South African Telecommunications Sector Performance Review[1]

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1 This study draws on the methodology developed by LIRNE.NET to conduct their annual review of the ICT sector in Denmark. LIRNE.Net is a collaborative research and training network consisting of the Danish Technical University, the Technical University of Delft, the London School of Economics and Witwatersrand University LINK Centre. See www.lirne.net

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0. Executive summary

The last decade has seen dramatic shifts in the telecommunications sector, with the rise of the Internet fundamentally changing the way business and individuals communicate and wireless mobile services providing connectivity to millions of people previously excluded from having a phone. In South Africa the sector has grown dramatically from contributing less than 2% to the Gross Domestic Product in the early 1990s to just under 6% currently.

The 'managed liberalisation' policy for the sector saw the partial privatisation in 1996 of 30% of the fixed line operator, Telkom, to a strategic equity partner, with the subsequent floating of another 28% of the company on the stock exchange in 2003. The granting of a third mobile licence in 2001 brought further competition to the duopoly mobile market and this could be extended with a fourth entrant after 2003. There will be a competitor to the fixed line incumbent, Telkom, following the delayed licensing process to find the remaining 51% share of the Second Network Operator, currently owned 30% by Transtel and Eskom and 19% by empowerment group Nexus. A third international gateway is also available with the granting in 2002 of the international carrier of carrier and multimedia licences to Sentech. Also severely delayed has been the licensing of under-serviced area operators. It is hoped that by the fourth quarter of the year the initial 10 of the nearly 30 districts identified as having teledensities of less than 5%, will be licensed. This will give Small Medium and Micro Enterprises (SMMEs) and historically disadvantaged communities an opportunity to enter the telecommunications market.

The Value Added Network Services (VANS) market, which in South Africa includes Internet Service Providers, is liberalised but its activities have been stunted by restrictions which require that it acquire facilities from Telkom. In line with global trends, and in compliance with World Trade Organisation commitments, the development of the telecommunications market has been overseen by a sector regulator - initially the South African Telecommunications Regulatory Authority (SATRA) and following its merger in 2000 with the Independent Broadcasting Authority (IBA), the Independent Communications Authority of South Africa (ICASA).

Gains have clearly been made. However, developments within the sector have been characterised by a range of unintended policy outcomes and a series of costly licensing and regulatory disputes.

While criticisms abound over the lack of certainty and stability in the sector created by a constantly shifting policy framework, these changes reflect the anxiety of Government to respond to the fundamental technological and economic shifts that underpin the burgeoning global network economy. The recently proposed convergence legislation represents the third major overhaul of telecommunications policy since the first participatory and consultative policy process was initiated in the mid-nineties. Throughout these changes however, the core policy objectives have remained and to some degree remain unfulfilled. The changes to legislation have largely been geared at devising methods to achieve these objectives. The policy continues to seek a balance between the provision of basic universal service to disadvantaged rural and urban communities with the delivery of high-level services capable of meeting the needs of a modern economy. Other policy goals include the promotion of an innovative and responsive sector through the development of broad and diverse service offerings; a competitive manufacturing and supply sector; the promotion of competition; investment and stability in the

sector, as well as encouraging a diverse shareholder base through the promotion of SMME's and historically disadvantaged groups and individuals; developing a strong consumer focus that takes into account the needs of local communities and disabled users; and ensuring technical compliance and efficiency and facilitating the development of human resources within the sector.

From a perspective of promoting universality, the strategy to boost telephone penetration through the granting of a five-year exclusivity to Telkom in exchange for the doubling of the network has not produced the desired outcome. In South Africa, fixed-line teledensity currently stands at 11% and fixed-line household penetration at an estimated 31%. At the time of its privatisation and granting of exclusivity in 1997, Telkom was given mandatory service obligations to install 2.69 million new lines. During the next five years Telkom installed 2.8 million new lines but only 665,819 of these lines remain connected to end users, resulting in overall fixed line network penetration falling in the last three years of the exclusivity period up to 2002. Price increases way beyond what was anticipated by rate rebalancing, have contributed to this dire situation. Charges have increased by more than 27% on average a year and the cost of a local call is now almost five times what it was in 1996.

The net effect of this is that more than 2 million lines, or more than 75% of the licence obligation for network expansion, are not connected to subscribers. Moreover, even these figures mask the actual penetration rate for residential subscriber service. Of the 4.9 million fixed lines in operation in South Africa in 2002, 467,518 were ISDN lines, 195,399 were pay-phones, and 707,881 were pre-paid fixed lines. ISDN lines are really substitute lines to provide additional capacity for advanced services for existing subscribers and while recent increases in payphones and prepaid fixed lines are commendable, they help disguise the fact that subscriber fixed lines declined by 10% to 3.6 million in 2002 (Melody, 2002). It is possible that there are now fewer residential subscriber fixed line customers than there were in 1997.

As a result, while fixed line growth is slowing internationally, South Africa is now one of a handful of countries worldwide with a declining fixed line teledensity.

The complementary strategy of securing affordable access through the establishment of a Universal Service Fund to subsidise network roll-out to under serviced areas and access for needy people has not relieved this dire situation. Shortly after the Universal Service Agency was established in 1997 it was decided that the fund would be used to roll-out telecentres in line with international trends towards the aggregation of needs and provisioning of services at collective access points. However, rather than overseeing this process, the Agency took responsibility for implementing this highly contested decision. Wracked by political and leadership crises and without the skills and experience to devise or implement such an ambitious programme, the model and implementation was severely flawed. By 2000, despite the high costs associated with the establishment of USA telecentres less than half of the 65 telecentres established by the Agency had working telephones and less than a quarter were regarded as sustainable by their managers.[2]

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2 Benjamin, P (2001) Telecentres and Universal Capability: A study of the telecentre programme of the Universal Service Agency in South Africa. 1996 – 2000, PhD thesis, University of Aalborg, (unpublished). See also http://www.communitysa.org.za/

However, the disappointing performance generally in the fixed line sector has been compensated for by the unanticipated exponential growth in the mobile sector. According to the International Telecommunications Union (ITU), from a base of just under one million subscribers in 1996 the number of mobile subscribers in South Africa overtook fixed line subscribers in 1999 and, according to the most recent figures from Cellular.co.za, currently stands at 14.4 million users, of which 80% are estimated to be active.

Mobile has proved to be a much more efficient technology for providing access to telecommunications services than have fixed lines. As an indicator of this, Telkom's lines per employee figure currently stands at 130 while Vodacom and MTN have similar productivity figures in South Africa at about approximately 1600 connections per employee, in line with international mobile indicators.

Somewhat serendipitously, mobile services have gone a lot further in expanding universal service in South Africa, thereby fulfilling an objective that was originally intended to be accomplished through Telkom's exclusivity period. The number of mobile subscribers stands at almost triple that of the fixed network (14.5 million versus 4.9 million); with Vodacom's 7.5 million subscribers representing 60% of the mobile market, MTN second at 5.22 million and the new entrant Cell C with 1 million subscribers as of February 2003.

Most commentators now agree that the means by which voice telephony universality will be achieved in South Africa and throughout the rest of Africa is through mobile services. However, the potential of mobile to close the gap on basic voice communications should not happen at the expense of the continued expansion of a more affordable public switched network, without which the digital divide will increase between those with access to voice communications only and those who are able to participate in the economy and society due to their access to enhanced services.

VANS may be the most important sector of the future economy. This segment of the market reflects the application of continuously improving technologies emanating from the telecommunication equipment, computing hardware and software, and consumer electronics industries. Integration of these technologies into the telecommunication network, and in terminal devices connected to the network such as personal computers and mobile phones, has provided the foundation for the continuous development of new electronic information/communication services, which are being applied throughout the entire economy.[3]

While the value added services market in South Africa is large by continental standards, this segment of the market has not flourished as well as was anticipated under a partially liberalised regime. The effect of Telkom's unchecked dominance of the market has had a chilling effect on the liberalised market segment, with its unconstrained control of bandwidth and effectively of pricing, despite the intention of the policy and law to include price regulation. The negative impact of this has not only been on users and consumers. High communications costs impact on the economy more generally and are a major consideration in the determination of investment destinations even for non-telecommunications activities.

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3 Melody, Kane, Currie and Gillwald (2003) Value Added Network Services in South Africa, LINK Internal Working Paper.

Telkom's market dominance has also been the source of the majority of complaints that have tied up the newly established sector regulator ICASA, the Competition Commission and the Courts. Most of the complaints have related to boundary issues between what constitute VANS and what is in the exclusive Public Switched Telecommunications Network (PSTN) domain, and around the provision of facilities by Telkom to VANS. While the total value of the data services market, excluding Telkom, was worth R2.88 billion, Telkom's 2002 Annual Report states that its data business revenues alone were R3.9 billion. While all these revenues would not equate with VANS services directly and although internally Telkom would classify many of these services as PSDN services, one can deduce that a significant amount of these revenues derive from data services which may be classified as VANS when offered by other players. This would make Telkom a major, if not the major, player in the VANS market.

With ISPs classified as VANS services in South Africa, they have been at the forefront of these complaints. Nevertheless, Internet in South Africa has continued to grow over the past six years, but recently at much slower rates. According to World Wide Worx, 2.89 million South Africans had access to the Internet at the end of 2001, and this figure was expected to grow to about 3. 1 million by the end of 2002[4]. This growth rate of less than 10% would mark the lowest growth rate achieved since the public was first given access to the Internet in South Africa in 1994. World Wide Worx estimates that 1 out of every 15 South Africans had access to the Internet as of the end of 2001, and that it will take until 2006 before this figure reaches 1 in 10. Like other value added services, around 70% of the ISP costs accrue directly to Telkom for facilities and usage, and likewise around 70% of the usage costs for Internet services go toward line rental and call charges. The doubling of the local call price by Telkom in the last financial year has impacted dramatically on the cost of Internet services and internationally, evidence, with few exceptions, suggests that as long as costs remain this high Internet penetration will be stunted. In the past five years of Telkom's monopoly there has been an international decrease of 65% in Internet costs and a 45% increase in Telkom costs.[5]

At the heart of the regulatory challenge facing South Africa is the market design arising from the reform process. The market is structured around a vertically integrated national company, from whom rival firms, with whom the integrated company competes downstream, are required to acquire their non-competitive facilities in order to operate or with whom other networks have to interconnect in order for their customers to access the historically larger number of subscribers on the incumbent's network. This structure creates anti-competitive incentives for the incumbent to deny access to its network to rival firms, whether through delays or pricing strategies. Access regulation has been adopted by regulators across the world facing this type of market structure. This regulatory approach depends on relatively complex costing models that are particularly onerous to enforce, especially when the former public utility's accounts are not clearly separated and there is not a sense of what constitutes real costs. Even once costs are realistically allocated there are inherent information asymmetries that disadvantage the regulator, as the incumbent operator will always have better knowledge of its own costs than does the regulator. This resource intensive regulatory approach arising from such market structures places an enormous regulatory burden on the country and requires expensive and skilled regulatory machinery to operate effectively.

4 World Wide Worx (2002) Internet Access in South Africa, 2002, Pinegowrie, South Africa.

5 David Meintjies, MD of UUNet quoted in Financial Mail, 25 July, 2003 at Convergence Colloquium.

Addressing this fundamental structural issue will require a major review of policy and as in other markets consideration of the structural separation of the different market segments to reduce anti-competitive incentives. However the Government has the powers within the existing legislation to remove some of the inhibiting effects on the development of this critical sector of the national economy and which have been the source of the industry complaints that have encumbered ICASA, the Competition Commission and the Courts. These would include removing the artificial distinction between voice and data in a digital environment, specifically VoIP, and permitting the alternative provisioning of facilities, resale and direct connect by certain categories of network operators. To prepare for a converged policy environment the capacity of the various networks in the country should be optimised by the lifting of restrictions on all networks in order to create an integrated information infrastructure required for a networked economy.

Eight years after the introduction of these first policy reforms this paper seeks to determine the degree to which policy outcomes match policy objectives and to begin to quantify the success of policy and regulatory reform in terms of the performance of the ICT sector. While modest in its aims this paper hopes to provide a baseline assessment of the ICT sector in South Africa that can be built on annually, and to provide the basis for the comparative and longitudinal studies required for appropriate policy formulation and effective regulation. It is intended in future to do fuller examinations of all policy objective areas, especially empowerment and consumer protection. Other than the shareholding in major licences such as third cellular licence and SNO there have not been many empowerment opportunities and were they have occurred they have seldom included women, who are specifically mentioned with regards to equity in the law.

Although the major telecommunications companies do contribute to empowerment within the sector through procurement quotas or thresholds these are difficult to quantify and do not impact on the ownership and control within the sector. The policy decision to grant licences to SMME and communities in under-serviced areas has considerable potential to contribute to empowerment objectives of sectoral and national policy, if an enabling regulatory and investment environment is created for them. With delays to the licensing of the USALs and the funding and licensing regime not yet finalised the outcomes of this closing window of opportunity cannot yet be assessed.

Likewise, although not quantified here, the lack of competition across the sector and the failure of the regulator to establish an effective consumer complaints regime have negatively impacted on consumers. While this should be alleviated with the second network operator on the PSTN side, the entry of a competitor into the market should not be regarded as a substitute for an effective consumer complaints regime for the industry. Even within the mobile industry, where there are three competitors, subscribers are tied-in, either into contracts which do not leave them with choices or they are effectively tied-in by the inconvenience and cost of changing numbers, stationery and billboards. The intended introduction of number portability and carrier selection will go some way to ameliorating this problem and increasing the competitiveness of the sector. While it is true that considerable gains have been made on the customer service side of the industry in order to attract customers since the start of sector reform, dispute mechanisms are far from adequate and need to be addressed if the credibility of the sector is to be improved. These important issues will be the subject of future research.

1. Policy and regulatory framework[6]

1.1 White Paper

The policy flux within the telecommunications sector is indicative of enormous political and social transformation at the national level and reflective of the rapid changes in the global telecommunications market. Despite the changing legislation and strategies to achieve national goals the policy objectives remain largely unchanged from those determined through the consultative policy process that resulted in White Paper on Telecommunications. The primary objective of this initial period was to increase affordable access to communications through gradual liberalisation of the market. The policy envisaged a market structure to orientate the sector towards accelerated development and universal service as well as take into account technological and international trends. The strategy to achieve this focused on the expansion of the fixed line network through the partial privatisation of the incumbent, accompanied by the granting of a five-year exclusivity period to the operator, in exchange for an obligation to double the network. While the monopoly on the Public Switched Telecommunications Network was extended, competition in the mobile sector was to be increased in the cellular market through the introduction of additional operators, and service based competition in the value-added network services (VANS) market was opened up.

In line with international trends and in compliance with WTO commitments, the policy identified the need for a sector regulator to implement policy; to create a transparent and certain regulatory environment for investors and consumers; and to contribute to building a stable and well-functioning market.

Other policy goals which persist include the promotion of: an innovative and responsive sector through the development of broad and diverse service offerings; a competitive manufacturing and supply sector; competition; investment and stability in the sector; a diverse shareholder base through the promotion of SMME's and historically disadvantaged groups and individuals; a strong consumer focus that takes into account the needs of local communities and disabled users; technical compliance and efficiency; and facilitating the development of human resources within the sector.

1.2 Market structure

The arising Telecommunications Act of 1996 fundamentally shaped the market structure of South Africa's telecommunications industry. The existence of a private monopoly on Public Switched Telephony Network (PSTN) continues to be the most salient feature of South Africa's telecommunications market. Telkom SA, the corporatised telecommunications utility, was granted an exclusive licence to provide private switched telecommunication service[7]. This exclusivity period was to endure for a period of no less than five years, with stringent annual network roll out targets with regard to new lines installed; modernisation of the network; and expansion of services to previously under-serviced areas. Annual licence targets were also set in relation to quality of service. Telkom's monopoly has lapsed, but the company continues to enjoy de facto monopoly status quo. A Second Network Operator (SNO) planned for 2002 is now due to be licensed in the Third Quarter of 2003.

6 Drawn from internal LINK paper by Cohen, T, Gillwald, A, and Milazi, M (2003) *Review of South African Policy and Regulatory Framework* .

7 RSA Telecommunications Act s34(2)

The Cellular Mobile Services segment of the South Africa telecommunications market consists of three operators. In 1993, two companies, Vodacom and MTN, were simultaneously granted licences to operate mobile telephony services. This market segment existed for eight years as a duopoly. In November 2001, progress towards full competition was made with the licensing of a third operator, Cell C.

The Value Added Network Services (VANS) market in South Africa is subject to regulated competition. The Act however requires that all VANS operators provide their services through telecommunications facilities provided only by Telkom, which competes against them with a VANS licence in addition to its PSTN licence. This has been the major source of disputes within the sector tying up ICASA, the Competition Commission and the Courts. These disputes arise from technological and market distinctions that have become redundant in a digitalised and liberalising environment.

These problems arise from the market structure that has emerged from the policy reform. The market was, and by default continues to be, structured around a vertically integrated incumbent, Telkom, which competes downstream in the competitive VANS segment of the market and whose competitors are required to acquire their facilities from it. The anti-competitive tendencies inherent in this structure demand highly resource intensive regulation, which requires the regulator to constantly monitor and correct the behaviour of the incumbent. It requires implementation of a rigorous access regime to ensure access by the incumbent's competitors to the incumbent's network and facilities within reasonable timeframes and at cost related prices. The regulatory regime to deal with access has traditionally been based on a complex set of instruments, including those to allow for accounting separation and cost based interconnection, and facilities leasing formulas. Managing these instruments has proved challenging enough for mature, highly resourced regulators. Together with the inherent information asymmetries in the arrangements, access regulation systems have proved overwhelming to inexperienced and resource restricted regulators such as ICASA.

1.3 Institutional arrangements

Institutional arrangements resulting from the policy reform required a break from the past and an end to regulation of the sector by Telkom and the Department of Posts, Telecommunications and Broadcasting. An independent sectoral regulator, the South African Telecommunications Regulatory Authority (SATRA) was established to oversee the liberalisation of various telecommunications market segments in a phased process and to regulate in the public interest. Under the Minister, the Department of Communications (as it became after 1996) assumed responsibility for setting policy on telecommunications and the radio frequency spectrum, while the Regulator would be responsible for impartial implementation of that policy.

The establishment of the Universal Service Agency (USA) by the Telecommunications Act 1996, created the third statutory pillar of South Africa's telecommunications regulatory architecture. The USA was created to promote the goal of universal service, as well as to encourage universal access[8]. The Agency is tasked with defining, in the South African market, the content of universal access, as well as universal service[9]. The agency has an extensive mandate in the area of

8 Ibid. s59(1)

9 Ibid s59(2)

universal service, including implementing investigations, monitoring and evaluating the extent of universal service, making policy recommendations and conducting research on information technology and developments in the telecommunications industry in the country and globally[10]. Unlike the IBA and SATRA the USA is governed by a chief executive appointed by the minister.

The Agency is funded by appropriations from Parliament. Importantly, the USA is statutorily required to manage the account of the Universal Service Fund (USF). In terms of the Telecommunications Act of 1996, every licence holder operating in South Africa is required to pay prescribed annual contributions to the USF. The money in the fund is used exclusively to subsidise telecommunications services in underserved areas, and to assist needy persons to access services.[11] Suffering from staffing problems, budget constraints and some overlap with the consumer affairs portfolio of the regulator, this agency was brought closer to the Department of Communications in the 2001 amendments to the principal Telecommunications Act.

During 1998, a process was begun in government to merge the IBA with SATRA. The rationale for the merger was provided in the increasing convergence of the telecommunications and broadcasting sectors, as well as the efficiency and cost benefits of a single entity. The Independent Communications Authority of South Africa (ICASA) Act 13 of 2000 provides for the dissolution of the IBA and SATRA and for the transfer of their regulatory functions to a new independent regulatory agency, ICASA. The agency is governed by a chairperson and six councillors, and is responsible for regulating both the telecommunications and broadcasting sectors. Its powers are defined and derived from the underlying statutes that empowered both SATRA and the IBA. Thus, ICASA has powers to licence telecommunications service providers, to monitor their compliance with licence conditions, to allocate and manage frequency spectrum, and to regulate apparatus type, among its wide ranging regulatory powers.

One of the main problems affecting ICASA's functions and also raising questions regarding its independence lies in provisions of the Act which couple the Minister and ICASA in the performance of two primary regulatory functions, namely, the awarding of major licenses, and the making of regulations. The requirement that regulations be approved by the Minister has created a serious regulatory bottleneck with critical sector development regulations, most particularly in the critical interconnections and facilities leasing framework, being delayed in the Ministry for months and even years. This has allowed various interests to lobby the Minister once decisions have already been reached by the regulator, in accordance with the public processes required by law. This has resulted in uncertainty in the industry and often in time consuming and costly court challenges to gain clarity.

1.4 Post exclusivity reform

In preparation for the end of the first phase of policy reform and exclusivity period in 2002, a second phase of managed liberalisation was initiated with the Telecommunications Amendment Act of 2001. The Act brought substantive legal and institutional changes to the sector. The Amendment Act of 2001 removed some of the constraints on the PSTN market with the introduction of a Second Network Operator, consisting of the communication networks of Transtel and Eskom, a 19% empowerment partner, which was granted to Nexus, and a 51%

10 Ibid s60(3)

11 Ibid s66

strategic equity partner. Although this competitor to Telkom could theoretically have been operating from May 2002 when Telkom's exclusivity expired, licensing delays have meant that it will only be licensed in the last quarter of 2003, allowing Telkom continued market access advantage.

Another competing international gateway was also introduced in the Telecommunications Amendment Act of 2001 through the carrier of carrier and multimedia licences granted to Sentech, the State broadcasting signal distributor. However, with conditionalities on its licence, including the prohibitions on it connecting directly with subscribers and on offering voice services, Sentech's ability to respond to the unfilled demands of users and consumers is limited.

A further window of opportunity created by the Amendment Act for rolling out services to remote areas through small-scale commercial ventures has also been stymied by licensing issues. Also intended to be licensed at the end of Telkom's exclusivity were an initial 10 of 30 Under-Serviced Area Licences (USALs) in areas with less than 5% teledensity. Already stifled by lack of clear state funding or the guarantees critical to the success of such licences elsewhere in the world, delays to the licensing of these SMME and empowerment aspirant operators have severely impacted their viability. Adding to the problems for the USALs has been the announcement that four million free cellphone SIM cards would be offered to poorer communities as part of the cellular operators' community services obligations. It is believed this deal was struck by the cellular operators with the Communications Ministry in return for cheaper access to the 1800MHZ spectrum.[12] The Under-Serviced Areas Licences Group, representing bidders, believes this to be the final straw on top of the delays in getting to market that have left them cash strapped. Recent proposals by the Universal Service Agency that USAL licensees may qualify for a R25m grant and R2,5m loan scheme at 5% interest payable over 10 years, with an additional guarantee up to R10m, may, if adopted, go some way to creating viable business operations.

These new licence categories, together with pro-competitive regulatory measures introduced in the legislation, specifically number portability and carrier pre-selection, will require a highly skilled and resourced regulator.

1.5 Convergence Policy

The South African government has recently embarked on a public consultative process in order restructure the telecommunications sector to make it more suited to a converged policy environment. Taking advantage of digital transmission technology will lead to the emergence of an integrated infrastructure capable of delivering voice, video and data services at high speeds and lower costs. It is anticipated that unlike previous processes, convergence policy will not go through a Green or White Paper process but will move straight to legislation. The Department of Communications wishes to have a draft Bill before Parliament in 2003. The main features arising from the consultation include a more horizontal market, a flexible licensing structure and technologically neutral regulatory approach. Emphasis has been placed on ensuring that the opening of the market to more enhanced services does not increase the digital divide rather than reduce it. The government has committed itself to improving access to enhanced services but how exactly remains unclear at this stage.

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12 Bidoli, M (2003) *Still Stuck in the Starting Blocks? Financial Mail,* 18 July.

2. Telecommunications Market

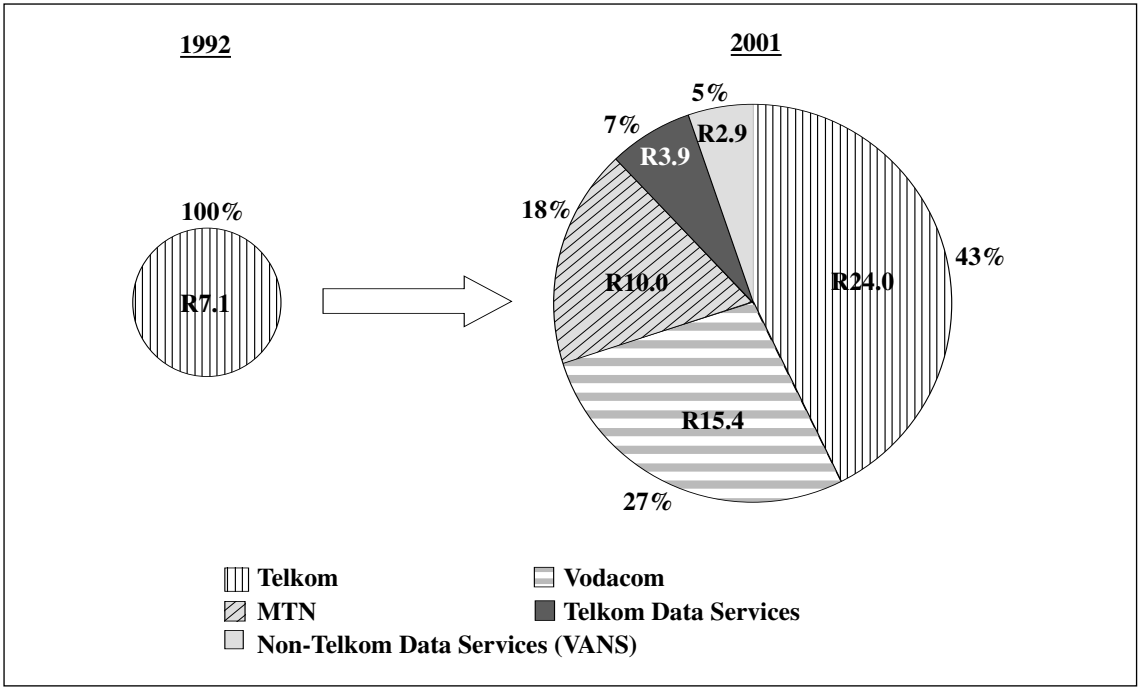
The telecommunications sector is increasingly important to the overall health of the South African economy. In the ten year period between 1992 and 2001 the revenue generated by the sector grew from R7 billion to R56 billion (ITU (2002); BMI-T (2002), Link Centre Analysis). In the process it grew from representing 1.9% of South Africa's GDP to 5.8% of its GDP. In this sense South Africa has performed very well. For example, in South Korea, a shining example of ICT growth, telecommunications only represented 4.3% of GDP in 2001. Although telecommunications increased percentage of GDP may reflect the high cost of telecommunications, there is little doubt that there has been increased activity and expansion in the sector.

The partially privatised public switched telecommunications network incumbent, Telkom, has made impressive gains during the period of its extended monopoly from 1997 to 2002, growing its activities from R7 billion in 1992 to R43 billion in 2001 and retaining a significant 43% of total market share.

With over 30% of the total market share by 2001, and more than three times the number of subscribers than the fixed network, the mobile cellular market has grown beyond all expectations. According to market research firm BMI-Techknowledge, today the pre-paid market in South Africa makes up 75% of cellular subscribers, and more than 90% of new connections are pre-paid. Indeed, new entrant Cell C estimates that 98% of its subscribers are pre-paid users. These figures are in line with the experience throughout Africa where BMI-T estimates that between 90% and 95% of cellular customers are pre-paid. However, while contract customers only make up 25% of subscribers in South Africa they still generate around 70% of revenues due to their much higher average revenue per user (ARPU). Vodacom's financials are fairly typical in this respect, with post-paid ARPU standing at R547 per month, over five times the pre-paid ARPU of R93. This disparity has required mobile operators in South Africa to develop a very particular business model, which has since been exported to the rest of Africa through MTN's and Vodacom's international operations. The model is quite different from the Northern Hemisphere model where marginal customers are not generally brought on to the network, and certainly not as quickly after launch or in such large numbers as have been seen in Africa. Understanding this model, in terms of effective regulation and ensuring continued investment in the network, is critical to the sustainability and growth of mobile operations in South Africa and Africa more generally

Figure 2.1 breaks down the contribution of the various parts of the South African telecommunications sector to the total revenue generated by the sector. As can be seen, both the size and the composition of the sector have change dramatically over the past ten years as Vodacom, MTN, and the competitive VANS providers have entered the market. The composition of the sector continues to change, as Cell C entered the market in late 2001 (and was therefore not included here), and will change further, following licensing delays, when the SNO is licensed, in the final quarter of 2003. Data services, which include leased lines, Internet, corporate networks and virtual private networks, continue to grow and now represent 12% of the sector, or just under R7 billion – equal to the size of the entire sector in 1992.

Figure 2.1 Size of South Africa Telecommunications Sector (Billions of Rands), 1992 - 2001



* 2001 estimate reached by utilising Telkom and MTN fiscal year 2002 data which runs from April 2001 to March 2002.
Source: ITU World Telecommunications Indicators Database (2002), Telkom IPO Prospectus, 2002 MTN Annual Report, 2002 BMI-Techknowledge Communications Handbook.

Moreover, these figures only measure the direct contribution of telecommunications to the economy. Through its enabling indirect effects, telecommunications may be the most important sector of the future economy. The sector reflects the application of continuously improving technologies emanating from the telecommunication equipment, computing hardware software, and consumer electronics industries. Integration of these technologies into the telecommunication network, and in terminal devices connected to the network such as personal computers and mobile phones, has provided the foundation for the continuous development of new electronic information/communication services, including the Internet, referred to as Value Added Network Services (VANS), which are being applied throughout the entire economy.

The value added services market in South Africa is both large and varied, with market research firm BMI-TechKnowledge estimating that, not including Telkom, the South African data services market was worth R2.88 billion in 2001. BMI-T identifies Omnilink, FirstNet, AT&T, Internet Solutions, and UUNet as the most prominent non-Telkom players in the corporate data and VPN sector.

Telkom's 2002 Annual Report states that its data business revenues were R3.9 billion, putting the total value of the data services market at a little under R7 billion. While Telkom's data business line item in its Annual Report may not correlate exactly with its VANS activities a 58% share of the revenues generated in the data services market would indicate that its value added

services market share is significant. In its summary of its data business performance for the year, Telkom discusses its "managed data network services (MDNS)", "VIPLink" (a VPN service), and "hosting and Internet access services". These types of services are all considered VANS products by ICASA; indeed, managed data network services are explicitly included in the definition of VANS in section 1 of the Telecommunications Act. Therefore, while Telkom's VANS revenue share may not be 58%, as some of the components of its data business may be legitimately part of its PSTN services, it is likely that its VANS market share is likely significant and potentially even dominant in the VANS market.

In terms of Internet connectivity, the South African market has five Tier 1 ISPs; that is, ISPs that manage at least some of their international bandwidth and fully manage their own national networks. These Tier 1 ISPs are Internet Solutions, UUNet, Telkom's Internet networking reseller SAIX, MTN Network Solutions, and Datapro. Some market researchers, such as BMI Techknowledge, also consider AT&T Global Networks to be a Tier 1 ISP. There are also hundreds of Tier 2 ISPs (ISPs that purchase their bandwidth from a Tier 1 ISP) and Tier 3 ISPs (virtual ISPs that only handle the sales and marketing of their brands) in South Africa. Arthur Goldstuck found in 2001 that there were 170 ISPs in the country that provided digital leased line services. [13]

2.1 Empowerment , ownership and control

A major social objective of the policy reform process remains the empowerment of historically disadvantaged individuals and communities that had been marginalised from the sector which historically had been almost exclusively owned and controlled by white interests. The regulator was also mandated to ensure the inclusion of historically disadvantaged individuals particularly through the changing ownership arrangements of the sector. Opinions within the sector are mixed on the success of economic empowerment within the sector.

The licensing of a data switch licence to Vula, later to become Wireless Business Solution, by the Director General just prior to the Telecom Act came into force and licensing of the third cellular operator, which was finally awarded to CellC, allowed for some issues of redress in ownership within the sector. However, as has been identified in other industries there were structural constraints on the effective participation of historically disadvantaged individuals with regard to accessing the kind of capital needed for this kind of enterprise.

The 19% component in the SNO, awarded in 2002 to Nexus, was another intervention to get greater participation in the sector by those historically excluded. The active participation by women in these bids has been negligible.

But perhaps the most damning criticism of the economic empowerment policies is their failure to be accompanied by careful funding strategies, whether state guarantees, interest free loans or special access to Development Bank or IDC funding. This is perhaps most concerning in the case of the Under-Serviced Area Licensees which, while providing a once in a life opportunity for participation by SMMEs and co-operatives, is highly dependent on a funding model for its success. The areas being licensed are those that have traditionally not been served by the incumbent due to the high cost of rolling out services to low-density areas inhabited by low-

13 The Goldstuck Report: *Internet Access in South Africa,* 2002.

income populations. Furthermore, the licenses are being offered to groups that historically have been without access to capital and other resources. While new cost-effective technology, low transaction cost business models provide some solutions, it is the responsibility of policy and regulatory decision-makers to create conditions under which new entrants are most likely to be able to make effective business cases. The absence of a clear funding model allowing either for government subsidies, awarded through some form of competitive process, or no-or low interest state loans is likely to severely undermine the viability of USALs in all areas. Evidence from elsewhere in the world indicates that these are key to leveraging further investment far in excess of the initial amounts provided by the state and key to their viability.[14]

Pressure for transformation of this critical sector has been building for years and will result in an Empowerment Charter in line with charters in other critical industry sectors by early next year following deliberations throughout the years with all the major industry associations and the Department of Communications.[15]

3. Network investment and capacity

Traditionally, telecom revenue per capita of countries has been used to provide some indication of activity in the telecom sector. With the minimal penetration of fixed line in developing countries, the telecom revenue per capita has been correspondingly low. As a middle-income country by UN classification, South Africa's comparative telecom spend per capita has been low, but by comparison with other countries in the Southern African region, its telecom revenues per capita are relatively high. As can be seen from the table below, at $155.38 in 2000 South Africa had the highest telecoms revenue per capita among TRASA countries and was in the middle of the pack with regard to other middle-income countries (Poland and South Korea having higher revenues; Mexico, Morocco, and Turkey having lower). These five middle-income countries were chosen as comparison points given their rough similarity to South Africa in terms of income levels and telecommunications penetration in 1996, and as such their performance over the last six years can then be compared with that of South Africa. Morocco was chosen as its execution of its reform and liberalisation process is often held up as an example of an African success story in the telecommunications sector.

The reverse side of revenue generated by telecommunications activities is of course the investments made in the network itself. While the level of telecommunications investment per capita can fluctuate significantly from year to year as major capital projects are begun or completed, the figures do provide an idea of the commitment of respective countries to expanding their networks and joining the information society. By looking at the massive amounts that South Korea has invested in telecommunications in the table below, it is perhaps not surprising that it now leads the world in broadband and 3G deployment and, in the past six years, has rocketed up most ITU statistical tables. The rise and fall of the South African level of investment reflects the capital expenses associated with the 2.8 million lines that Telkom was required to roll out during its exclusivity, while the recent decline in these figures reflects the completion of this exercise and Telkom's stated intentions in its 2002 Annual Report:

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14 For more detailed account see Gillwald, A (2003) Under-serviced Area Licences in South Africa: Steps to achieving viable operators, *LINK Centre Public Policy Research Paper no.3.*

15 For more details see *Business Map Foundation* Update ICT Charter: It's industry's show for the moment, 7 July 2003, at www.businessmap.co.za

Table 3.1 - Telecommunication service revenue* per capita (US$)

Country	1996	1997	1998	1999	2000	2001
South Africa	$119.27	$144.32	$135.97	$149.31	$155.38	—
Angola	$9.73	$9.97	$10.70	$12.83	$8.66	—
Botswana	$46.97	$54.08	$58.34	$74.82	—	—
Korea (Rep. of)	$308.84	$295.14	$217.44	$307.55	$373.67	$376.43
Lesotho	$7.15	$6.86	$5.72	$5.37	$4.93	$4.33
Malawi	$3.35	$3.73	$3.30	—	—	—
Mauritius	$100.88	$100.13	$103.59	$103.47	$121.29	$120.15
Mexico	$84.43	$92.45	$96.12	$108.22	$123.74	$144.71
Morocco	$25.60	$24.83	$27.92	$31.14	$39.82	$46.53
Mozambique	$3.21	$3.52	$3.87	$4.89	$5.56	$5.84
Namibia	$48.82	$50.24	$49.52	$56.79	$53.52	$49.64
Poland	$65.67	$89.43	$135.93	$151.93	$182.92	—
Seychelles	$434.65	$455.45	$465.17	—	—	—
Swaziland	$27.47	$27.70	$25.43	$29.50	$27.45	$25.93
Tanzania	$2.37	$3.13	$3.42	$3.83	$3.98	$3.85
Turkey	$52.65	$68.00	$79.62	$74.66	$82.03	$78.40
Zambia	$13.07	$16.71	$11.91	$9.19	$6.25	$4.93
Zimbabwe	$12.51	$12.11	—	$10.05	$13.13	—

Source: ITU World Telecommunications Indicators Database (2002). DRC data not available.
* - Total revenue (turnover) received from providing telecommunications services in each country.

> As we reach the end of our licence obligations, we have changed our capital spending decision process to ensure that adequate returns on investment are achieved. We are focused on reducing capital expenditure in our segment without impacting service levels. This year we started the process by reducing our capital spend to R6,9 billion, 25% of revenues, from R8,1 billion in 2001, 31% of revenues.

Nevertheless, the South African levels of investment indicate that South Africa is investing significantly more in its telecommunications infrastructure in line with its larger economy than other TRASA countries for which data is available. In terms of upper middle-income countries, South Africa invests less than Poland, Mexico, and South Korea and more than Morocco and Turkey. It should be noted, however, that with the exception of Mexico and Morocco, South Africa has significantly fewer total telephone subscribers per capita than the other middle-income comparison countries, and one would therefore expect to see higher investment rates if this gap were to be narrowed.

Table 3.2 - Annual telecommunications investment* per capita (US$)

Country	1996	1997	1998	1999	2000	2001
South Africa	$21.10	$37.01	$48.90	$31.83	$28.37	—
Botswana	$13.82	$24.08	$26.25	$29.60	—	—
Korea (Rep. of)	$128.23	$176.04	$96.47	$150.20	$164.19	—
Lesotho	—	—	$0.39	$0.64	$0.52	—
Mauritius	$67.65	$33.98	$37.17	$42.22	$45.65	$55.27
Mexico	$18.72	$19.98	$33.01	$40.73	$51.40	—
Morocco	$7.28	$5.20	$4.75	$8.52	—	—
Mozambique	$1.39	$2.26	$1.03	$1.78	$2.76	—
Namibia	$26.28	$30.05	$29.55	$12.35	$20.51	—
Poland	$30.25	$33.54	$30.26	$37.16	$35.41	—
Seychelles	$112.38	$61.42	$80.02	$88.50	—	—
Swaziland	$10.32	$14.86	$14.97	$13.17	—	—
Tanzania	$6.52	$6.12	$7.94	$5.75	—	—
Turkey	$6.91	$8.74	$9.51	$8.93	$9.62	—
Zambia	$1.36	$1.58	$1.23	$0.52	$0.77	—
Zimbabwe	$11.93	$11.61	—	—	$0.40	—

Source: ITU World Telecommunications Indicators Database (2002) Angola, DRC and Malawi data not available.

* Annual expenditure associated with acquiring ownership of property and plant used for telecommunications services and includes land and buildings.

4. Network coverage and subscriber numbers

The official measure for universal service traditionally utilised by the ITU has been the number of fixed network main telephone lines in use per 100 inhabitants. With a declining number of fixed line subscribers over the last two years concomitant with the exponential rise of mobile service in South Africa, and indeed throughout the continent, measures of universality will have to be reformulated to consider the significant contribution of commercial mobile services. While figures across the Southern African region are impressive, in terms of global comparisons they are still behind Asia, which is taking over from Europe as the region with the most rapid growth in mobile market penetration.[16]

By the end of 2001 the ITU estimated that 28 African countries, representing more than half of the countries in the region, had more mobile users than fixed line users. Sometime during 2002, mobile subscribers were expected to pass the 1 billion user mark globally, and to pass the total

16 - Melody, W (2002) Trends in European Telecommunication: 2002 Status Report of Denmark's Progress in Telecom Reform and Information Infrastructure Development, prepared for National IT and Telecom Agency IT, Denmark International Discussion Forum, Denmark, 17 –19 October 2002 at www.lirnet.net

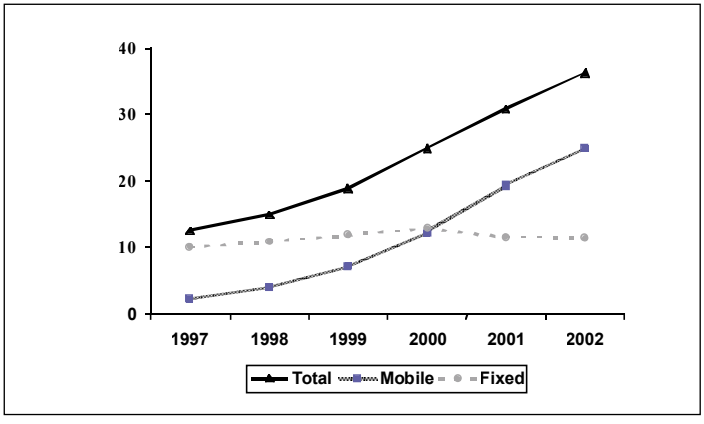
number of fixed line subscribers not only in Africa but also worldwide. While the difficulties of accurately measuring mobile take-up are numerous, especially with regard to active and non-active pre-paid user accounts, the ITU strongly recommends that "policy-makers and regulators must overcome their fixation with fixed-lines and look to mobile as a way of achieving social policy goals."[17] The ITU has found that in developing countries, mobile penetration, due to the mechanism of pre-paid accounts, is not as heavily dependent on income as are other types of telephony. This conclusion, supported by the phenomenal growth rates, yields hope that mobile can address some aspects of the digital divide, which is largely income based. However, despite the achievements of mobile it is also clear that fixed lines will continue to be an important developmental measure. This is especially true in terms of access to the Internet, which is not yet feasible through the GSM technology that has thus far been the de facto standard of the global mobile boom. To gain a more accurate figure of the changes in teledensity in South Africa over the last six years, fixed, mobile, and total teledensity are presented in Table 4.1. When fixed and mobile growth are combined South Africa's figures show impressive annual growth during this period, although 95% of this growth was generated by the increase in mobile subscribers.

Table 4.1 South Africa Telephone Subscribers per 100 inhabitants

Indicator	For Year Ending March							
	1997	1998	1999	2000	2001	2002	CAGR 1997-2002	CAGR 2000-2002
Main telephone lines per 100 inhabitants	10.1	10.8	11.8	12.8	11.5	11.4	2.5%	-5.6%
Cellular mobile telephone subscribers per 100 inhabitants	2.3	4.0	7.1	12.1	19.3	24.9	61.0%	43.5%

Source: 2002 Telkom Annual Report.
Figure 4.1 – Total Telephone Density in South Africa, 1997-2002*

Figure 4.1 – Total Telephone Density in South Africa, 1997-2002*



* - For the year ending in March
Source: 2002 Telkom Annual Report

17 ITU World Telecommunications Development Report 2002, Executive Summary, Pg. 8.

Internationally, the figures tell a similar story, with the majority of universal service growth achieved in Africa during the latter half of the 1990s coming as a result of the growth in mobile penetration. In terms of fixed line growth in TRASA and the middle-income comparison countries, as can be seen in Table 4.2, only Morocco, Zambia and the war-torn Democratic Republic of Congo have worse performance in terms of annual growth than South Africa over the past six years.

Around the world the performance of mobile over the past six years has been nothing short of extraordinary, with many countries achieving subscriber increases in excess of 100%. While South Africa's growth rate is lower than this it is nonetheless impressive given the relatively large initial base of 2.35 million subscribers off which it was achieved. Compared to middle-income countries, South Africa performs well, having slightly fewer subscribers per capita than Poland, slightly more than Mexico, and significantly more than Morocco and Turkey. Once again South Korea ranks significantly further ahead of all the other countries.

Table 4.2 – Fixed, Mobile, and Total Telecommunications Subscribers per 100 Inhabitants [18]

Country	1996	2001	CAGR %	1996	2001	CAGR %	1996	2001	CAGR %
	Total telecommunications subscribers per 100 inhabitants			Main telephone lines per 100 inhabitants			Mobile subscribers per 100 inhabitants		
South Africa	12.84	35.77	22.74	10.49	11.3	1.41	2.35	24.53	59.85
Angola	0.5	1.23	19.73	0.47	0.59	4.65	0.03	0.64	84.42
Botswana	4.83	—	44.95	4.83	—	17.32	0	16.54	124.08
DRC	0.09	0.32	28.88	0.08	0.04	-12.94	0.02	0.29	70.72
Korea	50.02	108.44	16.74	43.04	47.60	2.03	6.98	60.84	54.19
Lesotho	0.83	—	25.06	0.77	—	7.54	0.06	1.53	91.12
Malawi	0.41	0.95	18.30	0.37	0.47	4.90	0.04	0.48	64.38
Mauritius	18.06	48.27	21.73	16.22	25.56	9.52	1.84	22.70	65.29
Mexico	10.36	35.40	27.86	9.28	13.72	8.13	1.07	21.68	82.53
Morocco	4.6	19.60	33.63	4.45	3.92	-2.50	0.16	15.68	150.18
Mozambique	0.34	1.28	30.36	0.34	0.44	5.29	0	0.84	202.74
Namibia	5.85	12.16	15.76	5.43	6.57	3.89	0.42	5.59	67.82
Poland	17.48	55.53	26.01	16.91	29.51	11.78	0.56	26.02	115.49
Seychelles	21.93	81.87	30.14	20.56	26.73	5.39	1.36	55.15	109.70
Swaziland	2.41	9.61	31.87	2.41	3.14	5.43	0	6.47	136.36
Tanzania	0.33	1.60	37.13	0.3	0.41	6.45	0.03	1.19	108.78
Turkey	24.07	58.70	19.52	22.79	28.52	4.59	1.29	30.18	87.86
Zambia	0.97	1.72	12.14	0.94	0.80	-3.17	0.03	0.92	98.30
Zimbabwe	1.59	4.27	21.84	1.59	1.86	3.19	0	2.41	163.49

Source: ITU World Telecommunications Indicators Database (2002)
Note: Botswana and Lesotho CAGRs only calculated for 1996 – 2000

18 Note that the figures for South Africa in Table 4.2 are slightly different from those in Table 4.1 above due to the fact that Telkom reports figures for its financial year (ending in March) while the ITU reports figures on a calendar year basis.

In terms of overall subscriber growth, South Africa performed relatively well compared to other TRASA countries when factoring it its large user base. However, the performance of the fixed line sector has put a drag on this growth, with countries such as Botswana, Mauritius, and the Seychelles recording growth rates significantly higher than that of South Africa. While South Africa's growth rate is also in line with other middle-income countries, its current growth trajectory would not seem to allow it to narrow the teledensity gap between it and the best performing countries of South Korea, Turkey, and Poland.

5. Consumer pricing

5.1 PSTN

5.1.1 Residential

In South Africa and other developing countries, universality will only be achieved by a combination of increasing access to telephone services and, equally importantly, by ensuring that those services are affordable to the general population. This is demonstrated by the failure of Telkom's mandatory service obligations, where access was provided but not at an affordable cost. Following Telkom's partial privatisation in 1997, the company embarked on a process of rate rebalancing to bring their tariffs in line with their costs.

Table 5.1 Residential Telephone Tariffs*

Country	Residential telephone connection charge (US$)			Residential monthly telephone subscrip. (US$)			Cost of a local 3 minute call (peak rate) (US$)		
	1996	2000	%Change	1996	2000	%Change	1996	2000	%Change
South Africa	$68.15	$29.94	-56.07%	$10.61	$9.03	-14.89%	$0.06	$0.09	50.00%
Angola	$96.35	$80.08	-16.89%	$96.35	$14.94	-84.49%	$0.13	$0.08	-38.46%
Botswana	$60.17	$44.12	-26.67%	$4.61	$3.01	-34.71%	$0.03	$0.02	-33.33%
Korea (Rep)	$300.83	$88.42	-70.61%	$3.11	$3.54	13.83%	$0.06	$0.04	-33.33%
Lesotho	$80.24	$55.76	-30.51%	$4.65	$4.32	-7.10%	$0.03	$0.02	-33.33%
Malawi	$45.73	—	—	$6.53	—	—	$0.04	—	—
Mauritius	$111.43	$38.10	-65.81%	$3.34	$2.29	-31.44%	$0.06	$0.04	-33.33%
Mexico	$235.92	$119.45	-49.37%	$9.47	$15.54	64.10%	$0.10	$0.15	50.00%
Morocco	$39.01	$47.04	20.58%	$6.02	$6.11	1.50%	$0.09	$0.08	-11.11%
Mozambique	$50.14	$31.43	-37.32%	$7.02	$8.63	22.93%	$0.04	$0.06	50.00%
Namibia	$54.66	$38.33	-29.88%	$8.26	$6.19	-25.06%	$0.04	$0.04	0.00%
Poland	$158.75	$129.01	-18.73%	$3.97	$7.01	76.57%	$0.06	$0.08	33.33%
Seychelles	$87.53	$52.36	-40.18%	$10.46	$8.76	-16.25%	$0.17	$0.14	-17.65%
Swaziland	$34.89	$24.64	-29.38%	$2.79	$1.51	-45.88%	$0.16	$0.05	-68.75%
Tanzania	$59.29	—	—	$4.45	—	—	$0.08	—	—
Turkey	$122.84	$19.99	-83.73%	$3.23	$4.40	36.22%	$0.06	$0.12	100.00%
Zambia	$45.53	$16.07	-64.70%	$0.83	$1.61	93.98%	$0.25	$0.06	-76.00%
Zimbabwe	$17.50	$18.01	2.91%	$1.97	$3.60	82.74%	$0.03	$0.05	66.67%

Source: ITU World Telecommunications Indicators Database (2002).

* No data available for Democratic Republic of Congo

Accordingly, as can be seen above, the cost of a three-minute local call in South Africa increased by 50% in dollar terms between 1996 and 2000. As will be discussed below, this has played a role in causing people to come off the network in South Africa in recent years. Over this four-year period a number of countries saw decreases in connection charges, subscription rates, and usage rates — perhaps driven by the competitive pressure of mobile and SNOs where they have been licensed. As of 2000 South Africa's connection charge was below average, although its monthly subscription and tariffs appeared slightly higher than average.

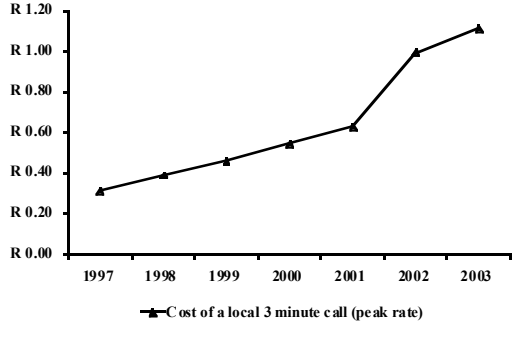
5.1.2 Business

The business market tells a similar story, as in South Africa, businesses pay the same connection charges and usage rates as do residential users. Businesses are charged a higher monthly subscription fee than residential users, and in South Africa, like the other countries in the group, this rate has generally increased over the last four years as operators take advantage of businesses' relatively price-insensitive demand for telecom services. Traditionally these higher rates have then utilised by operators to subsidise the provision of service to residential users or those in uneconomic areas.

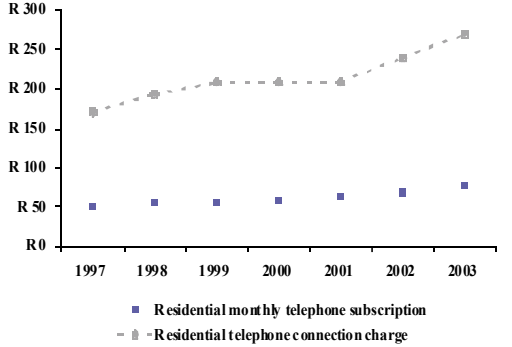
It is important to note that in order to facilitate an international comparison these figures are presented in dollars. The picture can be significantly different when presented in local currencies. In South Africa, for example, the cost of a three minute local call on the fixed network increased by 50% between 1996 and 2000. In contrast, in Rand terms, the cost of a three-minute local call increased by 162.5% and the average annual increase for this call was 27.3% over this period — far outstripping inflation over the same time period[19]. This trend has continued with the cost of a three-minute local call more than doubling again between 2000 and 2003. In Rand terms the cost of a local call is now almost five times what it was in 1996, while monthly subscriptions have increased by two-thirds and the connection charge, after a steep initial reduction following privatisation, is re-approaching its 1996 level.

Figure 5.1 Telephone Tariffs 1997- 2003 (in Rand).

Cost of a Local 3 Minute Call (Peak Rate)



Cost of Monthly Subscrip./Connection Charge



Source: 1997 – 2000 from ITU World Telecommunications Indicators Database (2002), 1998 – 2003 from Telkom Press Releases**.**

19 According to Statistics South Africa, inflation was 5.4% in 2000.

Table 5.2 - Business Telephone Tariffs*

Country	Business telephone connection charge (US$)			Business monthly telephone subscrip. (US$)			Cost of a local 3 minute call (peak rate) (US$)		
	1996	2000	%Change	1996	2000	%Change	1996	2000	%Change
South Africa	$68.15	$29.94	-56.07%	$11.53	$12.00	4.08%	$0.06	$0.09	50.00%
Angola	$160.58	$149.40	-6.96%	$160.58	$10.01	-93.77%	$0.13	$0.08	-38.46%
Botswana	$60.17	$44.12	-26.67%	$4.81	$3.14	-34.72%	$0.03	$0.02	-33.33%
Korea (Rep.)	$300.83	$88.42	-70.61%	$3.11	$3.54	13.83%	$0.06	$0.04	-33.33%
Lesotho	$101.18	$62.68	-38.05%	$6.98	$4.32	-38.11%	$0.03	$0.02	-33.33%
Malawi	$65.32	—	—	$6.53	—	—	$0.04	—	—
Mauritius	$167.15	$76.19	-54.42%	$5.57	$3.81	-31.60%	$0.06	$0.04	-33.33%
Mexico	$408.81	$369.98	-9.50%	$12.89	$20.93	62.37%	$0.10	$0.15	50.00%
Morocco	$39.01	$94.07	141.14%	$6.02	$9.41	56.31%	$0.09	$0.08	-11.11%
Mozambique	$50.14	$31.43	-37.32%	$4.99	$8.63	72.95%	$0.04	$0.06	50.00%
Namibia	$54.66	$38.33	-29.88%	$8.26	$6.88	-16.71%	$0.04	$0.04	0.00%
Poland	$158.75	$129.01	-18.73%	$3.97	$7.01	76.57%	$0.06	$0.08	33.33%
Seychelles	$87.53	$52.36	-40.18%	$11.47	$8.76	-23.63%	$0.17	$0.14	-17.65%
Swaziland	$34.89	$24.64	-29.38%	$2.79	$1.51	-45.88%	$0.16	$0.05	-68.75%
Tanzania	$59.29	—	—	$4.45	—	—	$0.08	—	—
Turkey	$122.84	$19.99	-83.73%	$3.23	$4.40	36.22%	$0.06	$0.12	100.00%
Zambia	$45.53	$16.07	-64.70%	$0.83	$1.61	93.98%	$0.25	$0.06	-76.00%
Zimbabwe	$17.50	$18.01	2.91%	$1.97	$3.60	82.74%	$0.03	$0.05	Swaziland

Source: ITU World Telecommunications Indicators Database (2002)

* No data available for Democratic Republic of Congo

5.1.3 Tariff rebalancing

Part of the reason for the rapid increase in local tariffs was the requirement that Telkom rebalance its local, long distance, and international tariffs in line with the costs associated with these services in order to prepare for the introduction of competition. During its days as a public monopoly Telkom, like many other PTOs, had subsidised local call rates with the revenues garnered from the lucrative long distance and international markets. In a competitive environment this would not be sustainable and long distance/international rates would have to be reduced to more accurately reflect their costs while local rates would have to be increased. The Telkom IPO Prospectus indicates rebalancing did occur, as in 2002 long distance rates[20] were only 2.7 times local rates as compared to 13.2 times in 1997. According to Telkom the

20 In this case defined by Telkom as calls to destinations over 200 kilometres.

weighted average effective price per minute to all international destinations decreased by about 44% between January 1998 and March 2002.

It is important to note, however, that while international tariffs have fallen and the rebalancing of local and long distance rates was achieved, this has been accompanied by dramatic increases in local rates and a rezoning of long distance rates. As can be seen in Table 3.5, from 1999 to 2001 long distance rates did not change while local rates were increased. In 2002, the two long distance zones were collapsed into one with the effect that the price of those calls formerly going to Zone 1 were increased while those calls formerly going to Zone 2 were decreased. Without data on traffic volume to these zones it is not possible to analyse whether overall long distance rates increased or decreased on average. However, if one looks at the rates in 2001, one can see that the median between the two rates (R0.60 for Zone 1 and R1.24 for Zone 2) would be R0.81. As the new rate was set at R0.88 it seems unlikely that long distance rates were reduced, especially as the majority of calls made by users tend to be to locations geographically closer to them. Once establishing the ratio of 2.7 in 2002, Telkom has decided to maintain this ratio, and both local and long distance tariffs were raised by 12.5% in 2003.

Table 5.3 - Breakdown of Domestic Tariff Rebalancing

Year	Local (0-50 Km)	Long Distance Zone 1 (50-100 Km)	Long Distance Zone 2 (>100 Km)	Ratio Long Distance Zone 2 to Local
1999	0.16	0.60	1.24	7.7
2000	0.18	0.60	1.24	6.9
2001	0.21	0.60	1.22	5.8

	Distance Bands Rezoned		
Year	Local (0-50 Km)	Long Distance (>50 Km)	Ratio Long Distance to Local
2002	0.33	0.88	2.7
2003	0.37	0.99	2.7

Note: Tariffs are rounded to the nearest cent and may therefore not exactly correspond to the ratio given.
Source: 1999 from ITU World Telecommunications Indicators Database (2002), 1999 – 2003 from Telkom Press Releases.

5.1.4 Price regulation

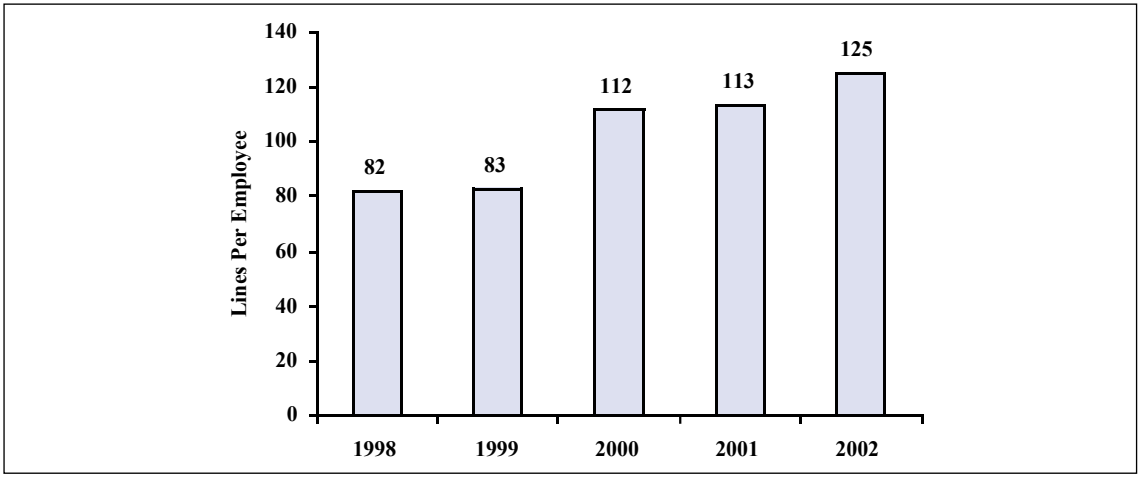
As a monopoly, Telkom is required to file its annual price increases with the telecommunications regulator in South Africa. The reasoning behind this is simple. As Telkom is currently the sole provider of these services in South Africa, the only choice that consumers have is to obtain the services from Telkom or not to obtain them at all. Therefore, Telkom's price setting must be subject to review to ensure that it is not utilising its monopoly power to set an excessive price for its services. In South Africa the mechanism that is used by ICASA to evaluate Telkom's proposed pricing increases is one that is used by national telecom regulators around the world for assessing pricing proposals of incumbent telecom operators - the Price Cap model. According to this model, for a specified future period, the telecom operator may adjust prices on the basis of estimates of probable inflation in the operator's costs (often measured by the consumer price

index, CPI) and achievable improvements in its productivity, generally labelled "X". Inflation increases costs. Productivity improvements decrease costs. Thus the formula CPI –X which allows the operator to raise their prices by the inflation rate adjusted downwards for its productivity increases.

In the current rate regime the inflation figure used in the Price Cap is arrived at by using the year-on-year increase in the CPI for each September while the productivity X factor is set at 1.5%. As has been noted elsewhere[21], the productivity factor of 1.5% seems extremely low given international practice and Telkom's productivity improvements in recent years. For example, the X factor for British Telecom was set at 7.5% during the 1990s, and is currently set at 6.5% in the US, 7.5% in Australia, and 3.0% in Mexico (Intven, 2000, 4-26).

The standard used by Telkom and other operators around the world for judging labour productivity is the number of main line subscribers per employee. Due to major reductions in its workforce in recent years, Telkom's main lines per employee productivity has improved dramatically, increasing by 50% since 1998. Over this five year period Telkom's fixed line employee productivity has been growing by 11% on an annual basis – significantly higher than its productivity adjustment factor of 1.5%. Moreover, this trend has continued with Telkom's IPO prospectus reporting that the employees per line metric had reached 129 by September 2002. International best practice also indicates that there is further room for improvement as many of Telkom's international peers have achieved productivity levels of 200 lines per employee.

Figure 5.2 – Telkom Lines Per Employee, 1998-2002*



* - For the year ending in March
Source: Telkom IPO Prospectus.

21 A full assessment of Telkom's 2002 price increase by Professor W.H. Melody can be found at http://link.wits.ac.za/research/wm20021130.htm

The rapid growth in Telkom's productivity as compared to the figure that is used in South Africa's Price Cap regulations means that Telkom is able to increase its rates at a significantly greater rate than a competitive market would allow. The central premise of the Price Cap Formula is to mimic a competitive market, to ensure that gains from productivity increases are distributed to both consumers (in the form of lower prices) and the monopoly operator (in the form of profits). In South Africa this has not occurred, as consumers have continued to pay higher and higher prices despite great productivity improvements within Telkom. One way of gauging the effects of these higher tariffs is to look at what has happened with the number of residential fixed line users over the past five years. For this task the standard teledensity definition of main lines per 100 inhabitants can sometimes be misleading. This is because increases in lines connected to business and government users, who are better able to afford higher tariffs, can sometimes hide decreases in the number of lines connected to residential users. Furthermore, Telkom's main lines statistics also include ISDN and payphone lines, two areas that have shown rapid growth in recent years and that could be masking a decline in residential fixed lines.

Table 5.4 – Residential Main Lines

Residential Main Lines Per 100 Inhabitants				
Country	**1996**	**2000**	**CAGR 1996-2000**	**Residential Lines as a % of Total Main Lines (2000)**
South Africa	6.50	6.38	-0.46%	56%
Botswana	2.90	5.49	17.32%	60%
Korea	33.70	34.59	0.66%	75%
Mauritius	13.30	18.82	9.07%	80%
Mexico	6.92	9.14	7.19%	73%
Morocco	3.48	3.87	2.75%	77%
Namibia	2.99	3.76	5.94%	60%
Poland	14.04	21.72	11.54%	77%
Seychelles	13.36	15.24	3.34%	65%
Turkey	16.96	21.38	5.97%	76%

Source: ITU World Telecommunications Indicators Database (2002).

As was discussed earlier, the performance of South Africa's fixed line sector overall has been stagnant. However, when measured by residential main lines it is even worse. As Table 5.4 shows, in 2000 there were fewer residential users connected to Telkom's network than there were in 1996, before the company was privatised. This situation is unlikely to have changed given that according to the ITU, Telkom had 11.4 total main lines per 100 people at year-end 2000. But according to the prospectus filed by Telkom ahead of its March 2003 IPO, this figure had shrunk to 10.8 by September 2002. Table 5.4 also shows that South Africa had, with the exception of Zambia, the lowest number of residential lines as a percentage of total main lines,

and the slowest growth in residential main lines, between 1996 and 2000, of any of the countries in the comparison group. At 56%, South Africa has an unusually low percentage of residential users, or conversely an unusually high proportion of business and government users, especially compared with the other middle-income countries where about 75% of lines were residential lines. The low percentage of residential main lines in South Africa suggests that Telkom's user tariffs are not affordable to the majority of potential residential users in South Africa.

It is likely that the rapid increase in Telkom's prices was, in combination with the growth in mobile, the cause of the high number of people coming off the fixed line network in South Africa in the past three-four years. This reinforces the point that it is both increased access (seen in the more than two and half million new lines installed by Telkom) and increased affordability (not yet seen in South Africa) that are necessary to achieve universal access.

5.2 National Mobile Operators

Table 5.5 provides interesting information that may provide some initial answers to why mobile technology has proved so popular. Firstly, for countries where there was service in 1996, the level of each type of charge (connection, monthly subscription, and cost of a three minute call) fell between 1996 and 2000. Secondly, the convenience and flexibility of pre-paid services has helped to spur adoption. Market research firm BMI TechKnowledge has estimated that over 90% of cellular users in Southern Africa and the rest of Africa are pre-paid.[22] These statistics are borne out by the experience of South African companies' foreign mobile operations. For example MTN has found that in Cameroon 97%, of its subscriber base is pre-paid. In Nigeria, the figure is 98%, in Rwanda 96%, in Swaziland 95%, and in Uganda 98%.[23] Pre-paid is popular through-out Africa because it allows customers to avoid relatively high monthly subscription fees and, once connected, subscribers only pay by the minute for the calls that they make (although the tariffs are generally higher for pre-paid than for contract customers). While South Africa performs quite well in terms of the cellular connection charge, it appears subscription rates and tariffs still have room to decrease. South Africa has cellular tariffs higher than those found in Angola, Mauritius, Morocco, Mozambique, Seychelles, and Mozambique, even though the South African cell phone user base is bigger, with greater economies of scale than those found in these other countries.

22 BMI-Technknowledge Communication Handbook 2002

23 MCell Ltd. Annual Report 2002

Table 5.5 - Mobile Cellular Telephone Tariffs

Country	Mobile Cellular activation charge (US$)			Mobile Cellular monthly subscription (US$)			Cost of a local 3 minute call (peak rate) (US$)		
	1996	2000	%Change	1996	2000	%Change	1996	2000	%Change
South Africa	$21.21	$13.69	-35.45%	$34.47	$25.22	-26.83%	$0.96	$0.69	-28.13%
Botswana	—	—	—	—	—	—	—	—	—
Korea (Rep)	$87.02	$44.21	-49.20%	$27.35	$14.15	-48.26%	$0.71	$0.35	-50.70%
Mauritius	$27.86	$19.05	-31.62%	$16.71	$4.76	-71.51%	$0.17	$0.15	-11.76%
Mexico	$13.03	$0.00	-100.00%	$28.82	$25.37	-11.97%	$0.88	$0.82	-6.82%
Morocco	$91.79	$9.41	-89.75%	$22.95	$11.76	-48.76%	$1.38	$0.56	-59.42%
Namibia	$58.15	$36.02	-38.06%	$23.26	$14.41	-38.05%	$0.95	$0.70	-26.32%
Poland	$198.43	—	—	$13.89	—	—	$2.14	—	—
Seychelles	$201.21	$87.39	-56.57%	$60.36	$17.34	-71.27%	$0.83	$0.50	-39.76%
Turkey	$184.26	—	—	$6.14	$3.42	-44.30%	$1.11	$0.59	-46.85%

Source: ITU World Telecommunications Indicators Database (2002)

As Table 5.5 indicates, the activation fee and monthly charges for cellular contracts have continued to decline despite the recent appreciation of the Rand. Using the current exchange rate of 8.4 Rands to the Dollar, these charges are at around $12 and $14 respectively, as compared to $13.69 and $25.22 in 2000. Unfortunately it is not possible to make a comparison based on tariff rates to the ITU figures in Table 5.5, due to existence of different tariffs between post-paid and pre-paid customers, the different types of calls, and the fact that the ITU does not provide its methodology for arriving at an average national mobile tariff.

Table 5.6 - Mobile Operator Peak Rate Charges in Rands

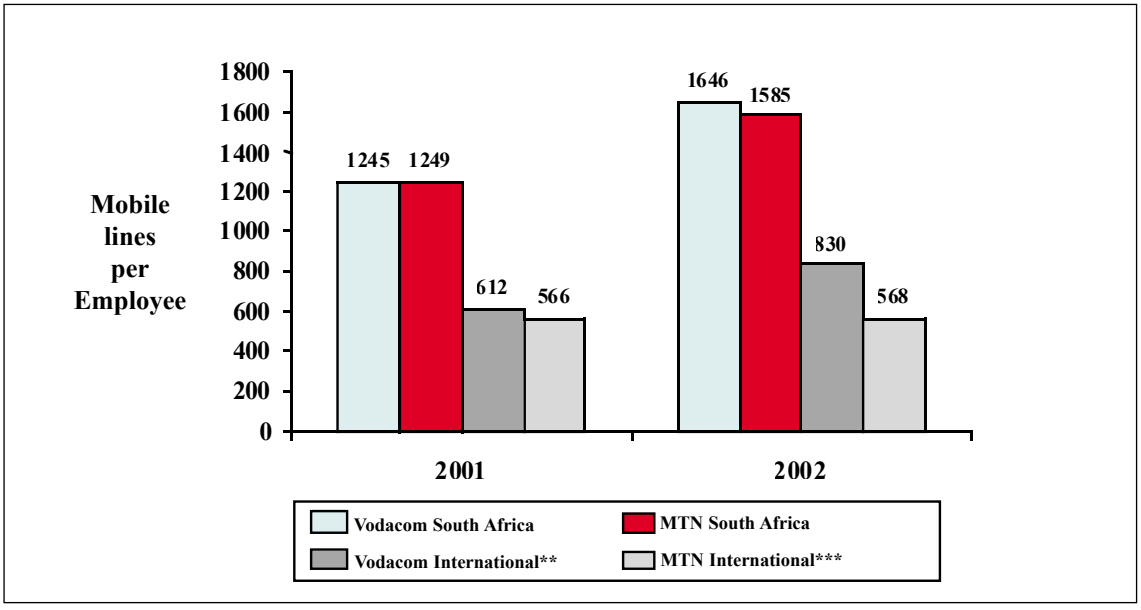
Provider	Activation Charge	Monthly Charge	Minutes Provided	Call on own Network	Call to other Mobile Network	Call to Fixed Network
Vodacom Contract*	R 97	R135	120 off peak	R1.70	R2.70	R2.70
Vodacom Pre-Paid**	N/A	N/A	N/A	R2.85	R2.85	R2.85
MTN Contract***	R95	R120	15 peak, 85 off peak	R1.70	R2.20	R2.20
MTN Pre-Paid	N/A	N/A	N/A	R2.60	R2.85	R2.85
Cell C Contract-	R94	R78–	N/A	R1.60	R2.00	R2.60
Cell C Pre-Paid	N/A	N/A	N/A	R2.40	R2.70	R2.70

* Everyday Weekend Contract
** Vodago Standard Pre-Paid
*** My Call 100 Contract
- ClubChat Contract
– Is a minimum monthly usage requirement rather than a subscription fee.

Source: Vodacom, MTN, and Cell C websites.

Mobile has proved to be a much more efficient technology for providing access to telecommunications services than has fixed line. As is discussed above, Telkom's lines per employee figure currently stands at 130. In line with international experience, Figure 5.3 shows that Vodacom and MTN have achieved far greater productivity rates both in South Africa and in the other African countries within which they have operations. MTN and Vodacom have similar productivity figures in South Africa, at approximately 1600 connections per employee. This productivity metric is improving rapidly. For Vodacom, it stood at 555 as recently as 1998 and moreover it continues to increase reaching 1,854 as of September 2002. The productivity of Vodacom's African operations has also increased rapidly, from 279 in 2000 to 1,360 in September 2002, indicating that these operators' success in South Africa can be replicated in other Africa countries.

Figure 5.3 – Mobile Lines Per Employee, 1998-2002*



* - For the year ending in March
** - Refers to operations in the Democratic Republic of the Congo, Lesothu, and Tanzania.
***- Refers to operations in Cameroon, Nigeria, Rwanda, Swaziland, and Uganda.

Source: Telkom IPO Prospectus, MTN 2002 Annual Report.

In terms of operator strategies, Vodacom has focused on the pre-paid market since the launch of Vodago, its prepaid service, in November 1996. Over 80% of Vodacom's customer base is pre-paid and this proportion is continuing to grow as 95% of its new connections are pre-paid. On the other hand, despite its first-mover status in the pre-paid market, MTN has the strongest focus on the post-paid contract market of the three operators and has been the first of the operators to roll-out data services. MTN is attracted by the higher ARPUs offered by contract customers and 22% of its customer base are contract users – a relatively high figure for the country and the continent. MTN's proportion of pre-paid users is growing, as 86% of the operator's new connections in 2002 were pre-paid, but this is not as fast as the 95% pre-paid users as a proportion of new connections shown by Vodacom. MTN's contract users have an ARPU of R602 per month, higher than the R547 per month generated by Vodacom's contract customers, and this may explain MTN's greater focus on contract customers as compared to its competitors.

Cell C's strategy focuses on attracting the mid to lower market post-paid contract users (leaving up-market contracts to MTN), and the upper pre-paid market (leaving the lower and mid pre-paid market to Vodacom). Although the company has not released specific figures, the Cellular.co.za website has estimated that 98% of the new entrant's customer base is pre-paid. The operator claims that its strategy of competing on price is the only way to get people to switch away from the incumbent operators. Accordingly Cell C has the lowest contract and pre-paid tariffs among all of the operators and does not charge contract users a monthly subscription fee. Cell C also hopes that its simplified and targeted pricing plans will attract users away from the other

operators. The operator hopes that with this approach it will be able to achieve a 25% market share within 6-7 years of its November 2001 launch. This strategy may prove fruitful as ITWEB (15/06/02) estimates that churn in the cellular market is in the neighbourhood of 25% and in its first annual report, Cell C said that 65% of its customers are former customers of either Vodacom or MTN. The new entrant claims that the strategy of attracting existing users away from the incumbents, rather than focusing on new users, is necessitated by the two-year delay in the granting of its licence. During this time almost 7 million new cellular users were signed up by Vodacom and MTN, which has led to a perception by Cell C that the market may be approaching the point of saturation. Hence the focus on poaching existing users rather than trying to sign up new ones. After a year and a half of operations, Cell C has around a million connections, although it appears that the number of active revenue generating customers is far less than this figure. It also remains to be seen what effect Cell C's pricing strategy is having on the company's ARPUs, as it has declined to reveal these figures, saying only they are in line with the industry range for both pre-paid and post-paid.

5.2.1 Roaming

GSM has made enormous strides, accounting for the lion's share of mobile communications globally with 800 million subscribers. While this common standard has made possible communication across the globe, the high costs associated with roaming continue to be a major area of concern. Despite high levels of competition in mobile, all over the world roaming charges are estimated to be between 40 –70% higher than cost [24]. Even though roaming falls between jurisdictions and is therefore unregulated, the question remains as to why the competitive market is not driving down the prices. The answer lies in the monopoly on the termination call number. Ewan Sutherland of the International Telecommunications Users Group (INTUG) points out that the problem arises from the unregulated termination on mobile, with the effect that operators exploit each others customers in jurisdictions in which they are not regulated.

So lucrative has been this exploitation that operators facing criticism from Northern Hemisphere regulatory agencies have indicated that as much as 15% of their revenues are derived in this way. To demonstrate the lack of correlation between GSM roaming charges, Sutherland demonstrated that while it costs a Belgian operator, Proximus, subscriber roaming in South Africa € 2.08 to receive a forwarded call from Belgium to South Africa through MTN or Vodacom, calling from South Africa to Belgium on MTN costs only €1.43 or €1.19 (off-peak), or € 1.51 on Vodacom. Likewise international calls to Belgium on Vodacom cost only €0.50 and (0.39 off-peak) and a Vodacom subscriber roaming on Proximus a similar € 0.40, while calling back to South Africa from Belgium costs €3.00/ and €2.82 off-peak – more than a Proximus subscriber receiving a forwarded call from Belgium and magnitudes of scale more than a call to Belgium from South Africa.[25]

24 Opcit p6

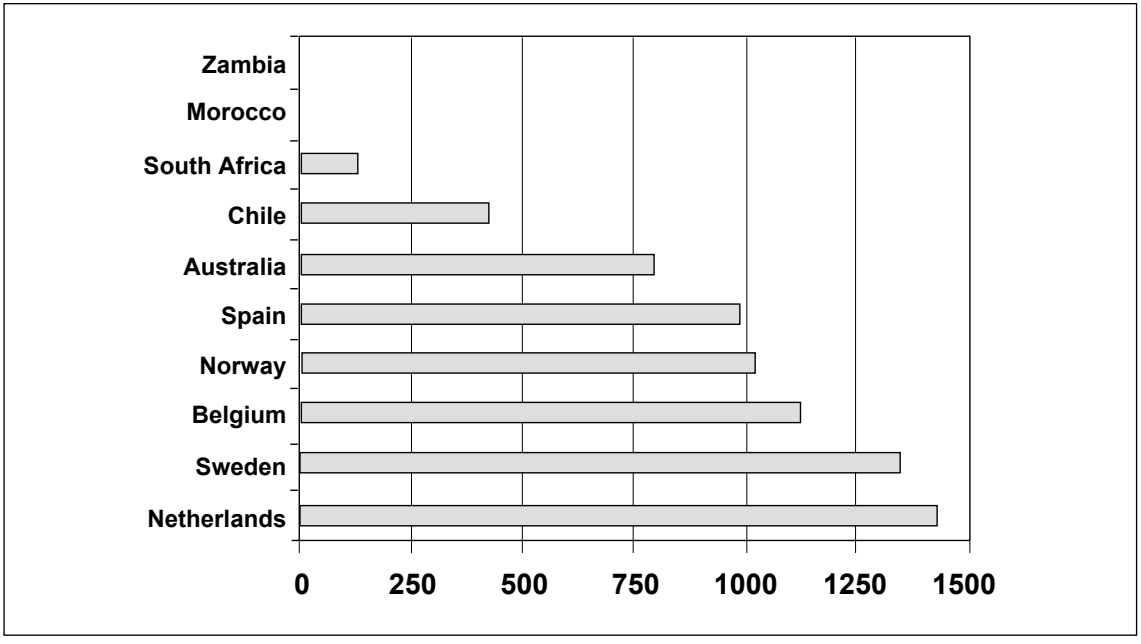
25 See Sutherland E (2003) *Mobile Regulations* for fuller account at http://link.wits.ac.za/papers/es20030219.pdf

6. Interconnection

With restricted network competition the main form of interconnection has been fixed-mobile.

Figure 6.1 demonstrates the disparity between mobile termination charges and fixed termination charges. For example in the Netherlands mobile termination charges are about fifteen times the fixed termination charge. It is unlikely that the costs of the mobile network in the Netherlands are fifteen times that of the fixed line network. By this measure South Africa seems more in line with costs as mobile termination rates are approximately double those of fixed line terminations.

Figure 6.1 – Mobile/Fixed Termination Charge Difference (%)



Source: Sutherland (2003), LINK Centre Seminar 19/02/03
http://www.intug.net/talks/ES_2003_01_regensburg_files/frame.html

Despite South Africa's relatively reasonable mobile termination rates as compared to OECD countries, Telkom has argued that mobile charges in South Africa are still above costs. Telkom contends that the 1993 interconnect agreement with the mobile operators, upon which the current charges are based, effectively fixed Telkom's share of revenue from calls made from its network to mobile users, and calls made from mobile users to Telkom customers. The share was fixed, regardless of the volume of calls or the retail price of the call.

In January 2000, the then CEO of Telkom, Tom Barry stated:

> The interconnect agreement was based on an unrealistic projection of the number of customers in South Africa, compared with today's actual users. Adjusted for inflation, the revenue we are getting is a small fraction of the 1993 prices. The prices for facilities were also fixed in 1993, meaning that the mobile operators are paying less for these facilities than other customers.

Table 6.1 – 2003 Telkom and Mobile Operator Interconnection Fees (Incl. VAT)

Type of Call	Peak Rate	Off-Peak Rate
Fixed (Telkom) to Mobile (Vodacom, MTN, Cell C) Call	R1.88	R1.11
Termination Rate paid by Telkom	R1.40	R0.83
Amount Retained by Telkom	R0.48	R0.28
Mobile (Vodacom, MTN, Cell C) to Fixed (Telkom) Call26	R2.20 – R2.85	R0.86 – R1.55
Termination Rate paid by Mobile Operator	R0.27	R0.14
Amount Retained by Mobile Operator	R1.93 – R2.58	R0.72 - R1.41
Mobile (Vodacom, MTN, Cell C) to Mobile (Vodacom, MTN, Cell C) Call	R2.00 – R2.85	R0.90 – R1.55
Termination Rate paid by Calling Mobile Operator	R1.40	R0.83
Amount Retained by Calling Mobile Operator	R0.60 – R1.45	R0.07 – R0.72

Source: Tariff information from Telkom, Vodacom, MTN and Cell C Websites. Termination and Retention rates from Telkom IPO Prospectus and communication with mobile operator officials.

Note: The range of tariffs provided for Mobile Peak and Off-Peak rates in this table are based on the Vodago Standard Pre-Paid, Vodacom Everyday Weekend, MTN Classic, MTN My Call 100, Cell C Easy Chat, and Cell C Club Chat calling plans. Other plans offered by these operators may include different tariffs.

The current ratio of mobile termination rate to fixed termination rates stands at R1.40 to R0.27 at peak hours. Expressed in percentage terms mobile termination rates are 519% of fixed termination rates, which would put South Africa in the middle section of Figure 3.1 at a significantly higher rate than that contained for South Africa in the diagram. The 2003 ratio is an improvement over the corresponding ratio of 2002 which was R1.40 to R0.24 or 583%. As can be seen the ratio improved because the mobile termination rate was not increased between 2002 and 2003. According to officials at Vodacom, interconnection rates in South Africa are governed by a commercially negotiated agreement, whereby on the 1st of January each year each party can raise interconnection rates by the previous year's consumer price index or by R0.02 – whichever is higher. Therefore, last year the mobile operators could have raised their rates from R1.40 (peak)/R0.83 (off-peak) to R1.46 (peak)/R0.86 (off-peak), but chose not to do so. Telkom did raise its termination rates from R0.24 (peak)/R0.11 (off-peak) to R0.27 (peak)/R0.14 off-peak, and this increase accounted for the improvement in the mobile to fixed termination rate ratio. Given the parameters of the interconnection agreement between the South African operators it is hard to see how the ratio of mobile to fixed termination rates will improve unless the mobile operators voluntarily continue to freeze their termination rates.

Table 6.2 Telkom and Mobile Operator Peak Rate Call Charges Per Minute

Provider	Local Call on own Network	National Call on own Network	Call to Mobile Network	Call to Fixed Network
Telkom	55.2c for first 90 seconds; 37.1c for each minute thereafter	99c	R1.88	N/A
Vodacom Contract*	R1.70	R1.70	R2.70	R2.70
Vodacom Pre-Paid**	R2.85	R2.85	R2.85	R2.85
MTN Contract***	R1.70	R1.70	R2.20	R2.20
MTN Pre-Paid	R2.60	R2.60	R2.85	R2.85
Cell C Contract****	R1.60	R1.60	R2.00	R2.60
Cell C Pre-Paid	R2.40	R2.40	R2.70	R2.70

* - Everyday Weekend Contract
** - Vodago Standard Pre-Paid
*** - My Call 100 Contract
****- ClubChat Rates

Source: Telkom, Vodacom, MTN, and Cell C websites.

There is international support for Telkom's view that mobile termination rates should be decreased. In the past few years regulatory authorities around the world have reassessed their views regarding the high levels of mobile termination charges. While these asymmetrical charges were originally intended to reflect the higher costs of mobile networks in the early stages of their development, with the growth of mobile has come a realisation that these costs should fall as economies of scale are gained.

Internationally, mobile operators have fought the designation of their termination charges as excessive and argued that competitive pressures within the industry constrain termination charges. The mobile industry also argues that the costs of mobile networks are fundamentally different from those of fixed networks. Specifically, the mobile networks allow their customers to originate and terminate calls to and from customers regardless of their location. This functionality requires specific equipment and does not have an equivalent on the fixed network. The mobile operators argue that it is this additional equipment investment and functionality that causes mobile termination rates to be set at such a high level. Mobile operators also argue that terrain and availability of spectrum can have a significant impact on the performance and costs of constructing their networks and that these cost drivers also have no fixed line equivalent. Indeed Oftel has found that the per minute costs of services on mobile networks are higher than those on fixed networks in the UK by a ratio of between 5 and 10 to 1. However, the ITU Development's Office in Bangkok has also found that due to economies of scale and the larger size of mobile

networks in the region "…in Asia price trends were such that one could already observe the cost per local customer access line on a mobile network to be lower than on a fixed network."[26]

It is therefore difficult to conclude from international practice whether South Africa's mobile termination rates are too high. Currently, the mobile termination rates are 5.2 times fixed termination rates, which would be within the range of UK operators that was found to be unacceptable by Oftel. However, in 2001 the UK had 35 million fixed line connections and 46 million mobile connections – with the mobile market split between four operators. In contrast South Africa has 4.9 million fixed line connections and 14.4 cellular connections and the cellular market is currently essentially split between two operators. Given the impact of the economies of scale in Asia, which actually may be enough to lower mobile costs below fixed costs, it certainly seems possible that mobile termination rates are set well above their costs in South Africa.

Oftel Ruling on Mobile Termination Rates

During December 2001, the UK regulator Oftel ruled that mobile termination rates in the UK were substantially in excess of costs and that an immediate reduction of 15% be effected and that a price cap of RPI –14% should be implemented over three years. The UK's four mobile operators objected and the matter was referred to the Competition Commission.

The Commission found that "each Mobile Network Operator (MNO) has a monopoly on call termination to its network" and that competitive pressures at the retail level did not act as a constraint on termination charges. It found that termination charges were currently in excess of costs by 30-40% and in the absence of price controls would be more than double costs by 2005/06 if current charges were maintained in real terms. Each operator was earning monopoly profits on calls to its own network as, for example, there is no other way to make a call to Vodafone subscriber without using Vodafone's network. Oftel therefore argued that there was no competition in call termination.

Oftel hopes that the price cap will provide operators with an incentive to reduce their network costs as opposed to the lack of incentive to reduce costs in the current unregulated environment where operators could exploit the monopoly on termination to their own network.

[26] Excerpts from June 2002 report of the ITU-T SG3 Rapporteur Group on Mobile Termination Rates.

7. Leased lines

Leased lines are used by high volume users such as Value Added Network Services and Internet Service Providers, which make use of carrier facilities to build high capacity virtual networks to manage their traffic. In many developing country jurisdictions, such service providers are required to source these facilities from the incumbent monopoly provider, with the associated lack of opportunities to negotiate prices or use alternative suppliers. In South Africa it was assumed that in the spirit of the White Paper on Telecommunications that informed the policy that led to the 1996 telecom legislation, restrictions on facilities provision would end when Telkom's exclusivity ended in 2002. However, the 2001 Telecommunications Amendment Act extended the requirement that facilities be acquired from PSTNs, meaning Telkom and new Second Network Operator. This situation will be maintained until a notice is set forth by the Minister of Communications indicating that other providers can build their own networks. The Minister is able to do this at any time. There have been calls on the Minister to trigger these provisions, which are contained in the current legislation, in order to free up the sector from the existing constraints that appear to be placing a drag on this segment of the market's development – a sector which is critical to innovation and development of the e-economy.

As can be seen in Table 7.1, South Africa is far and away the leader in the provision of leased lines in Africa. This undoubtedly is a reflection of South Africa's status as the economic powerhouse of the continent. Given the scale of the South African market, it is also not surprising that the charges for national leased line rental are lowest in South Africa, although in terms of international leased lines, Botswana, Lesotho, and Zambia charge at lower rates.

Table 7.1 - Digital Leased Lines and Tariffs

Country	Number of Lines 2000	Number of Lines 2001	Installation of Local 64 Kbps Line	Monthly Rental Up to 1KM 64Kbps Line	Monthly Rental 10-20 KM 64Kbps Line	Monthly Rental International 64 Kbps Line
South Africa	—	76,730	$148.57	$134.00	$134.00	$2,051.00*
Botswana	578	—	$596.96	—	$239.12	$674.50
Malawi	430	475	$174.00	—	$221.00	$2,000.00
Mauritius	806	842	—	—	$314.40-$508.90	$3630.50**
Mozambique	65	214	$563.40	$116.20	$298.95	$3613.11***
Namibia	500	800	$36.60	—	—	—
Tanzania	27	50	$1,410.00	—	$7,499.00	$7,650.00
Turkey	—	—	—	—	—	—
Zambia	128	137	—	—	$250.00	$1800.00****

* Satellite
** Half circuit price to USA
*** Link for Europe and the U.S.
**** Link to the U.S.

Source: BMI-TechKnowledge Communication Technologies Handbook (2002)

8. Competition

8.1 PSTN

Although the Telecommunications Amendment Act anticipated the introduction of a PSTN competitor to Telkom upon the expiry of its exclusivity in May 2002, the SNO licence has still not been awarded. In terms of the legislation, 30% has been set aside for the communications arms of the power parastatal Eskom and the national transport network Transnet, namely EsiTel and Transtel. In addition, a 19% empowerment share of the license was awarded to Nexus. ICASA received two applications for the remaining 51% Strategic Equity Partner share of the SNO but ruled that neither of the SEP bids were regarded as meeting the threshold requirements set by the Minister of Communications in her Invitation to Apply. Following the Minister's announcement that a committee headed by the Deputy Director General of Telecommunications would be appointed to negotiate with interested parties in order to ensure the licensing of an SNO, four bidding consortia emerged which were finally reduced to two, Communitel and Two Consortium. Latest reports suggest that these consortia again have been found wanting and ICASA may again propose to the Minister again that neither of them be licensed.[27]

Concerns were raised about the inherent conflict of interest in this process. The Minister was now responsible for negotiating the terms and conditions for the participation of the SNO while simultaneously attempting to deliver a successful Initial Public Offering for Telkom, in which the government remains the largest single shareholder. This situation was further complicated by the fact that the SNO ownership structure already has two public entities accountable to Government through the Minister of Public Enterprises incorporated into it.

Any result that emerges from this convoluted process is unlikely to hold any prospects for improving the access to facilities and interconnection - the key to competition, innovation, and growth of the sector. One scenario is: the Minister protects the interests of Telkom and negotiates a weak entrant unable to challenge Telkom in any way. The other, more likely scenario, as the Minister is under pressure from the Ministry of Public Enterprises and Department of Finance to increase the values of EsiTel and Transtel is: to secure an investor in the SNO through the granting of deal-sweeteners behind closed doors. Such deals would inhibit vigorous competition, and compel other players in the market to deal not only with the incumbent but a protected duopoly of PSTN operators.[28] Already the legislation favours this end result, as it was intended to attract investment in the PSTNs, by requiring competitive market segments to acquire facilities from the PSTNs, rather than self-provide or procure them from other operators, such as the mobile operators or the multimedia carrier, Sentech. In particular the restrictions on VANS service providers offering voice in addition to the data services that they currently offer has been seen as protecting the revenue streams of the PSTN at the cost of higher prices and inefficiency to end users.

8.2 National Mobile Operators

While operators in the mobile market believe the market is competitive, with three players, and does not require the regulatory scrutiny it faces, the original duopoly players, Vodacom and

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27 http://www.icasa.org.za/Contents/Resources/Whats%20New/110803%20SNO%20NGC%20Report.pdf for Next Generation Consultants' report.

28 See Melody,W (2003) WISER Seminar paper for fuller account of implications for competition and of licensing process at www.link.wits.ac.za

MTN, strongly dominate the market with a roughly 60-40% split of the market respectively. While Cell C has made considerable gains in a highly entrenched market, its viability is fragile. Delays in the approval of its highly contested licence allowed the other two mobile operators to acquire another 7 million subscribers, largely from the pre-paid market they had not entered before. With mobile increasingly a substitute for fixed voice services and both of the original mobile licensees operating networks with more subscribers than Telkom, Cell C has requested ICASA to determine their dominance in the market and declare Vodacom and MTN as major operators with dominant market power in terms of the regulations.

8.3 VANS

The lack of competition in fixed networks and services has severely hampered the growth of the market. Not only has the market segment shrunk from 5.5 million in 1999 to 4.9 million as of September 2002, but VANS providers claim that the denial of facilities required to build their VANS networks, and the predatory pricing on services offered by Telkom's VANS and ISP subsidiaries, have impacted negatively on the downstream VANS industry as a whole. Several studies indicate the negative impact of Telkom's high cost of providing facilities and services on the growth of the Internet industry in South Africa. [29]

The last five years have proved difficult for the VANS operators, whose ability to innovate and make their services efficient has been hampered by restrictions on their activity, due to the voice and facilities exclusivity granted to Telkom and now the SNO. By law all South African VANS providers are required to source the telecommunications facilities necessary to provide their value added services to customers from Telkom and the future Second National Operator once it is licensed.

The VANS had hoped that the Telecommunications Amendment process of 2001 would have ended Telkom's facilities exclusivity and allowed the VANS to expand their offerings by providing VoIP services. However, the Amendments only extended these privileges to the future SNO and set no date for allowing VANS to build their own facilities or provide VoIP. The VANS argue that the current market structure, combined with Telkom's aggressive behaviour, makes it impossible for them to compete and will result in a number of them going out of business. For example, they argue that Telkom's forcing competitive VANS to pay a distance based charge for leased lines while only requiring its own subsidiaries to pay a flat rate charge for the same service, makes it impossible for VANS providers to bid on work for large companies with a national network of offices. They say they cannot compete with Telkom in this sub-market because, with the distance-based charges on the leased line, the cost of connecting a national client's offices would be prohibitive.

8.4 Customer premises equipment

The deregulation of customer premises equipment requires nothing other than type approval from the Regulator together with the introduction of competitive networks and services allowed for a boost to the equipment supply side of the industry. However CPE is largely a foreign import business with little significant opportunities for employment creation or local empowerment as has been evidenced in some other emerging markets.

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29 See Goldstuck Report 2002, World Wide Worx.

9. Preparing for next generation networks

9.1 Broadband development

Table 9.1 demonstrates that as of 2001 South Africa was lagging behind other middle-income countries in terms of deployment of broadband technologies. Meanwhile, at this time, broadband technology is virtually unavailable throughout the rest of Africa. While South Korea is a world leader in terms of broadband deployment, Mexico, Poland and Turkey all have a lead on South Africa in terms of broadband deployment. Telkom's ISDN service is available in South Africa, although as of 2001 it only had a little under 25,000 subscribers.

Table 9.1 Intelligent Network Subscribers, 2001

Country	BROADBAND					ISDN	
	DSL 2001	Cable 2001	Other 2001	Total	Per 1000 Inhab.	ISDN 2001	Per 1000 Inhab.
South Africa	0	0	0	0	0.00	24,110	0.55
Korea (Rep. of)	4,452,590	2,723,330	629,610	7,805,530	163.50	134,760	2.82
Mauritius	0	0	0	0	0.00	1,410	1.18
Mexico	29,850	20,000	0	49,850	0.50	14,850	0.15
Morocco	0	0	0	0	0.00	10,000	0.33
Namibia	0	0	0	0	0.00	2,230	1.25
Poland	2,000	10,000	0	12,000	0.31	57,160	1.48
Seychelles	0	0	0	0	0.00	170	2.13
Swaziland	0	0	0	0	0.00	20	0.02
Tanzania	0	0	0	0	0.00	0	0.00
Turkey	4,000	0	0	4,000	0.06	8,690	0.13
Zambia	0	0	0	0	0.00	0	0.00
Zimbabwe	0	0	0	0	0.00	240	0.02

Source: 2002 ITU Internet Report: Internet for a Mobile Generation, Mobile Internet Statistical Annex 9

Broadband finally arrived commercially in South Africa in 2002 with Telkom's Gauteng launch of asymmetrical digital subscriber line (ADSL) service during the middle of the year. Take up of the service has not been as rapid as some industry observers expected, and Telkom estimates that there are currently 2,500 ADSL users in the country (ITWEB, 24/03/03). One of the disappointments around the service has been that its speeds are "best effort" and limited to 256Kbps upstream and 512Kbps downstream, which are considerably lower than the12Mbps anticipated if one is close enough to the DSL enabled exchange. A second source of frustration for some users is the imposition of a 3GB per month download limit by Telkom on the service to prevent "bandwidth hogs" from degrading the experience of other users.

One reason for the slow take-up is that residential users must pay around R2500 for the DSL modem and installation at start-up and a flat R750 per month for the service (plus whatever fees are charged by the ISP provider). As will be seen subsequently in the discussion of dial-up pricing, these costs only make sense for heavy users. In 2003, a dial-up user can expect to pay a little more than R800 for 30 hours of access a month (including call charges) at current prices, and therefore the service is not economical for the dial-up market as a whole which, according to Nielsen NetRatings, averages 4.5 hours on-line per month. The ISPs expected significant demand from small businesses and people with home offices for the ADSL service, but this has yet to materialise because of the high Telkom tariffs.

The ISPs argue that Telkom is to blame for this and have filed a complaint with ICASA on this matter. The ISPs argue that the launch of the service was shrouded in secrecy so that competitive providers were unable to get the information necessary to set up their own services – giving SAIX the advantage of a few months of operation without competition. Secondly, the ISPs argue that Telkom specifically designed its network architecture so that the ISPs cannot compete on price. Similar to earlier complaints around Telkom's distance based charging for leased lines, the ISPs argue that they have to pay for expensive links between the central ADSL authentication servers and their own networks, while Telkom's ISP is co-located with the authentication services, meaning that it bears no such costs and can offer better rates. The ISPs argue that they should be allowed to place their own equipment in Telkom's exchanges to ensure fair competition. Finally, the ISPs argue that currently they are essentially only able to resell the product, without being able to tailor the speed or bandwidth download restrictions for specific sub-markets. As a result of these problems, two of the leading competitive ISPs, Tiscali World Online and M-Web, only have about 500 ADSL subscribers between them (Ibid).

Telkom estimates that the South African market could hold 250,000 subscribers within five years, but most industry observers consider this figure to be optimistic. Telkom says that ADSL will be available in over 50% of South Africa by March 2003, and that the company will launch a satellite DSL which will be available anywhere in sub-Saharan Africa by the end of 2003 (Ibid). The DSL in the sky product will offer four distinct service packages with best effort download rates ranging from 64 Kbps to 512 Kbps. However, this projection of a quarter of a million users is unlikely to be achieved without the still to be licensed SNO or Sentech, the state-owned broadcast signal distributor and holder of a multi-media licence, offering competing products. This would allow the ISPs to compete on price, speed, and bandwidth download options, while developing offerings tailored specifically for small business and heavy residential users.

9.2 Undersea cable

The amount of international bandwidth to African countries was dramatically increased by the completion of the SAT3 cable in 2002. The 2.5 Gbps capacity of this cable will not only be a major upgrade on the capacity provided by the SAT-2 cable, but it will also benefit several coastal West African nations as well as landlocked Swaziland and the islands of Mauritius and Reunion.

Table 9.2 - Submarine Cable Capacity

Submarine Cable	Capacity	Year Operational	Countries Served	Links To
SAT-2	2 X 560 MBPS	1993	South Africa	Europe
SEA-ME-WE	2/3 (2 X 20 GBPS)	1999	Algeria, Tunisia, Egypt, Djibouti	Europe, Asia
Atlantis-2	2 X 2.5 GBPS	2000	Cape Verde, Senegal, Morocco	South America, Europe
SAT3 West African Cable (WASC)	2 X 2.5 GBPS	2002	Morocco, Senegal, Cote d'Ivoire, Ghana, Benin, Nigeria, Cameroon, Gabon, Angola, South Africa	Europe
SAT3 West African Cable (WASC)/Southern Africa and Far East (SAFE)	2 X 2.5 GBPS	2002	South Africa, Swaziland, Mauritius, Reunion	Asia

Source: IDRC Internet Out of Africa Map (2002). Available at http://www.idrc.ca/acacia/divide/.

9.3 Digital TV

South Africa's television broadcasters are in the process of trying to take advantage of the growing convergence between different types of media and their connections into the home to offer a range of new services to households. Internationally, industry analysts have argued that the provision of email and Internet access through television sets has the potential to rival the Internet revolution in terms of the expansion of access to information and communication. This potential is based on the observation that people are more familiar with, and own significantly more, televisions than they do computers. South Africa is no exception, with the ITU estimating in 2001 that there were 6.5 million television households in South Africa and only approximately 3 million personal computers.

During March 2002 satellite provider DSTV became the first operator in South Africa to roll out interactive television services and claims that by August it had signed up between 4000 and 5000 users of its interactive offerings. Overall, according to DSTV, as of March 2002 it had a total of 1 057 000 subscribers in South Africa and of these 591 000 were digital subscribers (meaning that some level of interactivity is enabled). Outside of South Africa the company had an additional 224 000 subscribers in Africa, of which 202 000 were digital. Almost all of these non-South Africa subscribers (200 000 out of the 224 000) are located in sub-Saharan Africa.

In South Africa, DSTV does face the prospect of competition in this arena with state owned broadcasting signal distributor Sentech planning to develop its own Vivid satellite service to offer television-based Internet browsing and e-mail services to customers. As of mid-2002, Sentech had about 35,000 customers with Vivid decoder boxes and was recently given a multimedia licence. Vivid is a free-to-air satellite service used mostly in rural areas in South Africa that lack terrestrial television coverage. Vivid carries the three SABC channels and eTV, and has no subscription fee.

The DSTV and Vivid decoder boxes are able to receive data transmissions on the same downlink that they utilise for their respective television channels. To provide a return path for interactive services the companies envision the use of a digital modem attached to the decoder that provides an uplink using the phone line. This approach to interactive TV is not without international precedent as British operator Sky has made this interactive solution work successfully in the U.K. Services being tested by DSTV and Sentech include e-mail, Internet browsing, instant messaging, and e-commerce operations. DSTV currently offers “TV Mail” (using MWeb email addresses) and rudimentary e-commerce operations, and is expected to launch Internet browsing and instant messaging applications later this year.

While offering interactive and Internet services over TVs may seem somewhat farfetched, and have thus far been unsuccessful in the U.S., with Microsoft’s WebTV venture being the highest profile failure, these types of offerings have been more successful the U.K. and France. For example, in the U.K. 31% of households have interactive television and use it for a variety of purposes that include e-mail, e-commerce, online banking, games, and interacting with television programs (Fortune Magazine, 04/08/02). Some of the factors that helped to drive the success of interactive TV in the U.K. are also present in South Africa, namely: a low penetration of PCs and online households as compared to the U.S. (making TVs the only means available to access the Internet for most households) and the dominance of a satellite based provision of “cable television services” (satellite operators can alter their transmissions to offer interactive services far quicker than a cable operator can rebuild its landline networks).

However, despite the high hopes for its ability to increase access to ICTs, digital television is currently priced beyond the means of most South Africans. Taking the example of DSTV, the digital satellite decoder (R1 499), satellite dish and installation (approximately R2 000-R3 000), and the digital modem/keyboard combination necessary for interactive services (R299 + R200 installation) are very expensive. These start-up costs are supplemented by ongoing costs that include a R360/month fee for DSTV and an additional R30 per month for the TV Mail service. When Internet browsing is launched later this year it may also involve additional fees to end users. Therefore, while digital services have the potential to increase access to ICTs in South Africa due to the relatively high penetration of televisions in the country, it is unlikely that this will occur at current price levels.

9.4. WiFi

WiFi offers high speed wireless connectivity in a number of areas. In response to pressure for the legitimate offering of this rapidly deployable broadband technology ICASA has issued a discussion paper. It indicates two major applications, one for private and the other for public usage. It is already in legitimate usage for company’s private Local Area Networks (LANs). With regard to the use of WiFi for public usage or commercial hotspots to induce clients to use other

services, such as in coffee shops or in airports, ICASA has interpreted the legislation to mean that such WiFi provisioning requires a value-added network services licence, with the licensee in turn having to use the Telkom network for the wireless link between hotspot owner and end-user. Wireless infrastructure is an extremely cost-effective way to bridge the last mile to the customer - a cost that has historically remained one of the largest components of telephony provisioning and several respondents to the discussion paper referred to this. They also drew attention to the use of WLAN equipment to complement fixed line local loop infrastructure and for redundancy purposes to reach rural areas where fixed lines are uneconomic. WiFi has also been cited as an ideal application for the Under-Serviced Area Licensees.

The need for spectrum regulators to be responsive to new innovations such as WiFi is regarded as critical to innovation and sector development. In this spirit there has been a public interest call for a 'spectrum commons'. This would allow a slice of spectrum dedicated for free usage below a certain power.

9.5 Broadband mobile services

Global System for Mobile Communications (GSM) is the wireless protocol that has enabled the explosion of mobile services in Africa and the rest of the world. While GSM has fostered an explosion in the use of cell phones it is essentially limited to carrying voice signals, as its maximum data rate is only 9.6 Kbps. This limits data functionality to text short messaging services (SMS) and limited browsing of pared down websites. The next generation of cell phone technology, the much touted 3G, will bring always-on data connections with broadband connection speeds to cell phones, potentially helping to drive increased access to the Internet, in the same way that GSM has driven increased universal access to voice telephony services in developing countries.

However, the launch of 3G services has been delayed in Europe, Japan, and the United States, as wireless operators have been saddled with huge debts from 3G spectrum auctions, the costs of upgrading their networks to carry 3G services, a series of technical glitches in getting new 3G enabled handsets to work properly, and uncertain consumer demand for 3G services. Given these difficulties and despite considerable scepticism around General Packet Radio Service (GPRS) in Europe, some local industry analysts see the GPRS protocol as a "2.5 G" stepping stone option that already offers many of the characteristics of 3G (albeit at lower bandwidths) and requires much less investment by wireless operators to launch. GPRS makes efficient use of limited spectrum availability in order to provide an always-on data connection with speeds of up to 100 Kbps thereby enabling email, Internet browsing, and multi-media messaging through mobile phones. In this manner it is hoped that GPRS services can overcome the main disadvantages of GSM — slow download speeds and high costs — with respect to data services.

Despite the lack of success with the commercial application of mobile data services elsewhere in the world, the South African mobile industry sees mobile data services as an opportunity to arrest the industry's steadily declining average revenues per user. For example, as recently as 1998 MTN's ARPU was just over R400 per month but by 2002, with rapidly increasing pre-paid subscribers, it was only half that (2002 MTN Annual Report). Perhaps it is not surprising therefore that MTN was the first South African operator to market data services and launch its GPRS service, branded as MTN DataLive, in June 2002. According to MTN officials, 99% of their network is GPRS enabled following a network investment of R50 million. During the trial phase,

the service was available to the approximately 20,000 MTN contract subscribers who had GPRS enabled handsets. By mid July, about 20% of these potential users had tried the services. MTN believes that the 70% month on month growth in the use of Wireless Application Protocol (WAP) technology to browse the Internet via GSM phones among MTN customers, bringing the total number of users registered for this service to 760,000 as of March 2002, demonstrates that there is sufficient demand for mobile data services in South Africa to justify the launch of GPRS.

Following MTN's launch of its services in June, Vodacom launched its "My Life" GPRS offering in October 2002. This was after the company spent R500 million on GPRS infrastructure and R700 million on purchasing additional 1800 MHz frequency spectrum to carry the service. While data services only currently make up 3% of Vodacom's revenues, the operator is hoping that this contribution will rise to 25% within the next five years. MTN is in a similar position, with revenues from data services in 2002 amounting to R312 million, or 3% of MTN South Africa's revenues. Like MTN, Vodacom now believes there are now enough GPRS enabled phones in the country (Vodacom estimates that 200 000 of its customers have them) to justify the launch of 2.5G. The industry hopes that GPRS can duplicate the success of SMS services, which for Vodacom increased from 50 million messages per month in October 2001 to 260 million per month in October 2002, and is now a significant revenue generator.

Thus far the newest cellular operator, Cell C, has not launched 2.5G services although its website states that it is "actively working" on the roll-out of GPRS and is in the process of testing the technology on its network.

Both Vodacom and MTN have structured their pricing plans for GPRS technology around the always-on nature of the data connection that GPRS provides. Therefore users are not charged for the amount of time spent on-line with their GPRS phones but rather for the amount of data that they download. MTN's focus on data services is borne out in its aggressive pricing on the services that include lower per megabit charges than with the Vodacom packages. The MTN Standard and Vodacom MyMeg0 offerings are pay-as-you-go products while the other plans offered by the operators are contract options. MTN bills for data sent and received in 20Kb increments so that users do not get hit with a charge for a full megabit that they do not use. The full breakdown of the operators' plans is provided in Table 16.

Table 9.3 – GPRS pricing structure

Operator Plan	Monthly Subscription Fee	Megabits Included w/ Subscription	Fee per Megabit
MTN Standard	R0	0MB	R25-R50
MTN Heavy	R50	2MB	R17-R22
MTN Premium	R263	15MB	R10-R15
Vodacom MyMeg0	R0	0MB	R45
Vodacom MyMeg1	R35	1MB	R20
Vodacom MyMeg5	R110	5MB	R20
Vodacom MyMeg10	R200	10MB	R15

Source: MTN and Vodacom Websites.

While these prices represent an improvement over GSM WAP download prices, they still have a long way to go before matching current fixed line prices. South African on-line news journal ITWEB estimates that Internet service providers typically charge less than R1 per megabyte for traffic carried over a fixed leased-line. It would therefore appear that prices will have to fall by a significant amount if GPRS services are to become a tool for providing universal access to data services in South Africa.

9.6 Satellite

The challenge of a limited fixed line infrastructure and a population that is geographically dispersed among a number of remote locations means that satellite based communications solutions have historically played a major role in the provision of telecommunications services in South Africa and will continue to do so for the foreseeable future. This situation is not unusual, as nearly all of Africa's international bandwidth is provided by satellite. With the exception of those countries that are connected to submarine fibre-optic cables (Algeria, Djibouti, Egypt, Morocco, Senegal, South Africa, Tunisia, the Canary Islands, and Cape Verde), satellite presents the only means of carrying international voice and data traffic for all other Africa countries (other than the links that countries may have with their immediate neighbours). According to the AITEC's Africa Communications Infrastructure and Services Report, as of 2001 Tunisia and Morocco had less than 60% of their international traffic carried by satellite, South Africa, Algeria, and Egypt had between 60% and 80% of their international traffic carried by satellite, Nigeria and Uganda had between 80% and 95% of their international traffic carried by satellite, and every other country in Africa had more than 95% of their international traffic carried by satellite. According to AITEC, capacity on existing satellites is heavily oversubscribed and it is becoming increasingly difficult to lease capacity from them. It is hoped that the Intelsat 903 satellite launched in March 2002 and the New Skies satellites launched in April and July will help to alleviate this problem.

With the completion of the SAT-3 fibre optic cable in 2002 and its connection points in Morocco, Senegal, Cote d'Ivoire, Ghana, Benin, Nigeria, Cameroon, Gabon, Angola, South Africa, Swaziland, Mauritius and Reunion, the dependency in the region on satellite for connectivity may also be set to lessen. Currently African ISPs are almost entirely dependent on satellites for international bandwidth, especially as only about 8-10 IXPs have been established on the continent. According to William Stucke, Chairman of the African ISP Association:

> In a market like South Africa, which has a peering point, perhaps 70% of Internet traffic is kept local. In a market without such a facility, local traffic accounts for 30%. Except for those countries with fibre connectivity, all that international Internet traffic is satellite-based. And apart from a handful of countries where ISPs are free to link directly to satellites, they have to procure their bandwidth requirements from the incumbent PTO. This has meant that ISPs have had to operate with high fixed costs, which have impeded their ability to penetrate the market on the basis of cost, and so Internet access remains too expensive for the vast majority.[30]

On the positive side, VSAT and other satellite technology is ideally suited for offering fast two-way data and voice services to remote and rural locations. The benefits of VSAT technology include "instant infrastructure" as installation can be done quickly; low initial investment as

30 - AITEC (2002) *The African Communications and Infrastructure & Services Report 2002/03*. Pg. 91.

compared to building out fixed networks; and, depending on the regulatory environment, low per minute costs following the initial hardware investments.

VSAT solutions have been deployed extensively in South Africa since the products first became available in the country during 1994, but their use is restricted by law in terms of who may offer these services and for what purposes. Only Telkom may use them without restriction. Although transport parastatal Transnet's communications arm Transtel offers extensive satellite services using VSAT in the rest of Africa, until the SNO of which it is part is licensed, it may not offer these services in South Africa. Sentech's use of VSAT also has a restraint on the offering of voice services. According to the ITU, Telkom now has in use over 5000 VSAT stations around the country, and as discussed above, will later this year launch a satellite DSL service which utilises VSAT technology. Vodacom, MTN and other mobile operators around Africa are also increasingly using satellite connectivity in their transmission networks, both to carry international traffic and to backhaul traffic from remote base stations to their central network locations. For example international satellite operator IntelSat is currently linking base stations with the core network for Vodacom in Tanzania and the DRC and for MTN in Nigeria, Uganda, and Cameroon (ITWEB, 18/11/2002).

With the digitisation of the information that travels over telecommunications infrastructure, satellite operators expect to carry increasing amounts of data traffic in the future. IntelSat, the international former government co-operative that carries almost a third of the world's satellite traffic, expects Africa's satellite data traffic to overtake African satellite voice traffic by 2005. IntelSat's African geostationary satellites are seeing a 10-15% growth in African traffic overall, but a 30% increase in data traffic from the continent. Currently the bulk of traffic out of Africa is basic telephony, but the future data traffic growth will be driven by the Internet, telemedicine and tele-education applications, and voice traffic in the form of Voice over Internet Protocol (VoIP). (ITWEB, 20/11/2001).

Besides the traditional satellite services offered by Intel since the mid-sixties and more recently by PanAmSat, Sentech, South Africa's broadcast signal distributor, through its recently issued carrier-of-carrier and multi-media licences, looks set to play an increased role in the provisioning of voice and data services via satellite. Sentech owns and operates digital satellite transmission systems that make use of IntelSat and PanAmSat capacity to provide links for terrestrial transmitter networks and direct satellite broadcasting services to SABC, eTV, and MultiChoice Systems. Earlier this year Sentech bought the remaining 30% share in satellite ISP InfoSat that it did not own. InfoSat provides businesses with satellite-based communications solutions such as Internet connectivity and data casting. Sentech has stated that the acquisition "will add substantial value to Sentech's multimedia and carrier-of-carrier licences" but its plans for integrating InfoSat into its operations are not yet clear.

10. Internet development

According to ITU figures in 1996, South Africa was 13th in the world in terms of Internet users, but by 2001 it was 26th and falling. As will be seen in the discussion of the pricing for dial-up Internet access below, this is due in large part to the high cost of Internet access in South Africa. Similarly, in terms of Internet hosts, South Africa fell from 16th in 1996 to 29th in 2001. Table 5.1 demonstrates that in per capita terms, aside from Mauritius and the Seychelles, South Africa is far and away the leader in TRASA in terms of Internet users and Internet hosts per capita. It also compares well against Turkey, Mexico, and Poland internationally while lagging far behind South Korea.

Table 10.1 Personal Computers, Internet Hosts and Internet Users per Inhabitant

Country	2001 Personal Computers per 100 inhabitants	2001 Internet hosts* per 1 million inhabitants	2001 Internet users per 100 inhabitants (estimated)
South Africa	6.85	5445.33	7.01
Angola	0.13	0.59	0.44
Botswana	3.87	757.35	2.97
DRC	—	2.19	0.01
Korea (Rep. of)	25.14	9213.64	51.07
Lesotho	—	27.78	0.23
Malawi	0.11	1.90	0.17
Mauritius	10.83	2605.00	13.17
Mexico	6.87	9149.21	3.62
Morocco	1.31	80.64	1.31
Mozambique	0.35	0.79	0.07
Namibia	3.64	2590.60	2.52
Poland	8.54	12682.05	9.84
Seychelles	15.00	3275.00	11.25
Swaziland	—	1119.61	1.37
Tanzania	0.33	41.10	0.83
Turkey	4.07	1607.79	3.77
Zambia	0.70	102.83	0.23
Zimbabwe	1.21	255.97	0.73

Source: ITU World Telecommunications Indicators Database (2002)
* - Internet hosts refer to the number of computers in an economy that are directly linked to the worldwide Internet network. This statistic is based on the country code in the host address and thus may not correspond with the actual physical location.

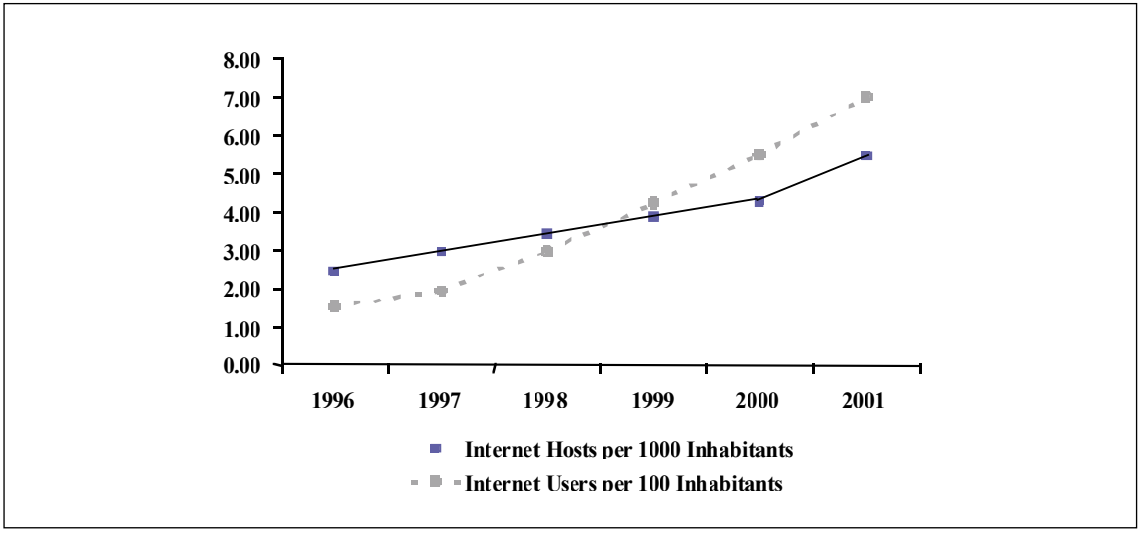
What is worrying is that the growth rate of South African Internet users has slowed more than it has elsewhere around the world. Indeed as can be seen from the ITU statistics, South Africa showed the lowest growth rate in Internet Users in TRASA countries between 1996 and 2001. While this is somewhat understandable given the relatively large South African user base as compared to other African countries, Poland, and especially South Korea, have achieved significantly higher growth rates from almost identical bases.

Table 10.2 - Internet users per 100 inhabitants (estimated)

Country	1996	2001	CAGR
South Africa	1.52	7.01	35.70%
Angola	0.00	0.44	246.03%
Botswana	0.17	2.97	77.82%
DRC	0.00	0.01	154.59%
Korea (Rep. of)	1.61	51.07	99.77%
Lesotho	0.00	0.23	149.25%
Malawi*	—	0.17	140.87%
Mauritius	0.19	13.17	134.61%
Mexico	0.20	3.62	79.08%
Morocco	0.01	1.31	196.75%
Mozambique	0.00	0.07	92.51%
Namibia	0.01	2.52	221.17%
Poland	1.29	9.84	50.02%
Seychelles	0.65	11.25	76.63%
Swaziland	0.05	1.37	91.49%
Tanzania	0.00	0.83	248.47%
Turkey	0.19	3.77	81.52%
Zambia	0.01	0.23	86.98%
Zimbabwe	0.02	0.73	109.57%

Source: ITU World Telecommunications Indicators Database (2002)
* - Malawi CAGR only calculated for 1997 – 2001.

Figure 10.1 – South African Internet Hosts and Internet Hosts, 1996-2001



Source: ITU World Telecommunications Indicators Database (2002)

As can be seen on a year on year basis since the Internet was first made available in South Africa in 1994, the growth rate in dial-up subscriptions has decreased steadily since 1997 and now stands at little more than 10%. Dial-up subscriptions are defined by World Wide Worx to include both home and office subscriptions and are not the same as Internet users in Tables 10.1 and 10.2. This is because several members of an office or family can share a single dial-up account. While growth rates in dial-up subscriptions would be expected to drop as the market saturates, in South Africa's case they have fallen faster than expected.

Table 10.3 - South Africa Dial-up Subscribers

Year	Dial-up Subscribers
1994	15,000
1995	33,600 (155%)
1996	79,700 (137%)
1997	196,620 (146%)
1998	366,235 (86%)
1999	560,000 (53%)
2000	782,000 (40%)
2001	960,000 (22%)
2002 (estimate)	1,115,000 (12%)

Source: Internet Access in South Africa, 2002, p21, p23.

10.1 Domain name registrations

Table 10.4 - 2002 Registered Domain Names

Country	gTLDs	ccTLDs	Total	gTLDs per 10,000 inhabitants	ccTLDs per 10,000 inhabitants	Total Domains per 10,000 inhabitants
South Africa	34,472	117,271	151,743	7.87	26.78	34.65
Angola	341	47	388	0.25	0.03	0.29
Botswana	341	360	701	2.03	2.14	4.17
DRC	—	824	824	—	0.16	0.16
Korea (Rep. of)	508,210	473,912	982,122	106.45	99.27	205.72
Lesotho	—	8	8	—	0.04	0.04
Malawi	—	991	991	—	0.86	0.86
Mauritius	2,389	3,020	5,409	19.91	25.17	45.08
Mexico	66,214	72,171	138,385	6.60	7.19	13.79
Morocco	2,730	2,243	4,973	0.90	0.74	1.63
Mozambique	0	249	249	0.00	0.12	0.12
Namibia	2,389	694	3,083	13.36	3.88	17.24
Poland	16,383	139,085	155,468	4.24	36.01	40.25
Seychelles	341	353	694	42.63	44.13	86.75
Swaziland	0	—	0	0.00	—	0.00
Tanzania	1,365	246	1,611	0.38	0.07	0.45
Turkey	106,147	36,123	142,270	16.02	5.45	21.47
Zambia	341	31	372	0.32	0.03	0.35

Source: Matthew Zook (2002): Interview
* ccTLDs refer to country code Top Level Domain name registrations (.za, .uk, etc.) while gTLDs refer to generic TLDs registered in a particular country (.com, .net, .org, etc.)
* Zimbabwean information not available

According to Nielsen NetRatings[31] South African surfers spend a lot of time at local websites, as compared to other countries in which the market research firm monitors Internet behaviour. South African Web properties made a strong showing against well-established global Internet brands, accounting for four out of the top 10 properties – the M-Web portal, Absa Bank, Johnnic e-Ventures and iafrica.com.

31 "Surfing behaviour of South African Internet community revealed", July 2001, http://www.360itsolutions.com/Stats2001.htm.

"In nearly every country where Nielsen//NetRatings has launched its service, we see global power players MSN, Yahoo! and Microsoft at the top of the Web properties list. This is due to their successful strategy of providing localised content in each country. South Africans however, show a strong loyalty to local players as well."

The study found that the most visited categories of sites in South Africa were search engines and portals; finance, insurance and investment sites; and telecom and Internet services sites.

10.2 Internet pricing

As Table 10.5 demonstrates, in South Africa almost 90% of the end costs to the user to connect to the Internet for 30 hours per week are direct PSTN charges. This ratio is higher than in any other TRASA country. While Poland and Turkey have a similar ratio of PSTN costs to total costs, their total cost to the end user is less than half of that charged in South Africa.

Table 10.5 - Dial-Up Internet Access Basket (US$), 2001+

	30 hours of Peak use per month				
Country	PSTN Monthly Subscription	PSTN Usage	ISP Charge	Total	PSTN Charges % of Total
South Africa	$9.00	$54.50	$8.50	$72.00*	88.2%
Angola	$1.10	$9.60	$20.00	$30.66	34.9%
Botswana	$3.00	$12.90	$14.70	$30.65*	51.9%
Korea (Rep. of)	$2.30	$0.00	$11.20	$13.52	17.0%
Lesotho	$4.30	$10.40	$12.20	$26.95*	54.5%
Mauritius	$2.30	$22.90	$22.90	$48.00	52.5%
Mexico	$20.10	$0.00	$10.70	$30.78	65.3%
Morocco	$6.10	$45.20	$26.30	$77.61	66.1%
Mozambique**	$7.16	$42.00	$30.00	$79.16	62.1%
Poland	$10.70	$18.40	$0.00	$29.11	100.0%
Seychelles	$8.80	$84.10	$30.60	$123.47	75.2%
Swaziland	$1.50	$28.50	$11.50	$41.57	72.2%
Tanzania	$3.80	$47.20	$69.00	$120.06*	42.5%
Turkey	$3.70	$7.40	$1.40	$12.52	88.7%
Zambia	$1.60	$36.60	$19.00	$57.25	66.7%
Zimbabwe	$3.60	$27.00	$49.20	$79.83	38.3%

+ Namibia data not available

Source: 2002 ITU Internet Report: Internet for a Mobile Generation, Mobile Internet Statistical Annex 11.

* - Unlimited Internet Access

** - Monthly Subscription and Peak Rate from ITU World Indicators Database, ISP Subscription from Miller Esselaar and Associates (2001), A Country ICT Survey for Mozambique.

One way of measuring the affordability of Internet Access is to look at how much the total cost of the basket of dial-up Internet access represents as a percentage of average monthly income. The average income figure was arrived at by dividing per capita GDP by 12. The ratio of cost of Internet access to average income gives an idea of how much of their income the average person would have to spend on 30 hours of Internet access for a month. On this measure South Africa performs relatively well against other African countries, mostly by virtue of its high level of per capita income. However, when compared to middle-income countries, South Africa does not perform as well. With the exception of Morocco, Internet access in South Africa is two or three times as expensive as in Korea, Poland, Mexico or Turkey and even more expensive on a relative basis given South African incomes. Turkey is perhaps the best example of the problem, as with an almost identical per capita GDP as South Africa, it has a cost of Internet access that is around one-sixth of what it is in South Africa ($12.52 versus $72.00).

Table 10.6 - Dial-Up Internet Access Basket as a Percentage of Average Monthly Income, 2001+

Country	Average Monthly Income ($US)	Cost of 30 Hours Peak Internet Access (1 Month)	% of Monthly Income
South Africa	$216	$72.00**	33.40%
Angola	$58	$30.66	52.56%
Botswana	$255	$30.65**	12.02%
Korea (Rep. of)	$737	$13.52	1.83%
Lesotho	$30	$26.95**	88.60%
Malawi	$13	—	—
Mauritius	$313	$48	15.36%
Mexico	$513	$30.78	6.00%
Morocco	$92	$77.61	83.98%
Mozambique	$15	$79.16	539.73%
Poland	$377	$29.11	7.73%
Seychelles	$640	$123.47	19.30%
Swaziland	$103	$41.57	40.56%
Tanzania	$21	$120.06**	567.21%
Turkey	$186	$12.52	6.75%
Zambia	$29	$57.25	200.88%
Zimbabwe	$55	$79.83	144.27%

+ Namibia data not available

Source: 2002 ITU Internet Report: Internet for a Mobile Generation, Mobile Internet Statistical Annex 11, United Nations Population Figures, World Bank World Development Indicators Database.

* Includes PSTN monthly subscription, PSTN usage charge for 30 hours, and ISP fee.
** Unlimited Access.

The high cost of Internet access in South Africa, both in absolute and relative terms, is undoubtedly one of the reasons why the growth in Internet subscribers has slowed and South Africa continues to tumble down the worldwide table of Internet Users. This fall is largely due to the high price of Internet access that South African Internet users must pay. As almost 90% of the cost of the dial-up Internet access basket is direct PSTN charges, it is probable that the average annual increase in Telkom's local call tariffs of 27.3% has strongly contributed to the slowing rate of Internet take-up in South Africa.

Figure 10.2 – Relation of access cost to subscribers

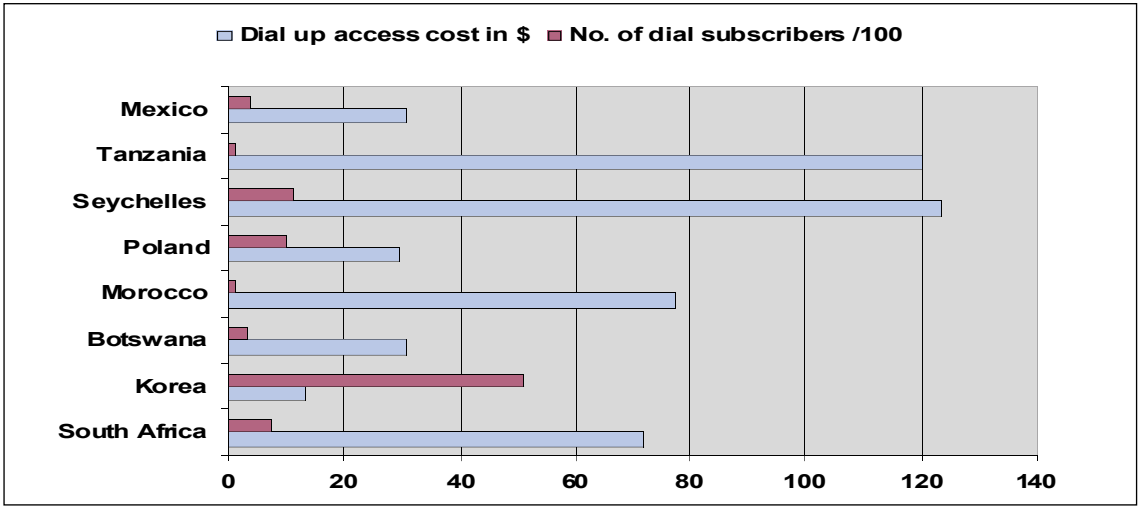
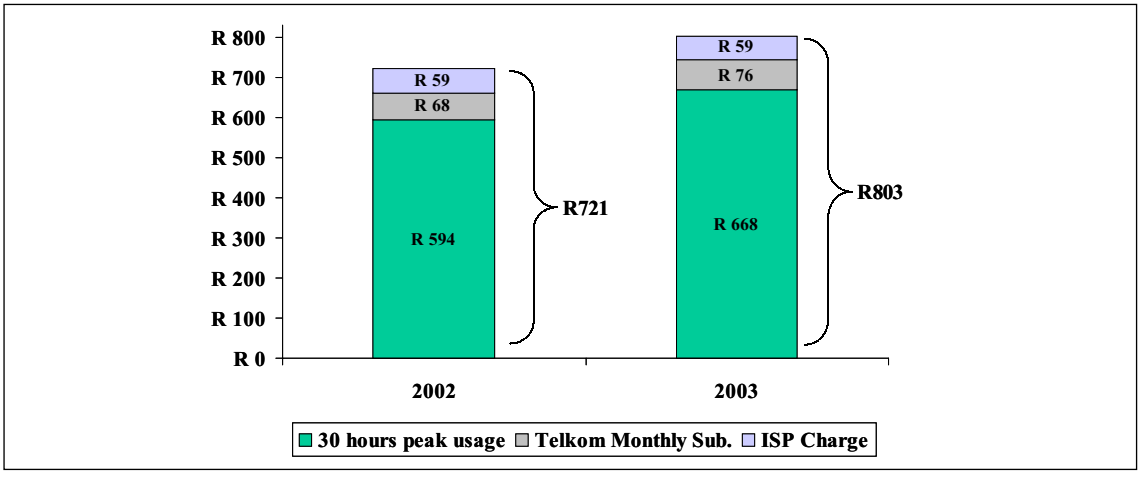


Figure 10.3 demonstrates the effect of Telkom's 2003 price increase on the Internet Access basket. Rands are used in the chart, given the significant changes in the Rand- Dollar exchange rate between early 2002 and March 2003[32]. ISP monthly charges are held constant at the R59 mark as according to World Wide Worx this is the "compelling" price point at which most ISPs in the country offer their services. As can be seen in the chart, the Telkom increases in local tariffs and monthly subscription fees cause the cost of the basket to rise from R721 in 2002 to R803 in 2003 - an increase of 11.4%.

Figure 10.3 – Effect of 2003 Telkom Price Increase on South Africa Internet Access Basket



32 Using an average exchange rate for 2002 and for the first three months of 2003 the total dollar cost of the Internet Access basket is $68 and $96 respectively. Table 4.1 shows that the price for the same basket of services was $72 in 2001. While the trend is clearly upward, driven primarily by the Telkom price increases, this trend is somewhat obscured by the fluctuation in the Rand from 7.5 in January 2001 to 13.5 in December 2001 back down to its current level of 7.8 as of March 2003.

There is further evidence supporting the assertion that local call charges are affecting Internet traffic. In June 2001, Nielsen NetRatings[33] found that South African Internet users only connect to the Internet for an average of 4.5 hours per month, ranking 25th out of the 27 countries that the market research firm surveys. South African users spend similar amounts of time on-line per Internet session as do users in other countries (26 minutes compared to 28 minutes in the UK and 30 minutes in the U.S.), but have far fewer sessions per month than users in other countries (10 sessions versus 19 in the US). This disparity is most likely due to the high cost of local call charges in South Africa. Sue Bolton, director of sales and marketing in South Africa for Nielsen stated that "Monthly Internet usage in South Africa is similar in most respects to the global averages, with the exception of a fairly short amount of time spent online over the month – most likely a result of local Internet access charges." It is important to note that this disparity was found in a survey conducted in June 2001, which was before Telkom's 2002 (23.5%) and 2003 (12.5%) increases in local call tariffs and monthly subscription fees.

11. International ratings and indices

While it is difficult to encapsulate all of the elements discussed to generate a quantitative ranking, there have been attempts by various international organisations and universities to do this. The first is the ITU Mobile/Internet Index, which measures how developed each economy is in terms of information and communication technologies (ICTs), while also capturing how poised it is to take advantage of future ICT advancements. The index has 26 variables sorted into three clusters: infrastructure, usage, and market structure. The infrastructure component receives 50 per cent of the weight with 25 per cent on usage and 25 per cent on market structure. These three parts combine to give a score between 0 and 100 with 100 being the highest possible score.

The infrastructure factor measures the development of the key physical elements of the mobile and Internet network. The infrastructure factor first takes into account current data on fixed lines, mobile subscribers, estimated Internet users, and PCs as a representation of the users and devices on a network. Next, the infrastructure factor measures the state of Internet development by using data on international bandwidth, broadband subscribers and availability of leased lines. The infrastructure factor also includes data on the level of development of the mobile network by looking at 2.5G deployment, 3G licensing, and 3G deployment.

The network usage factor attempts to gauge how users are taking advantage of the existing network by looking at six indicators of usage and cost. First, the network factor looks at how many roaming agreements an economy has. This is done by looking at the mobile operator with the highest number of agreements and using it as a representative for the economy. ISP data serves as a proxy for Internet usage while secure socket layer (SSL) data shows how the domestic Internet is being used for secure transactions, (i.e. e-commerce). The network usage factor also examines local prices for mobile calls and Internet access by compiling a basket of minutes. The mobile tariff basket is compiled with the monthly subscription fee plus the cost of 30 three-minute calls (90 minutes in total). Unfortunately, this particular methodology does not seem to account for pre-paid use, which drives the majority of mobile usage in Africa and other developing countries. Finally, the usage factor incorporates telecommunications revenue as a

33 "Surfing behaviour of South African Internet community revealed", July 2001, http://www.360itsolutions.com/Stats2001.htm

percentage of GDP variable. This variable acts as a proxy for quality and variety of services. Higher telecoms revenue per capita may be due to people paying more for higher quality and more reliable service, bundling of services by providers, or intensive use of services.

The market structure variable attempts to capture the overall ICT market structure for the economy. The variable is broken into ten indicators, each connected to a slightly different market or piece of information. The first variable shows if the incumbent telephone operator is public or private. This incumbent privatisation variable tends to be the determining variable of the group because it usually sets the trend for the other communication markets. The second, closely related, variable is the number of years the incumbent operator has been private. By including the years since privatisation the ITU assumes that economies with a history of a private market perform somewhat differently than newly privatised markets. This learning curve may have a significant beneficial effect in the initial stages of privatisation, but the increase in benefit tapers off over time. Thus, the maximum number value for privatisation is set at 20 years before 2001, which corresponds to the year 1981. Another important set of variables deals with the relationship between the regulator and the incumbent operator, based on the premise that separate regulators are generally better able to implement policies and regulate operators in a neutral manner. The first variable looks at whether or not the regulator is a separate entity. The second variable measures the number of years the regulator has been autonomous, assuming the regulator becomes more effective over time as it distances itself from the company or companies it is regulating. It is assumed that the marginal benefit for additional years of separate regulation is negligible beyond 11 years before the year of reckoning (1990 in this study). As a result, any economy that has had a separate regulator for more than 11 years receives the maximum score. The remaining indicators each describe different, but important, segments of the ICT market. Each one of these market structures is included because only when combined do they reflect the overall market structure for ICTs. The six market structures included are local telephone service, domestic long distance calls, international calls, mobile services, leased lines, and Internet service providers. If an economy is too small to have a domestic long distance market, this variable is dropped.

Table 11.1 ITU Mobile Internet Index Score and Rank (2001)

Country	2001 Mobile/ Internet Score (/100)	Rank	Infra. Score	Infra. Rank	Usage Score	Usage Rank	Market Score	Market Rank
Hong Kong	65.88	1	58.42	8	50.58	4	96.10	3
Denmark	65.61	2	65.37	2	43.60	19	88.09	17
Sweden	65.42	3	67.62	1	40.26	35	86.18	23
Switzerland	65.10	4	60.28	6	50.16	5	89.68	14
United States	65.04	5	55.59	10	48.97	8	100.00	1
Korea (Rep)	63.42	7	65.12	3	33.77	91	89.68	14
Poland	42.81	31	30.00	39	42.33	24	68.91	55
Seychelles	33.11	42	16.14	59	39.04	42	61.11	66
Mexico	31.11	49	5.37	100	28.11	132	85.61	27
South Africa	30.84	53	11.95	74	40.42	32	59.04	72
Turkey	29.11	63	19.66	48	42.75	22	34.34	141
Mauritius	28.23	65	10.43	81	35.82	69	56.25	81
Malawi	27.68	67	0.17	190	32.34	103	78.03	43
Botswana	24.56	82	4.76	104	36.17	67	52.56	93
Angola	24.53	83	0.25	181	32.86	99	64.77	62
Morocco	23.26	91	2.81	121	33.80	88	53.64	87
DRC	22.25	102	0.04	201	—	—	66.67	56
Zambia	21.55	103	0.38	172	33.95	86	51.52	95
Mozambique	20.12	120	0.23	185	26.49	137	53.54	88
Zimbabwe	19.88	122	0.86	156	33.34	95	44.44	115
Tanzania	19.81	124	0.39	171	22.10	156	56.36	80
Namibia	19.47	126	2.58	126	19.18	166	53.54	88
Lesotho	18.41	131	0.40	169	33.58	93	39.26	126
Swaziland	14.46	160	1.58	140	29.66	120	25.00	167

Source: 2002 ITU Internet Report: Internet for a Mobile Generation, Mobile Internet Statistical Annex 10

In 2001 South Africa was ranked 53rd out of the 206 countries measured, substantially ahead of most TRASA countries but behind other middle-income countries such as South Korea, Poland, and Mexico. Relatively speaking, South Africa fared poorly on the infrastructure and market structure factors, 74th and 72nd respectively, but performed relatively well on the usage factor (32nd). The poor performance on the infrastructure and market structure factors is perhaps not unexpected given the problems with fixed line roll-out, slowing Internet growth, and the VANS sector, as documented in this report. The relatively strong performance on the usage variable, which according to the ITU's methodology would not seem to take full account of pre-paid use is encouraging, and suggests that there is still substantial demand for ICT services in South Africa.

The second such comprehensive index has been developed by the Harvard Institute for International Development (HIID). In this recent international study of the E- Readiness of

different countries for the e-economy undertaken by the HIID for the World Economy Forum, South Africa was ranked 40th with respect to network readiness out of the 75 countries that were studied. The Network Readiness Index measures the state of development of ICT networks in various countries and the potential of those countries to exploit their networks' capacity. It includes factors such as network access, network policy, the degree to which society is networked, and the extent to which the economy is networked. Unsurprisingly given the data presented in earlier parts of this report, South Africa significantly trails South Korea, but received similar ratings to the other middle-income countries that this report has used for comparison purposes. South Africa was also ranked substantially higher than the only other two TRASA countries, Mauritius and Zimbabwe, which the HIID studied.

Table 11.2 - 2001 Network Readiness Index

Country	Network Readiness Index	NRI Rank
United States	6.05	1
Iceland	6.03	2
Finland	5.91	3
Sweden	5.76	4
Norway	5.68	5
Korea	4.8	20
Poland	3.85	35
South Africa	3.71	40
Turkey	3.67	41
Mexico	3.58	44
Mauritius	3.40	51
Zimbabwe	2.78	70

Source: The Network Readiness Index, Chapter 2: Measuring the Preparedness of Nations for the Networked World, http://www.cid.harvard.edu/cr/pdf/gitrr2002_ch02.pdf

With respect to South Africa the report noted, "Nonetheless, strong political will has led to several major national initiatives working to transform South Africa into a knowledge-based economy that are expected to result in an integrated national ICT policy during 2002". But it also stated, "Leading observers note that the key elements needed to further Networked Readiness will continue to be telecommunications reform, affordable prices, and promotion of computer literacy."

12. Conclusions

In the mid-nineties South African telecommunications policy was hailed as drawing on best practice while seeking to deal with the country's particular historical legacies. However, in retrospect and in the light of the policy outcomes and declining rankings on global indices, it has become clear that the policy framework was not conducive to implementation, and failed to recognise the limitations that face South Africa as a developing country with no experience of autonomous public interest regulation. This created enormous unfulfilled expectations of what would be achieved in the sector through the reform process.

The preferred strategy of multilateral agencies in the nineties, adopted by South Africa to secure investment in network roll out through the privatisation of the incumbent fixed-line operator, in exchange for a period of exclusivity, has not achieved its primary goal of improving access and equity. While investments in the network have been significant, with the network being fully digitised and the corporate customer base grown and service quality dramatically improved, the number of fixed subscribers has declined over the last two years, with over 2 million disconnections over the last five years, largely due to affordability and resulting in a net line growth of only 665 819 during the period of the exclusivity and in penalties of R15 million for failing to meet its licence targets.[34] The preferred sequencing of privatisation followed by liberalisation has created a private monopoly with the market dominance that severely inhibits effective competition.

The statutory protection of Telkom's revenues through the requirement that those that it competes with downstream acquire their facilities from the incumbent, has resulted in a slew of anti-competitive complaints to both ICASA and the Competition Commission. Together with the delays around establishing a clear and timely interconnection regime, the absence of this cornerstone regulation essential to enabling fair competition, appears to have reduced investor confidence not only in the major licences available but in investment more generally.

At least some of these problems arise from the co-jurisdiction that the Minister of Communications and the regulator have over core regulatory and licensing functions. This has resulted in a perceived conflict of interest for the Minister as the major shareholder in the monopoly incumbent and responsible for optimising the value of the state asset, initially in the privatisation process, and subsequently in the IPO, and as the state entity responsible for the creation of fair competitive conditions to other players in the sector. The negative impact this, together with the controversial licensing experiences, has had in South Africa is borne out by a slew of investment reports, industry association comments in the media and public hearing submissions.

Failure to introduce an effective competitive regulatory regime in a private monopoly environment has had a particularly negative impact on the VANS and ISP segments of the market, where Telkom's rights and behaviour have had a chilling effect on the market's activity. This has been one of the major sources of tension in the sector and the source of numerous disputes between the independent VANS, who claim that Telkom is leveraging its market power with anti-competitive effect in the VANS market, and Telkom, which complains that the VANS are

34 2002 Telkom Annual Report and Telkom IPO Prospectus (2003)

infringing on its exclusivity rights. While the failure to regulate the privatised monopoly effectively has been placed at the door of ICASA, and before it SATRA, it is important to understand the structural conditions established by the policy and laws under which regulation takes place.

At the heart of the regulatory challenge facing South Africa is the market design. Structured around a vertically integrated national company, rival firms, with whom the integrated company competes downstream, are required to acquire the incumbent's non-competitive facilities in order to operate. Other networks also have to interconnect in order for their customers to access the historically larger number of subscribers on the incumbent's network. This structure creates anti-competitive incentives for the incumbent to deny access to its network to rival firms, whether through delays or pricing strategies. Traditionally, the regulatory response to this market structure, which tends to arise wherever a former public utility enters into a competitive market, is access regulation. At its broadest this can include retail tariff regulation, either through a Price Cap Model such as in South Africa, or through a rate of return regime, to ensure affordable access to the service by end-users.

The failure to implement this regulatory tool effectively in South Africa is evident in the price hikes that have accompanied the privatisation of the PSTN. While initially these could be attributed to tariff rebalancing, the continued increases reflect the extraction of monopoly profits rather than cost-based pricing. A further justification for high tariffs during an initial reform phase relates to the need to upgrade, and, especially in developing countries, to roll out the network. While the investment in the network by Telkom with its strategic partner, Thintana, has been impressive. As demonstrated above, the primary objective of increased access to telecommunications with the associated economic and social multipliers, has not been met, with serious consequences for the sector, and indeed the national economy.

Complementary strategies to provide access through telecentres funded by the Universal Service Fund have had very mixed results, with very high associated costs and little sustainability.

On the wholesale side, access regulation focuses on ensuring access through the setting of wholesale tariffs for facilities, and compelling cost-based interconnection. All of these regulatory mechanisms depend on relatively complex costing models that are particularly onerous to enforce, especially when the former public utility's accounts are not clearly separated and there is not a sense of what constitutes real costs. Even once costs are realistically allocated, there are inherent information asymmetries that disadvantage the regulator, as the incumbent operator will always have better knowledge of its own costs than does the regulator. This resource - intensive regulatory approach arising from the market structure, has placed an enormous regulatory burden on any country seeking to implement it, and requires expensive and skilled regulatory machinery to operate effectively. Countries with far more experience in regulation, and with far greater skills and finances than South Africa, have struggled, and continue to struggle, to implement access regulation successfully.

The failures of this resource-intensive regulatory approach are evident in the negative impact the withholding of bandwidth and the high costs of facilities, despite a tariff regime, have had on the VANS and ISP market segments. While large by continental standards, their growth has been stagnating and lags behind similar size middle-income countries. The unrestrained exercise of Telkom's market power has had a chilling effect on what is probably one of the most important

market segments with regard to the network economy. The application of VANS across the economy creates opportunities for electronic commerce (e-commerce), e-government, e-education, in addition to an increasing variety of Internet services.

An equally unanticipated but positive outcome of the reform process is the exponential growth of mobile cellular networks. Intended to service the high end of the residential and corporate market, mobile has been the main source of connectivity, with three times as many subscribers as the fixed network by 2002, within 10 years of operation.

While the benefits of this technology, and its successful packaging for even low-income usage need to be harnessed to meet national objectives, a note of caution needs to be sounded with regard to regulating the mobile industry to meet universal service objectives.

Several commentators attribute the success of the mobile industry to the enabling environment created for GSM initially, and the focus of the policy and regulatory framework on the public switched network operator. This has allowed the mobile operators to charge tariffs that allow a reasonable return on investment needed to extend their infrastructure. Regulatory attention has shifted globally to mobile and to considerations of Internet and e-commerce regulation. As the mobile market has matured in the Northern Hemisphere, the high asymmetrical termination rates mobile operators have enjoyed in relation to fixed networks, and their excessive roaming charges, have come under scrutiny.

In South Africa it may be time for ICASA to re-examine whether it should not subject mobile termination rates to a price cap, in light of the unexpected growth and resulting economies of scale of these networks and the abuses of unregulated termination rates that have occurred in other countries around the world. However, a note of caution needs to be sounded. The African mobile business model is very different from those in more mature economies. The dominance of the pre-paid segment of the mobile market and the low ARPUs make for a far more marginal business case.

In addition, mobile telephony should not be viewed as a comprehensive universal access substitute for fixed line services from a developmental point of view. Currently the high cost of specialised terminals and high usage charges for data access make mobile unfeasible for general participation in the network economy. The declining fixed line network, despite the growth of its lucrative corporate market, has severe implications for the development of affordable access to the information infrastructure that is essential to overcoming the digital divide.

The creation of such an infrastructure is also constrained by the prevention of the competitive deployment of new technologies and applications, such as VSAT and VoIP. Packet-switching and IP telephony are already providing the foundation for dramatic cost and price reductions in other parts of the world that are essential to promote the e-economy. Where latest broadband developments such as ADSL and WiFi are being introduced, they are being offered in a monopoly environment that makes them unaffordable, although they are being cost effectively deployed in other parts of the world. This environment induces delays in new technologies and lends itself to cost protection of potentially redundant technologies, such as ISDN, which have not been fully amortised.

This is compounded by the constraints on optimising the capacity of existing networks in the country to be fully deployed for any service. Allowing all existing digital networks, irrespective of their traditional service areas, whether broadcasting or telecommunications, will drive down prices to more competitive global levels resulting in increased usage and penetration. It is through the integration and extension of existing networks that South Africa will start to build the information infrastructure necessary for effective participation in the global economy.

While some of the major structural limitations on the growth of the sector will require a complete overhaul of the legal and regulatory framework and market structure, some measures could be taken within the existing legislation, or with moderate amendment to it, to remove some of the most inhibiting policy and legal constraints. With the exclusivity period over, and the IPO of Telkom complete, the rationale for Ministerial control of core regulatory and licensing functions no longer exists. The regulatory bottleneck this has created in the preparation of a fair competitive environment for the sector could therefore be justifiably removed. The Ministry could still determine the liberalisation agenda through the nature and timing of licences to be granted through the law and the existing mechanism of policy directives.

This would free up the Ministry, currently burdened by regulatory responsibilities, to focus on the policy challenges facing this rapidly changing sector that underpins the modern economy, while the regulator would have the powers to deliver on its mandate and earn the legitimacy that will enable its effectiveness.

Several other policy and legal constraints inhibiting ICT penetration and sector and national growth could be removed within the framework of the existing legislation. This would include removing the current artificial distinction in a digital environment between voice and data, as well as the current limitations on self-provision, resale and direct connect. All that is required is that the Minister of Communications triggers them by setting dates on which such activities can be commenced.

This would have the added benefit of immediately relieving ICASA (and indeed the Competition Commission and the courts) from expending any more resources on the unproductive disputes that have plagued the industry since the beginning of the reform process, and clear the slate for anticipated convergence policy implementation.

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