the market for value-added services is currently being developed. Competition is anticipated for the latter.

3.11.7 Regional Organizations

The Zimbabwe PTC is very active in regional and international organizations, including SATA, RASCOM, SATCC, and ITU. Last year, the PTC hosted the SATA Regional Conference in Harare. This reflects an appreciation of the importance of synchronization of national policies regarding telecommunications in an environment of cross-border

communications. Such synchronization is expected to be difficult to achieve, particularly because of donor-established service standards.

TELECOMMUNICATIONS SECTOR SCOPING STUDY FOR SOUTHERN AFRICA - PHASE ONE

SECTION IV

THE ROLE OF THE PRIVATE SECTOR IN TELECOMMUNICATIONS

SECTION IV

THE ROLE OF THE PRIVATE SECTOR IN TELECOMMUNICATIONS

4.1 OVERVIEW

The objective of Section IV is to examine in detail the role of the private sector in the provision of telecommunications services. Over the past couple of decades, there has been a worldwide trend towards divesting of telecommunications from the control of national governments. This trend has accelerated greatly over the past decade and has resulted in the privatization of a great many aspects of the telecommunications industry in many developed as well as developing nations.

The government-regulated monopolies and government-owned organizations providing telecommunications in such countries have gradually been realigned to serve only very limited market areas such as basic service provision (dial-tone/Plain old Telephone Service (POTS)) to local jurisdictions only. Competition has opened up in the areas of local bypass and enhanced services, long distance service, equipment from telephone sets and Private Branch Exchanges (PBXs) to advanced technological multiplexers and switches, software and standards by permitting participation of the private sector.

The trend towards privatization and liberalization in the world is continuing via the inclusion of more and more market segments (e.g., local POTS and enhanced services provision) in developed countries. Privatization is rapidly being introduced into developing nations for almost all market segments of telecommunications from local POTS, cellular services, and international gateways to long distance services and hardware/software.

This chapter examines the developments related to private sector participation in telecommunications over the last few years as follows:

Section 4.2 offers information in the following areas:

- The role the private sector has played in those countries where telecommunications has been released from government control,
- The goals that are expected to be reached by having private sector participation in the telecommunications services industry,
- The constraints to private sector participation that exist in the international telecommunications services market,

- The trends for future privatization in those same countries in other market segments not already included, and

- Recommendations for private sector involvement in the SADC region based upon lessons-learned from the rest of the world and the potential advantages of not having to "re-invent the wheel" for privatizing key market areas.

Section 4.3 continues the analysis of private sector involvement in telecommunications by examining current and previous experience of participation in the SADC region. Specifically, 4.3 offers information in the areas of:

- Description of any past or current involvement of the private sector in SADC telecommunications, and

- A critical analysis of the key factors associated with privatizing telecommunications given the current environment in the SADC area. Both attractive and unattractive aspects are investigated.

4.2 THE ROLE THAT THE PRIVATE SECTOR HAS PLAYED IN PROVIDING TELECOMMUNICATIONS SERVICES WORLDWIDE

Historically, the nations of the world have provided telecommunications through government-owned entities and government-regulated private monopolies. It was believed that competition in the area of telecommunications was not practical due primarily to complex logistical and national security issues. The concept of a "natural monopoly", the desire to generate fiscal revenue, the goal of "universal service", and national security have been the most widely used reasons for governments to be both owners and operators of their countries' telecommunications infrastructure[1]

Governments, especially those of developing nations, have traditionally argued that telecommunications is a "natural monopoly". Historically, the installation of telecommunications networks has demanded large amounts of capital to initially establish service. The investment required initially is sufficiently large that in many markets, specially in small markets like those in the SADC region, viable operation is possible if only one company serves the market place.

Once the basic network infrastructure has been installed, the marginal cost of adding new subscribers is generally negligible. Basic network infrastructure includes switching

[1] Ambrose, W.; Hennemeyer, P.; Chapon, J.P. "Privatizing Telecommunications Systems", Discussion Paper #10, International Finance Corporation. 1990.

equipment trunk lines and outside plant facilities. The addition of subscribers involves the extension of the local loop to the subscriber which even in rural areas involves a much smaller investment then that required for the network infrastructure. At a given network size, profits for a monopoly telecommunications provider can be substantial. Governments in developing countries usually take advantage of this fact to generate extra fiscal revenue. In general, however, to insure that basic telephone service provision becomes a "universal service" (i.e. every one can have access to basic telephone dial tone), governments regulate tariff levels the monopoly may charge.

However, over the last decade, reform-minded regulators have placed into question the role of governments in operations and ownership of telecommunications entities. Consideration for privatization has expanded from a few industrialized countries to almost all corners of the world. There are several reasons for this movement.

First, governments have failed to provide reliable telecommunications services. In developing countries, the main problem has been poor service quality, with typical call completion rates (CCR) of under 50% when service is available. Long waiting lists for telephone services can take over ten years to be satisfied.

Large bureaucracies in state-owned telephone companies have resulted in large inefficiencies. The typical number of employees range between 50 and 100 per 1000 telephone lines in developing countries (including the SADC countries) compared to 0.2 per 1000 lines in the United States, Europe, and Japan. In addition, as technology has increased in complexity, these bureaucracies have been unable to recruit enough qualified technical and managerial resources.

Secondly, state-owned telecommunications companies usually lack the capital required to satisfy growing demands. Although telephone companies are known for their high profitability, large proportions of internally-generated funds are transferred to other non-profitable state-owned monopolies via the central governments. In order to utilize the required expansion funds, these telephone companies actually compete with other state-owned entities for government funds. Unfortunately, there are usually very limited amounts of funds available from the government since other industries like energy and certain programs with humanitarian objectives take higher priority in determining funding allocations from government.

Third, the long-accepted concept of a "natural monopoly" has started to erode. Many developed countries have graduated from their industrial years into the "information age," new technologies have become available which can provide the public with innovative new services to improve the quality of life and ultimately boost national economies. Rapid technology development and deployment is constantly improving efficiencies, quality of

service, increasing capacity of transmission, and allowing for introduction of new service offerings which improve the efficiencies of users in other industries. As a result, the cost of manufacturing, installation, and operations are diminishing significantly with time.

For example, the cost of transporting a telephone call over a long distance network has been reduced by half every two years over the last decade. The cost of installing a digital line has also significantly been reduced from those of its analog counterpart. Moreover, the cost of providing new services, such as mobile telephony is now sometimes equal to or less expensive than providing telephone services over "wire-line" (conventional telephone line) networks.

The net effect of these factors is to reduce risks and required investment levels necessary to build and operate new telecommunications services by others outside the realm of the "natural monopoly". As a result, governments of both developed and developing countries have started to review and modify existing regulations to allow and encourage competition ("liberalization") and/or seek participation from the private sector for basic telephone services ("privatization" of the state-owned telephone compa . and for other basic and enhanced services (i.e mobile/cellular services, data networks).

The introduction of competition and privatization in the United States, the United Kingdom and Japan has contributed to a reduction of rates charged to customers and produced an increase in availability and quality of service. In developing countries, the call for private sector participation results in new sources for expansion funding, rapid introduction of new services, and the addition of technical and managerial human resources. In addition, in the monopolistic telecommunications industry, nations have started to realize that the environment does not support the dynamics required to cultivate the innovation of new technological applications at market-driven costs.

In order to allow private sector participation in telecommunications, however, certain key areas have to be addressed in a restructuring plan. Most of these are related to regulation and government policies[2]. The most important are:

- **Telecommunications Law** - Most countries need to change their laws and some times their constitution (i.e. in Brazil) before the private sector is allowed to participate in the telecommunications sector.

[2] Ambrose, Hennemeyer, Chapon, pp. 7-8.

- **Frequency Allocation** - A review of frequency allocation is necessary to reallocate certain frequencies required by new services, such as mobile cellular telephony, as well as to monitor unauthorized transmissions.

- **Technical Standards** - As new operators are allowed to compete with the dominant telephone service provider, interconnection technical standards have to be well defined, published, and verified so that interfacing services between different operators will be possible with minimum difficulty.

- **Foreign Investment Laws** - In many countries, especially those in the former Soviet bloc, governments need to legislate new laws that protect the interests of the private investors (i.e. profit repatriation, investment protection, etc.).

- **Government Policies** - Governments need to clearly state their policies regarding such important issues as rate structures, "Universal Service" requirements, rural telecommunications services requirements, and competition.

- **Regulatory Structure** - In most countries, governments need to restructure their ministries or departments overseeing communications as well as their state-owned telephone companies before privatization and/or liberalization can occur. First, regulation and operations need to be separated from the state-owned monopolistic telephone company. Second, the telephone company needs to become autonomous and market-oriented so that its activities, capital requirements, and earnings are not tied to government operations and budgeting. Autonomy is required in the case of privatization and when competition is allowed in order to separate regulatory functions from the monopoly and to keep them in the state.

The following section addresses private sector involvement in the various telecommunications markets of the world and relates that involvement to potential applicability to the SADC region.

4.2.1 Summary of Private Sector Involvement In the World Outside of SADC Region

The private sector has been involved in the telecommunications sector since the invention of the telephone in the latter half of 19th century. In the U.S., the telecommunications sector has always been operated by the private sector in a competitive as well as in a monopolistic way. Similarly, other nations in Europe and around the world have experienced private sector participation in some form or another during the 20th century.

However, throughout most of this century, telecommunications services have been provided by state-owned monopoly providers in the majority of the world's nations.

The concept of private sector participation in the telecommunications sector has been fueled as a result of the liberalization and introduction of competition in the United States, The United Kingdom and Japan. The break up of AT&T in the U.S. in 1984, the privatization of British Telecom in the U.K. and Nippon Telephone and Telegraph in Japan in 1985, as well as the emergence of formidable competitors in those nations have served as models for other countries. The perceived benefits of such events are an improvement of quality of services, accelerated introduction of new services and technologies, and a reduction of rates for services to the end user.

As other nations follow similar paths of privatization and liberalization, the experience available to other countries becomes more and more valuable. Several nations introducing private sector participation in telecommunications are studying the examples of nations with similar climates and have already taken similar steps to accomplish their privatization goals. An example is Venezuela which privatized the state-owned telephone company, CANTV. Venezuela sent a government delegation to talk to the Mexican authorities that participated in the TELMEX privatization process and actually used its privatization master plan as a template for its own. In a similar manner, Uruguay has used Venezuela as a successful example of how to privatize ANTEL, its state-owned telecommunications company.

Private sector participation in telecommunications has meant that private companies are making in-roads of varying degrees in different parts of the world. Exhibit 4-1 presents the typical technological segmentation of privatized telecommunications markets in those countries which have already successfully undergone the process.

The most common example of private sector participation in developing countries is for the provision of basic telephone services via alternative technologies, such as cellular mobile, data and VSAT networks and teleports. The primary reason for this is low investment requirements, high rates of return, rapid installation and service provision which is usually not serviced by the dominant state monopoly carrier.

Private sector participants for these types of services are telephone companies in developed countries (i.e., the RBOCs in the U.S. and the PTTs in Europe and Japan), newly-privatized telephone companies in developing countries (ENTEL and CTC of Chile), and specialized carriers (i.e., COMSAT for teleports and McCaw Cellular for cellular telephony from the U.S.), and investment bankers and foreign and national entrepreneurs. The time required to implement such a program is usually less than a year and opposition is minimal, especially from labor unions, since the services did not exist before the private sector involvement. In some cases, however, political opposition groups, such as in the case of the

- Monopoly entity providing basic switched services (Dominant Carrier),
- Alternate carrier for basic switched services,
- Private point-to-point or multi-point non-switched digital networks,
- Cellular Mobile Services Networks,
- Paging Systems,
- Very small aperture terminals (VSAT) used for private wide area networks based on satellite technology,
- "Teleports" or "Gateways" used for transmitting either switched or non-switched international services,
- Data and value-added services (enhanced services) mainly used by corporate clients,
- Build, Operate and Transfer (BOT) - A government allows a private company to build and operate a telecommunications network with private sector funds. Operation is permitted for a reasonable number of years until the private company is able to recuperate its investment and profit. At the end of the period, the private entity transfers the operations to the government, and
- Operations and installations contracts are used by several countries to transfer these complex responsibilities to a well-qualified private sector entity under a time-limited contract.

Exhibit 4-1 Technological Segmentation of Private Sector Participation in Telecommunications.

African National Congress (ANC) in South Africa, categorically refuse to accept arguments favoring private sector participation in telecommunications since they feel that the alternative technologies capture the best customers with the greatest profit potential.

The second most common private sector participation methodology is the partial or full privatization of the state-owned telephone company. This usually occurs when the state has consciously formulated a policy to privatize other important state-controlled industries. Lead times to implement these types of privatization programs are usually one year or more and may even take as long as a full decade (i.e., Chile).

Principal private sector investors include the telephone companies in the U.S., Europe, and Japan as well as the large investment bankers in those countries. The primary benefit to

the host country of incorporating such investors is that it is able to attract very experienced operators with sufficient capital to implement reliable "universal services" to businesses and residential customers in both urban and rural areas. The proceeds from the sale of the state telephone company also bring much needed revenue to developing countries.

The drawback is that nations are competing with each other for a finite number of qualified operators and available capital. Investors in developed countries are learning to be selective in choosing which privatization they will actually pursue. It takes millions of dollars to prepare a winning proposal for a privatization tender. It is difficult for investors to win one or even two privatization and the losers are usually more conservative the second time around.

The private sector participation option used the least is Build, Operate and Transfer (BOT) and usually include long-term operations and installation contracts. BOTs have been tried in several places (i.e. Pakistan, Thailand) without much interest from the private sector primarily because of the large investment required to build a network which will not be owned by the operator. Operations and installation contracts are appealing because there are no up-front capital requirements and result in consultancy or support services types of contract.

Saudi Arabia is probably the best example where operations and installation contracts are used. For three years at a time, foreign operators are given contracts to operate basic and enhanced services. Bell Canada and Australia Telecom have been the most recent operators in this region.

In the SADC region, Botswana has experimented with management contracts through and agreement with Cable and Wireless (C&W) of the U.K. A new contract is currently under negotiation. The main advantage to Botswana is that it brings in the required expertise while maintaining ownership benefits. However, the negative is that it creates an environment of "colonialism" that may remind the locals of its recent past with the British Empire.

Of these, the best methodology is probably the privatization of the state-owned telephone company. Having the dominant carrier under private hands insures that capital is available to efficiently provide quality, basic telecommunications. Since most of the basic services are provided by the dominant carrier, expansion of its network in turn is the principal contributor in the telecommunications sector in support of economic growth as demonstrated in Section II.

A principal interest of the U.S. investors in the telecommunications industry lies in privatizing the state-owned telephone infrastructure and basic and enhanced services. The

U.S. telecommunications sector is very competitive when compared to that of Europe and Japan. U.S. West, Ameritech, Bell Atlantic, GTE and AT&T have already won privatization bids in Mexico, New Zealand and Venezuela. Other winners of privatization include France Telecom from France, Telefonica from Spain, STET from Italy, and Cable & Wireless from the U.K. For basic services with alternative technologies (i.e. cellular) and other enhanced networks, the list of US-based companies includes COMSAT, Hughes, Motorola, Alpha Lyracom, Sprint and MCI.

In assessing foreign direct investment in any industry, private investors primarily examine several key areas in selecting specific candidate countries.[3] These include:

- **Low Direct Labor Costs** - 10% to 15% of manufacturing costs.
- **Well Educated Pool of Labor** - competence, education, high skills.
- **Country risk** - acceptable if returns are sufficiently high.
- **Market Size** - One of the most important considerations (i.e. economies of scale).
- **Levels of Foreign Investment** - Important indicator of quality of the business climate.
- **Quality of Infrastructure** - Transport, communications, energy, and the degree of industrialization.

Potential investors in telecommunications services focus on the quality of existing telecommunications infrastructure. They consider the potential investment as another business decision similar to that of any other type of investment and these items are key to the Boards of Directors of U.S. corporations who have to respond to shareholders' interests when determining where to invest money into telecommunications markets.

To date, various degrees of market segmentation as presented in Exhibit 4-1 have been introduced in all continents of the world. Exhibit 4-2 and Annex IV.1 summarize the countries by region where private sector participation in telecommunications has been

[3] Pfeffermann, Guy P.; Madarassy, Andrea. "Trends in Private Investment in Developing Countries, 1992 Edition". International Finance Corporation, Discussion Paper Number 14, 1992.

introduced, is planned, or under consideration as a function of the previously-defined categories.

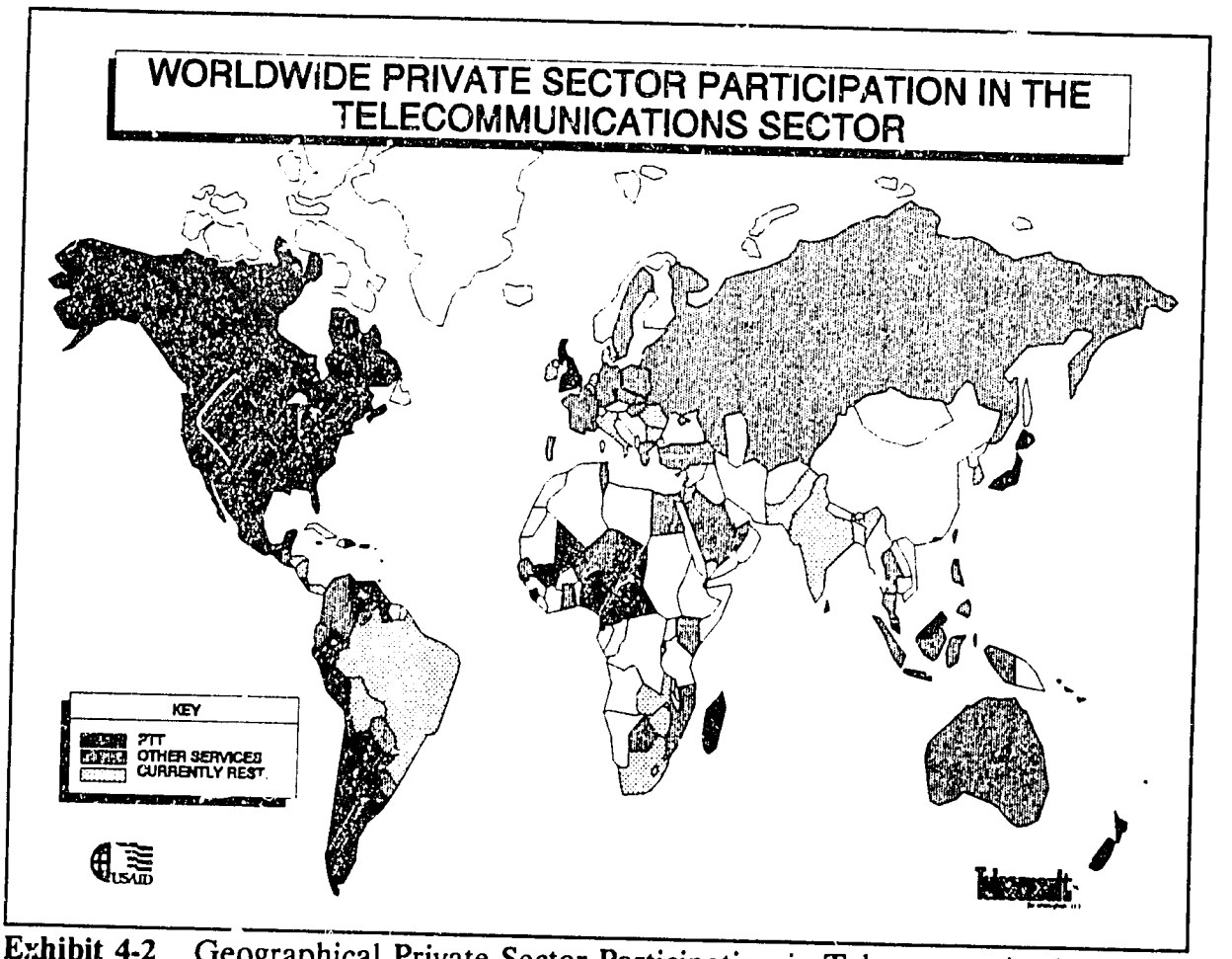

Exhibit 4-2 Geographical Private Sector Participation in Telecommunications.

4.2.2 Analysis of Worldwide Private Sector Participation in Telecommunications

This section addresses certain aspects behind the drive to privatize including:

- National Goals and Objectives,
- Market and Other Opportunities,
- Constraints and,

- Worldwide Trends for Future Private Sector Involvement in Telecommunications.

In addition, the issue of private sector involvement in telecommunications is discussed as it relates to its potential applicability in the SADC region.

4.2.2.1 Goals and Objectives of Privatization

There are four primary goals which contribute to the need to privatize national telecommunications markets:

- **TECHNOLOGY** - New technologies are rapidly becoming available which could allow provisioning of innovative telecommunications-based services to residential and commercial users. These services like electronic mail and high-speed digital connectivity could provide a catalyst to boost economic growth and allow organizations to compete better in the global marketplace. Government-controlled telecommunications entities are generally considered too large and bureaucratic in nature to provide the rapid deployment mechanisms required to take advantage of these new technologies. In developing countries, the lack of trained personnel in state-owned telecommunications enterprises may hinder the ability to select the proper technology at an optimum time frame.

- **MARKET DEMAND** - Customers, especially those in the commercial business sector, have become very sophisticated technologically in automated data processing systems operating autonomously at various locations throughout their companies. These customers have began to see a need to connect these locations via more advanced and more cost-effective telecommunications services than government-controlled organizations could provide. However, in a region like SADC, a simple telephone line is the most pressing demand on service providers.

- **EFFICIENCY** - Related to Market Demand, the cost of basic services has been ever-increasing and new services slow to be deployed and cost-prohibitive under the auspices of government-provided telecommunications. Private sector participants feel the urgency to become efficient producers since their own capital resources depends on the quality of production.

- **INVESTMENT REQUIREMENTS** - With the availability of innovative new telecommunications services comes the need to rapidly expand and digitalize national networks. This requires very large capital investments which are

generally hard to raise in the political environment associated with government-controlled organizations. In the case of SADC, state-owned telecommunications entities could benefit substantially from private sector capital to fund any requirements to the year 2000.

The objective behind these goals are to address the four factors directly as follows:

Technology - Due to market-driven competitive factors, private sector corporations can usually identify a need for new services, find funding, and apply existing or upcoming technologies to provide services more rapidly than a bureaucratic government entity.

Market Demand - Private corporations are usually better equipped to address customer needs more quickly than government organizations. Furthermore, start-up companies are many times created to address specific market niches to satisfy customer demand.

Efficiency - Private corporations are used to dealing with economic gyrations than national governments. To remain competitive and hence viable and sound organizations, these corporations must provide mechanisms to rapidly identify and deploy new technology innovations as required. Usually these innovations come at a lower per-unit cost to the customer and eventually act as an entree to even more new services.

Investment Requirements - The private sector receives funding through private and public investment and financial loans for use in providing capital to allow it to become more competitive. This funding is usually more readily available and more easily allocated than capital programs funded by government entities. Also, in the private sector, return-on-investment is a key component in the viability of a corporation. Hence, money is spent in order to make more money which will be spent to develop better services in a never-ending cycle of economic and fiscal improvement. Exhibit 4-3 illustrates the cycle related to private sector technology investment.

When government institutions cooperate with the private sector in funding issues, the investment cycle becomes more attractive from an investor point of view as well as from an economic output point of view. The role of a state-owned telephone company provides for better access to the customer base. The introduction of funds from government, multilateral or bilateral institutions increases the availability of investment resources, reduces the investment risk, while attracting other private sector investors as benefits arise through new incentives. The investment cycle, when the public sector is involved in joint funding with the private sector, is illustrated in Exhibit 4-4. Examples of U.S. and multilateral institutions providing funding in cooperation with the private sector are discussed in Section V.

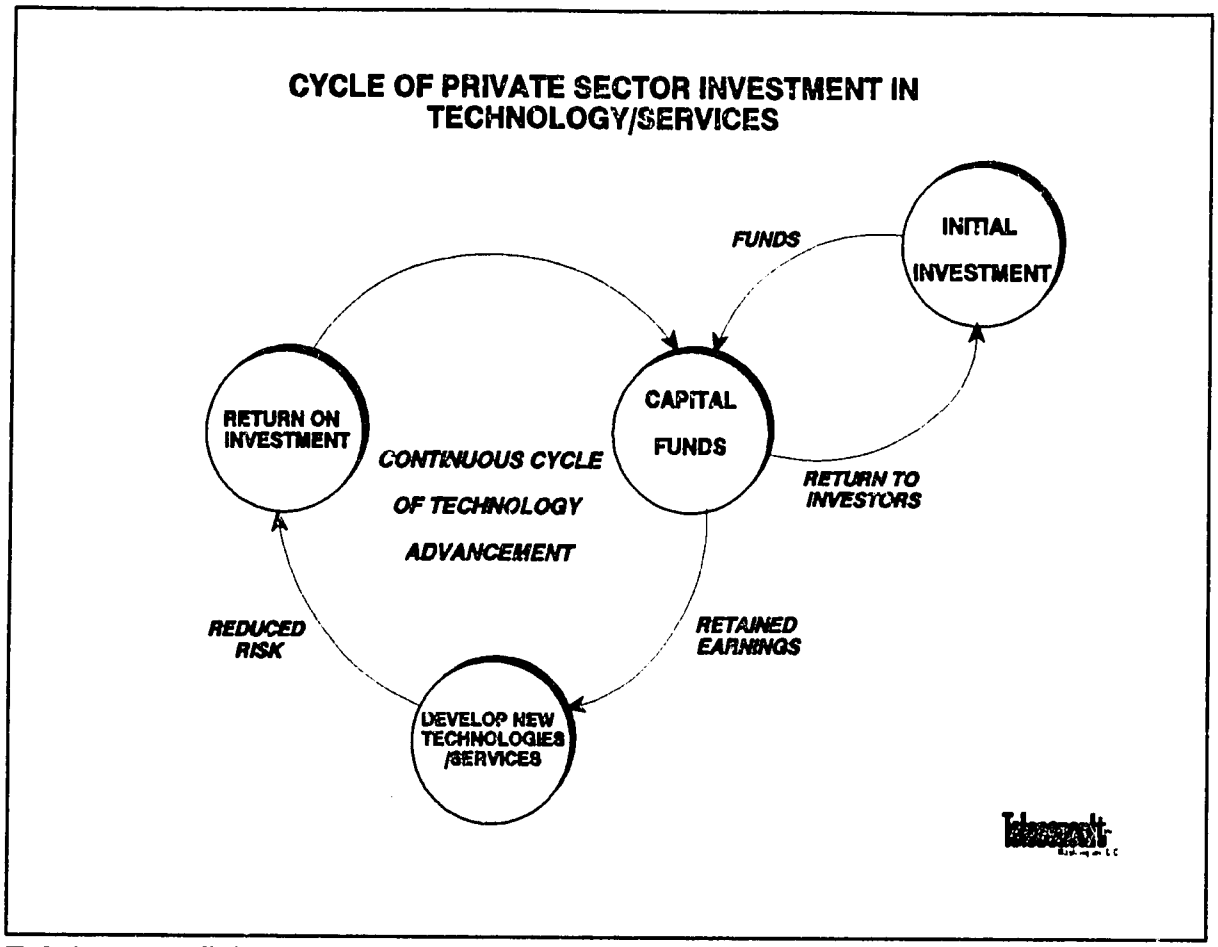

Exhibit 4-3 Private Sector Investment Cycle.

4.2.2.3 Opportunities

The interest of telecommunications operators, investment bankers, and entrepreneurs from the private sector has increased substantially since the divestiture of AT&T in the U.S. As discussed before, many countries have embarked in restructuring their telecommunications sectors to allow some sort of private sector participation. In developing countries, the World Bank has been a catalyst in funding technical assistance and promoting sector restructuring and privatization of state-owned telecommunications companies.

The attention to telecommunications privatization is at an all time high in the investor community. Since many such programs are occurring simultaneously worldwide, the opportunity exists to capture the attention of would-be investors. However, the SADC region needs increased promotion and a restructuring of investment plans so all interested parties can capitalize. In addition, there is an effort underway by the World Bank to

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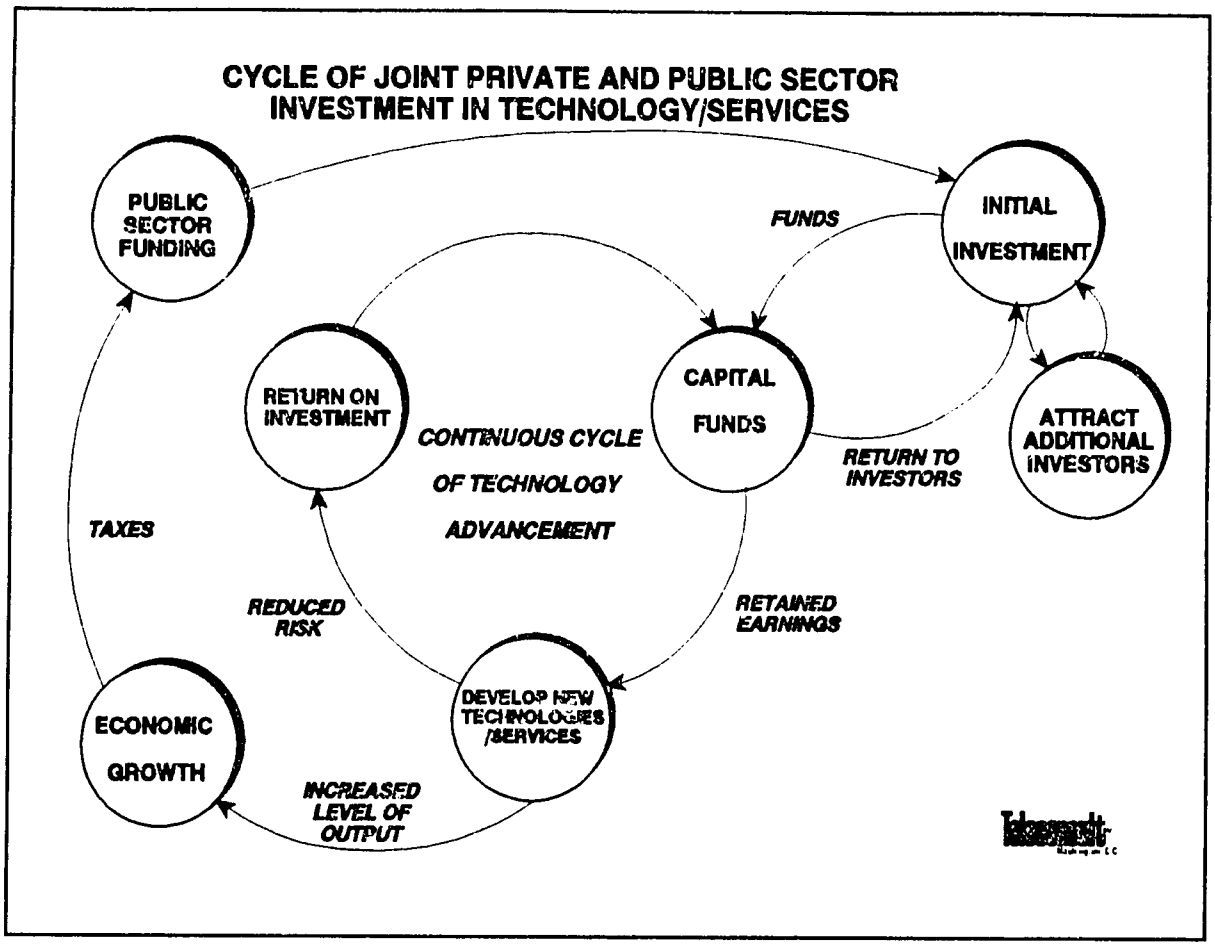

Exhibit 4-4 Cycle of Joint Public and Private Sector Investment.

promote the subject among the members of SADC and other countries. The potential private investor in the SADC telecommunications markets has had his interest sufficiently piqued.

The political will to consider private sector participation in SADC member countries is perhaps the greatest opportunity. For example, in Zambia, a new privatization law has cleared the way for private sector participation in several industries, including telecommunications. Many PTTs are currently contemplating the introduction of new services, such as cellular telephony and data communications, via private sector participation.

Although real and substantial risks do exist, when investing in developing nations, the opportunities presented to potential private sector investors in the telecommunications industry in these countries are worth pursuing. These include:

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- **Large Revenue Growth Potential** - In many developing countries, the large unsatisfied demand for basic telephone services represent a large revenue growth potential for many years.

- **Efficiency Gains** - The implementation of new qualified management, improved operations methodologies, and the rapid deployment of new technologies and services can improve efficiencies significantly. A telephone company can become more profitable and may even be able to serve new customers without installing additional new telephone lines due to improved fill factors (as described in Section I). Similarly, efficiency gains eventually promote economic growth (see Section II).

- **New Service Opportunities** - In a country like the United States, telephone companies are not allowed to provide certain telecommunications services due to regulatory restrictions. The RBOCs for example are forbidden to provide certain enhanced services that may use the basic telephone network (i.e. cable TV, electronic yellow pages). These type of investors, however, are able to explore such new services in foreign countries which can provide them with much higher returns than basic telephone services in their home markets.

In general, the opportunities associated with the privatization of telecommunications in developing nations revolve primarily around the economic benefits realized by the sponsoring nation. The benefits exist for both the host country and the private sector investor.

4.2.2.4 Constraints

For every opportunity for private sector participation in the telecommunications industry, there is almost an equal constraint. Privatizations that have been successful have had their share of obstacles. Those under consideration are also experiencing similar constraints. The most common are:

- **Opposition from Labor Unions** - Most employees of state-owned telephone companies belong to a labor union. These labor unions usually oppose privatization efforts because they believe the number of jobs will be reduced if the telephone company goes under the control of the private sector. In 1992, the privatization of Telecom, the long distance telephone company owned and operated by the Colombian government, was derailed due to massive strikes from telecommunications labor unions, paralyzing the nation for two weeks.

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- **Lengthy Negotiations** - Negotiations between the private and public sector in the telecommunications industry can be very lengthy. These can last many months or even years. Any changes in political views may delay or even cancel the efforts that lead to the actual transaction between the parties. Other obstacles that may extend negotiations are the requirement of new laws and regulations, the restructuring of a state-owned telephone company, agreement with labor contracts, determining the value of the state-owned assets, and the adoption of a tariffed rate structure.

- **Regulatory Restructuring** - In order to allow private sector participation, new laws are required in most nations. The separation of regulation from the operations of the dominant carrier implies the creation of a regulatory body, the formation of an autonomous operating telephone company, and the establishment of clear policies and regulations. Depending on how the sector is restructured, the obstacles to the private sector may be significant. For example, a policy to allow competition with the dominant carrier or to force the private sector to provide services to non-profitable markets (i.e. rural telephony) increases the risk to the private sector. Other factors may include taxation, foreign investment laws, frequency/spectrum allocation, and profit repatriation.

An additional constraint developed rapidly during 1992. As discussed earlier, the most viable investors in developing telecommunications industries are the private telephone operators in developed countries. In the case of U.S. operators, the RBOCs and GTE are currently reevaluating their involvement in such markets.

Several RBOCs have substantially reduced their international staff and are cutting back on overseas activities. They are finding that it is not easy to manage and operate overseas investments in foreign telecommunications services infrastructure. Because it will be difficult to attract the large telecommunications investors to the SADC region, the possibility exists that other smaller companies may take advantage of the situation. However, these smaller companies may not have sufficient human and capital resources to carry out the mandate of a privatization contract.

Currently, there are 48 privatization opportunities competing against one another for a very few qualified investors from industrialized nations. Unfortunately, SADC is not high on the preference list of potential markets for available investors. As covered in Section II, investors use decision matrices in order to analyze a country's risk and to prioritize their investment opportunities and SADC countries tend not to be attractive under such criteria.

4.2.2.5 Trends in Private Sector Participation Worldwide

Privatization of government-controlled telecommunications companies involves careful planning and an intimate understanding of the process. Experience gained from those countries which have already embarked on privatization programs has shown four fundamental areas of importance when restructuring telecommunications market sectors. These are:

- **Regulatory Issues** - regulations and statutes covering issues such as competition, pricing, standards, etc. required to make the privatization process work and evolve. Regulation implements the policies set forth by governments,

- **Market Segmentation** - the means in which the market is segmented, the number of entities involved, and the roles which they will play,

- **Ownership Philosophy** - the structure of the ownership of the various entities created under market segmentation (ownership may include public, private, foreign, or a combination), and

- **Provisions for Competition** - the methodologies and processes adopted to ensure competition in the various market segments.

In those countries where privatization has already happened, there have been various levels of implementation related to the above four areas. Solutions have been adopted to take into consideration specific socio-economic objectives, market issues, geographic coverage, and investment objectives associated with the sponsoring nation.

Thus far, there seems to be no "cookbook" plan for importing telecommunications privatization into nations wanting to privatize. Instead, a basic methodology based upon those four fundamental areas can be used to develop a specific privatization scheme for introduction into a candidate country. This scheme can then be molded and shaped based around the local political environment and take advantage of the "lessons-learned" and historical understanding gained by privatization efforts in other countries.

A description of international experience gained thus far in each of the four fundamental areas associated with privatization is provided in the following four sections respectively.

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4.2.2.5.1 Regulatory Issues

The changes that affect the telecommunications sector point to problems that involve the organization and content of regulatory policy. From the organization's point of view, the traditional model of a monopolistic, self-regulated PTT becomes inappropriate as the PTT's activities are commercialized and the telecommunication markets are opened to competition.
Countries like the U.K. and Australia have reacted creating independent regulatory entities which focus on the telecommunications industry. This approach can help minimize the fears of political "intervention" that otherwise could affect investments in the sector. In other cases, the responsibility for regulation has been transferred out of the PTT to the appropriate ministry in the government. New Zealand has avoided any regulation directed specifically to an industry and relies instead on general legislation regarding fair commerce and anti-competitive practices. Due to restrictions in the laws, Venezuela has created a subdivision within the Ministry of Communications to regulate the telecommunications industry as a temporary measure before it creates an independent regulatory agency (CONATEL). Whichever option is chosen, arrangements must be made to assure the required resources and skills are in place for an effective regulation.

Regulation in the telecommunications market sector carries the following objectives:

- Defines and protects any required exclusive rights awarded to operators,
- Protects the consumer through price and rate-of-return controls,
- Assures fair competition and minimizes the chance for market abuses, and
- Defines and manages any "obligation for community service" imposed upon the operators (e.g., universal dial tone and free emergency service access).

Concession of the traditional monopolistic enterprise clearly limits the field of competition, but can be justified as a means for increasing the market value of the telecommunications entity or to provide a source of funds for future modernization of the network. A similar consideration can influence the method chosen to control prices and rates-of-return. Such controls provide major incentives to improve operating efficiency but can dissuade any potential investors.

Furthermore, the assurance of fair competition becomes more difficult because the traditional monopoly inevitably continues to dominate local network service markets. A number of methodologies have been utilized to keep such dominance from being used to skew competition in the related value-added services and customer premises equipment

(CPE) markets where market entry is easiest. Emphasis is placed on maintaining adequate separation between competitive and non-competitive market players in measurable if not necessarily physical terms. The future trends towards Open Network Architecture (ONA) are expected to further promote fair competition and ease the regulating entity's oversight burden.

The definition and interpretation of Community Service Obligations (CSOs), are invariably within the conflictive aspects of the regulatory agenda, since they center attention directly on the conflict between the commercial objectives of an operator and the broader socio-economic objectives of the government. These issues acquire special importance when the government wishes to encourage rapid improvements in coverage penetration, and/or quality of network services, since these improvements imply substantial levels of investment. It could also be important for the regulatory entity to specify a cost accounting system for the CSO's, and a preferred method for their financing. In Australia, difficulties in this area have consumed a considerable amount of regulatory effort.

The issue of rural versus urban service has been addressed in several countries through the use of the "Franchise Contract". That is, when a private entity invests in the privatization of a state-owned telecommunications entity, governments usually include provisions for services in CSOs, including rural telephony. For example, the Mexican and Venezuelan operating franchises were forced to provide at least one public telephone for population centers with over 500 people. In addition, the Venezuelan franchise allows for other operators to obtain a franchise in geographic areas where CANTV may not want to serve within a given time frame in its investment plan. Another provision that is under consideration in Venezuela is the use of a special taxation (up to 15%) of carriers (other than CANTV) and private network owners for the purpose of subsidizing CANTV's expenses in rural areas.

The issue of national security is probably the most difficult to address in a political context. Many nations that have privatized their state-owned telephone companies have decided to install private secured telecommunications networks. In addition, the armed services continue to enjoy dedicated frequency allocations for their exclusive use. If commercial applications require the use of these frequencies, the regulatory agency can negotiate with the armed services the reallocation of government frequencies. Finally, most countries do not allow majority ownership by foreigners in the privatized telecommunications entities. All countries that have privatized their telecommunications entities thus far require that foreign ownership be less than 50% of outstanding voting shares.

4.2.2.5.2 Market Segmentation

An important issue in restructuring government-controlled telecommunications markets is the segmentation of that market. That is, a determination must be made for how to provide basic telecommunications services. Should these services continue under the domain of a single operator or should the company be divested to create new and separate entities to address specific services in the specific market segments?

Market segmentation implies the use of divestiture to break the grip of single-operator control and allow the provisioning of various services in competitive environments. Divestiture is usually designed around the various service areas (local, long-distance, enhanced, international, etc.) or geographic parameters as required when considering existing network architectures.

The most vivid example of divestiture is that of the U.S., where local services are provided by regional operating companies (the RBOCs) while domestic and international long distance services are provided by competitive operators such as AT&T, MCI, and US Sprint. Canada, Denmark, Japan, Chile, Mexico, Colombia, and Bolivia are other examples that have separated service provision responsibilities into separate entities.

This type of segmentation has been adopted in order to reduce monopolistic tendencies from individual operators. It has also been adopted to promote direct competition among operators within a geographical area as well as indirect competition among operators in different geographical areas. This strategy can be very valuable to regulators. However, careful consideration must be given to possible operational difficulties and inherent inefficiencies due to network duplication. Additional consideration is needed to address the desired government policies such as cross-subsidization that may be in place in existing tariff structures.

Divestiture in the U.S. resulted in the break-up of the 100-year-old AT&T in 1984 into the RBOCs which provide basic local services and the "new" AT&T providing domestic and international long distance services. The long distance market was immediately opened to competition with interexchange carriers such as MCI and US Sprint first on the scene to compete with the new AT&T.

Also, soon after the AT&T divestiture, literally hundreds of small- to medium-sized companies formed to compete for long distance services. Some were direct suppliers of services which built and operated their own networks. Others were resellers which bought bulk capacity from the primary carriers at wholesale prices and resold services to customers at retail. However, since divestiture, the long distance market in the U.S. has undergone rapid consolidation with many of the lower-order direct and reseller suppliers either being

bought out by the more prominent suppliers or forced into bankruptcy as profit margins shrank and the economic laws of supply, demand and competition took hold.

In developing countries and emerging democracies, regulators have decided to allow competition in basic services that utilize alternative technologies such as cellular telephony and data communications since they are not usually offered by the dominant carrier at that time of their introduction. In addition, the required capital to start offering these services is much smaller, by a factor of at least a hundred when compared to basic telephone services.

However, in the long run, the plan for many developing nations, such as Mexico, Venezuela and Argentina, is to allow competition in other basic services like national and international long distance services within six to ten years from the time of privatization. Regulators assume that investors in a dominant carrier should have installed a modern network and be able to become strong competitors within that time frame. In the SADC countries, this time frame might be much longer since the networks in the region are among the least developed in the world. In addition, the longer the monopoly period, the lower the investment risk, which results in a more attractive incentive for potential investors.

4.2.2.5.3 Ownership Philosophy

In the U.S., ownership of entities within telecommunications market segments has been primarily private. However, in other countries, there has been a continuous debate of whether ownership should revolve around state versus private sector participation. Other countries have implemented private sector involvement differently.

Until recently, with the exception of the United Kingdom and Spain, the European Community (EC) had resisted any changes in their ownership structure. Alternative policies (i.e. The Netherlands, Ireland) have restructured their state-owned telecommunications entities into corporate entities with shares owned by the government. The primary purpose of this policy is to improve operational and marketing efficiencies. Recently, Germany, France and Italy have started to contemplate private sector ownership of telecommunications networks.

In the U.K. and Japan, ownership was transferred to the private sector via public stock and debt offerings on the world financial markets. New Zealand, Mexico, Argentina and Venezuela also pursued this route but first transferred ownership via direct sales to operator consortia. Venezuela found it politically necessary to involve employees of the old government-controlled companies as minority shareholders in the new entities.

Foreign ownership in the newly-formed telecommunications companies has also proven important to privatization policy development. In each of the nations which have undergone privatization, foreign ownership has been allowed, but restricted. The U.S. closely monitors foreign ownership through the Federal Communications Commission (FCC) and limits foreign control to 25 percent of the public switched network. Similarly, New Zealand designed its policies to restrict foreign ownership to less than 50 percent. The government of the U.K. holds "Golden Shares" in British Telecom and Cable and Wireless, allowing it to block any monopolistic tendencies by either company and to prevent majority control by a foreign entity.

The main issue in foreign control lies in the concept of "national security". As mentioned previously, governments require control to be in the hands of nationals so that foreign entities do not manipulate the use of telecommunications networks in case of war or other international conflicts.

Other issues also affect the decision of ownership. Many countries want to leverage local investors with those of more capitalized and experienced foreign investors. The issue of technology transfer has always been important in developing countries. In Africa and SADC, the region is suspect of foreign investors "colonizing" their countries all over again. For these reasons, an optimum balance of foreign-versus-domestic ownership will be the principal factor in ensuring the success of a privatization of the state-owned telephone entity or private sector participation in other services.

4.2.2.5.4 Provisions for Competition

The main benefits of competition are to provide market dynamics to improve operating efficiency and quality of service, optimize cost-benefit of service offerings to the user, and promote the timely introduction of new and innovative services. In ideal circumstances, the qualities resulting from competition can be positive for all involved parties.

However, competition can foster some negative factors as well. These include the duplication of corporate and government physical plant infrastructure, organizational structure, reduced economies of scale, and potential negative impacts to certain socio-economic and political objectives.

Basic versus Enhanced Services: By diligently planning privatization efforts, nations have been able to balance the positive and negative impacts of competition. Most privatization models have been based upon direct government regulation for basic services to maintain universal service objectives and, the introduction of competition to enhanced services markets to promote innovation and control costs. However, the boundary between what constitutes a "basic" service versus an "enhanced" service is not clearly defined. The

definitions of what is included in the two areas has evolved differently depending upon the nation implementing the policies.

In the U.S. for instance, the FCC provides the definition for what is included in basic services versus what is considered to be an enhanced offering. Still ambiguous, basic services include such things as the provision of dial tone and other local market offerings where enhanced services included things that offer content modification and/or addition, or interaction with an information repository or database.

Japan's system and policies are simply based upon whether the operator owns and operates its own network infrastructure. So called Type I operators maintain their own infrastructure from which they offer telecommunications services. Type II operators provide services using the Type I operator's infrastructure.

New Zealand and the U.K. have instituted the most radical policy initiatives. Their policy regards all telecommunications services to be competitive, whether basic or enhanced, as long as the operator receives a license to provide such services. These policy initiatives are still quite new and the verdict is still out concerning whether they will be successful in positively impacting associated markets.

Future Policy Considerations: The trend in the telecommunications industry is that the concept of basic versus enhanced service offerings will continue to become blurred and eventually merge into one area. Furthermore, the globalization of world economies has produced the need to operate as regions and not as separate national entities when it comes to networking and telecommunications. These trends are already affecting the way in which privatization policies are being implemented and how they evolve.

New technologies and resultant service offerings like Integrated Services Digital Networks (ISDN) are making the concept of separate areas for basic and enhanced services obsolete. ISDN crosses the bounds of basic/enhanced services as well as regulated versus competitive markets so that existing policies are not applicable. The trend for the future is one which will open the entire marketplace to competition with only minimal government oversight in order to maintain some semblance of control and monitor national security.

Many countries have already established bilateral arrangements to provide basic and enhanced telecommunications services across national boundaries. This trend will probably continue until ubiquitous worldwide connectivity is achieved offering very advanced services based upon new technologies.

In the SADC region, one of the main determinants in allowing competition is the size of the market. Although a country's population may be sufficiently high, the ability to pay for

telecommunications services may not be high enough to support certain types of services under competition. For example, it may be advantageous to allow the private sector to own and operate a cellular franchise but the market might not be large enough to foster competition with another cellular service provider. In developing countries with larger economies than those of the SADC region, newly-privatized telephone entities are given the right to install cellular networks in competition with other private sector cellular telephone service providers (i.e. Venezuela, Argentina, Hungary). The main decision in these cases has been the size of the market along with the low capital requirements required to install such systems.

4.2.3 Worldwide Trends in Management and Financing of Telecommunications Entities

Private sector involvement in management and financing of telecommunications services is still evolving. As market and investor conditions in their home markets change, the management structures in foreign operations change. Likewise, as economic conditions surrounding private investors change, their ability to finance privatization of basic and enhanced services change. The conditions under which New Zealand Telecom was privatized in the late 1980s are not the same as those under which Uruguay is undergoing in its current privatization of the state-owned telephone company, ANTEL. The following provide an insight into the management and financing options that have been observed to date.

4.2.3.1 Management

The world trend in management of telecommunications entities where the private sector is involved varies from country-to-country and operator-to-operator. The degree of management and control over a private venture depends on the agreement between the shareholders as well as on the laws that regulate the management by foreign entities. Recent privatization (i.e., Mexico, Venezuela, and New Zealand) have shown that if there is a telecommunications operator as a shareholder, this entity usually has a significant role in managing the technical operations as well as in providing strategic directions to the board of directors of the private entity. The day-to-day operations are usually supported by local personnel and those from the newly-privatized telephone company.

Executive management is usually controlled by the majority shareholder within the private sector. In cases where the government still holds majority ownership (i.e. CANTV in Venezuela), executive management control is directed by the largest private shareholder (i.e. GTE in CANTV). In the TELMEX privatization (Mexico), executive control is directed by the Mexican private sector majority partner.

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During the early 1990's, U.S. telephone companies underwent changes to their regulatory and market conditions. Large amounts of layoffs occurred throughout the industry. Regulatory conditions have enabled the RBOCs to enter service areas previously off-limits and have caused them to re-focus their human and capital resources more into domestic markets (i.e., value added services). At the same time, personnel are reluctant to accept foreign based positions unless they represent a long term commitment because they feel that their previous position might no longer be available and they might be out of a job once they return to the US. As a result, several RBOCs have expressed difficulties in identifying available qualified personnel to relocate to other countries where privatization efforts have been successful[4]. This has created a tighter selection criteria among U.S. operators when deciding where to concentrate efforts in upcoming worldwide privatization opportunities.

The ability to attract talented human resources from operators like the RBOCs to opportunities in the SADC region will be a major challenge. Experienced technical and managerial human resources are essential to invoke necessary operating efficiencies. In the past, the region has been able to attract talented foreign human resources through limited operational and technical assistance contracts.

Botswana has in place a contract with Cable & Wireless to operate its state-owned telephone network. The quality of Botswana's telephone network has improved since the inception of this contract, as compared to other networks in the region. In other countries, technical assistance contracts have been issued mostly to European consulting entities. Unfortunately, these consulting entities are themselves owned by their country's government. Based on these observations, it can be concluded that although retention of private sector management resources is important, it is also as important and necessary to include private sector capital and equity incentives in order to maximize the potential for growth and quality improvement of the telephone companies currently owned by governments.

4.2.3.2 Financing

There are several options available to finance telecommunications projects in developing countries. The provision of appropriate rate structures is the most important form of financing telecommunications infrastructure (internal generation). Since most governments do not set rates high enough (due to cross-subsidies), external financing is usually required. For state-owned entities, external financing to sponsored nations is available from multinational banks (i.e., the World Bank, African Development Bank), bilateral institutions

[4] Personal correspondence between one of the authors and several RBOCs.

(country-specific aid and financing) and from vendors (i.e., Siemens, NEC, Alcatel, etc.). However, bilateral or multilateral financing usually falls short of expansion requirements.

The amount of annual capital required for worldwide telecommunications expansions in 1990 was US$279 billion[5]. By 1995, world telecommunications annual capital requirements is expected to grow to US$567 billion. In order to meet demand for financing during the 1990s, US$26 billion will be required per year. However, based on current estimates, there is projected to be only US$12 billion per year available for funding, creating a shortfall of US$14 billion per year. The annual capital requirements for telecommunications expansion for the SADC Region for the remaining of the decade is estimated at about $700 million, including the RSA. This represents about 2.7% of the world's capital requirements for telecommunications infrastructure.

Financing of telecommunications entities in which the private sector is involved varies from case-to-case. However, methods of funding for private telephone operators is limited. These include:

- **Equity Financing** - Investors become equity holders, involving experienced management from experienced operators. Global equity offerings in the world's stock markets to attract institutional investors as well as telecommunications funds are usually part of a privatization package (i.e. the U.K., Mexico, Venezuela, Argentina, Chile).

- **Debt Financing** - Depending on the debt/equity ratio, private investors in telecommunications can turn to national and international markets to secure debt instruments at reasonable interest rates. In cases where international traffic settlements favor the host country, settlements with a foreign telecommunications credit worthy entity can be used as collateral for debt financing. For example, AT&T's settlements with TELMEX from traffic flowing from the U.S. to Mexico was used as collateral to raise over US$1.5 billion in favor of TELMEX over a period of less than two years[6]. This has been the case for several recent private sector telecommunications projects in developing countries (i.e. Venezuela, Chile).

- **Debt/Equity Swaps** - The conversion of a country's public debt to equity in a state-owned telephone company is also an alternative method of financing.

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5 Townsend, Philip. "Developments in the World Telecommunications Industry". Bear Stearns International Research, 1991.

6 Murphy, "Working With Safety Nets", Latin Finance, Sept., 1991.

This requires the participation of banks holding public debt in the country in question. In 1990, Argentina was able to retire over US$5 billion in foreign debt and accrued interest in the privatization of ENTEL (the then state-owned telephone company).

Although all of these vehicles are applicable to the SADC countries, the region will have difficulties attracting financing due to competition from other regions of the world. SADC private sector financing opportunities might not be first on investor's list. Investors and financing institutions are directing attention to other parts of the world, such as Latin America, the former Soviet Republics (CIS), Eastern Europe, and their own home markets (i.e. U.S., Europe, Japan). With the exception of the Republic of South Africa, the size of the markets in the region may not be sufficient to attract needed funding. As analyzed in Section VI, assistance from the governments of developed nations might be necessary to provide sufficient incentives to attract investors.

4.3 EXPERIENCE OF PRIVATE SECTOR PARTICIPATION IN THE SADC REGION

The role of the private sector in the SADC region has been minimal. The only cases in the Region where the private sector is participating or is contemplated for future participation are those identified in Exhibit 4-5 and Annex IV.1. These countries are Botswana, Mozambique, Zambia, Zimbabwe, the Republic of South Africa (RSA) and Tanzania. However, the tendency for the Region is to increasingly involve the private sector in more areas than before.

In **Botswana**, Cable & Wireless is under contract to manage the state-owned telephone company. The contract has been under execution for most of the 1980s. The government is currently renegotiating its relationship with C&W. The main benefit to Botswana in this private sector arrangement is that C&W imports experienced technical and managerial human resources. During the tenure of C&W, efficiency has increased dramatically. This can be measured by the decrease in number employees per 1000 telephone lines from 85 in 1987 to less than 50 in 1989. In 1989, only Zambia and South Africa had a lower number of employees per line in the region (see Section II).

In **Mozambique**, Telecomunicaciones Do Mozambique (TDM), the state-owned telephone company has been divested from the post office (PTT). TDM is now an autonomous entity, restructured to respond efficiently to market demands as an autonomous entity. Private sector participation has been allowed in Mozambique to provide other services such as technical consulting and data communications. The drawback to private sector participation in Mozambique is that TDM, which is still a state-owned monopoly, has a 50% equity participation in all of the new service providers and could still flex its monopolistic muscles. Another major constraint for Mozambique may be that future potential private investors

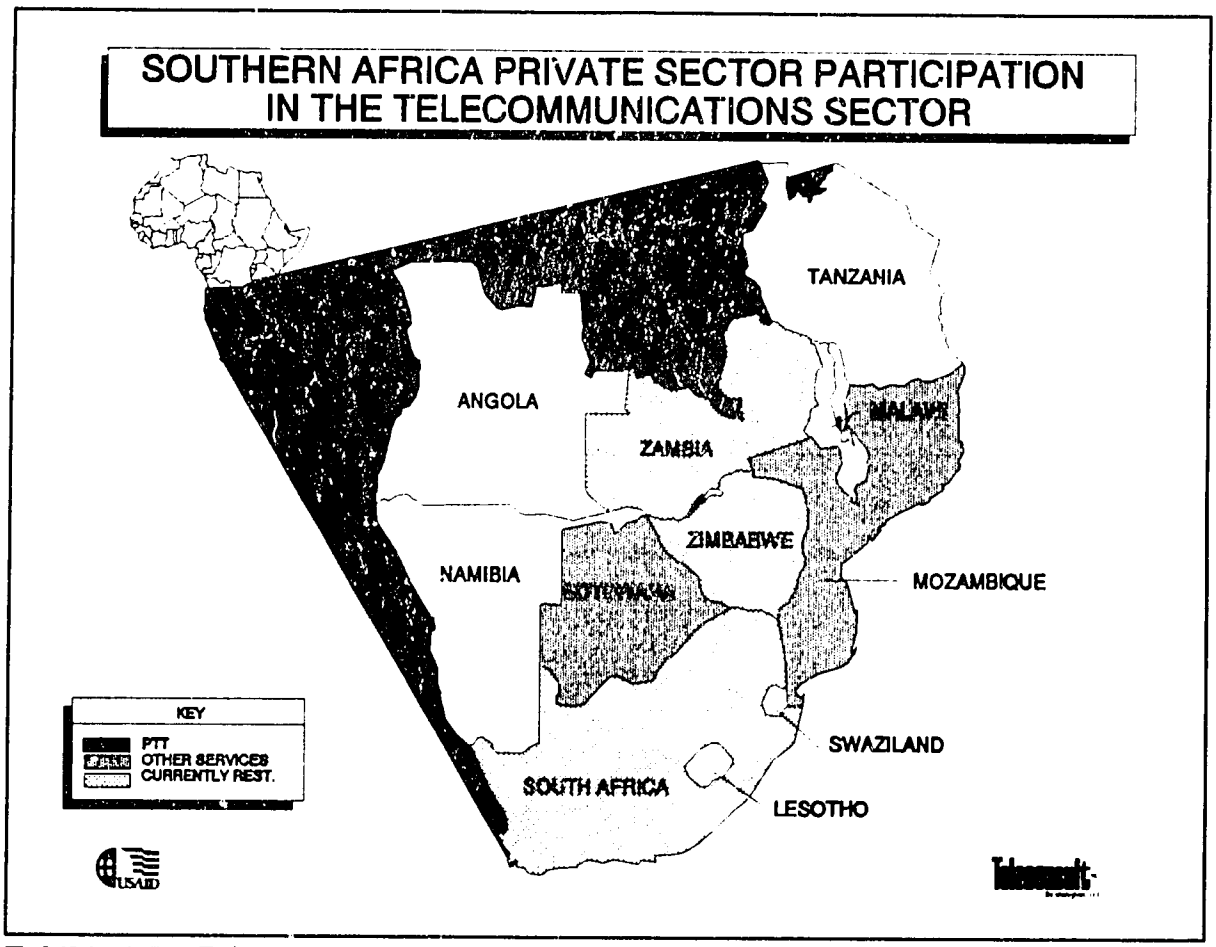

Exhibit 4-5 Private Sector Participation in SADC.

may stay away from the country until civil unrest ceases through recently-established peace agreements intended to end its civil war. At the moment, it is too early to assess the impact of private sector participation.

In **Zambia**, no private sector participation in telecommunications is yet available. However, a new privatization law that permits privatization of the state-owned telephone company was recently approved. The law also covers other industries. The major constraint for the country is that the country lacks the major ingredients to attract private investors when compared to other investment opportunities in the world. That is, the perceived low market demand, low investments in other infrastructure, and country risks may force the government to take extra steps in promoting the country to potential investors.

In **Zimbabwe**, the Ministry of Information, Post and Telecommunications is working with the World Bank to restructure its telecommunications sector. The intent is to restructure

the sector and create a regulatory entity separate from operations of telecommunications services. It is also intended to divest telecommunications functions from postal functions. The government also envisions participation from the private sector in certain enhanced services, such as cellular telephony.

From a point of view of the private sector, Zimbabwe has one of the largest markets in the region outside the RSA. The expected return on investment for any private sector participant can be very rewarding since the expansion requirements for the telecommunications networks to the year 2000 are significant. The negative aspect for private investors in Zimbabwe is that the Government has traditionally imposed central control, and hence may potentially increase the perceived country risk.

With the most developed economy in the region, the **Republic of South Africa (RSA)** may provide the highest potential returns to investors as compared to other opportunities in SADC. The RSA government has already divested telecommunications from the post office. In October 1991, Telekom was created as an autonomous telecommunications operating entity, responsible for its own operational revenues and returns. Telekom has restructured its organization to best respond to business customers and focus on the most profitable service offerings. Due to financial constraints, Telekom has expressed great interest in exploring participation from the private sector to provide new services such as cellular telephony as well as for assistance in funding its large expansion requirements in the future. Telekom is aware of the fact that even though there is virtually 100 telephones for every 100 white inhabitants, the black population has virtually no telephone lines available. For this reason, Telekom will require large capital resources in order to provide equal access to all members of the population in the RSA.

The main constraint for private sector participation in the RSA is political risk. The African National Congress (ANC) opposes private sector participation in telecommunications. In fact, due to opposition from the ANC for private sector participation in cellular telephony, Telekom has decided to installed a new cellular system on its own even though it had expressed interest in attracting a private investor. Other key ingredients that attract private investors - market size, level of foreign investment, and quality of infrastructure are all sufficiently high to interest the private sector.

Based on the principal elements that affect investment decisions, it can be concluded that, in general, the **SADC Region** will have difficulty attracting private sector investors in the telecommunications sector. Without additional investment incentives, the attractive characteristics for the region do not appear sufficiently strong to counter the unattractive aspects of the region.

The attractive characteristics for the SADC region include:

- **Large Revenue Growth Potential** - In all countries of the region, the large unsatisfied demand for basic telephone services represent large revenue growth potentials as compared to the initial investment requirements. The area has the lowest telephone density penetration in the world. Therefore, any expansion will result in a relatively high impact to the marketplace as well as the overall economy.

- **Efficiency Gains** - The implementation of new qualified management, improved operations methodologies, and the rapid deployment of new technology and services can be expected to improve efficiencies significantly in the SADC region. Furthermore, due to current low levels of telephone density, a small incremental increase in the number of telephone lines will improve efficiency dramatically.

- **New Service Opportunities** - Services other than basic telephone services are not yet common in the SADC region. Business users can benefit from the provision of new enhanced services and alternative technologies, such as cellular telephony. The low capital requirements for these type of services as compared to basic telephony may attract entrepreneurs and smaller companies which otherwise might not be able to compete against larger established operators in other more attractive markets. Small U.S. telecommunications operators and entrepreneurs have shown to be among the best competitors in the world.

- **Proximity to the RSA** - The emergence of the RSA into a democratic and open society will promote additional trade opportunities between the SADC countries and the RSA. This will, in turn, promote growth of telecommunications traffic in the region, increasing the potential for revenue growth. In addition, entrepreneurs from the RSA are potential investors that may contribute to "local" capital as counterparts to foreign private investors (i.e. from the U.S. and elsewhere).

Unfortunately the potential constraints imposed on the private sector may be significant enough to obscure the attractive benefits that the SADC region may bring. These include:

- **Country Risks** - The perceived country risk by private investors for the region is relatively high when compared to other investment opportunities around the world. Economic and political instability in the region are probably the most important impediments in attracting private sector investors to the region.

The political instability in Mozambique, the RSA and Angola, for example, contribute negatively to the risk image of the region.

Another contributor to country risk is the uncertainty and timing in future regulatory structures. In order to allow private sector participation, new laws are required in most of the SADC nations. The separation of regulation away from operations of the dominant carrier will require the creation of a regulatory body, the formation of an autonomous operating telephone company, and the establishment of clear policies and regulations. Although some countries have started to restructure their telecommunications sectors, several years might be necessary to include all countries in the region. Other factors that increase country risks include taxation treatment, foreign investment laws, frequency allocation, profit repatriation, and the establishment of technical standards (determined by historic donors).

- **Market Size** - One of the most important considerations to private sector investors is market size. Outside of the RSA, the two largest markets are Tanzania and Zimbabwe. With worldwide competition for scarce private investment capital, the market size for the remaining SADC countries might not be sufficiently large to attract the necessary investors. The size of the region's economies will only dictate less than 2% of the world's required investment capital during the 1990s.

- **Limited Funding Availability** - There will be an estimated shortage of US$14 billion per year of required funding for worldwide telecommunications infrastructure during the 1990s. With this constraint, the SADC region will have difficulties attracting financing due to competition from other regions of the world. Additional difficulties to attract financing may also be attributed to the fact that the region posts high country risks and contain small market sizes. For these reasons, SADC private sector financing might not be high on a potential investor's list. Investors and financing institutions are directing attention to other parts of the world, such as Latin America, the former Soviet Republics (CIS), Eastern Europe, and their own home markets (i.e. U.S., Europe, Japan). Assistance from governments of developed nations might be necessary to minimize country risks and provide sufficient incentives to attract investors.

From the point of view of U.S. investors, the SADC region is not overly attractive for private sector investment. Although there are numerous entrepreneurs willing to take the risks of investing in the SADC region, most serious investors (i.e., the telecommunications operating and manufacturing companies) and financing institutions are directing their

attention to other parts of the world. Unless a coordinated effort is established to promote the region, create sufficient incentives and to develop policies for sector reform, the private sector may never be a significant contributor to the Region's capital and managerial requirements in the telecommunications sector. Recommendations addressing these issues are included in Section VI.

ANNEX IV.1

TELECOMMUNICATIONS SECTOR SCOPING STUDY FOR SOUTHERN AFRICA - PHASE ONE

SECTION IV

WORLDWIDE PRIVATE SECTOR PARTICIPATION IN TELECOMMUNICATIONS

	WORLDWIDE PRIVATE SECTOR PARTICIPATION IN TELECOMMUNICATIONS							Annex IV-1			
		• = EXISTING	♦ = PLANNED OR UNDER CONSIDERATION			♣ = SADC MEMBER					
		PRIV. DOMINANT	COMPETITION IN	PRIV DIG.					DATA/VALUE ADD.		OPER./INSTAL.
REGION	COUNTRY	CARRIER	SW BASIC SERV.	NETS.	CELLULAR	PAGING	VSAT	TELEPORTS	NETWORKS	BOT	CONTRACTS
NORTH AMERICA	CANADA	•	•	•	•	•	•	•	•		
	MEXICO	•		•	•	•	•	•	•		
	U.S.A.	•	•	•	•	•	•	•	•		
CENTRAL AMERICA	GUATEMALA	♦			•			•			
& PANAMA	HONDURAS	♦			♦			♦			
	EL SALVADOR				•			♦			
	NICARAGUA	♦			♦			♦			
	COSTA RICA	♦			•			♦			
	PANAMA	♦			♦			♦			
	BELIZE	•			♦						
CARIBBEAN	JAMAICA	•						•			
	DOMINICAN REPUBLIC	•									

	WORLDWIDE PRIVATE SECTOR PARTICIPATION IN TELECOMMUNICATIONS							Annex IV-1			
		● = EXISTING	♦ = PLANNED OR UNDER CONSIDERATION			♣ = SADC MEMBER					
		PRIV. DOMINANT	COMPETITION IN	PRIV DIG.					DATA/VALUE ADD.		OPER./INSTAL.
REGION	COUNTRY	CARRIER	SW BASIC SERV.	NETS.	CELLULAR	PAGING	VSAT	TELEPORTS	NETWORKS	BOT	CONTRACTS
	PUERTO RICO	♦	●		♦						
	BARBADOS	●									
	ST. KITTS & NEVIS	●									
	TRINIDAD & TOBAGO	●			●						
SOUTH AMERICA	VENEZUELA	●		●	●	♦	●	●	●		
	COLOMBIA	♦		●	♦	♦	♦	●			
	ECUADOR			♦	♦		♦		♦		
	PERU	♦ , ●			●			●			
	BOLIVIA	♦			●			●			
	CHILE	●		●	●	●	●	●	●		
	ARGENTINA	●		●	●	●	●	●			
	URUGUAY	♦			●			♦			
	PARAGUAY	♦			●	●	♦	♦			
	BRAZIL	♦			♦	♦	♦	♦	●		

	WORLDWIDE PRIVATE SECTOR PARTICIPATION IN TELECOMMUNICATIONS							Annex IV-1			
		● = EXISTING	♦ = PLANNED OR UNDER CONSIDERATION			♣ = SADC MEMBER					
		PRIV. DOMINANT	COMPETITION IN	PRIV DIG.					DATA/VALUE ADD.		OPER./INSTAL.
REGION	COUNTRY	CARRIER	SW BASIC SERV.	NETS.	CELLULAR	PAGING	VSAT	TELEPORTS	NETWORKS	BOT	CONTRACTS
WESTERN EUROPE	UNITED KINGDOM	●	●	●	●		●	●	●		
	IRELAND	♦									
	FRANCE	♦					●				
	SWEDEN	♦	●	●	●			●	●		
	BELGIUM	♦						♦			
	NETHERLANDS	♦									
	DENMARK	♦									
	SWITZERLAND	♦		♦				♦	♦		
	GERMANY	♦			●	●	●	●	♦		
	PORTUGAL	♦			♦						
	SPAIN				♦				●		
	NETHERLANDS	♦									
	ITALY			♦	♦						
	GREECE				●						

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		● = EXISTING	♦ = PLANNED OR UNDER CONSIDERATION			♣ = SADC MEMBER					
		PRIV. DOMINANT	COMPETITION IN	PRIV DIG.					DATA/VALUE ADD.		OPER./INSTAL.
REGION	COUNTRY	CARRIER	SW BASIC SERV.	NETS.	CELLULAR	PAGING	VSAT	TELEPORTS	NETWORKS	BOT	CONTRACTS
CENTRAL &	POLAND	♦	♦	●	●	♦	♦	●	♦		
EASTERN EUROPE	CZECHOSLOVAKIA	♦	♦	●	●	♦			●		
	HUNGARY	♦	♦	●	●	♦		♦	♦		
	ROMANIA	♦		♦							
	BULGARIA	♦		♦							
	RUSSIA	♦	♦	●	●	♦		●			●
	LITHUANIA			♦				●			●
AFRICA	EGYPT				♦				●		●
	KENYA	♦			♦						♦
	GHANA	♦									●
	NIGER										●
	NIGERIA	●									♦
	TOGO	●									
	TUNISIA								●		●

	WORLDWIDE PRIVATE SECTOR PARTICIPATION IN TELECOMMUNICATIONS							Annex IV-1			
		● = EXISTING	♦ = PLANNED OR UNDER CONSIDERATION			♣ = SADC MEMBER					
		PRIV. DOMINANT	COMPETITION IN	PRIV DIG.					DATA/VALUE ADD.		OPER./INSTAL.
REGION	COUNTRY	CARRIER	SW BASIC SERV.	NETS.	CELLULAR	PAGING	VSAT	TELEPORTS	NETWORKS	BOT	CONTRACTS
	MALI	●									
	MADAGASCAR	●									
	CHAD	●							●		
	CENTRAL AFR. REP.	●									
	DJIBOUTI	●									
	NIGERIA	●					♦				
	EQUATORIAL GUINEA	●									
	CAMEROON	●									
	SENEGAL								●		
	GAMBIA										♦
	GUINEA-BISSAU	●									
	SIERRA LEON	●									
	MOROCCO	♦			♦					●	●
♣	ZAMBIA	♦					♦				
♣	ZIMBABWE	♦			♦						
♣	BOTSWANA										●

	WORLDWIDE PRIVATE SECTOR PARTICIPATION IN TELECOMMUNICATIONS							Annex IV-1			
		● = EXISTING	♦ = PLANNED OR UNDER CONSIDERATION			♣ = SADC MEMBER					
		PRIV. DOMINANT	COMPETITION IN	PRIV DIG.					DATA/VALUE ADD.		OPER./INSTAL.
REGION	COUNTRY	CARRIER	SW BASIC SERV.	NETS.	CELLULAR	PAGING	VSAT	TELEPORTS	NETWORKS	BOT	CONTRACTS
♣	MOZAMBIQUE									●	●
	MAURITIUS				●						●
	SOUTH AFRICA	♦			♦						
MIDDLE EAST	SAUDI ARABIA	♦			♦						●
	TURKEY	♦								●	
	JORDAN	♦									
	ISRAEL	♦									
	BAHRAIN	●			●						
	KUWAIT				●						
	U.A.E				●						
	TURKEY	♦			♦				●	●	
ASIA/PACIFIC	BANGLADESH	♦	♦		●						
	CHINA						♦				
	INDIA	♦					♦				

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WORLDWIDE PRIVATE SECTOR PARTICIPATION IN TELECOMMUNICATIONS

Annex IV-1

● = EXISTING ♦ = PLANNED OR UNDER CONSIDERATION ♣ = SADC MEMBER

REGION	COUNTRY	PRIV. DOMINANT CARRIER	COMPETITION IN SW BASIC SERV.	PRIV DIG. NETS.	CELLULAR	PAGING	VSAT	TELEPORTS	DATA/VALUE ADD. NETWORKS	BOT	OPER./INSTAL. CONTRACTS
	INDONESIA	♦			●		♦			●	
	MALAYSIA	●			●	●					
	SINGAPORE	♦				●		●	●		
	PHILIPPINES	♦	●		●			●			
	SRI LANKA	♦			●						
	THAILAND	♦			●		●		♦	●	
	PAKISTAN	♦			●		♦				
	FIJI	♦ , ●									
	VANUATU	●									
	SOLOMAN ISLANDS	●									
	HONG KONG	●	●		●				●		
	SOUTH KOREA	♦									
	TAIWAN								♦		
	JAPAN	●	●		●						
	AUSTRALIA	●	●		●			●	●		
	NEW ZEALAND	●	●	●	●			●			

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	WORLDWIDE PRIVATE SECTOR PARTICIPATION IN TELECOMMUNICATIONS							Annex IV-1			
		● = EXISTING	♦ = PLANNED OR UNDER CONSIDERATION			♣ = SADC MEMBER					
		PRIV. DOMINANT	COMPETITION IN	PRIV DIG.					DATA/VALUE ADD.		OPER./INSTAL.
REGION	COUNTRY	CARRIER	SW BASIC SERV.	NETS.	CELLULAR	PAGING	VSAT	TELEPORTS	NETWORKS	BOT	CONTRACTS
WORLDWIDE											
SATELLITES:	PANAMSAT		♦	●							
	ORION SAT. CORP.		♦	●							
	COLUMBIA COMM.		♦	●							
UNDERSEA FIBER:	MOST PTT CONSORT.			●							
	PTAT			●							
	PACIFIC TELECOM			●							

ANNEX IV.2

TELECOMMUNICATIONS SECTOR SCOPING STUDY FOR SOUTHERN AFRICA - PHASE ONE

SECTION IV

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TELECOMMUNICATIONS SECTOR SCOPING STUDY FOR SOUTHERN AFRICA - PHASE ONE

SECTION V

THE ROLE OF U.S. A.I.D IN TELECOMMUNICATIONS DEVELOPMENT

SECTION V

THE ROLE OF U.S. A.I.D IN TELECOMMUNICATIONS DEVELOPMENT

5.1 REVIEW OF A.I.D.'S POLICIES AND STRATEGIES THAT RELATE TO THE TELECOMMUNICATIONS SECTOR:

The Foreign Assistance Act of 1961, as amended, authorizes A.I.D. to administer two kinds of foreign economic assistance: Development Assistance and the Economic Support Fund. Although there are small telecommunications components within many of the development assistance programs, the majority of the large-scale telecommunications activities in A.I.D. are carried out within the framework of the Economic Support Fund. Each kind of assistance can take one of three forms; a loan on concessional terms, development grants or technical assistance.

Within the category of Development Assistance, A.I.D. programs are guided by the "basic human needs" mandate set forth in amendments to the Foreign Assistance Act. This mandate shifted an earlier A.I.D. emphasis on the promotion of large scale infrastructure projects (power plants, roads, dams, etc.) to focus on efforts directed at helping the least developed countries to meet their "basic human needs." These needs are for food, nutrition, rural development, population planning, health, education and resource development. These needs have, in some cases, been met through radio network and radio broadcast facilities. The A.I.D. Rural Satellite Program, under Development Assistance, combined a specific kind of telecommunications applications with development goals. The Development Fund for Africa falls within the Development Assistance category. The FY '93 request for Africa is $776.6 million.

The second category of foreign economic assistance administered by A.I.D. is the Economic Support Fund (ESF). ESF is the most flexible form of U.S. assistance. Justification for ESF can be political, economic or strategic or any combination of these. The use of ESF funds for Commodity Import Programs enables a country to purchase industrial and agricultural equipment, spare parts and new materials. There have been several telecommunications projects in the ESF category, many in Liberia, Madagascar and Egypt. The Egyptian telecommunications project is one of the larger ESF projects and it is also the only major telecommunications project now ongoing. ESF was also used in the rehabilitation and restoration efforts of telecommunications in Lebanon and Grenada.

In February 1984, A.I.D. released a Policy Determination (PD-10), titled Development Communications, which stated its future approach to telecommunications. The Policy Determination provided guidance on the objectives and conditions under which A.I.D. will

support the fuller application of communications technologies in U.S. assisted development programs. The guidance applied to all Development Assistance - funded programs and to those supported with Economic Support Funds.

> "The priority for A.I.D. will be 'development communications,' defined as the application of existing communications technologies and media to problems of development. A.I.D. will also give attention to 'communications development', defined as the development of new or additional communications infrastructure and capacity, but will not give priority to investment in infrastructure."

With regard to infrastructure development, A.I.D. will:

> ".... limit direct investments in infrastructure development and will concentrate instead on technical assistance designed to ensure that infrastructure projects are effectively implemented and utilized (e.g. training for key technicians and managers, technical assistance to organizations making use of existing infrastructure)."

A.I.D.'s Directorate for Policy, which was established in 1991, has the central responsibility for policy formulation. It is charged with updating PD-10. It is on their Action List; however, no specific date has been set for the update.

In June 1985, A.I.D. issued a Blueprint for Development titled, *The Strategic Plan of the Agency for International Development*. The plan reiterated A.I.D.'s commitment to bringing about fundamental, systematic change. It identified its major components as policy dialogue, institutional development, utilization of the private sector, and technology transfer and development. The program focus identified five key problem areas: Inadequate Income Growth, Hunger, Health Deficiencies, Illiteracy and Lack of Education, and Unmanageable Population Pressures. The Plan encouraged "fuller participation of the private sector as an engine of growth." Significantly, no mention was made of infrastructure of any type, including telecommunications.

In December 1990, A.I.D. issued a series of new initiatives. Among them were: Toward Strategic Management, The Partnership for Business and Development, The Democracy Initiative and Family Development. Two of the initiatives are of interest to the telecommunications sector. The first, Toward Strategic Management, reflected A.I.D.'s response to a re-examination of A.I.D.'s organization, operations and structure. It proposed organization changes to meet the new initiatives and stated: "our strategic management goal as an organization is to do fewer things and do them very well."

The initiative titled "The Partnership for Business and Development" seeks the participation of the American private sector in the effort to develop and sustain free-market principles

and broad-based economic growth in developing countries. The initiative states: "Just as the profit-driven American private sector has proved to be an unequaled engine for human progress and development on the national level, A.I.D. believes it can be a suitable vehicle for helping emerging countries to achieve their economic development objectives. Mutual benefit to the economies of the developing countries and the American economy will be the litmus test for this initiative."

The Partnership Initiative includes six activities:

1. The Capital Projects Fund: A.I.D. will seek legislative authority to create a fund to support sound capital projects of direct strategic relevance to U.S. trade competitiveness.

2. The Business and Development Network: A Washington and field mission-based network to provide advice, information, insight and counsel to American firms seeking to do business in countries in which A.I.D. operates.

3. The Business Advisory Council: Already authorized in the Foreign Assistance Act to provide A.I.D. with additional business perspective as the five other activities are implemented.

4. Emerging Sectors in Development: Pilots of a few select U.S. industries (e.g., environmental products, financial services, and telecommunications) that promise extraordinary economic development impacts springing from American private sector investment in the countries where A.I.D. operates.

5. Competitiveness Through Universities: Engaging the talents of America's best universities and business schools to address the challenges of emerging economy issues affecting American business.

6. Business Internship Programs for Emerging Markets: Assisting the American private sector to develop a cadre of young men and women equipped with the business skills for emerging markets and an understanding of business cultures in countries where A.I.D. operates.

The two activities with the greatest bearing on telecommunications are the activities of the Capital Projects Fund and the Emerging Sectors in Development. An Office of Capital Projects and Engineering has been established in the A.I.D. Bureau for Private Enterprise. A.I.D. has launched an important trade and investment activity under the Capital Development Initiative for Central and Eastern Europe entitled "CDI Telecommunications Business Development Services." This activity is designed to provide transactional assistance

with respect to trade and investment opportunities. The project will stimulate the flow of U.S. investment capital and high technology exports to Central and Eastern Europe as well as promote privatization and private sector development. It will foster the development of telecommunications infrastructure in Central and Eastern European countries. It will provide expert technical assistance in identification and development of a broad gamut of trade and investment project opportunities for the U.S. private sector, including in-depth analysis, marketing and packaging for financing. Through promotion of U.S. private investment and joint ventures, significant additional improvement in the quality and supply of telecommunications services is expected in Central and Eastern European countries.

The project is designed for all 10 Central and Eastern European countries. However, project activities will first be initiated in CSFR, Hungary and Poland and then gradually expanded to other Central and Eastern European countries as economic reforms encourage and additional funding permits.

An innovative feature of the activities under the contract will be the preparation of enterprise profiles and investment memoranda for Eastern European telecommunications enterprises which will be provided to U.S. investors to facilitate match making and privatization, and to close the conceptual gap between East and West which has been hindering investment negotiations.

As CDI Telecommunications Business Development Services activities develop over the next few months , announcements in the "Eastern Europe Business Bulletin" will facilitate communications with U. S. investors. The U.S. Department of Commerce, International Trade Administration publishes this Bulletin to alert U.S. investors to trade and investment opportunities.

The Bureau for Europe implements another State/A.I.D. Telecommunications /Electronic Media Technical Assistance project, which provides for seminars addressing Telecommunications Policy, Laws and Regulations. Spectrum Management Workshops have been conducted in Bulgaria, Czechoslovakia, Hungary and Poland. Meetings with telecommunications policy officials from those countries have been held in Washington. The U.S. Trade and Development Agency (TDA) has provided funds to study digital overlays for the telephone system in Czechoslovakia and to support a feasibility study of telecommunications. A U.S. consulting firm has reviewed the telecommunications sector in Hungary and has made restructuring recommendations after its evaluation, along with privatization considerations. A feasibility study has been completed for the expansion of the Polish telecommunications network and implementation of technology transfer for the production of telecommunications equipment in Poland.

A.I.D. has also recently established Capital Development Offices in Moscow, Russia and in Kiev, Ukraine to encourage organizational restructuring of state monopolies and to promote privatization. These offices will be part of the proposed A.I.D. Missions to be established in these two states.

An effort under the Emerging Sectors on Development is this current initiative to determine if A.I.D. should get involved in telecommunications in Southern Africa and, if so, to determine the particular role of A.I.D. In addition, attention will be given to enhancing the U.S. Private Sector's constructive involvement.

A.I.D. was one of the co-sponsors along with the Department of State, of a number of private sector telecommunications firms and Africa Communications magazine of AFCOM '92. AFCOM '92 was held in Washington, DC from March 30, 1992 to April 1, 1992 with the theme "Building Partnerships for the 90's and Beyond." This was the first U.S.-Africa Communications Conference. Its purpose was to develop U.S. African private/public sector partnerships, disseminate information on resource requirements for improving Africa's communications industry, facilitate opportunities for trade, investment and technology transfer and provide participants with an update on future communications projects and procurement opportunities. Nearly 200 delegates from African countries and the U.S. attended. Among them were PTT Ministries and key telecommunications decision makers from Africa as well as high level U.S. telecom authorities. Among the Southern Africa representatives were those from Zimbabwe, Botswana, Mozambique, Namibia, Zambia, Swaziland, Tanzania and the SATCC. AFCOM '92 was pronounced an outstanding success in meeting its objectives of stimulating greater U.S. private sector interest in the relatively underdeveloped but rapidly expanding African communications industry and served as a forum for the exchange of ideas about ways to initiate new partnerships and to enhance existing coalitions between African and U.S. communications industry groups.

> Addressing AFCOM '92, Ambassador Bradley P. Holmes - Coordinator and Director, Bureau of International Communications and Information Policy of the U.S. Department of State spoke on: "Achieving Partnership Goals in the 90s". He emphasized the launching of several new initiatives to encourage private investment in the development of Africa. Mr. Alfred Sikes, Chairman of the U.S. Federal Communications Commission pointed to a brighter future in which satellite communications will play a large part. He stressed the need to improve rural telecommunications, privatization and offered regulatory assistance. Mr. Daniel Onyewuen, Secretary General of the Pan African Telecommunications Union, addressed "Prospects and challenges for Communications Development in Africa." Mr. Kouassi Apetey, Director of Infrastructure and Industry, African Development Bank, spoke on:" Resources, Procurement, Opportunities and Financing for Telecommunications Growth." Mr. Mathias Lubega, Chief - Regional Bureau for

Africa, UNDP, addressed the UNDP and reviewed privatization of telecommunications facilities which can further the commercial and technical success of the telecommunications sector in Africa. Mr. Shola Taylor, Project Director RASCOM Interim Office, ITU discussed the Regional African Communications Satellite. Mr. Jean Jipguep, Deputy Secretary General, ITU discussed "Telecommunications in Africa." His Excellency D.N. Magang, Minister of Works, Transport and Communications, Botswana reviewed "Prospects and Challenges for Communications Development in Africa: Africa and U.S. Perspective." Mr. Alfredo Namitete, Coordinating Committee Chairman-SATCC, Mozambique spoke on: "Emerging Opportunities and Telecommunications Developments in Southern Africa." Mr. Andile Ngcaba, Chief of Communications & Infrastructure, African National Congress, South Africa spoke on: "Telecommunications in the Post Apartheid Period". Mr. Miguel J. Schloss, Division Chief, Africa Region, World Bank addressed "Telecommunications Policy Responses and Sector Strategy for Sub-Sahara Africa." Mr. David Clark, Chief Executive, Botswana Telecommunications Corporation discussed "Emerging Opportunities and Telecommunications in Southern Africa". The Honorable Dalmas Otieno Anyango, Minister of Transport and Communications, Kenya spoke on: "Investment Opportunities in Kenya." His Excellency Professor Abdulla A. Abdalla, Ambassador of Sudan to the U.S. addressed "Status of Communications in North Africa." His Excellency Roosevelt Jay, Minister of Transport and Communications in Liberia spoke on: "Telecommunications Development in Liberia."

5.1.1 Bureau Mandates

The A.I.D. Geographic Bureaus have no specific mandates for telecommunications other than the Bureau for Europe which is actively pursuing this sector in the Central and Eastern European countries. The Private Enterprise Bureau, through its Office of Capital Projects, is investigating telecommunications opportunities as well as other sectors in a number of countries including Russia and the Ukraine. The Office of Capital Projects also responds to requests for support from all A.I.D. Bureaus. The Near-East Bureau continues to support the telecommunications sector in Egypt and has recently approved an expanded Telecommunications IV Project which provides four new digital exchanges in the Cairo area along with associated outside plant construction. The African Bureau supports the Southern African Development Community (SADC) and in FY '92, is providing $50 million for transportation, private sector development, agriculture and natural resources management, program development and evaluation. The FY '93 budget request of $50 million addresses the same sectors.

A.I.D.'s new initiatives through the Capital Projects Fund and A.I.D.'s many years of experience on capital projects, including telecommunications, recognizes that it should again participate in capital projects with the appropriate funding support of the Congress. Capital projects in past years received less attention and efforts were focused more on meeting the basic needs of client countries. It is now recognized, as listed under Emerging Sectors in Development of the Partnership Initiative, that adequate infrastructure contributes to economic development and serves the growing needs of the dynamic private sectors.

The Capital Projects Office is currently evaluating program structure and development of infrastructure in Central and Eastern Europe and the Newly Independent States. Program initiatives include the assessment of the infrastructure needs, including telecommunications, analysis of U.S. industrial participation in the development. This new mandate is prompted by recent legislative activity. The U.S. Congress has passed legislation calling for the Agency for International Development, working through the Capital Projects Office, to undertake a comprehensive study of the infrastructure needs in the NIS the CEE and Mongolia. The purpose of the effort is to:

a) Identify those sectors in the economies of these countries that are most in need of rebuilding.

b) Identify opportunities for U.S. firms to help develop the infrastructure in these countries, including an assessment of the export opportunities for U.S. high technology companies.

There is a need for a specific telecommunications mandate for Africa. In particular, for Southern Africa now that Angola and Namibia are independent and the conditions in South Africa are improving. Africa, with fewer than one telephone per 100 people, is handicapped in advancing in the commercial and information world. System upgrade and expansions as well as privatization of certain telecommunications elements should be considered and supported by increased investment.

5.2 REVIEW OF A.I.D. PROJECTS WORLDWIDE IN THE TELECOMMUNICATIONS SECTOR; HOW THEY HAVE ADVANCED A.I.D. GOALS AND OBJECTIVES; AND LESSONS LEARNED:

A.I.D. has been involved in telecommunications for over 30 years worldwide but telecommunications has never been designated as an area of emphasis. Telecommunications projects have been supported both under Development Assistance and Economic Support Funds. In addition, a number of efforts have been financed under the Commodity Import Program in conjunction with ESF efforts. Assistance has generally gone to the areas of

feasibility studies, consultancies, equipment procurement and installation, management studies and management training.

The U.S. Trade and Development Agency, which is an independent U.S. Government Agency, has a close relationship with A.I.D. In its efforts to promote telecommunications exports overseas, it provides grants to conduct feasibility studies and also commissions Definitional Missions. These missions take place prior to financing feasibility studies to help define the telecommunications project in depth. TDA has also participated in projects in energy, transportation, environment, water and manufacturing.

Telecommunications technology for developing countries has benefitted from A.I.D. financing. Specific communications include: broadcasting, airport navigational aids, railway control systems, Supervisory Control and Acquisition (SCADA) Systems for electric distribution and transmission, seismic studies, marine traffic control, emergency medical services, and for health, education, agricultural, disaster and relief services.

5.2.1 Goals and Objectives

The goals and objectives of the two principal A.I.D. telecommunications projects, one in Liberia and the other in Egypt, were accomplished through a similar course of action. The objective in each case was to improve the telecommunications system by strengthening the planning, management, operating and training functions of the Liberian Telecommunications Corporation (LTC) and the Arab Republic of Egypt Telecommunications Organization (ARENTO). In addition, the system was managed more efficiently custom service was improved and the system was upgraded.

To meet the goals, initially a consulting firm assessed the existing condition of the system. This led to the development of a 20-year long-range plan with particular emphasis on the first five years and the necessary implementation of a System Improvement Plan (SIP) to prepare the existing system for the introduction of the new infrastructure, exchanges and outside plant.

To prevent the restored and expanded system from deterioration, management and personnel training was conducted and improved maintenance routines, standards and practices were introduced. Management training included: telecommunications organization, planning capability, personnel management and man-power development, financial management and accounting practices, rates and tariffs, budgeting procedures, audits and inspections, billing and collection, purchasing and inventories, and improved operating practices and procedures.

A training school was established in Sinkhor, Liberia along with equipment and training materials. The already established school in Cairo, Egypt was provided with a 1AESS training switch and training materials. It is now known as the ARENTO Telecommunications Training Institute. The effort of both training centers included training local instructors to provide a continuity of instruction.

The A.I.D project procedures were followed on hiring an A&E Consultant to prepare specifications for equipment and its installation, to assist in the bid evaluations and selection of contractors, to monitor the performance of contractors and to make recommendations for acceptance.

As part of the projects, both telecommunications organizations were established legally as independent agencies. They have, through the years, demonstrated their capabilities, managerially and technically, to operate a financially viable national and international telecommunications system. Both Liberia and Egypt attract additional commercial financing for their system expansion and use their experienced judgement to adapt their long-range plans.

A.I.D.'s participation in Lebanon and Grenada demonstrated a quick response by providing telecommunications equipment for the restoration of service at specific locations designated by their Governments.

A.I.D. financed and installed radio networks and broadcast systems in a number of A.I.D. client countries. A.I.D.'s participation has improved the effectiveness of the telecommunications systems and satisfied requirements to provide communications for projects in health, agriculture, rural development, education, human resources. Supervisory Control and Data Acquisition (SCADA) systems are now in place and can transmit inputs to a central processing and control center.

The Capital Development Initiative (CDI) has the objective of developing infrastructure projects that will support private sector growth in Eastern Europe. The infrastructure in Eastern Europe is in desperate need of repair, renovation and modernization. Although the condition of the infrastructure may be a deterrent to new investment, the need for development also yields opportunities for U.S. exports and investments. Making the connection between the needs of the region and the U.S. business community is difficult. Difficulties include regulatory, institutional, and technical barriers which limit Eastern Europe access to U.S. capabilities as well as U.S. firms ability to penetrate the market. The initiative is working at reducing the barriers to trade, exchange and investment in order to foster development of new infrastructure projects.

The Capital Development Initiative methodology implements technical assistance in three key areas:

- Policy and Regulatory Reform
- Infrastructure and Investment Strategies
- Infrastructure Project Development

The sectors of involvement include telecommunications, energy, environment and transportation. For these sectors A.I.D. provides technical assistance to CEE governments in policy and regulatory reform to encourage private investment in infrastructure development. At the project level, A.I.D. provides assistance in identifying, designing and marketing infrastructure projects.

In the telecommunications sector, CDI has established an office in Warsaw staffed by an american contractor and local experts. The initial contract period is three years with quarterly reviews of progress and results. The staff is supported by a minimal support in the U.S. for coordination with other A.I.D. offices USG activities. The project staff is primarily involved with three key activities,

- Project opportunity identification.
- Promotion of investment and trade, joint ventures and coventures
- Project packaging and marketing

The Capital Development Initiative has been very successful in pursuing the goals of U.S.A.I.D. Although the program is in its early stages it has achieved significant impact with a relatively small investment. Development issues as well as privatization and trade efforts have been pursued through the program. The establishment of a regional office has accomplished a presence that has proven necessary to sustain awareness among the key players in the development of the sector both in the targeted countries and in the U.S.

5.2.2 Projects

This section will review a number of telecommunications and communications efforts supported by A.I.D. through the years. In the telecommunications projects, the project goals and objectives have largely been met. In some cases because of civil strife, goals which were initially met have subsequently deteriorated. Some of the projects are highlighted in the following:

- In the case of Liberia, the telecommunications expansion provided service to thousands of waiting list subscribers. The coastal telecommunications system provided a linkage to the Ivory Coast and access to the Earth Station at Abidjan. Subsequently, the Liberian Telecommunications Corporation procured their own earth station at Sinkhor. Legislation was obtained, as part of the project, establishing the LTC as an independent agency. The new outside plant installations to the rural areas, connecting exchanges provided by the Japanese, brought telephone service to a previously neglected region. Telephone directories and Yellow Pages were introduced bringing the LTC another source of revenue. Sound management, financial and business procedures were introduced. A 20-year fundamental telecommunications plan was produced and a Telecommunications Training School was established.

- The Telecommunications Project in Madagascar brought service to the communities in the Northern Province and to the Southern Province. A.I.D. provided the commodities for the wire-line carrier system and then the personnel of the Posts and Telecommunications organization engineered the installation. A.I.D. reviewed and approved all documentation and inspected and evaluated the installation. A change from wood poles to steel poles was made because of the frequency of cyclones which tended to snap the wood poles used in earlier efforts.

- The telecommunications link connecting the National Systems of Chad, Cameroon, and Nigeria provided a needed communications service. This project was implemented for the Lake Chad Basin Commission.

- Management training was provided to telecommunications administrations in Liberia and in Egypt, and executive and professional technical personnel were introduced to new technology, management information systems, and up-to-date management procedures in the operation and maintenance of telecommunications entities. Special emphasis was placed on customer service and marketing.

- In Lebanon, the restoration and rehabilitation of the outside plant in West Beirut provided service to subscribers which had been interrupted due to the civil strife.

- A new and larger capacity digital exchange was installed at Westerhall in Grenada to replace an old and smaller capacity exchange which was destroyed during the U.S. intervention in Grenada. Telecommunications equipment was air-lifted to the site to expedite the restoration of service.

- The major telecommunications effort by A.I.D. is the ongoing effort in Egypt. Details of the program will be found later in this section. In 1977, the Egyptian

telecommunications system was unreliable and unable to meet the growing public demand for telephone service. Telephone service in Cairo was so poor that even next door neighbors could not successfully call one another, let alone make calls to the rest of the city or to other cities or countries. A detailed sector study was made of the telecommunications system and a 20-year program was developed. Telecommunications Projects I, II, and III were financed by A.I.D. at $242 million to finance the costs of U.S. technical assistance and the replacement of obsolete rotary switching systems in Cairo and Alexandria. In addition, through the Commodity Import Program (CIP), $62.5 million was provided to finance a microwave system to interconnect all telephone exchanges in Cairo and Alexandria. These three projects have provided 283,000 new telephone lines. At the completion of the last of the three exchanges in Alexandria and the six in Cairo, Egyptian President Hosni Mubarak presided over the inauguration services and acknowledged the tremendous impact the improved service has provided for the public, government and industry.

Continuing the improvement program, Telecommunications IV was approved to provide two new digital exchanges in Cairo to meet the needs of areas inadequately served. These two exchanges each have a capacity of 30,000 lines with expansion capability to 60,000 lines. At this time, Telecommunications IV Expanded has been approved and will provide an additional four digital exchanges for Cairo. Goals of improved telecommunications service in Egypt have been achieved. The Arab Republic of Egypt National Telecommunications Organization (ARENTO) has become a separate legal entity with control over its personnel and salary administration. Due to the installation of fiber optic inter-office cables, the quality of service between all existing telephone subscribers in the Cairo and Alexandria network has been improved immensely.

Further, through the accomplishments and experience gained from the first three Telecommunications Projects, ARENTO is now effectively operating the new 1AESS Switching exchanges in Cairo and Alexandria without further direct assistance from the U.S. Suppliers. Furthermore, ARENTO has effectively supervised the construction and installation of a new 30,000 line electronic switching system and the associated outside plant cables for the Abbassia exchange area of Cairo without the usual intense level of expatriate advisor involvement.

Consistent with the covenants contained in A.I.D.'s project agreements, ARENTO has been increasing rates to telephone customers as the service continues to improve. As a consequence, ARENTO is presently able to meet its operation and maintenance costs and some of its debt service requirements. However, the remaining amounts of income are inadequate to finance its continuing expansion programs.

The Cairo Mission has calculated that there are 2.7 million direct beneficiaries enjoying service because of the first three telecommunications projects for Cairo and Alexandria. This approaches the goal of providing all of the residents of Cairo and Alexandria with improved telecommunications services.

The goal of achieving an efficient organization capable of operating a financially viable national and international telecommunications system has been reached through extensive management and personnel training and the introduction sound financial and business procedures. In accordance with the A.I.D. financed 20-year master plan, ARENTO plans to reach a telephone density of 7 telephones per hundred by the year 2000. The current density is 2.2 per 100. This effort will require the addition of approximately 250,000 lines per year. In order to reduce costs of digital telephone exchanges and to provide employment and technical training to its personnel, ARENTO has recently completed a joint-venture agreement with the Siemens Company of Germany for the local manufacture of digital exchanges for its telecommunications expansion.

Further project description are provided in Annex 5.1.

5.3 LESSONS LEARNED:

The two Telecommunications Projects funded by A.I.D. in Liberia and in Egypt provide a number of lessons learned that should be considered in any future efforts in the Telecommunications sector.

The development of a fundamental plan for the near term (5 years) and the long term (20 years) telecommunications expansion has given direction to the effort in each country. In addition, because of the plan's detailed information, a European consortium (Germany, France, Austria) has signed contracts in Egypt totalling approximately $750 million in subsidized credits to finance the turnkey construction of telephone exchange systems of 360,000 lines. A variety of other international supplier financing has also been made available. The same has been true in Liberia where Japanese financing has provided for a number of up-country telephone exchanges. The importance of a long-range plan cannot be overemphasized. However, more emphasis must be placed on aggressive follow-up marketing and financial arrangements by U.S. entities to follow up on the A.I.D. funded long-range planning.

A Service Improvement Plan was essential to improve existing developing country telecommunications systems in preparation for the implementation of the Master long-range

plan. This effort consisted primarily of concentrating attention on maintenance, repair, record-keeping, air conditioning, standby generators, housekeeping, training, etc.

A capable, aggressive Consultant Project Manager is important to the success of a project. Maintaining continuity of the Project Team personnel will also have a positive influence on the success of the project.

Equipment chosen should have a history of proven in-service results and be backed up by a reliable manufacturer.

The number of organizations involved in providing an overall service should be minimized to reduce coordination problems which have proven to be difficult in the international business environment.

Hardware implementation is more readily accepted by host countries than are institutional changes such as organizational restructuring. These changes cannot be adopted quickly, but must be constantly re-introduced with tact and light pressure.

The relatively short implementation schedules and reasonable costs incurred in the Egyptian telecommunications projects for switching and outside plant should be used as a standard for other telecommunications projects.

Training of operations and maintenance personnel is a continuing process. Attention to retention of personnel after they are trained is essential and the salary structure should be such that employees are not attracted by competing interests thereby losing the investment made in training.

Greater attention needs to be given to inventory and spare parts procurement. This is particularly true since the source of spare parts may be located thousands of miles away. Difficulties can be experienced in shipping, customs, foreign exchange and composition of unit packs. Without the ready availability of spare parts, major investments can be out-of-service indefinitely with a resulting major impact on service and on revenues.

By establishing a Utilities Coordination Board, it is possible to prevent the damage done to other utility's plant by water, electric power, sewer and telecommunications organizations. These groups cause many costly troubles for each other and often do not report them. A Coordination Board member could inform other board members what and where the work is scheduled to avoid damage. The Board could also coordinate construction plans of various utilities so that street openings can be minimized.

Coordination with host country building construction firms needs improvement so that Building Occupancy Dates (BOD) can be met to avoid delays and costs to equipment suppliers.

The Capital Development Initiative has yielded some interesting lessons learned. First, thee regulatory environments in these new democracies are very dynamic and highly sensitive to political and economic changes in the countries. In order for A.I.D. to keep aware of and potentially affect regulatory changes, sustained formal and informal involvement in the telecommunications and political community is required. Sensitivity to the likely outcomes of regulatory efforts is developed through continued contact with principals in the academic, and institutional community. Academic involvement in sector strategy and policy in Eastern Europe is quite extensive. In all of the target countries the academics play an important advisory role to Government and industry. The establishment of the regional, dedicated office has facilitated sensitivity and understanding of the sector. Second, local experts in the sector are in short supply and in high demand particularly from equipment vendors and large telecom operators and investors. Conflict of interests among local advisors can only be avoided through full disclosure of potential conflicts. Thirdly, the level of commitment to development of the sector is continually being evaluated by local authorities. Their willingness to implement recommendations is dependant upon the confidence of A.I.D.'s commitment to follow through with objectives. In these three representative areas, the CDI project has successfully attained appropriate levels of knowledge of the market, institutional planning and project opportunities through the establishment of the office and the dedication of a staff to remain in the region over the period of the project. Remote operation of project activities would not result in successful achievement of objectives.

5.4 IDENTIFICATION OF BASIC ISSUES FOR A.I.D.'S CONSIDERATION IN BECOMING INVOLVED IN THE TELECOMMUNICATIONS SECTOR:

It is recognized that telecommunications is a tool for development and that economic growth is dependent on an adequate telecommunications system. SADC has acknowledged that there is a shortfall of telecommunications services in the region and this has an impact on its economic development. The stated reason for this condition is under investment in the sector.

The SADC members are a significant economic group with over 80 million people and a combined GDP of about USD $27 billion (1989). The region has important natural resources with gold and minerals comprising 80 percent of the export value of the region. Individual countries have significant differences in population, geographic size, per capita income and resources.

Because of under investment in the telecommunications sector, it represents an opportunity for A.I.D. involvement and private sector participation. Policy Determination, PD-10, "Development Communications" detailed in Subtask 5-1 stated in part that A.I.D. would limit direct investments in infrastructure development and would concentrate instead on technical assistance and training to optimize utilization of existing infrastructure. The New Initiatives issued in December 1990 which includes the Partnership for Business and Development has prompted A.I.D. to request the Congress to authorize the Capital Projects Fund to support capital projects of direct strategic relevance to U.S. trade competitiveness. Under the section on Emergency Sectors in Development, telecommunications is identified as a U.S. industry that would trigger great development with the investment of the American private sector.

The Congressional Presentation for Fiscal Year 1993 requests $50 million for SADC from the Development Fund for Africa for improvements in the railways of the Transport Sector. Planning for the FY 1994 Annual Budget Submission contemplates a new project "Telecommunications Sector Development" depending on the outcome of the current Telecommunications Sector Scoping Study and the planned SADC Telecommunications Restructuring Seminar to be held early in 1993.

There is no current production of electronic telecommunications equipment in the SADC countries. Competition can be expected from the current suppliers of equipment from Europe and from Japan. Telephone exchanges are electro-mechanical and digital. The SADC goal is to completely digitalize the sector and to prepare for the features of the Integrated Services Digital Network (ISDN). Because of the high capital costs to initiate production of central office equipment in a SADC country, production of digital switching equipment is unlikely to happen. However, joint ventures to produce value added or enhanced services, cellular communications, facsimile equipment, etc. is possible. A.I.D. should assist in exploring the investment climate, both local or imported material sources, availability of qualified human resources, repatriation of profits, and export opportunities. Taxes and size of markets for specific products are also considerations.

A.I.D., through the Trade and Development Agency (TDA), can assist U.S. business on feasibility studies and contract definition. In addition, the Department of Commerce sponsors trade missions, trade shows and seminars.

Improved telecommunications helps advance A.I.D.'s goals in the social and political arenas by increasing the opportunities of the people to communicate readily and rapidly. Good communications improves national integration politically, urban to rural communities, business transactions, health and agricultural information and medical and disaster responses when incidents occur. Namibia became an independent democracy in 1990. Angola first

free elections are scheduled for September 1992 and Mozambique is finally negotiating a peaceful settlement between warring parties which depends on good communications. Telecommunications can also serve local initiatives to strengthen democratic institutions which is another one of A.I.D.'s initiatives.

The Africa Bureau of A.I.D. has established three focus areas for Southern Africa. They are:

1) Transportation (Railways, Roads and Ports)
2) Food Security (Agriculture and Livestock)
3) Trade and Entrepreneurship (Private Sector)

It is suggested that A.I.D.'s effort in the telecommunications sector be included either in the focus area of Transportation or Trade and Entrepreneurship.

5.5 REVIEW AND ANALYSIS OF POTENTIAL CONSTRAINTS ON A.I.D.'S INVOLVEMENT IN THE TELECOMMUNICATIONS SECTOR IN THE SADC REGION

There are a number of items which must be considered when participating in the telecommunications sector in Southern Africa. Among them are the peace agreement in Angola, the independence of Namibia, peace negotiations in Mozambique and the process toward the abolition of Apartheid in South Africa. These happenings help create the necessary conditions for stability and peace which are essential to attracting the involvement of A.I.D. and the private sector.

Although it has been anticipated that South Africa would be welcome to join the SADC organization when the country has established itself as a truly non-racist and democratic country, this might well be several years in the future. A number of SADC countries belong to the Southern Africa Customs Union (SACU) including Botswana, Lesotho, Namibia and Swaziland. SACU is administered by South Africa and collects customs duties on member state's imports from outside the union and excise taxes on local production. Tariffs are very high - in some cases 100% - to protect domestic industry within SACU, including South Africa firms. These high tariff barriers have tended to discourage the smaller member states from seeking extra-union sources of imports and favor trade with South Africa. SACU revenues are distributed amongst the members on an agreed formula.

In addition, a number of SADC countries are members of the Preferential Trading Area (PTA) of Eastern and Southern African nations. Some SADC countries are also members

of the Lomé-Convention which is a trade agreement between the European Community (EC) and 66 former dependencies including 45 African States. This agreement permits duty free entry into the EC for some agricultural and some manufactured products. These trade linkages must be considered by A.I.D. and their possible impact on contemplated efforts and programs.

As concerns the Development Fund for Africa (DFA), there are no constraints. However, programs for Angola are restricted to Non-Governmental Organizations (NGO) for humanitarian assistance and electoral support. The restrictions on developmental assistance have been lifted but await implementation until after the scheduled elections in September 1992. The SADC appropriations language for FY'93 is expected to reflect the request for $50 million for activities designed to improve competitiveness of the region's private sector through transport sector capital projects. In the case of South Africa, the A.I.D. program operates outside of South African Government channels. The FY'93 request for $80 million will be handled through NGOs to support ongoing activities which promote human rights and a civil society, human resource development and private sector mobilization including housing. Projects are proposed in the areas of education and training.

The SADC Program of Action is listed in the Republic of Mozambique, Maputo Report of 29-31 January 1992 and an update of the status of projects in the Telecommunications Ten-Year Development Plan dated June 1992. The latter shows a total of 128 sector projects listing all the outstanding national and regional projects still requiring foreign exchange funding and covering projects listed in the last report that have received funding. Thirty-one, or 24%, of the total projects listed have received funding, at least in part, or have funds identified. (The major National projects are listed in Task 1-3 by country in the discussion on telecommunications services shortfall).

A review of the regional and national projects shows the emphasis on the completion of the missing links in the regional transmission network infrastructure to be achieved through the provision of digital microwave, satellite links and international telephone and telex gateway exchanges. The main focus is on extending the intra-SADC automatic telephone traffic to Angola, Mozambique and Namibia. Only Namibia does not have an earth station and digital Gateway Exchange. Because of the non-completion of the interconnecting links, intra SADC traffic is still via Europe for most of the traffic from Angola, Mozambique and Tanzania. Individual country systems are being expanded and rehabilitated to respond to the expressed demand for telephone services. The telephone density in SADC countries in terms of Direct Exchange Lines (DEL) per 100 inhabitants is very low at 0.53 /100 in 1989 (refer to Task 1-3, Table I). Also expressed is the need for International Subscriber Dialing (ISD) in the total SADC regional network by the introduction of modern digital exchanges with common signalling systems and compatible national technical standards. There is also a need for management and technical training in operations, maintenance, planning and

commercial operations. The existing training facilities for technicians need enhancement to ensure self-sufficiency in skilled manpower and improvement of productivity to ensure an adequate return on investment. Human resources in the region is characterized by high unemployment and under employment along with a shortage of skills critical to the economic development. All of the above present opportunities for A.I.D. and for private sector investigation and participation.

The attitude of SADC/SATCC toward private sector participation varies with the individual countries with some examples as follows:

Botswana - Attitude toward privatization is favorable and primarily aimed at Botswana citizens but there is some opportunity for foreign companies to purchase equity in existing businesses from the State. There are no foreign exchange controls and there are tax concessions for major new industrial investments. Member of the Southern Africa Customs Union and common (Rand) monetary area.

Malawi - Privatization is increasingly applied to state-owned enterprises. Its main attractions are: low labor costs, disciplined and well-motivated work force, a stable political environment, and a government sensitive to the needs of the private sector with a record of scrupulously honoring commitments made, anxious to attract more foreign capital and know-how. Domestic market is small. Most effective way to exploit advantages of the country is to use it as a workshop in which value is added to imported materials and the end product is exported. Telecommunications is in the public sector. One hundred percent foreign ownership is allowed. Malawi trades openly with South Africa.

Namibia - Private enterprise is encouraged and there is a positive attitude toward foreign investment. There are no joint-venture requirements. Nationally, there is an efficient telecommunications system in existence. Current priority includes expanding the rural telecommunications network and developing microwave links to neighboring states. U.S. firms, by establishing a presence in Namibia, can trade free of customs duty with South Africa and other SACU members. Namibia is a member of Southern Africa Customs Union.

Swaziland - The Private Sector dominates and provides 54.7% of GDP. The Swaziland Industrial Development Co., started in 1987 and 37.5% owned by the government, was established to promote foreign investment and industrial development. Privatization candidates include Swazi Railways, Post and Telecommunications Corporation, Swazi Electricity Board and Piggs Peak Hotel. The Public Enterprise Unit of the Ministry of Finance is willing to talk to interested parties. There is a possibility of 100% private ownership. Non-Swazis may own land but the transaction must be approved by the Land

Control Board. Swaziland is a member of SACU, PTA and the Lome Convention. The investment climate is positive, relatively cheap and cooperative labor, availability of many raw materials, favorable tax and credit, and a favorable foreign exchange situation for foreign investors.

Tanzania - The National Investment Act of 1990 introduced a wide range of investment incentives. There is an opportunity for profitable new investments or joint ventures. A number of reforms have been introduced to benefit investors. Among them are: authorizing Foreign Exchange Bureaus to conduct transactions in market rates; reducing the overvalued exchange rate of the Tanzanian shilling; reducing duty rates for most capital and consumer goods; introducing the Open General Licensing System to liberalize imports of inputs. However, there are a number of concerns: many inputs needed for productive investment are in short supply; infrastructure needs rehabilitation; and chronic shortage of foreign exchange and qualified managerial personnel. Tanzania is a member of the Preferential Trade Area (PTA).

Zimbabwe - In general, Zimbabwe supports parastatel organizations and prefers joint-ventures which enable Zimbabweans to participate in ownership and management, although 100 percent foreign ownership is permitted. Zimbabwe is a member of the Lome Convention, PTA and has bi-lateral trade agreements with Botswana, Malawi and South Africa. A number of major U.S. firms have invested in Zimbabwe prior to independence when it was known as Rhodesia, including: Union-Carbide; Colgate-Palmolive; Sheraton and Holiday Inn Hotels; Mobil; Universal Leaf Tobacco; 3M; IBM Cummins Diesel and Digital Computers. Since independence, H.J. Heinz is the only U.S. company that has invested in a plant. The Government of Zimbabwe has formulated a framework for Economic Reform with policies to enhance reliance on market forces and a reduction of the role of the State. Zimbabwe has the potential to become one of the most dynamic economies in Sub-Saharan Africa. Zimbabwe has a diversified economy, sophisticated financial centers, strong skills base and an investment-friendly tax arrangement. Some constraints are: the foreign exchange situation will remain tight for the foreseeable future; regulatory environment slow in approvals, projects over $3.0 million have to be approved at ministerial level: land acquisition can be difficult; and employee dismissal regulations can be a problem. Of particular concern is a severe AIDS problem which could seriously affect the work force. This has implications for investment decisions because of the high cost of training personnel only to lose them to disease when they are at their most productive level. A choice must be considered between labor intensive and capital intensive techniques.

Lesotho - Privatization has made little progress in Lesotho for a number of reasons. There is a lack of an entrepreneurial class and a population that traditionally avoid risks and favors wage employment over ownership. In addition, there is a lack of

professional and technical skills in the available local work force, in part due to workers being drawn to higher wage jobs in the Republic of South Africa. Donor assistance to Lesotho is significant but the total to the private sector is fairly small, at less than 1%. The USAID Mission to Lesotho is making important and continued efforts in this area which may help significantly to expand the private sector activity. Constraints to privatization include dependency on the Republic of South Africa which has provided 95% of the imports since independence and GOL's budget deficit restricts its ability to expand or create employment programs. However, there is a need to promote the private sector in times of fiscal austerity as a way to promote employment and growth. Participation in SACU has created disincentives to expand Lesotho's private sector.

SADC/SATCC and the Republic of South Africa

There are a number of concerns regarding the admission of the Republic of South Africa (RSA) to SADC membership. To address these concerns, SADC has established a Joint Planning Committee, involving four member states and the Liberation Movements to direct and manage this work. A prepared plan and program will determine how integration takes place and whether RSA joins SADC or SADC joins RSA.

RSA has been manufacturing electro-mechanical telecommunications equipment. In 1977, it adopted digital technology for the future expansion of its system. RSA concluded agreements with CIT-Alcatel to manufacture the E-10 digital switch known as the SA 128E and also with Siemens to manufacture, in country, their digital switching system designated EWSD. The objective of RSA is to have an all-digital network by the year 2010. Manufacturing long-term agreements were made for the manufacture of the systems. These agreements expire in 1994/45 at which time the agreements could be modified or terminated. These agreements incorporated a large portion of local content in the systems. Recently, a new independent corporation, Telkom, (which was a part of the South African Post Office was set up to operate the telecommunications network in a more service-oriented mode. How these decisions were made is of interest to SADC.

Restrictions on Support to the Private Sector, Mixed Credits

Mixed credits are payment options guaranteed by the governments. Mixed credits can offer very favorable financing costs because private sector vendors do not have to bear all the costs of financing. Governments are usually willing to provide this type of financial assistance in order to increase exports.

The restrictions to the private sector are that the terms of the transaction must meet the Organization for Economic Cooperation and Development (OECD) codes. Twenty-four

countries, including the United States, are members. The OECD has, as one of its basic aims, that of contributing to sound economic expansion in developing countries.

A.I.D. supports developmentally sound capital projects as part of a balanced foreign aid program. It will continue to do so consistent with OECD agreements.

5.6 IDENTIFICATION OF THE OTHER U.S. GOVERNMENT AGENCIES WITH AN INTEREST IN TELECOMMUNICATIONS AND CHARACTERIZE THEIR INTEREST AND ACTIONS:

There are a number of U.S. Government Agencies also interested in telecommunications in Southern Africa. Among them are the following:

Overseas Private Investment Corporation (OPIC)

OPIC is a self-sustaining U.S. Government agency that promotes economic growth in developing countries by encouraging U.S. private investment. OPIC operates in approximately 100 developing countries, providing financing and political risk insurance to a number of U.S. investors for telecommunications and other projects.

OPIC assists U.S. investors in this effort through two principle programs:
(1) insurance of investments against certain political risks, and
(2) financing of enterprises through direct loans and/or loan guarantees
OPIC can provide medium and long-term funds for financing in countries where conventional financial institutions are reluctant or unable to lend on such a basis.

OPIC recently sponsored a telecommunications trade mission to Africa that included several U.S. telecommunications firms and visited a number of nations. An OPIC investment mission visited Zambia in September 1992 and included telecommunications representation. The visit wa primarily a marketing and introduction of U.S. industry representatives with government officials, public and private enterprises and the State bank of the country.

The Export-Import Bank of the United States (EXIMBANK)

Eximbank is the independent U.S. Government agency that facilitates the export financing of U.S. goods and services through a variety of grant, loan, and guarantee programs. It supplements, encourages, and does not compete with commercial financing. By neutralizing the effect of export credit risk that the private sector will not accept, Eximbank helps U.S. exporters compete in overseas markets on the basis of price, performance, delivery and service. Eximbank concessional flows for telecommunications projects, from 1986 to 1988,

totalled $262.7 million for direct loans, $165.9 million in guarantees, and $4.2 million in grants. The largest of these was a $112 million direct loan to the Indonesian Ministry of Finance on behalf of PERUMTEL, the Indonesian Telecommunications Authority, for the purchase, launch and insurance of the PALAPA B-2R satellite.

Eximbank has country agreements with all of the SADC nations with the exception of Angola, Mozambique, Zambia and Tanzania. In the case of Tanzania, Eximbank will work with the private sector only. Eximbank has had discussions with GTE concerning the earth station in Lesotho and has had discussions concerning the expansion of the earth station in Zimbabwe.

U.S. Trade and Development Agency (TDA)

The U.S. Trade and Development Agency promotes economic development by underwriting investment surveys in developing countries which helps U.S. firms to get involved in projects offering significant export opportunities. It is an independent U.S. Government Agency which enhances U.S. exports to major infrastructure and industrial projects in the developing world by providing grants to enable U.S. firms to conduct feasibility studies of the projects. Experience has shown that U.S. participation in the planning stage of a major project can swing significant exports of goods and services to U.S. suppliers during subsequent project implementation. TDA will consider both public and private sector projects. TDA can provide funding on a non-reimbursable grant basis for studies and consultancies that determine the technical, economic, and financial feasibility of a project. TDA can also provide definitional studies and planning services for major projects in developing countries. Telecommunications is a sector in which TDA participates. TDA projects have assisted the international marketing efforts of U.S. telecommunications companies.

When TDA receives a request from a host country government, it normally commissions a preliminary Definitional Mission to visit the project site. The visit will include discussions of the project in depth with project sponsors and technicians, with U.S. Embassy officials, with potential sources of financing and with other relevant experts to develop detailed information on the project. This will enable TDA officials to make a determination as to the eligibility of the project for TDA support.

Telecommunications projects have traditionally accounted for between 10 and 15% of TDA's projects and program budget. TDA has initiated 84 telecommunications projects. Fifty-three projects have gone beyond the definition mission stage and have led to a feasibility study, an orientation visit, etc. In all, TDA has allocated just over $20 million to the telecommunications sector. Telecommunications projects rank on about the same priority as manufacturing, transportation, water and the environment. The only sector allocated significantly more priority at TDA is energy. TDA has done telecommunications projects

in Africa (5 countries), Asia (9 countries), Latin America (14 countries), Eastern Europe (6 countries) and Southern Europe (2 countries). They have included satellite and earth station technology, telephone switching and carrier equipment, radio and TV broadcasting, data communications, cellular radio technology, and telecommunications system privatization and regulation. TDA's Africa effort has been in Mali, Ivory Coast, Morocco, Togo and African Regional. TDA has provided a Regional Earth Station study for SATCC.

U.S. State Department

The State Department is the U.S. Government entity responsible for international treaties and is the government's signatory. As such, it is responsible for U.S. international telecommunications policy. The State Department has established the Bureau of International Communications and Information Policy (CIP). CIP's statutory role is to represent the United States in the International Telecommunications Union (ITU). Its role in the ITU includes formulating and leading delegations of interested government and private sector representatives. CIP supports the International Telegraph and Telephone Consultative Committee (CCITT), an organ of ITU. This committee develops telecommunications standards, known as CCITT Recommendations. Another committee is the International Radio Consultative Committee (CCIR). The State Department has established a Federal Advisory Committee to assist and advise the Department on matters concerning U.S. participation in the activities of the CCIR and its various study groups.

The State Department also recommends funding allocations to the ITU and the United Nations Development Program (UNDP). These funds enable the ITU and the UNDP to provide consultants, training and support of telecommunications programs in the developing countries. The UNDP and the ITU have and are currently providing telecommunications assistance to the SADC Governments, however, this funding will be substantially diminished by the end of 1992.

The CIP Bureau of the State Department manages a telecommunications development fund to support international institutional development and other activities which promote international communications and information development. Fund in the initial funding years (1988 and 1989) provided support grants to two organizations: the International Telecommunication Union's Center for Telecommunication Development (CTD), and the United States Telecommunications Training Institute. Since 1990, the CIP Bureau has encouraged diversification of its grant recipients. Types of activities funded under the program: Telecommunication Training, Information Management, Conferences and Seminars. The Training Institute has trained 793 participants from Africa.

Federal Communications Commission (FCC)

The FCC is responsible for the regulation of communications and the establishment of regulatory procedures, inputs from telecommunications users and the final adopted regulations. The FCC, with its considerable experience in developing and modernizing regulatory approaches to take into account changes in technology and market conditions, has made an effort to share that experience and expertise with a number of developing nations and emerging democracies. Mr. Alfred Sikes, Chairman of the FCC, stated before the 1992 United States - AFCOM '92 on April 1, 1992, that FCC's International Communications Office is prepared to provide regulatory assistance to African nations which are working on privatization and on the development of sound independent regulatory systems. Two ongoing FCC programs have been particularly helpful in training developing country telecommunications experts:

1) Since 1960, the FCC has coordinated training in specific technical areas in response to requests from developing countries submitted through the ITU. Training programs are arranged with corporate entities, academic institutions and various government agencies. Over 200 training courses have been arranged in one year alone.

2) For several years, the FCC has cooperated with the U.S. Telecommunications Training Institute (USTTI) by sponsoring two courses and by sharing sponsorship of a third. These courses are Frequency Management and Infringements, Radio Spectrum Monitoring and Management, and Radio Spectrum Management and Computer-Aided Techniques.

U.S. Department of Commerce (DOC)

The Department of Commerce encourages, serves and promotes the nation's international trade. The DOC offers assistance and information to increase the U.S. competitiveness in the world economy. It develops policies and conducts research on telecommunications and assists in the growth of minority businesses. Its International Trade Administration promotes world trade and strengthens international trade and investment possibilities of the U.S. It manages trade fairs and exhibitions emphasizing telecommunications and promotes U.S. telecommunications products and services throughout the world market. It also assists private sector organizations on export financing.

National Telecommunications and Information Administration (NTIA)

The NTIA was formed in 1978 from the Office of Telecommunications in the Commerce Department and the Office of Telecommunications Policy (OTP) of the Executive Office of the President. It has a broad role in telecommunications and information issues for the DOC. Included among its broad goals is the formulating of policies to support the development and growth of telecommunications, information and related industries and

furthering the efficient development and use of telecommunications and information services. NTIA provides policy management for the Federal use of the electromagnetic spectrum. It conducts seminars and training in spectrum management, both overseas and in the U.S. Telecommunications Institute. U.S.A.I.D. Missions can submit requests to NTIA for consideration of specific needs.

NTIA works closely with the U.S. Government agencies in support of telecommunications development activities. It also funds pre-feasibility and feasibility studies for capital projects, participates in and sponsors seminars and conferences on communications development and provides policy advice to developing nations. Some specific examples funded by NTIA and other organizations including Department of State and A.I.D. are:

- Jamaica — Privatization of certain telecommunications services. 1986
- Guatemala — Options for private sector participation in new telecommunications services.
- Ghana — Major survey of telecommunications requirements and policy perspectives.
- Costa Rica — Privatization of part of the Costa Rica Electric and Telecommunications Authority.
- Southeast Asia Telecommunications Conference
  NTIA, the Government of Indonesia and 31 companies from the U.S. telecommunications industry sponsored this conference. 1990
- Thailand — In cooperation with TDA, NTIA compiled a study of spectrum planning and frequency management requirements.
- Caribbean Telecommunications Infrastructure Development Program
  A collaborative initiative of the Department of Commerce and representatives of the U.S. telecommunications industry to discern policy issues, technical requirements, and development priorities which Caribbean and Central American telecommunications administrations face.
- Papua, New Guinea — Evaluation of computer-aided spectrum management. 1985
- Thailand — In cooperation with A.I.D., developed the terms of reference for a telecommunications infrastructure study. 1989

- Thailand — In collaboration with A.I.D., performed the telecommunications infrastructure study for the National Economic and Social Development Board of the Royal Thai Government. 1990

- Micronesia — NTIA led a team, funded by the U.S. Department of the Interior, to the Federated States of Micronesia, the Republic of the Marshall Islands, and the Republic of Palau to report on telecommunications policy and technical requirements.

The United States Telecommunications Training Institute (USTTI)

The USTTI is a unique joint venture of U.S. Government organizations and a broad spectrum of the U.S. communications industry. The Institute provides telecommunications training to less developed countries, as well as others, in the latest telecommunications subjects, technical and managerial. Instruction is provided by specialists from Telecommunications Corporations and the National Telecommunications and Information Administration. The goal of this partnership is to share U.S. communications technology through tuition-free training courses for qualified telecommunications and broadcast professionals from developing countries. USTTI has over 30 private sector sponsors. In addition, the following U.S. Government agencies are represented on the USTTI Board of Directors: FCC, Department of State, NTIA and the U.S. Information Agency. USTTI has offered over 160 diverse courses free of charge to attendees from developing countries.

As can be noted from the listing of organizations in this Subtask, very little is currently planned for the telecommunications needs in Southern Africa. However, the listing reveals a number of resources available to the SADC countries and to the region. There are areas of mutual interest and no discernable potential conflict with A.I.D.'s objectives. Missions should consider forcefully presenting their telecommunications needs of their client countries to AID/W and to take advantage of those organizations which are in a position to provide feasibility studies and definitional missions. Training opportunities at USTTI might also be investigated for host country management and technical professionals.

A review of the draft SATCC Telecommunications Development Program for the 1992-1994 period demonstrates an ambitious effort and also lists the additional funding required to accomplish the program. The SATCC program gives a high priority to:

- Completion of Missing Links of the PANAFTEL network,
- Completion of Satellite Earth Stations to achieve connectivity within the region and for international access,
- Completion of international telephone and telex switching centers in member countries,

- Rehabilitation, extension and maintenance of the existing infrastructure,
- Providing dedicated telecommunications networks to meet special requirements in support of transportation, Civil Aviation and meteorological projects,
- Achieve regional Operational Coordination, harmonization and standardization in traffic, tariffs, policy and regulatory issues,
- Enhancing efficiency through Development of Manpower Training and Institutional Development Strengthening, and
- Improved capability for preparation of long-term Development Master Plans.

Committee II (Networks and Services) of the U.S. delegation preparatory team for the African Telecommunications Development Conference has made a number of recommendations. Among them are:

- The U.S. urges the African nations to support those spectrum allocation proposals at WARC '92 that would protect the option to adopt new technologies as they emerge,
- Proceed directly to digital systems as practical and cost effective and replacement of analog systems,
- Make sub-regional plans in accordance with accepted world standards,
- Support PANAFTEL objectives of building the inter-African network,
- Encourage the adoption of new development strategies including privatization, competition, uniform and stable regulation, separation of operations and regulatory functions,
- Support the Regional African Satellite Communications System for the Development of Africa (RASCOM) but urge that PANAFTEL adopt policies encouraging approval of private, as well as public, networks including Very Small Aperture Satellite Systems (VSAT) and compatible private satellite services,
- Support continuation for a second Transport and Communications Decade for Africa (UNTACDA - 2) with regard to the United Nations Transport and Communications Decade for Africa, and
- Add training elements as a part of all telecommunications projects. Implementing the above recommendations will improve and modernize the telecommunications of SADC. Particular emphasis is made on the adoption of privatization as an underlying approach throughout Africa.

5.7 ANALYSIS OF THE ROLE OF OTHER BILATERAL AND MULTILATERAL DEVELOPMENT AND FINANCE AGENCIES WITH A CURRENT OR PLANNED INTEREST IN THE TELECOMMUNICATIONS SECTOR IN SOUTHERN AFRICA:

Among the multilateral development and finance agencies interested or active in Southern Africa are: The United Nations Development Program (UNDP) and its organization, the

International Telecommunications Union (ITU); The World Bank; The African Development Bank (ADB); the Arab Bank for Economic Development in Africa (BADEA); and the European Economic Community (EEC).

The United Nations Development Program (UNDP)

The UNDP is the world's largest channel for multilateral technical cooperation to enhance the quality of life and raise economic productivity. The UNDP supports more than 4,500 projects in 150 developing countries and dependent territories. Expenditures for technicians, equipment, wages and services in UNDP sponsored programs exceed $10 billion annually (1991). The International Telecommunications Union (ITU) is the oldest agency in the U.N. system. The ITU sponsored the Independent Commission for Worldwide Telecommunications Development which produced the report, "The Missing Link." The report stated clearly that there will be no development without telecommunications, nor economic growth without telecommunications. The report stimulated increased technical cooperation and assistance by the ITU. The ITU is the driving force behind the PanAfrican Telecommunications Network (PANAFTEL). The PANAFTEL network is not yet completed in Southern Africa. Missing links exist to Angola, Mozambique and Namibia. Unfortunately, funding for ITU consulting services and training to the SADC countries is about to come to an end in September 1992. However, if other sources are identified, the ITU is willing to bridge financing for a short period of time (i.e. 3 to 4 months).

World Bank - International Bank for Reconstruction and Development (IBRD)

The World Bank's main purpose is to provide finances for constructive purposes out of its own capital, funds borrowed in capital markets and retained earnings. The Bank extends medium or long-term loans averaging 20 years to help finance specific projects that lay the groundwork for economic progress. Most of its loans are to developing nations. The World Bank has been involved in financing telecommunications projects in Africa for about 40 years. Bank financing has constituted about 20 percent of total project costs, the rest has been financed from other multilateral sources, bilateral sources and internally generated funds. Telecommunications loans have, on the average, constituted about 3 percent of total Bank lending. Although telecommunications has not been one of the top priority sectors for the Bank in the past, the Bank is becoming increasingly aware of the critical role played by telecommunications in economic development.

The World Bank involvement has given two major benefits to the development of the sector. First, through competitive bidding, borrowers have been able to obtain competitive prices for equipment procured under Bank financing. It is estimated that International Competitive Bidding has, in many instances, resulted in cost savings of at least 30 percent.

Borrowers have used those prices to negotiate prices for equipment obtained through other sources of financing when international competitive bidding was not the criterion for procurement. The economic rate of return for projects in which the Bank has been involved has averaged 25 percent.

Second, the Bank has initiated institutional reforms in the sector that were required to improve the efficiency of both the overall sector and certain operating entities. The World Bank has a concessionairy financing organization, the International Development Association (IDA) which offers loans to governments subject only to a service charge, with a payment term of 50 years. IDA loans are available only to the poorest of developing nations.

In April 1992, the World Bank notified SATCC that it, along with the ITU, intends to initiate a study on policy issues of telecommunications sectors in Africa. Country studies will be undertaken in Zimbabwe, Zambia, Namibia, Tanzania, Uganda and Ethiopia. A group of francophone countries will be examined under the study's second phase. The World Bank has an ongoing interest in the telecommunications efforts of the SADC countries.

The African Development Bank (ADB)

The headquarters of the ADB is in Abidjan, Ivory Coast and has a membership of 50 African States. The U.S. is a contributor to its fund. The ABD aims to spur both economic development and social progress among its members on an individual and joint basis. It has five associated institutions through which public and private capital is channeled. They are: The African Development Fund; The Nigeria Trust Fund; the African re-insurance Corporation; the Sociéte Internationale Financiere pour les Investissements et la Developpment en Afrique (SIFIDA); and the Association of African Development Finance Institutions (AADFI). The ADB has been one of the donors of the recently completed Rural telecommunications Study. At the AFCOM-92 meetings held in Washington, DC in March and April 1992, the ABD representative encouraged applications for funds for the telecommunications sector in Africa. ADB is providing a loan of $15.9 million toward the National telecommunications project in Mozambique. The ADB is also financing digital equipment for the expansion of three telephone exchanges in Malawi.

The Arab Bank for Economic Development in Africa (BADEA)

BADEA was created by the Arab League summit in Algiers in November 1973. It supplies African countries with technical assistance. All members of the Organization of African Unity (OAU) are eligible as recipients except those African countries belonging to the Arab League. Objectives of BADEA are two-fold; to assist African countries with large balance

of payments deficit by providing aid, and to sponsor Arab investments in Africa through investment guarantees. The headquarters of BADEA is located in Khartoum, Sudan. BADEA is providing a loan of $8.1 million toward the National Telecommunications project in Mozambique.

The European Economic Community (EEC)

The EEC is an organization of the European Community (EC) consisting of 12 full European members. Under the Lomé Convention, 60 nations in Africa, the Caribbean and the Pacific are affiliated with special trading and economic privileges. EEC contributed toward the SADC Rural Telecommunications Study.

Bilateral Development and Finance Agencies

There are a number of bilateral development and finance agencies active in both national and regional telecommunications efforts with the SADC countries. Among them are:

- Canadian International Development Agency (CIDA) - Funding for telecom was canceled after June 1992,
- Australian International Development Assistance Bureau (AIDAB),
- German Financial Institution for Reconstruction (KFW),
- Swedish International Development Authority (SIDA), and
- Norwegian Assistance and Development Authority (NORAD).

In addition to the above agencies, a number of countries have provided both grant and loan assistance. These countries are, and have been: France, Japan, Portugal, Italy, Belgium, Spain, Sweden and Norway.

The above agencies and countries have provided consultants, experts and specialists to perform a number of tasks such as:

- Identify project infrastructure for investment,
- Enhance use of regional networks,
- Prepare project cost estimation,
- Implement project monitoring and supervision,
- Conduct regional operational coordination and studies,
- Give training courses and seminars,
- Develop staff and institutions,
- Coordinate technical liaison with regional and international organizations, and
- Provide documentation and information.

Some of the Bilateral Agencies' contributions which have been made and are being made:

CIDA - Study on regional satellite connectivity
- Rural telecommunications study
- Retrofit of Boane 'A' antenna to comply with INTELSAT mandatory specifications for dual polarization - Mozambique
- Financing two additional domestic earth stations with small diameter antennas - Mozambique

KFW - Report with final recommendations for Mozambique backbone trunk network

AIDAB - Pre-feasibility study for Network Management Centers
- Pre-feasibility study on AXE-10 Repair Centers

SIDA - Traffic and capacity requirements for International Telephone Switching Center in Namibia
- Telecommunications statistics data base
- Regional Synchronization Plan
- Telecommunication Network Planning Course

NORAD - Telecommunications Manpower and Training Needs Study Survey
- Meetings with Namibia and Botswana for contract agreement on completion of PANAFTEL terrestrial links
- Coordination with Zimbabwe, Malawi and Mozambique for the digital radio propagation study and analysis
- Financing for the expansion and extension of the microwave trunk network in Botswana

Financing assistance has been provided by a number of countries as follows:

• France	-	Domestic satellite projects in Mozambique & Angola,
• Italy	-	Telecommunications in Beira Port, Mozambique,
	-	Training courses and seminars on telecom subjects,
	-	Loan and grant ($55.2 million) National Telecommunications Development Project - Mozambique,
• Belgium	-	ITSC in Tanzania ($4.0 million), Teleprinters for Telex exchanges throughout Zimbabwe,
	-	Study on Data Networks and Packet Switching,
• Sweden	-	Loan and grant ($13.8 million) National Telecommunications Development Project - Mozambique,

- Norway - Microwave link Namibia - Botswana,
  - Grant ($6.0 million) National Telecommunications Development Project - Mozambique,
- Japan - Harare International Telephone Switching Center - Zimbabwe,
  - Detailed specifications for expanding the capacity of the Mazowe satellite earth station - Zimbabwe.

5.7.1 COMMENTS AND SUGGESTIONS:

The Southern Africa region meets the A.I.D. criteria for development and economic assistance. Some of its needs are being met through existing programs of the Africa Bureau. However, food security, rural development, health and nutrition, family planning, education and resource development can all be more effectively accomplished with an efficient, modernized telecommunications network system. Effective telecommunications is a requirement in the transition from state-run to free market economies. To improve the existing parastatal telecommunications organizations, consideration should be given to privatization or partial privatization.

A.I.D. needs to review its interests in Southern Africa and to make a decision regarding the telecommunications sector as an area of emphasis. Initially, SADC should acknowledge the priority of supporting the telecommunications sector with its resulting economic, social and political benefits. Major expenditures in telecommunications facilities can only be justified on the basis of benefits to the whole economy of a country or region. Rural telecommunications can be financed in part with the profits from urban areas as an example. A.I.D. should consider calling a meeting of the Interagency Working Group to address telecommunications and related development issues at policy levels to determine and establish a priority for telecommunications in SADC. If a favorable determination is the result, explore financing options to include development funds and privatization assistance. New digital technology should be emphasized and the features of Integrated Services Digital Network (ISDN) be introduced as applicable. Standards and training also should be implemented. A review of the SADC ten-year telecommunications plan should be made and unfunded areas should be made known to U.S. entrepreneurs, consultants and equipment manufacturers.

The Southern African market with its growing needs in all areas represents a challenge and opportunity to U.S. industry. The previous paragraphs have shown the interest of multilateral and bilateral agencies as well as certain individual countries in Southern Africa and due to their efforts have created investment opportunities for telecommunications consultants, experts, specialists and equipment manufacturing organizations.

The fact that the above entities are active and pursuing opportunities in Southern Africa give them an advantage over potential A.I.D. efforts in this sector. It should be recognized that all ten countries are either former colonies of European powers or have close linkages with them. In addition, the Lomé Convention offers certain market advantages such as duty free entry into the European Community countries for some agricultural and manufactured products. The countries currently active which do not have former colonial linkages are Japan and the Scandinavian countries.

All of the telecommunications activities listed as well as the equipment furnished can be provided by U.S. consulting firms and U.S. equipment manufacturers. The telecommunications market needs to be promoted by the U.S. Government. Perhaps an interagency meeting is in order to establish a position on telecommunications in Africa and in particular Southern Africa.

The U.S. telecommunications industry can compete effectively with telecommunications companies in other countries. Investment incentives and promotion of telecommunications opportunities are needed to attract U.S. firms to this market. Of interest is the fact that Regional Bell Operating Companies (RBOCs), because of certain marketing restrictions in the U.S. and in some cases with slower basic telephone growth in their territories and with competition for certain services, are looking to overseas opportunities. They are interested in supplying management, equipment and, in some cases, to take an equity position in a parastatal or a partial privatization position. This issue was covered in Section 4.

ANNEX V.1

TELECOMMUNICATIONS SECTOR SCOPING STUDY
FOR SOUTHERN AFRICA - PHASE ONE

SECTION V

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ANNEX V.2

TELECOMMUNICATIONS SECTOR SCOPING STUDY FOR SOUTHERN AFRICA - PHASE ONE

SECTION V

A.I.D. COMMUNICATIONS PROJECTS (NON-TELECOMMUNICATIONS SECTORS)

A.I.D. COMMUNICATIONS PROJECTS (NON-TELECOMMUNICATIONS SECTORS)

Liberia

- Airport Navigational Aids 1979 ($0.5 million)

Air traffic control equipment for the Roberts Field and other airports in the country consisting of Non-directional Beacons, Distance Measuring Equipment and power units.

- Regional Broadcast System 1981 ($1.9 million)

Four sites in rural areas plus a studio in Monrovia. Equipment consisted of four 10 KW AM units for the broadcast of agricultural information in the pre-dominant language of the area; studio production facilities; maintenance and test equipment; and training.

Sudan

- Broadcasting Equipment at the Soba Site 1980 - 82 ($2.0 million)

Two 100 KW AM transmitters with their associated antenna structures were installed and put into service. The Transmitter building was equipped with a new and larger capacity air conditioning system.

Tunis

- HF Radio Network for Emergency Operations 1987

For early warning of possible flood conditions and other emergencies.

Zaire

- Railway Control System for ONATRA 1979-81 ($10.0 million)

Radio control system to serve the needs of the railroad and port operations of ONATRA. System serves railroad movements from Kinshasa to Matadi, a distance of 366 Km with selective calling to all stations and to all locomotives with a backup buried cable with drops at all stations. Port operations consisting of a number of base stations, fixed transceivers and portable transceivers. Buried cable also transmits bills of lading, inventory data, train makeup, etc.

Egypt

- National Energy Control Center 1977 - 81 ($43.5 million)

A large size Supervisory Control and Data Acquisition (SCADA) system controlling all thermal and hydro-electric generating plants in Egypt through power line carrier and microwave transmission to remote terminal units. The Cairo-West main control center

is equipped with two large Cyber computers, a number of smaller computers connected to 39 remote terminal units for the data acquisition.

- Suez Canal Authority - Vessel Traffic Management System 1977 - 80 ($17.7 million)

An electronic system to control vessel traffic through the canal. System consists of a main computer and display center at Ismailia and two ancillary control centers at Port Said and at Port Suez; three long range radars; a Loran system; and radio equipment for pilots, small boats and dredges. In addition, there was an extensive training component in the U.S. for key personnel.

- Egyptian National Railways - Railway Traffic Control System 1980 - 84 ($27.0 million)

This control system provides nationwide control of train movements improving safety and utilization of rolling stock. System incorporates 7 Railway Traffic Control Centers controlling 4,600 KM of track, microwave radio connecting 550 selected way stations backed up with a wire-line network; radio equipment for 500 locomotives; loggers; control consoles; special circuits for handling accidents and security.

- Ministry of Irrigation, Aswan and High Dams Authority - Seismic Study 1983 - 85 ($6.0 million)

Project studied earthquake activity and dam stability evaluations for the Aswan High Dam through a number of sub-tasks requiring seismic equipment, telemetry, computer programs and analyses. Final results showed that the High Dam is stable under the Safety Evaluation Earthquake conditions.

- Ministry of Irrigation - Seismic Study 1987 - 88

Seismic safety evaluation of the old Aswan Dam with reference to findings of the study of the High Dam.

- Ministry of Irrigation - Irrigation Management System 1987 ($3.0 million)

Management of irrigation operations employing meteor communications with 250 remote terminal units providing data on water levels and flows to two computer control centers for analysis and action.

- Organization of Broadcast and Television Federation 1977 - 80

One one-megawatt medium-wave transmitting system ($4.2 million)
Two 250 KW medium-wave Transmitting systems ($2.7 million)
Three 100 KW short-wave transmitting systems ($4.5 million)
Two two-KW FM transmitting systems for Cairo) - ($0.5 million)
One 1-KW FM transmitting system for Alexandria)
Eleven medium frequency, low-power transmitters for remote areas and seven sites in Upper Egypt.

- Ministry of Health - Medical Emergency Radio Communications 1978 ($2.4 million)

Emergency Medical System installed in Cairo and Alexandria consisting of Hospital Consoles (10), Ambulance Radios (175), Portable Radios (135), Medical Packages (10), lot of spare parts and training of personnel. Ministry of Health was pleased with the

performance of the EMS and expanded the network to other cities with $6.0 million of their own funds. Following an evaluation after the EMS was in operation for five years, the system was expanded again with a portion of $5.0 million allocation to the Ministry of Health in 1983.

- Egyptian Government Ministry of Marine Transport - Hydrographic Survey 1977 - 80 ($7.0 million)

A PASA was contracted by A.I.D. with the U.S. Navy to conduct a hydrographic survey of the Mediterranean coastal ship transit area from Alexandria to Port Said, the approach areas to the Port Said entrance of the Suez Canal and the Gulf of Suez, from Suez to the end of the Sinai Peninsula. Accurate navigational maps were produced along with an evaluation of existing navigational aids and recommendations regarding changes and estimated costs.

Jordan

- Jordan Electric Power Co. - SCADA 1977 - 79

33 KVA Distribution Network SCADA System consisting of a Control Center, 32 remote Stations, 38 Substations, Communications Equipment and Data Processing Equipment.

- Ministry of Transportation - Marine Radio System 1987 - 88

Equipment for transmitting and receiving sites consisting of marine-band transmitters, microwave links, antenna systems, PCM telephone multiplex and other associated equipment.

- Natural Resources Authority - Jordan Seismological Observatory 1982 - 85 ($0.7 million)

Provided for the design, installation and operation of a National Seismological Network Observatory designated the Jordan Seismic System (JSS). Personnel from the United States Geological Survey provided the technical expertise and equipment procurement for the Observatory, seismic sites and training of personnel.

- Continuation of Effort 1985 - 90 ($2.0 million)

Included additional equipment.

Jamaica

- Jamaica Broadcasting Company - Field Survey 1979

Field survey for the location of a 10 KW medium-wave transmitter in the Mandeville area for the dissemination of agricultural information to the local farmers. Based on field strength measurements, a transmitter site was selected as well as the selection of a studio location. An equipment list and estimated costs were submitted.

El Salvador

- Ministry of Education - Instructional Television 1973

Furnishing of several hundred 25-inch television receivers to support the Instructional Television Program of 40,000 students in Grades 7 through 9.

Haiti

- Ministry of Agriculture - Communications System 1978 - 79

Field survey and recommended locations of stations, antennas, etc. for an agricultural radio communications system using both VHF and HF equipment, Main Station at National Headquarters at Damien with links to the 12 agricultural districts. In addition, radio circuits were terminated at the activity centers within each district. Equipment lists and installation and maintenance costs were provided.

Guatemala

- Ministry of Health - Communications System 1977

Design of a health communications network to provide voice communication facilities between regional and local hospitals situated in the larger cities, and the health centers and health posts located in many of the smaller communities of Guatemala. Many of the health centers and posts had no commercial electric power or telephone service. Recommended was a backbone radio system at 960 MHz and spur links at 460 MHz. VHF radio links were designated for Health Centers and Health Posts with power generators.

Colombia

- Ministry of Health - Health Communications Network 1975

Design of a health communications network which included specifications for the necessary equipment and for the required operations and maintenance training. The network was to serve State offices, 12 University Hospitals, 114 Regional Hospitals, 372 local hospitals and 1,885 Health Care Centers and Posts.

Caribbean Island Nations

- Disaster Services - Hurricane Warning Network 1980

Design and implementation of HF radio hurricane warning network with headquarters in Barbados with links to St. Vincent, ST. Lucia, Dominica, ST. Kitts, Antiqua and Anguilla. Equipment and installation funded by U.S. Office of Foreign Disaster Assistance. Equipment was ordered on an expedited basis.

Grenada

- Grenada Broadcasting Company - Replacement Transmitter 1984 ($0.85 million)

A 20-KW medium-wave transmitter, towers and a directional antenna were procured and installed to replace the transmitter damaged during the intervention in 1983.

Bangladesh

- Disaster Communications - Radio Equipment 1967

A radio Cyclone Warning System was installed consisting of 6 base stations and 27 satellite stations in the areas most vulnerable to cyclonic and tidal bore devastation. The system was connected to the telecommunications network and operated by the Telephone and Telegraph Department. After the cyclone and tidal wave in 1970, the system was repaired and reactivated.

Nepal

- Education - Teacher Training Radio Network 1978 - 81 ($0.95 million)

A 100 KW short-wave transmitting system was installed at the Khumalter transmitter site located in Kathmandu. Spare parts and training of operating and maintenance personnel was provided. Battery operated and solar powered radios were procured for the teachers involved in the program.

Korea

- Ministry of Broadcasting - Studio Equipment

Telecine and other TV studio equipment was furnished to upgrade the capabilities of the TV broadcasting studio in Seoul.

Italy

- Seismic Studies and Monitoring

Laboratory and observatory equipment was provided for the monitoring and analysis of seismic activity in the Pazzuoli area west of the city of Naples.

Philippines

- National Electrification Administration 1979

Bid documents prepared and HF and VHF radio equipment, both fixed and mobile, were procured and installed at 81 Rural Electric Cooperatives. The communications network provides administrative, operation and maintenance functions.

Syria

- Damascus Water Project - SCADA System 1980 - 81 ($9.0 million)

A Supervisory and Data Acquisition system was designed to provide sensor information from pumping stations, reservoirs, and water flow to a centralized computer installation. The computer could then monitor all information and initiate appropriate actions through computer programs to provide a unified water flow through the system. Equipment was procured and installation initiated with some equipment ready but not shipped. Effort was stopped due to Foreign Policy decisions by U.S.

Swaziland

- Ministry of Agriculture - Radio Network 1981 - 83

Design and procurement of a radio network to support the Rural Development Area Infrastructure Program connecting the facilities of Agriculture, Veterinary, Fisheries, Forestry, Research, Dairy Board, etc. Equipment procured and installed consisted of transmitters, repeaters, fixed and mobile radio transceivers, spare parts, test equipment and training. Radio base stations without power were equipped with batteries and gasoline powered charging units.

Sahel Regional

- Sahel Water Data & Management, Phase I 1977-81 ($6.3 million)
- Sahel Water Data & Management, Phase II 1982-86 ($7.7 million)
- Sahel Water Data & Management, Phase III 1987-94 ($14.0 million)

A.I.D., along with other donors, is contributing to equipping, operations and maintenance of the AGRometrological/HYdrological/METrological (AGRHYMET) Program. This program is to support increased food production in the Sahel by providing national planners and researchers with timely weather and climatic data that increases the understanding of cyclical events and their impact on water, soils, vegetation and crops. Equipment consists of sensors, data links, computers, telecommunications - both terrestrial and satellite. Countries served: Niger, Mauritania, Chad, Guinea Bissau, Gambia, Mali, Cape Verde and Burkina Faso.

Development Communications

The Division of Development Communications, Office of Education of the former Bureau for Science and Technology has provided communications assistance in support of development programs in such areas as health, education and agriculture. Media employed has been radio and satellite. More than 40 developing nations have been assisted in their efforts to use communications to contribute directly to development and to human well being. Some examples:

In support of public health, radio campaigns are teaching mothers a lifesaving therapy for their sick infants.

In basic education, radio techniques have been designed along with teaching materials to successfully teach mathematics, science and language.

Radio networks were developed in Liberia, Guatemala, Jamaica and other nations to provide agricultural information to rural areas.

A network in Nepal uses radio broadcasting to train teachers.

A.I.D.'s Rural Satellite Program has provided communications to facilitate rural development in Peru, Indonesia, the Caribbean and Senegal.

ANNEX V.3

TELECOMMUNICATIONS SECTOR SCOPING STUDY FOR SOUTHERN AFRICA - PHASE ONE

SECTION V

THE ROLE OF U.S.A.I.D IN TELECOMMUNICATIONS DEVELOPMENT

A.I.D. TELECOMMUNICATIONS PROJECTS

A.I.D. TELECOMMUNICATIONS PROJECTS

LIBERIA

- Telecommunications Expansion 1971 - 1978 ($10.4 million)

  Management training and development of a 20-year telecommunications plan for the Republic of Liberia.

  Engineering design, preparation of specifications and bid documents and engineering supervision of the procurement and installation of equipment and materials for the expansion of the system. The project included: an increase of 3,000 lines to the Monrovia Main and Sinkor exchanges; a new 1,000 line exchange at Paynesward; a new coastal microwave link from Monrovia to Harper; and, a high-capacity microwave and troposcatter system with additional equipment at Harper to link with the Ivory Coast system at Tabou. The project also included associated outside plant, tools, vehicles, etc. In addition, up-country communications were improved as well as marine radio transmitting equipment.

  A Telecommunications Training School was established with training aids, text materials and hands-on equipment. Later, the school was moved to Freetown, Sierra Leone as a result of the Mano River Union Treaty to serve both nations.

MADAGASCAR

- Telecommunications Improvements I 1967 - 1976 ($2.0 million)
- Telecommunications Improvements II 1973 - 1977 ($1.2 million)

Wire line carrier systems in the Northern Province were subsequently extended to the Southern Province. Only materials were provided. The engineering and installation furnished by the personnel of the Directorate of Posts and Telecommunications. Materials provided included copper-clad steel wire, insulators, transposition brackets, steel poles, crossarms, anchor rods and plates, etc. Several inspection visits revealed excellent installation work and record keeping.

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NIGERIA - CHAD - CAMEROON

- Lake Chad Basin Commission Telecommunications 1972 - 1977 ($0.98 million)

The Project consisted of the engineering design, procurement, and installation of equipment and materials for a telecommunications microwave link of approximately 145 miles between N'Djamena (Chad), Kousseri (Cameroon), and Maiduguri (Nigeria). It provided for telephone, telegraph and telex communications among the three cities and tied in the National Telecommunications System of each of the three countries into the National System of the other two countries.

GHANA - TOGO

- Accra - Lome Telecommunications Link 1974

This contract provided for the field survey and technical specifications for a microwave link for telephone, telegraph and telex service between Accra (Ghana) and Lome (Togo). The selection was a single hop between Ho, Ghana and Mt. Agou, Togo. Bid specifications were prepared.

GHANA

- Telecommunications Survey of Ghana 1967

An economic and technical appraisal of Ghana's telecommunications requirements was made, culminating in a plan for the phased development of the National Telecommunications System of Ghana, through the 1970s.

REGIONAL WEST AFRICA

- Economic and Technical Feasibility Study of Improving International Telecommunications in West Africa 1968

The study report is based on a field survey of five nations; Nigeria, Dahomey (Benin), Togo, Ghana and the Ivory Coast. The purpose of the study was to provide an integrated multi-channel network extending from Lagos, Nigeria to Abidjan, Ivory Coast. It was assumed that satellite earth stations would be installed in Lagos and Abidjan to coincide with the availability of the international ground network. The study concluded that an international microwave trunk route to improve international communications among the five countries was economically, financially and technically feasible. The study financed by A.I.D. was presented to the National Aeronautics and Space

Administration for consideration of the earth stations while A.I.D. considered the terrestrial links..

SUDAN - VARIOUS STUDIES

- Telecommunications spare parts 1987 ($5.0 million)

Provision of spare parts and test equipment for central office exchanges and the domestic satellite system.

- Upgrade of Umm Haraz Earth Station 1986 - 1988

Equipment was procured to retrofit the Umm Haraz earth station to meet INTELSAT requirements. Retrofit did not proceed due to finding of Consultant that the antenna azimuth ring was out of level and that the retrofit could not proceed until the condition was corrected by re-grouting and re-leveling the ring. The Sudan Telecommunications Public Corporation (STPC) would not agree to follow A.I.D.'s contracting procedures for corrective action. A.I.D. then withdrew support.

- Automatic Numbering Equipment 1985 - 1987 ($0.385 million)

ANI equipment with international restriction features was procured and installed.

VENEZUELA

- Ministry of Communications - Radio Spectrum Management 1976

An evaluation was made of the regulatory activities of Venezuela Radio and recommendations were made for technical advisory services, technology and commodities which can improve spectrum management to benefit the broadcasting, land mobile and other radio services.

THAILAND

- Office of the Prime Minister - Radio Frequency Management - Telecommunications 1966

All aspects of radio and telecommunications frequency regulation and its related problems were investigated. Recommendations included establishment of a radio regulatory office as an entity in the Post and Telegraph Department; training of qualified

technical personnel to form a professional nucleus for the regulatory office; revision of and new Thai radio laws; training in monitoring procedures and activities; documentation of all authorized radio stations; and establishing a salary structure to attract qualified personnel, etc.

- National Economic and Social Development Board - Terms of Reference 1988

A Consultant team prepared the Terms of Reference for a Telecommunications Infrastructure Study for the National Economic and Social Development Board of the Royal Thai Government. Task descriptions addressed: Organization, Regulation, Pricing Policy, Role of the Private Sector, New Technology and Services, Development Planning, Human Resources and Training, and Program Implementation. Level of effort and cost estimates were also submitted.

- National Economic and Social Development Board - Telecommunications Infrastructure Study 1990 -1991

Report submitted is an assessment of the telecommunications infrastructure in Thailand. It stresses the importance of telecommunication development to national growth, identifies impediments to growth, and makes recommendations for their removal. Topics included the above Terms of Reference. Conclusions focused on major organizational change and privatization.

HASHEMITE KINGDOM OF JORDAN

- Ministry of Communications - Feasibility Study 1959 - 1960

This study was financed by the International Cooperation Administration (ICA), the predecessor agency of A.I.D. The study showed that a major expansion of the installed facilities would be necessary to handle the telecommunications demand. The original study was updated in 1965 by an A.I.D. Consultant.

- Ministry of Communications - Engineering & Management Services 1966 - 1972 ($6.3 million)

This project helped finance the construction of a portion of the Jordan telephone system physical plant and established the Telecommunications Corporation of Jordan (TCC) as an operational organization. Switching exchanges and outside plant, microwave equipment, telephone instruments and other equipment procurement was delayed because of the Israeli-Egyptian War. It was further delayed because the West Bank was not returned to Jordan, necessitating a major revision of procurement items.

- Telecommunications Corporation of Jordan - Management Assistance 1974

A Management Assistance Team recommended more advisory assistance in the organizational and management areas, the expansion of the physical plant of the telephone system and the upgrading of the systems operation and maintenance.

- Telecommunications Corporation of Jordan - Management Assistance 1976 - 1978

Management services were provided to assist the TCC become an autonomous, fiscally sound, service-oriented organization. Reports addressing specific areas were submitted by the team consisting of a General Manager, a Financial and Rate

Specialist, General Plant operations and Training Specialist and a Commercial Engineer. All team members had assigned several Jordanian counterparts.

MIDDLE EAST

- Middle East Regional Telecommunications 1978 ($0.06 million)

A telecommunications study at the time of the proposed Camp David Accord was conducted to identify economically and technically feasible regional telecommunications investment possibilities for the Middle East which would promote economic, commercial and cultural linkages to enhance the peaceful stabilization of the area. Territories that were addressed included: Egypt, Israel, Jordan, Lebanon, Syria, Gaza, West Bank and Saudi Arabia. The resulting bilateral relations between Israel and Egypt were, unfortunately, not accepted by the other nations which prohibited the recommendations of the study to be implemented.

LEBANON

- Ministry of Communications - Definitional Study 1982

A team of experts, funded by telecommunications firms and with a contribution by A.I.D. to the American Lebanon Private Sector Cooperation, Inc. (ALPSCI) which organized the effort, visited, analyzed and reported their evaluation of telecommunications damage in Beirut, Lebanon. At the request of the PTT, eight exchanges and areas in Zone 1 of West Beirut were inspected. One exchange was totally destroyed from shellfire and

22,000 of West Beirut's 85,000 telephones were out of service. Recommendations were made for rehabilitation, upgrade and expansion of exchanges and outside plant.

- Ministry of Communications - Managerial & Technical Services 1983 - 1985 ($7.7 million)

This contract provided for rehabilitation of outside plant, restoration of designated exchange area networks, procurement of commodities, development of a training program and training of personnel. Much of the effort was completed in spite of constant interruptions due to localized fighting, destruction of the U.S. Embassy and several evacuations of personnel to Cyprus.

- Ministry of Communications - Management Assistance

To assist in the upgrading of the PTT, several consultants provided their expertise in the specialties of finance and telephone organization.

GRENADA

- Grenada Telephone Corporation - Digital Exchange 1983 - 1984

The Westerhall Telephone Exchange and its building were destroyed during the U.S. intervention. A new building was constructed to house a new 800-line digital telephone switch.

- Grenada Telephone Corporation - Review of St. George and Mt. Hartman Exchanges 1984

This contract covered a review of East German telecommunications equipment, obtained through an East German loan, which had been partially installed by East German engineers and Cuban technicians. Work was approximately seventy-five percent completed when it was stopped by the U.S. intervention. Consultant provided alternatives for completion or replacement of the East German crossbar exchanges and associated equipment.

DEVELOPING COUNTRIES AND AFRICA

- Telecommunications Privatization in Developing Countries and Africa 1987

A report was prepared for the Center for Privatization, an A.I.D. funded organization, which addressed privatization with particular attention to the four countries of Cameroon, Ivory Coast, Kenya and Senegal. This survey of Telecommunications Privatization projects addressed the need for better telecommunications in Africa, the

historical background, current status and problems of a number of telecommunications administrations; and privatization as a mechanism for meeting needs. U.S. telecommunications companies contacted were not willing at the time to take an equity position but were willing, on a contract basis, to assist African Telecommunications entities to achieve a level where partial or full privatization becomes attractive to the investment community. Also addressed in the report were the legal and regulatory aspects of privatization. Recently a New York Times news item of July 6, 1992 reported that Kenya has reconsidered its earlier position regarding privatization and has offered its stake in 207 companies for sale.

EGYPT

- Arab Republic of Egypt National Telecommunications Organization (ARENTO)

Telecommunications Sector Study 1977-78		($4.7 million)
Telecommunications Expansion I	($40 million)	
Telecommunications Expansion II	($80 million)	
Telecommunications Expansion III	($122 million)	
Telecommunications Expansion IV	($40 million)	
Telecommunications Expansion IV-E		($42 million)
Greater Cairo Microwave System	)	
Greater Cairo Microwave Expansion II	)--	($62.5 million)
Alexandria Microwave System	)	
Telecommunications Expansion V	($218 million)	

Because of the unreliability of the Egyptian Telephone System and the inability to meet the growing public demand for telephone service, in 1977, A.I.D. financed an in-depth study which resulted in the launching by the Egyptian Government of an ambitious 20-year, $20 billion program to rehabilitate and modernize the telecommunications system. A comprehensive eight-volume report along with detailed appendices was initiated in 1978 under Telecommunications I. Also prepared were bid documents for electronic exchanges along with outside plant, management and administrative training, tools, test equipment, materials and technical assistance to upgrade and rehabilitate the existing system pending the introduction of the new electronic exchanges. Telecommunications I, II and III provided for nine 1AESS telephone exchanges in Cairo and Alexandria with 255,000 lines and the associated outside plant. The Greater Cairo microwave system provided digital junction links well in advance of the installation of the underground junction network and was later expanded to provide greater flexibility of operations to all 15 exchanges in Cairo. The Alexandria digital microwave junction system provided a similar function for nine exchanges in that city. Telecommunications IV, now being completed, provides for two new digital exchanges in Cairo to serve the areas of Bab-El-Khalk (South East Cairo) and

Pyramids West. Each exchange included a digital switching system and its related outside plant. Each of the two switching systems has a capacity of 30,000 lines, expandable to an ultimate capacity of 60,000 lines. Fiber optic junction cables were also included along with manpower development and training of ARENTO engineers and technicians in the operation and maintenance of the new systems. As an add-on, a 30,000-line digital switch was also installed in at Heliopolis. To respond to the increasing public and private sector demand, Telecommunications IV expanded and has been initiated to provide for four additional digital switches in Cairo and three outside plant additions in Cairo and Alexandria. Contract negotiations are under way for the required Consulting Engineering Services with a Bechtel/Teleconsult team.

- Organization of Broadcasting and Television Federation - Procurement and Installation of a Dimension PBX.
- Al Akhbar Newspaper Publishing Company - Procurement and Installation of a Dimension PBX.

ANNEX V.4

TELECOMMUNICATIONS SECTOR SCOPING STUDY FOR SOUTHERN AFRICA - PHASE ONE

SECTION V

THE ROLE OF U.S.A.I.D IN TELECOMMUNICATIONS DEVELOPMENT

CONTACT POINTS OF REFERRNCE

ANNEX V.4

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TELECOMMUNICATIONS SECTOR SCOPING STUDY FOR SOUTHERN AFRICA - PHASE ONE

SECTION VI

CONCLUSIONS, RECOMMENDATIONS AND A SADC ACTION PLAN FOR USAID

SECTION VI

CONCLUSIONS, RECOMMENDATIONS AND A SADC ACTION PLAN FOR USAID

6.1 OBJECTIVE

The primary objectives of Section VI is to summarize the findings, conclusions and recommendations leading to and Action Plan for the SADC Region to be implemented by USAID. This Section includes the identification of:

(1) Key Policy Issues in developing a framework for promoting private sector participation in telecommunications in the region.

(2) Information requirements on the SADC Region that are necessary for the private sector to make an informal decision for long range participation in the Region.

(3) Incentives that may be required to promote U.S. private sector involvement in the region to maximize the impact of policy changes and information provision.

Included in this Section is a preliminary Action Plan outlining a proposal for next steps for USAID to promote the development of the telecommunications sector in the region, with a particular emphasis in promoting the role of the U.S. private sector. The plan includes a draft scope of work for Phase Two of this Scoping Study.

6.2 KEY POLICIES ISSUES AND REGULATORY FRAMEWORK

In Section III, the current and planned policy, regulatory, and institutional issues in the telecommunications sector in the SADC Region were reviewed. In Section IV, key policy issues that promote private sector participation in telecommunications were identified and discussed. Exhibit 6-1 maps these key policy issues to the current and planned status as reviewed in Section III.

The following is a brief analysis of these key issues from a regional and individual country perspective.

6.2.1 Telecommunications Law

With the exception of Zambia, no private sector participation is allowed for basic telephone services in the SADC Region (including RSA). Zambia has passed a new law to privatize the operations of the basic telephone networks. Regarding enhanced services and other

SUMMARY OF KEY GOVERNMENT POLICIES REGARDING THE TELECOMMUNICATIONS SECTOR

COUNTRY	TELECOMM LAW	FREQUENCY ALLOCATION AND LICENSING	TECHNICAL COMPATIBILITY	FOREIGN INVESTMENT LAWS	EQUITY POLICIES	SECTOR POLICIES	TIES TO REGIONAL ORG.
ANGOLA	STATE MONOPOLIES, NO COMPETITION IN SERVICES.	REGULATION BY INDEPENDENT REGULATORY BODY.	CONFORMS TO CCITT RECOMMENDATIONS AND CEPT STANDARDS.	NO CURRENT INCENTIVES TO ATTRACT FOREIGN PRIVATE SECTOR INVESTORS.	STATE OWNERSHIP ONLY.	MERGE LOCAL AND LONG DISTANCE OPERATORS. DEVELOP SERVICES IN SAFE AREAS.	SATCC.
BOTSWANA	STATE MONOPOLY, NO COMPETITION IN SERVICES.	SELF REGULATED BY THE STATE OWNED MONOPOLY.	CONFORMS TO CCITT RECOMMENDATIONS AND CEPT STANDARDS.	FAVORABLE TO FOREIGN PRIVATE INVESTORS.	STATE OWNERSHIP ONLY.	TOP PRIORITY IS THE DEVELOPMENT OF RURAL AREAS.	SATCC, SATA, ARTC, PATU
LESOTHO	STATE MONOPOLY, NO COMPETITION IN SERVICES.	SELF REGULATED BY THE STATE OWNED MONOPOLY.	CONFORMS TO CCITT RECOMMENDATIONS AND CEPT STANDARDS.	LOW CORPORATE TAXES, WAIVERS ON IMPORT TAXES, LAND AVAILABLE TO FOREIGNERS.	STATE OWNERSHIP ONLY.	IMPROVE BASIC SERVICES QUALITY AND EFFICIENCY OF OPERATIONS FOR STATE MONOPOLY.	SATCC, PTA, SATA.
MALAWI	STATE MONOPOLY, NO COMPETITION IN SERVICES.	SELF REGULATED BY THE STATE OWNED MONOPOLY.	CONFORMS TO CCITT RECOMMENDATIONS AND CEPT STANDARDS.	DUTY DRAW-BACK, CAPITAL ALLOWANCES, REPATRIATION OF PROFITS AND DIVIDENDS, WORK PERMITS FOR EXPATRIATES	STATE OWNERSHIP ONLY.	DIGITALIZATION OF URBAN AREAS, INCREASE TELEPHONE PENETRATION IN RURAL AREAS.	SATCC, SATA, ITU, ARTC, RASCOM.
MOZAMBIQUE	STATE MONOPOLY FOR BASIC SERVICES; PRIVATE SECTOR COMPETITION FOR ENHANCED SERVICES.	REGULATION BY INDEPENDENT REGULATORY BODY.	CONFORMS TO CCITT RECOMMENDATIONS AND CEPT STANDARDS.	NEW LEGISLATION PROMOTES FOREIGN INVESTMENT IN PRIVATIZATION PROCESS INCLUDING JOINT VENTURES.	JOINT VENTURES WITH THE PRIVATE SECTOR.	IMPROVE EFFICIENCIES VIA JOINT VENTURES. INCREASE RURAL SERVICES VIA SATELLITES.	SATCC, SATA, PATU, ITU.
NAMIBIA	STATE MONOPOLY, NO COMPETITION IN SERVICES.	REGULATION BY INDEPENDENT REGULATORY BODY.	CONFORMS TO CCITT RECOMMENDATIONS AND CEPT STANDARDS.	IMPLEMENTED LIBERAL FOREIGN INVESTMENT POLICIES, BUT POLICIES FOR NEW LAW STILL UNDER CONSIDERATION	STATE OWNERSHIP ONLY.	COMMERCIALIZATION OF INTERNATIONAL SERVICES TO REDUCE DEPENDENCY FROM RSA.	SATCC
SOUTH AFRICA	STATE MONOPOLY, NO COMPETITION IN SERVICES.	REGULATION BY INDEPENDENT REGULATORY BODY.	CONFORMS TO CCITT RECOMMENDATIONS AND CEPT STANDARDS.	FOREIGNERS OBTAIN FAVORABLE EXCHANGE RATES TO ATTRACT FOREIGN CAPITAL BUT AT LOWER RATES FOR REPATRIATIONS.	STATE OWNERSHIP ONLY.	LIBERALIZE SECTOR, ALLOW COMPETITION, SATISFY BUSINESS COMMUNITY AND EXPAND SERVICES TO RURAL AREAS.	NONE.
SWAZILAND	STATE MONOPOLY, NO COMPETITION IN SERVICES.	SELF REGULATED BY THE STATE OWNED MONOPOLY.	CONFORMS TO CCITT RECOMMENDATIONS AND CEPT STANDARDS.	NO DETAILED INFORMATION AVAILABLE AT TIME OF WRITING OF THIS TABLE.	STATE OWNERSHIP ONLY.	INCREASE AVAILABILITY OF URBAN AND RURAL SERVICES.	SATCC, SATA, PANAFTEL, ARTC, PATU.
TANZANIA	STATE MONOPOLY, NO COMPETITION IN SERVICES.	SELF REGULATED BY THE STATE OWNED MONOPOLY.	CONFORMS TO CCITT RECOMMENDATIONS AND CEPT STANDARDS.	INVESTMENT CODE 1990 ENCOURAGES FOREIGN INVESTORS. INVESTMENT PROMOTION CENTER ESTABLISHED	STATE OWNERSHIP ONLY.	PROVIDE HIGH QUALITY SERVICES AT AFFORDABLE TARIFFS THROUGHOUT THE COUNTRY.	PATU, PANAFTEL, ITU, SATA, SATCC.
ZAMBIA	NEW PRIVATE MONOPOLY LAW FOR BASIC SERVICES; PRIVATE SECTOR COMPETITION FOR ENHANCED SERVICES.	CURRENTLY SELF REGULATED BY MONOPOLY. PLANNED INDEPENDENT BODY.	CONFORMS TO CCITT RECOMMENDATIONS AND CEPT STANDARDS.	NEW PRIVATIZATION LAW PROVIDES INCENTIVES FOR FOREIGN INVESTORS IN TELECOMMUNICATIONS.	PRIVATIZATION OF ALL TELECOM SERVICES.	DOUBLE LEVEL OF PENETRATION BY THE YEAR 2000 VIA PRIVATIZATION OF THE STATE MONOPOLY.	SATA, RASCOM, ITU, SATCC.
ZIMBABWE	STATE MONOPOLY, NO COMPETITION IN SERVICES.	SELF REGULATED BY THE STATE OWNED MONOPOLY.	CONFORMS TO CCITT RECOMMENDATIONS AND CEPT STANDARDS.	UNAVAILABILITY OF HARD CURRENCY AND ASSOCIATED CURRENCY RESTRICTIONS ARE BARRIERS TO FOREIGN INVESTORS.	STATE OWNERSHIP ONLY.	IMPROVE THE NETWORK OF EXISTING SUBSCRIBERS FIRST, THEN EXPAND TO NEW SUBSCRIBERS.	SATA, RASCOM, SATCC, ITU.

Exhibit 6-1 Summary of key policy issues regarding the telecommunications sector in the SADC Region.

non-wireline services, Zambia and Mozambique are the only two countries that allow competition and private sector participation for these services. Therefore, in all countries, with the exception of Zambia, new legislation will be required in order to allow private sector participation for all services (excluding management contracts) in the SADC Region.

6.2.2 Frequency Allocation and Licensing

Regarding frequency allocation and licensing of service providers, there is no one consistent policy in the SADC Region. There are four countries which provide regulation via an independent body and one that is planning to do so. These are Angola, Mozambique, Namibia, South Africa, and in the future Zambia. It is essential to separate frequency allocation and licensing from the main monopoly in order to allow for fair competition by the private sector in the telecommunications sector. The decision to do so is in the hands of each government that has not yet separated regulation from the main monopoly provider.

6.2.3 Technical Compatibility

In general, all telecommunications services providers comply with CCITT recommendations. With the exception of the U.S. and Japan, most countries follow the European CEPT standards. This is the case for the telecommunications service providers in the SADC Region. The CCITT recommendations include the US, European and Japanese standards. In the case of new technologies, such as digital cellular services where competing standards have not yet been implemented in large scales, the choice of standards is left to the individual countries. The danger of new technologies in a region like SADC is that the proliferation of different standards will not promote economies of scale or the deployment of regional networks (i.e. regional cellular networks). It is recommended that the region should coordinate the selection of all new technology based services through an organization like SATCC. The selection of a standard is very important to private sector participants. This is even more of an issue within an individual country as competing and complementary networks need to be connected with each other. It is very easy to exclude a certain type of technology from any given region of the world if the selection of a standard is not used in that region.

6.2.4 Foreign Investment Laws

The SADC region has a large variance of policies regarding foreign investment laws. However, most of the countries in the SADC region have established laws to provide incentives to foreign investors. The exceptions are Angola and Zimbabwe. However, each country has different policies and incentives to attract the private sector.

6.2.5 Equity Policies

In regards to equity policies, most governments in the SADC region still regard the telecommunications sector as a strategic resource to the government and are reluctant to allow private sector participation in the telecommunications sector. The exception to this are Mozambique and Zambia. Mozambique allows equity participation by the private sector in all enhanced services. Zambia will privatize the state owned telecommunications monopoly. This policy decision is crucial if there is to be any significant private sector participation in the telecommunications sector in the SADC Region.

6.2.6 Sector Policies

Sector policies in the SADC Region varies from country to country, as can be observed in Exhibit 6-1. In the case of Angola and Mozambique, the main objective is to provide basic services despite the inherent problems resulting from civil war. The way each is approaching these objectives, however is very different. Angola is not planning for any private sector participation while Mozambique is allowing it for enhanced services. In the case of RSA, the policy is to provide the best available services to business while at the same time expand services to rural areas. In the countries surrounding RSA, Namibia, Lesotho and Swaziland, the objective is to improve the availability and quality of basic services while at the same time reduce the dependence of traffic flowing via RSA networks. With the exception of Zambia and Mozambique, however, the policy is to implement these policies via state owned enterprises.

6.2.7 Ties to Regional Organizations

With the exception of RSA, all of these countries are members of SATCC. Most of them are also members of SATA and are expected to also become members of RASCOM, the new regional association of satellite based services which intents to launch a satellite by the year 1997. It is important for these countries to coordinate with each other the implementation of regional networks and of new services. This is even more important for the private sector as the normalization of policies, standards and technology provide incentives to the private sector to invest in more than one country and take advantage of larger markets by gaining efficiencies through economies of scales.

6.3 INFORMATION REQUIREMENTS FOR THE PRIVATE SECTOR

In previous Sections, several items were identified as key issues considered by the private sector in making telecommunications investment decisions in developing countries. These include general conditions of a particular country, the current and planned regulatory framework, as well as specific conditions relating to investments in the telecommunications

industry.

6.3.1 General Conditions on a Country Basis and for the SADC Region

In general, private sector investors have similar types of concerns which do not dependent on the type of industry under consideration. Relating to telecommunications, these include:

- **Low Direct Labor Costs** - Investors in the SADC Region will require knowledge of the labor costs in the telecommunications field. In the case of privatization, the inefficiencies relating to the high number of employees in the telephone companies in the region will probably be a concern when investment decisions are required. The issue of labor contracts will be an important action item for any potential investor.

- **Well Educated Pool of Labor** - Investors will want to have an appreciation of the skilled labor pool available in a given SADC country and in the Region. U.S. investors have difficulties in relocating human resources to developing countries for long periods of time. This will probably be the case for the SADC Region. It should be noted that europeans have shown not to have much difficulty in relocating employees to developing countries, specially to Africa and the SADC Region.

- **Country risk** - Inadequate information on general political, economic and industry specific risks is probably the main reason why the SADC region is viewed as a high risk area. U.S. investors view country risks as one of the most important indicators in making investment decisions in developing countries.

- **Market Size** - Another important consideration for private sector investors is the size of the market. Most investors are aware of the large market potentials in the RSA. However, the SADC Region is not generally known as a particularly large market. It will be very important for investors to obtain accurate and reliable information regarding the market potentials in all areas of the telecommunications industry.

- **Levels of Foreign Investment** - The level of foreign investment in the region is viewed as an indicator on how "friendly" a host country is to foreign private investors ("success breeds success"). This is probably more true for U.S investors. When a U.S. investor arrives in the region, the level of U.S. investment versus European, Japanese, or local investors is the first impression he or she will obtain. This first impression will probably be a

factor in determining investment decisions in the region. For U.S. investors, it is expensive to visit the area before any significant opportunity becomes available. Therefore, it will be important to provide these potential investors as much information on this and other characteristics of the Region.

- **Quality of Infrastructure** - For most private sector investors, the quality of infrastructure is very important. U.S. investors are used to reliable communications, widely available air, road, and marine transportation as well as comfortable hotel accommodations. For example, when Poland become attractive for U.S. investors, the Warsaw Marriott become the "business center" for most investors in all industries, including telecommunications. Daily flights to Warsaw have became common from several U.S. cities. U.S. investment, including telecommunications, in Poland has increased significantly since 1990 (over US$1 billion in telecommunications). Although it is difficult to determine how much did the quality of infrastructure influenced U.S. investors, it can be concluded that it was a principal facilitator in closing business agreements.

6.3.2 Information on Regulation

Information on laws and regulation is one of the first items private sector investors seek when contemplating investment in a developing country. This is the case in the SADC region. The basic information required includes:

- **Telecommunications Law** - Most countries have an existing law that designates the state as the only entity allowed to own and operate telecommunications infrastructure and services. In some countries, the laws are currently under modification to allow for privatization or some sort of private sector participation. Investors will need the latest copy of the telecommunications law and other related regulations, a copy of the proposed changes, an assessment of probable outcomes to these proposed changes.
- **Frequency Allocation** - Private sector investors require information on existing frequency allocations and plans for modifications. New services usually require new frequency allocation and sometimes reallocation of existing frequencies. Investors also seek information on frequency monitoring capabilities where they are contemplating investment in specific countries.

- **Technical Standards** - Local technical standards are very important to private sector investors. The SADC region has traditional adopted technical standards utilized by vendors from donor countries. Fortunately, the world has formalized and established telecommunications standards which are

applicable to all nations. The U.S. has its own standards but complies with international standards when crossing borders to other nations. However, for new services, such as cellular and PCN technology, technical and operating standards have not yet been fully established. The U.S. industry currently has a competing cellular standard proposed by the European Community. It is important to provide information regarding proposed standards for new services in the Region.

- **Foreign Investment Laws** - This is another important information required by private sector investors. The law is used in determining the ivestment risk for a given country. It is important to provide interested investors with information on the laws of the SADC region as well as the RSA.

- **Government Policies** - The current and expected government policies for the countries in the Region and in the RSA are important to potential investors. In light of the changing dynamics of the in Region and the RSA, this issue becomes very important factor in making an initial assessment to invest in the telecommunications sector. For example, in the RSA, investors need to asses the policies promoted by the ANC. Any changes to current policies will affect the country's investment risk (up or down).

- **Regulatory Structure** - In most countries in the Region, governments need to restructure their ministries or departments overseeing communications as well as their state owned telephone companies before privatization and/or liberalization can occur. First, regulation and operations need to be separated from the state owned monopolistic telephone company. Second, the telephone company needs to became autonomous and market oriented so that its activities, capital requirements, and earnings are not tied to the state's operations and budget. Autonomy is required in the case of privatization and when competition is allowed in order to separate regulatory functions from the monopoly and keep them in the hands of the government. Most investors will not invest in a country if the regulatory framework is not clearly defined. This is an area where the World Bank is actively involved in and where USAID can contribute in the future.

6.3.3 Information on Opportunities and Other Constraints

In addition to general and regulatory information, private sector investors require information on market opportunities and other constrains that may affect potential investment results. The type of information that should be provided to private investors, including those from the U.S., should be matched to their primary industry objectives.

These interests include:

- **Large Revenue Growth Potential** - Exporting U.S. telecommunications goods and services to markets that offer large revenue growth potentials. In many countries in the region, the large unsatisfied demand for basic telephone services represent a large revenue growth potential for the 1990s (relative to the initial investment).

- **Efficiency Gains** - The introduction of new qualified management, improved operations methodologies, and rapid deployment of new technology and services can improve efficiencies significantly to the point that a privatized phone company can become more profitable even before any new network expansion is materialized.

- **Investment Opportunities** - Information on opportunities in privatization of state owned telephone networks as well as other basic and enhanced services are of interest to investors. A short term (under a year), medium and long term assessment of investment opportunities will help the privates sector in evaluating its commitment to participation in the Region. Opportunities in basic services such as cellular as well as other enhanced services (i.e. VSATs, teleports, data communications) are of special interest to small and medium size U.S. business and entrepreneurs. Timely dissemination of investment opportunities to U.S. investors will be important in contributing to the success of any USAID initiative in the Region's telecommunications sector.

Information on additional constrains on potential private sector investors include:

- **Political and Labor Union Opposition** - When contemplating private sector participation in telecommunications, most developing countries face opposition from political fronts as well as from labor unions. This will probably be the case for the SADC Region. In the RSA, the ANC opposes private sector participation in telecommunications. This fact alone has already repelled potential U.S. investors in telecommunications from the RSA

- **Availability of Financing** - As mentioned in Section IV, insufficient availability of financing for telecommunications projects around the world creates an additional constraint to potential investors. Although debt and equity financing is possible for the Region, other regions of the world present more attractive returns for investors and financial institutions. Information on available financing for telecommunications projects in the SADC region is of

great importance to U.S. and other private sector investors.

6.4 TELECOMMUNICATIONS TECHNOLOGY OPTIONS FOR SADC REGION

The development of this study has been relatively independent of the type of telecommunications technology that is in use or could be used in the SADC Region. This Section analyzes the array of technological options that provide cost effective and appropriate means to address the region's demand shortfalls identified in this study.

6.4.1 Regional Characteristics Affecting the Choice of Technology

Most of the installed telecommunications infrastructure in the region is located in the major cities. It is in the large cities that switches and outside plant equipment are installed, serving residential areas and the lucrative business and government clients. However, the region is characterized by having a large rural population, about 2/3 of the total population, as depicted in Exhibit 6-2.

RURAL POPULATION IN THE SADC REGION
1986-90 INDICATORS

COUNTRY	URBAN POP. % OF ALL POP.	RURAL POP. % OF ALL POP.	TOTAL POP GROWTH	RURAL POP GROWTH
ANGOLA	29.1%	70.9%	2.8%	5.4%
BOTSWANA	23.6%	76.4%	3.2%	8.7%
LESOTHO	20.3%	79.7%	2.8%	6.4%
MALAWI	14.8%	85.2%	3.4%	5.8%
MOZAMBIQUE	26.8%	73.2%	2.8%	8.7%
NAMIBIA	57.0%	43.0%	3.2%	5.1%
RSA	58.5%	41.5%	2.6%	3.7%
SWAZILAND	33.1%	66.9%	3.5%	7.8%
TANZANIA	32.8%	67.2%	3.0%	8.5%
ZAMBIA	55.6%	44.4%	3.8%	5.8%
ZIMBABWE	27.6%	72.4%	3.1%	5.2%
AVE. EXCL. RSA	32.1%	67.9%	3.2%	6.7%
AVE. INCL. RSA	34.5%	65.5%	3.1%	6.5%

Source: UNDP and The World Bank

Exhibit 6-2

The rural population is growing twice as fast as the urban population. With these demographic conditions, it is important to consider technologies that are cost effective in serving the rural population, not just those in urban areas.

Other constraints affecting the region (except RSA) are that economies are generally poor, demand satisfaction is among the lowest in the world, and not enough capital is available to upgrade the existing telecommunications infrastructure. With these constraints, the following provides a brief description of technologies that are available to provide basic telecommunications services to the area.

6.4.2 Available Technology for Basic Services in Rural Areas

The most attractive technologies available to serve rural areas are those based on non-wireline technology, utilizing the natural frequency spectrum resources. These include satellite, cellular, and multi-access radio. With satellites, remote areas can be rapidly accessed with relative independence of transmission costs. Once a signal is received in a remote area, multi-access radio or cellular networks can be used to distribute the signal to the end user. Before the end of the decade, cellular technology will be complemented by personal communications systems (PCS) or mobile satellite telephones receiving signals directly from a satellite. This combination of technologies provides the following advantages and benefits:

- Allow for fast deployment of services. Satellite links via domestic satellite services (DOMSAT) or other regional services provide transmission to any part of the country at low costs with minimum installation delays (measured in weeks or months instead of years with conventional wireline networks).

- Once a signal is received in a hub established in a rural village or town, a small cellular system may be installed economically and quickly to provide basic telephone services.

- In low density population areas, multi-access radio systems may be installed in conjunctions with public telephones to allow economic access to basic services by any party.

- In very isolated areas where no significant population densities and telecommunications infrastructure exist but communications must be established, mobile satellite terminals can be used to provide temporary (i.e. for emergency purposes) or more permanent communications (oil companies).

- For business and government traffic requirements, digital services utilizing very small aperture terminals (VSAT) networks provide data connectivity to any part of the country at low installation and operations costs.

6.4.3 Available Technology for Basic Services in Urban Areas:

For the Region's main urban areas, traditional telecommunications network technologies and topologies can be used to expand existing telecommunications networks. For these type of areas, the following strategies may be followed:

- Install all future telephone switches utilizing digital technology.

- Expand the local distribution network utilizing conventional copper technology as well as fiber optic links and rings between switching centers to provide low cost connectivity between the switches and at the same time servicing broadband data requirements to business users. This type of network is called a wireline network.

- Install cellular and future PCS networks to rapidly deploy voice and low data rate requirements to residential and business customers to complement the expansion of the wireline network. The cost of this wireless network is comparable to the cost of a wireline network on a per user basis. The low entry barriers for this type of network is ideally suited for private sector participation.

- The installation data networks to serve business and government clients via packet switches based on CCITT X.25 recommendations is also ideally suited for private sector participation due to the nature of the clients and the relatively low investment requirements.

- In the future, the deployment of new technologies that provide data connectivity via the public switched network directly to end user (Frame Relay, Asynchronous Transfer Mode (ATM) and ISDN) will eliminate the need for specialized X.25 data networks. These technologies, however are relatively new and will probably take until the end of this decade before the first deployment in the SADC region occur.

- Expansion of intra-regional networks should continue utilizing digital microwave, fiber optics and satellite systems where traffic patterns and density conditions merit them.

An illustration of a sample network based on the above recommendations is shown in Exhibit 6-3.

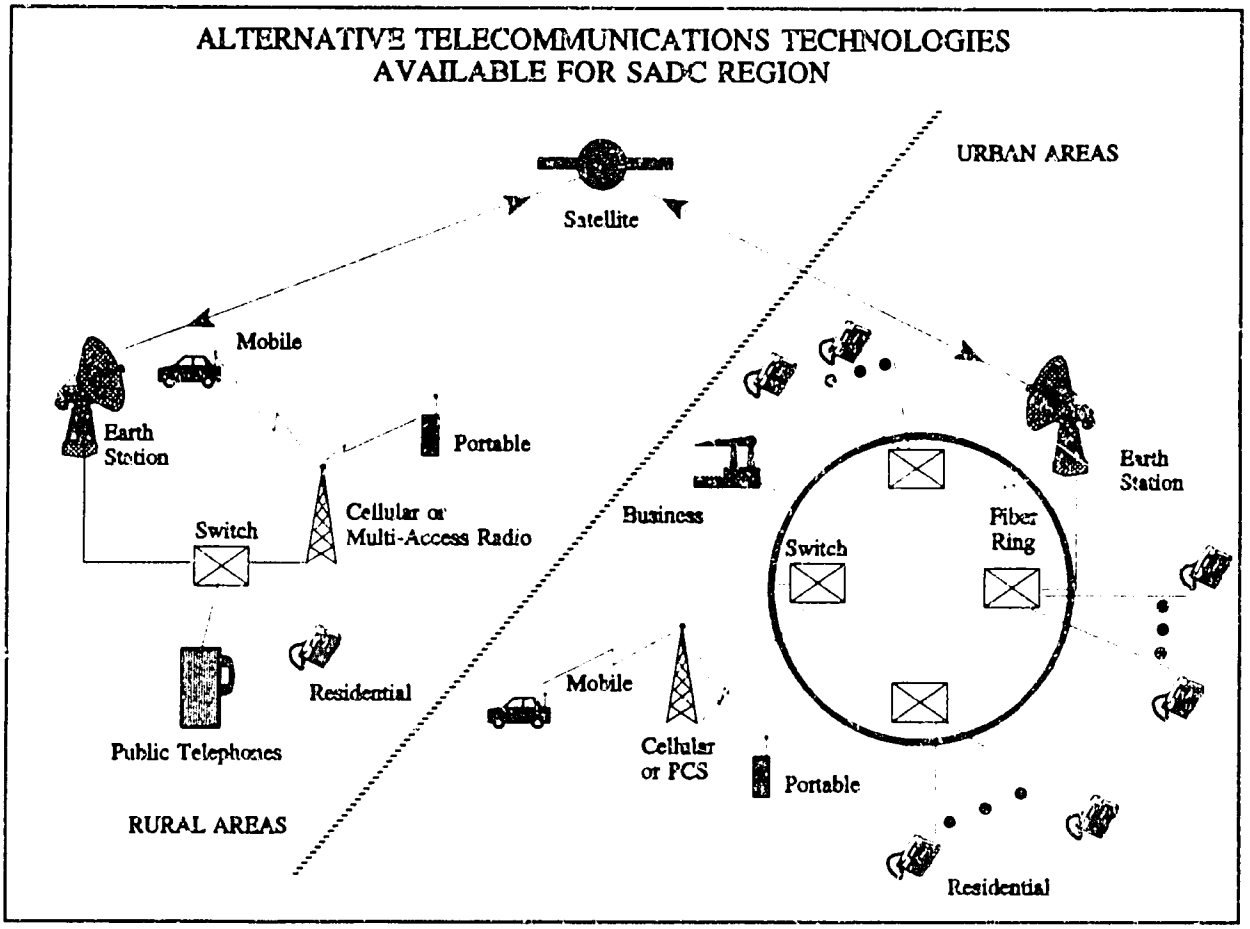

Exhibit 6-3 Alternative Telecommunications Technologies Available for the SADC Region

6.5 INVESTMENT INCENTIVES

There are a number of means which USAID and other financing institutions can mitigate the risks factors that hinder U.S. and other private sector involvement. Among the policy responses or programs that may facilitate private sector participation are:

- Providing technical assistance to host countries in restructuring state owned telecommunications entities in a manner that foster competition, and new services, e.g. franchising schemes.

- Providing technical assistance for privatization of existing state owned and

operated telecommunications entities or other telecommunication service providers.

- Promotion of the Region's market opportunities via trade and reverse trade missions, project evaluation, corporate technical exchanges, and trade organization representation.

- Provide or facilitate debt, equity or financing guarantees for host country projects in which U.S. private sector entrants are participating.

These options can be effective, particularly in the context of refocusing the activities of the host country's PTT, the backbone of any country's telecommunications industry. The options outlined above are well-suited to encourage involvement of the more entrepreneurial elements of the U.S. telecommunications sector.

There are substantial barriers, however, to entry into the SADC markets. Many of the U.S. private sector investors are too small or otherwise not inclined to enter markets like those of the SADC Region as a consequence of the perceived political, regulatory and commercial risks of financing telecommunications ventures independently and of the substantial expense involved in risk assessment and risk management. These U.S. companies require access to capital information and insurance on a basis that will allow them to match the financial returns available in other markets.

The following expands on each of the above options:

6.5.1 Technical and Regulatory Assistance

USAID has been providing worldwide technical assistance in telecommunications for many years (see Section V). In the SADC Region, governments and their respective state owned telecommunications entities have been assisted be the europeans for many years. Key technical positions within PTTs have been funded by bilateral donors. The results have shown that European equipment dominates the market place. With this scheme, U.S. businesses have not had much success in the past. For this reason, it is important for USAID to provide technical assistance to host countries in restructuring state owned telecommunications entities in a manner that foster competition, and new services, e.g. franchising schemes.

The promotion of competition, new services, and restructuring telecommunications entities would provide a level field for U.S. businesses. Allowing competition in the sector would diversify the decision making process for purchases of telecommunications equipment. Likewise, the introduction of new services would provide new opportunities for U.S.

business, specially for those services requiring new technology in which the U.S. industry has a competitive edge over european and japanese counterparts (i.e cellular, VSATS, data communications).

In the area of privatization, multilateral institutions led by the World Bank have been providing technical assistance around the world for the privatization of state owned telecommunications entities. It is important to have U.S. policy makers to provide advise on regulatory matters. In recent privatizations, U.S. based legal and technical advisors have had success in assisting foreign governments. In the SADC region, however, european advisors are better known to the market place. Having U.S. based companies provide legal and technical assistance in privatization helps remove some of the barriers for U.S. investors.

6.5.2 Promote Regional Market

Although some interest has been expressed by U.S. based telecommunications operators in the RSA, the SADC Region is at the moment not in the forefront of the mind of U.S. investors and businesses. Other areas of the world are currently undergoing telecommunications restructuring, privatization, and introducing new telecommunications services. These include Latin America, Central and Eastern Europe, the former Soviet Republics (CIS), ASIA, and even the countries from the European Community.

Several programs have been introduced to promote these other regions. More importantly, the political will to restructure their industry base, including telecommunications, has made U.S., european and japanese investors take a serious look at the opportunities presented. The World Bank and other multilateral institutions have proceeded in providing technical assistance and financing to restructure the telecommunications sector. Furthermore, government officials in these countries are constantly visiting U.S. and european institutions in order to learn from the experiences of countries that have already privatized or restructured their telecommunications sector. Investors track these programs early in the planning stage many months or years before privatizations and new franchised are opened for public bidding.

In some cases, special programs have been instituted to provide incentives and promote markets to potential investors. In the U.S., the Trade and Development Agency dedicates resources for reverse trade missions by providing grants to foreign governments to pay for their trips and expenses while they visit U.S. telecommunications operators and manufacturers. OPIC has periodic trade missions for U.S. industry members to visit foreign countries in order to promote certain investment opportunities among potential U.S. investors.

USAID recently started the Capital Development Initiative for Central and Eastern Europe. The Initiative provides technical assistance and matching grants to the U.S. private sector for feasibility studies. The initiative includes a market promotion programs to bring potential investing opportunities to the U.S. telecommunications industry. The Initiative also promotes projects among financing institutions such as the IFC, TDA, and other bilateral and multinational financing institutions.

Promoting the Region will be essential in bringing opportunities to the attention of U.S. investors. The region should be treated like a product that needs to be marketed before it can be sold. In Mexico and Argentina, for example, privatization opportunities were of great interest to U.S. investors. These two countries have had a their markets promoted in the U.S. for many years. A privatization opportunity in Botswana or Zimbabwe, for example, will require additional promotional efforts to bring the opportunities to the attention of U.S. investors. Potential U.S. investors need to have knowledge of opportunities as well as the opportunity to meet with decision makers in those countries (i.e. reverse trade missions).

6.5.3 Financing Assistance

Due to the shortage for available funds to finance telecommunications projects around the world, the SADC Region will need to seek creative ways for financing its telecommunications infrastructure. In addition to internally generated funds, the Region currently works with multinational institutions such as the World Bank, the African Development Bank and Fund as well as a number of bilateral institutions. Unfortunately, both internal and external generated funds are not sufficient to cover the required capital requirements.

Private sector participation provides an alternative source of financing requirements. Debt, equity and lease financing from the private sector can be used to complement or replace conventional financing for public telecommunications entities. Unfortunately, the private sector itself needs incentives to reduce the commercial risks inherent in the Region. To incentivate the U.S. private sector, the region needs additional financing vehicles for risk reduction. These may include:

- **Telecommunications Seed Fund** - A US Government supported fund would automatically provide incentives to U.S. investors when considering potential telecommunications projects in the SADC Region. With a seed fund, the perceived risks for the region would be reduced to manageable levels. A proposal for a SADC Telecommunications Fund (the "Fund") is presented in Annex VI.1.

- **Pre-investment Grants** - Many private investors are hesitant to spend marketing resources in projects located in high risk areas. U.S. investors would seriously investigate investment opportunities in the SADC Region if the U.S. Government would provide matching grants for pre-investment feasibility studies. This is similar to grants already provided by USAID with its Capital Development Initiative in Central and Eastern Europe.

- **Risk Insurance** - The provision of risk insurance is another incentive that could attract potential U.S. investors to the region. Programs similar to those provided by OPIC for political and currency convertibility insurance should be re-enforced for the SADC Region. Although risk insurance may be provided by existing specialized U.S. Government organizations, the establishment of a specialized regional office to serve the SADC region would provide additional incentives to the U.S. private sector because this office would have first hand knowledge of the conditions in the SADC Region.

The main effect from financial incentives is to reduce investor's commercial risks in potential private sector telecommunications projects. This type of incentives already exist in Eastern and Central Europe and other regions of the world (USAID's CDI; OPIC, TDA, IFC).

6.6 NEXT STEPS FOR USAID

In several of the preceding Sections, the involvement of the private sector in the telecommunications industry worldwide has been reviewed. Likewise, the primary objectives for USAID involvement in the telecommunications sector has been summarized.

By way of review, a broad list of AID objectives justifying the creation of incentives for the private sector participation in the SADC region are:

Economic

- Promotion of a market economy
- Stimulating competitiveness and productivity
- Supporting indigenous business development
- Increasing foreign exchange earnings
- Supporting U.S. business interests
- Stimulating the export of U.S. telecommunications equipment and services into the SADC Region
- Facilitating U.S. private sector investment

Social and Political

- Integration of host country and region
- Establishing a modern telecommunications infrastructure to facilitate efficient, and wide-spread delivery of information which has been determined to be a necessary condition for sustained economic growth (Section II).

A summary of key objectives for the U.S. telecommunications private sector's involvement in the SADC region have been reviewed previously in this Section. As the foregoing demonstrates, the objectives of USAID and the U.S. private sector are highly correlated in terms of telecommunications in the SADC Region. There are political or competitive issues, however, that can inhibit private sector involvement in the Region. These have also been summarized in this Section and in Section IV.

In order to promote the interests of the U.S. private sector in the SADC Region, Teleconsult recommends that USAID create a U.S. private sector incentive program for a minimum of two years. This program would provide financial, technical, and legal assistance in assessing opportunities for private sector participation in telecommunications. The program would also provide financial assistance to qualified U.S. investors. Exhibit 6-4 illustrates the structure of this program.

USAID would dedicate a Program Manager responsible for implementing and operating the program. Reporting to the Program Manager, the proposed structure would have a team of legal, technical and financial advisors. The Program Manager would report to the USAID Southern Africa Regional office in Harare, Zimbabwe. The location of the program, however should be in Maputo, Mozambique, next to the SATCC offices. The main functions to be performed by the Program are:

Legal Advise

- Advise host governments in the creation of new telecommunications laws
- Advise host governments in the formulation of new regulations.
- Advise host governments in restructuring their state owned and operated telecommunications entities.
- Advise U.S. investors on implications of existing and proposed laws as well as on the regulatory environment in the Region and in specific countries of interests.

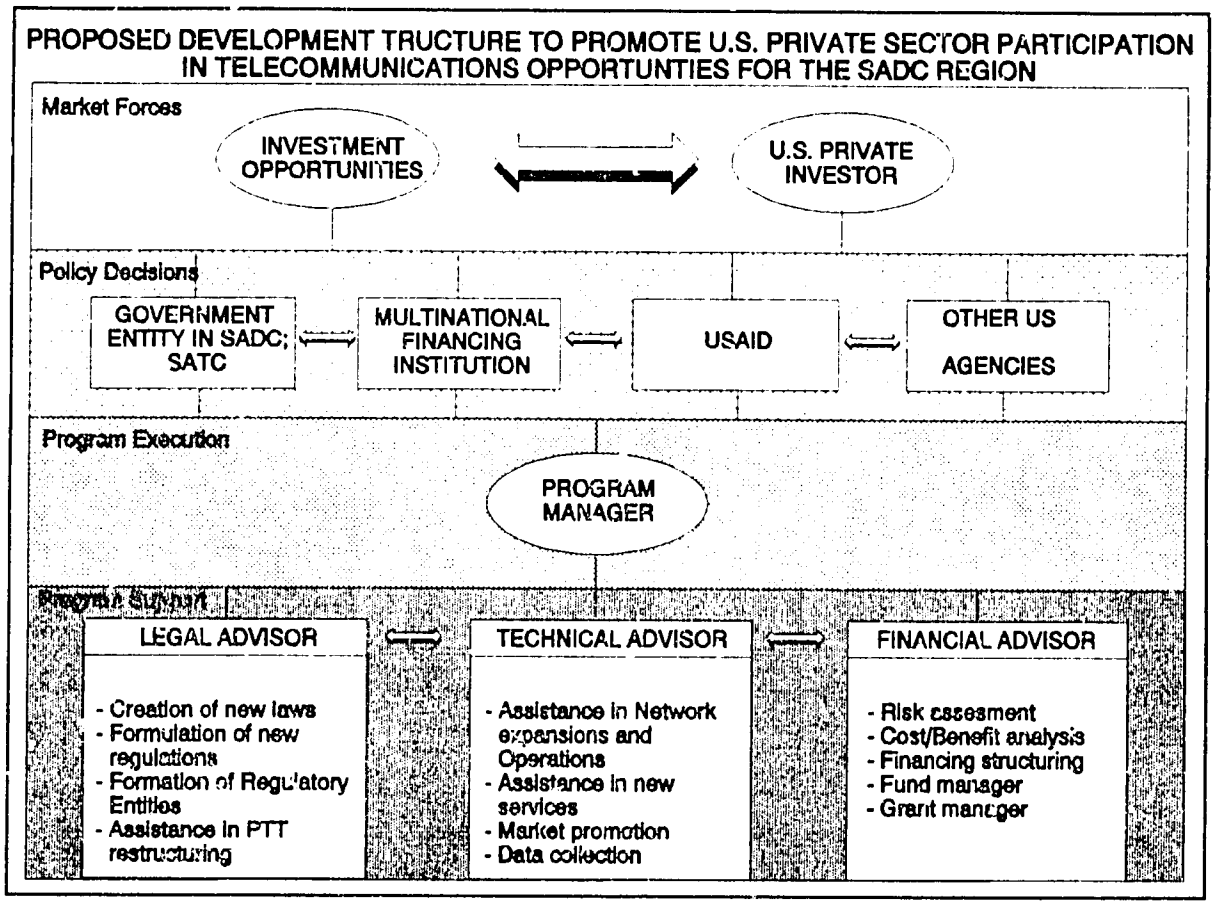

Exhibit 6-4 Structure of Proposed USAID Incentive Program to Promote U.S. Private Sector Participation in the SADC Region.

Technical Advise

- Provide assistance to host governments and private sector participants in the expansion of current infrastructure and the creation of new services and their respective infrastructure.

- Promote the Region and potential investment opportunities to U.S. investors. This would include trade and reverse trade missions, promotional publications, and issuance of public tenders via U.S. based publications (i.e. Commerce Business Daily).

- Continuously gather necessary data for use by the U.S. private sector to make investment decisions in the Region. These include economic, technical, and legal information as well as relevant and useful market intelligence.

Financial Management and Advise

- Provide risk assessment on a country and regional basis as well as on specific investment opportunities for the U.S. private sector.

- Provide cost benefit analysis to the U.S. private sector for project specific opportunities. Analysis should also include refining of macro and micro economic models relating telecommunications investments to growth in the economy (see Section II).

- Design financing structures on a project specific basis. Utilization of the Program's funds will be considered. These include the use of pre-investment technical assistance grants and the SADC Telecommunications Fund (Annex VI-1).

- Management of matching funds as well as of dedicated funds from the SADC Telecommunications Fund. Initial recommended funding is to dedicate US$10 million to the Fund. Leveraging this Fund with sources from other financing institutions (i.e. IFC, African Development Bank/Fund) and the private sector could generate funding in the order of US$50 million to $100 million for use by the private sector. Matching grants should be limited to under US$500,000, similar to those of USAID's Capital Development Initiative. Grant limits should be modified appropriately as experience is gathered in the program.

In order to implement the proposed program, it will be necessary to establish the Program and the SADC Telecommunications Fund. Teleconsult proposes that Phase Two of this scoping study be used to design the details of the Program. A draft scope of work for Phase Two is included in Annex VI.2. The estimated costs for setting up the program (Phase Two) and for implementing the program are shown in Exhibits 6-5 and 6-6. Phase II is estimated to cost approximately US$650,000 over a four to six months period. The Program cost is estimated at about US$3 million over a two year period. Including the US$10 million required for the SADC Telecommunications Fund, the proposed budget for USAID's private sector incentive program is estimated at about US$13,650,000 over a two and one half year period.

	BUDGET FOR AID PRIVATE SECTOR INCENTIVE PROGRAM					
			COST PER	NUMB ER	NUMB ER OF	TOTAL
POSITION			MONTH	OF ADV/ MO.	MONT HS	COST
PROGRAM ADVISOR			32,175	1.0	4	128,700
LEGAL ADVISOR			32,933	1.0	4	131,733
TECHNICAL ADVISOR			18,590	1.0	4	74,360
FINANCIAL ADVISOR			28,600	2.0	4	228,800

						563,593
OPERATING EXPENSES:			15%			86,407

						650,000
						= = = = =
			Exhibit 6-5			

AID PROGRAM COST:						
			COST PER	NUMB ER	NUMB ER OF	TOTAL
POSITION			MONTH	OF ADV/ MO.	MONT HS	COST
PROGRAM ADVISOR			32,175	1.0	24	772,200
LEGAL ADVISOR			32,933	1.0	12	395,200
TECHNICAL ADVISOR			18,590	2.0	18	669,240
FINANCIAL ADVISOR			28,600	1.0	24	686,400
LOCAL ADVISORS			2,000	3.0	24	144,000

						2,667,040
OPERATING EXPENSES:			15%			399,960

						3,067,000
			Exhibit 6-6			= = = = =

ANNEX VI.1

TELECOMMUNICATIONS SECTOR SCOPING STUDY FOR SOUTHERN AFRICA - PHASE ONE

SECTION VI

PROPOSAL FOR A SADC TELECOMMUNICATIONS FUND

PROPOSAL FOR A SADC TELECOMMUNICATIONS FUND

New, innovative and more efficient financing vehicles that combine public and private financing techniques need to be created in a manner that will reduce the barriers to the private sector entering the telecommunications market in the SADC Region. The financing vehicles suggested in this Annex contemplate using the human and financial resources currently expended by USAID in a manner that encourages the participation of the U.S. private sector. The financing vehicles outlined below would seek to:

- Develop creative sector financing strategies that address the specific opportunities, structural problems, and market conditions identified previously.

- Partially offset the current capital shortage by efficiently directing publicly funded technical assistance and risk management programs towards support of private sector financing.

- Coordinating closely with SATCC, USAID, OPIC, TDA and other public and multilateral agencies responsible for financially supporting initiatives in the region in a more coordinated manner.

Initially, the financing vehicles contemplated would require a capitalization from USAID. The Agency, would, however have a market-based performance criteria and private management techniques which would allow the fund to invest directly in promising private telecommunications projects and enhance their acceptability by the U.S. private sector community.

One such vehicle could be a SADC Telecommunications Fund (the "Fund"). This equity investment fund would be set up with an investment manager ("Investment Manager" or Financial Advisor) and report to a board of directors which could be composed of a variety of public and private entities acceptable to the Fund's investors. The Investment Manager would manage the Fund and would coordinate with USAID and others to identify telecommunications projects meriting private sector participation.

Specifically, the Fund would identify telecommunications projects in a host country that merit evaluation for investment purposes. A project may originate from USAID, the host country's government or PTT, new indigenous entrepreneurs, or the Fund itself. Ideally, the Fund would be invited to evaluate opportunities that USAID or other parties with broad view of the host country's optimal objectives have concluded are meritorious. That way, the Fund can benefit from the technical and political analysis that was done by others and focus on what it will do best - evaluate a project's financial soundness and its

ability to provide appropriate financial returns to itself and to private sector investors. What the Fund would do best is suggest financing structures and techniques that will promote economic efficiency and attract U.S. business and capital to the project.

Although the focus of the Fund would be on providing access to private sector capital, it would also help structure transactions in a way that would accommodate public sector mechanisms that reduce commercial or political risk, such as political risk insurance through OPIC, or MIGA; export credits from the U.S. Export-Import Bank; or co-financing with multilateral institutions such as the African Development Bank and Fund or the World Bank's IFC.

The Fund would focus on small-to-medium size telecommunications projects in the SADC region. For example, its investments could range from US$1 million to US$10 million. This range represents a significant commitment by a Fund of this nature and it will enhance a project's appeal to the private sector by the Fund investing in it.

The Fund's primary objective would be to co-invest with smaller U.S. goods and service providers or private U.S. financing groups interested in a wide range of equity and equity-related investment opportunities in telecommunications and telecommunications related ventures. Its goals would be to offer attractive returns (20-40%) and stimulate competition, productivity and better telecommunication services within the SADC Region. The Fund could invest in a number of diverse projects such as basic network expansion or digitalization, rural telephony projects, cellular and PCN systems, teleports, private networks, VSAT and satellite systems, fiber optic systems, specially mobil radio or trunking systems, and other telecommunications-related ventures. It could also take a "lead" in creating larger financing syndications with USAID and other public and private sources where the objective is a privatization of a PTT or major upgrading of a host country's telecommunications system; projects that would typically exceed the ability of the private sector to finance alone.

A portion of the Fund's resources could also be targeted at smaller more entrepreneurial projects requiring US$250,000 to US$5 million. The remaining portion of the portfolio's assets would ideally be invested in as part of a larger USAID development scheme where the Fund takes a role in those aspects of a development plan that meets its investment criteria.

The Fund would behave much like a private sector fund in that it would evaluate the following items making an investment in a project:

- The growth prospects of the market served and project in question;

- The project's competitive position in relevant markets;
- The quality and performance record of the potential U.S. partners(s) and the local host country management;
- The project's capital plan, financial resources, and the effects of the government regulatory and policy environment;*
- The company's profit margins and return on investment;
- The availability of suitable arrangements for liquidating the Fund's investment and realizing the expected return in convertible currency;*
- The political and economic environment of the host country and any target markets; including political risk issues, government monetary and fiscal policy, currency stability or convertibility, laws governing investment;* and
- The availability of OPIC insurance or other acceptable political risk mitigation structures.

* These are criteria about which private U.S. entities would find USAID uniquely qualified to formulate well informed opinions.

By behaving similar to a for-profit entity, the Fund would enhance its credibility in the private sector and more easily attract private sector companies to **co-invest** in the Region. This Fund would also offer the additional benefit of greatly multiplying the influence of whatever resources USAID has for stimulating development in this Region as it would have private dollars paralleling USAID's efforts. Moreover, it is recommended that the Fund invests in telecommunications projects where all the investing parties perceive a clear strategy for liquidating their investment. This would further stimulate private sector involvement and give USAID a means by which to re-invest previously committed resources in future years.

The **multiplier effect** of USAID's participation in the Fund would be further enhanced by limiting the Fund's participation to 20 to 30 percent of any projects in which it invests. The Fund should also cooperate closely with IFC and other bilateral and multinational financing agencies to coordinate closely with IFC and other bilateral and multinational financing agencies to coordinate financing of larger projects and further mitigate the private sector's perception of inappropriate risks. The Fund should act as a sophisticated lead investor which understands the country and regulatory risks associated with the project, which invests directly, and which can attract appropriate investment entities.

In summary, a Fund is an attractive financing vehicle which USAID can engage to incentivate the private sector involvement because the Fund will:

- **Reduce substantially the risk** perceived by the private sector in telecommunications projects in the SADC Region;

- Allow USAID to **multiply the effect of the resources** allocated to develop the telecommunications industries of the SADC Region as well as channel the direction of U.S. investment in the telecommunications industry;

- Improve significantly the **penetration of U.S. businesses** in the SADC region especially where U.S. providers have goods and services that can stimulate a host country's private sector and develop indigenous entrepreneurs.

ANNEX VI.2

TELECOMMUNICATIONS SECTOR SCOPING STUDY FOR SOUTHERN AFRICA - PHASE ONE

SECTION VI

DRAFT PROPOSAL FOR PHASE TWO SCOPING STUDY

DRAFT PROPOSAL FOR PHASE TWO SCOPING STUDY

The statement of work presented here is a follow up phase to the Telecommunications Scoping Study, Phase One, performed by Teleconsult Inc. and Price Waterhouse. The following four tasks comprise Phase Two of the Scoping Study:

Task 1 - Establish the policy objectives for an AID Private Sector Incentive Program (the "Program") for the SADC Region.

In this task, policy objectives that promote private sector participation, specially from those of the U.S. will be developed. these will include sector, regulatory and incentive policies as discussed in Section VI of the Phase One Scoping Study.

Task 2 - Establish a SADC Telecommunications Fund (the "Fund").

In this task, a detailed design of the Fund will be developed. This will take into account the Funds selection criteria, the mechanisms to capture international funds, as well as the legal, operational, and logistical requirements for the funds implementation.

Task 3 - Determine a preliminary selection of specific projects to be considered and promoted by the Program.

A comprehensive list of potential projects requiring private sector participation in the SADC Region shall be identified. This list shall conform to the objectives set forth in Tasks 1 and 2. This list will form the initial investment basket available to the Fund.

Task 4 - Determine detailed logistic requirements for implementation of the Program.

In this task, a detailed implementation plan will be developed. This will include detailed steps required to implement the Fund. It will also provide a detailed resources requirements as well as a detailed implementation schedule.

All of the Tasks will be undertaken in the U.S. with some of the work undertaken in several trips to Southern Africa.

The expected manpower requirements are as follows:

- 1 Program Manager for a period of 4 months.
- 1 Legal advisor for a period of 4 months.
- 1 Technical advisor for a period of 4 months.
- 2 Financial advisors for a period of 4 months.

The total estimated effort for Phase Two is 20 man-months over a four to six month period.

TELECOMMUNICATIONS SECTOR SCOPING STUDY FOR SOUTHERN AFRICA - PHASE ONE

SECTION VII - APPENDIX

GLOSSARY

GLOSSARY

Analog: Electrical signal carrying information content. Most telecommunications equipment manufactured before 1980 were analog based.

Bypass: When a (potential) customer uses alternative means of connection to the network rather than the traditional carrier as its provider.

Consumer's Surplus: The benefit derived by a consumer from the consumption of a good or service beyond what the customer paid for it.

Cost-based Pricing: Prices that are specifically related to cost associated with the production

DEL: Direct exchange line. Refers to an installed main line subscriber telephone.

Digital: Discrete samples of an analog signal. Digital based systems are less susceptible to noise impediments than analog signals. Digitalization allows for system integration and significant increases in transmission and switching capacity resulting in a reduction of per unit costs of telecommunications systems. Most systems manufactured after 1980 are based on digital technology.

Derived Demand: Derived Demand describes business demand for productive inputs i.e., firms do not demand a good or service for their own sake, but for what it can contribute to producing a given output at least cost. Inelastic demand, whether derived or consumer demand, is demand that is not very responsive to price changes. Specifically a given percentage increase or decrease in price is accompanied by a smaller percentage decrease or increase, respectively, in quantity demanded.

Dominant Carrier: A telephone company which by itself dominates the local telecommunications market. Without proper regulation, a dominant carrier could abuse monopolistic powers.

Economics of Scale: Economics of Scale exist if proportional increases in inputs more than proportionally increases output. Mathematically, if and only

$$f(x_1, x_2, .. x_n) > Q, \text{ for } > 1$$

where x_i 's are inputs and Q is the output.

Economies of scale can arise from a number of sources. Larger capital items (e.g.

machines) may be able to produce several units at a lower unit cost than the machine that would be required for low levels of production. .

Economies of Scope: When a firm is able to produce two or more products jointly at a lower unit cost than producing each separately.

Elasticity: The sensitivity of quantity to a change in the variable of interest. Thus price elasticity of demand is:

$$= (Q_i/Q_i)/(P_i/P_i) \text{ or}$$

$$= (Q_i/P_i)/(P_i/Q_i)$$

where P_i is the price of the. good or service and Q_i is the quantity.

Income elasticity, more precisely, the income elasticity of demand, is the responsiveness of demand to changes in income, that is, purchasing power.

All other elasticities are similarly defined.

Externalities: There are two externalities associated with telephone service: call and access. The call externality arises from the impact, positive or negative, upon the called party, which is in addition to the benefit received by the caller, who, by definition, must regard the benefit to be at least as great as the cost. Obviously, not all calls received are regarded as beneficial by those called, and one manifestation of this is unlisted numbers. But, on balance, the call externality is very likely positive.

The access externality arises each time an additional subscriber joins the network because there is now one more party that the previously existing community can reach. This is thought to be a benefit that continues to accrue as the network increases without limit, and it is the rationale for charging subscribers to larger exchanges more for access than subscribers to smaller exchanges. This externality more critical in developing countries where the systems have very low penetration. There are large proportions of subscribers whose access, insofar as it enables one to reach, and be reached by them, is irrelevant, except to the extent that the costs to all are reduced due to economies of scale.

Economic Profit: Profit over and above a normal return on investment. Accounting profit is greater than economic profit. Accounting costs would, generally, be below the economic costs.

Exchange: A central office area containing a telephone switching equipment and the connecting outside plant.

Fill Factor: The percentage of DELs relative to the total installed capacity of an exchange.

Flat-rate Pricing: Pricing a service at a uniform price irrespective on the volume consumed. A common pricing practice for exchange service in the United States.

GOS: Grade of Service. The percentage of calls not completed in a telephone network.

International Settlements: The payment of one county's telecommunications entity to another for the carriage of its traffic to the terminating point in the recipients county. Settlements have not been based on the costs of the transmission.

Marginal (or Incremental) Cost: The cost associated with the additional (incremental) cost of providing an additional unit of output.

Monopoly: A single supplier of a good or service. A "natural" monopoly exhibits economies of scale and scope which, if its prices are based on costs, will generally, prevent entry.

Natural Monopoly: The concept of natural monopoly is that of an industry in which there is room for only one supplier, due to something in the nature of the production process or the market. Traditionally, a declining long run marginal cost curve, i.e., economies of scale, was considered the defining characteristic of a natural monopoly. More recent research indicates that what is known as strict cost sub-additivity is the appropriate cost test. Strict cost sub-additivity means one firm can produce more cheaply than two or more firms. Necessary and/or sufficient conditions on the cost function for it to be sub-additive are investigated in Baumol.

OSP: Outside Plant. The cable network connecting a Switching Center to a subscriber.

Opportunity Cost: The cost associated with the next best alternative use of an input.

Pareto Improvement: A move toward Pareto Optimality. An improvement in the benefits for some without the loss of benefits by others.

Pareto Optimality: The optimal allocation of resources as judged by consumers valuation of the goods and services given the resources available. Even if the price is set at marginal cost, this may not be a move toward Pareto optimality, since the necessary conditions outside the industry have not been met. This has been termed in the literature the problem of "second best". See Lipsey & Lancaster.

PABX: Private Automatic Branch Exchange. A small switching equipment usually located in a customer premise.

Penetration: The percentage of DELs per 100 inhabitants.

Plant: A term used to designate telephone equipment and cables.

Predatory Pricing: Pricing with the purpose of preventing a potential competitor from entering the market or driving a competitor out of the market. Predatory pricing may be considered evidence of predatory intent

PTT: Post, Telephone and Telegraph. A term used to refer to government owned and operated entities providing postal and telephone services.

RBOC: Regional Bell Operating Company. One of seven regional local telephone company which resulted from divestiture of AT&T in the U.S (1984).

Rate Averaging: Setting uniform rates based on an average, such as uniform rates per kilometer without regard for the individual costs of a service, product or route.

Rate Base Regulation: Regulation based on the size of the (depreciated) capital stock i.e. the amount of investment in telephone plant and equipment.

Rate Re-balancing: Changing a rate toward a cost basis. The practice usually occurs in response to threats of competition.

Regulation: A method of control of a firm or company through a series of rules and regulations.

Restructuring: Used in reference to the privatization or structural changes in the operation, ownership and control of the telephone administration or other government entity. Restructuring is used in the context of privatization.

Subscriber Access: The connection to the switched central office of the telephone company. It is, in general a fixed cost, but in most countries at least part of the fixed cost is recovered by usage charges.

Supply: As used in this Study, refers to the available DELs that can be used to provide telephone services to subscribers.

Switch: A telecommunications equipment utilized to interconnect subscriber lines and interoffice trunks.

Switching Center: A terminal office consisting of a switch and associated equipment.

Switch-hook: Available switch termination for a subscriber line.

Telephone Network: An infrastructure used to interconnect subscribers in a given geographic

area. Can also be used to designate all telephone infrastructure in a country or the world.

Tariff: The formalization of the prices, conditions of service and other rules associated with the provision of an utility service offering.

Traffic Sensitive Costs: The costs associated with the usage of a service. A sub-set of what the economist refers to as variable costs.

Trunk: Refers to facilities to connect switching centers.

Universal Service: Refers to market penetration of the telephone service to as many members of the society as possible.

Usage-sensitive Pricing: Pricing of service based on the volume of service used by the customer, as opposed to flat-rate pricing (See above).

Waiting List: A list of subscribers who have ordered telephone services and have not yet been connected to the telephone network.