

TIPS 1999 Annual Forum

at Glenburn Lodge, Muldersdrift

19-22 September, 1999

The State of the Telecommunications Industry in South Africa and the Potential Costs/Benefits of Liberalisation

Rough Draft

Produced for TIPS

By James Hodge

| | | |
|----------|---|-----------|
| 1 | INTRODUCTION | 4 |
| 2 | THE NATURE OF THE COMMUNICATION SERVICES INDUSTRY | 5 |
| 2.1 | Composition of the Communication Services Industry | 5 |
| 2.1.1 | Network Providers | 5 |
| 2.1.2 | Service Providers | 7 |
| 2.2 | Nature of Production and Forms of Trade | 8 |
| 2.2.1 | Network Providers | 8 |
| 2.2.2 | Service Providers | 9 |
| 2.2.3 | The Incidence of Trade between Countries | 10 |
| 2.3 | Role in the Broader Economy | 11 |
| 2.3.1 | Role as Intermediate Input | 11 |
| 2.3.2 | Demand for Intermediate Inputs | 12 |
| 2.3.3 | Medium for Content Providers | 14 |
| 2.3.4 | Household Expenditure Item | 15 |
| 3 | THE SOUTH AFRICAN DOMESTIC TELECOMMUNICATIONS SERVICES INDUSTRY | 16 |
| 3.1 | The Domestic Communication Services Market | 16 |
| 3.1.1 | Fixed Line Telephony | 16 |
| 3.1.2 | Mobile Cellular | 16 |
| 3.1.3 | Satellite Services | 17 |
| 3.1.4 | Internet and other Data-based VANS | 18 |
| 3.1.5 | Other Mobile Services | 18 |
| 3.2 | Current Trade in Communication Services | 18 |
| 3.2.1 | Cross-border Supply | 18 |
| 3.2.2 | Commercial Presence and Presence of Natural Persons | 19 |
| 3.2.3 | Consumption Abroad | 20 |
| 3.3 | Regulations Governing Competition and Trade | 20 |
| 3.3.1 | Background and Objectives of Current Regulation | 20 |
| 3.3.2 | Independent Regulatory Body | 21 |
| 3.3.3 | Fixed line telephony | 22 |
| 3.3.4 | Mobile communications | 24 |
| 3.3.5 | Interconnection, Facilities Leasing and Numbering | 25 |
| 3.3.6 | Universal Service and Human Resource Development | 25 |
| 3.3.7 | Other General Regulations | 26 |
| 3.3.8 | Barriers faced in Export Markets | 26 |
| 4 | THE POTENTIAL IMPACT OF LIBERALISATION OF THE DOMESTIC AND FOREIGN COMMUNICATIONS SERVICES | 27 |
| 4.1 | Potential Impacts of Full Deregulation and Trade Liberalisation | 27 |
| 4.1.1 | Impact on the Domestic Telecommunications Service Industry | 27 |
| 4.1.2 | Broader Economy-wide Benefits | 31 |
| 4.1.3 | Equality Issues - Universal Access and Low Skilled Workers | 33 |
| 4.1.4 | Factors influencing the estimation of cost/benefits | 34 |

| | | |
|------------|---|-----------|
| 4.2 | How far is Current Deregulation getting us? | 35 |
| 4.2.1 | Impact of Current Deregulation | 35 |
| 4.2.2 | Limits of Current Deregulation | 37 |
| 4.2.3 | Estimating the benefits/cost from additional liberalisation in South Africa | 40 |
| 5 | POLICY TO MAXIMISE THE BENEFITS AND MINIMISE THE COSTS OF LIBERALISATION | 44 |
| 5.1 | Regulatory and Industrial Policy | 44 |
| 5.2 | Trade Policy | 45 |
| 5.2.1 | Compliance with the WTO Agreement on Basic Telecommunications | 45 |
| 5.2.2 | SADC Free Trade Agreement | 47 |
| 5.2.3 | Demands South Africa can make on the international trading system | 48 |

1 Introduction

The telecommunications industry is amongst the most innovative and rapidly growing sector of the modern economy which plays a central role in producing the infrastructural foundation for the new information age. The attitude of governments to the industry have also changed, with a common consensus that the days of national monopolies are over and that the sector must be opened to private competition if it is to flourish. The pace of change has varied amongst countries, with some more cautious than others, and some introducing more competitive regulatory regimes than others. For the laggards, the WTO process of negotiations on Basic Telecommunications will act as a force to move them towards a far more liberal regime in a shorter time period.

The purpose of this paper is to provide some background research for SA negotiations in the next round of trade talks in the WTO. It takes a close look at our own telecommunications industry and how far we have come down the road of liberalisation and how far we still have to go. It looks at how we might lose and benefit from such a process and what pressures might be brought to bear on changing the nature and pace of our own regulatory reform.

The paper proceeds as follows. Section two examines the nature of the communications industry itself and its role within the broader economy. Section three then proceeds to analyse the state of the industry in South Africa and the regulations that govern its operation. Section four looks at the potential gains from liberalisation from an economic theory perspective before analysing how far current deregulation has taken us and what additional benefits might we expect from further liberalisation. Finally, section five examines some of the policy options that might help South Africa maximise the benefits of further reform.

2 The Nature of the Communication Services Industry

2.1 Composition of the Communication Services Industry

The communications industry can be sub-divided for analysis in a number of different ways. The purpose of this paper is to examine the possible consequences of deregulation and trade liberalisation in the communications sector in South Africa. As such, the focus should be on how the industry might look *post* deregulation rather than how it looks now. In particular, we cannot assume that a service provider owns the network too. Further, we must allow for flexibility in the services that network and service providers are able to offer due to technological convergence. The starting point for this analysis is to separate the industry into network providers and service providers. Each category is then sub-divided by types of providers and their range of possible services.

2.1.1 Network Providers

As the name suggests, network providers operate the infrastructure on which various communication services are run. The range of services that can operate on a particular network, depends on the technological nature of that network. We can differentiate network providers by the type of technology used, but due to technological convergence, we should also be aware of the range of services that each can provide.

One means of differentiating between networks is by the medium of transmission used. There are essentially two means – fixed line or mobile. The former uses a physical cable (made of say copper or fibre optic) to transmit information, while the latter makes use of the radio frequency spectrum for transmission. Within each group – fixed line or mobile – the service capabilities of the network depend on the type of transmission equipment and receiving devices used.

Fixed Line Networks

Within the group of network providers that use fixed line infrastructure, networks were historically built to focus on one of three different types of transmission – voice, data or image. The providers focused on voice provided public or private telephony. Technologically, their switching equipment allows two-way transmission between two individual points on the network by establishing a dedicated line between two points for the duration of a call. Data networks can also be of either a public nature (such as the Internet), or a private nature (focused on a few large companies). They differ technologically in that the switching equipment does not establish a dedicated line and instead routes 'packets' of data on common usage lines from one point to another through the path of least resistance. As line traffic congestion can delay packets, this has previously been unsuitable for quality voice or image transmission. Finally, image networks have been those created for providing cable TV services in many industrial countries. In this case, there is only one-way transmission and it is also to all points of the network simultaneously, disqualifying one-to-one communication.

The networks not only differ in terms of transmission equipment, but also in terms of network speed (measured in terms of kilobytes per second). Typically, voice transmission requires relatively low speeds (64 kbps) and so these networks have been built as such. Conversely, adequate image transmission requires higher speeds and so cable operators have installed higher speed networks. Data networks may vary considerably depending on the requirements of the users. This is because there is not the minimum requirement of voice or image transmission where one needs to hear or view it at the speed at which it is being broadcast.

Finally, networks differ in terms of coverage. They may be local, national (linking local areas), or international (linking national networks), or all three. To provide full international coverage, individual networks must interconnect with each other. So for instance, public data networks for Internet transmission have concentrated on national and international networks leaving the local connection to take place via the local telephone network. Many private data networks also include a stretch of leased network from a public provider. They will also interconnect with some

of the group of mobile communications networks discussed below, to extend coverage even further.

However, technological advances have meant that networks built for a single specific purpose can be slightly altered to provide other types of services, and so compete with other network types or create new services completely. The fundamental reason behind this, is that almost all networks use a digital format. For example, cable operators have made alterations to their networks which now allow two-way, one-to-one communication. This has enabled the creation of the new 'pay-per-view' television services, and also allowed them to actively enter the Internet providers market with telephony a possibility in the future. Data networks operating on packet switched technology, have always been able to provide telephony and image or voice broadcast – albeit of poorer quality. However, recent ITU agreements on a common gateway protocol for passing multimedia from telephone networks to data networks should greatly improve the quality in the near future. This will see priority being given to voice and image packets, avoiding the problem of congestion. Finally, voice networks have also been active and now offer all options through installing the faster speed ISDN lines (integrated services digital network).

The movement of a network into a new service area depends not only on whether it is technically feasible or not, but also whether the network has sufficient speed to offer the service, and its coverage. For instance, public data network providers (Internet providers) have struggled to provide image broadcast at a good quality partly due to using the low speed local telephone network to provide the 'last drop' to the household.

Mobile Communication Networks

In the same way as fixed line networks, there are a range of different mobile communication networks which were built for different transmission purposes. Some allow two-way transmission, while others only allow one-way. Some are limited to one-to-many transmission, others have one-to-one capability. The infrastructure in each case consists of transmission equipment, receiving devices and a band of the radio frequency spectrum which the operator is licensed to transmit over.

The group of mobile communications with two-way capability include the familiar terrestrial cellular networks, satellite communications networks, two-way radio, radio trunking (public access mobile radio) and wireless local loop. Cellular makes use of a network of terrestrial transmission stations to link hand-held phones with relatively short signal receiving distances. The network is usually national in size but can interconnect with other national networks to provide international services. Satellite makes use of more powerful devices to transmit to one of a number of earth stations, which in turn link to each other via one or more satellites. The greater distances the receiving equipment must transmit over, means they are larger and more expensive than cellular. However, the use of satellites enables the network to minimise the number of earth-based transmission stations. Satellite can be used merely to transmit international traffic or actually provide a personal communications network. The relevant market for satellite is usually a region but a network of satellites can provide global coverage.

Two-way radio is often transmitted over very short distances and include networks for emergency services and communication within a defined corporate space. Often the distances are short enough that no transmission stations are required, and the hand-held devices are sufficient. The longer distances are covered by radio trunking, which operate in a fashion similar to cellular networks. Finally, wireless local loop is a recent addition and is being used to provide a 'last drop' to the consumer for fixed line voice or data networks. It is similar to two-way radio where the physical coverage is very limited, and the receiving device (a telephone) is often fixed in location. This is designed not to compete with the cellular networks but to provide a cheap alternative to using fixed wire as the last drop to the home.

The group of one-way transmission networks include those for voice (public radio broadcast), data (paging) and image (television broadcast). These are mostly performed using a network of terrestrial transmitters. However, satellites are frequently used to provide pay-television services in most countries. Coverage depends on the size and network of transmitters.

The same issues of interconnection, speed, coverage and flexibility (to provide other services) that were discussed in fixed line networks apply equally to mobile networks. For instance, networks with two-way coverage can provide services operated on one-way systems if they have the required network speed and coverage (for instance cellular networks providing paging-type services), but the reverse is not necessarily true (television broadcasters are unable to enter the personal communications market because of one-way transmission limitations).

2.1.2 Service Providers

It has often been the case in the past that the owner of the network has also provided the services that operate over that network – whether it is a television broadcast or local telephony. However, it has been the distinct strategy of deregulation in parts of the telecommunications and broadcast industries that the network is separated from the services that are provided on it. The reason for this is that often the network will remain a monopoly because of the expense and duplication that pushing out another network might involve. Therefore, the only way to inject competition in these instances is to separate the network from the service and introduce competition in the provision of the services on the network. In addition, firms may choose to provide more than one service over their network and so cannot be easily boxed as a provider of one or other service. For this reason, it is better to think of network providers and service providers.

The range of services that we are talking of are no different to the ones already mentioned above, in particular:

- Public Telephony – local, national, international, mobile national, mobile international, pay-phones
- Data – these are usually referred to as Value-added Network Services (VANS) and include email, Internet, EDI (electronic data interchange), paging, managed data network services, etc.
- Private telephony – fixed telephony, mobile telephony (e.g. two-way radio, radio trunking)
- Broadcast – public radio, public television, pay television

A service provider who does not own the network offers the service by either leasing part of the network from the network provider and enhancing this with one or more service component, or interconnecting their own network to others in order to provide the service. The service component is added for essentially two reasons – a) because the network provider does not offer the service, or b) the network provider is seen to be inefficient at that service and the service provider is able to offer it at lower cost or better quality.

A South African example of the former is the cellular industry. The network providers do not retail to the public but instead wholesale network access to a group of approved service providers. These providers in turn offer retail outlets to access customers, they stock and sell the phones, they do the credit checks, link the customer to the network and perform all billing and debt collection. Alternatively, service providers offering managed data networks may lease part of the public network but complement this with their own protocol conversion and data encryption capacity. They may also have some network infrastructure themselves that bypasses aspects of the public network that is incapable of running the service.

In terms of efficiency arguments, a number of possibilities emerge. It could be that a network provider is using dated or inefficient technology at points in the network which a service provider may choose to replicate and then lease or interconnect to other parts of the network to compete. This may be as simple as the credit and billing component, or internet access via the local telephone network but using a national data network. Alternatively, the large network provider may not be able to adequately price discriminate amongst all niches in the market and a service provider may lease excess capacity in the network for the purpose of niche resale. This is often the case with international or national telephony services providers. The internet provides another example of niche servicing – an important component of what customers seek in service providers is member services such as home page news, links and community

information. These can be tailored to niche markets while the cost can be kept the same by leasing lines.

2.2 Nature of Production and Forms of Trade

The nature of production is quite different for network and service providers, with the former having to make large sunk investments in lines and transmission equipment. It also raise issues such as interconnection and network economies. For this reason they are handled separately below.

2.2.1 Network Providers

The starting point for analysis is the relative factor intensity of production. Network provision is unsurprisingly very technology-and capital-intensive. Further, because of the technical nature of production, it is also human capital intensive. This observation is common sense. Network provision is physical capital intensive because of the need to make large investments in a physical transmission network. The costs of establishing the network will vary by the type of technology used (e.g. cellular, fixed line or satellite) and the coverage of the network, but they remain large in all cases.

We know that communications equipment is technologically advanced and that firms in that industry invest vast sums in research and development. We also understand that the rate of technological progress has been rapid in recent decades. The requirement for technical knowledge does not stop at the equipment manufacturer. The network provider needs to have the technical expertise to adopt the technology in the first place, adapt it to their specific network conditions, integrate it effectively with existing equipment of different ages and origin, maintain and troubleshoot over the life of the technology and gradually enhance its performance to improve productivity. These processes are not simple and require a high degree of in-house expertise. Finally, it follows that it is human capital that is required to install and operate such a technologically advanced network and so a high degree of human capital is required for successful production.

In terms of measuring the relative intensity of factor use, this is done very easily with physical and human capital intensity by using a couple of ratios. However, technological intensity is difficult to demonstrate because the usual measures, such as spend on R&D, do not exist for service industries. However, the high human capital content should point to technological intensity.

In table 1 below we compare the capital-labour ratio to determine relative physical capital intensity and the percentage of the workforce in professional or technical occupations to determine relative human capital intensity. In both cases the figures for communications represent the national fixed line provider Telkom only. Therefore, although not fully representative of all technology types, it provides a rough indication of the nature of production in network providers. It is clear from both sets of figures that communications are far more intensive in their use of physical and human capital than other aggregate parts of the economy.

Table 1: Indicators of the nature of production by sector 1995

| Sector | K-L Ratio (R1000s capital per employee) | Percent of workforce professional or technical occupations |
|-----------------------------|---|--|
| Agriculture | 46 | 0.4 |
| Mining | 258 | 4.6 |
| Manufacturing | 135 | 5.3 |
| Services Sector | 199 | 22.0 |
| Communications ¹ | 396 | 26.9 |
| Total Economy | 169 | 15.2 |

¹These values are calculated for Telkom only in 1998

Sources: SARB Quarterly Bulletin March 1998, CSS OHS Survey 1995; Telkom Annual Report (1998)

The pricing and competitive behaviour amongst network providers is influenced by a number of factors peculiar to network industries. First, the value of a network is related to the number of customers connected to that network. Therefore, it is in the interests of all competitors to interconnect with each other to gain access to as broad a customer base as possible in order to enhance the value of their respective networks. The ability to interconnect also means that firms can compete with other network providers on one part of their network without having to duplicate the entire network – for instance, firms may compete on long distance telephony by building their own long distance infrastructure and interconnecting to a local network to reach the final customers.

The key determination of competition and pricing, is how interconnection is priced. Interconnection charges are partly determined by the cost of interconnection and transmission of calls, and partly by the market structure of network provision. The latter presents a number of possibilities, each the outcome of negotiation.

- a) if the one network provider has a monopoly in the part of the network that the other network wishes to interconnect with – in this case, if the two networks do not compete in any markets (as is the case of two national providers from different countries) then the outcome may resemble costs more closely. This is unless there is an uneven traffic flow causing one provider to deliberately overprice in order to gain an effective subsidy from users of the other network (a common practice amongst African national providers). If the two networks do compete in other segments of the market (such as provision of long distance communications) then there is incentive to deliberately overprice in order to ruin the competitiveness of the other network in the other market.
- b) If the one network provider faces competition in the part of the network that the other network wishes to interconnect with – in this case, the network can either collude with their competitors in the market to keep interconnection costs high, or price competitively in order to take paying traffic away from competitors. It is important to remember at this point that competition comes not only from networks of the same technology (e.g. fixed line vs. fixed line) but also from networks of different technologies (for instance international voice traffic could go by satellite or fixed line). In some cases the competition may not be perfect but it at least provides an upper limit under which a monopolist may price over marginal cost.

These competitive problems that emerge with network industries means that a number of regulatory tools are used to try increase competition in a deregulated industry. These may include setting the price of interconnection (according to some cost formulae) or segmenting the market so no one player has incentive to overprice (for instance in the USA local network monopolies cannot provide long-distance services).

A second feature of the communications industry is that once the network is in place, the marginal cost of transmitting one more call or piece of data over the network is negligible, unless it pushes the network to the point of full capacity. This creates a problem on how to price services, including interconnection charges. It has resulted in a range of pricing from a flat monthly fee for local calls or Internet access, to pricing individual calls differently in peak and off-peak periods. It has also allowed niche service providers to thrive as they purchase off-peak excess capacity at discounted prices and attempt to resale more effectively to the public in order to make a profit.

The pricing mechanism used by regulators to price interconnection charges is the long run incremental cost (LRIC) of building and maintaining a network, including an average return on capital. This is a difficult process, especially as it relies on information provided by the network provider one is trying to regulate. Despite the teething problems, this is seen as the manner in which to price such services in a competitive market when marginal costs pricing is nonsensical.

2.2.2 Service Providers

Service providers are qualitatively different from network providers. They lease network capacity and facilities and so do not have the large capital outlays that a network provider has, nor the technological concerns of building and maintaining a network. The amount of technological

expertise they require depends on what service they are providing and whether they choose to duplicate or complement parts of the network with their own switching equipment. Either way, it will be less technologically demanding than operating an entire network.

The lower production demands and sunk costs required to be a service provider, means that the industry is likely to be more competitive and therefore price competitively (whether it is marginal cost or other). However, competition can be stifled if one of the competitors is a network provider too. If the network provider is a monopoly, it can merely price facilities leasing to outside service providers at a level which makes them uncompetitive with the in-house service provider. Alternatively, if the network provider only has a monopoly in an unrelated market, they may engage in cross-subsidising operations in order to price their service provider below cost to give them a competitive edge.

It is these opportunities to act anti-competitively that have caught the attention of regulators. These problems are dealt with either by regulating the cost of leasing (again at the LRIC) or segmenting the market so network providers may not have service provider businesses.

A particular service has both cost and quality dimensions and so competition amongst providers takes place along a range of cost and quality issues. For instance, amongst internet service providers the considerations for the buyer may be cost per hour, content provided by the provider, speed of access and percentage downtime. Different providers may target different needs of consumers and offer a different service package. In the same way, international voice service providers may target different consumers with different choice destinations for international calls and price accordingly.

2.2.3 The Incidence of Trade between Countries

Trade in services can occur through four possible modes of supply – cross-border supply, consumption abroad, commercial presence and the presence of natural persons.

Until recently, the most common form of trade between countries has been through cross-border supply. Trade occurs through the interconnection of networks in order to complete or route an international call. Imports can be considered outgoing calls which the network provider in the other country charges to be completed. Incoming calls or ones third-party routed by a country's network are considered exports. Cross-border supply dominated, but not limited to, interconnection charges for data or voice. It is possible for services such as web-hosting to occur cross-border, where a web-site for a South African company is hosted on a network in the USA, possibly for reasons of speed and price. Cross-border supply of satellite video broadcast and voice communications is also becoming increasingly more common. It is possible for satellite communications to bypass all domestic infrastructure by passing signal distribution through a earth gateway station located in another country.

With the growing liberalisation of communications services internationally, an increasingly important form of trade has become commercial presence. In order to provide communications services to consumers in a country beyond completing their international calls to another country, network and service providers need to have a physical presence in that country. All networks, with the exclusion of satellite, require investments in terrestrial transmission equipment and either physical lines or radio frequency. Even for satellite communication one still requires an earth station to link to the satellite, and authority for use of radio spectrum.

Due to the growing importance of commercial presence as a means of service trade, the presence of natural persons also becomes important on the level of intra-corporate transferees only. The high demands for human capital in production mean that companies entering a market may require to bring in their own technical expertise in order to build and maintain their network or service. However, there is no trade demands beyond inter-corporate transferees.

Finally, there is consumption abroad. This occurs when consumers from one country are physically located in another for a temporary period and make use of foreign communications services. The reasons for being located in another country may vary from tourism to business to education. Use of a foreign provider constitutes trade. It is difficult to capture back most of this trade, but many national providers have tried using a few methods. One, by issuing national calling card services. In these cases, when a traveller makes an international call using this

service, the call is routed through the network back home and in this way provides revenue and 'imports'. Two, many callback services have sprung up in countries like the USA whereby a customer from South Africa places a call 'as if' they were in the USA through the callback operator calling them and connecting them to the number they wanted to call. Three, by arranging international roaming agreements for mobile phone users. In this case, a customer may use their phone in another country and be billed back home. Any charges over and above the interconnection charges from the other national network constitute a dig into imports.

2.3 Role in the Broader Economy

Communications services play a key role in any economy – from being an important intermediate input to business, an enabling medium for a range of content providers, a significant item in household expenditure, and finally a source of demand for numerous manufacturing and service industries. What follows is a discussion of the role in the broader economy of communications services as a package of both network and service providers.

2.3.1 Role as Intermediate Input

The role of communications as an intermediate to business can be seen to have 2 dimensions – a) as a cost item required to operate a business, b) as a strategic and competitive tool.

As a cost item, communications does not appear that significant for most parts of the economy judging from the statistics in table 2 below. It represents only 0.1% of total costs in agriculture and mining, 0.4% in manufacturing industries and 2% in service industries. However, these figures definitely underestimate the cost importance of communications for two important reasons. First, the data network costs are accounted for under the section titled business services, along with other business service items. Second, the last input-output data available for South Africa is 1993, which is one the verge of the Internet explosion, the launch of cellular communications in South Africa, and the growing globalisation of business here. As such it would not account for the enormous annual investments that firms make in Internet web sites, email, mobile communications and international communications/data transfer. The combination of these factors means that actual expenditure on communications services could be three to five times that represented in the input-output tables of 1993. At those levels, price variations in communications services will impact significantly on the cost and hence competitiveness of business, as well as the overall price level of the economy.

As a strategic competitive tool, communications are becoming more and more vital to businesses globally. Increased globalisation has resulted in the requirement to communicate and transmit vast amounts of data to suppliers, industry customers and affiliates internationally on a timely basis. The rise of electronic commerce, has now established a need in many industries to use communications networks to deal with the final demand household consumer too. In both cases, the need is for high speed, high quality communications services that are geared to the specific needs of the firm and which are available at a cost that does not make it prohibitive to communicate or put them at a competitive disadvantage to firms in other countries. The important point here is that what matters most for an economy is the availability of world-class communication services at a reasonably competitive price, even if they are not the cheapest.

Table 2: Intermediate inputs as a percentage of total costs (1993)

| Sector | Network Providers | Total Intermediate Input |
|--|-------------------|--------------------------|
| Agriculture | 0.1 | 48.5 |
| Mining | 0.1 | 39.9 |
| Manufacturing | 0.4 | 64.9 |
| Food, beverages, tobacco | 0.3 | 75.2 |
| Textiles, clothing, leather and footwear | 0.3 | 59.4 |
| Wood and wood products | 0.4 | 61.6 |
| Paper and printing | 0.4 | 69.5 |
| Chemicals, rubber and plastic products | 0.3 | 67.7 |
| Non-metallic mineral products | 0.3 | 47.3 |
| Basic metals | 0.1 | 51.1 |
| Metal products and machinery | 0.5 | 64.1 |
| Transport equipment | 0.3 | 59.9 |
| Other manufacturing | 0.5 | 70.7 |
| Service Sectors | 2 | 43.6 |
| Utilities | 0.2 | 53.3 |
| Construction | 0.8 | 66.1 |
| Distribution services | 2 | 42.1 |
| Tourism & travel | 0.3 | 62.3 |
| Transport services | 0.2 | 43.1 |
| Communication services | 11.7 | 31.5 |
| Financial services | 3.8 | 55 |
| Business services | 1.1 | 16.7 |
| Community, social & personal services | 2 | 43.6 |

Source: CSS Input-Output Tables 1993

2.3.2 Demand for Intermediate Inputs

Growth of the communications industry has some important trickle-down effects for certain parts of the economy and resulting in output and employment creation in these sectors. There are two sources of such demand – investment demand and ongoing operations demand.

Investment demand includes capital goods required by the industry to increase its size of operations. Table 3 shows the capital structure of a typical telecommunications network provider – Telkom – and a typical service provider. For the network provider, it is clear that high tech capital goods (telecoms network equipment and data processing equipment) dominate the inputs (78%) resulting in few trickle-down effects for most developing countries who have not developed these industries.

Table 3: Structure of capital requirements for the communications industry in SA (1998)

| Item | Network Provider | Service Provider |
|----------------------------|------------------|------------------|
| Land & buildings | 4.1 | |
| Telecoms network equipment | 71.3 | |
| Telecoms support equipment | 3.7 | |
| Other equipment | 0.7 | |
| Data processing equipment | 6.7 | |
| Vehicles | 2.5 | |
| Furniture and office | 0.4 | |
| Working Capital | 10.8 | |
| Total | 100.0 | |

Source: Telkom Annual Report

However, there are larger multipliers for ongoing operations. Table 4 below presents a representative cost structure for both a network and service provider. For the network provider, intermediate inputs make up around 40% of costs, labour 26%, capital 12%, and profits 22%. Proportions will vary across markets.

Table 4: Operating Cost Structure for the Communications Industry in SA (1998)

| Cost Item | Network Provider | Service Provider |
|-------------------------------------|------------------|------------------|
| Costs of Intermediate Inputs | | |
| Interconnection fees | 13.00 | |
| Other intermediate inputs | 26.58 | |
| <i>All intermediate inputs</i> | <i>39.58</i> | |
| Costs of factor inputs | | |
| Labour costs | 25.97 | |
| Profits | 22.21 | |
| Capital Costs | 12.22 | |
| Licence fees | 0.02 | |
| <i>All factor inputs</i> | <i>60.42</i> | |
| Total Costs | 100.00 | |

Source: Telkom Annual Report 1998

Table 5 below presents the direct and indirect output and employment multiplier effects of a R1 million increase in communications and business services. The inclusion of business services is a result of much of the VANS being classified under this heading. The multiplier effects are negligible for the primary sectors but significant for the manufacturing sectors - metal products and equipment (transmission and receiving devices); chemicals, rubber and plastic products (plastic casings for equipment); paper and printing (marketing and office materials). The largest gains are in other service industries, in particular, other communication or business service providers, distribution, transport and utilities. In total, a R1m increase in output in communications or business services creates direct and indirect increases in output of between R1.3m and R1.6m and creates between 25 and 29 jobs across the industries mentioned.

These figures are not high compared to agriculture or manufacturing which see multipliers in the region of R2.1m and R2.4m for output and 93 and 41 jobs for employment respectively. Part of the reason for this is a low participation of SA industry in communications equipment, with much derived demand going to imports from other countries. This may change with time and raise the average multiplier effect. Regardless, this does serve to emphasize that the most important role that communications services have in the SA economy is as an input to business and households. As such, enhancing its intermediate role should probably be the most important factor to remember when devising policy, and not increasing local equipment production.

Table 5: Total direct and indirect output and employment multiplier effect of a R1m increase in output of communication and business services (Rands)(1993)

| | Output Multiplier (R'000s) | | Employment Multiplier (no.) | |
|--|----------------------------|------------------|-----------------------------|------------------|
| | Network Provider | Service Provider | Network Provider | Service Provider |
| Agriculture | 4 | | 0.3 | |
| Mining | 20 | | 0.3 | |
| Manufacturing | 241 | | 3.4 | |
| Food, beverages, tobacco | 3 | | 0.0 | |
| Textiles, clothing, leather and footwear | 15 | | 0.5 | |
| Wood and wood products | 4 | | 0.3 | |
| Paper and printing | 35 | | 0.8 | |
| Chemicals, rubber and plastic products | 54 | | 0.1 | |
| Non-metallic mineral products | 4 | | 0.3 | |
| Basic metals | 11 | | 0.0 | |
| Metal products and machinery | 106 | | 0.1 | |
| Transport equipment | 6 | | 0.1 | |
| Other manufacturing | 3 | | 0.1 | |
| Service Sectors | 1705 | | 32.5 | |
| Utilities | 46 | | 0.3 | |
| Construction | 5 | | 0.3 | |
| Distribution services | 94 | | 2.0 | |
| Tourism & travel | 1 | | 0.1 | |
| Transport services | 64 | | 0.9 | |
| Communication services | 1431 | | 24.1 | |
| Financial services | 16 | | 0.3 | |
| Business services | 38 | | 0.3 | |
| Community, social & personal services | 6 | | 0.1 | |
| Total Multiplier Effect | 1968 | | 36.4 | |

Source: CSS Input-Output Tables 1993

2.3.3 Medium for Content Providers

What the analysis of communication services as an intermediate input or as a source of derived demand fail to convey, is that entire industries are based around the existence of communications services and would not exist otherwise - these are the content providers. Too often we view the communication services as a demand derived from growth in other industries or in household income. What we fail to appreciate is that innovation, cost reduction, quality improvement and independent expansion of communication services enable the growth and expansion of a large content industry that is transmitted over the communications infrastructure. This process one where the communications industry itself creates demand through innovation and investment. The links to these content industries cannot be portrayed usefully by an input-output table.

The content providers could most easily be classified according to voice, data and image/video content. Voice would include those companies producing content for radio broadcast - from music to programming. Video/image would be those producing for television or education broadcast - from advertising to dramas. Finally, data content would be associated with those

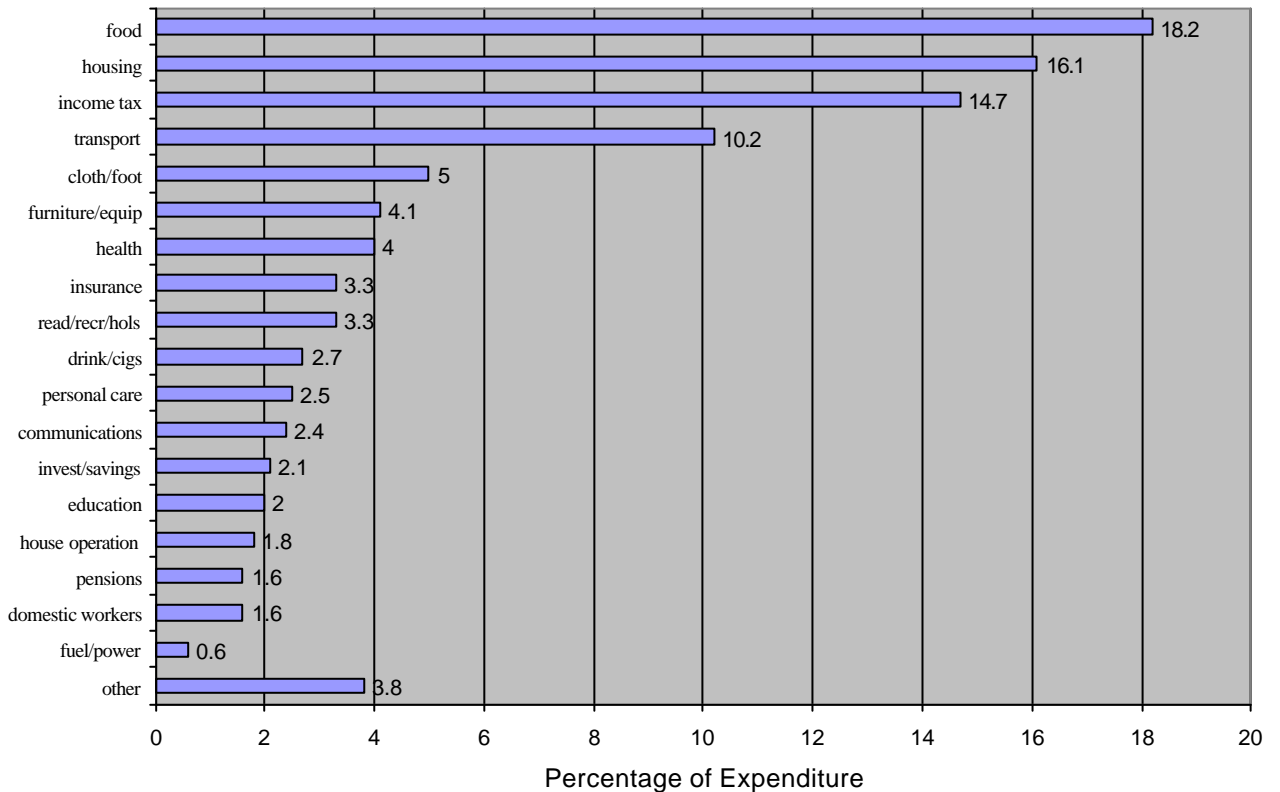
firms providing content for the Internet or private data networks - from online news corporations to electronic commerce. In all these industries, expansion of the network and lowering the costs of transmission expand the number of people connected to the network and therefore expand the market for content. Enhancing the speed and quality of the networks open up the opportunities for new content products to be introduced which also expands the market for content.

The question remains - how big are the multiplier effects on content providers stemming from improvements and expansion of the network.

2.3.4 Household Expenditure Item

Finally, communications enter the household consumption function. Communications does not represent one of the main items that households spend their income on, but at 2.4% of household income, it is still a significant item. In fact, as figure 1 shows, households on average spend more on communications than on investments/savings, education, house operations, pensions and fuel/power. The size of expenditure is also sufficiently large so that price movements in the sector will influence both the welfare of consumers and the price level – the consumer price index.

Figure 1: Household expenditure patterns (1995)



Source: Statistics South Africa, Income and Expenditure Survey, 1995

3 The South African Domestic Telecommunications Services Industry

3.1 The Domestic Communication Services Market

3.1.1 Fixed Line Telephony

Fixed line local, long distance and international telephony services remain under a monopoly granted to Telkom Ltd until May 2002. This exclusivity period can be extended for an additional year if Telkom meets a certain proportion of its proposed rollout to under-served areas and network performance targets by the end of 2001. Telkom was wholly-owned by the government until April 1997 when a 30% equity stake was sold to a consortium consisting of SBC Communications (60%) and Telekom Malaysia (40%).

The liberalisation of the market will be phased in. Already customer premises equipment and VANS are open to competition. In year 4 the VANS and private operators will be allowed the resale of leased capacity, while at the end of the period new infrastructure players will be allowed in.

The fixed line network currently consists of 4.6m main lines, of which 128 000 are payphones. This translates into a telephone density of approximately 10 per 100 people. The sector generates revenues of R20 billion per annum, with total assets of approximately R22 billion. However, network access and coverage is currently inequitable and reflects the priorities of the previous government by extending universal service to white households while ignoring other races. It is this imbalance that the exclusivity period is meant to address by giving the current monopolist time to extend the network significantly through cross-subsidisation. This process will see a total of R50 billion invested over the 6 year period. At the end of the exclusivity period, overall teledensity should be close to 20 per 100 people, with the most gains in previously under-served areas. Table 6 below provides an indication of the past imbalances by citing the 1996 census figures for household telephone facilities by population group.

Table 6: Household telephone facilities by population group (1996)

| | African | Coloured | Asian | White | Total |
|--|----------------|-----------------|--------------|--------------|--------------|
| Telephone in dwelling/ cellular phone | 11.3 | 43.4 | 76.9 | 88.5 | 28.6 |
| Telephone at a neighbour nearby | 5.2 | 14.8 | 8.9 | 1.3 | 5.5 |
| A public telephone nearby | 44.6 | 26.2 | 10.2 | 6.5 | 35.8 |
| At another location nearby e.g. work | 6.0 | 7.8 | 1.8 | 2.1 | 5.4 |
| At another location not nearby | 7.8 | 1.6 | 0.5 | 0.2 | 5.8 |
| No access to a telephone | 24.4 | 5.7 | 1.3 | 0.8 | 18.3 |
| Not stated | 0.6 | 0.4 | 0.3 | 0.5 | 0.6 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Source: Statistics SA, Population Census 1996

In addition to the public network operated by Telkom, there are two significant private networks operated by the parastatals Transnet and Eskom. They were granted permission to develop extensive private networks to ensure contact with remote operations where Telkom was unwilling to put in infrastructure.

3.1.2 Mobile Cellular

Mobile cellular communications was launched in South Africa in 1994. There are currently two *network providers*, MTN and Vodacom, with a third network licence being issued by the end of 1999. The network operators do not deal directly with the public but wholesale airtime to

appointed service providers who in turn retail network access to the public or corporations using their own tariff structures. The service providers currently appointed to each network are:

- MTN network – Autopage Cellular, M-Tel, Nashua, Nedtel, Plessey Cellular, Radiospoor Cellular, Sebcom, Supercall, Transtel and TTC.
- Vodacom network – Afritel, Autopage Cellular, Cellphones Direct, GSM Cellular, Nashua, Nedtel, Plessey Cellular, Radiospoor Cellular, Supercall, Teljoy and Vodac

South Africa has seen phenomenal growth in the industry of around 50% per annum, and by the end of 1998 there were an estimated 2.1 million subscribers, providing industry revenues of roughly R4 billion per annum. This makes South Africa the largest GSM technology network outside of Europe and is the fourth fastest growing GSM market in the world. The Vodacom network has the larger share of the market with 55% of subscribers. National coverage of each network is very high with largely very small rural towns left unconnected. An example of coverage by one network, MTN, is provided in figure 2 below.

Figure 2: MTN Network Coverage (1999)



Source: MTN web page, 1999

3.1.3 Satellite Services

There are currently a number of commercial satellites which have a footprint which covers South Africa and provide communications or broadcast services. The INTELSAT satellite has been operational for many years and is primarily used by Telkom to provide communications services and international telephone connections. The PanAmSat PAS-4 was launched in August 1995 and has thusfar been used primarily for digital direct-to-home (DTH) satellite television and more recently distance education. A recent addition has been the PanAmSat PAS-7 and a Global Mobile Personal Communications Satellite Network launched by Iridium. Another GMPCS operator, Globalstar, is expected to begin operations in 2000.

Signal distributors provide the domestic links to these foreign-owned commercial satellites. In the broadcast market the dominant signal distributors are Orbicom and Sentech. In telecommunications, Telkom operates a monopoly on signal distribution through earth gateway stations. Even with the Iridium network, all earth-satellite links must operate through a Telkom earth gateway or, if bypassed through a gateway station in another country, then a bypass fee must be paid to Telkom.

3.1.4 Internet and other Data-based VANS

The Internet

Internet access in South Africa has been growing at a rapid rate for many years. South Africa ranks as one of the top twenty countries in the world in terms of number of Internet sites. There are an estimated 800 000 subscribers, of which about 80 000 are dial-up users and the rest using a permanent digital leased line.

Physical networks are provided by a number of players, specifically The Internet solution, Pipex Internet Africa, Sprint SA, SAIX, OpenNet, and UniNet. There are also a large number of service providers who lease capacity from the networks and retail to the public at their own tariffs. Market share of service providers is Internet Solutions owns 64%, followed by UUNet Internet Africa/iAfrica with 9%; GIA with 4%; Mweb and Intekom with 2% each and SAIX 1%. The cellular network operator, Vodacom, has recently entered the market with its subsidiary, Yebonet.

Other VANS

The industry was launched when VANS service provider licences were issued in 1991. There are currently about 60 license holders with approximately 12 000 customers and a total annual revenue of around R180-200 million. The top three service providers have a market share of 75% and are Trafix, EDS/Vanco and FirstNet. Other significant networks include GOVNET, Info Van, and Denel Informatics.

3.1.5 Other Mobile Services

Paging Sector

The paging industry was the first to have private operators issued licences and is well established in South Africa. There are currently 21 paging companies with an estimated market of 110 000 pagers and revenue of R121 million¹. The dominant operators are Radiospoor (40%), Autopage (25%), Paging Plus (10%). A handful of these operators do not provide services to the public but operate their private corporate paging services only.

Radio Trunking

The first radio trunking licences in South Africa were only issued in 1993, a year before the introduction of cellular networks. The expansion of the cellular networks has stunted the growth of radio trunking as they are direct competitors in mobile communications services. There are currently 11 licensed operators sharing a market of between 5000 and 7000 radios. The sector is relatively small with revenues of R9 – R12.5 million per annum. The sector is dominated by 3 operators – Fleetcall, Q-Trunk and One-to-One.

Wireless Data Services

There are currently only 2 wireless data network providers, Swiftnet and WBS.

3.2 Current Trade in Communication Services

3.2.1 Cross-border Supply

Cross-border supply takes place through international interconnection charges and leasing of cross-border transmission lines. As Telkom has a monopoly on international services, it is they who conduct such trade.

[More data is required to give a fair picture of this form of trade]

¹ Dept of Communications (1998)

Table 7: Payments and Revenues from International Interconnection in current Rm (1995-99)

| | Payments for International services | Revenue from International Services |
|------|-------------------------------------|-------------------------------------|
| 1995 | | 2145.0 |
| 1996 | | 2682.9 |
| 1997 | | 2790.8 |
| 1998 | | 3008.7 |

Source: Telkom Annual Reports 1996-99

3.2.2 Commercial Presence and Presence of Natural Persons

Imports

Foreign participation in the domestic telecommunications industry is a recent phenomenon and still remains limited through regulatory restrictions. In fixed line telephony a monopoly exists but foreign companies have a 30% stake and key management control in the domestic supplier. The 30% share was bought for a value of RX billion and the deal gives the foreign consortium, Thintana, the right to appoint three of the five-member operating committee for day-to-day operations, including the right to appoint the chief operating officer, the chief financial officer, and the chief strategy officer. Regulations limit entry to this market for another 3 years and even then, foreign participation is limited to a 30% share of all supply.

The other sector that has seen significant foreign investment is the Cellular communications sector. Foreign participation in this market is also limited to 'a cumulative maximum of 30%' but holdings in individual firms may exceed 30% as long as participation across all firms in the market is not greater than 30%. Vodacom's foreign shareholder is Vodafone UK with a stake of 31.5%. Local shareholders in Vodacom include Telkom (50%), Rembrandt (13.5%) and Descarte Investments (5%). MTN no longer has a foreign shareholder after Cable and Wireless UK sold their 25% stake last year to local group Johnnic and Transtel. The reason for the sale was apparently to take the large short-term gains that have been made and use that to dig further into other markets. Recently the domestic makeup of the group included M-Cell (34.71%); Transtel (30.03%); Johnnic (13.5%); Naftel (11.76%); National Empowerment Fund (10%).

In the VANS sector the major foreign participants are IBM and EDS who own significant shares of Trafos and EDS/Vanco respectively. As with the other markets, foreign participation is limited to 30%. Ownership of the big three providers is: - Trafos (IBM 50% and Standard Bank 50%) EDS/Vanco (Dimension Data:50%; EDS: 43% and AECI 7%) FirstNet (a wholly owned subsidiary of First National Bank). Large international investment has also played a significant role in growing the internet industry in South Africa. Foreign participants include Sprint and IBM.

Satellite networks are provided solely by foreign providers with only a minor shareholding by Telkom in Intelsat (%)and Inmarsat (%). The Dept of Communications has initiated plans to examine the feasibility of launching a regional satellite owned by industry members from the region. However, plans are not far advanced and if followed up would take many years to unfold. Signal distribution is operated by local firms only, of which Telkom is the only one for telecommunications services. The reason for this is that Telkom has a monopoly on international services until 2002/3.

Exports

The entry of international firms into South Africa and the liberalisation of telecommunication markets elsewhere in the world has provided an incentive to South African firms to enter foreign markets.

In the fixed line network segment of the market, Telkom has been investigating a number of opportunities in Africa, including the Democratic Republic of Congo, Senegal, Cote d'Ivoire, Ghana, Malawi and Uganda. It is part of the Telkom strategy to become a pre-eminent telecoms operator in Africa in order to broaden its revenue base and allow for the economies of scale to

make it competitive internationally. This outward investment is taking place mostly with its current equity partner, Telekom Malaysia, who agreed to look at investment in other African countries together with Telkom. Of the countries that have been investigated thusfar, a bid has already been placed for a 51% share of Uganda Telecoms. This is a consortium bid with Telekom Malaysia and is in competition with two other consortiums.

In the mobile communications market, the network provider MTN has been very aggressive in moving into Africa while Vodacom has been slower off the mark. This difference may have a considerable amount to do with differences in ownership. Vodafone, a 31.5% shareholder in Vodacom, has several licences in Africa and Vodacom has admitted that it would not bid in competition to them. MTN, on the other hand, no longer has any foreign ownership.

Thusfar, MTN has invested a total of \$110m in networks in Rwanda (\$20m), Swaziland (\$20m) and Uganda (\$70m). In each case MTN has entered the market with local partners. In Swaziland the partner is Swaziland Postal and Telecommunications, in Rwanda it is Rwandatel, and in Uganda the main partner is Telia of Sweden but local partners are also part of the consortium. The customer base is 7000 in Rwanda and 35 000 in Uganda. MTN is also finalising an investment in Nigeria which it sees as full of potential due to population size. Other markets which MTN has expressed an interest in are Kenya, Cote d'Ivoire, Tanzania, Ghana and Sengal. They were unsuccessful in their bid for a mobile licence in Cameroon. The company sees the strategy as both providing long-term growth once the South African market saturates, but also as a means of reducing costs through building regional networks which provide bulk purchasing power. In contrast, Vodacom only has an investment in Lesotho with 6500 customers.

[There needs to be some analysis of how Internet Providers have engaged in trade]

3.2.3 Consumption Abroad

There is no data on the communication service consumption of South African travellers abroad. In terms of trying to capture some of this market, Telkom has introduced and marketed an international calling card. On the mobile front, both Vodacom and MTN have numerous international roaming agreements. MTN has agreements in X countries and Vodacom in X countries.

In an effort to grab some of the SA market, callback services entered the SA market some years ago but were quickly classified as illegal as they bypassed the Telkom monopoly.

3.3 Regulations Governing Competition and Trade

3.3.1 Background and Objectives of Current Regulation

The momentum towards restructuring the telecommunications market in South Africa came in the late 1980s when the previous government investigated the option of having the public telecommunications managed as a commercial enterprise. The momentum came from both observation of changes internationally and the fact that inefficiencies in the delivery of communications services locally resulted in poor returns to capital and rising debt – hindering its ability to serve the needs of a growing modern economy.

After Telkom was incorporated in 1990, a study by Coopers & Lybrand was initiated to examine the policy options for restructuring the industry to maximise the economic and social benefit, including improving telephone penetration, affordability and service levels. The recommendations of the report, released in 1992, included most of the elements of the eventual regulatory regime enacted in the Telecommunications Act of 1996. These included an exclusivity period for Telkom, resale of capacity for voice traffic prevented for 3-5 years, stringent licence conditions for Telkom during this period of exclusivity, and the establishment of an independent regulator. It also included a call for some immediate steps to be taken – including the issuing of two mobile communications licences and the opening up of the VANS and customer equipment markets.

The government acted on the mobile licences (issued June 1994) and the opening of the VANS and customer equipment markets (1993). However, the major revamp of the regulatory regime would have to wait for first a change in government and second a process of broad consultation

through a Green/White Paper process. The White Paper was only released in March 1996 and the ensuing legislation enacted in November 1996. This meant that although a 5 year monopoly period was recommended for Telkom back in 1992, that monopoly period only began to take effect in 1997.

The Green/White Paper process did, however, contribute to the final regulatory outcome because it included a number of objectives other than increasing competition, efficiency, innovation and profitability in the industry. In particular it called for the following social goals to be part of the objectives of a telecommunications policy:

- promote the universal and affordable provision of telecommunication services;
- ensure that, in relation to the provision of telecommunication services, the needs of the local communities and areas are duly taken into account;
- encourage ownership and control of telecommunication services by persons from historically disadvantaged groups;
- encourage the development of human resources in the telecommunications industry;
- promote small, medium and micro-enterprises within the telecommunications industry;

The most important economic goals expressed in the objectives were:

- promote the provision of a wide range of telecommunication services in the interest of the economic growth and development of the Republic;
- encourage investment and innovation in the telecommunications industry;
- encourage the development of a competitive and effective telecommunications manufacturing and supply sector;
- ensure fair competition within the telecommunications industry;
- ensure efficient use of the radio frequency spectrum;

What follows is a discussion of the most important aspects of the current telecommunications regulatory regime in South Africa.

3.3.2 Independent Regulatory Body

An important component of the new telecommunications regulation was the establishment of an independent regulatory body, a function that used to reside with the Department of Communications and Telkom. The new body, the South African Telecommunications Regulatory Authority (SATRA), consists of 3 to 5 councillors and one chairperson, all Presidential appointments based on the recommendations from a parliamentary committee. The act specifically excludes people who may have conflicting interests such as a financial interest in the industry itself, and demands that the committee be representative of the population and with sufficient expertise amongst them. The councillors are appointed for 4 years and the chairperson 5 years. The council can appoint a sizeable staff and occasional consultants to assist it in performing its function.

The intent of the regulation is that in the long run SATRA is wholly financed through various licence and tender fees from the industry itself. This gives the Authority an important financial independence from the Ministry. However, there is provision for the Authority to get finance through parliament. Each year SATRA must submit an account of previous years finance and present a proposed budget to the Ministers of Communications and Finance for approval. Any funding from the fiscus must be approved by parliament.

The purpose of SATRA is to regulate the industry in terms of the Telecommunications Act (1996) and pursue any new policy directions that are issued by the Minister of Communications as long as they are consistent with the broad objectives expressed above and if prior consultation has taken place. Many aspects of the Telecommunications Act provided only limited guidance and regulatory principles and so much of the initial work of SATRA was to put some concrete guidelines together for the purpose of regulation. The regulatory aspects left to the discretion of the regulator included interconnection, facilities leasing, GPMCS and licence conditions.

However, the implication of the Minister setting policy means that many of the dates for which segments of the market are opened for competition, and the number of new entrants, are left to

the discretion of the Minister - the Telecommunications Act of 1996 does not put specific dates to the process of liberalisation. The regulator merely calls for bids and issues licences according to fair and transparent criteria.

3.3.3 Fixed line telephony

Public Switched, Long-distance and International Services

The attainment of social objectives played an important role in deciding how to regulate the fixed line market. It was felt that rapid infrastructure rollout to previously under-served areas was critical to the promotion of universal service and economic empowerment. As these areas are generally either low-income or rural, the feeling was that immediate competition in fixed line services would not serve the objectives best. This is because a) new entrants would target the more lucrative and easily established business and long-distance markets first and not seek to rollout in these under-served areas, and b) competition in these markets would squeeze the profitability of Telkom and so limit its own ability to rollout in these unprofitable areas, c) the option of contributions to a universal service fund was not desirable until basic exchange infrastructure was in place in some areas to which low income households could be more cheaply connected. This coincided with the need to restructure Telkom itself to face competition – such as improving efficiency and rebalancing its tariffs to remove cross-subsidisation. It is also felt that the granting of an exclusivity period helped raise the market value of Telkom allowing for a better price on the equity sale.

For these reasons, the Telecommunications Act gave Telkom a regulated monopoly for five years, extendable to six, in the following market segments:

- public switched telecommunications network,
- national long distance,
- international,
- local access,
- public pay phones, and
- infrastructure for value added network services, mobile cellular network operators, and private networks (other than Transnet and Eskom).

However, to ensure that this exclusivity period fulfilled the goals of infrastructure rollout and preparing Telkom for competition, strict licence conditions were placed on the network provider. The licence conditions included rolling out 2.81 million new lines over the exclusivity period, of which 2/3rds will be in under-served areas and for priority customers. It is estimated that this will require capital investment in the region of R53 billion. The specific rollout targets are presented in table 8 below.

Telkom wins an extra year of exclusivity if by the end of the fourth year it has achieved a roll-out of 90% of its cumulative five-year total line target and 80% of its five-year under-served line target. This will be granted if Telkom accepts a new five-year total of three million new lines and a proportionate increase in its under-served line target. There are financial penalties for failing to reach these targets. Telkom pays penalties of R450 per line for the first 100,000 and R900 per line for each extra line missed. If it misses Priority Customer targets the penalty per unit is R4,500, schools R900, public payphones R2,250 and villages R1,125.

Table 8: Rollout Targets for Telkom in terms of License

| | 1997/8 | 1998/9 | 1999/2000 | 2001 | 2002 | Total |
|--|--------|--------|-----------|--------|--------|---------|
| Total new access lines bought into service | 340000 | 435000 | 575000 | 675000 | 665000 | 2690000 |
| No. in under-served areas | 265000 | 318000 | 359000 | 357000 | 378000 | 1677000 |
| No. for priority customers | 3240 | 3845 | 4055 | 5060 | 4046 | 20246 |
| No. of villages served | 510 | 610 | 610 | 800 | 644 | 3174 |

| | | | | | | |
|--------------------------|-------|-------|-------|--------|--------|---------|
| No. of payphones | 20000 | 25000 | 25000 | 25000 | 25000 | 120000 |
| No. of replacement lines | 20000 | 13000 | 65000 | 551000 | 603000 | 1252000 |

Source: JEDP

In addition to these rollout targets, Telkom is committed to upgrading the network and its service record. This involves upgrading the entire network to digital by 2000, lowering the installation waiting period to X days for business and X days for residential, lowering the number of faults per 100 lines to x, and reducing the time to fix faults to x days.

The licence also allows for restrictions on price increases introduced by Telkom to ensure that its monopoly position is not abused during the exclusivity period. These are set for a bundle of services (including local, long-distance and international) and are restricted to the CPI -1.5% for the first three years, after which SATRA will set tariffs.

The above exclusivity arrangements relate to network provision. However, the Act does allow for the introduction of independent service providers in the local access, payphone, national long-distance and international services after the fourth year of exclusivity. These providers would not be able to operate their own networks but would be able to lease and resale capacity from the incumbent, Telkom, or a licensed private network operator. This should increase efficiency in aspects of the provision of telecommunications services through competition. Conditions will be set at the time for licences to provide these services, and will most likely include limitations on foreign ownership (to 30%).

When the exclusivity period comes to an end, the Act makes provision for the Minister to authorise SATRA to issue one more licence for provision of a public switched network provider that will include long-distance and international voice traffic. Additional competition may come from VANS who will be allowed to carry voice traffic at an unspecified future date. As it stands, there is likely to be a limitation on foreign ownership as is the case with all other market segments. The licence holder will be eligible for universal service fund contributions of x%, human resource contributions of x% and a licence fee of 1% of turnover. There may be additional conditions attached but these are unlikely to exceed any that Telkom would have to bear.

Finally, although the Telecommunications Act did not specify the exact timing of the end of the exclusivity period or the timing for resale of services, the government has made a GATS offer on Basic Telecommunications which binds it to introducing competition no later than the end of 2003.

VANS

The value added network services business is open to competition, with all licence holders prior to the 1996 Act retaining their licences. The industry is open to new applications without the Minister issuing a call for licences. However, to protect the monopoly market segments of Telkom, VANS licence holders are prevented from the resale of capacity and of carrying voice traffic, until a date set by the Minister. In fact, they are also required to make use of Telkom facilities to undertake their services. The licence conditions also include no undertaking of anti-competitive practices and adhering to practices that protect the customer. SATRA has set the licence fee for VANS at R15,000 a year. They are also eligible for a universal service contribution of R1500 per annum and human resource fund contributions of R750 per annum from mid-1999.

VANS are described as including electronic data interchange, electronic mail, protocol conversion, database access, managed data network services, voice mail, store and forward fax, video conferencing, telecommunications related to publishing and advertising services and electronic information services, including Internet service provision. However, there is currently a legal battle over the provision of Internet services. Telkom has argued that Internet services constitute a basic service and as such fall under its monopoly. SATRA has ruled in favour of the Internet Service Providers (ISPs) but Telkom has taken the battle to the Supreme Court.

Private Networks (voice)

Eskom and Transnet both have large private networks that could potentially be used in competition to Telkom. In fact, it is believed that one of these two would likely get the second public switched licence in partnership with an empowerment group and an international operator. They have the advantage of not only having a large existing network, but also extensive land access over which to lay out a new network. There are also numerous other private networks that operate within a corporation on their land.

In terms of the Act, a licence is required to operate a private network that extends beyond the boundaries of land owned by the corporation, except for Transnet or Eskom. No such licences are available until notice from the Minister. In addition, in order to limit the potential competition from Transnet and Eskom at the end of the exclusivity period, or at the point where resale of capacity is allowed, the Act states that either of these two may not *“install or extend their telecommunication facilities so as to cause unnecessary duplication of such facilities with the telecommunication facilities of Telkom, or embark on any major installation or extension of their telecommunication facilities, without the proposed installation or extension in question having been referred to a liaison committee”*. The liaison committee includes Telkom and so they must authorise network expansion. If agreement is not met, SATRA may intervene and make a decision on network expansion.

3.3.4 Mobile communications

Cellular

The Telecommunications Act recognises the licences of Vodacom and MTN to operate a cellular network. It also requires that within two years SATRA investigate the feasibility of issuing more licences. This has occurred and one more licence is due to be awarded in November 1999. SATRA is required to conduct a further feasibility study for a fourth cellular licence by July 2001. The Act allows SATRA to establish licence conditions for any licence that help achieve the objectives laid out above. Thusfar they have included limitations on foreign ownership, requirement to have a Black empowerment partner, economic development through local purchasing and exports, universal service obligations (beyond USF contributions) and human resource development. The scheme developed for the cellular licences was to attach values to certain development actions for which the network operators were credited. The requirement was for a credit amount and the licence holder could choose the mix of activities that fulfilled this obligation.

In addition, there were some specific service conditions:

- MTN and Vodacom were required to install 7,500 and 22,000 community service telephones respectively to under-serviced areas over a period of five years
- Achieve a population coverage of 60% within 2 years and 70% within 4 years.
- Not increase prices in one year beyond the CPI

The conditions for a new licence have similar requirements but have been relaxed to attract international investors. In particular, the new entrant will be allowed domestic roaming on the MTN and Vodacom networks to provide them with extensive coverage while their network is being rolled out and they will be protected from further new entrants for 5 years. There is also no specified shareholding size for the required empowerment partner.

The Act also recognises that in order to provide a cellular service, the licence holders will need to provide long-distance and international services, often through alternative technologies (satellite or fixed line). To protect the Telkom monopoly, the cellular providers are not allowed to make use of any fixed lines other than those from Telkom, and all international services must be routed through the Telkom network. They are of course free to negotiate international roaming services for when the consumer is out of the country.

Satellite

Satellite networks can be used for transmission of national long-distance and international

traffic, as well as Global Mobile Personal Communications. As Telkom does not have any satellite network itself, the network provision is open to competition. However, in order to protect the Telkom monopoly on international traffic, all signal distribution for incoming and outgoing calls to SA through earth stations must take place through the Telkom service provider. In the event that the Satellite network is able to bypass the Telkom facilities through satellite-to-satellite links or earth stations positioned outside the borders, a bypass fee must be paid. This fee has yet to be negotiated. This arrangement will end when Telkom exclusivity ends.

3.3.5 Interconnection, Facilities Leasing and Numbering

Interconnection is crucial to a competitive environment as the value of a network depends on the number of subscribers. It is also necessary for a separation of service providers from network providers. Under the Act and subsequent guidelines issued by SATRA, interconnection with a major provider is ensured

- At any technically feasible point in the network,
- Under non-discriminatory terms,
- In a timely fashion under conditions that are transparent and fair, and
- At rates determined by SATRA. These will be set at the long run incremental cost (LRIC) of building and maintaining a network by an efficient telecommunications provider, including an average return on capital. The information required for setting such rates, will be determined by the Chart of Accounts and Cost Allocation Manual (COA/CAM) that is obligatory for all network providers to submit.

SATRA reserves the right to settle disputes over interconnection and enforce the minimum requirements established above for interconnection agreements. Similar guidelines have been established for facilities leasing, another important practice for furthering competition in the telecommunications industry.

The numbering plan has yet to be finalised by SATRA though a proposed policy document has been released which provides us with an insight into the principles that SATRA is working with.

3.3.6 Universal Service and Human Resource Development

Two important social objectives of telecommunications policy are universal service and human resource development. These are given concrete support in the Act through the formation of two funds and a supervising agency for universal service.

Universal Service

The Universal Service Agency has been established with the goal of investigating and recommending ways to achieve universal service. This includes defining what the universal access or service targets are. The Agency has two tools with which to influence universal service. First, they may recommend licence conditions that help bring about universal service/access. Currently, both the cellular network providers and Telkom have significant obligations to provide services to under-served areas, as discussed above. While these conditions remain, new entrants will be given similar conditions to ensure no competitive advantage.

Second, the Universal Service Fund was established to subsidise "needy persons towards the cost of the provision to or the use by them of telecommunications services", and to repay Telkom and other licence holders with universal service obligations for extending their services to poorly or unserved areas and communities. For now, Telkom will receive most of the money as it rolls out to these areas. The fees are non-discriminatory and have been set by SATRA at 0.16% of turnover per annum for network providers, R1500 per annum for VANS and R1000 per annum for private networks.

Human Resource Development

The Department of Communications will manage the Human Resources Fund whose goal is to "promote the provision of adequately skilled human resources at all levels of the telecommunications sector in sufficient numbers ... in such a manner as to redress past unfair

discrimination in education, training and employment". The annual contributions to this fund are half those to the universal service fund and are similarly non-discriminatory.

The Act makes provision for a wide range of applications for which this Fund can be used, from training in schools through to postgraduates, from unskilled to artisans. The funds may be used for applications from bursaries to upgrading teaching staff and facilities in selected institutions.

3.3.7 Other General Regulations

Other significant regulations impact on the telecommunications industry even though they are not geared specifically to it. These include:

- Exchange controls – limits on moving foreign exchange limit the extent to which SA companies can export telecommunications services through FDI. Further details are available from the TIPS finance study.
- Sourcing of finance – firms established in SA with a foreign holding of more than 25% can be prevented from sourcing capital locally. This will impact on imports of foreign telecommunications through FDI because sourcing local capital limits allows companies to limit their exchange rate risk. Lower risk may result in higher investment.
- Presence of natural persons – trade through FDI requires the movement of experts and management to establish and control the operation. Restrictions on gaining temporary work access to the country will limit the extent to which experts can be used and so limit FDI. South Africa seems to lack a transparent policy on the movement of persons. More details are available from the TIPS study on the temporary movement of persons.

3.3.8 Barriers faced in Export Markets

The process of deregulation is similar throughout the world and so the same barriers to foreign entry established in SA exist in other countries to varying degrees depending on how far down the path they have gone. In South Africa's primary potential markets, sub-Saharan Africa, the process is not significantly deregulated.

[Need to examine current state of regulatory reform in sub-Saharan countries]

4 The Potential Impact of Liberalisation of the Domestic and Foreign Communications Services

4.1 Potential Impacts of Full Deregulation and Trade Liberalisation

As already discussed in section one, the nature of trade in telecommunications services is that the majority of trade is likely to involve commercial presence. The exception is international traffic, which constitutes only a portion of total revenues. For this reason, the following analysis of the costs and benefits of deregulation and trade liberalisation is predominantly about the impact of trade on industrial performance in the host country – regardless of ownership issues. This being the case, the main impacts of trade can be seen to be static and dynamic efficiency gains in the sector liberalised and the broader impact on the rest of the economy from gains in that sector. A brief discussion of the route through which benefits arise from deregulation and liberalisation follows. The discussion will make use of a recent OECD study on the impact of deregulation to provide a rough idea of the size of these potential benefits/costs². The study only looked at regulatory reform and not specifically trade liberalisation. However, as most of the impacts are confined to the domestic market, and all trade liberalisation adds is foreign technology and investment, then the results are useful for the SA study.

4.1.1 *Impact on the Domestic Telecommunications Service Industry*

Static Pricing Effects

Many telecommunication service markets are characterised by monopolistic or oligopolistic market structures due mostly to regulatory restrictions. Firms operating in these markets have market power and so face are able to restrict output in order to influence price and maximise profits. The introduction of competition through deregulation and trade liberalisation will result in increasing the elasticity of demand faced by the incumbent(s), forcing them to move closer to a more efficient marginal cost pricing regime – i.e. lower mark-ups of prices over costs. The size of these benefits are likely to be large in the case of telecommunications network providers which have traditionally been monopolies.

It is important to note that increased competition in telecommunications comes not only from those using the same technology but also those using alternate technologies. For instance, fixed line telephony operators face competition from cellular, satellite and now internet telephony. The more expensive technology used for cellular telephony means that it is not a close substitute, but nonetheless it has a disciplining impact on the fixed line operator by setting an upper boundary for price markups. Further, cost reductions in these alternate technologies effectively lower that upper boundary which has a competitive impact on the fixed line operator. In the same way, cable operators branching into internet provision are a source of competition for Internet network providers using slower fixed line technologies.

The OECD study on the potential impacts of regulatory reforms includes countries which have already undergone some reforms and others which remained monopolistic at the time of writing. Table 9 below lists the gross and net margins for telecommunications network companies in various countries as well as the OECD estimate of how profit margins may be reduced from increased competition or more demanding price-caps where competition is infeasible. The OECD recognises that profit margins are an imperfect means of estimating profit mark-ups over marginal costs in the industry but no adequate data on marginal costs is available. Their estimate is that a gross profit margin of 10% and a net margin of 5% is 'normal' and so there is substantial scope for reducing margins even in the USA.

² OECD 1996

Table 9: Margins in OECD telecommunications sectors and the potential impact on profits of reforms

| | USA | Japan | Germany | France | UK |
|---------------------------------|------|-------|---------|--------|------|
| Margins | | | | | |
| Based on gross operating income | 17.2 | 8.8 | 28.0 | 18.5 | 21.5 |
| Based on net income | 10.6 | 3.5 | 8.0 | 6.2 | 13.8 |
| Potential Impacts of reform | | | | | |
| Profits | -15% | 0% | -15% | -10% | -25% |

Source: OECD 1996

Static Scale Efficiency Effects

The introduction of new competition in the domestic market will impact on the scale of operation of all players. The extent to which the impact is positive or negative, depends on the entry/exit costs to the industry, the current scale of the incumbents and the extent to which the market expands from the expected price reductions resulting from lower price-cost margins and productivity improvements.

For telecommunications network providers the sunk costs are huge, making entry and exit extremely costly. In this case, the entry of new firms is unlikely to result in the exit of existing firms. Therefore, entry will mean that the market share of each operator will be reduced, suggesting that there may be a loss of scale efficiency. However, this is unlikely for a number of reasons. First, studies of OECD countries suggest that the market expansion effects of deregulation and liberalisation of telecommunications markets are extremely large. OECD (1996) suggests that in protected markets like France and Germany, the market could expand by over 40% if one accounts for product innovation, productivity improvements and lower price-cost margins. Second, many network providers are operating well above efficient scale already. Third, technological improvements are reducing the efficient scale level all the time. Finally, new entrants will not wish to operate at a less efficient scale than existing firms as it would put them at a cost disadvantage. Therefore, assuming all participants get an equal share of the market, entry is likely to be limited to the point where all operators have sufficient scale. In fact, under most regulatory regimes, entry is regulated anyway to ensure that all operators are able to operate at an efficient scale and make a reasonable return on their investment.

For telecommunications service providers, the sunk costs are considerably lower making entry and exit less costly. The sunk main costs may include a retail distribution network, contractual obligations for leasing network capacity, and personnel redundancy obligations. In this case, a drop in price mark-ups from increased competition and productivity improvements will induce firms to expand output and reap the benefits from operating at a larger scale – a further efficiency gain. In order to facilitate this scale expansion, we are likely to see either some inefficient firms being forced to exit the market (opening opportunities for remaining firms to expand output) or some firms will enter the export market (allowing them to raise output volumes sufficiently).

Static Productivity Gains

The introduction of greater competition is likely to result in an immediate reduction of inefficient business practices in domestic firms, serving to lower marginal costs. The lowering of prices through lower price-costs margins and opportunities for scale efficiencies will force domestic firms to adopt the available domestic best practice production technologies to retain profitability. The alternative is to see profits squeezed to the point where they may be forced to exit the market, or have their market share reduced to the point where they start to lose scale efficiency too. It should be emphasised that this process is a reduction of X-inefficiency and not an improvement in technological frontiers – that is discussed in the next section.

Empirical evidence from manufacturing firms facing increasing import competition suggests that average productivity does increase as the dispersion of productivity levels amongst domestic firms decreases through inefficient firms exiting or improving³. The extent of the immediate

³ Tybout, J. et al (1991)

productivity gains from removing inefficiency in production may be significant but are likely to be dwarfed by the technological gains discussed below. It is difficult to empirically separate these effects from the growth in productivity that is likely to occur over the short-to medium-term as competition and trade increases the drive for future productivity increases and access to foreign know-how allowing a closing of the technological gap.

Dynamic Benefits from innovation and productivity growth

The telecommunications service industry is noted currently for its rapid rate of technological progress that is not only reducing costs at a phenomenal pace, but also expanding the market through a continual introduction of new products. For this reason, the potential dynamic benefits from deregulation and trade liberalisation are seen to be far more important than the static gains from pricing, scale efficiency and a once-off reduction of X-inefficiency. Competition and trade liberalisation will influence the rate of process and product innovation in the telecommunications sector and therefore facilitate South Africa to 'close the technological gap' with other countries and realise higher rates of productivity improvement and product innovation. The mechanisms that achieve this are:

- Increased competition from deregulation and/or trade liberalisation improves the incentive to innovate/imitate in the long run as productivity gains from other producers gradually push prices low enough to force non-innovating firms to exit the market, or producers of new products displace producers of old products.
- Trade or FDI will help firms get access to foreign know-how. As imitation is often less costly than innovation, the rate of technological progress should accelerate. Exposure to a larger knowledge base should also accelerate their own innovation through having an additional idea source.
- Trade may expand the service market (either by exports or domestic expansion from price-cost margin reductions) which improves the return to innovation and so increase the innovative effort.

These effects differ from the static gains where a firm improves productivity once-off to the level of domestic best-practice. Under the dynamic gains from trade, firms accelerate their technological growth rate and so should come closer to 'catching-up' with world best-practice.

The counter-argument is that when learning-by-doing (learning through production experience) is the most important source of technological gains, then temporary protection may be the best policy in order to allow domestic firms to gain that experience and improve productivity sufficiently to compete. The emphasis is that protection needs to be temporary otherwise there is no incentive to move down the learning curve.

However, in the case of telecommunications this argument probably holds little credibility for a number of reasons. First, competition takes place through commercial presence except for international services. Therefore, failure by domestic firms to learn rapidly means that they are replaced by foreign firms but who produce on domestic soil anyway. Second, foreign providers entering will still use a high portion of local labour which must go through the same learning curve as incumbents which allows incumbents time to learn. Further, in the case of network providers there may be a significant time passed until the network is fully operational and with high coverage. Third, the high sunk costs of network providers means that they are not going to be destroyed by competition and therefore have time to learn.

It should be noted that many of the benefits to productivity growth in a service sector may come from trade liberalisation of an input market. Liberalisation of an input market may increase the variety and quality of inputs available to the service firm, which in turn improve the productivity of the service firm. This is the case with one part of the communications sector, internet services and e-commerce, which responds to price reductions in the inputs of local access providers. It is the introduction of new services in this area that many of the gains from liberalisation may occur.

Deregulation can have a significant impact on the level of e-commerce and other internet usage in a country through reducing the cost of access for consumers. Lower access costs result not

only from the price reductions expected but also a change in the charge structure. As mentioned in section one, the marginal costs of an additional call when spare capacity is present, is more or less negligible. For this reason, more efficient local access pricing involves higher connection charges and lower call charges. Pricing in many deregulated markets has moved this way, often with local calls free. In addition, increasing efficiency of the local access telephone company, allows interconnection charges for ISPs to be reduced, lowering the cost of using an ISP for the consumer (necessary for internet access). The overall impact is that the cost of online browsing and shopping becomes significantly reduced, drawing more consumers into the virtual marketplace.

E-commerce and the provision of online information services, like any economic activity, has economies of scale. For e-commerce, there needs to be sufficient volumes in the market to ensure the establishment costs are covered. For free online informational services, there needs to be sufficient volumes to ensure sufficient advertising revenues are raised to cover establishment and ongoing costs. Therefore, drawing more consumers into the market is likely to make e-commerce and free information services more and more viable locally. In turn, this allows more rapid growth of the industry locally, creating output and employment expansion.

Analysts argue that the early deregulation of the US market has enabled them to take the lead in e-commerce over other industrial countries for all the reasons cited above⁴. It has also had a significant spin-off for the telephone companies too. The burgeoning e-commerce has created a consumer demand for multiple lines to the household – one for calls and one for the internet. This translates into higher output for local access companies which put in these lines. This in turn can lead to employment creation and further efficiency gains from increasing scale. It is this effect that accounts for some of the potential output growth from deregulation discussed above.

The OECD study (1996) provides some idea of how large these benefits from productivity improvements and product innovation can be. Table 10 below reproduces their measures of labour and capital productivity of telecommunications network providers in 1994 and their estimates of the potential impact of deregulation reforms. It is interesting that even amongst industrial countries, the productivity levels can vary so considerably – mostly due to a lack of competition and trade. Such lags in productivity mean that when reform is implemented then the potential productivity improvements are highly significant, up to 40% improvement in labour productivity and 50% improvement in capital productivity. What is equally impressive, is the estimation that catching up with lags in product innovation in these markets could expand market demand by between 10-30%.

It should be noted that growing internet usage has a significant impact on these figures. First, growing usage leads to longer call times, raising capital productivity as measured by calls minutes per unit of capital. Further, much of the innovation-induced output expansion arises from increasing lines for internet use and the e-commerce and free information services.

Table 10: Margins in OECD telecommunications sectors and the potential impact on profits of reforms

| | USA | Japan | Germany | France | UK |
|---|------------|--------------|----------------|---------------|-----------|
| Labour Productivity Index (composite of access lines and call minutes per employee, 1994, USA =100) | 100.0 | 96.0 | 72.0 | n.a. | n.a. |
| Capital Productivity Index (Call minutes per unit of capital service, 1994, USA=100) | 100.0 | 46.0 | 38.0 | n.a. | n.a. |
| Potential Impacts of reform | | | | | |
| Labour productivity | 10% | 15% | 30% | 40% | 20% |
| Capital productivity | 10% | 40% | 40% | 50% | 20% |
| Innovation effect on output | 10% | 15% | 30% | 30% | 15% |

Source: OECD 1996

The size of all these numbers reflect how fast process and product innovation has been occurring in the telecommunications sector, and continues to occur. Continuing to uphold

⁴ See FCC (1996)?

monopoly market structures is only going to result in a widening of the productivity and product range gap with countries like the USA. As this gap widens, so does the cost of not reforming these markets and the penalty to the domestic users of telecommunication services.

Overall impact on Output, Employment and Prices

Telecommunications services is about the only service sector where analysts expect deregulation will result in a positive outcome on employment generation along with the expected gains in output and lower prices (the output gains are expected as few leakage's occur to cross-border suppliers). This is in large part attributable to the high degree of market expansion that is likely to occur from improved innovation and not the smaller static gains. It should be noted however, that the expected gains are likely to be achieved in the medium term and the initial impact on employment will be negative until prices have time to adjust and bring in demand increases.

The OECD (1996) estimates for a few OECD countries are presented in table 11 below. Price reductions range from 6% for the relatively liberal USA telecommunications sector to 30% for the more restricted French sector. Output increases by between 13% to 45%, with roughly 70% coming from product innovation. Finally, employment is seen to increase in all cases and ranges between 2% for the UK to 11% for Germany. These estimates are adjudged reasonable accurate based on deregulation experience to date.

Table 11: OECD assessment of potential sectoral output, employment and price effect of regulatory reform

| | USA | Japan | Germany | France | UK |
|---------------------------|------------|--------------|----------------|---------------|-----------|
| Output Prices | -6% | -16% | -23% | -30% | -13% |
| Sectoral Output, of which | 13% | 23% | 41% | 45% | 21% |
| Price induced | 3% | 8% | 11% | 15% | 6% |
| Innovation induced | 10% | 15% | 30% | 30% | 1h5% |
| Sectoral employment | 3% | 8% | 11% | 7% | 2% |

Source: OECD 1996

These benefits accrue to the telecommunications sector itself and do not include the potentially significant downstream benefits which are discussed below. It is also important to note that these are the estimated benefits from deregulation, over and above the natural growth of this sector under current monopolistic conditions.

4.1.2 Broader Economy-wide Benefits

Demand, price and productivity in other industries

Benefits from trade liberalisation of service markets are not confined to these markets alone. In fact, many commentators believe that the main gains for developing countries are actually with the downstream users of these intermediate services. This is especially the case with telecommunications services which form the backbone of the new information economy. The source of up-and downstream benefits arise from the fact that service industries are both an important intermediate input into all sectors of the economy, and they are a large source of demand for many products. The range of possible downstream benefits include:

- Increased demand for productivity enhancing inputs – the process of improving productivity in response to liberalisation or deregulation will most likely result in increased demand for selective inputs to bring about these changes. In the telecommunications industry these are most likely to be business services, new capital equipment, technology licensing, education services and financial services. The extent to which this demand is realised locally depends on the import-intensity of these inputs.
- Increased investment demand for capital goods – it has been noted that deregulation and trade liberalisation is likely to result in demand expansion from price reductions and product innovation. The increased output will require additional investment in capital goods to support expansion. However, the extent to which the local economy benefits will depend on the import intensity of capital goods.

- Increased ongoing demand for intermediate inputs – this increase in output will result in increased demand for supplier inputs. A full input table is presented in the first section of the paper which shows which industries are likely to benefit most.
- Price reduction for sectors in which liberalising sector is an intermediate input – lower prices in the liberalising sector feed into lower input prices for other industries. These lower input prices may lead to lower prices in these industries too, which in turn will expand output to an extent determined by their price and income demand elasticities. This impact is likely to be significant in telecommunications due to the huge scope for price reductions.
- Productivity improvements for sectors in which liberalising sector is an intermediate input – growth in the quality and variety of intermediate inputs can result in improving productivity and growth in final goods production. This occurs as either less input is required due to its higher quality, or the more specialised input is more closely tuned to the needs of the industry and so has a greater productivity impact. With telecoms, new services may just make productivity enhancements feasible in downstream industries. These productivity improvements in downstream industries may lead to price reductions and demand expansion if significant. A further source of productivity increases may come from investment in new capital equipment in order to expand output. Much technology is embodied in new equipment.
- Scale effects – the expansion of demand in a number of linked sectors (for any of the reasons mentioned above) could lead to scale efficiency benefits, increasing efficiency and lowering marginal costs.
- Price reductions in a number of sectors increases the real income of consumers, which feeds through to a general increase in the level of domestic demand. Demand patterns, and the impact of changes in relative prices on these patterns, will determine which industries benefit most from demand increases.

The extent to which lower input prices and productivity enhancing improvements in service intermediates lead to price reduction and demand expansion in domestic final good industries depends in part on the market structure in those industries. If they are oligopolistic in nature, these improvements may not feed into lower prices but higher margins and so weaken the demand expansion effect. Similarly, if the productivity improvements are fed entirely into wage increases, then prices will not reduce. However, in this case there would still be some demand expansion from higher incomes in the consumer base. How significant this is for domestic industry, depends on the import-intensity of such demand.

Further, the total price reduction and output expansion is a result not just of these first round effects, but also of further rounds of similar effects as the price reductions and output expansions in other industries feed into higher demand for the services that have been liberalised or other sectors.

Finally, it should be recognised that the macroeconomic environment will impact on whether this potential demand changes are actually fulfilled. For this to occur, there needs to be an environment that is conducive to investment in output expansion, including low or dropping real interest rates. Otherwise, the potential demand may not be realised.

Broader Macroeconomic Benefits

A period of co-ordinated and significant trade liberalisation in a number of service sectors at once can have a number of other positive macroeconomic side-effects that may increase the potential benefits to a country undergoing the process. These effects are likely to be small if only one sector is liberalised at a point in time.

- Firstly, the simultaneous reductions in prices in a number of service and related sectors through productivity improvements could significantly lower inflationary pressures for a period in a country. This may allow for the reduction of real interest rates without fear of significant inflationary outcomes. Lower real interest rates should allow the expected output expansion in the affected sectors to occur but also crowd in more private investment in unrelated sectors.

- Secondly, because commercial presence is a prerequisite for most telecommunications service trade, then the liberalising of trade will lead to a round of foreign investment in a country. For developing countries this is important as it means that a significant amount of the new investment will not place a strain on the balance of payments. The lower threat to the BoP removes pressure from the monetary authorities to lift interest rates – a strategy used to balance the foreign account by attracting foreign capital flows.
- Thirdly, a period of price stability and higher growth bought on by widespread liberalisation, may crowd in more investment (local and foreign) as expectations of future returns increase. The impact of higher growth rates on foreign investment patterns has been shown to be significant.
- Fourth, the co-ordinated demand increase from a number of service markets undergoing liberalisation may bring about a sufficient market demand for a number of common inputs (goods or services) which may assist in establishing an industry or producer service in a developing country.
- Finally, the process of enhancing productivity growth through numerous service sectors at once will require human resource training to bring about these improvements. This should raise the overall level of human capital in a country.

4.1.3 Equality Issues - Universal Access and Low Skilled Workers

Universal Service

Most of the liberalisation experience has been in industrial countries where there was already a high level of universal service before liberalisation occurred. In addition, most countries have kept universal service programs but moved to using a standard, non-distorting firm levy rather than distorting cross-subsidisation to implement the program. The concern amongst developing countries is that liberalisation will lead to a desertion of the less profitable low-income market by all providers (so-called 'cream-skimming') making universal service less attainable under such a regime.

However, because countries are able to keep a less distortionary version of their universal service programme under a more liberalised market, the effect on universal service from liberalisation cannot be anything but positive. First, as already demonstrated the price reductions that could come about from liberalisation are potentially huge and would not be realised under a domestic monopoly. These reductions will serve to make telecoms services far more affordable to the low income population, which should translate into more of these people owning a telephone. This effect could be highly significant. An imperfect example is a contrast in teledensity growth in the more liberalised USA market to the more restricted market of SA. From 1988 to 1997 the teledensity in the USA increased from 51 to 64 main lines per 100 inhabitants, while in South Africa the teledensity increased only slightly from around 8.5 to 10 main lines per 100 inhabitants. Obviously differences in consumer income growth account for some of the differences, but much can be attributed to lower prices.

Second, even if a degree of cream-skimming occurs, the universal service levy can still be used to put phones into low-income homes. Considering the size of price reductions from increasing competition and access to foreign know-how, there is considerable scope for imposing a large levy while retaining much of the price reductions. The overall universal service effect should be far greater as one has the benefit of a similar universal service provision as that under monopolistic conditions, combined with the market-widening effect of lower prices.

This confers with the limited experience of some developing countries undergoing partial liberalisation. For instance, when cellular companies entered the Zambian market, they extended service to some low-income rural areas ahead of the incumbent monopolist. This is despite operating a technology that is usually more expensive and without any contractual obligations to serve this market.

Low-skilled workers

Although the overall impact of telecommunications reform on employment is seen to be positive

due to the large potential productivity gains and its important intermediate effect, the impact on different groups of labour is bound to be uneven. In particular, reform is likely to disproportionately benefit the highly skilled over the low and unskilled for the following reasons:

- Raising the productivity of labour within telecommunication network providers will require a higher proportion of more skilled workers. Even though employment may increase in the medium term as output expands, low skilled workers may still lose out if the growth effect is lower than the displacement effect of technological upgrading.
- Much of the demand created by the telecommunications companies during the process of upgrading productivity and then expanding output will go to industries that employ a disproportionately high amount of highly skilled labour. These include business services (32.2% of workforce highly skilled), other communication services (30.5% highly skilled) and high tech manufacturing.
- Expansion of e-commerce and internet services will also create numerous skilled work opportunities for development of these services. However, e-commerce may also create numerous lower skilled jobs in the warehousing and distribution components.

Of course, this expansion of employment also presents an opportunity for lower skilled workers to upgrade their human capital, especially those already employed in the telecommunications industry. This is provided of course that they have a sufficient basic education to be feasibly trained for the new jobs and that the network providers make the choice to train them and not replace them with ready-skilled workers.

4.1.4 Factors influencing the estimation of cost/benefits

The potential costs and benefits from telecommunications liberalisation found in the OECD study are a useful guide to how sizeable some market impacts may be, but they are not necessarily the same benefits that South Africa may realise. South Africa differs from these countries in a number of crucial ways that will alter the size of the costs/benefits. These differences include:

- Lower technological capability – South Africa has a lower overall technological capability than the OECD countries which limits its ability to absorb new technology. This means that local firms are unlikely to reach the productivity highs of their foreign counterparts. Even foreign entrants operating in the local environment will be restricted to an extent by limits in technological capability embodied in the local human resources and suppliers that are used. However, the productivity gap is most likely larger anyway, which means that similar gains can still be made.
- Lower average incomes – lower average incomes and a smaller middle income market will impact negatively on the measured productivity of the telecommunications sector and the potential output growth. Lower incomes mean lower rates of computer and cellphone ownership. Lower computer ownership limits demand for additional lines per household – an important source of expansion in the US market. This will negatively affect the measured labour productivity of lines per employee. Lower incomes and lower household computer ownership also serve to limit the demand potential for e-commerce and the advertising revenue for informational services. This will then limit the extent to which these new services emerge locally and therefore the estimates of how much output might grow from deregulation. Finally, it will also limit the measured capital productivity of call minutes per unit of capital. Lower internet access means lower call minutes and lower incomes means lower call demand.
- Higher market risk – higher risk within developing countries from political instability to exchange rate risk, require that a premium is placed on returns to investment. Therefore, the price-cost margins will be higher than in industrial economies, lowering the price reductions and the expected benefits that flow from that.
- Potential shortage of skilled labour – South Africa suffers from a tight labour market for skilled labour. If telecommunications liberalisation leads to an expansion of labour demand, for the reasons cited above, then a skills shortage may have two effects. First, it may

restrict firms from responding to the increase in demand and so the real output expansion effects may be reduced. Secondly, it may just raise the costs of improving productivity by incurring higher training costs. These would then lower the potential price reductions and so lower output expansion. Finally, shortages imply greater market power for existing skilled labour and so a high proportion of the productivity gains are likely to be captured by skilled labour in the form of wage increases. This will serve to reduce any output and employment expansion effects.

- Higher demand leakage's – South Africa does not have the same depth of manufacturing in high tech and capital goods industries as the OECD countries, nor the quality of business services. Therefore, much more of the expected demand increases from the telecommunications industry itself will leak to foreign firms for information technology products (hardware and software). Further, some of the gains from the expansion of downstream industries will leak to foreign capital goods suppliers.
- Less competitive market structures in downstream industries – many product markets in South Africa are characterised by oligopolistic market structures and limited import-competition due to high tariff levels. Reductions in telecommunication prices may not fully feed into price reductions in these downstream markets as some of the gains may be taken up in profits. This will limit the potential output and employment expansion in these markets. It will also limit the general deflationary effects of liberalisation and increases in the real wealth of consumers.
- Restrictive macro environment – currently South Africa has a relatively restrictive macro environment noted for high real interest rates. If this persisted, the high interest rates would lower the potential demand expansion effects and so feed through to lower potential employment effects.

Many of these factors can be addressed to some extent by suitable industrial and human resource policies which may minimise their impact. These options are discussed later in the paper. However, even with policy intervention, they are still likely to play a role in reducing the potential benefits of reform.

4.2 How far is Current Deregulation getting us?

Current deregulation has moved South Africa down the path towards a more competitive and liberal telecommunications sector. The key changes in the market that have occurred since 1994 are a) introduction of some competition for the fixed line provider from two cellular network providers, b) introduction of a thriving VANS industry including a host of Internet service providers, c) equity partner for Telkom to inject capital and improve productivity, d) clear time limits on the existence of a fixed line monopoly, e) independent regulatory authority with clear guidelines to price cap telephone charges and . However, the key limitations remain a) no fixed line competition, b) VANS must lease all facilities from Telkom, c) all international traffic must go through Telkom, d) no Internet telephony competition, e) limited foreign ownership. The purpose of this section is to assess how far current deregulation effort have taken us and where they limit the potential benefits of reform mentioned previously.

4.2.1 Impact of Current Deregulation

Cellular and VANS

The introduction of cellular networks has been the single most important change in the SA telecommunications industry. It's impact in relation to the discussion in the first part of this chapter can be summed as follows:

- Market expansion – the introduction of a new telecommunications product creates new demand in the industry and so expands the market, creating new investment and employment. There may be some displacement effect of existing products (i.e. fixed line telephone), but this is likely to be only a small portion of demand. The downstream product demand from the investment in infrastructure was relatively small as most transmission equipment and hand-held phones were imported. However, it did create thousands of jobs in

the local service providers retailing the airtime to the public and in the network providers installing and maintaining the infrastructure. The discussion of the industry in section 2 reflects the size of this effect.

- Competitive effect – cellular companies provide competition to the fixed line operator as they provide the same product – telephony. However, the use of different and more expensive technologies mean that this competitive effect has a minimal effect on price, and may only set an upper boundary to the pricing decisions of the fixed line operator. Though it has been effective in bringing about product innovation. The cellular companies have chosen to compete on coverage and value-added services (e.g. voice mail, call ID, etc), which has enhanced the attractiveness of their product. This has forced Telkom to respond by introducing its own value-added services in order to remain competitive on product at least while retaining its price advantage. The rapid introduction of value-added services has market expansion effects (including investment and employment creation).
- Downstream productivity – the cellular market has enabled downstream users to improve productivity, reaping all the gains associated with that.

The licensing of VANS and a competitive environment for their development has seen them grow at a rapid pace. An indicator of this is the fact that SA is considered the 18th largest Internet market based on number of internet hosts. The fact that these products do not compete directly with telephony means that they have had little competitive effect on Telkom but they have had large market expansion and downstream productivity effects like cellular phones. Again, the downstream benefits from investment in infrastructure was limited as the communications, network and computing equipment required to establish the industry was mostly imported. However, there are large employment and continued downstream demand gains. The productivity effect is also expected to be large as data communications are a primary source of lowering transactions costs in business.

Equity Partner

The introduction of an equity partner for Telkom not only injects capital for network expansion but also allows for Telkom to access foreign technology and so improve its own rate of learning and productivity increase. The impact of the capital injection is to expand the market through growing the network. This has important demand effects on the industries used in capital investment and ongoing operations. It also has important universal service implications. The access to foreign know-how allows costs to come down and some of this to feed through to lower prices – enforced by the price capping of SATRA. This price reduction has important stimulatory effects on demand and on price reductions in user industries – including other communications industry players who lease Telkom facilities (VANS) or use them for international connections (cellular). The expectation from Telkom is that they will reach current world best practice productivity levels by 2002 when their exclusivity period ends.

Universal Service

The argument for granting the Telkom monopoly is that it will allow higher profit margins which will allow Telkom to expand the network to unprofitable low income areas to raise equality of access. This expansion will lead to high levels of growth in main lines, providing all the benefits associated with that in terms of derived demand for capital equipment and operating inputs. Incentives to use local manufacturers (most are international subsidiaries) has meant the expansion of the local telecommunications equipment manufacturing base, creating a number of skilled jobs. It has also seen expansion into under-serviced areas at a pace yet to be seen in SA.

Exports

A more liberal environment has also encouraged the network operators to export into newly liberalised African markets. The incentive to do so comes from a) wishing to reap lower the costs of capital equipment through bulk purchasing for numerous markets (economies of scale), b) diversification of risk through developing more than one income source tied to the economic cycles of different countries, c) reaping some of the increasing returns to investments in learning

and knowledge creation in telecommunications network operation back in SA. So far all network operators are expanding into other African markets, with MTN the most significant player. This is a natural response to the threat of entrance of new competitors into the SA market in the future because although they may lose some market scale at home, they can compensate for that through exports.

Human Resources

Finally, the current policy has seen the emergence of a Human Resources Fund to invest in training human resources for expansion in the telecommunications sector. In addition, the network operators have contractual obligations to training up lower skilled workers for positions in a more productive enterprise. These programs serve a) to offset some of the potential for a shortage of skilled workers to inhibit expansion of the industry and b) remove the natural tendency for inequality by ensuring lower skilled workers are retrained rather than retrenched.

4.2.2 Limits of Current Deregulation

Despite the enormous gains that have been made from the current deregulation of the industry, there remain numerous parts of the regime which limit the sector reaching the full potential benefits that could come from liberalisation. The centre of the problem is the continued Telkom monopoly and the manner in which it is being regulated.

Price-cost margins

The first problem is that we are not seeing the lowering of price-cost margins. Table 12 below uses a number of imperfect measures to demonstrate the point. The imperfect measure of margins is the gross and net operating profit margins. Although gross operating margins have fluctuated, the net margin has steadily increased over the entire period. Therefore, it is suggested that part of the gains from productivity increases are feeding into higher margins and not lower prices. The reasons that we are not seeing the price margins decrease are:

- No direct competition – Telkom remains a fixed line monopoly and so will continue to price like a monopoly and reap higher average profits. The court action against the ISPs to have the right to be the only ISP in the country is a prime indicator of monopolistic behaviour.
- Limited indirect competition – Telkom gets indirect competition from cellular providers. However, these providers are concentrating on competing on value-added services and coverage, and not on price. Part of the reason for this is that as long as Telkom's fixed line prices remain high, there is little pressure for the cellular providers to reduce theirs. Telkom in turn feels lower competitive pressure to reduce its prices as long as the cellular companies do not. This convenient stand-off can be explained in part by Telkom's 50% share of the dominant cellular provider, Vodacom. Another potential source of competition is from internet telephony. However, this competes only with long-distance and is currently illegal in SA. Although it is difficult to regulate such a ban, Telkom has tied up the internet providers through court action in the meantime.
- Lax Price capping – the alternative to using competition to lower price-cost margins is to impose stringent price capping on the monopoly. South Africa has failed to do this and has regulated a price cap for fixed line telephony call cost increases of CPI-1.5% and for cellular at the CPI for a representative bundle of services. Considering that labour productivity in Telkom is increasing at an average of 8.5% for the last 4 years (see table X below), asking for a decrease in prices of 1.5% per annum is not a binding constraint to the monopoly.

[Needs to be completed]

Table 12: Measures of Telkom Productivity, Profits and Prices, 1994-1998

| | 1994 | 1995 | 1996 | 1997 | 1998 | % change, 94-98 |
|--|------|------|------|-------|-------|-----------------|
| Telkom profit margins | | | | | | |
| Gross margin | 27.0 | 24.3 | 22.8 | 27.1 | 22.7 | -16% |
| Net margin | 8.3 | 7.8 | 9.1 | 11.9 | 12.0 | +45% |
| Telkom labour productivity (lines per employee) | 59 | 63 | 70 | 75 | 82 | +39% |
| Telkom capital productivity (call minutes per unit of capital) | | | | | | |
| Telkom real price changes | | | | | | |
| Price of local calls per minute | | 7.3c | 8.0c | 10.3c | 12.9c | |
| Price of long distance calls per minute | | 1.55 | 1.54 | 1.36 | 1.18 | |
| | | | | | | |
| | | | | | | |

Source: Telkom Annual Reports 1995-98

Productivity growth

The second problem is that productivity is probably not increasing as fast as it could. Currently South Africa's labour productivity in telecoms is about 1/4^{er} that of a few leading international companies, including the equity partner SBC (see table X in section 3.3.3 below). The current rate of productivity growth of 8.5% will only enable the current productivity gap to be closed in 17 years. In addition, productivity growth in these leading firms is currently growing at 5% per annum on average, further widening the gap. In 1996 Telkom said that it was confident that it would reach best-practice productivity levels by the end of its exclusivity period – at the time estimated at 200 lines per employee. But current productivity in best-practice firms already stands at around 330 lines per employee and will most likely be around 400 lines per employee in 2003 if they continue to see 5% per annum productivity increases. This would leave Telkom still at 1/2th the labour productivity of the leaders by the end of the exclusivity period.

[Need to add capital productivity story]

There is no doubt that some of the differences will be due to some of the factors mentioned under section 3.1.4 such as a generally lower technological capacity, skilled labour shortages and lower consumer incomes. However, part of the gap might be explained by the regulatory structure. In particular, the lack of competition and the lack of a stringent price-capping regime to compensate for it. The same lack of competition (direct and indirect through other technologies) that prevents price-cost margins from coming down, prevents Telkom from hastening to improve productivity levels. It is also aware that even when competition arrives, it will have considerable market power anyway, allowing it a degree of flexibility in pricing to compensate for any productivity lags. In addition, because foreign ownership is limited to 30%, the new entrant will be a South African firm that will need to undergo a learning curve itself and will not reach world best-practice. The issue of foreign ownership limitations is also a reason why Telkom itself is unlikely to see productivity growth to world best-practice. Limitations on ownership will limit the amount of technology transfer from the foreign firm, limiting the potential local productivity gains.

Internet Industry

A further problem with the current regulatory regime is the regulatory uncertainty over internet service provision. Although SATRA ruled clearly in favour of the ISPs, this has been challenged by Telkom in the Supreme Court. Even if the courts eventually rule in favour of the ISPs, the uncertainty created until that point serves to lower levels of investment in this part of the industry. This is crucial as it lowers internet access speed as infrastructure lags behind the influx of new online subscribers. It also prevents the possible cost reductions that may come from investments in new capital equipment and expanding markets.

Human Resources

The current human resource policy is innovative and much required. In fact, it probably does not go far enough because it has a narrow focus on traditional telecommunications. As already noted, many of the gains will be in the broader communications industry, including internet backbones, e-commerce, information services. It is here where there is exceptional growth and where skilled human resources are demanded in greater numbers. A lack of human resources may limit the expansion of this industry through either not being able to meet demand or lowering demand through skilled labour appropriating many of the productivity gains. Further, for equality in the labour market, it is important that this growth in jobs does not end up entirely in the hands of skilled white labour.

Impact of higher prices

The overall impact of these issues is that prices throughout the communications industry will not be reduced at the rate which may be feasible under a more competitive regime. This applies not only to fixed line telephony, but to all other parts of the industry because of its link to Telkom. For VANS, the link is that they must use Telkom facilities and use Telkom as the international carrier. For cellular phones, fixed line represents an important source of competition and as long as Telkom's prices remain high, there is little competitive pressure to lower their rates. In fact, a recent study put the cellular call prices in South Africa amongst the highest in the world in terms of purchasing power parity.

The result of not seeing the level of price reduction that is feasible under a more competitive regime, is that South Africa will experience many of the costs of reform without many of the benefits for the remainder of the exclusivity period. In particular,

- Output and employment growth in the entire telecommunications industry will be below its potential as higher prices limit demand growth. In fact, employment may decline as productivity improvements in Telkom are not compensated for in terms of price-induced output growth.
- Growth of e-commerce and information services for the Net will be restricted as they hinge significantly on the cost of access. This is where much of the communications industry output gains will come from.
- Lower output growth will limit the benefits of derived demand in the downstream industries. Although much of this is import-leaked, what remains in SA will be smaller.
- There will be very limited price-induced downstream effects on other industries, limiting the potential employment creation, output expansion and deflationary impact that will have. In fact, current policy favours skilled workers even more than full liberalisation because only the high tech capital equipment industry is benefiting, while the other industries that may see a demand expansion from price reductions employ more lower skilled workers.
- There will no real increase in consumer incomes that comes from price reductions.

Universal Service

The question left to answer is whether a cost of a more liberal regime is will be lower rollout to currently underserved areas as profit margins are squeezed. If this does not occur, there would also be a loss in output expansion and the associated derived demand effects. On that point however, the discussion above makes it clear that most of the benefits come from price

reductions combined with output expansion and not output expansion alone. This is because expanding investment demand contains high leakage's as most of the capital equipment is imported. In contrast, price reductions impact all of the economy, including household real incomes.

However, I would also argue that the same universal service obligations are achievable under a liberal regime with the added bonus of larger price decreases. First, lack of access to some of the underserved areas reflects past discrimination and therefore reflects pent-up demand rather than an inability to pay. This is clear from both a waiting list of over 100 000 for residential phones in 1997 and the uptake of cellular technology in some of these areas. Second, considering that prices have the potential to drop by some 20-30% more (see calculation below), many more low income households are likely to be drawn into the demand catchment. Thirdly, new entrants are likely to roll out to currently unattractive low income areas if they see future potential. The reason is that it gives some a degree of market power by being already active in an area. Lastly, there are the universal service contributions that can be used to subsidise access. Even if the level of these contributions are increased to a point of current price-cost margins in Telkom, prices will still come down further than current levels because of the additional productivity gains from the pro-competitive effects. Under this scenario the trickle-down investment and ongoing output expansion demand effects would also be secure.

In fact, not only does current policy have immediate effects on the potential of the industry to deliver lower prices, but it may have a lasting effect after liberalisation. This is because allowing Telkom to expand main lines further will give it more market power in a post-exclusivity period, enabling it to have more control over price-setting. There is evidence from some countries that did not go the SA route that teledensities increased dramatically after liberalisation. For instance, the Philippines saw their teledensity rise fourfold in 3years from 2 to 8 lines per 100 people.

4.2.3 Estimating the benefits/cost from additional liberalisation in South Africa

Any estimation of benefits and costs from additional liberalisation is likely to be an imperfect one. The process with telecommunications is much more imperfect due to the rapid developments in the industry which makes both the future difficult to forecast but also the data used rapidly out of date. Input-output tables from even a few years ago will not reflect the current importance of Internet in corporate and private consumption. Industry surveys from a few years back will not reflect the growth of a myriad of service providers, e-commerce and information service firms. The age and limitations of the SA data make this problem even worse.

The SA input-output table is from 1993, predating the Internet explosion and cellular telephony in the country. The survey of the telecoms sector only includes the fixed line provider Telkom, and not the cellular companies. The enormous number of internet firms are included under business services and cannot be easily extracted even if they were properly surveyed.

Considering these problems, it is not worth the effort to build a CGE model to examine the implications as the results will cannot be trusted. It is better to make some predictions using simple partial analysis and to make adjustments to the data based on assumptions about how the market may look today. What follows is an analysis of the various ways in which liberalisation of the telecommunications sector may impact the SA economy. The estimates take current reforms and their benefits as a given, and tries to estimate what benefits may emerge from greater liberalisation on top of current efforts. The estimates are crude but they provide an idea of range in which the benefits may be. The methodology used is that of OECD 1996.

Impact on Productivity and Profit Margins

Table 13 below has a comparison of capital productivity, labour productivity and profit margins for Telkom and a number of other telecommunications service providers. Differences between firms reflect both the differences in regulatory environment and differences in the nature of the economies. The latter include technological capacity, market size and consumer income levels. The extent to which SA lags behind the other countries is clear. The question that needs to be answered is how much of this gap will be addressed by current deregulation, how much of this

gap is a reflection of differences in the economy and will not be made up, and how much of this gap is due to the differences in regulation.

Table 13: Measures of productivity and price-cost margins for a number of network providers (1998)

| | Telkom | BT | SBC | Bell South | Bell Atlantic | Average for foreign |
|----------------------------------|--------|------|---------|------------|---------------|---------------------|
| Labour Productivity | | | | | | |
| a. Main lines per employees | 82 | 261 | 340 | 326 | 398 | 331 |
| b. Call minutes per employee | ? | ? | 1144089 | ? | 1438981 | ? |
| Index (85% of a, 15% of b) | | | | | | |
| Capital Productivity | | | | | | |
| Call minutes per unit of capital | ? | ? | 4965240 | ? | 4699171 | |
| Index | | | | | | |
| Profit margins | | | | | | |
| Gross margin | 24.9 | 19.5 | 18.7 | 25.8 | 19.3 | 20.8 |
| Net margin | 12.0 | 13.1 | 10.1 | 15.6 | 8.8 | 11.9 |

Source: 1998 Annual Reports of all companies presented

In terms of labour productivity, it has already been noted that Telkom expect to reach a labour productivity of around 200 lines per employee by 2003 through improvements with the equity partner. By this time the industry average is likely to be closer to 400 lines per employee and so productivity will be half. Differences in the economies will have a significant impact on productivity measures as noted in section 3.1.4. Taking a rough estimate that this forces account for about ¼ of the productivity gap, then regulatory issues can be assumed to account for the remaining ¾. Therefore, for the purposes of estimation, it will be assumed that productivity could rise by a further 50% given a more liberal regime for telecommunications.

[Need to get a measure of capital productivity – for now assume that capital productivity can increase by same amount as labour productivity – 50% - which is what OECD assumed for European countries and so may not far off the mark]

The comparison of profit margins reflects that Telkom is not entirely out of line with international firms. It has a higher than average gross margin but an average net margin. As noted in the OECD study, profit margins are not a good estimator of price-cost margins but if used, then the normal level should be considered around 5% for net profit – a level slightly above the real interest rate. The higher levels recorded in the other firms is put down to a lack of stringent price caps in those markets too, as they either operate as local monopolies or in a duopoly with market power. The level quoted by the OECD needs to be adjusted again for economy specifics – in this case additional market risk. The differences in the real interest rates are a good proxy for this. Current real interest rates in SA are around 8-9% as opposed to 3-4% in industrial countries, a premium of about 5%. This means that there is still scope for margins in Telkom to be lowered by approximately 20% with tighter regulation.

First Round Price, Output and Employment Effects

The impact of performance improvements on the prices in the industry can be done very simply by taking a breakdown of the cost structure of the industry and making alterations to reflect the expected productivity and price-cost margin improvements. The results of such analysis is presented in Table 14 below. The cost structure is that of Telkom in 1998 and the performance improvement estimates are taken from above. Included is a reduction in interconnection fees which reflect reductions in costs in other network providers. This figure has been set at 20%, roughly the expected price reductions in Telkom with the assumption that competitive

processes will have a similar effect on lowering their rates. The total impact of these potential performance improvements is a 21.8% reduction in real prices beyond what is already occurring under current deregulation.

Table 14: Calculation of Cost Impact of Additional Reforms in SA

| | Cost structure of the industry (%) | Estimated performance improvement from additional reforms | Cost Reduction Impact |
|--|------------------------------------|---|-----------------------|
| Costs of Intermediate Inputs | | | |
| Interconnection fees | 13.0 | -20 | -2.6 |
| Other intermediate inputs | 26.6 | 0 | 0.0 |
| <i>All intermediate inputs</i> | 39.6 | | -2.6 |
| Costs of factor inputs | | | |
| Labour costs | 26.0 | | |
| * due to higher productivity | | 50 | -8.7 |
| * due to changes in wages | | | 0.0 |
| Profits | 22.2 | -20 | -4.4 |
| Capital Costs | 12.2 | -50 | -6.1 |
| Indirect taxes, less subsidies | 0.0 | | |
| <i>All factor inputs</i> | 60.4 | | -19.2 |
| Total Costs (equals total output) | 100.0 | | -21.8 |

The impact on output and employment depends not only on the expansion of output induced by an additional drop in prices, but also the expansion of demand arising from additional product innovation. The price-induced effect is calculated using a standard price elasticity of demand of 0.5. The innovation impact is an estimate based on industry knowledge and what has occurred in other countries. The innovation impact selected in this case is the same as that estimated for the more protected OECD markets – 30%. The results of these calculations are presented in table 15 below. It is expected that output will expand by roughly 41%, with about 11% of this coming from price reductions. The overall impact on employment will be negative because of the expected large gains in labour productivity – a total drop of 6%.

Table 15: Impact on Output and Employment

| | Impact |
|----------------------------|--------|
| Output Effect | |
| Price-induced Effect | 11% |
| Innovation effect | 30% |
| <i>Total output effect</i> | 41% |
| Employment Effect | -6% |

Impact of Demand Created by Telecommunications Industry

[Need to get most recent data before completing this section]

Impact of lower telecommunications prices on downstream industries

[Need to get most recent data before completing this section, however some initial estimates appear below. The results are small because as a cost item telecommunications remains a small overall cost item. What we need to consider is the strategic value and its impact on productivity downstream such as on e-commerce]

| Sector | Cost reduction(%) | Output change(% of current output) | Employment change(%) | Employment impact (no.) | net trade effect (Rm.) |
|-----------------|-------------------|------------------------------------|----------------------|-------------------------|------------------------|
| Agriculture | -0.04 | 0.02 | 0.02 | 156 | 0.5 |
| Mining | -0.04 | 0.02 | 0.02 | 129 | 4.5 |
| Manufacturing | -0.17 | 0.09 | 0.09 | 1129 | -1.2 |
| Service Sectors | -0.88 | 0.4 | 0.4 | 20503 | 15 |
| Total | -0.3 | 0.2 | 0.3 | 21918 | 19 |

Broad Macroeconomic Impact

[Need to complete above sections before putting in estimates]

5 Policy to Maximise the Benefits and Minimise the Costs of liberalisation

Accepting the constraints of honouring the contractual obligation to continue the Telkom monopoly until 2003, how might we approach the telecommunications industry in order to maximise the benefits during this period and beyond. What follows is a number of observations based on the observations made above. First there is a discussion of internal regulatory and industrial policy issues. This is followed by a discussion of trade policy issues.

5.1 Regulatory and Industrial Policy

The following are suggestions for directions in policy:

- 1) Stringent price capping – if we accept a fixed line monopoly until 2003, then one of means of removing some of the monopoly price-cost markup and increasing the speed of productivity growth is to set far more stringent price-caps. These need to be applied not only to call rates but also interconnection and leasing rates. Current legislation sets the price cap at CPI-1.5% for call rates for the first three years of the exclusivity period. After this, SATRA will determine the price-cap rate. SATRA is also in the process of establishing rules for interconnection charges. The discretion in the regulation will allow price caps to be set more stringently to bring down prices. Further, because the Universal Fund is now up and running, these monies can be transferred to Telkom to continue its programme. At the moment the price-capping and interconnection decisions for both the cellular and fixed line industries will be based on a cost analysis of the industry players. This may have its downside in that the current poor performance may result in continued lenient price capping. It may be an option to base this decision partly on the cost analysis of foreign players (as available from other regulators) as this will provide greater pressure to reduce costs⁵.
- 2) Price structure – the power to establish price-caps could also be used to bring about changes in the structure of call charges to a more efficient one of higher connection charges and lower call charges. This will have the dual effect of increasing Telkom's capital productivity by increasing call minutes and also of encouraging internet usage which will help grow the e-commerce and information service markets.
- 3) Deregulate at earliest opportunity – the current legislation provides both an earliest date for deregulation of certain markets and ministerial discretion as to when the exact date may be. It is important that SA deregulate at the earliest point so as to begin to reap some of the price reduction benefits of deregulation. In order to quicken the process even further, the process of calling for tenders and issuing of licences could happen sufficiently in advance to enable the new licensors time to make some infrastructure investments prior to the date when they begin offering services to consumers. This will enable active competition from the earliest start date. At present, legislation only requires that the feasibility of an additional fixed line operator be investigated before end 2003. It could be another year before a licence is issued and even longer before effective competition emerges. These delays can prevent the benefits of liberalisation from emerging for another 6 years. In the same manner, there is still ministerial discretion over when resale and international services are liberalised – even though a rough timetable has been laid down. There could be delays in this process of many years too.
- 4) Internet access and telephony – there needs to be positive resolution of the legal threat to the Internet industry as rapidly as possible to ensure that investment in internet backbone infrastructure accelerates. There is also scope within the regulations to permit internet telephony on the basis that it is infeasible to regulate. This would spur development of the industry and bring needed competition to the fixed line operator.

⁵ This approach has already been used by Argentina.

- 5) Cross-holdings – the current legislation provides for action by SATRA if it finds uncompetitive behaviour taking place and prevents cross-holdings in a concentrated market. However, the definition of market is very narrow and considers cellular phones as separate to fixed line. Considering that the technologies do compete with each other to some extent, the cross-holding of Telkom in Vodacom should be investigated to see if it is impacting on price-setting in both markets. The opportunity for collusion exists, especially during a period where no fixed line competition exists.
- 6) Human resource policy – to ensure growing equity and prevention of a shortage of skilled labour slowing down the industry expansion, the current human resource policy should be extended to include the internet industry. Further, current immigration policy should be reviewed to determine the extent to which it inhibits immigration of skilled labour in this field. It is unlikely that SA will be able to produce the skills at the rate at which demand expands and so immigration is a necessary policy to plug the gap⁶. This is especially urgent as SA appears to have a significant ICT brain drain currently.
- 7) Strong competition policy – many of the benefits from price reductions come from expanding output and employment in downstream industries. To ensure that these occur, downstream users need to pass these on in terms of price reductions. A strong competition policy will assist in preventing these reductions being absorbed into higher price-cost margins.
- 8) Macroeconomic policy – assuming that liberalisation of telecommunications is part of a larger deregulation process, then it is important that the correct macroeconomic environment is in place to support growing investment. South Africa has stabilised its macro environment but high real interest rates pose a threat to investment. Under a deregulation process these should come down as price reductions in intermediate inputs will provide the necessary deflationary pressure.

5.2 Trade Policy

Trade policy is intertwined with regulatory policy as regulations remain the primary trade barriers in services. Therefore, legislation that South Africa has put in place for telecommunications has already defined much of the trade policy stance for the immediate future. However, trade policy is not just about maximising the benefits to SA, but also complying with international agreements. Therefore, this section takes a look at whether current policy is in line with the WTO negotiations and regional agreements, and what demands are likely to be placed in the future.

5.2.1 Compliance with the WTO Agreement on Basic Telecommunications

South Africa is a signatory to the WTO Agreement on Basic Telecommunications and is therefore committed not only to gradual liberalisation of its market, but also an acceptance of principles of how competition should be governed as contained in the reference paper. The reference paper is an important part of the multilateral agreement and has guided existing regulation in South Africa and regulatory decisions by SATRA for the time when competition is opened in the industry⁷.

Although SA bound some commitments to the WTO on the timing of liberalisation, these were in most part vague. For cellular there was a clear commitment to add at least one more network licence within 2 years (by 31 January 1999) which was delayed in the end by one year. For resale of fixed line services, there is only a commitment to liberalise between 2000 and 2003. For international services there is a clear commitment to add competition by end 2003. For

⁶ Even industrial economies are supporting the immigration of ICT personnel to cover their own shortfall.

⁷ In fact some of the SATRA rulings use the exact wording of the WTO principles

additional competition in local fixed line network providers, there is only a commitment to investigate the feasibility of an additional supplier by end 2003.

Finally, has made no commitment to liberalise certain aspects of the telecommunications industry. First, SA currently restricts foreign investment in suppliers up to a cumulative maximum of 30%. Second, FDI requires the movement of persons to establish and operate a branch. SA has made a commitment on work visas for foreign employees, but much discretion still lies with the Dept. of Home Affairs and it considered obstructionist. Third, SA reserves the right to prevent companies with foreign ownership of over 25% from raising capital locally. Full liberalisation would require these conditions to be dropped as it is discriminatory.

In the next round of negotiations, it is unlikely that SA will come under pressure to bring forward the dates of liberalisation as the negotiation process is likely to take place over a number of years itself. However, there may be pressure to confirm that actual competition will commence on these dates, that additional licences in cellular and fixed line be investigated, and that restrictions on foreign holdings are removed. What may also become an issue is how these services are regulated once opened to competition and how will licences be issued.

South Africa will have to comply with the WTO principles on pro-competitive regulation. South Africa has already committed to the regulatory principles which are listed below:

- Competitive safeguards – at a time when competition is allowed, then it important that there are appropriate measures to prevent major suppliers from engaging in anti-competitive practices⁸.

This principle is embodied in the legislation covering competition in cellular industry (government gazette no. 19828, notice no. 300 of 1999) and in article 53 of the Telecommunications Act. SATRA and the Competition Authority are entitled to investigate and prosecute.

- Interconnection – the WTO principles require that interconnection is ensured at any technically feasible point in the network, under non-discriminatory terms, in a timely fashion, at points requested and at rates determined by the authorities. These agreements should be publicly available and transparent. If a dispute arises it will be resolved by an independent body in reasonable time period.

Articles 43 and 44 of the Telecommunications Act deal with interconnection and facilities leasing in the market and endorse these principles and require SATRA to make specific rulings on the matters. SATRA has done this and laid down principles consistent with the WTO, including a time limit on how long before an agreement must be established and the fact that SATRA will oversee the charges.

- Universal Service – the principles allow for a member to define their own universal service obligations as long as they are competitively neutral, non-discriminatory, transparent and not unduly burdensome than necessary.

SATRA has already defined the extent of universal service contribution in the industry at a level that can be considered not overly burdensome. The Universal Service Agency is in the process of laying down its own definitions and goals for universal access and service. These may add additional burdens on operators alongside their contribution to the USF.

- Public availability of licensing criteria – where licensing is required, all terms and conditions plus selection criteria should be made publicly available.

SATRA complies with this requirement.

- Impartiality of the regulator – the regulator is separate from and not accountable to any supplier of basic telecommunications services and its decisions should be impartial.

⁸ These include withholding technical information required for interconnection, cross-subsidisation, using competitor information in an anti-competitive fashion

The independence of SATRA is ensured through the Telecommunications Act. Further, it intends raising its revenues from licence fees and so should be financially independent of government.

- Allocation and use of scarce resources – any allocation of scarce resources (frequencies, numbers and rights of way) will be carried out in an objective, transparent and non-discriminatory manner.

Rights of way are guaranteed under the Telecommunications Act. SATRA is putting together regulatory direction for numbering. In terms of allocation of licences (a scarce resource). SATRA upholds non-discrimination amongst all licence holders for frequencies.

Although all of the WTO pro-competitive regulatory principles appear to be adhered to in SA, there is obviously scope for disagreement over implementation by the regulator. Therefore there will remain scope for current policy to be attacked in trade negotiations based not necessarily on law but in practice. For instance:

- competitive safeguards, there are questions of how broadly the market may be defined (e.g. is cellular separate from fixed line or are both part of telephony), the efficacy of the regulator or competition authority in dealing with abuse (e.g. competence, extent to which fine acts as a deterrent). Already SA has been forced to confront these issues with Telkom claiming Internet services are a basic service and so fall under their monopoly (market definition issue). Although SATRA ruled on this issue, the authority of the regulator is being tested through Supreme Court action by Telkom.
- Interconnection and facilities leasing – under regulation SATRA can determine the charges for leasing and interconnection based on the LRIC of provision. Estimating the LRIC is not an easy task and the result is open to question. It is important to remember that this includes international interconnection where there has been considerable dispute over the high charges by developing country carriers for completing traffic from the USA. International pressure is certain to bear down where their companies feel penalised.
- The Universal Service provision raises the issue of when any additional licence requirements are too burdensome even if they are competitively neutral. South Africa imposes a number of other licence conditions from human resource fund contributions and fulfilment of other goals such as local equipment supplier development. Although developing countries are given the leeway to impose additional conditions, they reach the point where they are too burdensome. However, this is more likely to be an issue for adding new conditions to incumbents who have sunk costs. For those not involved in the industry, it will only impact on their decision to invest or not. Therefore, if the conditions are too burdensome then investment is unlikely to flow in or prices will reflect the additional burden. Already SA has lowered the additional requirements for the third cellular licence in order to make the licence more attractive to foreign investors. A further issue is again how one defines the boundaries of each market. South Africa has made common USF and HRF contributions for network providers of any technology, but licence fees and specific licence conditions vary. Considering that technologies compete to some extent, there may be a question of whether differing licence conditions are competitively neutral.

From the South African perspective, the only issue likely to cause concern is the foreign ownership issue as it will threaten the empowerment policy. All others reflect moving the country onto a path of liberalisation which offer the benefits alluded to in the previous section. The more specific commitments made, the less discretion there is in the system to go back on liberalisation and the dates set for it. It may be beneficial for SA to consider dropping the foreign ownership issue later in the process once licences have been issued. In this case, empowerment groups will already be entrenched in the industry and already reaped the rents from owning a licence. It would also help SA negotiate the removal of such restrictions in other markets that it wishes to get into.

5.2.2 SADC Free Trade Agreement

The SADC Free Trade Agreement makes no move to liberalise services beyond making countries move in that direction by complying with WTO principles. SADC has been intimately

involved with telecommunications from the start, but the focus has been on building infrastructure and connectivity between countries. It is therefore the WTO that is the binding constraint on liberalisation and not SADC.

5.2.3 Demands South Africa can make on the international trading system

It appears that SA is on the path to achieving a liberalisation that is in its own interests and is compliant with the demands placed on it by its regional partners and all other countries. South Africa should also look at where it can gain from the process, given that the local companies have expressed a desire to invest abroad and that international call rates are in part determined by interconnection charges with monopolies in other countries.

It seems logical that SA should place pressure on other countries to follow it in liberalisation for a number of reasons:

- it will lower international rates from SA and so feed through to lower prices with all the benefits that brings for downstream users
- It allows potential SA investment in these economies which will provide economies of scale and risk diversification for local telecommunications companies.

South Africa should also concentrate its efforts on countries in the region because:

- industrial countries are relatively open already and will open each other further in negotiations (from which SA will benefit through the MFN principle)
- a considerable amount of trade and investment is already taking place in the region which can be enhanced through better and cheaper communications infrastructure regionally. Therefore SA has the most to gain from the opening of regional markets.