DFID Internet Costs Study

Appendix D: Country Case Study: South Africa

Executive Summary

The South African Internet market comprises some 70 to 80 ISPs, about 750 000 dial-up subscribers and 1.8 million users. Four private top-level ISPs provide leased-line and dial-in services to second level ISPs and corporate users. The top level ISPs also provide international connectivity with bandwidth capacities ranging from 4 Mbps to 133 Mbps. The key players in the Internet industry are ISPs, including Telkom, the ISP association (ISPA), users' association, the Internet Society Chapter, the national regulator (ICASA) and the government Department of Communications.

Broad based Internet access and ICT usage culture among the populace are two of the prerequisites for South Africa development in the information age and for its successful participation in the new economy. However, the Department of Communications is concerned the Internet remains the growing but exclusive domain of the corporate sector and a small number of wealthy residential users. It is thus committed to expanding universal service to include Internet access. It also believes that only state intervention would deliver affordable access in the short term to medium terms.

To bridge the digital divide, the government is considering creating a broadband satellite network connecting all schools, colleges, technikons and universities in the country. This network will be exempted from regulatory and tariff restrictions and will provide community access points at the schools. This public Information Infrastructure will also be accessible to small, medium and micro enterprises (SMMEs) and communities outside of school hours. This new policy proposals would require all operators to provide services to educational institutions at a 50% discount of normal costs, and would not exclude the demand-driven development of other globally competitive, broadband networks servicing the needs of those who can afford it.

Direct Internet costs to ISPs comprise a value-added network (VAN) licence fee of US$1875 paid to the regulator and connectivity charges paid to Telkom. Connectivity charges depend on the bandwidth capacity of the leased line and in some cases relative volumes of the local versus international traffic. See table 1 below.

South Africa (ZA)	Link type	64K	128K	256K	512K	2 Mbps	45 Mbps
Internet SAIX	**ZA-Internet (Nat Only)**	291	547	982	1,890	7,059	
Internet SAIX	**ZA-Internet Nat/Internat**	7,617	1458	2,984	5,218	20,371	
Internet Solution	**ZA-Internet Nat/Internat**			3375			
Internet SAIX	**ZA-Internet International**	1,626	2,991	6,362	12,570	50,074	
Internet CITEC	**ZA-Internet International**		1,750				
Leased data line	**ZA-ZA Local**	179	365	428	551	1,239	
Leased data line	**ZA-US/FR/SN/NG/GH/EG**		5,371				352,609
Leased data line	**ZA-TZ/KE**		3,007				
Leased data line	**ZA-MZ/BW/ZW**		705				

Table 1: Internet connectivity charges, prices in US$

Dial-up Internet users pay between US$7.5 and US$15 per month for unlimited connectivity. These charges exclude telephone connectivity charges, which are paid directly to Telkom. Local telephone call costs are a major part of the average user's bill. For a 20-hour connectivity per month, a user would pay an additional US$31.25 to Telkom. Off peak time usage is charged a lower rate – a similar 20-hour connectivity off peak would cost an additional US$11.25. A local banking institution recently mounted a free Internet service, which has recently attracted a large number of subscribers. Although this may reduce access cost for some users, the local call charges are still likely to discourage use amongst the broad mass of the population.

However indirect costs for ISPs are the standard business costs that include personnel, office accommodation, equipment and other charges. Good technical expertise is relatively expensive, as it is scarce due to large numbers of skilled technicians leaving the country.

There was a general perception across the industry that Internet prices are up to four or five times higher than they are in comparable economies. It was also observed that opening up the market to free competition would bring down these costs to international levels thus making the Internet more accessible to the people. It was further observed that the proposed opening of the fixed network market to a duopoly would be unlikely to bring any significant changes on current price levels.

Contents

1 Background

1.1 The Geography

The Republic of South Africa is the southern most country on the African continent. The country is delineated into nine geographic and political entities or provinces and covers a land area of 1,127,000 square kilometres with a coastline of 2,798 km. As the country is so large, its terrain is varied and it experiences a variety of climates. The country is divided into nine administrative provinces, each with its own government.

1.2 The Population and Income Distribution

South Africa has a population of about 43.05 million[1], about 5% of the population of Africa. The population breaks down into 20.814 million males, 22.240 million females[2] and 9.1 million households[3]. Three of the nine provinces, namely, Gauteng, Kwa-Zulu Natal, and Western Cape, have predominantly urbanized households, while the remaining six are predominantly rural. At current prices the national average salaries and wages per month in each household about US$536.5[4] [5]. [6]. [7]. On average 59% of household income in South Africa goes towards paying for food (18%), housing (18%), income tax (15%) and transport (10%)[8]. Expenditure is very unevenly distributed in the country with the vast majority of the households living in abject poverty. In fact, the poorest 20% of the household account for 3% of the total expenditure while the richest 20% account for 61%.

1.2.1 The Economy

The GDP at real constant prices in the fourth quarter of 2000 was US$109,204.6 million[9]. The economy is based primarily on mining, agriculture, manufacturing and commerce. Export of minerals accounts for over 60% of merchandise export value. As service sectors continue to gain significantly within the economy, broadcasting has grown from 0.27% in 1990 to 0.6% of GDP in 1997. In line with international trends, the proportion of this income comes from subscriptions. The telecommunications sector has grown even more dramatically. At 4%, South Africa already spends more on

1 Statistics South Africa (STATSSA) 2000.
2 Ibid.
3 Census 1996
4 STATSSA 1997
5 At the prevailing exchange rate of ZAR11.43 to BP1.00
6 Measuring Poverty in South Africa: STATSSA 2000
7 Ibid.
8 Earning and Spending in South Africa: Central Statistics 1997
9 SA Reserve Bank Time Series Analysis Sheet 1: GDP at market prices 1990-2000

telecommunications as a percentage of GDP than most developed European nations[10].

Tariffs on IT and telecommunication equipment are relatively low. “Apparatus for carrier-current line systems or for digital line systems” also, “Telephonic or telegraphic switching apparatus” have the standard and most favoured nation (MFN) duty rates calculated at 5%[11], and are duty free if imported from the SADC region. Goods traded under the tariff category of “Transmission apparatus incorporating reception apparatus: Other” are Duty Free. The South African Custom tariff regime has categories of duty charged on technological equipment. These by and large range from duty free (zero duty) to a maximum of 15%, the latter being charged on very few and specific instances.

South Africa still faces many challenges around unemployment, crime, education, delivery of health services, and housing which largely arise from its history of apartheid. The country is relatively dependent on foreign investment and gears a number of economic policies around this. The slowing down of the world economy during 1998/1999 impacted negatively on South Africa with growth for 1998 being revised to a mere 0.7%[12]. The upward turn in the economy has resulted in positive domestic growth that was recorded at 3.1% in 2000[13].

Despite national policies aimed at economic redistribution and poverty alleviation, the country continues to have one of the highest Gini coefficients in the world (0.68 in 1998). The income gap is vast, with household subsistence levels less than US$200/month. This results in a situation where the poorest 20% of households (equivalent to 27% of the population), account for less than 3% of total income levels, whilst the richest 20% of households, (equivalent to less than 3% of the population) account for 65% of total income production[14].

1.3 The Political Situation

In 1994, South Africa became a constitutional democracy after over four decades of apartheid regime that embraced separate development based on racial and ethnic considerations, which by and large condemned the majority black population to a life of poverty and deprivation of all manner of human dignity. The second democratic elections took place in June 1999 and resulted in Deputy president Thabo Mbeki succeeding Nelson Mandela as president[15].

The democratic government has adopted a free-market approach to economic growth through its Growth, Employment and Redistribution (GEAR) strategy. Adherence to GEAR has required fiscal and monetary discipline and has introduced cuts in social

[10] Bain and Company SA: The South African Telecommunications Industry Structure and Regulation: How to destroy Value- Lessons form a global perspective, 5 April 2001, Johannesburg.
[11] Cargo Info Africa: South African Customs Tariffs
[12] SARB: NRI6006z National Accounts Information. GDP at market prices
[13] Ibid
[14] Yankee Group, 1999
[15] Other notable parities are: the Inkatha Freedom Party (IFP), the United Democratic Movement (UDM), the Pan-Africanist Congress (PAC) and the Freedom Front (FF)

spending and given priority to debt financing. The adoption of GEAR has resulted in a net loss of jobs. In the 1999/2000 fiscal year, 450,000 people entered the labour market, while the formal economy shed 186,522 jobs[16].

To address the inequalities in opportunity, the government has promulgated affirmative action policies and laws. The most notable being the Promotion of Equality and Prevention of Unfair Discrimination Act, No. 4, 2000, and Employment Equity Act, No. 55 which legislates threshold levels of representation in the workplace for the different racial groups.

On the global scene, President Thabo Mbeki has initiated the notion of African Renaissance that aims to rid the continent of its colonial legacy of political oppression, state corruption, poverty and war. The African Renaissance is a broad vision that requires among others a more able political leadership, focus on science, business and education, better health care and greater African unity. Recently at the World Economic Forum President Mbeki, alongside his Nigerian and Algerian counterparts gained acceptance for the Millennium Africa Initiative (MAI), which later became the African Millennium Recovery Plan (MARP). While still under development, the principles and central themes of the MARP have been discussed with leaders in the developed and developing world. Among the focus areas of the programme is the deployment of ICT for developmental purposes and to leverage the comparative advantages that African countries enjoy, including their peoples, the availability of natural resources, land, environment and heritage.

[16] South African Yearbook of International Affairs 2000

2 The Telecommunications Sector

South Africa has an extensive national telecommunication network with first-world nodes in the commercial centres but with very low penetration of rural and remote areas. The fixed line telephony has six million subscribers while the cellular telephony has more than eight million. It is the goal of the government to improve access to telecommunications in the country, especially in the rural areas. Both fixed line and cellular telephony providers have obligations to expand access to previously disadvantaged areas. A Universal Service Fund has been established to redirect a percentage of the profits of the licensed operators toward universal service goals.

2.1 Legal and Regulatory Framework

Last year (2000), South Africa established a single regulator for its broadcasting and telecommunications sectors. The Independent Communications Authority of South Africa (ICASA) thus replaced the South African Telecommunications Regulation Authority (SATRA) and the Independent Broadcasting Authority (IBA), both established in 1993. ICASA implements the statutory objectives of the now defunct bodies and remains guided by existing broadcasting and telecommunications legislation. The new ICASA Act only deals with the organisational structure of the merged bodies and arising rights and obligations.

A Council heads ICASA, which is its highest decision-making body. The president appoints ICASA Councillors following a public nomination and parliamentary hearing process as to their suitability for appointment. The primary role of ICASA is set out in the objects of the legislation establishing the IBA and SATRA, which enjoins them to promote a range of economic and social goals including the advancement of historically disadvantaged persons and communities. Other roles and functions of ICASA are in line with those of international regulators, and include issuing licenses for broadcasting and managing the frequency spectrum for optimal use. The main areas of policy focus are: Liberalisation and licensing plans; Initiatives to promote universal telecom and Internet access; Policy on licensing; IP Policy; Legislation on e-commerce; Dispute resolution/arbitration for interconnection; Competition

Fixed telephony is still under the monopoly of a state operator, Telkom, while mobile telephony has two operators, Vodacom and MTN. A second public switched telephone network (PSTN) operator will be licensed in May 2002, when the monopoly of this sector ends. At the same time, a third cellular operator has been licensed and is expected to become operational by the end of the year.

The government Ministry of Communications has various policy-making responsibilities and functions. It also has certain licensing functions and the power to veto any regulations. In March this year the Department of Communication released its draft policy goals around the planned 'demonopolisation' of Telkom next year which indicated its aim to see a consortium of the electricity, and transport parastatals becoming the holder of the second fixed operators licence.

2.2 Access to Telecommunications Services

Access to telecommunication facilities has been improving as the figures in table 2 suggest. In 1999, 90% of the households in SA had access to telephone within a 60-minute walk, up from 87% in 1998.

Access Time (min)	1998	1999
15	66	71
30	80	83
60	87	90

Table 2: Access to telecommunications facilities

Given the great increase in phones in the past year (especially cellphones), it is likely that that today around 90% of South African households are within 30 minutes walk of a telephone they can use.

2.3 WTO and GATS Commitment

South Africa is a member of the World Trade Organization (WTO) and is therefore bound to an open trade system that adheres to specific principles when trading with member states. By adopting the Basic Agreement on Telecommunications in 1998, South Africa enjoined itself to a number of principles including freer trade through tariff reduction, non-discrimination against foreign players, market liberalization, increased competition and policy transparency.

South Africa's WTO commitments under GATS generally require a totally liberalized domestic telecommunications market. These commitments require among others: ensuring access to and use of public telecommunications networks or services offered within or across the borders of South Africa (including private leased circuits) by WTO members[17]; ensuring that relevant information on conditions affecting access to and use of public telecommunications networks and services (including tariffs and other terms and conditions of service) is publicly available; providing information on specifications of technical interfaces with such networks and services[18]; and affording access on reasonable and non-discriminatory terms and conditions of use. The only WTO restrictions on market players will be placed to protect the integrity of South Africa's networks, maintenance of state security, secrecy, or to frustrate efforts to circumvent WTO agreements[19].

Article II of GATS Annex 1B provides for exemptions from these provisions. The exemptions granted South Africa under the article are consistent with Telkom's licence conditions. This has the effect of suspending South Africa's compliance with WTO

[17] Section 4. WTO: Final Agreement. General Agreement on Trade in Services. (GATS) Annex 1B Part 6. Annex on Telecommunications
[18] ibid Section 5
[19] ibid . General Agreement on Trade in Services. (GATS) Annex 1B Part 6. Annex on Telecommunications

mandated sector commitments until the end of Telkom's monopoly in May 2002.

2.4 Fixed and Mobile Industry Players

The telecommunications sector comprises a monopoly fixed line operation, Telkom, and two mobile GSM operators (MTN and Vodacom). A second PSTN provider will be licensed when Telkom's monopoly ends next year. In addition to Telkom, two other parastatals, a transport company (Transnet) and a power utility company (Eskom), have own of telecommunications networks. Eskom in particular has steadily moved into the telecommunications arena. It has over 250,000 km of high-voltage lines which it is already starting to string with fibre optic cable for future telecom links, it has already laid broadband connections to neighbouring countries, joined the consortium which purchased the Lesotho PTO, and has subsidiaries which are laying new fibre in other parts of Africa, notably Nigeria. It recently established a telecommunications arm, ESITEL.

The coverage of the cellular network presently extends to over 34% of South Africa's geographical area, which contains over 70% of the population. A third mobile operator's licence was awarded two years ago but is due to become operational by the end of the year. The delay has been caused by protracted legal contestation of the award by one of the losing bidders. The case was however settled recently.

Sentech, a government parastatal, is another player in the communications industry. Sentech is a broadcast signal carrier that provides most broadcasters with their terrestrial and satellite broadcasting facilities. It has some 500 television transmitter towers, as well as various FM, medium and short wave transmitters and satellite services. The privatisation of these agencies is also expected shortly and is expected to raise about $6billion dollars when the further privatisation of Telkom is included.

Transnet, Eskom and Sentech, are expected to form a 'triumvirate' to operate the second fixed line operator's licence which will be issued some time in 2002.

As part of its plans to establish a second fixed line operator next year, the Department of Communications released in March this year a set of policy plans for public comment. The highlights of these proposed policies include, among other things, furtherance of the objective of universal service, improving access to telecommunication services is an important short-, medium- and long-term priority. The targets for universal access have to be re-defined in terms of services for access to include advanced services such as Internet multimedia. The role of USA shall be to evaluate and monitor implementation of universal access projects. Institutional capacity to support effective evaluation and monitoring of attainment of targets is a priority. A seven-member board, one of whom will be the chairperson, will be appointed by the Minister to provide oversight. Telecommunication operators shall be required as part of their licence obligations to give a 50% discount on all Internet access calls made by any public school, free registration of domain names by public schools, permitting small, medium and micro enterprises (SMMEs) and co-operatives to provide telecommunication services including Voice over Internet Protocol (VoIP) for the specific purpose of advancing universal access in geographic areas with a teledensity of less than 1% from 7 May 2002 using their own or leased infrastructure.

2.4.1 Fixed Line Telephony

The South African fixed telephony network comprises about six million lines. The Telecommunications Act of 1996 affords Telkom monopoly over public switched telephony until 2002. In terms of the Act and Telkom's PSTN licence, the fixed line operator has an exclusive right to provide national, international and local telephony services. This service provision includes public pay phones, for a period of five years to expire in May 2002, when the sector will be open to new entrants. During the exclusivity period, Telkom is required to install 2.8 million new lines, including 120 000 payphones. Telkom's monopoly also extends to the supply of all infrastructures for value-added networks, as well as cellular networks. Telkom also holds a VANS and radio licence and has shares in three satellites namely, Intelsat, Inmarsat and ICO.

As part of sector reform, Telkom took on a strategic equity partner (SEP) in April 1997, to assist in settling a high debt/equity ratio and preparing the company for competition. The capital raised from the US$700 million sale price was further needed in order to effect fixed line rollout. Thintana Communications, a consortium comprised of US company SBC Communications International Inc, and Telekom Malaysia Berhad, acquired a 30% equity stake in Telkom, holding 18% and 12% respectively. During FY2000 Telkom's total assets were estimated at US$4.375 billion with annual turnover in excess of US$3.25 billion. Attributable profits were US$231.25 million, a 21.1% increase from the previous year, while its debt-equity ratio stood at 1.3[20]. Plans to sell a further 20% of Telkom have been announced, and an IPO and bourse listings of the company are expected before the end of the third quarter of 2001.

Profound regional differences in the fixed telecommunications infrastructure exist between rural and urban areas in South Africa. Almost half of Telkom's telecommunications lines are installed in Gauteng and the Western Cape, the country's most economically productive provinces. The Northern Province and the Eastern Cape, largely rural provinces, remain poorly serviced. This rural/urban divide is reflected in the fact that Universal Service-the availability of household telephony service-stands at 9% for rural households compared with 64% of urban households[21]. Universal Access, now measured as 30 minutes walk from a telephone, remains skewed and stands at 59% for rural areas compared to 94% for urban areas. To counter this inequality, part of Telkom's licence conditions require a network roll out where about 1.7 million lines are to be installed in under-serviced areas[22].

2.4.2 Mobile Telephony

The mobile telephony protocol used in South Africa is the GSM standard and the country is becoming one of the most important GSM markets outside Europe. By way of comparison, Italy, the world's largest GSM market has about 22 million users

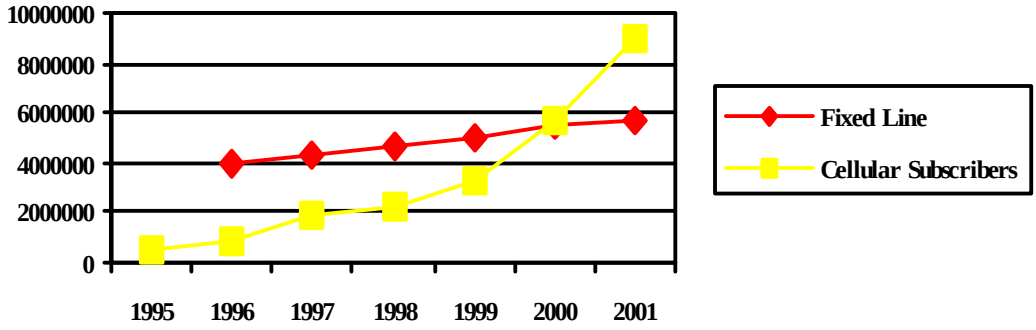
[20] Telkom Annual Report 2000
[21] Peter Benjamin on basis of South African Census October Household Survey 1999. See CommUnity at Projects .http://link.wits.ac.za Projects
[22] See Telkom PSTN Licence

compared with South African 8.9 million, representing 46% of the total African market[23].

The mobile industry is presently a duopoly comprising the Mobile Telephone Networks (Pty) Ltd- (MTN)- and Vodacom (Pty) Ltd. Shareholders in Vodacom include Vodafone-Airtouch plc, Telkom SA and the Rembrandt group. M-Cell, a listed South African telecommunications company, holds 72% of MTN shares, while Transnet and empowerment groups hold the rest. Both networks operate at 900 MHz, covering most urban areas and national roads and more than 70% of population. Cellular subscriber growth has far outpaced the initial expectations, and the industry continues to grow, reaching 1,9 million subscribers by March 1998 and 3.2 million at the end of 1999[24]. The majority of the subscribers come from the prepaid market, which grew in 1998 by 161%. Vodacom is 50% owned by Telkom and 50% by Vodafone UK. Based on call traffic volumes, the regional distribution of users are 29% in Gauteng (the Johannesburg and Vereeniging area excluding Pretoria), 24% in Pretoria, Northern Province and Mpumalanga, 19% in the Western Cape, 4% in the Free State and Northern Cape, 7% in Eastern Cape and 17% in KwaZulu-Natal.

The cellular sector had a pre-tax income of more than US$250 million in 1999. Vodacom recently invested US$37.5 million on its new Internet company, Yebonet, which it subsequently sold out to a Dutch group and became WorldOnline. Revenue per cell phone is estimated at US$34.4 per month and the value of cell phones was estimated at over US$65 million in 2000. The value of the cellular market is estimated to be about US$1.0 billion with combined revenue for MTN and Vodacom of some US$1.23 billion for financial year 1999[25]. Market forecasts a growth of US$1.9 billion by 2004, with as many as 15-16 million users expected by year 2005[26].

Figure 1: Graph showing growth of cellular over fixed line telephony use in South Africa



Sourced from BMI Tech-knowledge figures, 2000

[23] Mobile Office Online October 99
[24] Communication Handbook, BMI-TECHKNOWLEDGE, 2000
[25] ibid
[26] See Africa Cellular market overview: www.cellular.co.za for March 2001

Cellular operators also have extensive universal service obligations as part of their licence conditions. A Universal Service Fund has been established to redirect a portion of the profits of both fixed and cellular operators providing greater access in previously disadvantaged areas.

2.5 International Telecommunications

Telkom is the only agency authorized to provide international telecommunication facilities. It provides these via its SAT-2 fibre optic cable, which runs from Cape Town to the cross-Atlantic hub in the Canary Islands. Telkom also operates a large earth station hub, which provides backup routes and direct connections to countries not connected via the SAT-2 fibre link, principally in the rest of Africa. It is a shareholder in Intelsat and Inmarsat and uses the former to provide the satellite links and the latter's network of satellites to provide satellite phone services.

Telkom has also been active in bringing together PTOs in West African and Asian countries to build the WASC/SAFE fibre optic cable which will link PTOs from Malaysia, India and Mauritius to South Africa and onward up the west coast of Africa to land in Portugal. The cable is expected to be operational before the end of the year.

2.6 Key Players in the Communications Industry

2.6.1 SA Department of Communications

The public service arm of the Ministry of Communications is the Department of Communications, which is responsible for setting policy for the sector, working closely with the regulatory bodies, postal services, the national broadcaster and the national telecommunications network operators.

The Government is determined to promote broad based Internet access and ICT usage culture among the populace to ensure successful participation in the emerging global economy. The Department of Communications is however concerned that the Internet will remain the growing but exclusive domain of the corporate sector and a small number of wealthy residential users. To this end, it is committed to expanding the concept of universal service to include Internet access and to seeking ways of providing affordable access in the short term to medium terms to underserviced areas through state intervention.

To bridge the digital divide, the government is considering creating a broadband satellite network connecting all schools, colleges, technikons and universities in the country. This Public Information Infrastructure will be exempt from current regulatory and tariff restrictions and will provide access points to communities at the schools and will also be accessible to SMMEs outside of school hours. A new policy proposal already approved by cabinet will require all commercial operators to provide services to educational institutions at a 50% discount rate. The Government sees this as the only way to provide affordable access to broadband services. This would not exclude the

demand-driven development of globally competitive broadband networks services[27].

2.6.2 ICASA

The Independent Communications Authority of South Africa (ICASA) is the broadcasting and telecommunication regulatory arm of the government through the DOC. It combines the functions of the former SATRA and IBA. Its current projects for broadcasting include monitoring of broadcasters in their coverage of local government elections, corporatisation of the national radio and television broadcaster, SABC, finalisation of a position paper on granting of satellite broadcasting licenses, discussion paper on local content and licensing of the four year community radio broadcasting. For telecommunications, the current projects include finalisation of the numbering plan for telecommunication operators, development of spectrum policy, finalizing the third cellular license, and finalisation of VANS and PTNs regulations. Its future projects for broadcasting include an inquiry into broadcasting sports rights, review of ownership and control policies, inquiry into licensing of further private sound broadcasters, investigation into terrestrial digital broadcasting and investigation into community television. For telecommunications the future projects include review of ownership and control policies, Telkom's Initial Public Offer and audit of MTN and Vodacom's community service obligations. http://www.icasa.org.za

2.6.3 Telkom

Telkom is the 27th largest telecommunications operator in the world and provides a range of telecom services. It operates consumer and corporate ISP services and is also part owner of a 9,500 km fibre optic link to the Canary Islands (SAT-2), where it joins the international fibre optic network. Since the end of the sanctions era in South Africa, Telkom has been looking north to sell its expertise and infrastructure. With its high capacity international link and sophisticated ISDN services, Telkom is in an attractive position to sell bandwidth to other parts of Africa, especially through satellite connections. As early as 1994 it demonstrated its Spacestream VSAT service in Lagos, which can integrate voice, data and images on a single link. More recently it was the prime mover behind a consortium of African telecom operators, which are laying the West Coast/South Africa to Far East (WASC/SAFE) submarine fibre cable, which is expected to go into operation later this year. Telkom is also providing training facilities for some African countries, already assisting with billing systems and the development of exchanges in others. http://www.telkom.co.za

2.6.4 MTN

One of the two cellular GSM providers, MTN has concentrated on voice services. (See above for holding structure) http://www.mtn.co.za/,

[27] Interview with Director General, Department of Communications, South Africa, 13 February 2001

2.6.5 Vodacom

Vodacom one of the two cellular service providers, and 50% owned by Telkom. As part of their license requirements, both cell phone networks are obliged to put in 30 000 rural phones which will operate at a subsidised rate costing approximately 40% of the normal cell phone rates. These are often housed in recycled transport containers, owned by local entrepreneurs. Unfortunately quite a number of them are place in semi-urban areas where fixed line public phone shops run by small businesses exist that cannot compete with the subsidised rates. http://www.vodacom.co.za/

2.6.6 SENTECH

Sentech is a parastatal responsible for broadcast signal distribution. It also provides satellite downlink services for some Internet operators and consumers via a company called Infosat. http://www.sentech.co.za.

2.6.7 Transnet

Transnet is government owned transport, shipping and rail parastatal. It has the largest network in the southern hemisphere after Telkom and is interconnected with Telkom's infrastructure. Although it has no terrestrial infrastructure outside of South Africa as yet, Transnet has leased transponders on PanAmSat's PAS4 which allow it to use C-Band and KU-Band VSAT technology to connect to other countries and to remote areas inside South Africa. The leased transponders cover the whole of Africa. Transnet has also developed a wide range of expertise, which it is marketing to the rest of Africa. It is known for its skills in the installation of telecommunications infrastructure in harsh climatic conditions.

2.6.8 ESKOM

South Africa's national electricity supplier also provides fibre-optic capacity in the Southern African region. It maintains an autonomous telecommunications network that services the organisation's communications requirements. Although much of its backbone is currently based on microwave links, Eskom is running fibre optic cable down all new cables laid, including those planned for linking Botswana and Zimbabwe into the Southern African grid. The grid is expected to expand into a continent wide network in the longer term as projects to tap the electricity generation potential of the Congo come on stream. Eskom has a subsidiary company focussed on telecommunication, which is active in the rest of Africa.

2.6.9 Universal Service Agency

The USA is responsible for ensuring universal access to all telecommunications services. Originally established to ensure universal access to telephony, discussion are underway to expand its mandate to include access to enhanced services and public access points including voice, fax, Internet etc. Universal access is currently defined by the presence of public access services within 30 minutes walk from anywhere in the country. To accomplish this, USA operates a Telecentre Programme based on a franchise model which aimed to roll out a number of telecentres, located in rural areas

and providing access to photocopying, phones, fax, email, web and TV/Video. To assist the programme, the USA has developed a detailed specification of the components of a telecentre. The agency's continued existence after its first five years was determined by a sunset clause in the Telecommunications Act. Following a national process the Department of Communications to which the USA reports is considering proposal to continue the agency, despite concerns around its failure to deliver on its core mandate, with improved mechanism of accountability and transparency and better role definition. http://www.usa.org.za/

3 Internet Status

3.1 The Legal and Regulatory Framework

The Telecommunications Act 103 of 1996 provides the regulatory framework for all Internet and relates services and activities in South Africa. The Act vests authority in a regulatory body to implement and administer legal provisions therein. SATRA, the body identified in the Act has since been superseded by ICASA, whose mandate includes broadcasting, the former domain of IBA.

3.2 Industry Structure and Players

The South African Internet industry has experienced considerable growth in terms of providers, access networks and consumers since the market opened in 1993. In 1999, it was ranked 20th in world by Internet[28] nodes but has since slipped. The number of ISPs has stabilized at about 70 – 80 after an upswing of over 150 in 1999. These comprise at the top-level four leased line providers serving second level dial-up providers and corporate consumers. There also third level operators running small cyber kiosks and cafes and providing Internet training to relatively poor communities. The ISP association, ISPA, provides a forum for providers to discuss and share on issues affecting the industry.

In terms of network access, there are four top level Internet operators in the country, namely, CITEC, Internet Solution, UUNET Africa, and SAIX, that provide leased line services to their corporate and second level ISP customers. They also provide international access services. Table 3 summarizes their network bandwidth capacity and points of international linkage[29].

ISP	Bandwidth	Linkage(s)
CITEC	4 Mbps	London, Middle East
Internet Solutions	81 Mbps	New York
UUNET	133 Mbps	Boston, New York
SAIX	42.5 Mbps	New York, London

Table 3:International Internet capacity in South Africa

The Internet user community comprises about 1.8 million users[30] of which about 750000 are dial-up residential and small office home office (SOHO) users and the rest are corporate users. There is a high concentration of users in large commercial cities

[28] BMI_TECHKNOLWEGDE Communication Handbook 2000.
[29] Internet Service Providers Association of South Africa (ISPA)
[30] AISI-Connect National ICT Profile SOUTH AFRICA (ZA); Bellanet South Africa Report: Internet connectivity.

and town with limited spread to rural communities. The user community also has their association through which they engage in the activities of the industry.

3.3 Internet Service Regulations

The Telecommunications Act, 1996 regulates the country's Internet services and access as Value-Added Network Services (VANS). As operators offering electronic data interchange, email, protocol conversion, and access to databases or managed data networks, the ISPs require VANS licences[31]. The Act requires VAN operators to use Telkom's network facilities[32], and does not allow them to carry VoIP until a date fixed by the Minister[33]. Furthermore, VANS operators are not entitled to cede, assign or sublet their rights of use to Telkom facilities[34]. These restrictive conditions have become the subject of controversy in the Internet market.

In 1997, the ISPA filed a complaint with the Competition Board, alleging that Telkom's practice in the granting of telecommunications facilities constituted anti-competitive conduct. Telkom's response was that the Telecommunications Act, 1996, provides it with exclusive rights to provide Internet access. SATRA ruled that Internet service provision is a VAN service to which Telkom's exclusivity does not apply. Telkom has taken this decision to the High Court on Judicial Review and the outcome of the case is still pending. Planned changes in the VANS industry have been placed in the government publication, the Government Gazette. Continuity in the industry is enforced by 'grand-fathering' clauses with respect to VANS licences. The proposed changes also outline a new and specific licensing regime for VANS, with a new requirement of legitimation from ICASA. Importantly, the prohibition on the ability of VANS operators to carry Voice over Internet Protocol is retained in the proposals.

3.4 Key Players in the Market/Industry

3.4.1 OpeNET

Overlaid on the old GovNet infrastructure of leased lines, state operated OpenNet is actively connecting government departments and local administrations to its new TCP/IP based service which provides a number of other services as well as access to Internet. OpenNet's mandate instructs it to provide a local service whenever government departments in the same location make three or more requests for service. As a result the network is among the most widespread in the country with about 100 points of presence in different towns and cities.

[31] Section 40, Telecommunications Act 103, 1996
[32] Section 40 (2)
[33] Section 40 (3)
[34] Section 40 (4) (a) (i)

3.4.2 Internet Society, South Africa Chapter (ISOC-ZA)

ISOC-ZA was officially launched in June 1988 as an official chapter of the Internet Society (ISOC). It is a non-profit, non-governmental, international, professional membership organization serving the interests of the South African segment of the global Internet community. ISOC-ZA seeks to promote cooperation and dialogue between itself and representatives of the South African Internet community, ISPs, regulatory authorities and other interested parties and act as the spokesperson for and representative of the South African Internet community on all matters. http://www.isoc.org.za/

3.4.3 Storm Telecom

European and South African callback operator and Internet service provider via joint venture with ITI-KZN in Storm Internet. http://www.stormtel.co.za.

3.4.4 CiTEC

A top-level wholesale ISP established in 1996 as an Internet access provider (IAP), as opposed to ISP, thus focusing on the relate of mission-critical bandwidth solutions to the corporate market, that include local and international access and security solutions. http://www.citec.co.za/

3.4.5 Infosat

Provides a simplex (one-way) satellite broadcast-based service. It uses Sentech's facilities to transmit signal and standard DSTV subscriber equipment aimed at PAS-4. The system is not limited to a physical capacity of 64 kbps - each stream has the capacity to come in at 2 Mbps, and as each card has an aggregate bandwidth capacity of 48 Mbps. This means that if no one else were using the system at the same time the subscriber would have access to 24 x 2 Mbps sessions downloading concurrently from the Internet. Costs are about US$25 per month for a single user 64 kbps link, US$562.5 per month for a 64 kbps link to a LAN. http://www.infosat.co.za

3.4.6 Intekom

Intekom, a wholly owned subsidiary of Telkom, is one of South Africa's larger dial-up and leased-line ISPs. Intekom claims to have more POP than any other network in the country and that all connections use local phone call rates. http://www.intekom.co.za/

3.4.7 Internet Solution

A top-level wholesale ISP focussing on providing leased line links to the corporate sector http://www.is.co.za/ IS operates 17 POPs around the country.

3.4.8 M-Web

One of the largest consumer ISPs in the country. http://www.mweb.co.za/

3.4.9 UUNET

Subsidiary of the MCI/Worldcom group in partnership with local group Datatec, UUNET SA provides one of the two largest leased line Internet backbones in South Africa to corporate clients and ISPs. It operates a similar service in partnership with AfricaOnline in Namibia and Swaziland and has recently established UUNET Africa, a 50% joint venture with Africa's largest regional ISP, AfricaOnline, which has presence in 9 countries. http://www.uunet.co.za.

3.4.10 National Research Foundation (NRF)

NRF is the main research support agency of the South African government and also operates as the country's ISP to the scientific and academic research community - Uninet. http://www.nrf.ac.za/services/uninet. It also supports some connections to neighbouring country research/academic networks. About 5% of Uninet's budget is paid for by NRF with the remainder coming from service fees paid by members. The recovery of costs is based on a formula that has a small fixed component and a variable component directly linked to the volume of the different types of traffic between the Uninet backbone and the member site. The international traffic component is priced at about four times the national traffic costs. Uninet's current member sites consist of 22 university campuses, 14 technikons and 15 research institutions. About 300 schools are connected directly or via member sites. http://www.nrf.ac.za.

3.4.11 SchoolNet SA

Recently established by the Department of Education, this is the national body which will co-ordinate the linking of South African schools to the Internet. The SchoolNet SA structure consists of a Transitional Executive Council with participants from the Department of Education, DACST and regional school networking organizations. Provincial "SchoolNets" will be encouraged and supported while three advisory groups focussing on issues of connectivity and technology, human resource development and training, and content generation and curriculum will provide direction for SchoolNet's policy. http://www.school.za/.

3.4.12 Internet Service Providers Association (ISPA)

ISPA is the commercial association of ISPs, which comprises most of the members of the Internet industry. Full members pay an annual membership fee of US$625; associate members are not required to pay, but also do not have any voting rights. Only companies providing commercial Internet access may join the association. ISPA provides peering services for its members through two points (CINX in Cape Town and JINX in Johannesburg) and acts as a lobby group to influence government policy, which affects the industry. Members of ISPA are listed on the web site. http://www.ispa.org.za/

4 Internet costs

The data for this part of the study was collected through guided interviews with key stakeholders in the Internet Industry. The interviews were conducted with four categories of respondents, namely, the Internet users, role players in the telecommunications industry, including Telkom, government, focusing on the Department of Communications, and national Internet Service Providers. These interviews covered the following thematic topics: The Internet industry, The ISPs in the market; Prices charged, Connectivity, Costs and revenue structure, Relevant telecommunications costs, International components, and Looking ahead.

4.1 The Internet Industry and Market

The South African Internet industry has experienced rapid growth since the establishment of the first ISP, The Internet Company of South Africa (TICSA), in 1993, followed closely by Internet Solutions (IS). Thus, the number of ISPs grew to 20 within a year, 30 to 40 in two years, and over 100 in three years. This growth continued until there were between 150 and 200 ISP in late 1999. This number however came down through closures, consolidations and buyouts leading to about 75.

During that period, a vibrant Internet community of users emerged. Those in academia were the first members of the South African Internet community. The opportunities for international outreach presented by the Internet following the end of the boycott era fuelled user growth rates of over 100% for a number of years. This growth rate is now tailing off as only around a 40% growth rate was recorded in 2000. The number of users is now estimated at about 2 million comprising corporate users (60 % - 70%), academic/educational and residential dial-up users (30 % - 40%).

Local and international connectivity has experienced a corresponding growth rate. The few pioneer ISPs in the market had limited points of presence in major cities and were linked to the international Internet cloud via 64 kbps connections. Today, the maturing market has several local access networks in all major cities and towns, and points of presence in about 100 urban centres throughout the country, to which dial up service providers link to carry Internet service to residential users. At the same time, the international connectivity has grown from the original 64 kbps bandwidth to 90 Mbps in 1999 and to over 300 Mbps of outgoing bandwidth today.

4.2 Regulatory Constraints in the Market

The Telecommunications Act, 1996 that gave Telkom monopoly and exclusivity over provision of local and international connectivity is the biggest constraint to the development of not only the Internet market but also the communication infrastructure in the country. For one thing, it constrains the extent to which costs can be brought down by market forces. As noted elsewhere in the report, connectivity costs are a major component of the Internet costs. For another, it stifles local and foreign investment opportunities in the market, especially those seeking to develop alternative access

networks based on new broadband technologies.

There are no licensing constraints to new entrants to the market. They are only required to have a value added network service licence from ICASA. They would be required to pay a fee of US$1875 per year.

The licensing of a second operator when Telkom's exclusivity comes to an end next year will unfortunately not solve these constraints. We all know that a duopoly does not create a free and competitive environment driven by market forces that would drive prices down to affordable levels.

4.3 Patterns of industry ownership and influence

Top-level ISPs, such as UUNET, IS, AT&T, have international affiliations from which they draw influence and even ownership. Furthermore, since they deal primarily with corporate consumers and second level operators, a good deal of their influence comes from this market segment. Furthermore, being major customers of Telkom for both local and international connectivity is also a major source of influence.

The dial-up service providers have varied ownership and sources of influence. The consolidation of the market that has taken place in the last two years that reduced the number of ISPs from over 150 to about 75 created new dynamics and mixed levels of ownership and influence. Large media, IT and Telecom companies such as Vodacom, DiData and Telkom have acquired most players in this market segment that were largely independent. The market itself is another source of influence. Their suppliers as well as their consumers impose due influence on their operations. Entry into this market segment of a free Internet access provider in the form of a banking institution, ABSA, is already creating a high level of concern in the market. Should other banking institutions in the country follow suit, operators in the market segment would be forced to review their business strategies; some would clearly be forced out of business.

4.4 Industry Forums and Activities

The South African Internet industry has at least two major forums through which members engage in a variety of activities -- the Internet Service Providers Association (ISPA) and the South African Chapter of the Internet Society. The Department of Communications and the regulator, ICASA, provide additional forums through which industry players engage in various activities of interest.

Industry activities include the following. The Internet.org.za project was established in 1997 and operated mainly through mailing lists with some 300 to 500 subscribers. The focus of the project is largely on technical, legal and security issues. The ISPA also engages its membership through various committees and subcommittees. One such subcommittee is tasked to promote integration and expansion of services and connectivity within the SADC region in particular and the rest of Africa in general. This initiative seeks to increase availability and affordability of Internet access and services in the region, thus taking advantage of the fairly well developed Internet infrastructure in South Africa where they can purchase bandwidth from any of the 12 networks.

There is also a regulatory sub-committee responsible for submission on major policy processes. This subcommittee works closely with the regulator (ICASA) and the government (DoC) in development and implementation. Their participation in this process is viewed to have a positive impact even though the providers are quite opposed to current and proposed policies. The ISPs are currently mooting a one-day switch off of all ISPs to protest what they regard as the short sightedness of government policy.

4.5 Technology choices

Telkom's exclusivity constrains considerably the growth of the Internet industry in terms of technological choices. As the sole providers of local and international connectivity, Telkom is not in a hurry to venture into newer and better broadband technologies apart from ISDN, in which Telkom has invested heavily, despite its capacity limitations. Consequently, most users, especially in the dial-up segment of the market, have very limited bandwidth.

The mobile operators are believed to receive growing revenues from connecting customers to the net. One ISP, Megawan appears to have a business strategy of not buying anything from the dominant incumbent. It offers cheap 64k spread-spectrum based radio links in the ISM (industrial, scientific and medical) bands to its customers on the basis that Telkom is unwilling or unable to provide it with these radio links. A dedicated 64k-radio connection of this kind is provided for around US$62.5 per month whereas a Telkom 64k line costs around US$250 a month.

WAP and PDA are seen as gimmicks and are largely used by wealthy corporations. Over 99% of end-users utilize a PC. Only one company (Teljoy) is promoting the use of set-top boxes for Internet access and while Alternative Access Device use will grow in the market they are not expected to threaten the PC.

4.6 Purpose for Internet use

People use the Internet for the same reasons as other users elsewhere in the world. Internet banking and e-mail continues to be major uses, together accounting for over 60% of Internet use. The Microsoft study of web users on the South African MSN portal indicates that pornography is a major driver and requires large bandwidth due to its image-intensiveness. Other uses include chat, information searches, surfing/browsing, news, and music. The web based service to send SMS messages to cell phones that is operated by MTN is one of the most popular sites in South Africa, followed by Africam, which provides still pictures of wildlife at game reserve watering holes.

4.7 The ISPs in the Market

4.7.1 Market Share of ISPs

The South African Internet market is partitioned into access (leased lines) and dial-up services. As discussed earlier, the leased line market has four players, namely, CITEC, Internet Solutions (IS), SAIX and UUNET Africa. Of these, IS and UUNET Africa

dominate, claiming over 60% between them. The dial-up market comprises over 70 providers. M-Web, ABSA Freemail and World Online who between them have over 90% of the market dominate this market.

Overall, the Internet comprises about two million users, of whom about 750,000 are dial-up and the remainder is corporate users. In terms of ISPs, the market is divided into two segments - the leased line and international connectivity market, and the dial-up market. There are five providers in the first market, the largest of which is Internet Solutions followed by UUNET. The two providers account for over 70% of this market. UUNET SA reports an annual turnover of US$56.25 million.

4.7.2 Customer categories

The South African Internet market has three broad categories of consumer, namely, corporate, second level ISPs, and dial-up. Corporate consumers comprise large organisations, such as banks, the government, universities, and other academic institutions. Corporate consumers obtain leased lines services from top-level providers, and make Internet services available to their members. Second level ISPs are another category similar to corporate consumers. Unlike corporate consumers, however, second level ISPs by and large obtain leased line services for purposes of reselling the same to dial-up consumers.

The dial-up consumers, the third category, comprise residential users and small businesses (SOHO). A fourth category comprises Internet kiosk and cyber café operators as well as operators of telecentres and multipurpose community centres (MPCC). The majority of these consumers use dial-up services while the larger and more established could be using 64 kbps leased lines.

4.7.3 Availability and Charging Rates for Dial-up Services

While there is a general countrywide availability of dial-up services, they are closely linked to availability and distribution of telephone services. To this end, dial-up services are higher in urban areas than in rural areas. Furthermore, availability in the urban centres is higher in those areas with better telecommunications infrastructure and services. Thus, more residential subscribers are found in the suburbs than in the townships.

Most dial-up ISPs provide unlimited access for which they apply a flat-rate charging system. Thus subscribers pay a monthly fee irrespective of use. The fee ranges between US$7.5 and US$15 per month. This excludes telephone connectivity for which users pay directly to Telkom. The additional monthly bill for a 20-hour connectivity would be US$11.25 (off-peak time usage) or US$31.25 (peak time usage). Peak times are normally between seven in the morning and seven in the evening on a working day.

4.7.4 Published Materials

All major providers have websites from which a range of published materials is found. M-Web, for example, is a publicly quoted company and therefore publishes its financial statements on the web. Table 4 provides the websites of different providers.

Provider	Website/URL
CITEC	www.citec.co.za
Internet Solutions	www.is.co.za
M-Web	www.mwebholding.co.za
SAIX	www.saix.net
Sangonet	www.sangonet.org
UUNET Africa	www.uunet.co.za
World Online	www.worldonline.co.za

Table 4: Websites of top tier ISPs in South Africa

4.8 Full Information on Internet Pricing and Charges

4.8.1 Background to Internet Pricing

The provision of Internet services is the core business of ISPs. To this end, the basic requirements for business success in terms of pricing apply. This is to say that each operator must generate enough revenue from its business transactions to cover all its costs and to provide for a reasonable profit margin. Major cost items include: connectivity costs (payable to Telkom), equipment and facilities, including investment, maintenance and operations, personnel costs for professional, technical, managerial, and administrative support, and administrative costs, including office space, transportation, office consumables, communications, and the like.

It should be noted that connectivity costs are a major component of these costs and therefore a key determinant of Internet pricing and prices. It should also be noted the ISPs that participated in the study were reluctant to divulge their cost information, either because it was a confidential business information that they don't share with anybody outside their organisations or because such information could only be obtained from higher authorities within the organisation.

Consequently, the Internet prices are dependent upon the market segment in which the ISP operates. In the leased line segment the bandwidth determined the charge. In the dial-up segment, however, two pricing policies were found. While both policies operated on the basis of monthly charges, one uses flat rates while the other bases pricing on use. In the flat rate policies customers are charged a fixed amount of money per month irrespective of use. This provides them with full Internet access. In the variable rate, customers pay a standing fee plus a variable fee depending on actual connectivity time.

4.8.2 Charges payable to Telkom

This depends on the category of service providers in question. In the dial-up segment, the Internet-related charges are borne by the provider, who in turn charges users a fee. This fee was found to vary from one operator to another and was between US$7.5 and

US$15 per month. Most operators charged a constant monthly rate. Dial-up users, however, are responsible for their connectivity charges which they pay directly to Telkom as part of their normal monthly telephone charges. For a 20-hour connectivity per month, this would be US$11.25 (off-peak time usage) or US$31.25 (peak time usage). Peak times are normally between seven in the morning and seven in the evening on a working day.

For consumers in the leased line market, the rate payable to Telkom depends on the bandwidth of the line. One operator indicated that it paid to Telkom a monthly fee of US$187.5 for a 64Kb bandwidth connectivity and sold the same to its customers at US$937.5. The same operator indicated that it charged its customers US$31 250 per month for a 2Mb bandwidth. Otherwise, a 64k leased line Internet access service costs between US$250 and US$1375 a month, depending on the quality of service on the international component, of which Telkom costs would make up a substantial portion (Diginet line). Generally about 50% of operating costs of ISPs would be attributable to Telkom overheads. Table 5 gives data on the tariffs.

South Africa (ZA)	Link type	64K	128K	256K	512K	2 Mbps	45 Mbps
Internet SAIX	ZA-Internet (Nat Only)	291	547	982	1.890	7.059	
Internet SAIX	ZA-Internet Nat/Internat	7,617	1,458	2,984	5,218	20,371	
Internet Solution	ZA-Internet Nat/Internat			3,375			
Internet SAIX	ZA-Internet International	1,626	2,991	6,362	12,570	50,074	
Internet CITEC	ZA-Internet International		1,750				
Leased data line	ZA-ZA Local	179	365	428	551	1,239	
Leased data line	ZA-US/FR/SN/NG/GH/EG		5,371				352,609
Leased data line	ZA-TZ/KE		3,007				
Leased data line	ZA-MZ/BW/ZW		705				

- SAIX is the PTO top level ISP - Nat/Internat is 64K local /16K international (CIR), and multiples thereof e.g. 128K/32K, 256K/64K etc
- CITEC is a private top level ISP - 128K International CIR
- Internet Solution, private top level ISP Nat/Internat is 25K local /128K
- Leased data lines are only officially available from TELKOM.

Table 5: Leased data and Internet link pricing in US$

4.9 Quality of Internet Service

Different responses were obtained in respect of quality of service. Some ISPs, especially the larger ones, do not see quality of service as any problem at all, arguing that since they only provide leased line access services, which they obtain from Telkom, quality issues would not arise unless Telkom fails to maintain availability. While accepting that they had no statistics on connectivity failures, they noted that they were satisfied with the quality of services they obtain from Telkom.

One dial-up ISP however declined to discus QOS services issues arguing that this is part of their confidential business information package that their policies do not allow discussing with anybody outside the organization.

ISPA has no statistics on quality of service; this is known to vary from ISP to ISP and within ISPs over time. These are for classical reasons as providers try to anticipate bandwidth demand, and purchase it in "steps", creating usual congestion dialling in to the server. Although there is some evidence of over zealous incumbent employees, there is not sufficient evidence to believe Telkom systematically conspires against its competitors to deliver lower quality of service.

On the ISDN network, access is guaranteed for 64 kbps connections but is rarely used due to its prohibitive monthly rental expense.

4.9.1 Reliability of leased lines

Dependence on Telkom makes this a difficult arrangement. One ISP in the leased line market indicated that they have a service level agreement with Telkom that include penalties for failure to maintain presence on lines over a period of time that would result in lost business to its customers and to itself. They indicated that they advise their customers to install a redundant leased line if they wish to maintain a guaranteed 100% connectivity. This however means additional cost that can be justified only if uninterruptible connectivity is critical to their business.

4.9.2 Access speeds supported and achieved

This is not a problem for the leased line market. On the dial-up market however it was reported that Telkom purports to provide 56 Kbps, but this in practice goes down to 48.8 kbps and some times even lower, especially in areas outside the major city centres.

No quantitative data was obtained on this subject. The leased line ISPs reported that they allocate bandwidths according to requests and business agreements they have with consumers. They also noted that variation could arise only when the consumer has demand for more bandwidth capacity at certain peak times. They only respond to such demands if they have slack capacity. Otherwise, they operate on the basis of the capacity of their network. This in turn depends on the bandwidth capacity they obtain from Telkom.

4.9.3 Factors underlying QOS and routes to improvement

Bandwidth and traffic are two interrelated factors cited to be the greatest causes of service quality. High traffic in a small bandwidth causes congestion leading to deterioration in the quality of service. This situation also leads to longer waiting periods and lower than required bandwidth being available. This is because bandwidth providers rationalize allocation of available bandwidth to avoid breakdown and ensure continuous traffic flow. Consequently, consumers have to make do with what is available.

One way of dealing with traffic/bandwidth problems makes use of established patterns of consumption among different consumers. It has been established that the corporate consumers are busy during daytime while dial-up residential consumers are busy in the evenings and nights in a 24-hour cycle. Thus access providers and dial-up providers have an arrangement in which they trade in slack bandwidth capacities. During the day, there is higher demand in the corporate sector while there is slack in the dial-up sector. Thus, slack capacities in the system are channelled to the corporate sector during the day and to the dial-up sector in the evening. This arrangement results in better capacity utilization as well as in maintaining reasonably good quality of service.

It was also observed that service quality suffers from the inability of Telkom to maintain continuous connectivity of leased line services. Apart from advising consumers to establish redundant leased lines for purposes of guaranteeing continuous connectivity, top level services providers have service agreements with Telkom which require compensation for loss of business arising for loss of connectivity beyond some allowable period of time.

4.10 Internet Connectivity

All top level ISPs maintain national as well as international connectivity. In fact they have all established national access networks that cover the whole country through which corporate consumers and second tier providers obtain connectivity. The number ‘0860’ provides for the application of local call tariffs anywhere in the country for all Internet connectivity regardless of distance from the nearest POP, outlying users having dial-up access to the Internet at local call tariffs.

4.11 Cost and Revenue Structure

This is another area of the study where the respondents provided very little information claiming again either that they need authority to do so or that such information is classified as confidential business information that they are not permitted to share with anybody outside the organization.

While more respondents reported anticipating no change in Internet costs and pricing, they indicated that lower prices could only be achieved if the restriction that providers must use Telkom access is removed, and a fully and truly free and competitive market is created. This they noted would attract international providers into the market with the result of pulling down prices towards internationally rates applicable in the American and European markets. They further noted that the licensing of a second provider

would not bring about significant changes in Internet pricing, arguing that a duopoly encourages collaboration rather the competition between the providers. They cited the example of Vodacom and MTM, where the two firms use and maintain comparable pricing systems and arrangements.

The respondents further indicated Telkom charges are the major component of the cost structure of their international connectivity. If Telkom could adopt internationally comparable pricing for this component, then the Internet cost to consumers (corporate and dial-up) would be considerably lower than it is at present.

4.12 The International Component of Internet Costs

4.12.1 Choice of international links

There is no choice for local half circuit as ISPs are compelled to lease international links from Telkom. The situation will remain until May 2002, when a second operator is expected to enter the market. Then again, only Telkom and the second operator will provide international links. This arrangement it is argued will not bring any significant improvements on Internet cost and prices.

All second and third-tier ISPs obtain international links from any of the four top level ISPs (CiTEX, IS, SAIX, UUNET).

4.12.2 Negotiations for international interconnection

ISPs maintain a constant dialogue with the government, the regulator, and with each other through their associations, ISPA. In fact most of the providers sit in the regulator's council, which is its highest decision making organ. At the same time, they take part in policy-making processes of government. This happens at the public hearing stage of the process when they are invited to make presentations. At the same time, they are also engaged in the various technical forums usually established to deal with specific aspects of the policy process. In this way, they are able to provide useful inputs into these very important processes.

Similarly, they hold negotiations with Telkom, the sole provider of both local and international connectivity. In such consultative meetings, they debate and negotiate issues affecting the provision of Internet services in the country. At the same time, they discuss industry-specific issues that do not necessarily involve the government or the regulator.

4.12.3 Reasonableness of price charged

Telkom charges for both local and international links are reportedly much higher than similar charges in UK and US. Claiming that the Internet has become a commodity and not a luxury any more, the ISPs said it should be priced with affordability for the common person in mind, in a manner that promotes widespread access and use, especially by small businesses, schools and rural communities.

4.12.4 Desirable changes for improvement

Two proposals were provided. First, open the Internet market and inject more competition, in order to improve efficiency and ultimately reduce the prices to international levels. Second, provide a common international gateway through which all local ISPs obtain international connectivity. Such a gateway should be managed by ISPA; an association comprising all stakeholders to ensure that associated overhead cost to ISPs is kept to the lowest practical levels.

4.12.5 Cooperation among local and regional ISPs

Improving international interconnection arrangements through co-operation has been tried. TICSA tried to amalgamate costs as IS currently does. However this is really an arrangement to supply downline ISPs, reflecting associated cost benefits, rather than co-operative agreement. This simply reflects the tiered structure of the industry.

The need to open up regional linkages to support the growth of the regional market in the spirit of African renaissance has been proposed. This, it is argued, would not promote regional trade but also bring about goodwill and dispel current suspicious views of South Africa as the new African "super-power" in technological development and applications.

4.13 Looking Ahead and Closure

4.13.1 ISP expansion plans

While a steadily growing number of companies are still installing leased lines and consolidating their infrastructure, the high connectivity rates constrain the growth of the dial-up market segment. Most ISPs are waiting until the introduction of competition next year to make further major investments.

Some new plays are expected in the top box and kiosk arena, which may have a further impact on the market, for example Sansui's Mentacom WebTV has just been launched, which aims to allow viewers to send and receive e-mail, surf the Web or to conduct banking transactions - while watching television. An exclusive alliance with Netactive will allow users to subscribe and receive full Internet access for US$10.6 a month. The contract ties the user into a 12-month subscription.

4.13.2 New developments in the Internet market proposed by ISPs

Respondents were reluctant to disclose their own plans but generally pointed to access devices that will hit the market within 18-24 months that allow quicker downloads such as palm devices, DVD downloads, etc. Satellite access to the Internet would permit increased volumes being carried. Changes to ISDN and 128k pricing in the country being spoken of would also make them more affordable resulting in the greater usage of Internet.

Respondents suggested that costs of software and hardware are expected to drop. While respondents had been optimistic about the market opening up as soon as

Telkom's exclusivity expired, recent policy proposals for only one other PSTN operator and no further competition in the services market had made them more pessimistic. Service providers also looked forward to more bandwidth through new technologies such as DSL. However, while Telkom is testing ADSL, there is unlikely to be deployment of this in the foreseeable future, given the heavy investment it has put on ISDN technology. It is suggested that it will need to recoup some return on such investments before considering wide scale deployment of DSL technology.

Mobile connectivity is still seen as a major opportunity in the light of the astronomical growth of wireless telephony in Africa and South Africa in particular. While WAP has not performed as well as it was expected to there is considerable support for future broadband wireless mobile applications. It is expected that the situation will change for the better when more functional technologies hit the market. Creating a strategy to bring rural communities and educational institutions online through cheaper wireless and satellite application is a major focus of Government currently.

4.13.3 Beneficial Policy Changes proposed by ISPs

Service providers argued overwhelmingly for the deregulation of the telecom market so that ISPs can source bandwidth from other providers than Telkom. Increased competition it was argued would improve market efficiency and therefore pull down charges. The legalisation of Voice over Internet Protocol to provide big bandwidth consumers with economies of scale was also emphasised. Some respondent argued that as the dial-up consumers make up a tiny proportion of the market efforts to grow the market should focus on the corporate market that accounts for over 90% of the Internet revenue. Reduced Telkom charges were seen as a major deterrent of Internet take-up. By and large flat rates are preferred to variable rates.

5 Conclusions

South Africa's relatively advanced information infrastructure and wide range of proactive ICT policy initiatives could serve as a model for the most of the African continent and for developing countries. At the same time, the infrastructure needs expansion into the rural communities that were historically disadvantaged in order to bridge the 'digital divide' that characterizes ICT growth and use in the country.

Aside from this, the relatively high level of industrialisation and size of commercial sector (a feature not unconnected with the previous regime, but now with its own dynamic) has had a variety of direct and indirect impacts on the provision of ICT services. For example, largely due to competition for the high volume of business traffic, cellular telephony is now widespread even in remote areas of the country, and coverage extends to over half the population. Although costs are still high, the subsidised call rates for predominantly poor rural communities imposed on operators by the licensing policies has made cellular telephony more affordable, resulting in rapid growth and expansion of the network to hitherto remote parts of the country. But if the size of the business market and resulting profit potential had not been so great, the cellular operators may not have rolled out such an extensive network so quickly, or agreed to subsidise rural callers.

Similarly, the large banking sector has promoted access in remote areas where bank branches are now connected in real-time via satellite and the banks routinely train rural account holders in the use of automatic teller machines. Mobile ATMs are also in use to pay illiterate pensioners using palm recognition systems. Also, the large market for satellite television services in South Africa provided sufficient commercial justification for PanamSat to establish digital broadcasting services aimed at the country, and this has also had a spin-off in rural areas and other SADC countries where satellite dishes are now a not uncommon sight, even in informal settlements. The recent launch of Internet services via this medium has provided further opportunities for access in rural areas that would have otherwise been unavailable.

Although the country has dropped out of the top-20 countries worldwide when ranked by Internet usage, at 4%, with some 70 – 80 ISPs, about 750 000 dial-up subscribers and an estimated 2 million users, the South African Internet market is still the largest with the highest per capita penetration in the continent of Africa. At a monthly rate of US$15 or less for unlimited dial-up connectivity, the cost of Internet subscription is not unreasonable. However, the fact that these charges are exclusive of telephone connectivity, which is paid directly to Telkom, and that the extra charges could be as high as US$31.25 for a 20-hour monthly connectivity, accounts for the high cost of Internet access and limits considerably its affordability. A free ISP backed by one of the major banks (ABSA) has recently attracted a large number of subscribers, and although this may reduce the cost burden for some users, the local call charges are still likely to discourage use amongst the broad mass of the population.

There was a general perception amongst the industry players interviewed that Internet prices are 4-5 times higher than they are in comparable economies. There was also a general agreement that they could be brought down to international levels through appropriate regulative processes and policies that open up the market to competition. To this end, it was further observed that the proposed opening of the fixed network market to a duopoly would not bring any significant changes on current price levels.

The retention of restrictions in the proposed telecommunications policy directives on VoIP and competition in the services markets were identified as constraints on wider take-up of the Internet. Together with the extension of limitations of access to leased facilities to the proposed duopoly PSTN operators, it is believed Internet costs would remain relatively high thus deterring widespread usage.

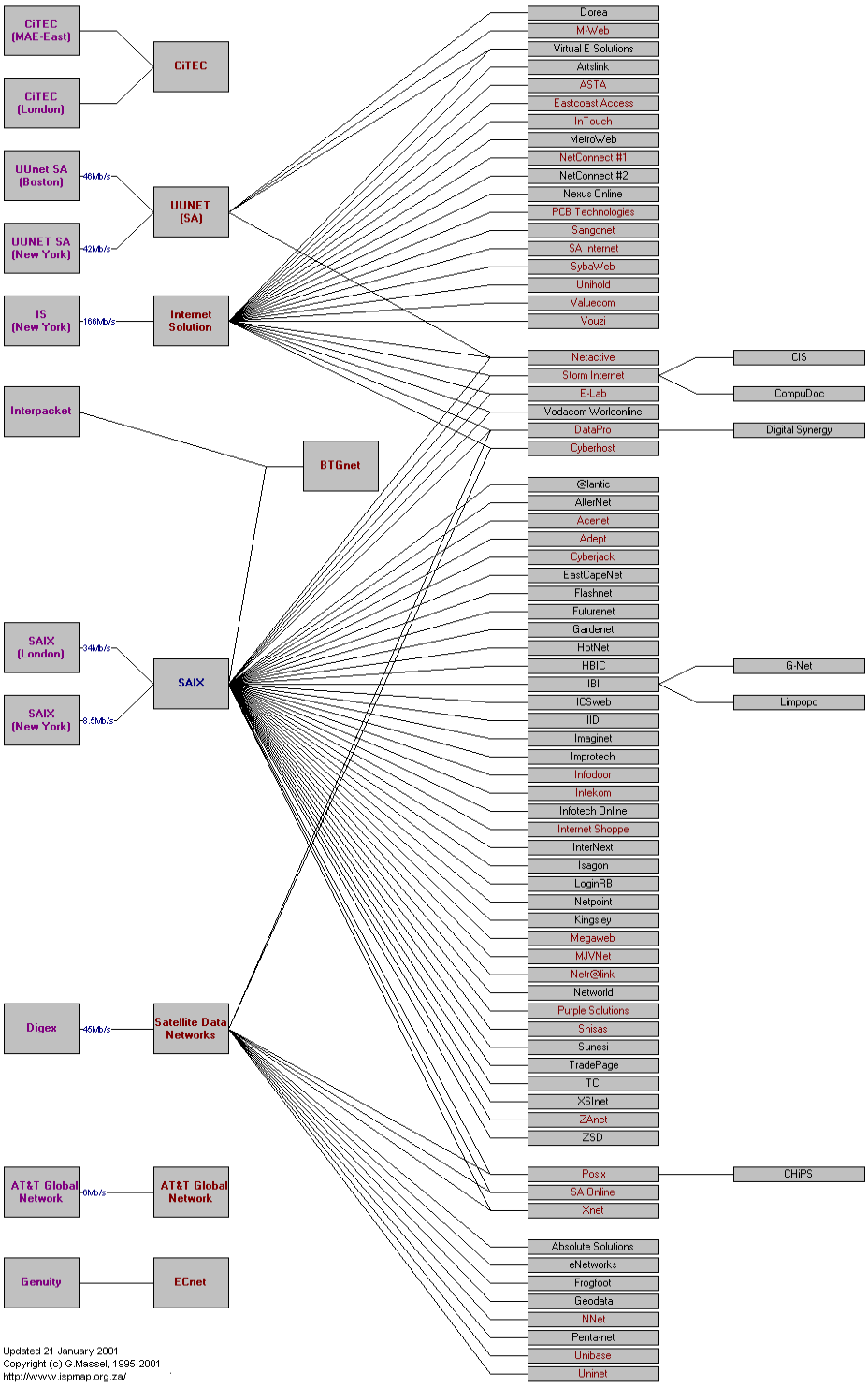


Figure 2: Map of South African ISPs