



South African Communications Market Study

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South African Communications, 2002-2008: Market Review and Analysis

Executive Summary

The South African telecommunications market is poised at a critical point in its development.

Since the 1996 Telecommunications Act, the fixed telecommunications market has been dominated by a resurgent incumbent operator, Telkom, while the mobile market has seen the launch of a third operator and rapid growth in users.

It has been a seven-year period that has seen some notable successes.

On the fixed side, the main achievement has been the successful sale of over half of the nationalized monopoly to private investors, and Telkom's subsequent heavy investment in a modern, reliable network infrastructure. Telkom is generally seen as a highly successful company that offers a good level of service to most subscribers.

On the wireless side, South Africa has witnessed a spectacular growth in users, far beyond original expectations. Despite high levels of income inequality, approximately 37 percent of South Africans now have a mobile phone.

In broadcasting, South Africa has seen the continued success of pay TV and a high proportion of digital subscribers among higher-income groups.

One consequence of these developments is that South Africa spends a relatively high proportion of GDP on ICT, and the sector as a whole has been a notable economic success story.

However, this progress need to be balanced against some major challenges on the road ahead.

First, the number of fixed lines has stagnated, for several reasons. A planned expansion in the Telkom network, though initially successful, failed to achieve a lasting increase in the number of connected lines; and a program to issue licenses to independent operators in underserved areas remains largely unimplemented. Real increases in the cost of lines and local calling probably contributed to this reversal.

Second, VANs and ISPs believe that the current regulatory environment is making it difficult for them to meet all of their business goals. The cost of many basic resources such as DSL, leased lines, and international telephony are all potentially obstacles to the positioning of South Africa as a leading location of advanced ICT services, and there is a clear need to enforce existing legislation and competition law more effectively.

Finally, the South African Internet is falling behind that of peer countries on most measures. In particular, dial-up penetration and usage is growing only slowly, if at all; and broadband has made little progress, especially in the residential market. Again, high cost is clearly a major factor in this stagnation.

These conclusions are supported not only by our own research, but also by research conducted by NGOs such as the ITU. The ITU recently placed South Africa 78th on its Digital Access Index, below peer countries such as Poland, Hungary, Czech Republic, Brazil, Mexico, Chile and Malaysia. The ITU noted that South Africa had fallen more than any other country but one among the 40 countries that it has previously surveyed in 1998.

The period from 1996, when Telkom was licensed, to 2004 when the SNO should at last begin operations, should therefore be regarded as a specific era that is coming to an end. A new era is now beginning. As well as the SNO, a third operator, Sentech, has begun to offer multimedia services to some subscribers. And the DoC recently presented a new Convergence Bill to Cabinet, with the aim of passing the bill into law in early 2004.

The question now is: should more be done to encourage the development of the market? Are the changes that have already been made or proposed sufficient to ensure that the ICT sector acts as a stimulus to the South African telecoms market and economy?

Pressure for further changes has three main sources:

- *A sense that convergence between different ICT sectors, driven by across-the-board digitalization, requires a rethink of key aspects of the current regulatory regime;*
- *A sense that the South African economy will be boosted by a more competitive environment in the ICT sector;*
- *A desire to improve access in general, and specifically in under-served areas, many of which still have penetration well below 5 percent.*

The Impact of Convergence

Convergence has many meanings. While its importance is undisputed, its effects and implications are not always clear, especially for regulation and policy. In this report we try to clarify some of those issues and identify what is real and what is now.

Section I of this report looks at three key aspects of convergence:

- *Convergence between broadcasting and telecommunications;*
- *Convergence between fixed and wireless services; and*
- *Convergence between voice and data, especially in the business market*

Broadcasting and telecoms

Convergence between broadcasting and telecommunications has been driven (as it usually is) by technology, and by the digitalization of content. Most importantly, a variety of new technologies have made it much easier to deliver digital entertainment (video, audio and games) via the Internet. These technologies include new digital compression schemes, video and audio streaming, and broadband access networks. Emerging technologies, such as wireless home networking, will strengthen the trend.

These technologies have in turn enabled service providers to create and offer residential broadband services, one of the most striking success stories of the past two years in telecommunications. In many countries, broadband residential penetration doubled in 2002 and will double again in 2003. In high-income countries, average penetration is already over 10 percent of households, and will reach 25 percent or more by 2007. This

major change is the main driver for convergence between broadcasting and telecommunications.

On the other side of the coin, meanwhile, digital TV has enabled a more complex palette of services to be offered to TV owners. These include a range of interactive services, including Internet-based services such as Web browsing and email.

The two industries, broadcasting and telecommunications converge and compete at the boundary where Internet-based on-demand entertainment meets TV-based on-demand services, personal video recorders and similar technologies that deliver entertainment more flexibly to consumers.

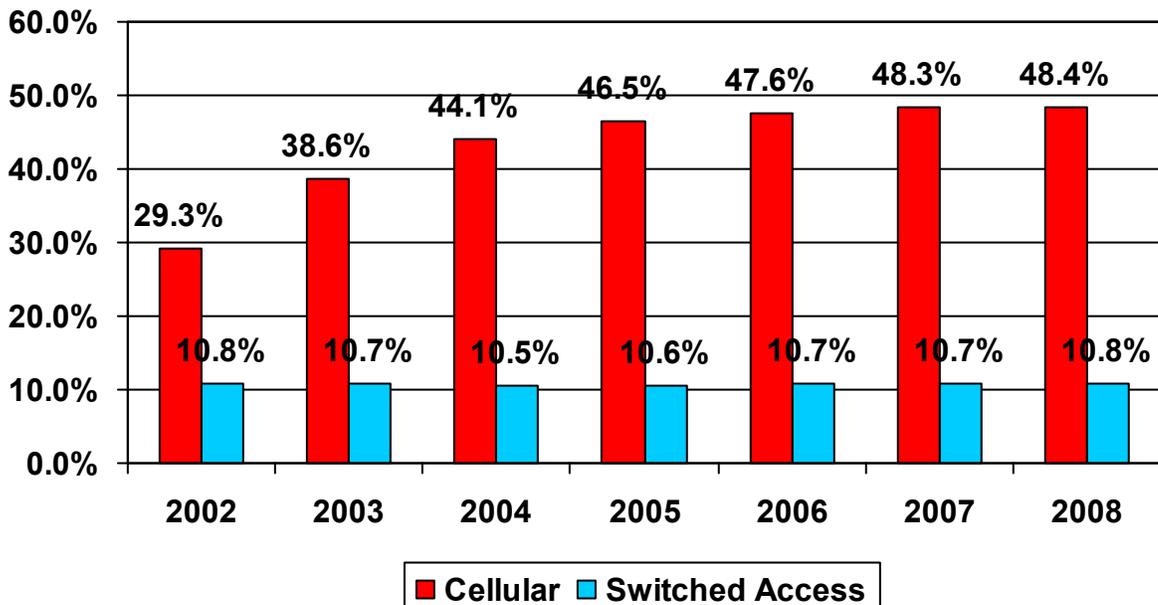
Despite these advances, convergence between broadcasting and telecommunications is at an early stage in its history. For all the hype, it is still the case that most audiovisual entertainment is consumed via conventional broadcasting and off-line media (CDs, videocassettes and DVDs), while interactivity is largely confined to the PC-based Internet. It will take at least five years, and probably longer, for the two industries to “converge” in any meaningful sense. In these circumstances, regulators can probably afford to focus their attention in other areas, and accept that divergent regulation of the two sectors is both inevitable and acceptable at least through the next five years.

Fixed and wireless

Convergence between fixed and wireless communications is also being driven predominantly by technology advances. For several years telecommunications companies have heralded the dawn of a new era when fixed and wireless networks would be tightly integrated, delivering seamless access to the same communications services and content irrespective of the access network or terminal used. But this vision is still not even close to becoming a reality. The truth is that convergence of fixed and wireless voice telephony will be a limited force in telecommunications markets over the next five years. Instead substitution of voice traffic from fixed to mobile networks will accelerate. This will lead to Mobile Network Operators (MNOs) becoming the dominant providers of voice telephony services (see Exhibit E1).

Exhibit E1: Population Penetration of Cellular and Switched Access, 2002-2008

Source: The Yankee Group, 2003



*There is more cause for optimism surrounding convergence of fixed and mobile **content** services. This will be driven less by technology convergence (though there will be some) and more by convergence of commercial business models and the content itself. Fuelled by more commercial success, we will see many established and influential content players become serious about their mobile content offerings. Working in partnership with MNOs, they will drive closer integration between their fixed and mobile content businesses. For similar reasons, we will also see some convergence of wireless and fixed Internet services. Whether through WAP-based applications on mobile phones, or via cellular data cards connected to laptop computers, wireless technology will increase Internet usage, and will drive some convergence with the fixed Internet world.*

In the long-term, convergence between broadcast services and mobile communications will also impact the way people consume content. It is possible to envisage a time when almost all broadcast services will have an interactive element. In many cases this interaction will be provided via mobile devices.

In summary, the wireless industry is already converging with several other industries. This convergence is occurring at different levels within the vertical value stack, from networking technology, services and applications, to end-user terminals. However, the source of the convergence is somewhat surprising. We are not seeing widespread convergence of fixed and mobile networks. There is some, but it is limited and it has had only marginal commercial success. The real source of convergence is between the wireless industry and other parallel industries like entertainment, news, imaging, Internet services, and a wide range of content businesses.

Unlike fixed/mobile convergence, this new convergence is already delivering commercial success, and it is changing the way people behave. *It is convergence based on a natural fit between previously distinct digital technologies and services, and not on a forced marriage of unsuited partners. It is convergence driven by real commercial opportunities, and not by little more than technology discontinuities. It is this convergence that industry players and regulators should focus on if they are to benefit from the full range of opportunities that will be presented by the wireless industry over the next five years.*

Voice and data

*Convergence between voice and data networks is perhaps the major driver for change in the global fixed telecommunications market. The reasons: operational efficiency and customer demand - the paramount drivers for fixed telecoms operators in the pragmatic 21st century. Within the operator, the collapse of different network elements and infrastructures into a single platform supporting voice and data services made the network much easier to manage. More importantly infrastructure convergence is set to halve existing operational costs, according to some operators that have already initiated a move to full migration. **More than 80 percent of major operators outside South Africa have clear plans for migration to a converged IP-based infrastructure.***

Within the business, there is also a drive toward convergence, focusing on collapsing separate voice and data infrastructures. By integrating voice and data into a single corporate backbone, enterprises are, like operators, achieving operational efficiencies. New services arising from convergence are expected to be profitable for operators due to internal operational cost savings, but also their greater sophistication. A key revenue driver in both developed and emerging markets is the IP VPN, which supports integrated

voice and data across a multiplicity of classes of service. Globally, IP VPN revenues are growing at a CAGR of 37 percent between 2002 and 2007. Another service tipped for massive adoption is hosted IP centrex solutions, a service reliant on voice over IP. This is because such services free enterprises from upfront costs of equipment purchases, ongoing maintenance and the business of handling moves, adds and changes.

The rationale for convergence within the operator is coupled with customer demand for new services reliant on next-generation infrastructure. In the consumer market, uptake of interactive content depends on a transport infrastructure that supports differentiated, high-fidelity delivery. In the business market, future profit margins are linked to operators' ability to prioritize network traffic by type, time of day and also by individual user. The ability to allocate different classes of service according to different business activities reliant on wide area communications is highly prized. Indeed, decision making within enterprises on communications services is driven by the demands that business processes and applications make upon networks. In addition, this applications-centered view of the world means that network operators must become increasingly familiar with IT infrastructures and services. This has led to convergence on both a commercial and operational level of IT and communications services, as the delineation between IT and communications functions blur.

What Does It Mean For South Africa?

Convergence has naturally attracted much attention recently in South Africa because of the publication of the Convergence Bill and its approval recently by Cabinet.

However, it is not the only way of looking at the market, and not all of the issues facing the country and the sector can be focused through the lens of convergence. While convergence often makes reform a more urgent priority, it must be seen as just one factor in a larger and more complex picture.

In **Section II** of this report, we analyze the current South African environment, highlighting both achievements and challenges, and in some cases comparing South Africa's situation with that of some of its peers.

This analysis raises the following key issues:

- The consumer fixed line market is flat on most measures, and significant innovation and reform will be required if the sector is to make any progress in penetrating lower income households. Rises in the cost of line rental and local phone calls are among the factors that are discouraging use.
- Broadband has made little progress, either in the business or consumer market. The high price of broadband is clearly a significant factor, and broadband is dominated for now by a single supplier, Telkom, though a second, Sentech, has now entered the market.
- The wireless market is generally in good shape. Despite limited regulatory intervention, real competition exists, and this has led to real choice for consumers. South Africa's MNOs are delivering significant social benefits for the country, both in terms of the services they offer and the employment opportunities they created.

- *Data service markets continue to grow, but largely to the incumbent's benefit. The absence of separate pricing for retail and wholesale services in particular means that competitive operators continue to struggle to build margin into the limited services that they can provide. Indeed, the 'Network Services' in the VANS market appears to be largely limited to the IT services and the wide area telecommunications services are sold as a loss leader.*
- *The current focus of competition lies in the provision of services to the larger business market. With pockets not as deep, South Africa's small, micro and medium-sized enterprises (including sole traders), whose interest in the Internet is growing, cannot afford to take up some of the services on offer - including newly-launched DSL, which remains an expensive option for most.*
- *In summary, there is strong evidence that further clarification of communications policy and enforcement of regulation is required if South Africa is to make better progress over the year or two.*

Our analysis suggests that there is ample scope to improve on the current situation by implementing and enforcing existing legislation to address the following issues:

- *Licensing implementation delays and non-transparent processes*
- *Access and Interconnection arrangements lacking detailed legislative criteria and comprehensive guidelines*
- *Inadequate regulation and control of Telkom's retail pricing*
- *Universal service policy unmatched with clear funding and implementation mechanisms and a well-equipped implementation agency*
- *Inadequate enforcement of anti-competitive conduct provisions and rules*
- *Regulatory structure compromised by dual responsibilities of the sector regulator and the Ministry of Communications*

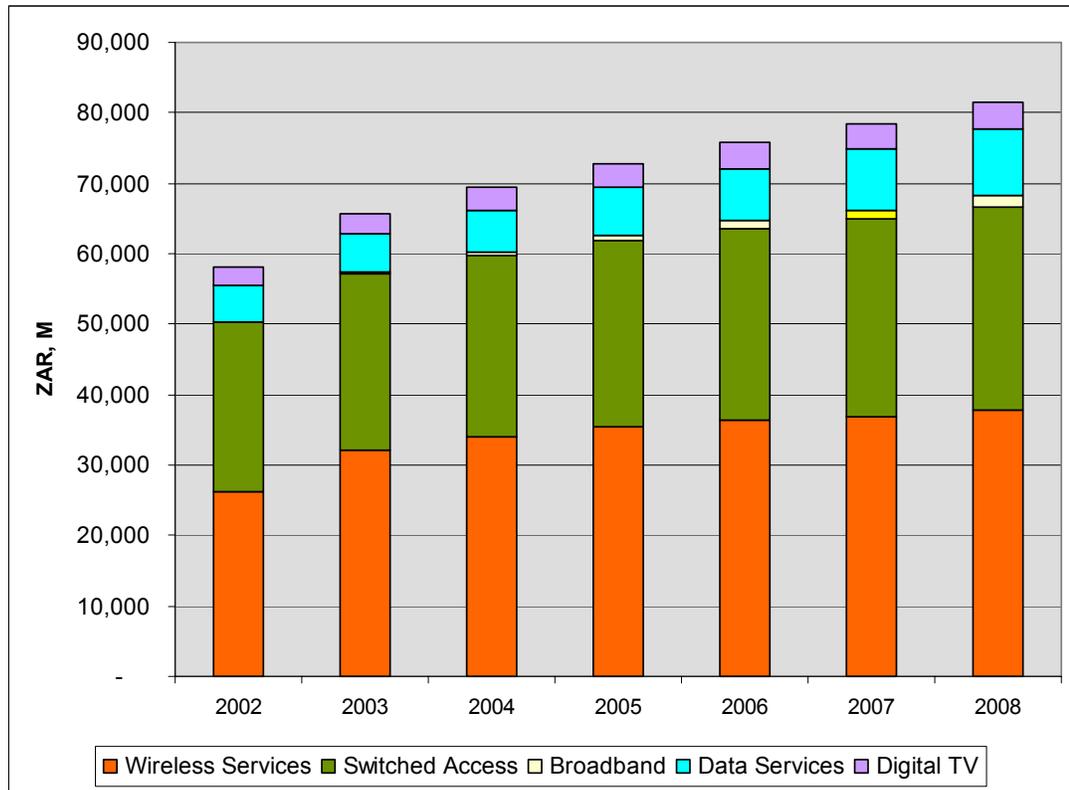
Section III of the report builds on the material presented in section II to create a set of forecasts for the South African market (see Exhibit E2).

In general, we do not expect to see very rapid growth in the market. Some markets are more or less saturated or will become so during the period of this review, and pricing will come under greater pressure than hitherto. New markets such as broadband will grow only slowly.

Exhibit E2

The South African Communications Market, 2003-2008

Source: The Yankee Group, 2003



Moving Things Forward: Scenarios for Change

On the basis of our analysis of major issues in convergent communications markets and technology, and our analysis of the current situation in South Africa, **section IV** of the report presents a three-stage program for policy makers to consider going forward.

In Phase 1, assumed to be implemented during 2004, no major changes are made beyond those already agreed or written into existing legislation. However, existing rules are clarified and enforced to preserve and enhance competition in those markets that are subject to competition; and the liberalization measures already envisaged in the existing legislation are fully implemented. The strategic objective is to create a period of stability for existing stakeholders, while at the same time ensuring that business users have more choice and residential access is extended where possible.

Phase 2 considers a set of further changes to the existing rules to create a more distinctively competitive environment. The strategic objective in this case is to **significantly** increase choice and to subject the incumbent to oversight in areas such as cost accounting and pricing that is more in line with international practice, in order to lower prices across the board, especially in the business market.

Phase 3 would entail more ambitious measures to create a much more competitive environment. The strategic objective in this case is to position South Africa

as a leading environment for ICT services by encouraging much more vigorous competition and much more robust oversight of Telkom's activities.

If nothing else, it is essential that policy makers fully implement the package of reforms agreed in 2001, and ensure that competition rules and ancillary reforms in areas such as interconnection are fully enforced.

Beyond that, determining how and when to implement the phased approach set out in the final section report ultimately depends on a subjective view of what is most important for the sector, its players, its customers and the country as a whole. The first phase would create some stability for the sector's players after a period of uncertainty about the next stages in reform, and it would enable the SNO to properly establish itself before further changes are made. It would also create a more fertile environment for other players such as VANs and ISPs. The second phase would take things a step further, and potentially bring South Africa ahead of major international peers such as Brazil, Mexico and Poland. The third phase would signal to the world that South Africa intended to be at the forefront in global ICT service development; it would entail some significant risks, especially for the existing providers, but also potentially the greatest rewards for South Africa in the long run.

Ultimately, the decision on how to move things on is a political one and must be taken after proper consultation with all interested parties—not just existing industry players, but also the wider business and social community. The key objective, however, whichever path is chosen, is to set in stone a clear, prioritized set of objectives that are pursued consistently, regardless of the vicissitudes of the day and the changing priorities of sectoral interests.

Table of Contents

The Impact of Convergence	2
What Does It Mean For South Africa?.....	5
I. Convergence: Theory and Reality	13
A. Convergence of Telecommunications and Broadcasting.....	13
1. Technological Convergence.....	13
i/ Introduction.....	13
ii/ Telecommunications network protocols	14
iii/ Digitization of audio and video content.....	15
iv/ Digitization of broadcasting.....	15
v/ Home Networks and Consumer Electronics	15
2. Regulatory Convergence.....	17
3. Market Convergence	19
4. Applying the Trends in South Africa	22
B. Convergence of Fixed and Wireless Communications	23
1. Introduction	23
i/ Fixed and Wireless Voice Telephony	24
ii/ Fixed and Mobile Content	27
iii/ Fixed and Wireless Internet	30
iv/ Broadcasting and Wireless.....	30
v/ Different Wireless Technologies.....	31
vi/ Wireless Voice and Data.....	32
vi/ Summary of Convergence Trends.....	32
3. Applying the Trends in South Africa	35
i/ Fixed and Wireless Voice Telephony	35
ii/ Fixed and Wireless Content.....	36
iii/ Fixed and Wireless Internet.....	36
iv/ Broadcasting and Wireless.....	36
v/ Different Wireless Technologies.....	36
vi/ Wireless Voice and Data.....	37
C Convergence of Fixed Voice and Data Services	37
1. General Discussion of Global Trends	37
i/ Introduction.....	37

ii/ The Revenue Mix is Changing	39
iii/ Convergence between IT and Telecoms is also a Factor	39
2. Technological Convergence	39
3. Regulatory Convergence	42
4. Market Convergence	44
i/ The Global Business Market	44
ii/ The Global Consumer Market	46
5. Summary	47
6. Applying the Trends in South Africa	47
D Broadband Access Network Technology: Development and Impacts	49
1. Introduction	49
2. DSL	49
3. Cable Modem	51
4. Optical fiber (FTTH)	51
5. Satellite Services	52
6. Powerline	52
7. Broadband Fixed Wireless, Wi-Fi and Wi-Max	53
F Transport Network Technology: Development and Impacts	55
1. Drivers for Growth in Transport Networks	55
2. Services that the Next-Generation Transport Infrastructure will Support	55
3. The Drive for Network Simplicity	56
4. WDM: Ensuring Fiber Efficiency to Meet the Hunger for Bandwidth	57
5. The Emergence of Carrier-Class Ethernet	58
II. A Review of South African Communications: The Current Situation	60
A. The Current Market By Revenues and Subscribers	60
1. Consumer Fixed Line and Media Market	60
i/ Market Overview	60
ii/ The Consumer Switched Access Market	60
iii/ The Consumer Broadband Market	62
iv/ Subscription TV	64
2. Wireless/Mobile Communications Market	65
i/ Introduction	65
ii/ Subscriber Base	65
iii/ ARPU	68

iv/ Active and Inactive Subscriber Bases	69
v/ Usage.....	70
vi/ Carrier Positioning	70
vii/ Mobile Data Services.....	72
viii/ Community Service Telephones (CSTs)	73
ix/ Competitiveness	74
3. Business Fixed Line and Data Communications Market	75
i/ Existing Business Customers	76
ii/ The Informal Sector	80
B. The South African Regulatory Environment	82
1. South Africa’s Phases of Liberalization.....	83
i/ Phase I - Telecommunications Act 1996	83
ii/ Phase II - Telecommunications Amendment Act (64 of 2001)	83
iii/ Phase III - Convergence Bill, 2004.....	86
2. Deficiencies of the South African Model.....	87
i/ Licensing Delays and Conflicts over License Rights	87
ii/ Spectrum Allocation and Wireless Licensing Delays.....	88
iii/ Access and Interconnection to Facilities	89
iv/ Price Regulation.....	89
v/ Universal Service	90
vi/ Unchecked Anti-Competitive Behavior.....	91
3. South Africa’s Regulatory Structure	92
4. Comparing South Africa’s Model with Global Norms	94
5. Recommendations	98
C. Key Players in the South African Market.....	98
1. Fixed Telephony and TV.....	98
i/ Telkom SA	98
ii/ Sentech.....	104
iii/ M-Web.....	108
iv/ Tiscali.....	109
v/ SABC	110
vi/ MultiChoice SA	113
i/ Internet Solutions	116
ii/ Transtel Profile.....	119

3. Wireless/Mobile Service Providers	124
i/ Cell-C	124
ii/ MTN.....	129
iii/ Vodacom.....	138
III Forecast for the South African Communications Market	149
A. Business Fixed Line Market	149
1. Broadband Market is Set for Growth	150
C Wireless/Mobile Communications Market (WME)	160
IV. Conclusions and Implications for Regulatory Policy	168
A. Phase One	168
Introduction	168
1. Implementation of Existing Legislative Provisions	169
2. Review of the Implications of Implementing Certain Provisions within Existing Legislation and Regulatory Guidelines	171
3. Establishment and Implementation of Thorough Market and Competition Review Processes	173
4. More Stringent Enforcement of Existing Anti-competitive Conduct Provisions.....	173
5. Increased independence of ICASA	174
6. Initiate a Process to Clarify National Policy and Set a Liberalization Plan and Time Frame.....	175
B. Phase Two.....	175
C Phase Three:	178
D. Conclusions and Summary Remarks	180

I. Convergence: Theory and Reality

Convergence has many meanings in technology markets, but for the purposes of this research, three are central:

- Convergence between broadcasting and telecommunications;
- Convergence between fixed and wireless networks and services;
- Convergence between voice and data networks, especially in the context of corporate networks.

Their effects on market development differ, but all are driven by two primary forces: digitalization of networks; and the emergence of IP as a unifying protocol. These powerful forces make technological convergence very attractive, but as we shall see there are many obstacles in the way of truly convergent applications, and it will take years for these fundamental changes to play out.

In principle, convergence can have one or (usually) more of the following effects. It can:

- reduce the cost of existing applications
- allow development of converged applications that have a greater functionality
- enable wider access to existing applications and content
- enable entry by competitors into previously closed markets
- disrupt the business models of existing service providers, especially well-established service providers
- disrupt or obsolete existing regulation and regulatory concepts

This chapter looks at the evolution of the telecommunications market through the lens of convergence. However, it is important to keep in mind that this is not the only way to characterize the changes currently taking place in the markets and technologies. In sections D and E of this section, we look more generally at major changes in technologies that are having an impact on both market and regulatory development.

A. Convergence of Telecommunications and Broadcasting

1. Technological Convergence

i/ Introduction

At the **infrastructure** level, technological convergence between telecoms and broadcasting is being driven by improvements and changes in network technology—for the most part, **telecommunications** network technology.

At the transport level, most broadcasting networks have been run separately from public telecommunications networks. However, there has been a gradual and largely uncontroversial convergence between these networks. In some countries, the broadcasting network has been divested and is being used as a general purpose telecommunications network. Meanwhile,

enormous improvements in fiber optics have encouraged migration of broadcasting traffic onto optical fiber networks. However, broadcasters also make heavy and specialized use of satellite communications both for transmitting programming between head-end sites and for distribution to consumers and this remains largely separate from mainstream telecommunications.

The blurring of the boundaries between broadcasting and telecommunications in the **access** network is much more controversial and potentially more important in the longer run.

Two changes in access technology are particularly important:

- Improvements in the performance of **twisted pair local loops** used in the PSTN. Current generation DSL allows delivery of up to 4Mbps download speeds. With current generation video compression, this enables the delivery of high-speed Internet **and** one medium-quality video channel; or one high-quality video channel. Next generation DSL will improve this performance. VDSL and ADSL2, both of which are now available, will allow delivery at 10Mbps or more, which will allow high-quality broadcasting and high-speed Internet into the home.
- Development of **alternative access technologies**, especially **optical fiber** and **broadband wireless**. Optical fiber has the highest capacity of any access technology, and can easily handle multiple high quality video streams into the home. Although there are still only a few million homes connected by fiber worldwide, interest in the technology is growing. Broadband wireless technology is improving fast, and could potentially offer the best ratio of cost to functionality. Other technologies, including **two-way satellite** and **powerline** are capable of providing certain converged service packages via a single technology. **Hybrid** technologies that typically rely on two technologies – for example coax and fiber, satellite and wi-fi, and fiber and wi-fi, also have growing appeal in some situations.

At the same time broadcasting of TV is also undergoing important change. TV is broadcast via three platforms: cable TV; satellite TV; and terrestrial TV. In developed countries there has been a slow drift away from terrestrial TV towards satellite and cable TV, often accompanied by an increase in ARPU. Cable TV offers an interesting instance of technological convergence in the access network, since most providers in Europe and the US offer cable TV and Internet access, and many also provide voice telephony.

These important technology developments are discussed in greater detail in section I.E below.

Most broadband networks will be technically capable of providing video entertainment services, including conventional television, within the next three years

ii/ Telecommunications network protocols

At the **network services** level, technological convergence is being driven largely by the spread of IP. IP enables video to be delivered over the Internet in various formats, such as multicast video, streaming video, video on demand and related music or audio services. Although IP was not originally developed to handle video, some of the major technical problems in delivering video have been resolved. The main issue that faces those offering video is that IP is a packet protocol that splits up the bitstream, but video must be delivered as a continuous stream in the right order. However, this issue has been resolved to some degree in two ways: first, by allowing users to download the entire video before viewing it;

and second, by using streaming protocols that ensure that the bits do arrive in the right order and adjust the bit rate and compression used to suit prevailing network conditions.

The emergence of IP networks that include Quality of Service (QoS) features, especially Class of Service, will improve performance further and make it easier for IP network owners to charge a fee for video services. In particular, MPLS (already widely used in corporate networks) could also be used in consumer-oriented video networks to improve the performance of video streaming.

Despite these improvements, the quality of video streamed over the Internet (as opposed to downloaded video) is subjectively far lower than the quality of orthodox video delivered via TV or DVD. The solutions to this problem lie less with the IP protocol itself and more with bandwidth. Despite all the work on QoS, **adequate, low-cost bandwidth** from end to end remains the single most important means of improving video quality, and this is likely to remain the case for the foreseeable future.

iii/ Digitization of audio and video content

At the **applications** level, developments in the way that video is coded are important. Most importantly, more and more video is now delivered to consumers in digital format: digital TV channels, the very rapid spread of DVD formatted video and CD music, and content delivered over the Internet via legitimate and illegitimate (peer to peer) networks are all helping to increase rapidly the proportion of content that is delivered in digital format. Internet video is typically coded using the MPEG2 standard, which allows DVD-quality video at 2-4Mbps, and VHS-quality video at 512kbps-1Mbps. However, the next-generation of compression technologies, MPEG4 and WIN-9 will considerably improve this performance, enabling DVD-quality video to be delivered at less than 2Mbps. These technologies are beginning to emerge in commercial products, and will be widespread in two years' time. This will greatly increase the potential of video over broadband as a commercial service.

In audio, most content is coded using MP3, which is inferior to CD quality but has nevertheless taken a significant share of the market because much of the content is available free.

iv/ Digitization of broadcasting

Digitalization of all public broadcasting is a policy goal in most developed countries. The main benefit of digital broadcasting is more efficient use of radio spectrum, and more channels for consumers. However, digitalization also allows delivery of a wide range of interactive services, making broadcasting a bit more like the Internet or like conventional point to point telecommunications. Digital TV usually includes a back channel via the set-top box that allows simple interactive applications such as voting and shopping. However, some channel and multiplex owners also enable applications such as TV-based email.

v/ Home networks and consumer electronics

Technical developments in the **home** are also becoming important. In advanced markets, customers buying broadband also typically buy a home network if they have more than one PC or use a laptop computer. These home networks are evolving, and it is beginning to become more common for home networks to enable content that is downloaded to a PC to be shown on a TV or heard via hi-fi and audio equipment. Many consumer electronics

companies (eg, Philips and Toshiba) have commercially launched products of this type, while telecommunications vendors such as Cisco are entering in the opposite direction, adapting PC home networking gear so it works with TVs and other devices. In this way, convergence is also taking place at the level of equipment in the home.

The spread of digital consumer electronics also encourages this trend; since “bits are bits”, and suitably coded digital content can be distributed on any digital network, in principle, this kind of convergence appears to be inevitable.

Exhibit 1 summarizes the key technologies and the way in which they encourage convergence.

Exhibit 1: Technologies that Tend To Promote Convergence of Telecommunications and Broadcasting

Source: *The Yankee Group, 2003*

Technology	Description/ Examples	Effects
DSL	Digital Subscriber Line	Allows increasingly high-quality video and audio to be delivered via copper loops
Cable TV	Two-way (upgraded) coaxial network	Enables cable TV companies to deliver video either via conventional channel structure or via Internet technologies
Alternative access technologies	Optical fiber; Wi-fi and Wi-max; powerline; digital satellite	Increases the reach and (in some cases) the speed of broadband telecommunications, raising interest in telco distribution of video (especially among content owners)
Digital video and audio	CDs, DVDs, MPEGs, JPEGs etc.	Makes it easier for telcos to deliver video services
Digital broadcasting	Cable, satellite, terrestrial	Enables conventional broadcasters to deliver telecoms/Internet-like services that include interactive elements
Peer to peer (P2P) networks	Kazaa, eDonkey	Distributed networks that make it very easy to download and acquire video and audio content. Most content distributed this way is illegally copied
Digital compression	MPEG2, MPEG4, WIN-9, MP3	Improvements in video compression follow a similar curve to “Moore’s Law” so high-quality video on lower speed lines will become easier to deliver in time
Home networks	Ethernet, 802.11	Home networks are rapidly becoming cheaper, easier to use, and capable of connecting any digital device
Digital consumer electronics	DVD players, CD players, digital televisions and STBs	The all-digital home is rapidly becoming a reality, making it easier for telcos to colonize.

Bottom line: Technology convergence is happening quite quickly and is the main driver for both regulatory convergence and market convergence—both of which are happening more slowly.

2. Regulatory Convergence Between Broadcasting and Telecoms

Many nations have introduced, or are considering, a consolidated regulatory model for electronic communications. **The two major variants are combining telecommunications and broadcasting regulation or telecommunications and generic competition regulation.** This is in part in response to convergence trends across technologies, markets, services, and service providers.

Converged regulators come in all shapes and sizes, and there is no one model, or template, that nations are pursuing. Merging of transport and content regulation implies continued regulation across electronic communications - where content regulation remains necessary and enduring. On the other hand, the signal from competition and telecommunications regulator merging implies limited sector specific regulation in the future.

While convergence is certainly forcing regulatory review and realignment, it is not reducing the need for regulation. The converse is the case. Both liberalization and convergence are accompanied by an increased, and increasingly complex, regulatory role. So too, **moves towards converged regulators do not necessarily equate to converged regulations.** Different, or asymmetric, regulatory treatment of different services and operators, remains the global norm.

Despite a powerful global business and academic lobby supporting the move to apply ex post generic competition regulations to communications sectors, industry-specific models continue to dominate around the world. Globally, the major role played by generic competition regulators is in relation to merger assessments and approvals.

There is a growing trend of incorporating telecommunications and broadcasting regulation under a single regulator. While this model has been long-standing in North America (FCC and CRTC), it has been a more recent phenomenon around the world. Nations that have now taken this course include: the United Kingdom (OFCOM), France (ART), Italy, Malaysia (CMC), Papua New Guinea, Tonga, South Africa (ICASA), Malaysia, Switzerland (OFCOM), Gambia, Uganda (UCC), and Bosnia and Herzegovina (CRA). Alternatively, broadcasting regulatory mandates are vested with state governments in some nations including Germany and Belgium.

While broadcasting and telecommunications may be integrated under a single regulator, separate operational and functional divisions for both are largely maintained, as in the United States and Canada. This is in part in recognition of different regulatory objectives and requirements for content (social, cultural and public interest) and carriage or infrastructure regulation (economic and technical).

Significant debate surrounds the rationale and outcomes of merging telecommunications and broadcasting regulators. This debate focuses on ongoing differences between the two sectors and different regulatory requirements for transport access and content access. For example, the underlying basis of spectrum allocation for telecommunications focuses on economic and competition objectives, whereas social policy objectives drive broadcasting spectrum allocation. There also concerns that politically and socially charged issues related to broadcasting may lead to subordinate treatment of telecommunications issues by a merged regulator. Nations such as Singapore continue to recognize such differences between the regulation of transport and content issues and maintain a separate broadcasting regulator.

Merely establishing a converged regulatory model is no panacea for effective and efficient regulation. Structural and functional changes to regulatory arrangements must be accompanied by key ingredients that apply to the establishment of independent sector regulators. These include

- A clear and detailed legislated mandate. Clarity of regulator mandates tied to overall national objectives and legal frameworks supporting reform
 - In the case of nations merging regulators, enacting legislation to enable institutional marriage, in the absence of changes to sector specific legislation, is a major concern
 - **In the case of South Africa, this is a key issue, where ICASA was established without amending the IBA Act, the Broadcasting Act or the Telecommunications Act**
- Independence from industry and political interests in terms of agency establishment, structure and staffing, funding and day-to-day operations
 - **In this respect, the appointment of ICASA councilors by the President of South Africa is problematic**
- Clear role demarcation between regulatory bodies and government agencies
 - **The legislation authorizing ICASA is short on designating responsibilities and powers, and the demarcation of roles and responsibilities between the Department of Communications, ICASA, the Competition Commission, and the Universal Service Agency creates ongoing jurisdictional issues while undermining the transparency and autonomy of ICASA decisions.**
 - **Dual responsibilities for licensing vested with both the sector-regulator and the Minister and the ultimate role of the Minister in approving ICASA regulations severely compromise the independence and credibility of ICASA**
 - **While the Convergence bill seeks to remove these Ministerial powers, gray areas remain and the Minister would retain a role in licensing**
- Transparency of decisions and decision-making processes
 - **Non-transparent and delayed licensing processes in both the fixed-line and wireless sectors have affected the credibility of ICASA in the eyes of local industry and foreign investors**
- Transparent and participatory consultation processes
- Formal enforcement powers and sanctions, which would meaningfully curb or deter anti-competitive behavior
 - **As part of the current overhaul of communications legislation, it is highly recommended that the role of ICASA in dispute resolution and its enforcement and penalty powers be clarified and its powers strengthened**
- Appeals mechanisms and expeditious dispute resolution processes, including adequate regulator empowerment and penalties

- Forbearance clauses to allow regulators to rollback interventionist rules when competition and market changes are evidenced
- Adequate resources—financial, staff, expertise, and experience
 - **ICASA’s compromised independence is exacerbated by its lack of experienced staff and adequate financing. Inadequate dispute resolution arrangements create a further barrier to effective regulation. The effectiveness of the Universal Service Agency has been significantly compromised as a result of inappropriate staffing, an unclear mandate, and insufficient funding.**

3. Market Convergence

Have broadcasting and telecommunications begun to converge at the market level? The European Union adopted the useful concept of “relevant markets” in order to assess whether particular suppliers had “significant market power” (SMP) in a specific market. A relevant market is one with definable borders and substitutable products.

Video entertainment is not defined by the EU as a relevant market in telecommunications. The main reason for this is that, **from the point of view of the user or consumer**, video supplied via broadcast TV and video supplied via the Internet are substitutable products only at the margins, at least for now.

Exhibit 2: Differences Between Broadcast AV and Internet AV Services from the Point of View of Consumers

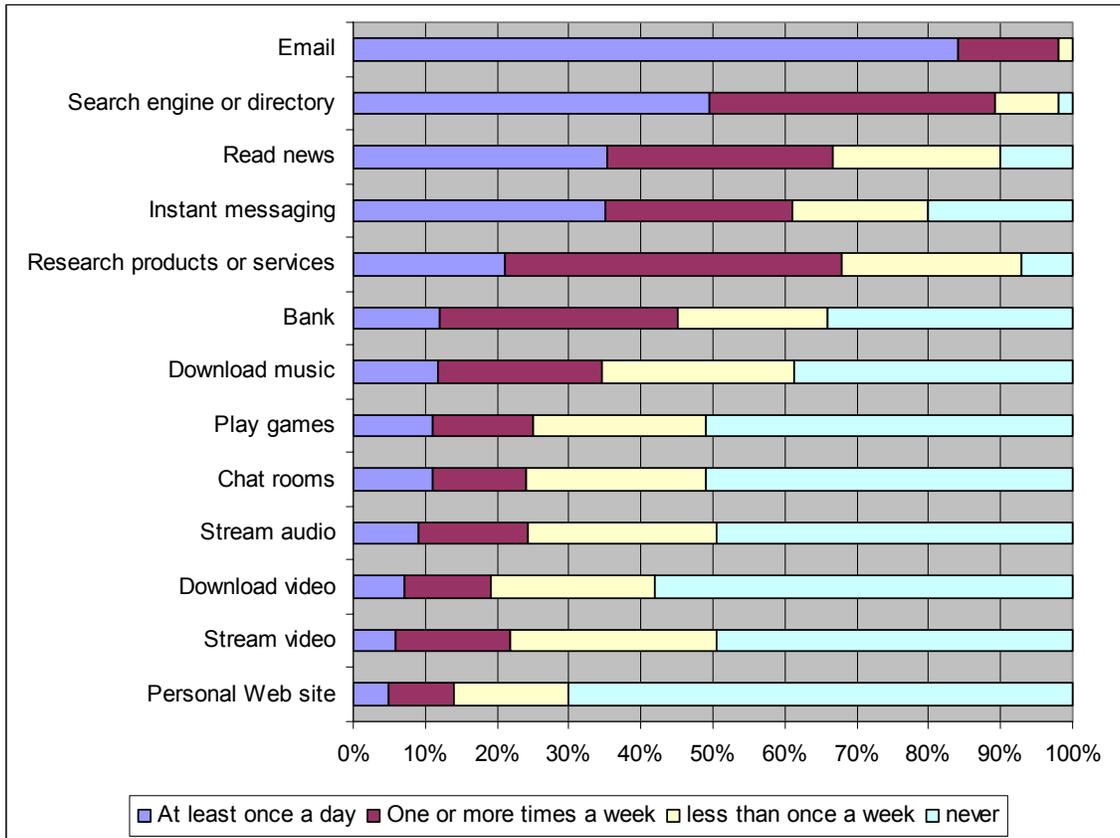
Source: *The Yankee Group, 2003*

	Broadcast AV	Internet AV
Interface	EPGs, remote control, STBs	ISP Web portals, Content owner portals, P2P engines, search engines
Terminal Equipment	TV, radio, sometimes recorded onto VHS or DVD	PC, laptop; sometimes ancillary equipment such as MP3 players, DVD players
Structure of Programming	Mostly in branded channels, though on-demand products are slowly emerging	Highly heterogeneous; no set structure. Almost all on-demand, though some is channelized as well
Type of Programming	Entertainment, movies, news, sport, documentaries, radio-based music	Pornography, pirated music, Internet radio (very wide range of channels)
Costs	Partly subsidized by advertising, but increasingly paid for per package or occasionally on-demand	Mostly free. Content is paid for indirectly in the monthly Internet fee, content
Quality	High or very high	From poor to high

Exhibit 2 shows that there are many important differences between AV entertainment delivered via broadcasting and AV entertainment delivered via the Internet. Beyond that, however, it’s important to note that the Internet is not primarily used for AV applications, even among relatively advanced populations of users. Exhibit 3, taken from the Yankee Group’s European Connected Consumer survey, shows that the most frequently-used applications make little use of audio or video content.

Exhibit 3: The Internet Is Not Used Primarily for Interactive Applications

Source: The Yankee Group, 2003

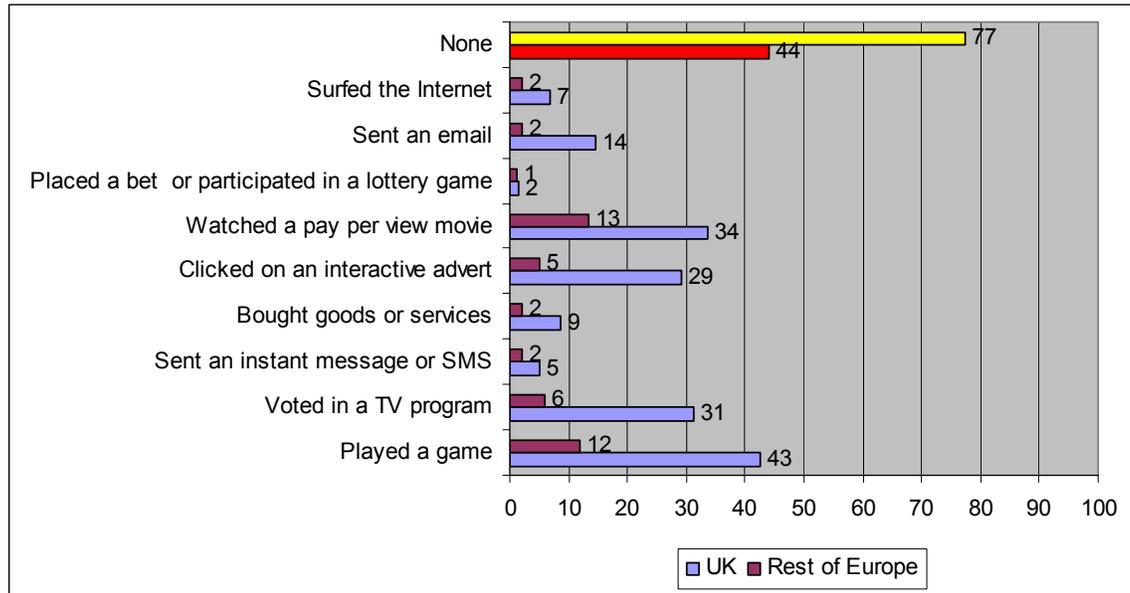


Source: The European Connected Consumer Survey, July 2003. Base: 3,200 online users in 12 countries. Question: How often do you do the following on the Internet?

The same applies to enhanced or interactive services supplied via the TV. Because these are not widely available and so far have only limited appeal, many households have never used them (see exhibit 4). Where they are more widely available, and promoted by providers, they are more heavily used—as in the UK. But even here, applications tend to be strongly associated with conventional programming, and true Internet applications are little-used via the TV platform.

Exhibit 4: The TV Is Not Used For Interactive Applications

Source: The Yankee Group, 2003



Source: The European Connected Consumer Survey, July 2003. Base: 3,200 online users in 12 countries. Question: Have you ever done any of the following using a TV remote control?

What is actually happening in practice? Telco-based video has generally made slow progress, but it is gradually spreading:

- in **Europe**, we estimate that less than 500,000 households (0.3 percent) pay for telco video delivered via IP today. The most significant provider is FastWeb in Italy, which has about 300,000 subscribers. There are smaller concentrations of customers in Germany, Sweden and other Scandinavian countries. Elsewhere, telco video is just beginning.
- in **the US**, there has been little real commercial activity to date. However, US companies dominate the provision of online entertainment, and US companies are estimated to have earned \$1.3bn from online content during 2002, and increase of 100 percent over the previous year. Online service providers such as Yahoo have also begun to make significant revenues from premium content (offered under the Yahoo Platinum brand) and other intermediaries such as RealNetworks are making progress; Real has over one million subscribers to its SuperPASS service, which offers exclusive content for \$9.95 per month.
- in **Asia**, telco video has made some progress in several countries, notably in Korea and Japan, where broadband penetration is high. In Japan, Softbank, the most aggressive broadband provider, has begun pushing broadband content... In Hong Kong, PCCW is offering pay TV to broadband subscribers, and in China the Shanghai Cable Network is offering a wide variety of content including video on demand.

Though few broadband services providers are earning much from content, there is very strong interest among telcos in supplying paid-for content via broadband. The key reasons for this interest are that, firstly, revenues from telephony or falling in all developed countries, and secondly, ARPU from broadband services is flat or declining. Most telcos

believe that “triple play” packages that include telephony, Internet access and paid entertainment will increase ARPU and reduce churn. So it is likely that there will be a strong push into entertainment over the next three years.

However, the existing providers of paid-for TV services are likely to put up a stiff fight against the insurgents. As well as having superior access to existing content, conventional TV platform providers are also moving to head off the threat posed by more flexible, on-demand packages delivered on broadband platforms. Hence Europe’s biggest and most successful pay-TV platform, Sky in the UK, is currently engaged in a multi-million-pound campaign to persuade subscribers to buy its personal video recorder (PVR) service. By locking consumers into its proprietary on-demand service, it hopes to mute any threat from the telcos.

What must change before broadcasting and telecommunications markets can be said to have converged?

- **It must be possible to use the same equipment and interfaces to watch content from either an Internet or broadcasting source.** For a variety of reasons, this is not the case today. Most video content is structured into channels and watched on TV using an EPG and a remote control; most radio content is listened to on radio receivers; most music is listened to on CD players, hi-fi equipment and radio. As noted above, the spread of home networks will break down the barriers. But it will take some years.
- **The same or similar content must be available on both platforms.** It will take some years for this happen because it requires that ISPs get access to the many kinds of premium content that are currently only available on TV, and which today is the most important content. Rights-management issues are a major barriers

In short, technological determinism is a dangerous theory in the entertainment industry. Conventional broadcasting will dominate the delivery of video and audio entertainment for the next 3-5 years, and convergence at the market level will happen only slowly.

4. Applying the Trends in South Africa

So far as the convergence of broadcasting and telecommunications is concerned, South Africa is some distance behind more mature markets, largely because residential broadband has barely begun and will grow only slowly in the next few years.

Paradoxically, the relative success of digital TV in South Africa by comparison with nations at a similar stage of economic development make it **less** likely that the two industries are about to converge. Because digital TV has made far more progress among residential subscribers than broadband, it will put Internet providers at a disadvantage in attempting to establish a new channel for paid-for entertainment.

The other related factor working against broadband as a major vehicle for paid entertainment, at least in the short term, is that most South Africans will continue to consume most entertainment at no cost—a consequence of low average incomes. Although approximately 65 percent of all South African homes are TV homes, only 7 percent of homes pay for TV. Even fewer (0.03 percent) pay for a broadband service at present. Telkom’s DSL service is

targeted primarily at businesses, and there are no paid content services targeted specifically at the South African market by other major operators such as M-Web and Tiscali

Although we expect strong growth from a low base when competition begins to emerge, only a minority of relatively affluent households are likely to have a broadband connection in the period under review (2003-2008).

This lack of progress means that major rights-owners will continue to see digital TV as by far the most important distribution vehicle for premium content. As elsewhere, there are other distribution channels such as DVD sale and rental which will also be important and which raise barriers for those attempting to establish new channels. The bottom line, again, is that convergence between broadcasting and telecommunications at the user level is years away in South Africa.

B. Convergence of Fixed and Wireless Communications

1. Introduction

Wireless communications has had a profound impact on communications markets and societies in most countries. In advanced markets, wireless communications has complemented the existing fixed telecommunications infrastructure, and has added the ‘mobility’ dimension to the way people communicate. In emerging markets, wireless has often led the way in providing many people’s first experience of telecommunications services. The impact of wireless technologies on peoples’ lives will become even more significant over the next five years. We are now seeing a number of important initiatives in the wireless industry that will lead to convergence with other services and industries. In this chapter we explore the major forces of convergence that will lead to a blurring of the lines between wireless communications and these other traditionally non-wireless technologies and services. We will examine the convergence of:

- Fixed and wireless voice telephony
- Fixed and wireless content
- Fixed and wireless Internet
- Broadcasting and wireless
- Different wireless technologies
- Wireless voice and data

In addition to this focus on convergence effects, it is important that we examine some aspects of divergence or substitution. To balance the convergence debate we will also assess fixed-to-wireless substitution effects, in terms of both voice and data services.

We will focus most on the first of the topics listed above because:

- Voice telephony is still by far the largest source of revenue for fixed and mobile operators; and
- Substitution of fixed network voice traffic to mobile networks is already having a dramatic effect on fixed and wireless markets.

i/ Fixed and Wireless Voice Telephony

Despite all of the hype surrounding mobile data services, voice telephony continues to generate the vast majority of MNOs' revenues. In Western Europe, voice telephony still accounts for over 85 percent of revenue, and we do not expect this to drop below 70 percent before 2007. In other regions like North America and Latin America the proportion of today revenues generated by voice is even higher. Similarly for fixed telecommunications operators, voice telephony is the dominant service today. With this heavy reliance on voice services, it is critical for fixed and mobile operators to take advantage of the technological advances that are making convergence a reality. At the same time, the fixed operators must understand that they are fighting a losing battle with the MNOs for voice minutes. They should explore opportunities for converged services, that leverage the success of mobile voice services, but which also boost voice minutes carried over their fixed infrastructure.

Exhibit 5 summarizes the major trends in the convergence of fixed and wireless voice services. It also lists a number of initiatives that are driving substitution of voice minutes from fixed to mobile networks.

Exhibit 5. Examples of Convergence and Substitution between Fixed and Mobile Voice Telephony

Source: *The Yankee Group, 2003*

Convergence	Substitution
Unified mailbox services	Tariffs designed to drive substitution of voice minutes from fixed to mobile networks e.g. Cellular "home-zones" like the "Genion" service offered by O2 in Germany, and tariffs offering large bundles of "free" minutes e.g. 3 in the UK.
"One Number" services	"Mobile office" or "Wireless PBX services that offer short-code dialing and reduced charges for calls between company mobiles.
Dual-mode cordless/cellular terminals and services	Wireless VPN services that provide a direct link to the MNO's network
Services that automatically redirect cellular calls made from home over the PSTN e.g. BT's "Blu phone" initiative using Bluetooth technology in the UK	Disconnection of landlines as consumers switch all voice calls to cellular.
"Limited mobility" services, offering a degree of mobility within the nearest wireless cell, but no handover between cells.	Push to talk (PTT) services that allow instant mobile voice communications. This represents another threat to fixed voice telephony
Voice over IP (VoIP) - cellular calls carried over packet-based networks.	The emergence of more 'mobile communities', particularly among young people, that are based exclusively on mobile communications.
Bundled fixed and mobile voice services	More sophisticated cellular terminals (or "Smart phones") that offer improved storage of personal contacts and PIM.
Tariffs that offer lower priced calls between the householder's home phone and their cellular phone.	Aggressive targeting of international voice traffic by MNOs e.g. Vodafone "Eurocall", which offers flat-rate international roaming charges.

One of the key questions facing all players in the voice communications business is: Which is the greater force: Convergence or Substitution? Evidence from several markets suggests only one answer: fixed-to-mobile substitution is the dominant force. Here is a summary of some of that compelling evidence:

- There are now more mobile telephones than fixed telephone lines in Europe, and in many other regions of the world.
- Between 20 and 40 percent of all European voice traffic originates on mobile networks, and this is increasing every year.
- European mobile service revenue will overtake the total fixed switched access market in 2004 (see Exhibit 6).

Exhibit 6.

European Switched Access and Wireless Service Revenue Forecast, 2002-2007

Source: The Yankee Group, 2003

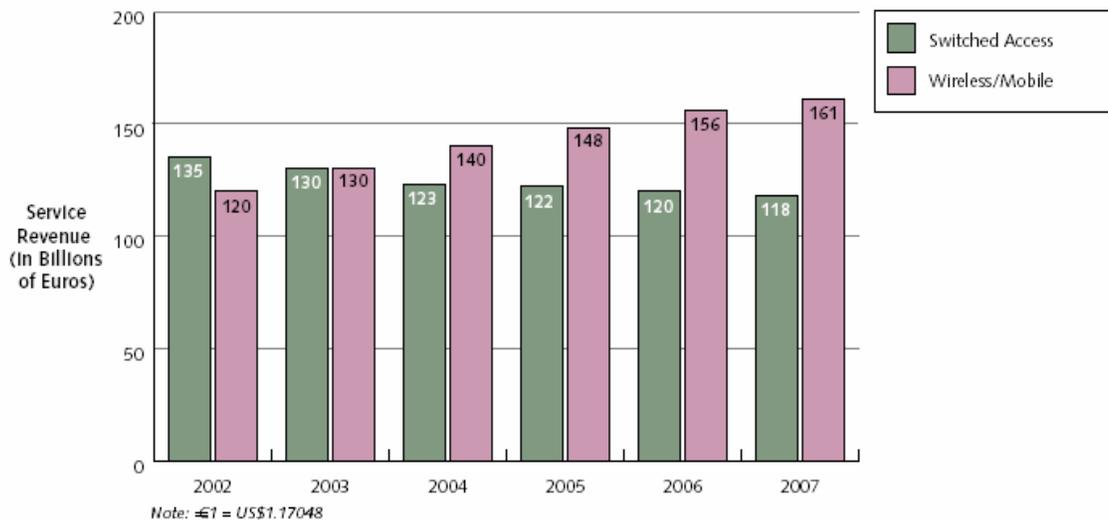


Exhibit 7 listed several of the drivers for fixed-to-mobile substitution. In summary, we can attribute this trend to a number of major developments:

- **Performance** - Digital mobile networks and handsets have improved considerably over the past 10 years. Almost without exception they now offer a consistent level of service that is acceptable to end-users.
- **Affordability** - Cellular technologies, particularly GSM, has benefited from significant scale effects. This has enabled MNOs to provide services at price points that were unimaginable 10-15 years ago. This has driven high rates of cellular penetration, which in turn has fuelled substitution of voice traffic from fixed networks.
- **Convenience** - Ultimately the success of mobile communications services comes down to the simple fact that they offer a degree of convenience that fixed networks cannot

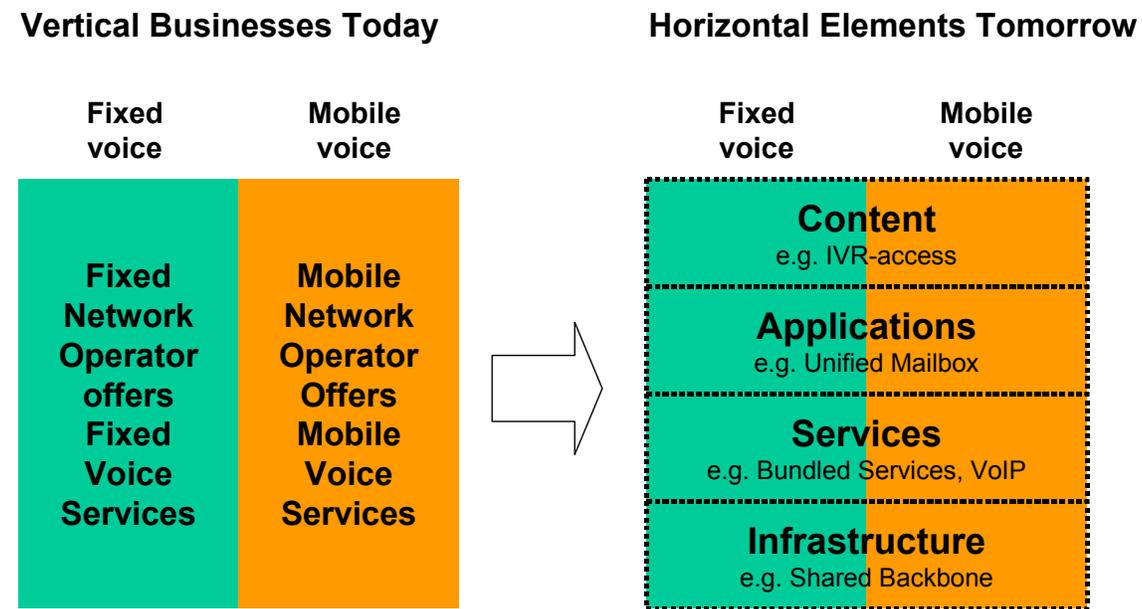
match. Mobility and “anytime, anywhere” communications adds enormous value to people’s lives, and it is a feature for which customers will pay a premium. This simple truth is what will continue to drive substitution of voice traffic from fixed to mobile networks.

What Role Will Convergence Play in Voice Communications?

We believe strongly that fixed to mobile substitution will continue and will increase. Despite this, there are opportunities for telecommunications service providers to offer converged services.

When thinking about converged fixed and wireless voice services, it is useful to have some framework for analyzing this convergence opportunity. In Exhibit 8 we introduce one such framework. This borrows the Department of Communications’ own model for thinking about convergence in general. Today, fixed and mobile voice businesses are essentially parallel, vertical industries. In both markets, the network operators are generally represented at all stages of the service value chain. They build, own, and operate the network, and provide voice services over that network. If we apply the concept of convergence to this situation, we can start to envisage other scenarios, where the network operator does not participate at all positions in the traditional vertical value chain. In the horizontal industry scenario, it is possible for one company to build and operate the network, while other companies deliver services over that network. It is also possible for those providers of the services and applications (or content) to offer the same services across fixed and mobile networks. In other words, the dependency of each service on a specific underlying network is reduced or removed completely.

Exhibit 7
Towards a Horizontal (Converged) Model for Voice Services
 Source: The Yankee Group, 2003



While this is a realistic scenario in theory, the question remains how viable is this in practice? The evidence to date is not encouraging. We have seen very few successful truly convergent fixed/mobile services. If anything the future paths for fixed and mobile voice communications are divergent rather than convergent. Voice traffic on mobile networks continues to increase significantly, while fixed voice traffic is already stagnant or declining in some markets. As mobile charges continue to fall, driven by MNO competition, technology advances, and lower interconnection charges, the pace of fixed to mobile substitution will accelerate. In this context, if a convergent service is to succeed, it must have some compelling benefit for the end user. But from the list presented in Exhibit 8, there are few that will make any significant impact on people's lives. We conclude therefore that:

Convergence of fixed and wireless voice telephony will not be a major force in telecommunications markets. On the contrary, substitution of voice traffic from fixed to mobile networks will accelerate. This will lead to mobile network operators becoming the dominant providers of voice telephony services.

ii/ Fixed and Mobile Content

Mobile content services represent an important future revenue stream for MNOs. Today, in Europe for example, mobile data represents approximately 15 percent MNOs' revenues. But less than 20 percent of that revenues is attributable to content services. The majority comes from SMS person-to-person text messaging. But over the next five years the mobile content share will increase, driven in part by SMS and MMS-based content and in part by WAP-based applications. This raises the question of whether we will see significant convergence of fixed and mobile content services in the future. We address this question by examining some of the most important dynamics within the mobile content business today.

What Is Mobile Content?

The market for mobile content can be divided into two distinct components:

- **Handset personalization**, based on software downloaded to a handset, personalizing it to the user. Generally, this consists of ring tones, logos, and games, although other applications, such as personalized menus and Tamagochi-style mobile pets, are also available. Spending on this type of content has been on a per-event basis, with downloads typically costing \$2 to \$5 for ring tones and logos and \$5 to \$10 for games. This represents the vast majority of spending on non-P2P services. Services often are ordered by means other than mobile channels (e.g., a premium phone number).
- **Information and entertainment**, for which a customer subscribes to a premium service to receive SMS messages either regularly (e.g., daily newsletters) or in response to triggers (e.g., subject matter alerts). A slightly more advanced form is WAP push, where an SMS message is sent to the consumer with the option to interact with the content, either by requesting more information, which initiates a WAP session, or through related messaging friends. Consumers also can launch a WAP browser and search for information.

Although handset personalization currently dominates the mobile content market, the providers can learn valuable lessons from the information and entertainment market. Entertainment often establishes a bond between the user and the service provider through a

monthly subscription. With downloads, once users have bought a game or a ring tone, they are lost to the vendor.

The Mobile Content Value Chain

Because of the relative immaturity of the market, significant tactical maneuvering in the mobile content value chain continues (see Exhibit 9). Content ownership and the development of mobile applications remain in the hands of established operators. Farther down the value chain, however, players continue to wrestle for position as they seek to cut costs or increase margins by expanding beyond traditional functions. This section examines movements within the mobile content value chain and assesses the best strategies for meeting the current competitive challenges.

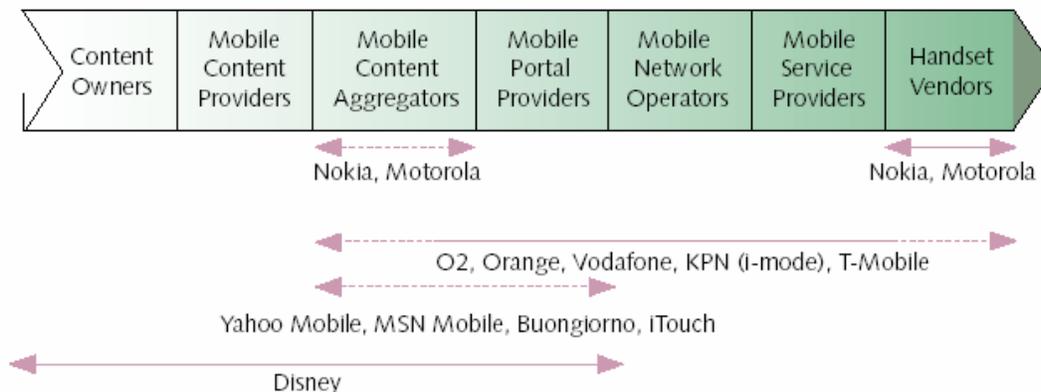
MNOs: Dominating the Picture

MNOs and mobile service providers (MSPs) maintain a preeminent position in the mobile content value chain because of the strength of their relationships with end users. Because of factors such as contractual obligation, problems with number portability, and consumer apathy, MNOs own their customers more than other players in the value chain. MNOs can influence which mobile portals and content aggregators the user selects. This has led to the consolidation of the mobile portal market. Other than those supported by the MNOs (e.g., Terra Mobile, Vizzavi, and Genie in Europe), the majority of which have been subsumed by the parent brand), virtually the only mobile portals to survive are operated by major players providing equivalent services in the Internet space (e.g., MSN and Yahoo).

Exhibit 8

The Mobile Content Value Chain

Source: the Yankee Group, 2003

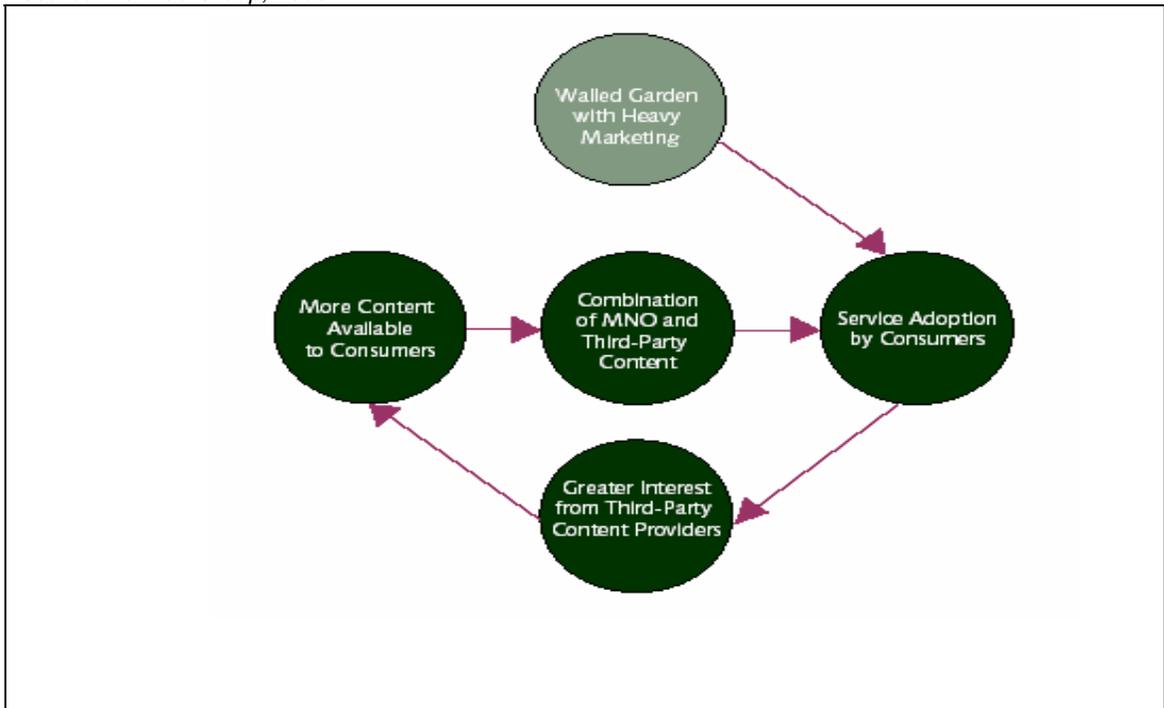


Exploring Convergence Opportunities in Mobile Content

One of the major barriers to the mobile content business today is a lack of participation and commitment by many of the world's leading content brands. While companies like MTV and Walt Disney do currently offer some mobile content services in partnership with MNOs, their mobile activities still represent a tiny fraction of their overall content business, delivered through alternative, well established channels like cinema, TV, radio, and print formats. It is our view that the major content brands and the MNOs will both benefit from closer partnerships and integration of their services. As Exhibit 9 illustrates, the MNOs desperately require greater choice in their mobile content portfolios. They need the major content players to promote 'mobile' versions of their content via their existing, well-established, and powerful marketing channels. We envisage a virtuous cycle of events where higher usage of mobile content by consumers will in turn attract more of the major content brands. This will stimulate the introduction of more mobile content services, which will in turn further increase adoption and usage. The key to achieving this virtuous cycle is greater convergence of mobile and fixed content value chains and services.

Exhibit 9: Kick-Starting a Virtuous Circle For Mobile Content

Source: Yankee Group, 2003



There are a number of other initiatives that are also leading to greater convergence (and in some cases substitution) between traditionally distinct industries. One clear example is the imaging business. The rate at which imaging capabilities (digital cameras) are being integrated into mobile phones is staggering. Global sales of these devices have already outstripped sales of traditional digital cameras. This trend, combined with the introduction of picture messaging services, means the imaging and mobile communications industries are converging. Imaging services have added a mobile element, and mobile devices have added an imaging element. This is a clear case of technology driving convergence. We must wait to

see to what extent consumer behavior adapts to this technology-led trend. Our view is that it will certainly change over time.

There are many other industries that are experiencing some degree of convergence between their traditional business and the mobile communications industry. These include:

- Sports e.g. more mobile sports content available
- News and entertainment e.g. the release of some music tracks exclusively via mobile channels, and the emergence of a large mobile ring tones business
- Gaming e.g. Nokia's N-Gage device which is equally a gaming device and a mobile communications terminal
- Banking e.g. the introduction of mobile banking and mobile commerce services

In summary, convergence between fixed and mobile content will be an important force in the development of the mobile content business. All industry players and regulators must appreciate this, and develop strategies that promote this convergence at every opportunity.

iii/ Fixed and Wireless Internet

We believe there is an opportunity for convergence between the fixed and wireless Internet. Though there has been a great deal of negative publicity surrounding the traditional view of the "mobile Internet", a lot of the hype has now subsided, and given way to a more realistic view of the market opportunity. On a number of fronts, we see a real and immediate opportunity for fixed and mobile Internet worlds to converge.

WAP versus the Web: WAP-based services, while confined to small screen sizes and limited graphics capability, are now relatively robust and accessible to millions of customers. Many web-based content providers already have WAP versions of their sites available, and the number of WAP page impressions being recorded by MNOs is rising steadily (dramatically in some cases). Going forward, we expect almost all players in the traditional Internet space to offer extensive "mobile Internet" versions of their content.

Wireless access to the fixed Internet: Another area where the fixed and mobile Internet worlds are colliding is in terms of access technologies. Using GPRS or 3G data cards, or WLAN access technologies, it is already possible to access the "fixed Internet" wirelessly. In this context, the fixed Internet becomes the mobile Internet without a need to adapt the content or (for the most part) the user experience.

In summary, over the next five years wireless technologies will allow many people, who would otherwise not have been able to do so, to tap into the rich vein of information and communications that the Internet provides. Increasingly, we will not talk about separate fixed and mobile versions of the Internet. We will talk about one Internet that is accessible through different access technologies and terminals. Convergence between fixed and wireless technologies will therefore significantly change the way people access the Internet.

iv/ Broadcasting and Wireless

The issue of convergence between telecommunications and broadcasting is discussed in another section of this report. Here we offer a perspective on the specific issue of convergence between wireless communications and broadcast services.

There are some clear opportunities for wireless and broadcast technologies and services to be more closely integrated. Already today, we can see some convergence, mainly at the terminal level. For example, some mobile phones already have integrated FM radio receivers. Some handset manufacturers, most notably the world's largest player Nokia, are developing visions of closer integration between broadcast radio and mobile communications. They discuss the idea of "visual radio". This allows the end user to view information on their mobile phone screen that is linked to the music track being played on the radio channel. In this scenario, the customer will also be able to interact with the radio station, to buy goods or services, request more information, or just "chat" about the radio content. Nokia is also reported to be holding talks with a number of companies in the UK with a view to launching a pilot service broadcasting TV to mobile phones in autumn 2004. The service would use the new DVB-H standard, previously named the DVB-X standard, which should receive ratification from the European Digital Video Broadcasting (DVB) group in January 2004.

There are further examples of convergence between broadcast media and mobile communications that are less visionary, and are reality today. For example, there is strong growth in TV text voting, whereby TV viewers can interact with certain programs by SMS. Radio channels are offering similarly interactive features. Another example of integration between radio and mobile is the "Shazam" service. This allows mobile phone users to get music tracks 'tagged' or identified, using their mobile phone. They can download the ringtone or buy CDs from their "Tag List" on the Website. The Songmail service allows customers to send music clips to friends' mobile phones. According to Shazam over 2 million tracks have already been tagged in the UK,

Convergence between broadcast and mobile communications will have a significant impact on the way people consume broadcast services. It is possible to envisage a time when almost all broadcast services will have an interactive element. In many cases the interactive component will be provided via mobile devices.

v/ Different Wireless Technologies

It would be incomplete to present a picture of convergence in the wireless domain without mentioning convergence between different wireless technologies. There are numerous examples of the way in which wireless technologies are converging. Here are a few examples:

- Cellular and WLAN
- Cellular and Cordless (e.g. DECT)
- Cellular and Satellite (e.g. GMPCS)
- Cellular and BlueTooth
- Cellular and Private Mobile Radio (PMR) e.g. Cellular Push-to-Talk
- 2G, 2.5G, and 3G cellular

In each case we are seeing a tighter integration between terminals, services, and sometimes distribution channels. Technology advances are enabling this integration, but in some cases we have yet to see the emergence of a clear business case and demand from end-users. Nevertheless, all industry players and regulators must be clear about how this convergence between different wireless technologies can change the wireless communications landscape. Increasingly we should take the view that many wireless terminals will support multiple

wireless access technologies. The way in which the device is used will no longer be determined by the embedded access technologies. Many individuals will own and carry multiple wirelessly enabled devices. Their use of those different access technologies will be governed by: the particular application they wish to use, their location, and the device they are carrying at that moment in time. MNOs, service providers, and content companies offer services that take account of this reality, and they must focus on the utility and value of the application to different user segments, rather than focusing on the demands placed on the wireless network. Likewise, industry regulators must legislate for this new reality, and introduce policies that promote diverse services offered by a diverse range of service providers.

vi/ Wireless Voice and Data

The final word in this section belongs to yet another form of convergence, and that is the convergence of voice and data within the wireless domain. The topic of convergence between voice and data communications in general is discussed elsewhere in this report in more detail. Here we offer a brief perspective on this subject as it relates to wireless technologies.

The only uncertainty with regard to the convergence of wireless voice and data is timing. It is certain that all wireless voice will eventually be packetized and transported over data networks. This will not happen overnight of course, and in the meantime we are faced with a gradual migration away from circuit-based wireless voice communications, towards IP-based services. This trend means that, from a network perspective, industry players and regulators should now start to think of wireless voice services as just another data application. This will require a major re-think but already we can see examples of this phenomenon. PTT is one example. This is a service that looks like voice to the end user, but looks like a data application to the mobile network. How should a service like this be priced, by the minute or by the packet? How should a service like this be regulated, as a voice service, or as a data service?

vi/ Summary of Convergence Trends

The wireless industry is already converging with several other industries. This convergence is occurring at different levels within the vertical value stack, from networking technology, to services and applications, to end-user terminals. However, the source of the convergence is slightly surprising. We are not seeing widespread convergence of **fixed and mobile** technologies and services. There is some, but it is limited, and has had only marginal commercial success. The real source of convergence is between the wireless industry and other industries like entertainment, news, imaging, Internet services, and a wide range of content businesses. Unlike fixed/mobile convergence, this latter form of convergence is already delivering commercial success, and it is profoundly changing the way people behave. It is convergence based on a natural fit between previously distinct digital technologies and services, and not on a forced marriage of unsuited partners. It is convergence driven by real commercial opportunities, and not by nothing more than technology discontinuities. It is this convergence that industry participants and regulators should focus on if they are to take full advantage of the opportunities that will be presented by the wireless industry over the next five years.

2. Regulatory Convergence – Telecommunications and Wireless

Unlike the fixed-line communications sector, the wireless sector has escaped extensive regulation until recently. Both convergence and structural consolidation in the wireless sector are influencing increased regulatory attention as issues of market dominance and anti-competitive conduct, hallmarks of the fixed-line sector, now also characterize wireless communications markets.

The crossover of regulatory issues from the basic fixed services sector to the wireless sector is notable in relation to licensing obligations and rights, end-user tariff regulation, interconnection issues and rules, and unbundling or open access developments for mobile virtual network operator (MVNO) use of incumbents' infrastructure. Despite the different market structures and operator dynamics between the fixed and wireless worlds, these long-standing issues associated with traditional telecommunications are now playing out in the wireless space.

Interconnection remains the most complex, controversial, and unresolved issue in fixed-line communications regulation. **Over recent years, much attention has also focused on the failure of local-loop unbundling to promote local competition or the deployment of high-speed services.** In many nations, there have been numerous complaints and disputes over wholesale pricing. Without competition, incumbents retain strong market positions and control of the local loop. In addition, many incumbents have capitalized on the lack of competition to exploit first-mover advantages in provisioning broadband services.

Many nations are reviewing the status of broadband deployment and options for its acceleration. In this process, regulatory and policy levers that have been employed to date are also under review. These include mandating of interconnection, and often unbundling, of backbone networks for the provision of broadband services by third parties, and forbearance from regulating new market entrants, including Internet and other broadband providers.

Interconnection in the wireless sector has always relied on commercial negotiation between operators. In nations with calling party pays (CPP) systems, interconnection rates between mobile-to-fixed and fixed-to-mobile calls are highly asymmetric. The interconnection rates are generally high and non-cost-based. This is particularly so in developed nations. In developing nations, mobile network operators (MNOs) also tend to be unable to secure reasonable call termination rates from incumbent fixed operators for mobile-to-fixed calls. Progressively, **nations are declaring MNOs as holders of dominant market positions and are imposing interconnection obligations**, including cost-oriented principles, in the development of mobile termination interconnection rates.

Regulatory moves to impose stricter regulations on MNOs come at a time of worldwide consolidation, when many of these operators confront financial difficulties. As always, regulators face a delicate balancing act. However, the risks of regulatory actions are heightened under current depressed market conditions. The success of MNOs and mobile services represents the key to achieving electronic communications policies in many nations.

Many nations are reexamining future wireless licensing models, with an urgent need to recognize fixed-to-wireless convergence and to reassess the basis and outcomes of maintaining line-of-business restrictions. Unified licensing responds to convergence trends by permitting operators to maximize the use of existing infrastructure and capitalize on technology developments that allow integrated service provision. As distinctions between voice and data services continue to erode and as wireless substitution for fixed-line services

escalates, increasingly there is recognition that asymmetric or different treatment of fixed-line, wireless and cable operators must be reduced, and ultimately removed. **Regulators around the world are implementing or examining converged licensing models, as part of the broader overhaul of service and operator specific regulatory distinctions.**

The shift to unified licensing must be coordinated and necessitates review of the implications of converged licensing for associated regulations and their subsequent adjustment. Notably, unified licensing implies modification of existing spectrum management arrangements, including future allocation processes and spectrum pricing. Interconnection revenue revenue-sharing arrangements between fixed-line and wireless operators will also need to be revisited as will rules for the assessment and approval of mergers and acquisitions. Unified licensing also dictates review of universal service funding and provision obligations that have traditionally applied to fixed-line operators.

Restructuring of universal service funding and delivery models is also a major global trend. In developed nations, telecommunications universal service—embodied in the concept of basic telephony services available to all households—remains a major political and social goal. In developing nations, the imperative is more on universal access—ensuring the availability of public access telephony services within a reasonable distance. However, **the incentives and options for universal service delivery have changed with the introduction of competition.**

Continued regulation and universal service obligations (USOs) have cross-impacts for the competitive neutrality of providers, while influencing competition and commercial practices in markets for services that are not subject to regulation. Governments are grappling with how to balance the impact of regulatory obligations on carriers, including universal service and interconnection arrangements, with continued incentives to innovate and invest in infrastructure and services. In the competitive era, the definition, funding, cost recovery, and delivery options for universal service have emerged as major points of debate.

The introduction of competition implies that regulations should be adjusted to promote the following:

- The competitive neutrality of providers;
- The alignment of subsidies with “actual costs” of delivery;
- Subsidies that are explicit and transparent to users; and
- Technology neutrality and the facilitation of converging markets and technologies.

Implications for South Africa arising from these global trends include:

Interconnection - Without a consistent and comprehensive interconnection regime in place, including regulated pricing, South Africa’s liberalization prospects are limited. In addition to implementing rigid accounting and reporting separation requirements for Telkom, interconnection relies on regulators skilled in interpreting and modeling industry cost data.

Competition Assessment - A major global trend is the conduct of granular market and competition assessments in many cases leading to the designation of dominant or Significant Market Power operators. Subsequent obligations are imposed on such operators such as for interconnection. As South Africa further liberalizes it must consider comprehensive adoption and application of dominant operator regulatory guidelines and rules. This must extend

beyond the current designations of Essential Facilities and Major Operators that are in place in selected interconnection and facilities sharing guidelines.

Unified Licensing - As noted, the shift to unified licensing must be coordinated and necessitates review of the implications of converged licensing for associated regulations and their subsequent adjustment. While the Convergence bill anticipates a move to more horizontal licensing, it is ill conceived without broader examination of its likely impacts in South Africa and in the absence of broader legal and regulatory adjustment. For example, if the basis for effective interconnection arrangements is not enhanced and the implementation and enforcement role of ICASA is not improved, changing licensing categories is a somewhat moot step. This is not to criticize the move to unified licensing as a laudable step; our note of caution is that any new licensing approach must be introduced in the context of broader reform and restructuring.

Universal service - A major trend has been the examination of competitive delivery models and tender selection mechanisms, of which there are a number of variations including tendering of obligations to a single carrier and multi-carrier competition, in which the subsidy is provided on a per-customer basis (portable subsidy); regional tendering models and multi-carrier competition with auctions.

The UASL concept is an encouraging step, along the lines of such targeted programs adopted elsewhere with some success. The key is effective implementation of this model.

While universal service type obligations are mandated for MNOs in many nations, in South Africa, greater certainty is required in terms of future obligations that will apply to MNOs. While wireless options are clearly an essential element of broader universal access objectives, MNOs must not be competitively disadvantaged with onerous or ad hoc obligations not balanced across all industry players.

3. Applying the Trends in South Africa

Here we consider the position of South Africa relative to the rest of the world on each of the convergence trends we introduced in the last section.

i/ Fixed and Wireless Voice Telephony

In many respects SA is already ahead of the rest of the world in terms of landline substitution. Mobile connections already far exceed fixed connections, and the scale of the discrepancy between the number of fixed and mobile phones is significantly larger than in most other regions of the world. The relatively low penetration of fixed services means there is little justification for investing in converged fixed and mobile services.

The issue of “limited-mobility services”, whereby cellular is essentially used as an alternative fixed access technology, is currently being debated in SA. This can be regarded as a fixed/mobile converged solution, and it may have a role to play in extending telephony services into some under served rural areas, but where full mobility services exist, and are priced competitively, it is difficult to see how a limited-mobility service will be able to compete in the long term. However, if limited-mobility services can be offered at a significant discount to mobile services, they should be able to carve out a reasonable market within under-privileged segments of the market.

We expect SA to continue down its current path, where mobile networks serve the needs of the majority of voice telephony customers. The type of converged fixed and mobile services that are becoming more common in Europe will have little or no role to play in SA. This view is based on the simple fact that the fixed telephony infrastructure will never be comparable to that available in most European countries. Regulation in SA should therefore focus on competition within the mobile sector, rather than convergence of the fixed and mobile sectors.

On that note, the regulator should be open-minded about the introduction of CDMA-based services. Indeed, if it proceeds towards a convergent regulatory regime, the regulator should, as far as possible, be technology-neutral, and therefore open to all technologies that meet the minimum criteria of the service license. This refers to the licensing of any future full-mobility MNO, limited-mobility service providers, and 3G operators.

ii/ Fixed and Wireless Content

Mobile content services in SA have achieved limited penetration rates. SMS accounts for the vast majority of the 5 percent of service revenue that the MNOs are expected to generate from non-voice services in 2003. However, despite this slow start we believe mobile content services will become more popular in SA. In order to boost mobile content service adoption, the participants in the South African mobile content value chain must adopt largely the same practices as now seen in some of the world's more advanced mobile content marketplaces. This includes more equitable revenue sharing between MNOs and content providers, increased marketing of content services, and greater focus on the point of sale. MNOs and mobile content providers should also seek partnerships with leading South African fixed content brands, as a means of generating more mobile content and ramping up awareness programs and other marketing campaigns.

iii/ Fixed and Wireless Internet

SA has very low rates of residential Internet access. Convergence of fixed and mobile Internet should therefore be a low priority. However, there is an opportunity to use the high mobile penetration rates to promote "mobile Internet" access to existing mobile telephony customers. For customers in under-privileged areas, this can be through WAP services. For more affluent customers and business users, access to the "fixed Internet" can be delivered by MNOs via GPRS data cards, or using existing GPRS terminals as modems for laptop computers.

iv/ Broadcasting and Wireless

The convergence of broadcast and wireless services that we described earlier must be driven by the broadcast industry. Without the support of the large broadcast companies, this convergence will not be realized in any markets, irrespective of how advanced the mobile industry is. Because South Africa is not a market leader in terms of broadcast services, we do not anticipate that the country will be at the forefront of the convergence of wireless and broadcast services.

v/ Different Wireless Technologies

The relatively low penetration of most non-cellular wireless technologies in SA means there is little immediate opportunity for convergence in this area.

vi/ Wireless Voice and Data

The roadmap and timeline for the convergence of wireless voice and data will be determined largely by network technology evolution and MNO investment decisions. It will be a gradual shift over many years as more networks are upgraded to IP. SA will therefore be no different to most other regions in terms of the convergence of wireless voice and data technologies and services. But if its 3G network-deployment falls behind other regions, it does risk lagging behind in terms of voice and data convergence. This is based on the premise that, for most MNOs, 3G will herald the beginning of the first real movement towards all IP networks.

C Convergence of Fixed Voice and Data Services

1. General Discussion of Global Trends

i/ Introduction

Fixed telecoms operators in Europe and North America believe that converged voice and data services are the key to future revenue growth. A Yankee Group study conducted in autumn 2003 identifies a massive shift in anticipated revenue streams over the next three years: two-thirds of the 25 operators interviewed across 16 European countries¹ believe that traditional voice will represent 50 percent or less of their revenue stream by 2006. Earlier survey results from research in North America reveals similar patterns of behavior.

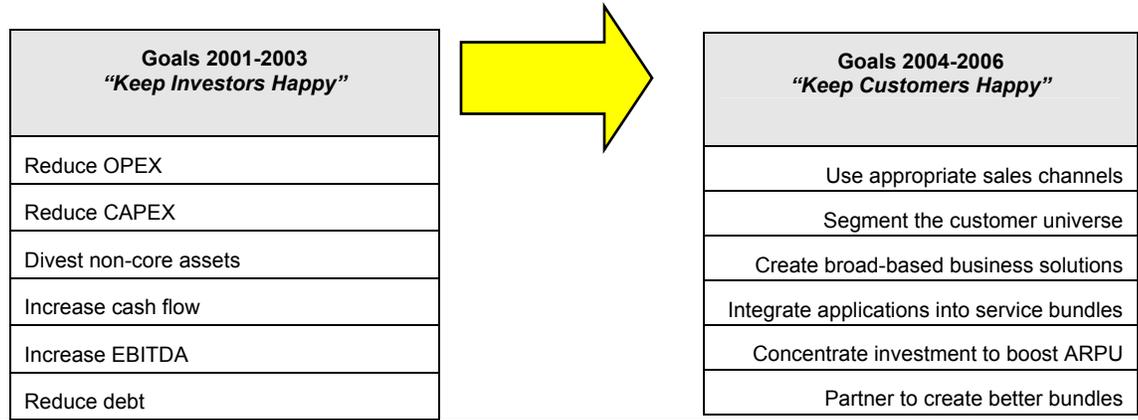
The desire to build loyalty across an increasingly demanding and educated consumer and business customer base is guiding operator decisions on packet service development. Indeed, investment in converged IP infrastructure is linked to a growing sense of optimism in the fixed telecoms market, as operators shed defensive strategies. At the same time, operators remain preoccupied with the need to reduce operational and capital expenditures. Traditional fixed voice revenues are fast declining both in terms of margin and as a proportion of total revenues. Arguably, the greatest barrier to the deployment of converged IP-based infrastructures is not technological concerns, but financial conservatism.

Both economic recession and market competition have driven major organizational change within operators. Buying technology for technology's sake is a luxury that no-one can now afford. At the same time, the emergence of market competition has taught customers, either consumers or businesses, that they can and should expect more from their communications services suppliers. This means that operators must look first at customer needs and then build a business case to launch a service, rather than the other way round, which was previously common practice. So the desire to grow revenues combined with the need to reduce costs is the tricky balance operators must now strike in order to stay in business.

¹ European operators included 12 incumbent operators, 13 competitive operators in Northern Europe (Belgium, Denmark, France, Netherlands, Sweden, UK); Central and Eastern Europe (Bulgaria, Croatia, Germany, Hungary, Poland, Russia, Switzerland) and Southern Europe (Greece, Italy, Spain).

Exhibit 10
Operators' Strategic Priorities are Changing

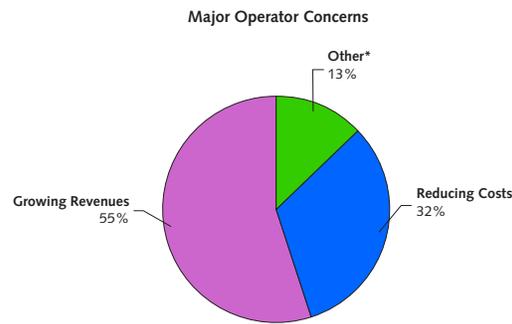
Source: the Yankee Group, 2003



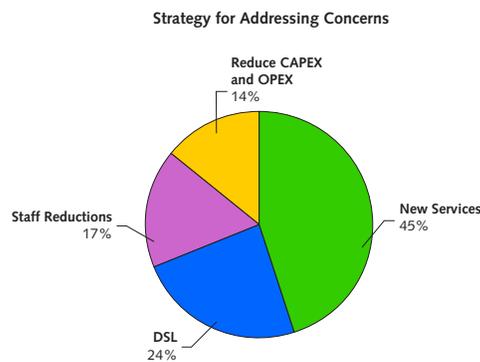
As the following exhibit illustrates, operators display similar concerns, irrespective of their location, size or type:

Exhibit 11
Operator Survey: Major Concerns and Remedies

Source: the Yankee Group, 2003



Note: *Other includes equipment obsolescence, customer retention and churn, market saturation



With regard to strategies to address these concerns, the results are conclusive: New service development is the key to future growth, closely followed and interlinked with the provision of DSL, viewed as a launch pad for service development. In terms of remedies, the lesser scores for tighter CAPEX and OPEX control as well as staff reductions, suggest that operators are already pared down to the bone, and that the next step must be an offensive strategy. Increasingly, that offensive strategy is tied to convergence of voice and data infrastructure and services.

ii/ The Revenue Mix is Changing

Traditional voice still accounts for the lion's share of revenues for most fixed telecoms operators, and in particular, those of incumbent operators. However, fixed voice revenues are fast declining both in terms of margin and as a proportion of total revenues.

As our recent study of European operators illustrates, 50 percent of operators say voice margins are flat, and another 44 percent say they are decreasing. Only 6 percent say that voice margins are growing, and these are related to more efficient bundling and the launch of new voice services for operators previously focused on data services.

There are, nevertheless, marked differences between incumbents and alternative operators: Forty-three percent of incumbents see revenues dropping, compared to 18 percent of alternates. But 45 percent of alternates see voice revenues as flat, compared to 29 percent of incumbents. Today, traditional voice represents more than 90 percent of revenues for 38 percent of respondents. But in three years' time, only 4 percent of all respondents say that voice will represent such an overwhelming percentage of their revenues. Indeed, two thirds of respondents say that traditional voice will represent 50 percent or less of total revenues.

iii/ Convergence between IT and Telecoms is also a Factor

Fixed telecoms operators are no longer content to offer connectivity services alone. Many are exploring expansion into the IT services space as a way to increase wallet share with business customers in particular. Operators are looking for ways to enhance relationships with their business customers. Their objective is to capture more revenue from existing clients, and win new business from others—and do both ahead of the competition of pure-play IT services companies. The provision of IT services combined with connectivity services is emerging as a way fixed telecoms operators can move up the value chain. Converging network infrastructures in the local area network and the wide area network are a means by which the convergence of IT and telecoms will be facilitated.

2. Technological Convergence

Operators already implementing converged voice and data infrastructures to support new services say immediate benefits include not only lower operational costs, but also faster service introduction resulting in improved customer relationships. Other key findings of our recent study include:

- 60 percent of operators already employ some form of packet-based infrastructure;
- 80 percent of operators believe deployment of converged services will boost profit margins and build revenues;

- 83 percent plan to offer some form of service provider-operated IP telephony, reflecting what operators say is growing end-user demand for converged services

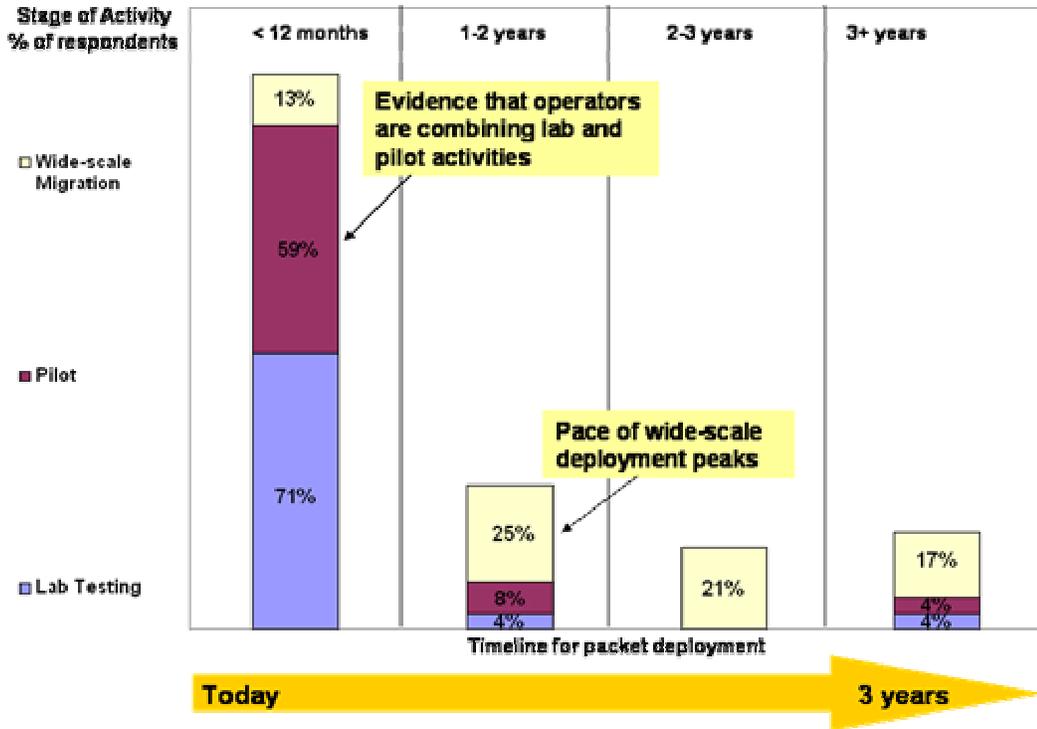
The need to do something - and fast - about voice revenues is acute for a majority of operators, not least for the 21 percent of respondents who also told us that the infrastructure they currently employ to support voice services is at the end of its lifespan.

Indeed, with arguably more to lose, incumbent operators are leading the drive to packet-based infrastructure migration with 42 percent of those interviewed planning wide-scale migration within the next two years, compared to 27 percent of alternative operators. Wide-scale migration is defined as not only replacement of network elements and consequent traffic evolution, but also commercial launch of a converged service. Alternate operators are under less immediate pressure due to lower cost bases. This is because they were structured for competition and have newer infrastructure, meaning they can compete more effectively on price for marginally longer than incumbents because their infrastructure replacement requirements are not as pressing.

Exhibit 12: Commercial convergence: IT and Network services

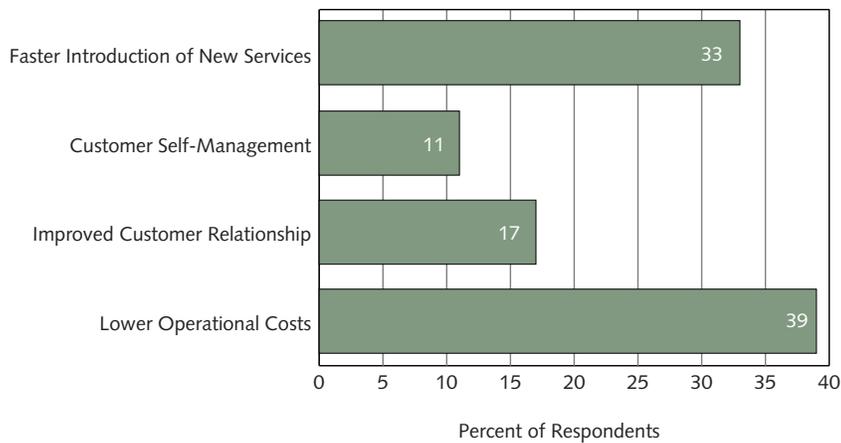
IT-Centric Services	
• Systems Integration	Activities involved with planning and building solutions that address customer technical or business requirements; systems integration involves systems and custom application development, and the implementation and integration of enterprise packaged software
• Application Management	Activities involved with the ongoing support of custom or packaged enterprise applications or systems of applications
• Decentralized IT	Activities involved with outsourcing the desktop, including hardware, software and support services, PDAs, LANs and local servers
Network-Centric Services	
• Network Consulting and Integration	Activities associated with planning and building data networks, including operations assessment, network planning and design, installation, configuration, project management and security implementation
• Network Management (Point)	Network management activities are packaged as a point solution, providing organizations management and support for all or part of their network communications infrastructure
• Network Management (Integrated)	Network management activities are packaged as an integrated solution, providing organizations end-to-end network monitoring and management across the WAN, the Internet and the LAN
• Centralized IT	Activities involved with traditional data center outsourcing, including servers, storage, security and systems management

Exhibit 13
Operator Migration Plans to Converged IP Infrastructure
Source: the Yankee Group, 2003



As we have found, the principal driver for convergence from the perspective of operator infrastructure and the launch of services is financial. On the one hand, convergence of operator backbone infrastructure brings substantial reduction of operational costs, and tighter control on these costs. On the other hand, operators in increasingly competitive market need to launch converged voice and data services to reflect the demands of the corporate market, which is itself driven to reduce costs and operate simpler communications environments.

From the perspective of North American and European operators in particular, convergence wins from both the supply-side and demand-side: lowering costs, increasing operational efficiency and enabling the development of innovative - and higher margin - services.

Exhibit 14**Operator Survey: Benefits of Converged IP Infrastructure***Source: the Yankee Group, 2003*

3. Regulatory Convergence

Internet protocol (IP) based networks and services pose major challenges for traditional communications regulations. IP-based services also challenge newer policy principles of competitive and technological neutrality, and regulatory forbearance in relation to new services.

Around the world, the regulatory treatment of IP telephony (IPT) varies dramatically and is often linked to broader policy objectives. Where universal access and affordability are key motivators of government policy, the trend has been hands-off regulation. Where minimizing the impact on incumbent revenue prevails as a policy objective, IPT services have been restricted to incumbent provision or banned outright. In between these extremes, there are a multitude of regulatory variants shaped by attempts to balance obligations and rights of incumbents against the promotion of new technologies and investment in new services.

Traditional service definitions and distinctions lose their meaning as packetized voice and data services travel over the same medium, and as different types of traffic are virtually indistinguishable. This makes separate measurement and usage metering of voice and data services nearly impossible. IP services such as **IP telephony services are challenging traditional subsidy mechanisms for domestic and international interconnection and universal service**, as usage-and distance-based charging mechanisms lose their applicability for packetized traffic.

Traditional licensing structures also are challenged by IP services. ISPs generally have not been subject to onerous licensing and market-entry requirements. Regulators must attempt to balance market development with licensing obligations that may be applied if IP services such as VoIP come to resemble traditional voice telephony, and as service availability and use becomes more widespread.

There is also a raft of technical and quality-of-service (QoS) standards issues to address, including interoperability between IP-based networks and PSTNs, and the development of numbering and naming protocols and processes.

There is no guarantee that the relatively hands-off global regulatory status quo will prevail. The classification and subsequent regulatory treatment of IP services are progressively emerging on regulator and judicial agendas. Short-term decisions to regulate IPT will have major implications for the development of this nascent market segment. These decisions will set dangerous precedents for future regulation of a myriad of different types of broadband and next-generation services and their providers.

Despite the persistence of widespread bans on the private provision of IP telephony services, particularly in developing nations, in many cases, regulations have been ineffective in controlling illicit bypass of PSTN networks and gray markets have proliferated. **Given the universal access opportunities presented by IP-based services, regulators are forced to consider regulatory reform to facilitate service availability via this route.** Broader reform agendas are also focused on market liberalization and the ending of incumbent monopolies, including ending exclusive rights held by incumbents for international termination.

As IP-based services become widespread, the case for regulatory parity will increase, including the application of more onerous licensing and market-entry requirements. Regulators must balance the obligations of IP service providers with rules that encourage this medium's growth.

Whether regulators have fully liberalized IPT provision, allow restricted services, or ban services outright, review of the policy and regulatory treatment of IPT is coming to the forefront on the agendas of regulators around the world. So too are the rationales for different regulations and their sustainability, whether based on service quality, substitutability, or other distinctions based on service characteristics.

Lessons from global experience as more and more nations begin to review traditional service and operator based distinction present a series of priorities for South Africa that must be factored into the current overhaul of regulatory and legislative arrangements. These include the imperatives of:

- **Reducing and removing asymmetric or unequal regulatory treatment of different service providers and different services**
- The treatment of VoIP and Telkom's voice service monopoly more broadly is a key and pressing issue that must be directly addressed in South Africa
- Reviewing fixed and wireless license conditions and constraints and promoting frameworks for the efficient use of existing infrastructure and encouraging investment
- Balancing obligations and rights of incumbents and competitors, including reduction of regulatory protection of incumbents based on outdated service or license categories
- Balancing competition objectives and consolidation trends including revising consolidation and merger rules, and serious examination of frameworks for infrastructure sharing, third-party leasing, outsourcing, and spectrum use

4. Market Convergence

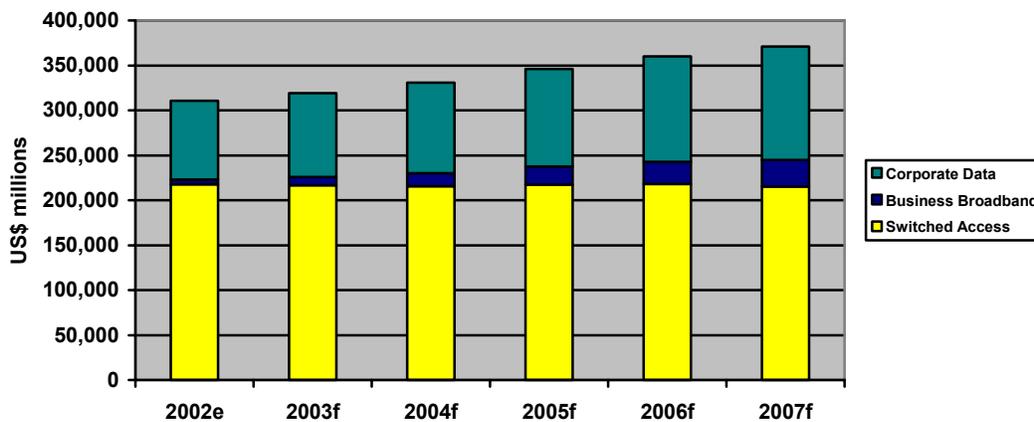
i/ The Global Business Market

IP VPNs, dedicated Internet access, and wide-area Ethernet are the primary sources of growth in the global corporate data services market. IP and Ethernet-based services will revolutionize the makeup of corporate data service revenue. The North American market exhibits a somewhat different trend. The existence of long-term competition means that leased line prices are very low and the rationale to migrate to IP VPNs and Ethernet services has less financial attraction than in other regions. **In markets where competition is relatively new or emerging, IP VPNs and wide-area Ethernet services offer profound benefits to businesses—and not simply due to price.** The Yankee Group’s Global Network Strategies Survey, an annual survey of 1500 large enterprises around the globe, has charted evolving decision-making criteria in the purchase of corporate data services over the past decade. Survey results suggest that price remains a factor, but quality of service, flexibility, and simplicity are also key issues for businesses. Vendors of IP VPNs, in particular—but also emerging wide-area Ethernet services—increasingly market these attributes, which speak more to the commercial and operational concerns of organizations. The “Technical Sale”—where a networking service is sold on what it *is* rather than on what it *does*--is becoming a thing of the past in the corporate data services market. The EMEA region—and specifically Western Europe, where the VPN concept is well understood and accepted—leads the way in IP VPN and Ethernet takeup.

Exhibit 15

Global Business Fixed-Line Market, 2002-2007

Source: the Yankee Group, 2003



As the global revenue forecast in previous exhibit shows, the business fixed-line market is recovering from the global economic downturn of the past three years. However, each regional forecast reveals subtle, but important, differences in market evolution:

- The Latin American market shows the highest overall revenue growth between 2002 and 2007, with a CAGR of 10.7 percent due to growth in switched access lines and revenue and uptake of IP-based services.
- The Asia-Pacific market, representing the largest population area and diversity of economies, also displays good growth across three business fixed-line areas, with a CAGR of 3.9 percent, as both IP VPNs and wide-area Ethernet drive the corporate data market.
- The North American market shows solid growth with a CAGR of 4 percent, due to the growth of IP-based services and wide-area Ethernet, as well as persistent, strong growth of the dominant leased-line market and frame relay.
- The EMEA market shows the smallest overall revenue growth, with a CAGR of 1.5 percent, due to strong migration to business DSL, IP VPNs, and wide-area Ethernet, which is eroding legacy data revenue. Business switched revenue is also in strong decline.

The Yankee Group's business end-user surveys indicate that the proportion of enterprise voice traffic traveling across managed IP, IP VPN or public Internet environments is rising sharply from 6 percent in 2002 to 20 percent in 2004. Indeed, our fieldwork with European businesses suggests that 73 percent of organizations have or planning use of packet-based voice with the next two years, with uptake of voice across IP VPNs in the region of 15 percent of the current market. Drivers for uptake of packetized voice and associated services are diverse, but are related to commercial, rather than technological benefits:

- Organizational dynamics: Organizations have a poor view of total costs and are looking for uniformity of solutions.
- Single network maintenance: There is also often a need to integrate resources and manage costs for a more dispersed and mobile workforce that needs simple and adaptable communications services.
- The need to improve customer service: The rollout of new applications, such as CRM, may lead to a decision to integrate into voice the computing environment in order to improve productivity and customer experience.

Exhibit 16

The Emergence of Converged Services in the Business Market

Source: the Yankee Group, 2003

Service Provider	Service Name	Customers
BT	Convergent solutions - IP Communicate, Multimedia VOIP service, IP telephony	Lloyd's of London, Northgate, Paul Smith Clothes
T-Systems	Telephony over IP	Schleswig-Holstein government
Cable & Wireless	IP-VPN QOS IP-LAN	HJ Heinz, Marks & Spencer
Equant	Voice for IPVPN, IP Telephony solutions	Japan Tobacco International, European Space Agency

ii/ The Global Consumer Market

The impact of converged services in net revenue contribution will vary across customer groups. In general terms, average revenue per user (ARPU) in the consumer market is flat in most markets. The consumer core telephony market is saturated with limited future potential with threats of substitution by services such as wireless, email, SMS and chat. Internet services offer revenue growth through customer acquisition, but here also ARPU is flat or falling. The Yankee Group's European Connected Consumer survey indicates that consumers are only interested in buying a bundle if it lowers the price - an opportunity that the promised lower operational cost of a packet infrastructure will help operators to fulfil. Service bundling, supported through a packet infrastructure, is also attractive for its potential to both increase ARPU and reduce churn.

- Tiered bandwidth and pricing models for their consumer access offerings, which accommodate low-end and high-end users, increasing operators' addressable market and service revenue opportunities;
- Diverse non-access products for broadband consumers: Content remains the big hope for operators. Both paid and free content forms an integral part of the broadband value proposition as stickiness and spend become the key objectives of broadband operators.

The examples provided in the following exhibit show operators leveraging converged packet-based infrastructure to offer broadband connectivity as well as services. Emerging bundle elements that are attractive in the consumer market include voicemail, fixed SMS and archived content.

Exhibit 17

The Emergence of Converged Services in the Consumer Market

Source: the Yankee Group, 2003

Operator	Converged Service Offer
Cablecom (Switzerland)	Bundled with cable service, but per minute call charges apply. Main line: CHF20 (€13) per month; Second line: CHF10 (€ 7.5) per month Domestic calls: CHF0.03 (€0.019) / minute; Calls to mobiles: CHF0.45 (€ 0.29) per minute.
Fastweb (Italy)	Option 1: Unlimited calls bundled with unlimited broadband access: €41 per month. Option 2: Same price for national & long-distance calls + bundled broadband access + option for TV services: €67/month.
Telekom Austria/ Jet2Web (Austria)	Aon.tv basic broadband package costs €7.90 per month. Includes four live TV channels, and credits for 100 streamed audio tracks or 200 streamed video clips per month.
T-Online (Germany)	Exclusive content offerings via dedicated broadband portal, T-Online Vision. Previews of the popular German soap opera, Good Times, Bad Times, available 24 hours as either a subscription (€9 per month) or pay-per-view (€0.99 per episode).

5. Summary

Operators' long-term commitment to converged services and infrastructures is clear, but strategies are still evolving. Despite indications that migration timescales are narrowing, there remains a healthy element of caution regarding immediate reliance on converged services alone to stem revenue erosion. As operators have told us, it is too early to tell whether all their aspirations will be achieved through converged services, yet for those with sufficient experience, customer retention is reported an immediate and important benefit. In the sober post-1990s market, operators are judged not on the size of their network, but rather on customer fidelity and value.

Operators are undoubtedly performing a difficult balancing act: They do not want to cannibalize profit margins, but offering services across converged packet-based infrastructures promises lower operational costs. As volumes grow and the migration to packet accelerates, the trick will be to build margins into packet-based services on offer, a task operators are only now addressing.

However, if converged services and infrastructure can truly reduce costs, increase loyalty and be a launch pad for new service development, then operators that do not accede to these market and economic demands will be in a dwindling minority with a doubtful future.

6. Applying the Trends in South Africa

Convergence of voice and data networks is ongoing in South Africa. However, convergence is happening in two discrete groups, and effectively, these groups are focusing internally on infrastructure convergence. These two groups are the business sector and the telecoms operator sector. Individually, both groups are both migrating toward converged packet-based environments.

Large businesses in South Africa are as sophisticated as any in Europe or North America. One example is Sasol Synfuels, the South African petro-chemicals conglomerate, which is employing gigabit Ethernet technology in order to combine business and manufacturing information on a single converged network. This includes the real-time visualization of activities in control rooms, which requires high bandwidth and speed.

But businesses and telecoms operators cannot achieve the full synergies that converged infrastructure can offer because a regulatory boundary exists between their network environments. This means that although a South African business may upgrade its voice infrastructure to use a IP-based PBX to route internal calls, it effectively cannot employ voice over IP consistently for off-net calls.

There is also a certain irony in the fact that both Telkom and the partners of the putative SNO both have committed to investments in packet-based infrastructure, notably the use of MPLS (Multi-protocol label switching technology), yet do not offer these services to external customers. This means that operators in South Africa are only realizing half the benefits that usage of converged infrastructure can provide.

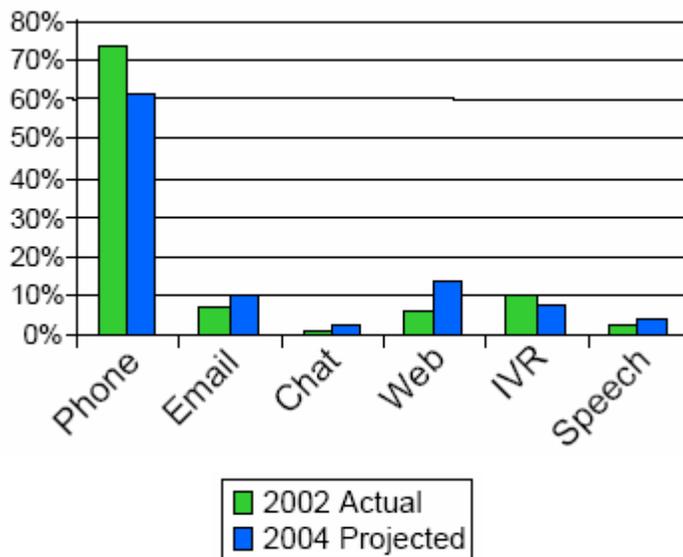
From the perspective of IT and telecoms convergence, South Africa is already home to two global players in this area, Dimension Data and Datatec. These network and systems integration companies are leaders in their field, and operate on a global level to provide a range of IT and network-related services not only to enterprises, but also to network operators across the globe. However, due to the high cost of bandwidth of

telecommunications, companies like Dimension Data cannot host their own business information and applications locally.

Efforts are underway to stimulate the off-shore outsourcing of call and contact centers to South Africa, led in part by the Department of Trade and Industry. On the surface, South Africa's proximity to Europe and North America, its low-cost, literate and English-speaking labor force would be a major attraction for foreign businesses. However, two factors directly related to the present regulatory environment will prevent the development of this industry: The high cost of connectivity within and from South Africa, and the lack of regulation allowing convergence. This is because call centers are fast transforming into contact centers where network traffic is converging from simply voice to information-rich data, as the following exhibit illustrates.

Exhibit 18
Contact Center Traffic 2002 and 2004

Source: the Yankee Group, 2003



As a result, our conclusion is that South Africa possesses many of the fundamental building blocks to deliver converged services, but lacks the regulatory 'mortar' to make these stand together.

Broadband Access Network Technology: Development and Impacts

1. Introduction

As we noted in part A of this section, access network technology is potentially a key driver for convergence. In particular, broadband access technologies enable the delivery of a wider range of services over a single network, including (for example) telephony, Internet access, video entertainment and television.

In this section, we examine these developments in more detail.

Exhibit 19 offers an overview of all the major access network technologies

Exhibit 19: How Technologies Might Evolve in Major Countries

Source: *The Yankee Group, 2003*

Based on average high-income country—situation varies by existing network infrastructure, economic development, geography

	Penetration	Penetration, Potential	Speed Now	Speed, Potential	Cost Now	Cost, Potential
DSL	High	High	Low-Medium	Medium-High	Low	Low
Cable modem	High	Low-Medium	Medium	Medium-High	Low	Low
FTTH	Very low	Low-medium	High	Very high	High	Medium
Satellite	Very low	Very high	Low-medium	Medium	High	Medium-High
Powerline	Very low	Very high	Medium	High	Low-Medium	Low
Broadband fixed wireless, wi-fi, wimax	Very low	Medium to high	Medium	High	Medium-High	Very Low

2. DSL

Development work on DSL began over a decade ago and was slow to mature. Recently, however, it has speeded up very rapidly and DSL is now the single most important new access technology since cellular telephony.

DSL's main strengths are the ubiquity of the telephone network in many countries and the power of the incumbent telcos, who are better-funded than any other technology-related service provider group. This means that DSL is likely to become the dominant broadband technology in most countries in the short and medium term, and in many this is already the case.

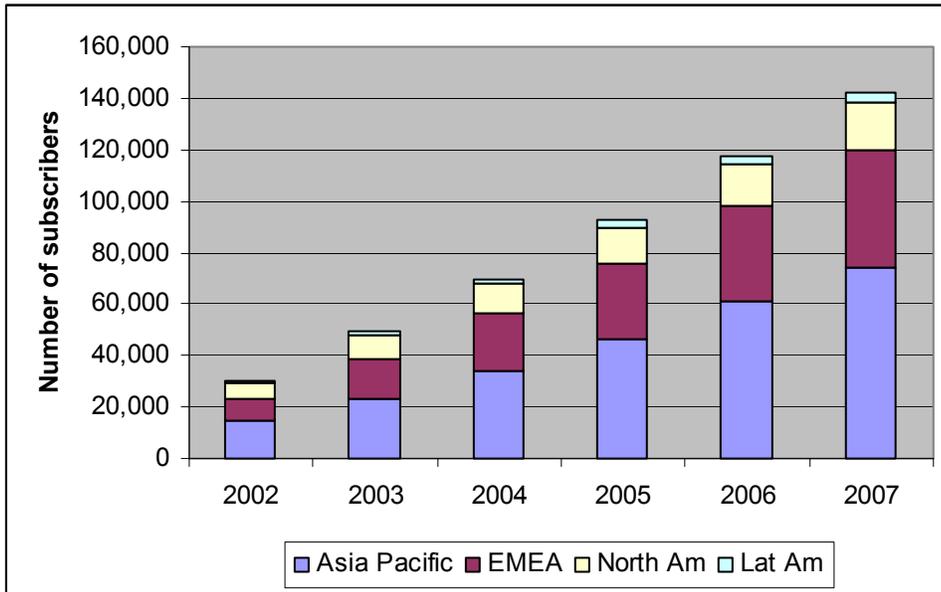
The evolutionary character of DSL means that it could also dominate over the longer term, though that is less certain. In principle, new variants of DSL will enable most services that

will be available in the foreseeable future to be delivered over DSL. Two new variants of DSL, VDSL and ADSL2, are capable of delivering several very high-quality video feeds to consumers.

Exhibit 20 shows the Yankee Group's forecast for DSL-based broadband worldwide.

Exhibit 20: DSL-based Broadband, 2002-2007, Global

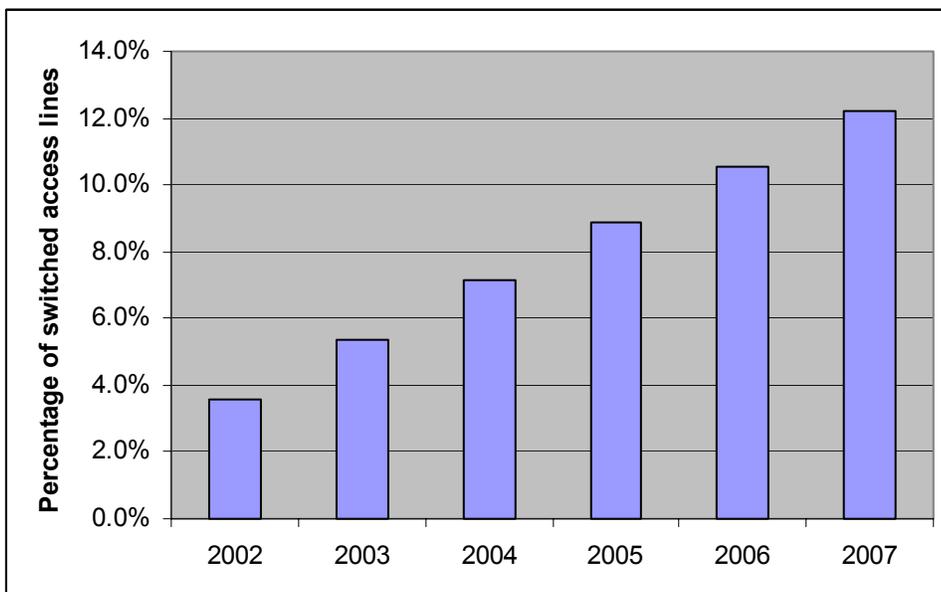
Source: The Yankee Group, 2003



Despite its relative success, however, note that DSL will remain a minority service, with just 12 percent of all global telephone lines converted to broadband by 2007.

Exhibit 21: Percentage of Global Switched Access Lines Converted to DSL

Source: The Yankee Group, 2003



3. Cable Modem

Cable modem technology led the early broadband market but has fallen behind since—largely because telcos are much better funded than cable TV companies, and in fact many cable TV companies, especially in Europe, are in serious financial trouble. Only in the US is cable modem the dominant technology today. In Asia, the most successful broadband region today, cable modem accounts for 31.2 percent of all broadband subscription now but this will fall to 16 percent by 2007.

During the next five years, the Yankee Group expects the proportion of broadband subscribers using cable modem to fall from around 44 percent to around 27 percent. Only in one region—North America—will it remain the dominant broadband access technology.

Cable modem technology offers similar performance in practice to DSL, though the way it does so differs. Coaxial cable is inherently a higher-bandwidth medium than twisted pair technology, so in principle it is easy to deliver at least 10Mbps over one cable. However, because cable networks are built to deliver television, they are not architected for point to point Internet services, and the bandwidth is therefore shared among as many users as are on the network at any one time. The result is that users get a similar performance on cable modem and DSL. In principle, performance can be improved by reducing the number of users sharing a specific segment, but this entails costly network upgrades.

4. Optical fiber (FTTH)

The theoretical bandwidth of optical fiber is to all intents and purposes unlimited. In practice, current implementations typically offer Ethernet speeds—usually 10Mbps, but some offer 100Mbps, and 1Gbps is feasible, if unrealistic in the current residential market.

The cost of optical fiber has held back its wide deployment, but it has fallen steadily. In a greenfield housing development where no cable has been laid, optical fiber is still more expensive than twisted pair cabling, but the differential is narrower than it was (according to our US estimate, about \$1,500 per household, against \$1,000 for twisted pair). However, since most of the cost is in the installation of the fiber under the pavement or other surface, it remains much more expensive to deploy than DSL where copper cabling already exists. Despite the development of lower-cost deployment techniques such as micro-trenching, this will continue to be the case. In time, **fiber to the home** (FTTH) may be obsoleted by improvements in wi-fi technology, which could deliver very high bandwidth at very low cost in uncabled areas (see below). However, it could still play a role in hybrid networks in which wi-fi is only used for the final connection to the home.

Despite the high cost of deployment, interest in FTTH has grown markedly in the past 12 months. In Europe, the success of FastWeb in Italy, which has the highest ARPU of any European broadband operator, has renewed interest. There are currently about 380,000 residences directly connected by fiber, and we expect this to grow to 2.7m by 2007, or about 1.8 percent of all households.

Most FTTH implementations are small-scale in the US, connecting about 70 small cities and communities to date, but we expect penetration to grow gradually. The major ILECs such as Verizon are committed in principle to a widescale and highly ambitious FTTH deployment, and have issued RFPs to big equipment vendors in the past year. The ILECs believe that FTTH will result in higher ARPU and regulatory relief on unbundling rules. If this deployment really takes place, it will drive down all costs and make FTTH a more realistic

proposition everywhere, and not just in the US (in fact, some vendors are thought to have quoted \$300 per household on mass deployments). However, we believe there is unlikely to be mass deployment for at least five years in the US, and we forecast fewer subscribers and lower penetration than in Europe through 2007.

Asian markets such as Japan were among the earliest to show real enthusiasm for FTTH, but that enthusiasm has waned in the wake of difficult trading conditions and the emergence of cheap alternatives based on cable and DSL. Although fiber has been deployed in several markets including Japan, China and Korea, we believe there is little growth.

5. Satellite Devices

Satellite as a broadband technology is a niche application today, mainly targeted at businesses though there is also a steady increase in residential subscribers. Typical services offer downstream speeds of 256kbps-600kbps.

In Europe, there are about 200,000 subscribers to broadband satellite services in 2003, and we expect this to grow to around 550,000 by 2007.

There are two main problems that will hold back its wider deployment for the foreseeable future. First, it is inherently a broadcast technology, making it difficult and expensive to deploy a true broadband upstream (also known as back channel) connection over the satellite itself. True two-way services are currently restricted to businesses. As a result, satellite broadband usually uses dial-up for the back channel, which is inconvenient and poorly adapted for some applications (such as peer to peer applications). It also rules out satellite wherever a phone connection is not available—making it less attractive in countries with undeveloped phone networks. However, in principle it would be possible to use wireless technologies for the back channel (including cellular mobile phones), which might give it a greater utility in these situations.

6. Powerline

Powerline technology (which delivers telecommunications services over existing electricity cables) has been around as an idea for over a decade, but has made little progress in the market and has attracted little interest among suppliers. However, interest has renewed in the past 12 months, driven by a range of new developments.

Most importantly, a Spanish chip designer, DS2, has developed two variants on powerline that offer much higher speed broadband connections at a modest cost per subscriber. DS2's current chip offers a line speed of 10Mbps. A new variant, which will be commercially deployed from January 2004, offers line speeds of 200Mbps. Supporters note that powerline is synchronous, offering the same bandwidth in both directions, and making it more suitable both for business applications and popular peer to peer applications.

This technology has attracted strong interest from Endesa, Spain's biggest electricity utility (and also the third-largest electricity utility in the world) and Iberdrola, another Spanish power utility. Both have launched commercial services in Spain. The European Commission has given strong encouragement to powerline because it sees it as a way to achieve a key policy goal: wider and more rapid deployment of broadband services in Europe. In a Commission document issued in June, the Commission said that member states should

“encourage” the deployment of powerline, and it has also led a related initiative to end uncertainty about radio interference.

There is growing interest in powerline in less developed economies like those of the EU accession countries such as Poland and Hungary, as well as others that include India and Russia. Here, electricity networks have a greater reach than telephone networks and could therefore play a bigger role in bringing the Internet to a wider audience.

The key issues in powerline are connected with the suitability of electricity cables to carry telecommunications signals. Although large-scale trials suggest that the service now works reliably, it is clearly dependent on the state of the electricity infrastructure: where this infrastructure is in poor condition, it won't be possible to deliver telecommunications services. A second issue is radio interference. Because electricity cables are unshielded, powerline signals interfere with certain radio signals, particularly shortwave radio. This has led to a strong campaign against powerline, especially in the US, by radio enthusiasts.

7. Broadband Fixed Wireless, Wi-Fi and Wi-Max

Fixed wireless has had a long and often disappointing history. Unrealistic expectations, poor carrier business models, and unproven technology plagued the early fixed and broadband wireless industry. However, while the broadband wireless market is still in its infancy, vendors are beginning to overcome technical obstacles such as line-of-sight (LOS) connectivity and produce broadband wireless products that function effectively in live deployments.

As with powerline, several recent developments have renewed interest in broadband fixed wireless, especially as a residential technology.

First, orthodox broadband fixed wireless technology is finally being successfully deployed, especially in the business market. The more it is deployed, the better it works and the lower the price for component technology. Among those who have deployed services in one of the three major bands (2.4GHz ISM, 3.5GHz and 5GHz) are Millicom in Peru, Speednet in Tokyo, IP Zone in Norway and Gold Mind Telecom in China. Other networks are planned in several countries in Europe, as well as in the US and Asia.

Exhibit 22: Significance of Technologies in South Africa Relative to Global Situation

Source: The Yankee Group, 2003

Technology	Significance (Higher/Lower/Same)	Commentary
DSL	Same	Although DSL has got off to a slow start, Telkom's dominance of the market means that it will be at least as significant as it is in other countries. The major uncertainties are whether wireless and other alternative technologies find a foothold, and whether Telkom chooses to cut the current high price.
Cable modem	Much Lower	There is no likelihood that cable TV will be at all significant in South Africa.
FTTH	Lower	FTTH could play a part in a few affluent districts if the facilities market is deregulated and independent metro networks are created, but the specific circumstances of SA make wireless a better likely bet in most cases
Satellite	Same	Satellite communications is insignificant as a broadband residential technology today, and the lack of an obvious back-channel combined with the high cost of ownership for satellite service suggests that it will not have much impact in residential markets except at the margin
Powerline	Higher (?)	Given the relative state of development, and uncertainty about the local electricity infrastructure, the significance of Powerline is hard to judge. However, it could become very significant if the current uncertainties are resolved, given the relative penetration of fixed line networks and electricity networks.
Broadband fixed wireless	Higher	Broadband fixed wireless is likely to play a significant part in the development of South African broadband. Both Sentech and the SNO are likely to use BFWA, and the technology could get a further boost from standards such as wimax (802.16)

Second, a broadband wireless service usually known as wi-max is developing a strong momentum. As the name suggests, wi-max (IEEE 802.16) is a variant on wi-fi (IEEE 802.11), the highly successful technology developed by the IEEE. Wi-fi is well-established as a LAN technology and is beginning to make an impact as a “hotspot” technology in airports and similar places. However, wi-max (known in IEEE language as 802.16) is designed specifically as a local access technology (with a range of up to 50km from one base station), primarily to reach areas not reached by wired broadband. The standard was completed in January and modems are expected to retail initially for around \$500, starting in late 2004 or 2005.

The main uncertainties for wi-max are that there is no standard frequency band (it is designed to work anywhere between 2-11GHz), and it requires a low-frequency allocation (below 1MHz) to work really effectively (since the lower the frequency, the lower the attenuation from walls, weather etc).

As an alternative wi-fi itself could be used as a local access technology, but since it is not really designed for this application it seems unlikely in the foreseeable that it can play anything more than a niche role.

F Transport Network Technology: Development and Impacts

Economic recession has impaired the ongoing development of fixed telecoms operators' transport networks in recent years. However, carriers continue to shift their limited capital expenditures toward packet-based systems, as firm plans are in place to consolidate autonomous networks on a common IP/MPLS infrastructure. The Yankee Group recently finished extensive interviews with more than 20 carriers worldwide. Despite several holdouts, at least 80 percent of Tier 1 carriers in Asia, North America, and Europe have firm plans to directly increase levels of voice, video, and data traffic over IP/MPLS. During 2001, for example, the U.S.-based Verizon spent 28 percent of its revenue on capital expenditures. Although that level of spending will not return soon (if ever), carriers have shifted more of their budgets towards packet-based routers and switches. This shift coincides with the commitment to IP/MPLS, and will continue throughout the forecast period of this report.

1. Drivers for Growth in Transport Networks

The growth of the IP VPN market worldwide, particularly in China will drive changes in the network core. The market for IP VPN services in China will see revenue growth of 70 percent CAGR from 2003 to 2006, when it will reach a market size of more than \$1 billion. To meet demand, wireline and wireless operators in China are spending heavily on IP infrastructure. North America and Europe both expect in excess of 35 percent CAGR in IP VPN revenues.

Consumer applications like gaming, peer-to-peer file sharing, and VoIP are driving core router spending, and also forcing carriers to examine how IP networks deal with real-time traffic. Consumer broadband subscriber growth is a worldwide phenomenon: In the U.S., service providers will add an average of 5.8 million broadband subscribers per year during the next 5 years. In Japan, by the end of May 2003, 398,000 subscribers were accessing the Internet through a fiber-to-the-home (FTTH) connection ranging from 10 Mbps to 100 Mbps. Only 50,000 subscribers had such access one year ago. Other consumer broadband hotbeds include Korea, China, and parts of Western Europe. These drivers are not the only factors that will influence the market for investment in the core of carrier networks: The rebound of enterprise IT spending will also contribute.

2. Services that the Next-Generation Transport Infrastructure will Support

Unlike in the traditional model, where incumbent vendors were responsible for creating applications on their switches, the next-generation transport will have integrated a platform to create applications. This will allow fixed telecoms operators to either create their own unique services or outsource this function to third-party developers. In either case, the time-to-market for these services will be exponentially reduced.

Businesses and consumers are asking for new productivity-enhancing services that will simplify management of their devices. Enhanced services such as find-me-follow-me and unified messaging reduce the time and complexities involved in managing the many end points available.

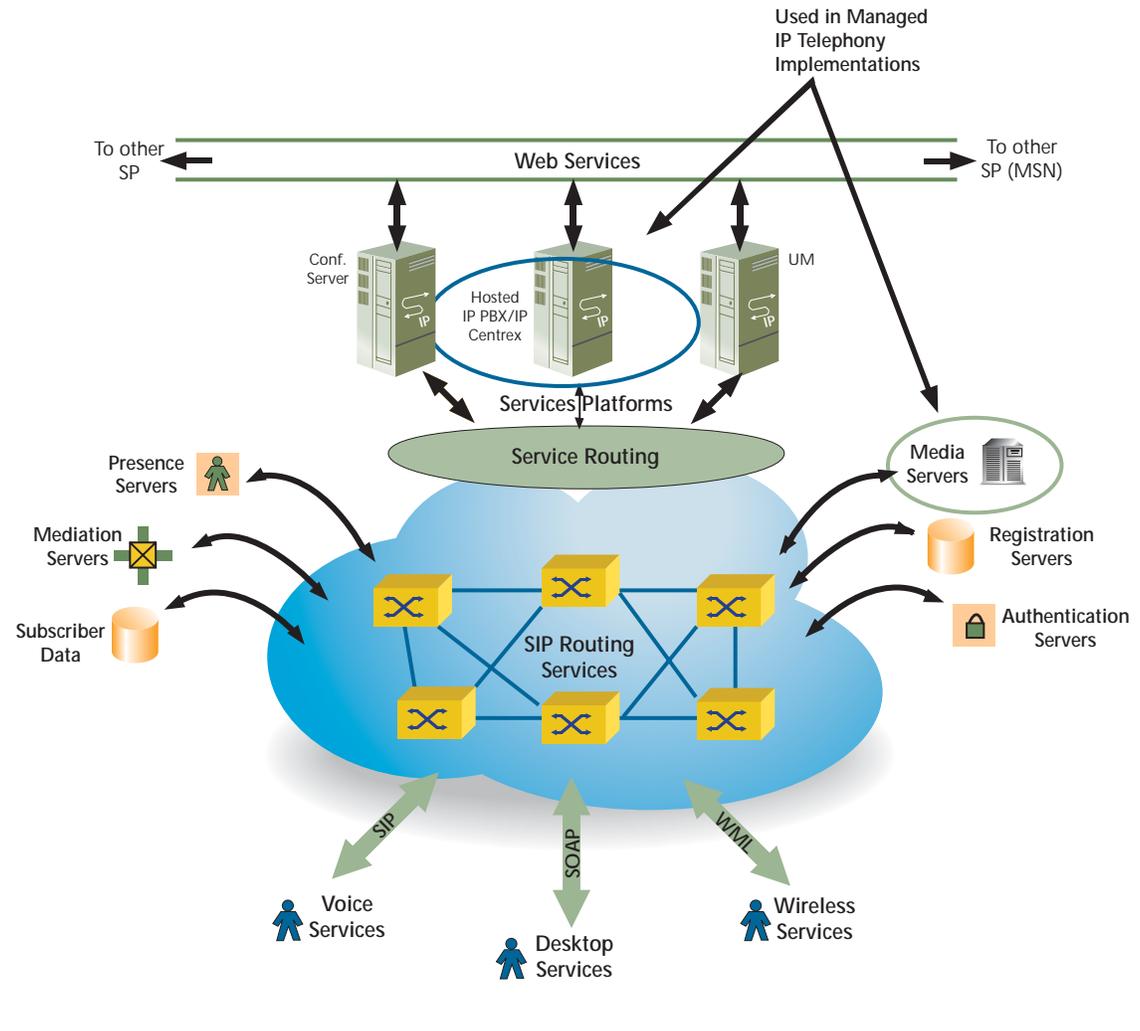
One of the top applications fixed telecoms operators are demanding in the next 12 months is hosted IP telephony. **Hosted IP telephony can help businesses increase their productivity by virtually eliminating the boundaries of the workplace, making them more accessible**

to clients and colleagues. We believe this comprehensive offering will become the foundation on which all other services will be built.

Exhibit 23

Network Elements for Typical Hosted IP Telephony Implementation

Source: Sylanro Systems and the Yankee Group, 2003



3. The Drive for Network Simplicity

As carriers evolve their networks, they are also looking to simplify integration and management and increase flexibility in service creation and delivery. Their goal is to lower capex and opex by reducing the quantity of network elements. Some vendors are touting that their products converge several network layers and services within the same platform.

Service providers are showing interest in these devices for pay-as-you-grow and best-of-breed capabilities. The argument among vendors and their customers centers on how much

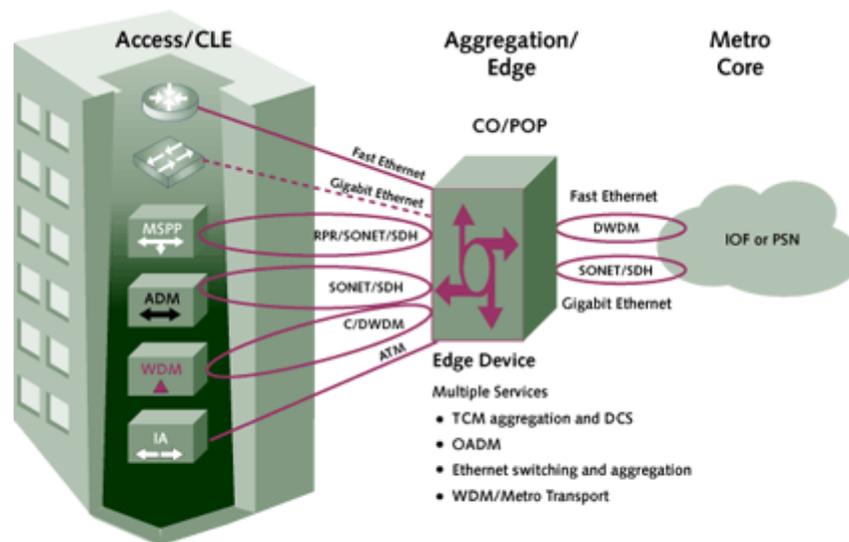
additional functionality these platforms should incorporate—and at what cost. Some of the key functionality under discussion includes:

- SONET/SDH transport
- Time-division multiplexing (TDM) aggregation
- Ethernet switching and aggregation
- Wavelength-division multiplexing (WDM) transmission

Some carriers will opt to combine the functions and layers into one platform, moving forward with their evolution quickly. Others will opt for legacy equipment to continue its functions while eventually moving to a cap-and-grow strategy once they can prove the return on investment and establish a standard operations model. Although the evolution will take time, opex will become a differentiating factor for carriers. The faster carriers can achieve network simplicity and opex savings, the sooner they will have a leg up on the competition.

Exhibit 24
Simplified Network Architecture of Edge Device with Combined Service and Networking Layers

Source: the Yankee Group, 2003



The combinations of networking layers and functionality differ among vendors. In all cases, the goal is to reduce networking equipment, simplify architectures and provisioning, and provide the ability to handle a number of different services by combining a number of network layers

4. WDM: Ensuring Fiber Efficiency to Meet the Hunger for Bandwidth

WDM systems are traditionally deployed to relieve fiber exhaust, where the cost of acquiring new fiber, either by building or leasing, is more costly than purchasing WDM equipment.

When a service provider installs WDM into the network, existing SONET/SDH systems, which had previously occupied a fiber pair each, can be rolled onto the WDM system, freeing up even more fibers. These newly spared fibers can then be used for additional WDM systems, increasing the fiber capacity in those cross-sections by orders of magnitude.

The more interesting application for WDM is as a platform for new services. WDM's flexible interfaces and bandwidth capabilities give marketing organizations more outlets to find ways to cost-effectively offer their product. For example, many vendors now have a pay-as-you-go option, with low up-front cost coupled with the ability to increase capacity incrementally. This allows service providers to offer new services quickly and with low capex, and then spend additional capex as needed.

The Yankee Group has identified the following new applications for WDM:

- Wireless Backhaul,
- Video on Demand,
- Enterprise Deployments and Campus Extensions,
- Storage-Area Networks,
- Managed Wavelength Services,
- Native Optical Ethernet Services, and
- Carrier-to-Carrier Interconnect.

5. The Emergence of Carrier-Class Ethernet

Ethernet has evolved dramatically for a protocol that was meant to simply connect a workstation and a graphical user interface. Service providers are developing their metropolitan area networks (MANs) to take advantage of Ethernet's simplicity and ubiquity. Ethernet has outlasted and outpaced every other competing protocol and continues to evolve from its original half-duplex speed of 2.9 Mbps to 10 Mbps to the recently standardized speed of 10 Gbps.

Ethernet's ability to carry up to 10 Gbps over 40 km makes it a good candidate for an underlying transport technology. Ethernet can play two distinct roles in a carrier's network:

- **Service interface:** Ethernet as a universal interface can provide a range of standard voice and data services to compete with legacy frame relay and private line services.
- **Transport interface:** Using Gigabit or 10 Gbps Ethernet as the underlying transport mechanism, Ethernet can efficiently transport data traffic, eliminating SONET/SDH architectures.

Carriers are moving forward with optical Ethernet infrastructures with two distinct strategies: building new optical rings or point-to-point infrastructures within the metro edge access points for current demand, and using a cap-and-grow strategy by replacing legacy Add-Drop Multiplexers (ADMs) with newer MSPPs. Both strategies are driven by customer demand. Progress with optical Ethernet differs according to region:

- **Asia:** Asia is aggressively deploying optical Ethernet infrastructures, specifically in Korea, Singapore, China, and Australia. Increasing bandwidth demand from enterprise

customers is fueling growth for emerging and incumbent carriers. Deregulation is driving competition from new entrants, forcing the hand of incumbents. Larger providers, such as China Netcom and KDDI, have deployed RPR.

- **Europe:** Europe trails Asia as the second most active region for optical Ethernet. Carriers such as Telenor and Deutsche Telekom, have announced optical Ethernet initiatives. PTTs have quickly migrated from their legacy ADMs into multi-service platforms increasing the overall activity within the region. Incumbent legacy transport vendors for much of the larger carriers are quickly trying to revitalize their product portfolios to ensure they hold their existing customer base within the region.
- **North America:** Most top United States carriers have chosen vendors for optical Ethernet deployments, although not all have been made public. In Canada, there has been little activity for optical Ethernet for major providers except for Bell Canada and municipalities. During the first half of 2004, activity will come from MSOs, which will use optical Ethernet to ramp up networks for increased data transport. Tier-1 wireline carriers eagerly await the ROI from optical Ethernet networks deployed during the first half of 2003.
- **Rest of the world:** Optical Ethernet has been slow to gain traction in these regions mainly because of low bandwidth needs and available capex. There was some RFP activity in Mexico and Brazil during the second quarter of 2003, which should be awarded during 2004. Carriers are starting to deploy pay-as-you-grow optical Ethernet modules to add data when and where customers require. These carriers are more concerned with provisioning and efficiency than with scalability. Trials are underway for many vendors, but few large-scale deployments have been announced.

II. A Review of South African Communications: The Current Situation

A. The Current Market By Revenues and Subscribers

1. Consumer Fixed Line and Media Market

i/ Market Overview

By comparison with the mobile market, the consumer fixed line market in South Africa is somewhat underdeveloped. However, the pay-TV market has been relatively successful, though necessarily limited by income inequality.

Both markets may be reaching saturation in the upper-income residential sector, and extending access to other users will entail creative product innovation to reduce the cost and, in some cases, universal service measures of various kinds.

Globally, the Yankee Group divides its consumer forecasts into three parts:

- **switched access**, including line rental, telephone service calling, and dial-up Internet;
- **broadband** including DSL, cable modem and alternative access services; and
- **subscription television**, focusing usually on digital TV.

This review will follow a similar scheme.

ii/ The Consumer Switched Access Market

Since 1996, the number of phone lines has waxed and then waned, a consequence of a misplaced policy for extending universal service. Telkom added 2.8 million lines in line with a mandate in the 1996 Telecommunications Act, but over 70 percent were reportedly disconnected because of non-payment. At the same time, an attempt to improve access by issuing separate licenses to cover underserved areas failed to make progress. No licenses have been issued. A separate effort by the Universal Service Fund to develop a network of community telecentres has also been widely judged a failure. Meanwhile, the number of mobile phone subscriptions has risen fast.

As a result, South Africa is one of the few middle-income countries in which the number of phone lines is in decline. The number of lines has fallen every year since 2000, with no clear sign that this decline will be reversed in the immediate future. In the residential market, the decline has been somewhat more marked as the balance between business and residential lines has shifted slightly towards business lines. In fact, the number of residential lines per 100 people (residential teledensity) has fallen from around 6.5 in 1997 to around an estimated 5.3 in 2003. About 55 percent of all lines are residential—rather low by international standards.

We believe there are three key reasons for the current decline in residential lines:

- The high monthly rental fee and the high cost of local calls. High rental fees (ZAR76 per month) create discouraging entry barriers for lower income users, and have encouraged migration to pre-paid mobile. Both rental fees and local call prices have risen ahead of inflation because of a tariff “rebalancing” program; local call charges nearly doubled between 2001 and 2003. ARPU has risen by more than 30 percent in nominal terms since 2000, against a global picture of declining nominal ARPU in competitive markets (albeit against a lower inflation rate—inflation in South Africa over the period 2000-2003 was approximately 25 percent). Although Telkom now offers a so-called PrepaidFone option, it still entails a monthly charge of ZAR47.23.
- The wide availability of prepaid mobile services, which appeal to customers who do not want to pay any regular fee upfront. 84 percent of mobile customers are prepaid customers, and spend ZAR87 per month—only slightly more than Telkom charges just for the line. Where usage is low, even the PrepaidFone option is more expensive than a pre-paid mobile phone.
- The high level of income inequality in South Africa, which makes it particularly difficult to price services to appeal to those in different income bands, and to take penetration beyond the top 20 percent or so of households. A large rural population (42 percent of the total) also makes fixed line communications problematic.

In our forecast, we have assumed that the decline in lines will slow and then reverse over the next five years, for the following reasons:

- Regulatory action enables underserved license holders to begin to make an impact, albeit limited at first
- Telkom slows the increases in rental and local call charges, and the regulator imposes somewhat tougher price controls (using the CPI-X mechanism)
- The SNO and possibly others begin to make an impact, albeit small at first, with so-called limited mobility services (which we consider to be a fixed network service).

None of these assumptions will necessarily prove correct; if they do not, then we would anticipate a continuing decline, albeit limited, in the number of residential access lines.

Our switched access market forecast includes the usage component of dial-up Internet access, a relatively competitive market in South Africa. Although a few players (including Telkom, M-Web and Tiscali) probably account for the majority of consumer accounts, there are many small ISPs who often price their services competitively and offer valuable add-on services including, for example, advice on security and computer maintenance.

Internet dial-up services are priced competitively by international standards, with prices ranging from around ZAR89 to ZAR149 per month. Although it is not a part of our forecast, we estimate that there are approximately 600,000 dial-up residential Internet accounts (estimates differ widely, from around 400,000 to 800,000), generating revenues in the region of ZAR750m per annum.

However, when the cost of local phone calls is factored in, the cost of Internet access is high and rising because of a steady increase in local phone rates. Unlike more mature and more liberalized markets, South Africa has not introduced a FRIACO-type regime for dial-up Internet access. FRIACO (flat rate Internet access call origination), a scheme originally introduced by Oftel in the UK but now used in most countries, regulates the cost of interconnect to incumbent telco local networks in such a way that ISPs are able to offer flat-

rate Internet access without any dial-up charges. Hence while the overall cost of using the Internet has fallen in most countries, in South Africa it has risen. Moreover, the proportion of Internet charges accounted for by the phone charge, as opposed to the ISP charge (assuming constant use) has risen sharply. Where a user spends two hours per week on the Internet, the total cost per month, including ISP charge is about ZAR300 per month (assuming equal time on line at peak-rate and off-peak times). This compares (for example) to ZAR360 per month for Multichoice's premium pay TV package—available, of course, for much longer than two hours per week.

In consequence (although we do not have documentary evidence to prove it) we believe it is highly likely that South African residential users are not online nearly as long as those in more liberal markets. Our research in other territories has shown that this severely retards the development of ancillary markets such as online advertising, e-commerce and content.

Although the high cost of local calls is one factor discouraging the spread of the Internet among consumers, it is not the only factor. In fact, the biggest hurdle to Internet usage in middle and low income countries is the high cost of PCs, as well as their relative complexity. The Yankee Group believes that only around 60 percent of European households will ever access the Internet using current-generation PCs, because of their cost and complexity. In South Africa, we believe that only about 10 percent of households own an Internet-ready PC, and the total potential market, bearing in mind income levels is probably no higher than 15-20 percent of households even if a more favorable flat-rate Internet service were introduced. In fact, the market for dial-up Internet is already quite flat, suggesting that current penetration of around 8 percent is as much as the market can bear at current prices.

iii/ The Consumer Broadband Market

As we noted in Section I, consumer broadband has been one of the outstanding success stories of the past two years in higher income countries, outstripping early estimates for growth. In most middle income countries (though not all), it has been slower to develop, and South Africa is no exception.

Until November 2003, there was effectively only one provider of broadband services in South Africa: Telkom. Although it was possible for other providers to resell Telkom's DSL services, there is no regulated wholesale offer, and the price differential is said by providers to be too narrow to provide sufficient margins. Consequently most broadband customers today are Telkom customers.

Telkom launched its service in 2003. At September 2003, Telkom reported that it had a total of 4,000 DSL customers, up from 2,500 in March 2003. Telkom does not report the split between residential and business customers for DSL. However, based on our knowledge of market development elsewhere, on Telkom's positioning of the service as a business service, and on the price, we believe that the majority of broadband customers today are business customers, and many residential customers are probably home office users who run their businesses from their residence. For the purposes of our forecast, we have assumed that 80 percent of customers in 2003 are business customers. On this basis, only about 800 customers are residential broadband users. However, note that in other markets, it is likely that the boundary between the two sectors is blurred by home office users, who constitute a significant proportion of all broadband users during the earliest stages of its development.

This compares to very much higher penetration rates elsewhere. Even if the total available market was assumed to be 1.5 million households, the penetration rate is still far behind that in countries such as Australia or Spain.

Three factors are preventing the more rapid spread of broadband, in our view:

- The lack of a wholesale pricing regime, or another mechanism (such as local loop unbundling) that would encourage the development of competition and probably lead to the creation of consumer-specific broadband services;
- The high price of Telkom's DSL service; for comparable services in Europe, the price is approximately ZAR250, less than one-third of the price in South Africa, despite the recent movement in the exchange rate and despite the fact that average incomes are much higher. Prices are even lower in Asian countries such as Japan and Korea that have specifically targeted mass-market broadband. Because the price of dial-up access is relatively low, broadband users must be relatively heavy Internet users to justify trading up to broadband.
- The high cost of international bandwidth. When buying a leased circuit to the US, the most important Internet destination, some ISPs and VANs report that they pay about five times as much for the half-circuit from Telkom as they do for the half-circuit from AT&T or other US providers. As a result, circuits tend to be run close to capacity or in the jargon are over-subscribed, and this means that broadband users connecting to sites outside South Africa do not get a substantially better response time than they would using a dial-up connection.

In the business market, there has been criticism of other aspects of the Telkom service, such as the lack of static IP addressing and the 3Gbyte per month volume download limit. However, we do not believe these would substantially retard the residential market; countries such as Germany where volume limits are common have not seen lower take-up as a result.

In November, Sentech announced a new broadband service built on its multimedia license, and using fixed wireless as the delivery platform. The service has three tiers, at 128kbps, 256kbps and 512kbps. The lower tier packages are cheaper than Telkom's service, but offer lower download speeds. At this point, it is hard to say how significant this service will be. Sentech has no track record in marketing and supporting a consumer telecommunications service, and is using a relatively untested technology. The pricing is not particularly competitive against Telkom. In these circumstances, and based on our knowledge of other markets, we would expect its impact to be minimal in the first 12 months, and only modest thereafter.

In our forecast we have made three assumptions:

- That the Telkom price will fall gradually, but will not fall to the levels typical in more mature markets;
- That Sentech will make only a minor impact;
- That a more acceptable wholesale DSL or LLU offer will be developed before 2005, encouraging entry by third parties using Telkom's lines

As with the switched access forecast, none of these assumptions is a foregone conclusion; if the environment is less benign, penetration will be lower; if a more competitive environment emerges, penetration will be higher.

iv/ Subscription TV

There are approximately 6.7 million households with TVs in South Africa, about 65 percent of all households, meaning that the TV set is probably the most widely distributed piece of communications equipment other than the radio set. However, these TV sets mostly receive free off-air broadcasts, and offer no route to “converged” communications at present.

Nevertheless, South Africa’s subscription TV market has done well by comparison with similar markets in other territories. Unlike many other countries, the market is entirely dominated by satellite TV, and one company has an effective monopoly as a subscription platform provider—Multichoice.

Multichoice began converting customers to its DSTV interactive digital package in 2002, and currently about 72 percent of subscribers take the digital service—about 730,000 digital customers in total. At ZAR360 per month, it is a relatively high-priced service by international standards, especially in view of the fact that there are no entry-level packages, and bearing in mind average incomes in South Africa. Nevertheless, Multichoice has penetrated 7 percent of all households and 12 percent of all TV households. In fact, the service can be seen to broadly match those in upper income countries, and presumably penetrates exactly the same kind of upper income household.

Taken overall, digital TV penetration compares favorably with other countries when income levels and inequalities are taken into account. In fact, if the available market for orthodox subscription TV is assumed to be the top 20 percent by income (ie, two million households), then penetration is around 37 percent and compares well with penetration in countries that have similarly high charges. However, the corollary is that the market probably cannot grow much more without further competition and significantly lower prices.

In our forecast, we have made the following assumptions:

- That a further satellite platform will be licensed from 2005 or 2006 at a much lower price point, but will have only a modest impact initially;
- That Multichoice will not introduce a lower-priced package for fear of cannibalizing its existing customer base.

Discussions about convergence usually focus in part on the potential of the satellite TV platform as a vehicle not just for video entertainment but also for Internet access, email and interactive services.

Multichoice has been providing these services for about 18 months. Although the company does not publish information on uptake or revenues, we believe that revenues are very small at present—as they are in most other markets. Among other things, Multichoice reported that it had 80,000 users of its interactive Playjam games channel. However, we believe that the number of users of Internet-related services such as email and Web searching is much lower.

In the world’s most developed interactive digital TV market, the UK, Sky earns less than 5 percent of its revenue from services not related to video entertainment.

Given that most satellite subscribers are relatively affluent and likely to have a phone line, Multichoice’s platform could also be a means for more conventional broadband Internet access, using the satellite platform for downstream services (typically at up to 600kbps) and the phone line upstream.

2. Wireless/Mobile Communications Market

i/ Introduction

South Africa now boasts a vibrant and competitive mobile communications market. Adoption of mobile services has accelerated at an unexpectedly fast rate over the past three years. The introduction of a third MNO in 2001 stimulated a new wave of competition, and ensured that consumers are receiving adequate levels of choice and service. Unlike the fixed telecommunications market in South Africa, the mobile market is competitive, growing quickly on most measures, and providing a platform for the country's leading MNOs to expand into other African markets. When benchmarked against many other comparable markets, the South African mobile communications industry, and the performance of its dominant players, compares favorably.

Nevertheless, there is scope for improvement. Penetration of full mobility services is still significantly higher among the more affluent segments of the market, though community service telephones (CSTs) have helped to extend the reach of telephony services to many rural areas. The contribution from mobile data services is still low by international standards, but this is largely due to demand-side factors. The MNOs are already offering data service portfolios that are close to the best available in other markets. Additionally, there is significant effort being made to promote the use of data services in South Africa. The introduction of SMS short codes is a good example. This is not something that has been achieved in many other countries.

We expect the South African mobile communications industry to continue to prosper over the next five years (see section IV for market forecasts). With the right degree and focus for regulatory intervention to stimulate competition and consumer choice even further, we are confident that South Africa can maintain its position as a healthy and vibrant mobile communications market, and will continue to attract outside investment in the sector.

ii/ Subscriber Base

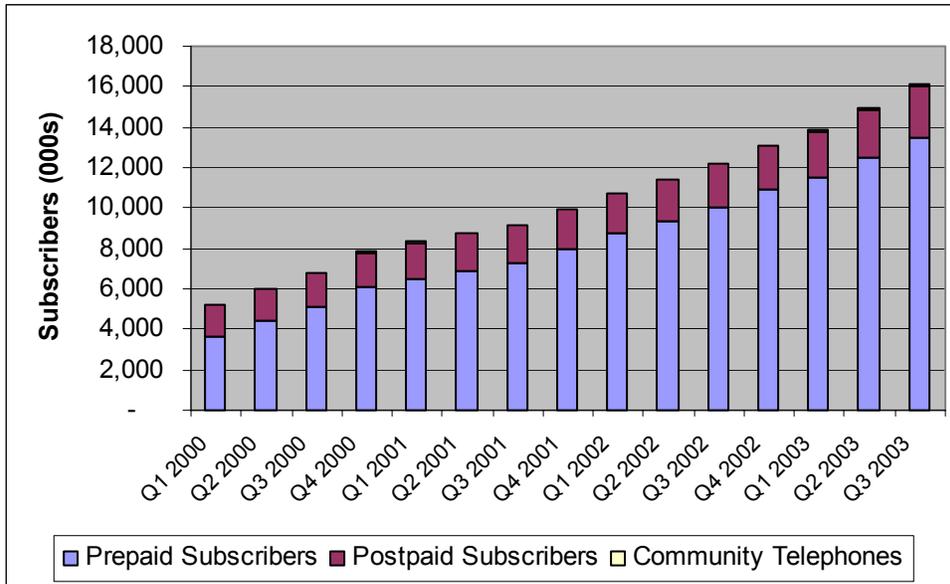
South Africa is the largest and most highly penetrated mobile market in Africa. At the end of September 2003 there were 16.1 million mobile subscribers, representing a penetration rate of around 37 percent.

The growth of the South African mobile subscriber base has not followed the stereotypical hockey stick pattern as illustrated in Exhibit 25. The market has seen a steady quarterly growth of 5-10 percent since the end of 2000 and 10-20 percent for the four quarters prior to that. There is no reason to suspect that any pattern other than steady growth will continue in the short to medium term. While South Africa has nowhere near the 80-90 percent penetration seen in European markets, its level of economic development and dispersed population means that penetration is likely to top out at a much lower level, probably around 50 percent.

Exhibit 25

South African Mobile Subscribers

Source: MNOs, The Yankee Group, 2003



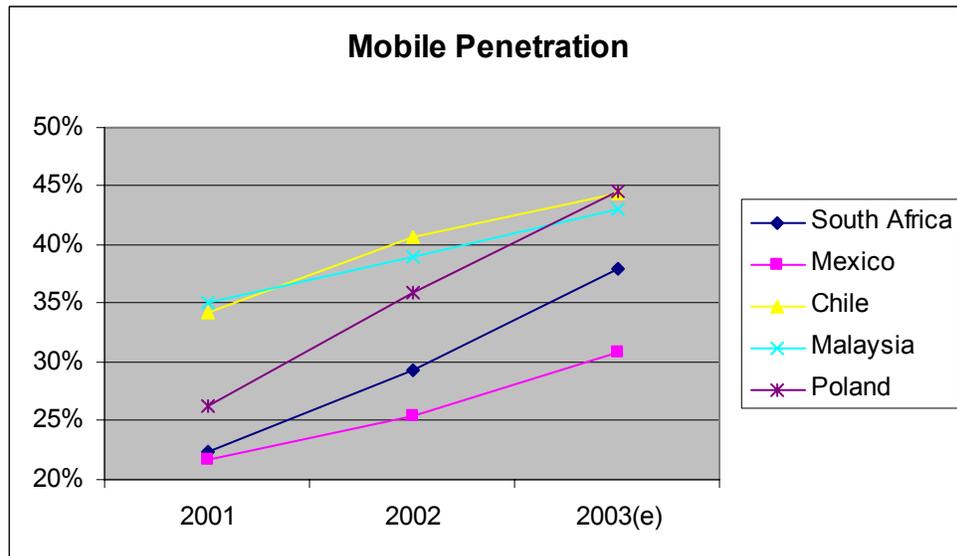
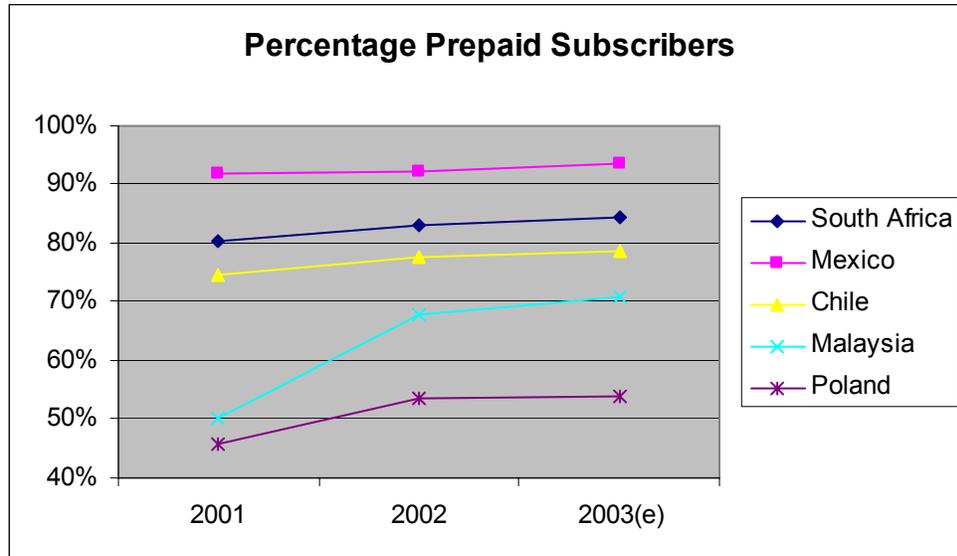
The main impetus to growth has come from the prepaid sector, which has gradually come to dominate the market. It accounts for 84 percent of subscribers today, up from 69 percent at the beginning of 2000.

As part of this report we will regularly refer to comparisons with a selection of markets that have broadly similar levels of economic development, for instance with reference to GDP per capita. In this section we will use Chile Malaysia, Mexico and Poland as the benchmark countries. Compared to these countries South Africa’s proportion of prepaid customers is typical as is the penetration rate (see Exhibit 26).

Exhibit 26

Benchmarking: Prepaid Subscriber Split and Market Penetration

Source: MNOs, The Yankee Group, 2003



One of the reasons for the remarkable success of mobile in South Africa has been the stagnation of the fixed line market. However, rather than losing out because of mobile's tremendous growth, Telkom in fact generates significant revenues from backhaul and termination. Additionally, as a 50 percent shareholder in Vodacom, Telkom benefits from the strong financial performance of the market leader. One of the potential benefits of the introduction of competition in fixed telecommunications services would be for MNOs to be able to build out their own links to base-stations, or to secure those services from an alternative provider. The introduction of competition should therefore drive down network operating costs.

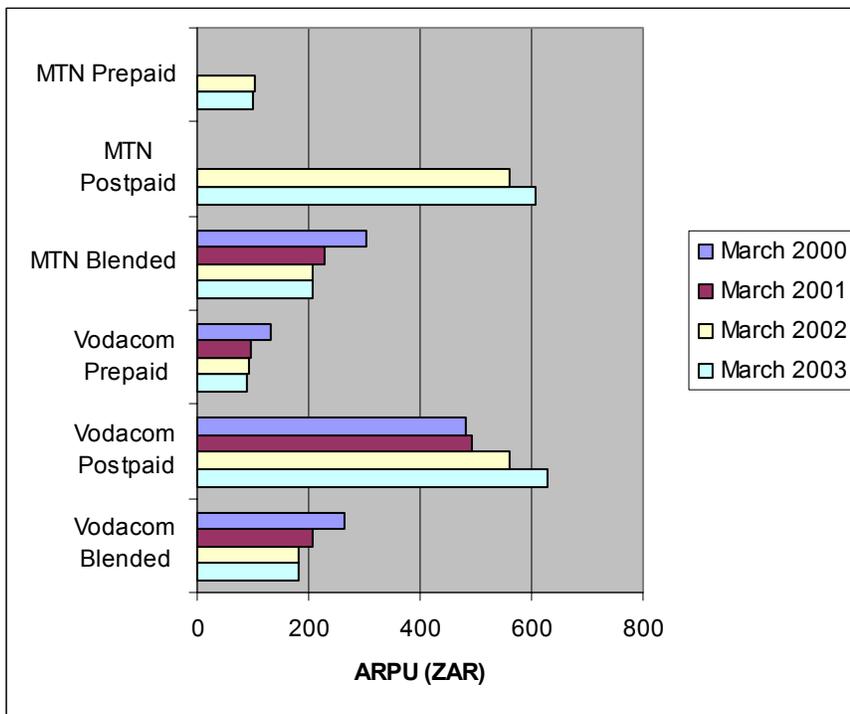
iii/ ARPU

With South Africa’s increasing penetration ARPU has declined. As mobile subscriptions spread from the less price-sensitive business and high-end consumer market into the mainstream of South African society the average value of a subscriber has inevitably declined. A quick glance at the ARPU development of MTN and Vodacom (see Exhibit 27) shows that over the four years shown ARPU declined by over 30 percent. Over the last twelve months, however, this decline in ARPU has largely been halted. The blended figures for both carriers have remained relatively stable in the twelve months to March 2003, falling from ZAR208 to ZAR206 for MTN and increasing from ZAR182 to ZAR183 for Vodacom. The most recent results, for the six months to September 2003 bear out the fact that ARPU has stabilized. Vodacom saw a 2 percent fall during the period, while MTN gained 0.5 percent. The stabilization of ARPU at Vodacom and MTN can be ascribed in part to the churning of low spending users to new entrant Cell-C. Overall, national ARPU continues to fall: at the end of September 2003 the national figure was approximately ZAR177, down from ZAR184 for the twelve months to March 2003.

Exhibit 27

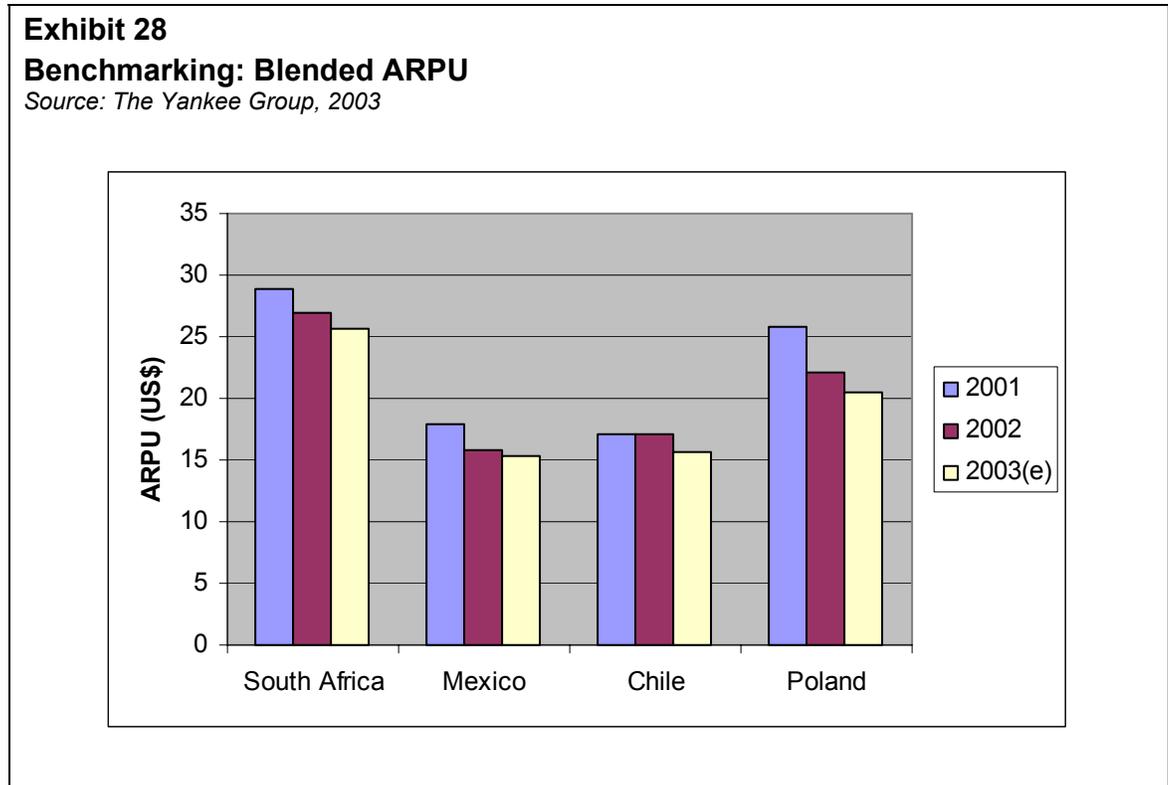
ARPU Stabilization at MTN and Vodacom

Source: MNOs, 2003



South Africa is still some way away from seeing ARPU stabilization. In Europe, most markets saw ARPU start to level off only as saturation occurred. South Africa is some way short of its - albeit lower - saturation level. Growth is consistent at 30 percent per year, compared to typically 5-10 percent in Europe, where in many markets ARPU has at best stabilized.

Compared to benchmark markets (as illustrated in Exhibit 28) South African ARPU is still relatively high, propped up by very high postpaid figures.



The result of increasing subscriber bases and only slightly declining ARPU has been an impressive growth in service revenues. The total value of the South African mobile market in the year to March 2003 was approximately ZAR27 billion (US\$4 billion) up 20 percent from ZAR23 billion the previous year.

iv/ Active and Inactive Subscriber Bases

South African operators report high levels of inactivity amongst their subscriber bases. The prevailing methodology for determining activity is whether a chargeable event (e.g. voice call or SMS message) has occurred in the previous three months. Even based on this conservative measure - in many markets six months is used - around 20 percent of South African subscribers are classed as inactive. Henceforth we will use the term “registered” to refer to the total customer base i.e. including active and inactive customers.

Ignoring inactive subscribers has a significant impact on many market indicators. The predicted total subscriber base is reduced to 13.7 million at the end of 2003 pushing the national penetration rate down to 30 percent. The effect on ARPU is also pronounced. Because the proportion of active subscribers is falling, the decline witnessed in registered ARPU is compensated for by fewer subscribers. The net result is that ARPU amongst active subscribers is set to stabilize in 2003 if levels of inactivity continue to rise.

Exhibit 29

Inactive Subscribers Push Penetration Up and ARPU Down

Source: MNOs, The Yankee Group, 2003

	2001	2002	2003
Registered Subscribers (000s)	9,952	13,104	17,369
Active Subscribers (000s)	8,695	10,912	13,715
Proportion Active	87%	83%	79%
Registered Penetration	22%	29%	39%
Active Penetration	19%	24%	30%
Registered ARPU (ZAR)	196	189	176
Active ARPU (ZAR)	223	222	217

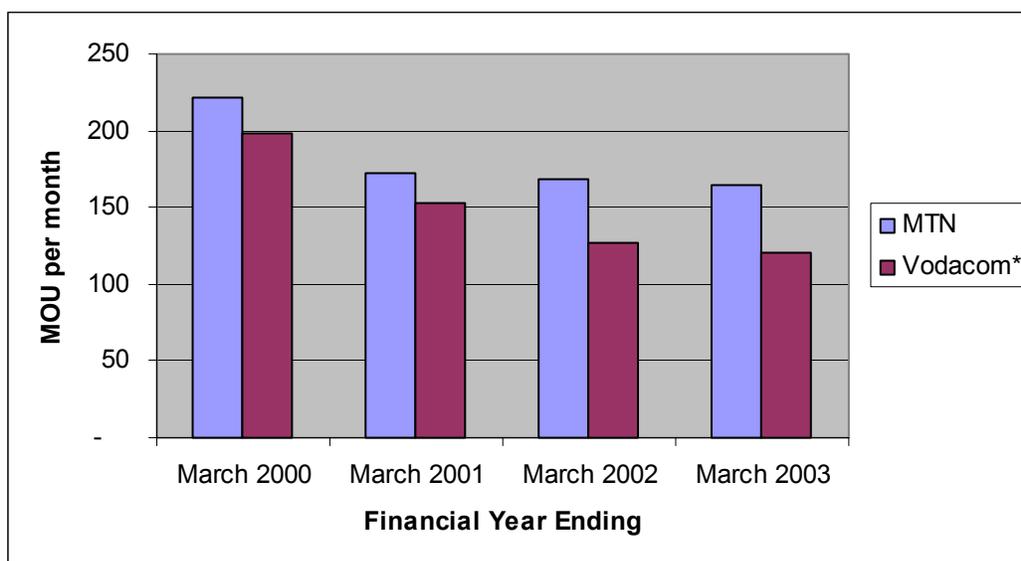
v/ Usage

Exhibit 30 shows that Minutes of Use (MOU) for Vodacom and MTN follow the same pattern as ARPU, largely stabilizing over the year to March 2003 in spite of the addition of over three million new subscribers. The implication is that the customers that have churned to Cell-C are significantly lower users. MOU data for cell-C is not currently available.

Exhibit 30

Average Minutes Of Use Stabilizes for MTN and Vodacom

Source: MNOs



* Yankee Group estimate

vi/ Carrier Positioning

Two operators, Vodacom and MTN were granted 15-year GSM licenses in 1993 and launched services in 1994. Prior to their launch there were no cellular operations in South

Africa. A third carrier, Cell-C was awarded a dual GSM-900/1800 license in November 2001. A fourth GSM operator may be licensed during 2004 when Cell-C's three-year exclusivity period comes to an end. In May 2003 Vodacom and MTN were also granted frequency in the 1800MHz band on a temporary basis.

Exhibit 31

South Africa: Market Summary

Source: MNOs

Operator	Launched	Subscribers (March 2003)	Subscribers (March 2002)	Annual Growth	percent Prepaid
Vodacom	1994	7,874,000	6,557,000	20 percent	85 percent
MTN	1994	4,723,000	3,877,000	22 percent	79 percent
Cell-C	2001	1,250,000	300,000(e)	317 percent	90 percent(e)

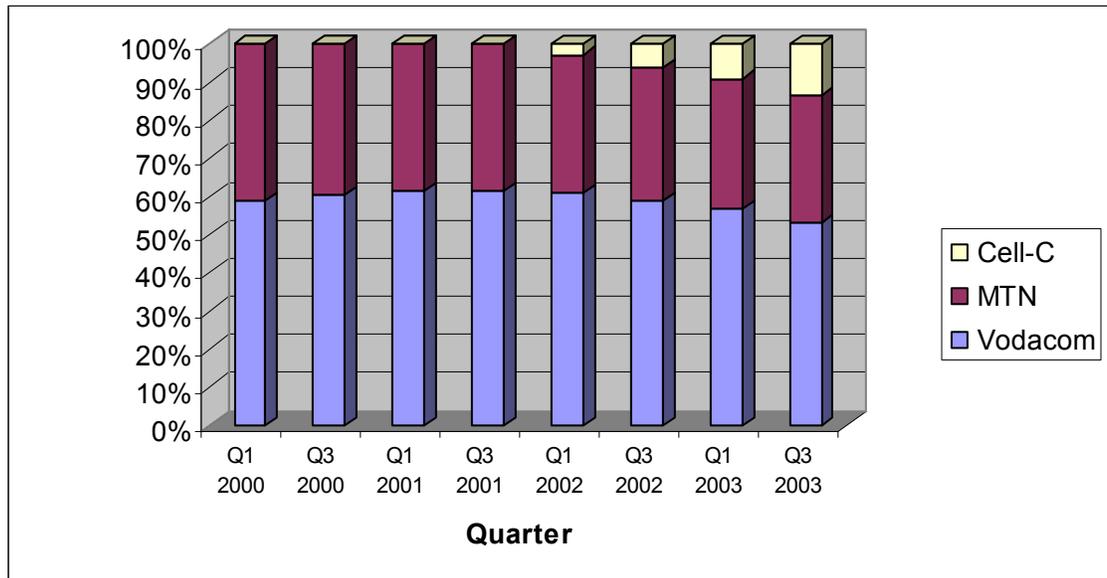
(e) Yankee Group estimate

The addition of new entrant Cell-C has invigorated the market. The operator is showing some success in building its market share - which currently stands at 14 percent - in the two years since its launch. Vodacom currently has 53 percent market share, while MTN has 33 percent.

Exhibit 32

Mobile Market Share: MTN and Vodacom Lose Out to Cell-C

Source: MNOs, The Yankee Group, 2003



Cell-C has adopted a traditional new-entrant approach, discounting heavily in order to win market share. While it claims to be targeting low value postpaid and high-value prepaid, evidence suggests that it has been more successful in attracting new low-end prepaid

customers. This success has largely been driven by Cell-C discounted prices compared to MTN and Vodacom - approximately 15 percent lower according to a report by JP Morgan. The lower costs are reflected in lower ARPU, around ZAR60 according to a recent estimate from Cell-C. Approximately 90 percent of Cell-C's subscriber base is prepaid.

The two established operators have adopted different strategies. Vodacom has used traditional incumbent tactics, exploiting its advantage in terms of channels to attract mass market prepaid customers, and using its established relationship with business customers to attract high spending postpaid users. Vodacom has an estimated 70 percent of business postpaid customers, compared to 53 percent of the total market. The result is that Vodacom has a higher contract ARPU than MTN, but a lower prepaid. MTN's strategy revolves around attracting high-value consumer users and this is reflected in its ARPU: lower than Vodacom for postpaid, but higher for prepaid.

Vodacom historically dominated the postpaid market, but in recent years this has been declining. At the beginning of 2000 Vodacom controlled 60 percent of the contract subscriber base. At the end of September 2003 this had fallen to 47 percent. In the meantime MTN had increased its share modestly from 40 percent to 43 percent, while Cell-C has taken 10 percent of the market. Historically Vodacom had a strong position with the business market, while MTN has put more emphasis on targeting consumer postpaid customers. With consumer growth outstripping business, MTN has managed to attract a disproportionate percentage of new contract customers.

In South Africa the three carriers handle only network operations. Customer acquisition and retention is the domain of the service provider. In addition to the service provider operated by each of the carriers, e.g. MTN Service Provider, there are a number of independent players. Some resell the services of all carriers (e.g. Nashua Mobile, Autopage), some for one or two networks, and others include mobile services as part of larger corporate accounts. The advantage of this system is that it is highly optimized for customer acquisition. With large numbers of independent players looking to take carriers' incentive payments, the route to market is virtually guaranteed. In future however, when new customers are harder to find and the service providers' efforts result predominantly in increasing churn, carriers will need to rethink their channel strategies. They will need to focus more on rewarding their channel partners for customer loyalty and service usage, rather than simply on the basis of gross additions.

Both Vodacom and MTN now have significant international presence, having extended their footprint into other African markets. This will allow both companies to continue to grow their total customer bases at strong levels, to compensate for slower growth in their domestic market.

vii/ Mobile Data Services

Data services will be an important revenue growth driver in future. Both MTN and Vodacom launched GPRS in 2002. Data accounts for around 4 percent of mobile revenue in South Africa. In the six months to September 2003 the figures for MTN and Vodacom were 4 percent and 4.5 percent respectively (see Exhibit 33). The contribution from data services is low compared with many European and Asian markets. There is clearly potential for this to grow. SMS has been the driver for most growth in data services internationally. We expect South Africa to follow a similar path, but, because South Africa will continue to be a more

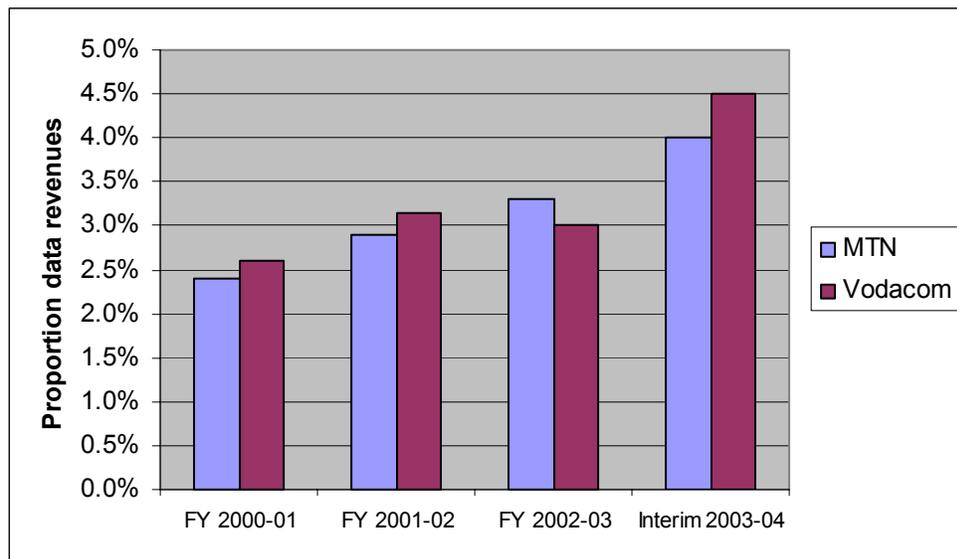
voice-oriented culture, we do not expect data revenues in South Africa to be comparable with those in Europe or most of Asia for the foreseeable future.

Due to the low penetration of data services today, there is currently little justification for the introduction of 3G services in South Africa. There are provisions within the current legislation that will provide 3G licenses to the existing MNOs. The exact timing for the take up of these licenses and the subsequent launch of commercial 3G services is still unclear. But we do not expect to see any significant adoption of 3G services in South Africa before 2006. This delay should not hinder overall development of the wireless market, however. It is more important for the MNOs to focus on existing, robust technologies to offer value-for-money applications, rather than be distracted by 3G technology that still has some technical glitches that need to be corrected.

Exhibit 33

Data Accounts For a Small but Growing Proportion of Revenues

Source: MNOs



viii/ Community Service Telephones (CSTs)

When licensed each of the three national GSM operators were obliged to provide community phones. The call charges for these phones are determined by the government, at R0.85 per minute flat rate throughout the day. MTN's license specified 7,500 CSTs, while Vodacom's was 22,000 and Cell-C 52,000. Vodacom and MTN have both exceeded their requirements. Cell-C expects to have 10,000 installed by 2004. These fixed GSM payphones are intended to extend access to telephones to previously underserved areas. CSTs are an important means of improving universal access at a community, rather than household, level. They provide many communities with their first taste of telecommunications, and therefore serve as a platform to extend access to other telecommunications services in the future. Though some of the MNOs claim to be operating the CSTs at a loss, it nevertheless provides them with an opportunity to prime the market for standard mobile communications services.

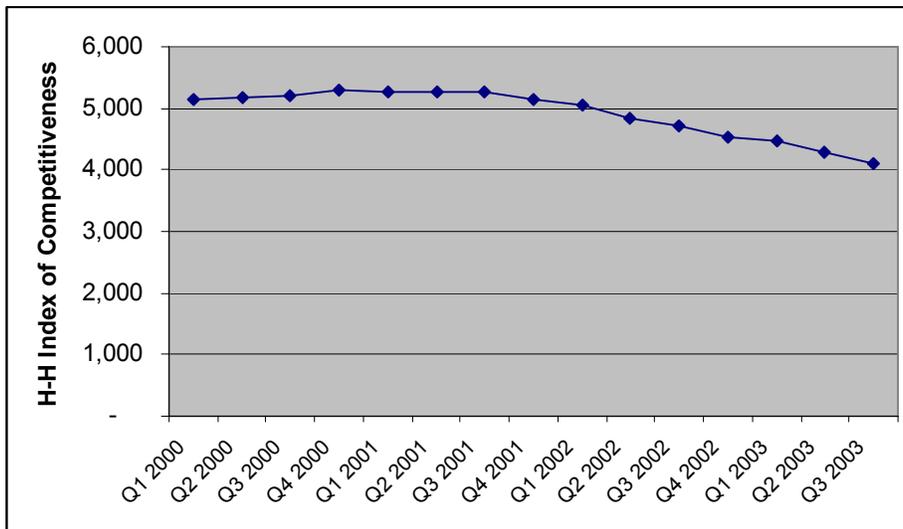
ix/ Competitiveness

The pace at which Cell-C achieved a substantial subscriber base indicates that until its launch the South African mobile market lacked a sufficiently high degree of competition. The introduction of further competition has clearly had a positive impact, driving the Herfindahl-Hirschmann Index down from 5,262 in September 2001 to 4,106 two years later (see Exhibit 34). The Herfindahl-Hirschmann Index measures the competitiveness of a market on a scale from 0 to 10,000. It is calculated from the sum of the squares of the percentage market shares of all the players in the market. A monopolistic market scores 10,000 and a perfectly competitive market scores zero.

Exhibit 34

Arrival of Cell-C spurs competition

Source: MNOs, The Yankee Group, 2003



A look at the Herfindahl-Hirschmann Index in Exhibit 35 illustrates that South Africa is now more competitive than many markets against which it can reasonably be benchmarked.

Exhibit 35**Herfindahl-Hirschmann Index Benchmarking***Source: MNOs, The Yankee Group, 2003*

Market	Number of Carriers	H-H Index
Mozambique	1	10,000
Saudi Arabia	2	6,791
Mexico	5	6,215
Zambia	3	6,177
Botswana	2	5,644
Egypt	2	5,042
Nigeria	4	4,855
South Africa	3	4,106
Spain	3	3,958
France	3	3,907
Italy	4	3,773
Zimbabwe	3	3,404
Poland	3	3,338
Germany	4	3,322
Chile	4	2,756
UK	5	2,488
Malaysia	5	2,482

The countries above were selected to benchmark the level of competition in South Africa with major western European markets (France, Germany, Italy, Spain and UK), markets in southern Africa (Mozambique, Zambia, Botswana and Zimbabwe), other major African markets (Egypt and Nigeria) and other markets worldwide of similar size and GDP per capita (Chile, Malaysia, Mexico, Poland and Saudi Arabia). Brazil is a market frequently used for purposes of benchmarking South Africa, but in this instance the fact that it consists of multiple markets, each of which has a number of licensed carriers, makes it unsuitable for this comparison.

3. Business Fixed Line and Data Communications Market

From a macro-economic perspective, South Africa has undergone fundamental change over the past 10 years: It is still reliant on agriculture, yet fast improving its substantial industrial and manufacturing capabilities, and its services industry is expanding. Equally important, the country is moving inexorably to a market-based economy where access to business opportunities and wealth generation is made available to all sectors of South African society, eliminating the imbalances wrought by apartheid. Successful achievement of these separate, but linked economic and political transitions is highly dependent on availability and usage of communications services and technology. This is not only because communications services and technology make business operations more efficient, but also because they distribute knowledge indiscriminately.

South Africa’s position in the global economy is reliant on robust business communications services. Already, South Africa represents a major hub for sub-Saharan African business activities, a position that it wishes to retain and grow. It is also a hub for certain global industries, such as shipping, where South Africa is a key trans-shipment point for goods exchanged between the markets of Asia and Latin America. Access to high quality voice and data communications services into and out of South Africa will cement the country’s regional and sectoral importance. Linked to this is South Africa’s relative proximity to Europe, the Middle East and North America, which means that it is being considered as an alternative outsourcing location for the booming global call center market.

In our analysis of the South African business communications market, we considered three principal issues:

- Does the existing telecoms market structure provide adequate services to existing business customers?
- Does the existing telecoms market structure serve South Africa’s total business customer universe?
- Does the existing telecoms market structure serve South Africa’s global economic interests?

i/ Existing Business Customers

Exhibit 36
South African typical business customer bases

Source: the Yankee Group, various suppliers, 2003

Supplier	Customer type	Number	Comments
Telkom	Global and corporate clients	225	Has moved aggressively to try to secure a greater share of the market
	Business and Government	550,000	
Internet Solutions	Businesses and corporate clients	4,000	Claims 60 percent of SA leading businesses are its clients.
UUNet	Businesses and corporate clients	1,500	Targeting all from SMEs to multinational corporates.
Storm	Business and corporate clients	4,000	Recently launched 'EconoPack' SME package.

As our forecast of the fixed-line communications market indicates, there is a shift in usage behavior and spending towards the data services environment. Although fixed voice still constitutes the lion’s share of the total revenue picture, data is taking share away year by year. This data growth phenomenon is evident across highly developed and less developed countries, where fixed access lines are on the increase, as the following exhibit displays. Where South Africa appears different than other comparable countries, however, is in the balance of business broadband revenues, which will grow to 3 percent of the business communications revenue pie, against a world average of approximately 6 percent.

Exhibit 37

Retail Business Revenue Distribution 2002-2007: Global

Source: the Yankee Group, 2003

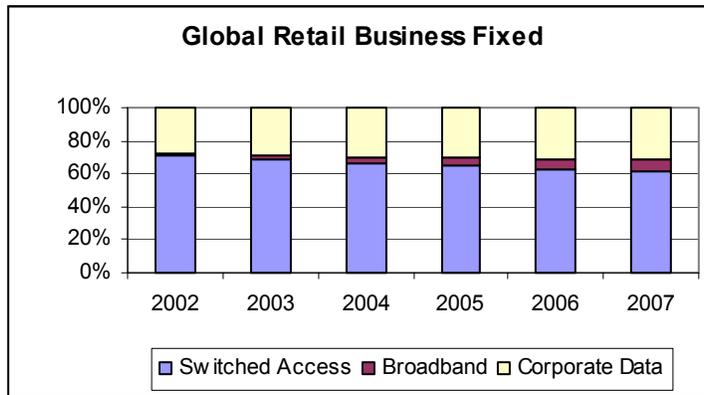
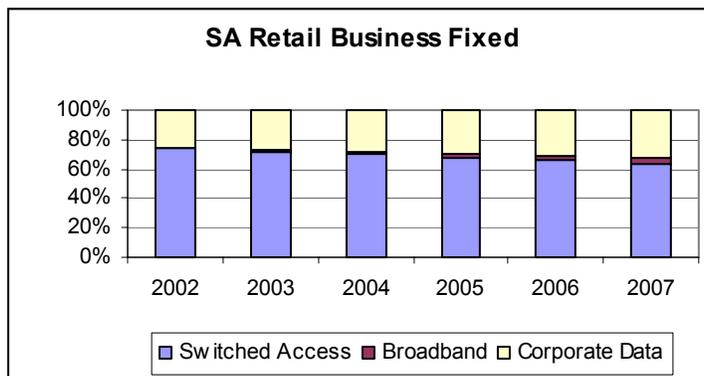


Exhibit 38

Retail Business Revenue Distribution 2002-2007: South Africa

Source: the Yankee Group, 2003



Our forecast for business communications is driven by the following assumptions: The incumbent operator is protecting vested interests in other revenue streams; it is focusing product development on other levels of the corporate data market; and is marginally interested in expanding its customer base beyond its existing size. As a result, the business DSL packages currently available in the South African market have limited attraction to businesses for reasons we will explain later. In addition, the lack of availability of true wholesale DSL prices (or indeed an unbundling regime) means that other operators cannot remedy this situation.

We believe this behavior is nevertheless understandable; business DSL is a double-edged sword because it has benefits and drawbacks for incumbent service providers like Telkom. Although DSL provides new revenue opportunities, it also speeds revenue decline in traditional legacy data services, in particular frame relay and dial-up PSTN and ISDN. In Europe, for example, larger companies are considering DSL as a less-expensive alternative to leased lines and frame relay networks, particularly for their branch offices and teleworkers. SMEs are also migrating to DSL to reap the benefits of an always-on connection with

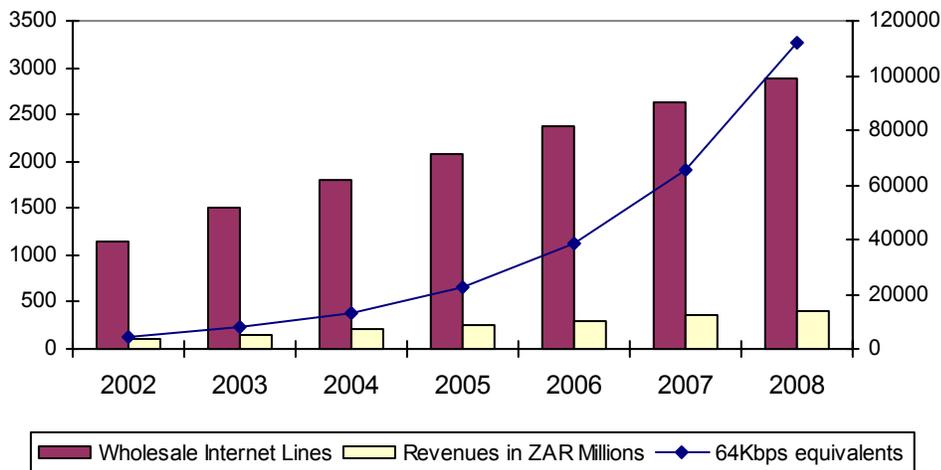
predictable cost. Finally, referring back to our earlier discussion of convergence, DSL is becoming part of the infrastructure platform used for the delivery of bundled voice and data services, including voice over IP. This is a fundamental threat to existing revenue streams.

Our belief is that frame relay revenues in South Africa are still growing, albeit more slowly than the demand for IP-based data communications. Nevertheless, the growth of services such as IP VPNs, are also a manageable development for an incumbent such as Telkom under the current regulatory regime, because it remains the sole supplier of the underlying connectivity, namely, a leased line. Migration to IP-based services is therefore manageable in the sense that Telkom still generates substantial revenues whether or not it owns the direct customer relationship. And the apparent lack of clarity on wholesale and retail prices for leased lines means that its margins are not compromised if another service provider sells the service. This is reflected in the uptake of wholesale lines for Internet, a figure which Telkom reports in terms of number of lines and 64Kbps equivalents. We have forecast this out with revenue figures calculated from reported costs for 64Kbps connections that competitive operators have obtained, as the following exhibit details. We assume price erosion growing over time, from 10 percent per annum, to 30 percent per annum with the arrival of the SNO impacting pricing significantly from 2005. Bandwidth demand in terms of 64Kbps equivalents is forecast at 70 percent per annum.

Exhibit 39

Wholesale Lines for Internet

Source: the Yankee Group, Telkom SA, 2003



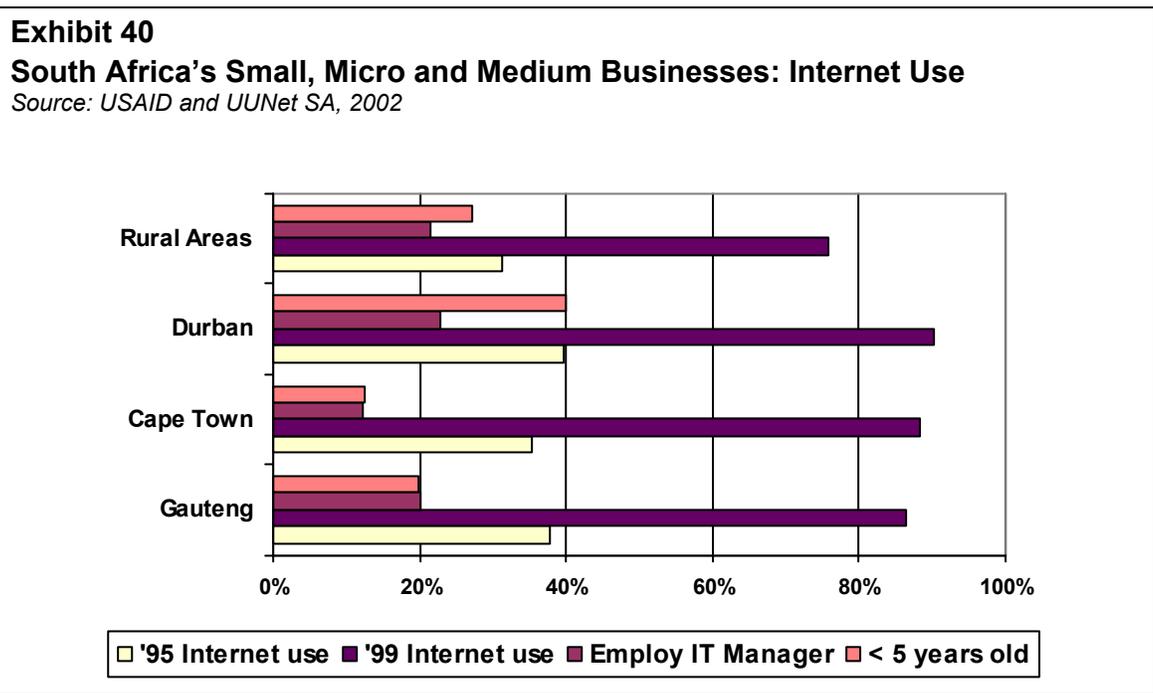
Business DSL is more disruptive than the arrival of a competitor for leased lines, since it threatens not only the leased line, frame relay, ISDN and PSTN revenue streams, but also provides a path to converged services. It also leverages what other competitors, including the SNO, do not have, which is local access to the physical locations of businesses.

Where does this leave South African businesses? For large businesses, DSL services as they offered today are not a worthy replacement for leased lines or, at the lower end, ISDN. Currently, South African business DSL service, although it offers higher capacity than the

standard 64Kbps leased line, does not offer the same level of security, throughput and predictability. In terms of security, offering DSL without fixed IP addresses is a factor, meaning that firewalls are not as easily installed. In terms of throughput, contention rates are still high, and reported to be 1:50, this means that performance is not absolute, unlike leased lines and ISDN where this is more predictable and reliable. Unlike ISDN, DSL charges are predictable, but so are leased lines charges, which offer the other benefits referred to previously. This means that large businesses will continue to rely on services that employ leased lines (provided by Telkom either on a retail or wholesale basis).

In the absence of business-class DSL solutions, competitive service providers are falling back on leased lines, driving growth in both South African retail and wholesale data services. For example, Storm, a local VAN, is targeting SMEs with the Econo-pack, a leased line bundled with a number of services. According to the company, the advantages of Econo-pack are that it provides a permanent connection, a fixed IP address and no monthly traffic limit. At a total fixed cost of ZAR2995.00, the package includes a 64kbps Diginet leased line from Telkom, the rental of a Cisco 1601 router, and a free .co.za domain.

For the South African SME, such offers will have some attraction, but DSL is the service that many really need. Although hard estimates vary, South African small, micro and medium-sized enterprises (SMMEs), play an important in the country's economy and contribute 35 to 40 percent of South Africa's GDP. Consequently, there is a growing need to provide more extensive communications facilities to SMMEs, not only inside urban areas, but increasingly outside them. Rural SMMEs are more highly dependent on Internet communications than their counterparts in rural areas, according to the South African Internet Economic Study, a study co-sponsored in 2002 by the United States Agency for International Development and UUNet SA, and managed by Africanomics, a subsidiary of Forecaster Ecosa. The goal of the study was to establish how SMMEs use the Internet to compete in the global environment.



As the exhibit illustrates, these are surprisingly sophisticated businesses when it comes to communications. More than 80 percent have used the Internet since 1999, and increasing numbers have IT managers to exploit communications solutions more effectively. SMMEs in rural areas were second highest in terms of youth after Durban-based SMMEs, indicating that new business development is not simply a phenomenon limited to urban areas.

Indeed, reliance on email usage was highest among rural SMMEs at 26.9 percent, compared to 24.4 percent of urban SMMEs. Indications are that rural SMMEs are more dependent on Internet resources since they do not have access to any alternatives, such as local libraries or business information centers. Rural SMMEs spend 21,1 percent conducting research on the Internet, compared to 15.9 percent for urban SMMEs. For those companies engaged in e-commerce, 35,1 percent depend on the Internet for more than 30 percent of their revenues, compared with only 21.9 percent for urban SMMEs. Arguably, these companies could be satisfied with dial-up, but broadband connectivity would increase their productivity. Our conclusion is that Telkom is generating attractive margins from this group, which is reliant on dial-up connectivity methods, and fears that monthly ARPU could drop with a move to DSL.

ii/ The Informal Sector

Although the high Internet usage referred to in the South African Internet Economic Study paints a positive picture in terms of awareness and usage of communications technology among some smaller enterprises, this is not the whole story. The informal sector of South Africa’s business economy needs equal scrutiny.

Non-VAT registered or informal businesses are typically composed of sole traders in small and micro enterprises turning over less than ZAR300,000 per annum. Together, these 2.3 million organizations and 2.6 million individuals contribute an estimated ZAR2.6 billion annually to South Africa’s business economy, according to Statistics South Africa. As a proportion of the total employed workforce, they are also significant, representing 23 percent of the total employed population as the following exhibit details.

Exhibit 41
Distribution of Employed Population

Source: Statistics South Africa, 2003

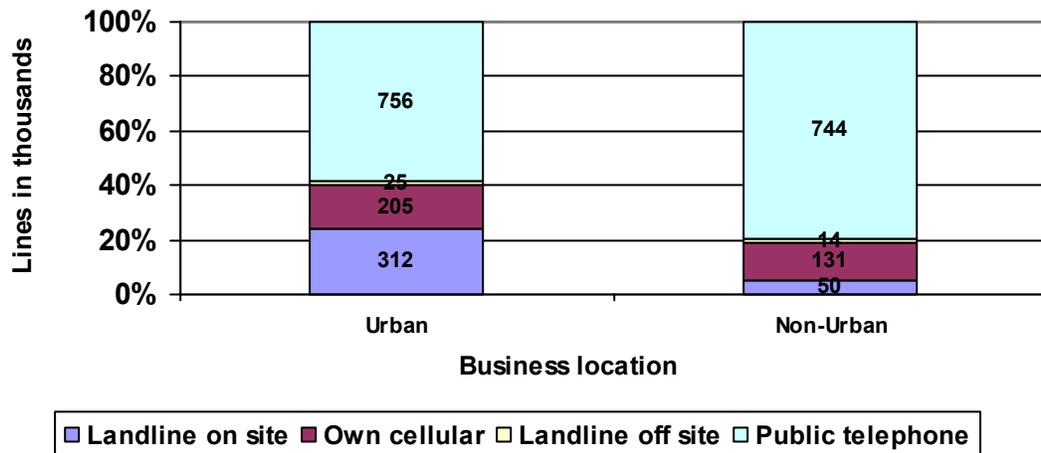
Variable	(000s)
Total employed	11 837
Among the employed:	
Employed in the formal sector excluding agriculture	6 678
Employed in commercial agriculture	699
Employed in subsistence or small-scale agriculture	653
Employed in non-VAT-registered businesses	2 665
Employed in domestic service	914
Employed, sector unspecified	227

In this less advantaged but important group, in which Africans account for 89.4 percent, Internet usage is more a distant desire than the urgent requirement to have a telephone. According to Statistics South Africa, whether based in rural or urban areas, most of these non-VAT registered businesses are reliant on payphones, as the following exhibit shows. Just over 20 percent of urban businesses have a landline on site, and less than 5 percent of rurally-based non-VAT registered businesses. In terms of usage of a personal fixed or mobile phone, only 40 percent of urban businesses and just under 20 percent of non-urban businesses have such facilities, or 30.4 percent overall. These are not itinerant workers or businesses - 67 percent, or 1.9 million operate from a fixed site.

Exhibit 42

Telephone penetration among non-VAT registered businesses

Source: Statistics South Africa, 2002



We believe that the current structure of the South African business communications market does an adequate job of serving the higher echelons of the sector. MNCs, large businesses and most medium-sized enterprises are obtaining the services they require to run their networks and business processes. The prices may be high and the choices few, as the following exhibit displays, but what is available is broadly satisfactory.

Exhibit 43

Comparative Bandwidth Costs

Source: Various, the Yankee Group, 2003

Route	Circuit	Miles	Cost per Month	Cost per Mile**	Cost per Mb**
Johannesburg to Cape Town	E1 (2Mbps)	773	\$9,340	\$12.08	\$4670
Los Angeles to Miami	T1 (1.5Mbps)	2348	\$2,000	\$0.85	\$1333
Johannesburg to Cape Town	E3 (34Mbps)	773	\$111,842	\$144.68	\$3289
London to Glasgow	E3 (34Mbps)	409	\$10,138	\$24.75	\$298
London to New York	T3 (45Mbps)	3470	\$8,000	\$2.30	\$178

**In U.S. dollars per month, excludes installation costs and SLA. All figures rounded.

But in saying that what is available is satisfactory masks the fact that there is little possibility of major expansion. As we noted in the introduction to this section, South Africa is considering its positioning as an alternative center for call centers. However, the high cost of bandwidth and lack of converged voice and data services will prove a major impediment to achieving this aim. Although Telkom is reported to provide a good level of service to corporate customers and competitive operators, it often comes at a high cost. This is why some large South African businesses are already hosting e-commerce activities in other countries and why the current situation will prevent the call center market from flourishing. In terms of the greater business population in South Africa, including SMEs and the informal sector, access and utilization of existing communications technology will continue to be limited, even with the expected arrival of the SNO. In summary, the current situation will continue to serve the upper echelons of the South African business communications market, but with little more than adequacy.

B. The South African Regulatory Environment

In contemplating the award of further fixed-line and cellular licenses, South Africa has a major opportunity to assess liberalization progress and to adjust policy accordingly.

Perhaps the most imperative issue for South Africa before implementing any further liberalization or passing new legislation, however, is clarification of national policy. This must be directly linked to prioritized national objectives and the process of building this plan must involve broad stakeholder consultation and negotiation. Unclear and shifting liberalization policy and timetables, matched with multiple unprioritised objectives in both the Telecommunications Act of 1996 and the new Convergence Bill, are at the heart of the problems encountered in implementing reform since 1996.

This section of the report provides a review of the salient features of the phases of liberalization in South Africa. From this review, we highlight and examine the key deficiencies of the existing model when compared to global policy trends.

Given that the Yankee Group project brief is primarily focused on a market review and prognosis, this regulatory review is not exhaustive. Moreover, the summary conclusions and comparison with global regulatory practices are preliminary and subject to more detailed analysis across all legislation, Ministerial determinations and regulatory guidelines both in force and in progress in South Africa.

1. South Africa's Phases of Liberalization

In order to assess progress in liberalizing communications markets, a brief review of South Africa's approach follows. In the WTO Basic Telecom Agreement, South Africa committed to end monopoly supply by the incumbent Telkom in public-switched services in May 2002.

i/ Phase I - Telecommunications Act 1996

- **PSTN monopoly; mobile duopoly; partial VANS liberalization**
- 1997 - Telkom granted a five-year fixed line PSTN exclusivity with rollout obligations (annual new line additions, network modernization, service expansion to underserved areas)
- Partial privatization of Telkom
 - The incumbent operator was partially privatized in May 1997, through the sale of 30 percent of the company's stake to the Thintana Consortium consisting of SBC Communications and Telekom Malaysia
 - In 2003, a further 28 percent of Telkom was floated on the stock exchange
- Mobile duopoly maintained (established in 1993)
- VANS services based competition introduced
- Sector regulator created – South African Telecommunications Regulatory Authority (SATRA)
- Establishment of the Universal Service Agency in 1997 (governed by a chief executive appointed by the Minister); funded via parliamentary appropriations
 - All licensed telecommunications and mobile operators pay annual contributions (maximum of 0.5 percent of annual turnovers) to a Universal Service Fund (USF), with contributions also required from private network licensees and value-added network service (VANS) providers. The fund has targeted telecenter developments. Network roll-out and service coverage obligations are also included under incumbent Telkom's license conditions, and under cellular provider licenses.

ii/ Phase II - Telecommunications Amendment Act (64 of 2001)

- **PSTN duopoly; mobile triopoly; third international gateway; additional spectrum allocation; licensing of universal service providers in under serviced areas; converged regulator**

The Amendment Act introduced significant legal and institutional changes in addition to the establishment of the sector regulator – Independent Communications Authority of South Africa (ICASA, authorized in 2000). ICASA combines the previously separate national broadcasting and telecommunications regulators. Headed by a chair and seven-member

council, members are appointed by the president with public participation in the nomination process. South Africa has resisted appointment by the legislature. The council is charged with staffing the authority, which is funded from parliamentary allocations. The Competition Commission gained concurrent jurisdiction with ICASA on issues of competition through an amendment in 2000 to the Competition Act of 1998.

The Amendment Act sought to address multiple objectives and attempted to address convergence, satisfy multiple stakeholders, appease the mobile community, encourage investment, and to protect minorities and disadvantaged users.

A number of the provisions listed below are not direct amendments, but are contained in the original Telecommunications Act of 1996. These carry-over items are included under the 2001 Act summary for purposes of consistency in order that the current regime is appropriately represented.

New Licenses

- Third mobile operator
 - Licensing process began in 1999, third operator licensed in 2001
 - Fourth entrant possible after 31 December 2003, pending market review and Ministerial Determination to license additional operators
- Provision for the licensing of a Second Network Operator (SNO) and 2nd international gateway to compete with Telkom from May 2002
- Sentech (State broadcasting signal distributor) to become 3rd international gateway and awarded multimedia services licenses.
 - Sentech prohibited from connecting directly with subscribers and from offering voice services
 - Under its multimedia license, Sentech is required to install a minimum of 8,500 Internet-connected computers in rural areas.
- Provision for the licensing of small and medium-sized enterprises to serve under serviced areas where teledensity is currently below 5 percent (Under Serviced Area Licenses, USALs)
 - USALs permitted to provide any telecommunications service including VoIP, fixed-to-mobile services and payphones
 - Provisions for the public tendering of universal service projects
- Provisions for access to the radio frequency spectrum in the 1800 MHz frequency band by existing mobile operators
 - Telkom and SNO right to apply for, and deemed as spectrum license holders in the 1800 MHz band
- Provision for third generation telecommunication radio frequency spectrum licenses to be issued to existing operators

Maintained and Modified Restrictions on Existing Operators

- MCTS operators prohibited from using fixed lines other than those of Telkom or other licensed PSTS operators, subject to change by Ministerial notice
 - Fixed-to-mobile limited mobility services permitted within local exchange areas
 - Mobile-to-fixed direct connect prohibited
- Maintains restrictions on VANS service provision via Telkom facilities until 7 May 2002
 - Allows for self provisioning/use of own facilities by all VANS on a date set by the Minister and subject to a Ministerial notice
 - Allows for the Minister to issue a notice to allow Telkom, SNO and licensed VANS to provide voice over Internet protocol after 7 May 2002
 - Allows for the Minister to issue a notice to entitle private telecommunications network operators with telecommunications facilities to resell spare capacity on such facilities
 - Provides for the leasing and resale of PSTS provider facilities
- Local loop unbundling prohibited for 2 years after the commencement of the SNO license
- Provisions for the introduction of number portability in 2005
- Carrier pre-selection mandated from 31 December 2003

Universal Service

- Under the 2001 Amendment Act, provisions for competitive tendering for universal access projects are included, and USF coverage is extended to include projects facilitating Internet use in public schools, the establishment of telecenters and public information terminals, and access by small enterprises to deliver services in rural areas.

Discretionary licensing provisions - carried through from the 1996 Act with minor modifications:

- ICASA ability to prescribe telecommunications services where a license is not required
 - Excluding PSTS; MCTS; national long distance; international; or multimedia services
 - Ministerial ability to invite applications for these 5 services or any other prescribed telecommunication service
 - ICASA ability to set license conditions (excluding PSTS, MCTS, national long distance, international or multimedia services)
- Telkom long-distance, local access and payphone monopoly sunset date set as 7 May 2002. §32A grants Telkom and the SNO a duopoly as holders of PSTS licenses between 7 May 2002 and 7 May 2005, pursuant to a market study by the Minister before 31 December 2003 to determine the feasibility of licensing further PSTS operators. Such license can only come into effect after 7 May 2005. Resale and equal access provisions would apply to new licensees.

iii/ Phase III - Convergence Bill, 2004

In part in response to regulatory deficiencies, in part due to South Africa falling behind its neighbors in terms of both competition and service availability metrics, and in part due to growing opportunities created by convergence and Internet and wireless services takeup, the government is now considering a major overhaul of communications policy. This would introduce technologically neutral policies and a more streamlined or unified licensing regime. In July 2003, the government announced its intention to draft new communications legislation by the end of the year. The draft Convergence Bill of December 3, 2003, anticipates the following key changes:

Overhaul of license categories

- Individual Licenses - Infrastructure Service; Communication Network Service; Communication Application Services
- Class Licenses - Communications Content Service; Communications Applications Service

Clarification and augmentation of the powers of ICASA

- Removal of provisions for Ministerial approval of regulations developed by ICASA; ICASA directed to 'consider' any policy direction issued by the Minister
 - No such policy direction regarding licensing may be issued if it interferes with the independence of the Authority
 - However, under (§13(4)) no application for the Infrastructure Service Licenses will be made without an invitation to apply from the Minister. Such licenses will be granted by the Minister on recommendation from ICASA
- ICASA responsibility for setting the terms and conditions of, and the granting of Communications Services licenses
- ICASA responsibility for spectrum licensing
- ICASA directed to prescribe and regularly review a list of types of communications network facility that are subject to mandatory interconnection obligations and to develop interconnection guidelines. ICASA is permitted but not mandated to prescribe a framework for interconnection rate setting and a framework for wholesale rates to be charged for specific classes of communications services
- Similar ICASA roles as for interconnection are outlined in relation to facilities leasing
- ICASA left to develop detailed guidelines for licensing criteria, license application and terms and conditions, interconnection, interconnection pricing, facilities sharing
- No reformulated universal service policy articulated
- Establishment of a Monitoring and Complaints Committee within ICASA to monitor license compliance
- ICASA to establish an ad-hoc consumer code forum
- No directions or designations on liberalization timeframe or market structure plans apart from a discretionary role that the Minister may assume in outlining such

Shortcomings

The Convergence Bill sets no liberalization plan or timescale matching the Act's objectives. It reduces but does not entirely remove unclear distinctions between the roles of ICASA and the Minister. It is too short on specifics, leaving broad interpretation and discretionary responsibility with the ill-equipped ICASA, with insufficient guidelines for the regulator in assessing market conditions and implementing new licensing provisions. The lack of specifics in terms of licensing criteria create the basis for continued delays and disputes, despite greater specification of dispute resolution processes. The Bill is silent on reformed universal service policy.

2. Deficiencies of the South African Model

In summary, South Africa's model is characterized by deficiencies in terms of:

- Licensing implementation delays and non-transparent processes
- Spectrum allocation and management issues also relating to delays in the allocation of new license bands
- Access and interconnection arrangements lacking detailed legislative criteria and comprehensive regulatory guidelines
- Inadequate retail price regulation
- Universal service policy unmatched with clear funding and implementation mechanisms and a well-equipped implementation agency
- Inadequate enforcement of anti-competitive conduct rules
- Regulatory Structure compromised by dual responsibilities of the sector regulator and the Ministry of Communications.

We examine each of these issues in detail below.

i/ Licensing Delays and Conflicts over License Rights

Second Network Operator

On July 26, 2001, the Ministry of Communications announced its plan to further liberalize the telecommunications market from May 2002. Licensing of a second and third national fixed operator was announced with foreign ownership limited to 49 percent. State-owned electricity and transport utilities Eskom and Transnet were to have stakes in the two operators. Both new providers would be allowed to operate mobile as well as fixed line telecommunications within six months of publication of new policy.

South Africa's policy to license two, rather than the originally proposed one additional provider, has been highly controversial, as have other elements of the proposal, forcing the government to revise the overall policy in August 2001. Subsequently, in late October 2001, a revised Telecommunications Bill was submitted to the National Assembly. The Ministry shifted its plans to license two operators down to one additional national fixed operator, with guaranteed rights of interconnection for two years to Telkom's network while it builds its own infrastructure. Foreign investors were to be invited to take a 51 percent stake in the new fixed-line operator, while 19 percent was reserved for empowerment firms and 30 percent for Eskom and Transnet.

Following ICASA's disqualification of two bidders for the 51 percent share of the SNO on the basis that the bids did not satisfy license threshold requirements, 4 new bidding consortia were reduced to 2. These bids were also disqualified by ICASA, leading an announcement by the Communications Minister in November 2003 to warehouse the foreign equity stake until a suitable investor can be found.

USALs

Prospects for USALs have been severely limited by setting of large service areas with associated high costs of service delivery. Delay in USAL licensing and the introduction of free SIM cards are further undermining the viability of the USAL model as currently conceived. The USAL requires urgent review and clarification of its funding model. In the first instance, geographic license areas must be reduced enabling viable business models for small rural operators. Announcements by the USA of increased funding of non-loan commitments to USALs are encouraging although the administration of this funding process and licensing arrangements remain unclear. In addition, the legislative provision providing for the tendering of targeted universal service projects have not been mobilized.

Lack of Clarity in Rules for Limited-Mobility Services

Licenses to offer limited-mobility services will be provided to Telkom, the SNO, and Under Services Area Licensees. Telkom cannot offer commercial services until the SNO is licensed. There is still some uncertainty as to what form the commercial limited-mobility services will take, and the timeline for their introduction. From the MNOs' perspective, the limited-mobility licenses represent a relatively minor competitive threat. However, if retail prices for limited mobility services significantly undercut those for full mobility services, the MNOs will inevitably see a negative impact on their network traffic.

Some MNOs argue that because USALs are authorized to provide limited mobility services in their areas, and because PSTS's are authorized to provide fixed-mobile services, the MNOs should be allowed to offer national long-distance carrier's carrier services, direct connect services, and international gateway services.

ii/ Spectrum Allocation and Wireless Licensing Delays

MNOs require certainty in available spectrum during the license period. Current uncertainty surrounding permanent allocation of 1800 MHz spectrum to MTN and Vodacom is counter-productive because it has the potential to delay MNO investment in 1800 MHz technology and services. The incumbent MNOs claim they have been trying to obtain permanent 1800 MHz spectrum for 4-5 years, but they are still only allocated the spectrum on a rolling three-month basis. 1800 MHz is already a significant source of bandwidth for MTN and Vodacom. For example, MTN is already using 400-500 1800 MHz base stations. This means they require certainty in terms of permanent allocation of this spectrum.

Cell-C would like to see "equivalent access" to spectrum, thus providing it with the equivalent amount of spectrum allocated to the two incumbents. Some MNOs have expressed a desire for spectrum trading to be allowed under the new proposed convergence legislation. They claim this will allow more efficient use of existing resources. Overall, the MNOs argue that spectrum allocation should be based on the most efficient use of that spectrum, and not on the ability to generate revenue.

The two largest MNOs would like to be licensed to offer international gateway services, allowing them to connect directly with MNOs, for example, in other African countries.

MNOs are requesting greater certainty in the obligations associated with their licenses. Specifically, they are asking that no significant new obligations be introduced during the license period. One example cited is the recently introduced requirement for the MNOs to register all prepaid customers. They also request that the total cost of all existing obligations and fees be taken into account before new obligations are introduced.

iii/ Access and Interconnection to Facilities

Unclear regulatory guidelines around interconnection present a major issue in South Africa in relation to the ability of the SNO to compete with Telkom, and the terms for facility-sharing. While the SNO is guaranteed interconnection rights to Telkom's network, a two-year time limit is set on these rights. This is a peculiar departure from global practices, where such sunset clauses have not been the norm, and where alternative operators continue to use and require access to incumbent infrastructure years after being licensed. Moreover, the 2001 law lacks detail about what Telkom will be required to make available to the SNO and how interconnection agreements are to be concluded.

The role of ICASA has been extended to enable the regulator to finalize interconnection terms and conditions and agreements. While new interconnection guidelines have been established for under serviced area licensees, revision of the broader interconnection guidelines from 2000 and 2002 should be undertaken

Wireless Interconnection is Less Contentious

The incumbent MNOs are satisfied that there was little regulatory intervention in the establishment of roaming, interconnection, and site-sharing agreements between MNOs. The incumbent MNOs are generally satisfied with current mobile termination rates in South Africa. Vodacom claims there are adequate measures in place to prevent excessive wholesale charges. These include regulatory and commercial limitations at both the wholesale and retail level. Some of the relevant wholesale pricing limitations are cost-reporting (and cost-based wholesale pricing), non-discrimination, transparency, and accounting separation. Cell-C would prefer to see cost-based interconnection and roaming charges, regulated by ICASA.

Infrastructure Restrictions and Control of Anti-competitive Behavior

South Africa's prohibition of facilities based competition and the unchecked control of Telkom's control of access to facilities are severely undermining the viability of a thriving service-based VANS market. This is despite legislative arrangements that could be invoked to force Telkom compliance with interconnection provision on a non-discriminatory basis (see anti-competitive behavior discussion below).

For the incumbent MNOs self-provisioning of transport infrastructure is a high priority. They generally perceive that the lack of competition in the fixed telecommunications market has prevented more competitive transport rates. The MNOs maintain that they should be licensed to provide their own transport services, and to re-sell spare capacity to other licensed players e.g. VANS, major ISPs, and potentially large corporate customers.

iv/ Price Regulation

After months of dispute, in June 2002, the ICASA and Telkom reached agreement over the carrier's retail tariffs. The regulator had argued that Telkom proposed rises of 5.5 percent for

retail rates for a basket of services were excessive. In December 2001, the High Court of Pretoria rejected an ICASA petition to restrict Telkom from raising retail tariffs. While a final judicial decision on the issue was anticipated in October 2002, on prompting from the government, the two parties reached an out of court agreement in June 2002. As a result, a rate freeze was in effect to the end of 2002, after which Telkom is permitted to increase local call charges for a two-year period, albeit at a level below the originally mooted 5.5 percent.

Under retail price regulations released by ICASA in August 2002, Telkom is subject to controls based on a Consumer Price Index -1.5 percent formula covering installation, rental, and call services. (MNOs are limited to CPI). Services excluded from the price controlled baskets are interconnection and value added network services, mobile and emergency services, and customer premises equipment. The carrier has also undertaken to provide a lifeline type service where customers may receive incoming calls, with the ability to make outgoing emergency calls only. Telkom has also committed to provide a voicemail service for un-serviced users, and new Internet packages.

Existing regulations limit MNOs' annual increases in retail prices to no more than the increase in the CPI. One MNO argues strongly against separate retail and wholesale price controls. The current situation is that CPI is the basis for retail price control. Wholesale prices are not controlled separately.

v/ Universal Service

(Refer also to USAL text above)

The USA's performance has been checked in terms of meeting the overall objectives of advancing universal service availability and monitoring of universal service obligations. From the outset, the USA was ill-equipped in terms of skills and staffing to drive the telecenter initiative and universal access objectives were not met by Telkom's rollout mandate, with multiple installed lines unconnected. At the same time, universal access objectives focused on fixed-line deployment have been outpaced by the growth of mobile services.

The USA has been challenged in terms of a lack of skilled staff in policy implementation versus policy development, overlap and confusion in reporting to the Ministry and ICASA, funding constraints, and an inability to negotiate for telephone lines from Telkom for its telecenters became a critical problem, resulting in a high number of telecenters not having access.

MNOs claim the light touch regulation of universal service obligations as it applies to MNOs has been the correct approach. They believe it has led to commercially viable mobile services being delivered to many under-serviced areas. They support a review of the current policy, to provide a more holistic approach (encompassing fixed and mobile technologies).

There is consensus that the current total level of fees and other obligations on the MNOs is not too onerous. Their main concern is not the size of the obligations, but the uncertainty surrounding the possible review or introduction of new obligations e.g. the requirement for the MNOs to adhere to the terms of the Monitoring and Interception Act, and the associated cost.

In June 2003, the government mandated that the three MNOs must issue four million free SIM cards over the next five years, in exchange for access to additional frequency bands. The MNOs accept that the distribution of free SIM cards will lead to higher mobile penetration

rates, and some of them have revised upwards their long-term expectation for saturation points for the market. However, the MNOs would prefer more attention given to measures that will enable them to reduce retail call charges for underprivileged individuals, rather than simply increasing the penetration of SIM cards.

The availability of SIM cards does not necessarily translate into more mobile phone users. The MNOs argue that without lower call charges free SIM cards will be under utilized and will not succeed in extending mobile communications services to a significant new segment of the population. Measures that will allow the MNOs to deliver lower charges include lower transport costs, enabled by greater competition in fixed telecommunications services.

vi/ Unchecked Anti-Competitive Behavior

With the introduction and development of competition, the focus of market investigations and examination of individual operator market positions is on the identification of dominance or SMP (Significant Market Power) on a case-by-case and market-by-market basis. Hence, while the Essential Facilities Doctrine continues to apply, competition has forced more granular analysis and justification of obligations formerly applied to monopoly operators.

South Africa lacks an established process for the assessment of market competition and market reviews. Arrangements for dominant operator/SMP designation and associated interconnection obligations have not been comprehensively applied in South Africa. For example, none of the MNOs in South Africa are deemed to have SMP except in relation to the under-serviced area licensing regime and associated interconnection arrangements. Triggers and processes for the removal of sector-specific ex-ante regulations are lacking in current legislation. Enforcement of anti-competitive conduct rules, notably in relation to Telkom's pricing of wholesale services is limited. In addition, enforcement of more rigid and detailed accounting separation and information reporting requirements applied to Telkom across segmented services and Business Units is required.

South Africa must address the designation and enforcement of dominant operator rules. Regulatory intervention should be based on the SMP status of each competitor on a market-by-market basis.

Dispute resolution processes are complicated by judicial arrangements whereby cases are heard by the next available high court judge, who may not have expertise specific to communications markets and issues. Litigation is also fraught with delays, as have been investigations of the Competition Commission on communications sector related issues.

Anti-competitive conduct provisions within the Telecommunications Amendment Act 2001 include and are not isolated to:

- §53 Clauses for ICASA action against undue preference or undue discrimination practices
- §44(2) Process for Ministerial determination of interconnection fees and charges in respect of Telkom in "fields where no or insufficient competition exists."
- §44(7) Notwithstanding Telkom interconnection guidelines (§43) "where the Authority is satisfied that Telkom is unwilling or unable to make suitable facilities available...may authorize that person to...obtain any necessary telecommunications facilities other than from Telkom..."

- Section 8 (b) of the Competition Act, prohibits a dominant firm from refusing to give a competitor access to an essential facility when it is economically feasible to do so, allowing the Competition Commission to apply the essential facilities doctrine

The application and focus of anti-trust type regulation in South Africa must address:

- Comprehensive designation and enforcement of dominant operator rules
- Vertical and horizontal agreements between operators
- Reducing delays in network provisioning and pricing agreements for interconnection services
- Anticompetitive pricing practices such as predatory pricing and bundling
- Fixed communications services wholesale pricing
- Collusion between wireless operators to set high reciprocal interconnection charges, thus keeping retail prices high

Regulatory intervention should be based on the SMP status of each competitor. Currently none of the MNOs in South Africa are deemed to have SMP except in relation to the under-serviced area licensing regime and associated interconnection arrangements. This situation should be reviewed, to protect all competitors from potentially anti-competitive practices. Following a full review of competition in South Africa, ICASA should determine whether SMP is a valid basis on which to regulate the wireless market. If these companies were declared to have SMP, it could result in them being forced to provide interconnection services at cost price. The exact definition of cost price would need to be established.

3. South Africa's Regulatory Structure

ICASA's compromised independence is exacerbated by its lack of experienced staff and adequate financing. Inadequate dispute resolution arrangements create a further barrier to effective regulation and competitors have constantly cited unchecked anti-competitive behavior on the part of Telkom. Slow approval processes and delays in the implementation of ICASA's regulations pending Ministerial sign-off have further hampered regulatory effectiveness in South Africa.

The Yankee Group has extensive experience in the examination and assessment of structural regulatory models. The Exhibit below maps the ideal and sub-optimal structural and functional characteristics of an independent regulator, and assesses the organization of ICASA against these criteria. Notwithstanding the provisions contained in the Convergence Bill, the major impediments identified are in relation to the compromised independence of ICASA resulting from Ministerial approval required for regulations developed by the authority and the dual responsibilities of ICASA and the Minister in relation to licensing.

Exhibit 44: Key Ingredients of an Independent Regulator – How Does ICASA Compare?

Source: *the Yankee Group, 2003*

Regulator	The Ideal	Sub-Optimal Arrangements	ICASA Status
How Established	Legislation (detailed) Separation from operational (incumbents and new entrants) and political interests	Ministerial/Government Decree; regulator subject to dissolution at will	<u>In compliance with global norm</u> Legislative basis established through the ICASA Act (2000)
Key Staff Appointment	Parliament/ National Legislature with public input to the nomination process	Selected by President/Head of State; Ministry	<u>Subject to political influence and interference by the Communications Minister</u> Members are appointed by the President with public participation in the nomination process. South Africa has resisted appointment by the legislature Councilors can only be removed by the National assembly
Constitution of Decision Making Body	Expertise covering legal, technical, economics, industry, regulation and public representatives No shareholdings or interests in communications industry	Minister Chairs Single Director	<u>In compliance with global norms</u>
Basis of Decision Making	Collegial		<u>In compliance with global norms</u>
Tenure duration of key staff	5 years – staggered terms Removal for cause only by appointing body	Subject to change with change of government Civil servant chair subject to removal by other civil servants	<u>In compliance with global norms</u> Staggered terms of different durations for chair and different councilors
Autonomy of decisions	If all other criteria are met – decisions not subject to political overturn. If the nation has a credible judicial system, the ability to appeal decisions to a judicial setting or a separate tribunal-like body provides an important check on regulator discretion and over-regulation	Appeal to Minister	<u>Decision making autonomy is compromised</u> by the provision that all regulations must be approved by the Minister and the overlapping Ministerial and ICASA roles in awarding licenses These are key areas that have led to many of the shortcomings and policy shifts since 1996 resulting in delays in licensing processes and the development of regulations by ICASA Convergence Bill anticipates removal of Ministerial approval of regulations, maintains some licensing responsibilities for both ICASA and the Minister
Enforcement Powers/Dispute Resolution	- Clearly defined enforcement processes and penalties, including separation of powers between different regulators - Expedient procedures for conflict resolution - Regulator arbitration mandates - Judicial, alternative body review as above - Authority to impose appropriate penalties and sanctions - License monitoring	In liberalized nations, dispute resolution, notably in relation to interconnection, represents one of the key regulatory roles. Lack of empowerment and unclear procedures have had a major influence on expedient resolution of disputes and long delays in implementing competition policies Without well defined rules, appeals processes lack basis for assessment of	<u>Limited legislative specification of ICASA powers, appeals processes, enforcement powers, penalties and sanctions</u> Dispute resolution processes are complicated by judicial arrangements whereby cases are heard by the next available high court judge who may not have expertise specific to communications markets and issues. <i>(refer also to Competition Regulation assessment below)</i>

	and ability to revoke - Ability to adjudicate disputes between operators and between operators and consumers	compliance	
Funding	A problematic area – funding via levies on operators creates a tax on the industry that is ultimately passed onto consumers. Funding off budget may limit the ability of the regulator to fulfill its role if the allocation is too low or if access to funds is not direct. Regardless of source of funds, the key is that the regulator have direct control over and access to its own funding		<u>Funded from Parliamentary appropriations.</u> Convergence Bill anticipates funding from industry levies including license fees
Transparency of processes	Publication of draft decisions for comment Publication of decisions and justifications Annual reporting Decision making based on publicly available information Public consultation Detailed information gathering powers and operator record keeping rules	High level of commercial in confidence material not available to alternative parties	<u>Generally in compliance with global norms</u> Problematic from the point of view of non-transparent licensing processes in practice and as a result of policy shifts and the requirement for Ministerial approval of ICASA regulations
Mandate	- Detailed specification of roles and responsibilities created via legislation – Balance discretionary powers and regulatory flexibility with predictability in the overall framework - Legislative definition of roles and relationships between different institutions involved - Clearly tied to political objectives and market structure aims of liberalization	Rules and processes not clearly specified or defined Interpretation of policy objectives and implementation or rules largely left to discretion of Minister or regulator or both	<u>Discretionary powers are wide</u> versus specified – see above re enforcement powers, sanctions etc. The legislation authorizing ICASA is short on designating responsibilities and powers, partly because the body was to assume the broad regulatory functions of the Independent Broadcasting Authority and SATRA. Moreover, ICASA was created without amendment to the IBA Act, the Broadcasting Act or the Telecommunications Act which it oversees. This omission is not ideal. ICASA has faced ongoing challenges in proving its expertise, proactiveness, and true independence. The draft Convergence Bill does not address this issue, while it also assigns multiple tasks to the already unequipped regulator in terms of establishing and implementing detailed regulatory guidelines across interconnection, licensing etc

4. Comparing South Africa’s Model with Global Norms

Having assessed ICASA’s structure and performance, this section reviews the status of South Africa’s liberalization model and implementation against global practices and trends across multiple criteria. We focus on current legislative and structural arrangements, with reference to the Convergence Bill as relevant.

The Convergence Bill is not a panacea for the regulatory and market deficiencies that have arisen since 1996. If passed, the Bill would carry over many of the shortcomings of the existing regime, while adding further uncertainty and complexity in an already unstable environment.

The Convergence Bill sets no liberalization plan or timescale matching the Act’s objectives. It reduces but does not entirely remove unclear distinctions between the roles of ICASA and the Minister. It is too short on specifics, leaving broad interpretation and the development of

detailed regulations with the ill-equipped ICASA, with insufficient guidelines for the regulator in assessing market conditions and implementing new licensing provisions. The lack of specifics in terms of licensing criteria, create the basis for continued delays and disputes, despite greater specification of dispute resolution processes. The Bill is silent on reformed universal service policy.

Exhibit 45, Summary: Assessing Key Elements of South Africa's Model Licensing

Source: *The Yankee Group, 2003*

Global Trends	Status in South Africa
<p>Around the world, licensing models for fixed telecommunications operators have included:</p> <ol style="list-style-type: none"> 1. No formal procedures (e.g. Denmark) 2. Notification 3. Registration/Authorization 4. Class License/General Authorization 5. Individual Licenses <p>For full-service carriers, issuing individual licenses has been the norm. In many cases, class licensing arrangements have been adopted for operators providing non-basic or value-added services.</p> <p>Wireless licenses have been issued via comparative evaluation or auctions</p> <p>Many nations are now considering a move to unified licensing models allowing operators to provide multiple services irrespective of their underlying delivery mechanism</p> <p>There is also a major trend of more closely aligning license rights and obligations for fixed-line and wireless operators</p> <p>Services such as Internet Telephony and 'newer' broadband services are forcing major review of traditional policies and associated licensing arrangements across:</p> <p>III. Service definitions and associated regulatory distinctions: Telecommunications, information, voice, data, local, long-distance, mobile, fixed</p> <p>IV. Interconnection charging</p> <p>V. Basis of universal service funding</p> <p>VI. Licensing and license fees</p>	<ul style="list-style-type: none"> • Licensing has generally not been transparent or timely as per the processes involved in the licensing of the third cellular operator, the SNO and USALs • The terms of Sentech's multimedia license remain unclear as do its interconnection rights • The 2001 Amendment Act nominally provides for the licensing of additional operators at the discretion of the Minister and on conditions set by ICASA. The associated provisions are unclear and the intent of the legislation in terms of new licensing is confusing, opening grounds for industry confusion and criticism of regulators for not acting upon existing enabling legislation • License obligations, service provision definitions, and associated line-of-business restrictions preclude operators from <ul style="list-style-type: none"> • Maximizing potential use of existing infrastructure • Providing integrated services • Securing adequate returns on investment • Review of licensing arrangements in South Africa necessitates a fundamental review of current service distinctions and artificial line-of-business restrictions that they perpetuate While the Convergence Bill anticipates a more unified approach to licensing, the Bill does not detail the differences between the five new license types proposed, nor their associated license terms and conditions that are to be established by ICASA • Implementation of unified licensing regime must be coordinated, necessitating review of associated regulations and their adjustment • The Bill also retains the role of the Minister in granting Infrastructure Service Licenses • Review of licensing arrangements necessitates a fundamental review of current service distinctions and artificial line-of-business restrictions that they perpetuate

Spectrum Allocation and Management

Global Trends	Status in South Africa
<ul style="list-style-type: none"> • Frequency planning and future spectrum allocation processes are the subjects of much debate under the changed market circumstances since 2000, when huge sums were paid for 3G licenses in Europe and interest and investment in communications opportunities were high. • Developing nations are particularly challenged in reforming spectrum management arrangements and in spectrum reallocation as part of broader liberalization processes. • Network sharing and the developing MVNO models present particular challenges for regulators in terms of their impact on the development of competition, Similarly, concessions that would allow the secondary trading of spectrum, the resale of licenses, and operator ability to take over additional licenses imply changes to existing spectrum caps as well as geographic market share and service provision restrictions. 	<p>Spectrum Allocation Delays:</p> <ul style="list-style-type: none"> • Allocation of 1800 MHz spectrum must be expedited • MNOs require certainty in available spectrum during the license period • Current uncertainty surrounding permanent allocation of 1800 MHz spectrum to MTN and Vodacom is counter-productive because it has the potential to delay MNO investment in 1800 MHz technology and services • MNOs claim there is too much uncertainty surrounding the possible entry of a fourth MNO. • Before the decision is taken, thorough market assessment by ICASA to determine if the South African market can support a fourth licensee is required (<i>refer to section below on Competition Regulation</i>) <p>Asymmetric Rules</p> <ul style="list-style-type: none"> • The allowance of limited mobility services, without allowing wireless operators to direct connect perpetuates asymmetric rules

<ul style="list-style-type: none"> • Many nations are also reexamining future wireless licensing models, with an urgent need to recognize fixed-to-wireless convergence and to reassess the basis and outcomes of maintaining line-of-business restrictions. 	
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Interconnection

Global Trends	Status in South Africa
<p>While national approaches to interconnection have varied significantly, some overall trends are identified as follows:</p> <ul style="list-style-type: none"> • Legislated interconnection regimes providing for access to selected network elements, often including provisions for access to supplementary facilities and service features • Preference for commercial negotiation of access agreements, with formal arbitration mechanisms in place as safety-net regulation • Regulators drawing on generic competition policies/tests of anti-competitive behavior in assessments of interconnection disputes on a case-by-case basis • Regimes supported by principles of unbundling; non-discriminatory provision of access; open interface and technical interoperability standards • Regulatory setting of default or benchmark interconnection rates, shifting to formal cost based pricing models and accounting separation requirements on access providers • Increased attention to mobile call termination regulation • Designation of dominant or Significant Market Power operators and associated interconnection obligations 	<ul style="list-style-type: none"> • High level legislated guidelines guidelines and regulatory guidelines not comprehensively applied by ICASA • This issue is not alleviated by the Convergence Bill aside from the addition of clauses whereby ICASA must develop interconnection guidelines and 'may' develop interconnection and wholesale pricing rules • The role of ICASA was been extended to enable the regulator to finalize interconnection terms and conditions and agreements. While interconnection guidelines have been established for under serviced area licensees, revision of the broader interconnection guidelines is required • The shift to LRIC pricing must be expedited in line with global norms • Disputes over interconnection pricing have been exacerbated in the absence of detailed wholesale pricing guidelines and detailed cost allocation arrangements • Provisions for shared access are articulated in facilities leasing guidelines • Maintenance of Telkom's defacto monopoly on both fixed-line facilities AND voice services is regressive; in many nations at least, VAS and VANS provision of voice services has been liberalized on a services-based competition model during early phases of the liberalization process • Major disputes have resulted around 'boundary' issues, particularly concerning 'legal' VANS services where Telkom has successfully argued that certain VANS activity violate its exclusivity • Telkom's exclusive access to cables (SAT3 and SAFE) also creates major bottleneck for competitive operators while maintaining high bandwidth prices; formal review of this issue by the Competition Commission is encouraged • While the SNO is guaranteed interconnection rights to Telkom's network, a two-year time limit is set on these rights. This is a peculiar departure from global practices, where such sunsets have not been the norm, and where alternative operators continue to use and require access to incumbent infrastructure years after being licensed • Moreover, the 2001 law lacks detail about what Telkom will be required to make available to the SNO and how interconnection agreements are to be concluded

Retail Price Control

Global Trends	Status in South Africa
<p>Regulation of public utility pricing has been driven by commitments to universal service policies and attempts to promote efficient use and allocation of resources. More recently, price regulation has also been used to curb abuses of dominant positions by former monopoly carriers. Price cap regulation, applying to non-competitive services supplied by a dominant carrier, has been adopted in many countries, following the UK model, where a maximum price ceiling is fixed on a basket of services. These prices have generally been adjusted over time, for example, in line with the Retail or Consumer Price Index, and have undergone periodic regulatory review.</p> <p>While the regulation of retail tariffs has traditionally focused on fixed communications, globally there is a growing focus on</p>	<ul style="list-style-type: none"> • South Africa's Price Cap productivity factor of CPI-1.5 percent significantly lower than the global norm for liberalized markets of between 5 and 10 percent • Set by negotiation in 1977, there is urgent need for review of the impacts and continued appropriateness of this low productivity factor • The current regime has not contained price increases, despite productivity gains achieved by Telkom • South Africa is an exceptional case in terms of its declining teledensity which is in part attributable to ongoing residential service price increases



<p>monitoring if not regulating mobile call tariffs.</p>	<ul style="list-style-type: none"> Investigation of Telkom's long-term contracts (and other potential predatory pricing practices) and their effects on competition and prospects for competitors is recommended More transparent billing requirements for Telkom are also necessary to ensure that consumers are able to compare competitive offerings on a service by service basis
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Universal Service Arrangements

Global Trends	Status in South Africa
<p>Universal service principles adopted in many competitive nations include:</p> <p><u>Delivery:</u></p> <ul style="list-style-type: none"> Incumbents remain primary universal service providers, with obligations included in individual licenses or under the provisions of general sector legislation Individual operator obligations may be geographically bound and service-specific Growing examination of options for the competitive tendering of universal service obligations. New licenses have traditionally included build-out and service coverage requirements, notably in developing nations. Significant development of targeted assistance programs such as for high-cost and rural areas. <p><u>Administration</u></p> <ul style="list-style-type: none"> Traditionally administered by ministry or sector regulator Growing examination of options for third-party administration. 	<ul style="list-style-type: none"> Implementation issues have severely hampered the achievement of universal access programs Originally focused on Telkom's license obligations - failure to curb the pace of rebalancing and to control Telkom's retail tariffs made service unaffordable despite availability USA policy, resourcing and funding was ill-conceived and in some part its objectives have been overtaken by the uptake of wireless services Prospects for USALs are severely limited by setting of large service areas with associated high costs of service delivery Delay in USAL licensing and the introduction of free SIM cards are further undermining the viability of the USAL model Establishment of a separate fund administrator has not been a major global trend, although South Africa does not stand alone in this respect The arrangements for universal service were restructured under the 2001 Amendment Act, with the Ministry of Communications assuming oversight of the USA replacing the authority of ICASA for the administration of licensing and the USF. This reversal of regulatory roles goes against the global trend of increasing the role and powers of independent regulators Initiate a consultation and review of universal service policy, funding and implementation

Competition Regulation

Global Trends	Status in South Africa
<p>Historically, governments have dealt with industry competition and concentration issues through a combination of regulatory arrangements, supported by legal definitions of market boundaries, players and activities. Regulatory mechanisms supporting the development of competition and the curtailment of abuses of monopoly power include:</p> <ul style="list-style-type: none"> Regulation of <u>vertical and horizontal agreements</u> between firms through formal prohibitions or restrictions on: price fixing; resale price maintenance; exclusive dealing; refusal to deal; and tying arrangements. <u>Control of mergers and acquisitions/ownership</u> regulation, based on tests of player dominance or substantial lessening of competition. <u>Tests of misuse of market power</u>, based on tools to define relevant markets and to measure substantial degrees of market power and misuse of power <u>Regulation of the horizontal and/or vertical integration activities of individual firms</u> through tools such as restrictions on market entry and lines of business ownership regulation <p>There is a growing shift to case-by-case assessment of anti-competitive behavior. With the introduction and development of competition, the focus of market investigations and examination of individual operator market positions is on the identification of dominance or Significant Market Power on a case-by-case and market-by-market basis. Hence, while the</p>	<ul style="list-style-type: none"> Arrangements for dominant operator/Significant Market Power (SMP) designation and associated interconnection obligations have not been comprehensively applied in South Africa. For example, none of the MNOs in South Africa are deemed to have SMP except in relation to the under-served area licensing regime and associated interconnection arrangements. South Africa must address the designation and enforcement of dominant operator rules. Regulatory intervention should be based on the SMP status of each competitor on a market-by-market basis. Section 8 (b) of the Competition Act, prohibits a dominant firm from refusing to give a competitor access to an essential facility when it is economically feasible to do so allowing the Competition Commission to apply the essential facilities doctrine Triggers and processes for the removal of sector specific regulations ex ante regulations are lacking in current legislation Enforcement of anti-competitive conduct rules, notably in relation to Telkom's preferential and discriminatory pricing of wholesale services is limited Controlling cross-subsidization is a major pending issue in South Africa Overhaul and more rigid enforcement of detailed

<p>Essential Facilities Doctrine continues to apply, competition has forced more granular analysis and justification of obligations formerly applied to monopoly operators. Forbearance clauses are also included in the telecommunications legislation of many nations (e.g. United States and Canada) where regulators are directed to monitor competition developments and lift regulations or forbear from regulating where markets are identified as competitive or contestable.</p>	<p>accounting separation and information reporting requirements applied to Telkom across segmented services and Business Units is required</p>
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5. Recommendations

In the short-to-medium term, the priorities for South Africa relate to:

1. Expediting the licensing of new operators and the allocation of additional spectrum as anticipated under existing legislation
2. Examining the scope for selective lifting of restrictions as enabled by existing legislation such as Telkom's continued voice service exclusivity
3. Establishment and implementation of thorough market and competition review processes
4. Implementing targeted measures to control anti-competitive conduct by Telkom, notably in relation to Telkom's pricing of wholesale services and enforcement of rigid and extended accounting separation and reporting requirements
5. Focused consultation and policy overhaul in relation to specific areas e.g. universal service and unified licensing policies and implementation mechanisms
6. Regulatory reform, notably in terms of strengthening the mandate and enforcement powers of ICASA and removing overlaps between the responsibilities of ICASA and the Ministry
7. Holistic liberalization policy development and associated legislative amendment.

C. Key Players in the South African Market

1. Fixed Telephony and TV

i/ Telkom SA

History

Established in 1991, South Africa's incumbent telco Telkom SA is also the continent's largest communications services provider in terms of operating revenue and assets. It provides fixed-line voice and data services, Internet, e-commerce, satellite, broadcasting and mobile communications services (through its 50 percent-owned Vodacom joint venture) to business, residential and payphone customers. Telkom has strategic equity partnerships with SBC of the USA and Telecom Malaysia, which jointly have a 30 percent shareholding in the company. The wholly-owned ISP subsidiary, TelkomInternet started operations in mid-2000 and in April 2001, merged with Telkom's formerly independent ISP, Intekom.

In return for the exclusivity of its Telecoms license until 2002, Telkom was committed to meeting a set of 16 licensing targets. If Telkom met 90 percent of these targets, it would qualify for a sixth year of exclusivity. However, Telkom opted out of taking further year's monopoly and the government proceeded with the liberalization process from May 2002.

On 7 May 2002, Telkom's five-year telecoms monopoly came to an end, and the company faces competition in the domestic Internet and international telephony markets. The Government has committed to ending Telkom's PSTN monopoly by December 2003.

In 2002, Telkom was South Africa's largest listed industrial company and was majority owned by the South African government (67 percent), while its strategic partners SBC Communications and Telekom Malaysia held 18 percent and 12 percent respectively and the black empowerment company Ucingo Investments owned the remaining 3 percent.

Major milestones and events

- **March 1997:** 30 percent equity of the completely state-owned South African Posts and Telecommunications (SAPT) was sold to the consortium of SBC Communications and Telekom Malaysia, which formed a joint holding company, Thintana Communications. ZAR4.7 billion of the ZAR5.6 billion that Thintana paid to the government was re-invested into Telkom for network expansion.
- **May 1997:** in tandem with the equity partnership process, the MPTB issued a new telecoms regulatory framework - embodied in the 1996 Telecommunications Act - and issued three 25-year telecoms licences to Telkom for the provision of Public Switched Telecommunications Services (PSTS), value-added network services and to use radio spectrum. Five years' exclusivity was given over basic fixed line and satellite services as well as usage of certain radio frequencies, while VANS, mobile and Internet services were opened to competition.
- **2000:** the government sold a further 3 percent stake of Telkom to Ucingo Investments Pty, a broad-based investment company representing over 20 black empowerment groups across all nine South African provinces
- **May 2002:** The process of partial liberalization of the fixed line telecommunications market began when the state-owned broadcast signal distributor Sentech was licensed to operate a multimedia service and provide carriers' carrier services, selling international bandwidth to other telcoms operators.
- **October 2002:** Government launched campaign for IPO of a minimum 20 percent of Telkom.
- **November 2002:** Government closed bids for a Second Network Operator (SNO) licence and ruled that Esi-Tel, the state-owned subsidiary of electricity utility Eskom, and Transtel, the telecom division of the Transnet transport utility group would jointly hold 30 percent of the SNO. Nexus connection was named the preferred bidder for a 19 percent black empowerment stake, while the remaining 51 percent will go to a foreign equity partner. By year-end 2003, customers will, for the first time, have an alternative choice to Telkom for their domestic long distance and international service providers. The SNO will be allowed to use Telkom's infrastructure for the first two years after its launch.

Recent Performance

Exhibit 46: Fixed Line KPIs

For the year ended March 31	1999	2000	2001	2002	2003
Fixed-line data					
Fixed access lines (thousands)	5,075	5,493	4,962	4,924	4,844
Postpaid – PSTN	4,768	4,668	3,930	3,554	3,285
Postpaid – ISDN channels	154	271	374	467	563
Prepaid	n/a	381	480	708	817
Payphones	153	173	178	195	179
Fixed-line penetration rate (percent of population)	12	13	11	11	11
Revenue per fixed access line (ZAR)	n/a	3,869	4,297	4,729	4,989

Fixed Line Revenue (ZAR millions)	2001	2002	2003
Fixed-line	26,100	28,570	29,199
Subscriptions, connections and other usage	4,197	4,410	4,595
Traffic	16,409	17,168	18,001
<i>Domestic (local and long distance)</i>	8,280	8,670	9,178
<i>Fixed-to-mobile</i>	6,845	7,323	7,539
<i>International (outgoing)</i>	1,284	1,175	1,284
Interconnection	1,706	1,798	1,773
Data	3,150	3,913	4,507
Directories and other	638	687	759

September 2003 Fixed Line Financial Update

ZAR millions	September 2002	September 2003	Percent increase (decrease)
Revenue	14,563	15,372	6
Operating Profit	1,894	3,025	60
EBITDA	4,396	5,748	31
Capital Expenditure	1,487	1,199	(19)

Regarding historical CAPEX, Telkom's network upgrade, including a 2.7 million fixed line rollout in the late 1990s has made extraordinary demands on CAPEX that are out of proportion with trends elsewhere. According to Telkom figures, CAPEX varied between 23 percent and 55 percent of revenues between 1997 and 1999. The company now plans

CAPEX to reduce to between 10 and 15 percent of revenues for its fixed line infrastructure for the foreseeable future, which is more in line with comparable operator plans in North America and Europe. According to recent financials for the period ending in September 2003, CAPEX to revenue was 9 percent, compared to 13 percent for the same period in 2002.

The Telkom transmission infrastructure is now totally digital, based mainly on fiber, although density of fiber pairs is not available information. The company also says its exchanges are all digital. Short-haul microwave is used in some areas. The company has SDH in the backbone, in addition to an extensive ATM network. Despite its opposition to the use of VOIP by competitors, Telkom is piloting VOIP to some countries and further network investment is earmarked for further expansion and upgrading in the provision of IP-type services to the corporate market.

Based on first half-year earnings ending September 30, 2003, Telkom Group's EBITDA increased to 37.8 percent from 32.3 percent for the same period last year. This is in large part due to cost-control in the company's fixed-line business. One metric that the company quotes is the number of fixed lines per employee that has risen from 137 to 142. Operating margins will be lower in the second half of the year, but the company aims to keep margins in the high 30-percent range in the medium term. This is exceptional performance in the global telecommunications market, identifying Telkom as a highly attractive investment for its current investors and any future investors, once further privatization is scheduled.

Customer Base and Revenues Attribution

At 31st March 2003, Telkom had 98,690 Internet customers, compared with 48,995 in 1Q02. The company launched ADSL service in August 2002 and had acquired 2,669 broadband customers by Q103, rising to 11,522 by the end of September. We believe that that most of these users are business customers.

According to recent filings, business represents 71 percent of fixed line revenues in 2003 after directories and other revenues are excluded. Currently, 41 percent of fixed access lines are provided to business accounts.

Telkom divides its business customer base into the following categories: global and corporate clients; small and medium-sized enterprises; and government. Government currently represents 7 percent of all fixed line revenues and 3 percent of fixed access lines.

Exhibit 47

Telkom SA's business customer base

Source: Telkom SA company reports

Customer type	Number
Global and corporate clients	225
Business and Government	550,000

Since the company has not broken out its business and consumer revenues, the Yankee Group has made certain assumptions regarding the current status of the business sector. We

have also taken into account indicators from the company's interim results for the half-year period up to September 30, 2003, which reveal that Telkom's data communications revenues grew 17 percent to 2.47 billion ZAR. We estimate that Telkom's business market annual revenues are ZAR 14.3 billion for retail switched revenues, excluding interconnect which is a wholesale category.

We believe that the consumer contribution in the data communications services revenue line is negligible to date, and that the bulk of dial-up Internet services are accrued under the company's switched access revenue line. The data communications revenue line, however, includes what would be normally be termed both retail and wholesale revenues. Telkom does split out revenues accrued from providing leased line services to mobile operators, but we believe that a substantial portion of wholesale revenues are also accrued under the remaining 'leased line and other' category.

For retail data revenues, we used two principal sources: leased lines and other data services. These other data services include the provision of VANs services, which in our definition would include X.25, frame relay, ATM and IP VPN services. Our conservative estimate is that Telkom currently controls about 40 percent of the VANs market from a retail perspective. We believe its market share is growing, as the company recognizes and leverages the attraction of IP services to businesses. The leased line market is almost exclusively the province of Telkom. Over time, Telkom's revenues in the VANs services market are set to grow in excess of 20 percent per annum over the forecast period. Revenues from leased lines provided to retail customers will grow more modestly, with a CAGR of 6 percent over the forecast period. This is a reflection of the saturation of the leased line market, the move to VANs-type services and the rise in usage of business DSL, although uptake is not forecast to be as strong as in other comparable countries. The impact of price competition in the retail leased line market will be minimal over the forecast's time period, largely due to Telkom's superior network granularity compared to any putative competitor, which means that it will still make money from wholesale tail circuit deals.

In our forecast of the business fixed-line market in South Africa, referenced elsewhere in this report, we attempt to create a separate accounting for wholesale revenue. As noted earlier, Telkom already reports wholesale leased line revenues for mobile operators, a business currently worth in excess of ZAR 1 billion. Our estimation is that this revenue stream will continue to grow for Telkom until the end of 2005 when the impact of the SNO will begin to be felt. This will drive substantial price competition in this area. Other wholesale datacoms revenue streams are more difficult to estimate. Nevertheless, Telkom reports that in year end 2003, the company operated 1,156 wholesale lines for Internet, or 4,635 64Kbps equivalents, an area we believe will grow strongly. In the business fixed-line forecast for South Africa, we have estimated the value of wholesale lines provided for mobile, Internet and other data services. Our conservative conclusion is that approximately 20 percent of total data communications revenues in South Africa are in fact wholesale revenues.

Service Portfolio—Relevant Products and Services

Telkom SA offers a full range of local, long distance and International telephony as well as Internet services for consumers as well as business customers. Below is a list of the most common consumer services provided directly by Telkom.

Exhibit 48: Product Portfolio

Source: Telkom data

Service Name	Service Description
Consumer Basic Voice	Local, national & International voice telephony
TelkomInternet Dialup Services	Dialup (PSTN & ISDN) Internet access
TelkomInternet Powered by ADSL	ADSL Internet access; speeds: 512/256kbps
TelkomInternet powered by Satellite	Broadband satellite Internet access

Telkom offers its ADSL product to consumers as well as businesses, providing speeds of up to 512kbps downstream and 256kbps upstream. However, its high price (ZAR680 per month for line access plus ZAR219 for the ISP fee) means ADSL will remain largely confined to the business market in the short to medium term at least. In the business market, ADSL prices are ZAR800 per month for line access, plus ZAR290 or ZAR239 for the ISP fee. The service currently also has a restrictive 3GB monthly download limit and no static IP addressing. This, along with the lack of effective competition due to high wholesale prices, will further deter mass market adoption of broadband. Some ISPs, like Tiscali, offer customers the opportunity to pay an additional ZAR216 per month, but this only increases download to 6GB per month.

Telkom's dial-up Internet products are competitively priced, at ZAR79.00, ZAR109.00 and ZAR189.00 per month for analogue PSTN, ISDN 64kbps and ISDN128kbps accesses respectively. However, we believe its March 2003 customer base of fewer than 100,000 left the incumbent with a dialup market share of less than 20 percent.

Market Strategy

Telkom believes the fixed line teledensity is nearing saturation, reflecting what it says is the high concentration of national wealth and access to infrastructure. The fixed line base fell by a few percentage points last year. This is a reference to the additional 1.7 million lines it was directed to provide in under-served areas, most of which we understand were disconnected for non-payment of bills.

Telkom accepts that it has historically had a high cost structure. One factor it notes is geography, since Telkom must provide service everywhere as the supplier of last resort, and South Africa is a large country. The company's telecoms equipment is all imported and the exchange rate is said to have played against Telkom. Nevertheless, Telkom asserts that its prices are reasonable. The company benchmarks itself against a set of peer countries and believes its prices are comparable.

The company says that prices will inevitably fall. Nevertheless, in November 2003, Telkom lodged an application with ICASA for a number of tariff increases. If approved, these will be effective from January 1, 2004, representing an increase of 2.7 percent in revenue for the regulated basket of services. This basket of services includes prepaid and postpaid line rentals, local, long distance and international calls, fixed to mobile calls and payphone calls. Telkom's argument is that current regulation makes provision for the carry over of rate benefits left unused in one year, to be claimable in the following year.

The South African Communications Environment

With regards to convergent services, Telkom argues for a three-layer model, not a four-layer telecommunications model. These are network-based services; pure services (ie, applications); and content. Telkom does not believe in separate infrastructure licenses. For example, it asserts that voice conveyance is a service, but that it is inherent in the network, so it is not a pure application. If infrastructure is licensed separately, Telkom claims that there is an issue of control and quality. The fact that metro municipalities are laying or encouraging the laying of fiber is a dangerous development for the market, according to Telkom.

The company says that since it is government policy to promote facilities-based competition, but prices for interconnect must not be too low. Telkom will strongly resist the introduction of LRIC-based cost accounting in this area, despite its scheduled introduction from 2005. Telkom is also reluctant to provide any level of shared access to DSL facilities.

YG Appraisal: Strengths, Weaknesses, Opportunities and Threats

Telkom will continue to be a formidable force in the business and consumer fixed-line communications market over the time period of this study. Its historic dominance has been strengthened by a comprehensive network overhaul and investment program, and it enjoys a solid reputation for service among business customers.

It is the most advanced communications provider across sub-Saharan Africa, with a digital network capable of supporting a far larger number of business and consumer subscribers than it currently serves.

The principal threat Telkom faces from the SNO lies in the erosion of its wholesale revenues. However, this threat is mitigated by the fact no other telecoms operator will be able to replicate Telkom's access network, including the SNO, and Telkom is not under any serious regulatory pressure to unbundle this access network.

Other service providers are unlikely under the current regime to have any real detrimental impact on Telkom's revenue streams.

However, the company could continue to see substitution of fixed by wireless customers and revenues, as foreshadowed in our forecasts. The relative saturation of its market segments means that growth can only come through a higher market share, and higher margins can only be achieved by raising prices or cutting costs. All three of these eventualities are perfectly feasible in current circumstances of Telkom's business environment.

ii/ Sentech

History

Sentech commenced operations in 1992 as the transmission and signal distribution arm of the public service broadcaster, SABC. Its mandate included provision of services provided to M-Net, Radio 702, Radio Ciskei, Transkei and Bophuthatswana Broadcasting Corporation. Sentech is licensed by the IBA as a broadcasting signal distributor in the common carrier category and provides the backbone of South Africa's broadcasting system, owning and operating around 180 terrestrial broadcasting transmitter sites. It also owns and operates satellite transmission systems, using Intelsat and PanAmSat

capacity to provide links for terrestrial transmitter networks and direct satellite broadcasting services.

In 1995 the Independent Broadcasting Authority (IBA) recommended that Sentech split from the SABC to become a public company. Parliament approved the BA report in March 1996 and in November 1996 adopted a Sentech Act to implement these measures. Sentech now operates as a state-owned commercial enterprise with its own board of directors.

The main objectives of Sentech's Social Corporate Investment commitment are to:

- Provide opportunities in the ICT sector to previously disadvantaged communities
- Ensure that projects funded by Sentech are sustainable
- Ensure that such projects are in line with the Government's development strategies
- Explore partnership opportunities with other companies to maximise the Corporate Social Investment strategy.

May 2002 saw the start of a partial liberalization of the fixed line telecommunications market. Sentech received licenses to operate a multimedia service - the first license of its kind in the world and an international gateway through which it can act as a carriers' carrier, selling international bandwidth to telecoms operators delivering service to and from destinations outside South Africa.

Exhibit 49: Recent Performance

Source: The Yankee Group, 2003, Sentech data

Revenue by product category	2003 (ZAR '000)	2002 (ZAR '000)	percent change	2003 percent of total	2002 percent of total
Television	204,672	187,250	9	44	44
Radio	121,900	113,879	7	26	26
Terrestrial and satellite linking	53,282	47,952	11	12	11
Satellite direct-to-home (DTH)	21,163	25,049	-16	5	6
Business television	3,496	4,180	-16	1	1
Facility rentals	9,283	8,032	16	2	2
Satellite decoder sales	12,513	9,227	36	3	2
Carrier of Carriers	4,234	0	100	1	0
InfoSat business solutions	24,820	15,255	63	5	4
Other	6,999	15,424	-55	1	4
Total	462,362	426,248	8	100	100

Exhibit 50: 2003 Revenue by Customer Class

Source: The Yankee Group, 2003, Sentech Data

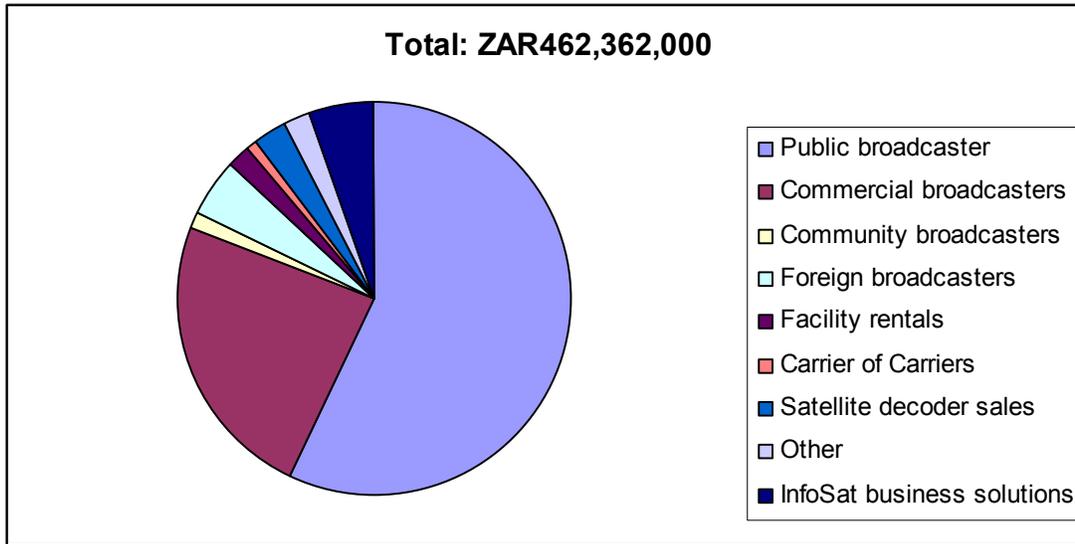


Exhibit 51: 2003 Revenue by Product Category

Source: The Yankee Group, 2003, Sentech Data

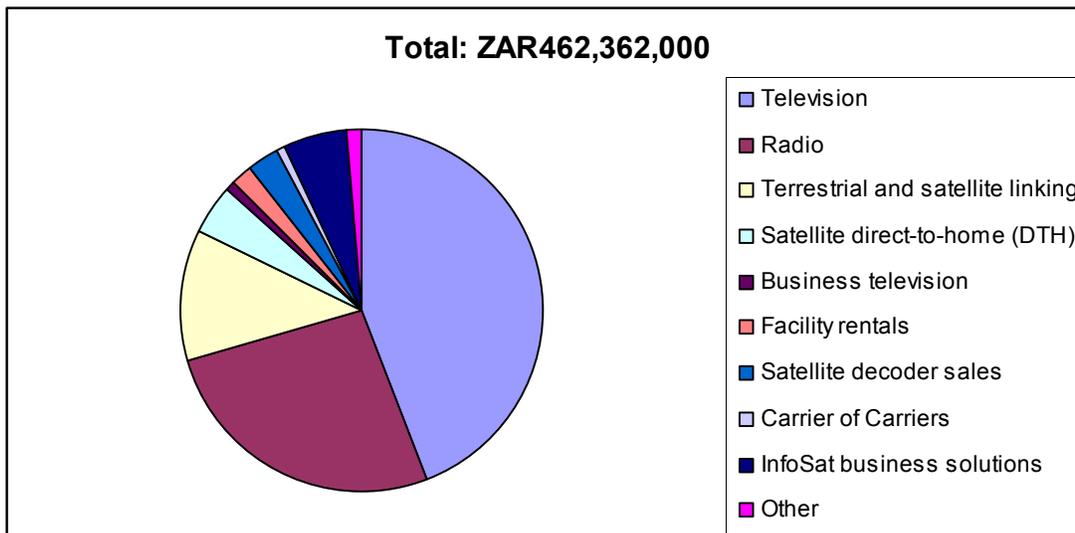


Exhibit 52: Three-Year Profit Record

Source: The Yankee Group, 2003, Sentech Data

	2003 (ZAR '000)	2002 (ZAR '000)	2001 (ZAR '000)
Net (Loss)/profit after taxation	-4,759	18,387	83,578

Market Strategy

Exhibit 53: Service Portfolio - Relevant Products and Services

Source: *The Yankee Group, 2003, Sentech Data*

Service Name	Service Description
My Wireless	Broadband Wireless Internet Access at symmetrical speeds of 128kbps, 256kbps and 512kbps
VSTAR Internet	2-way broadband satellite Internet Access using VSAT technology; speeds range from 256/64kbps to 512/512kbps
Direct-To-Home/VIVID	Free-to-air TV and radio services via DTH satellite
International Telephony	Carriers' Carrier

Vivid is a free-to-air satellite service used mostly in rural areas in South Africa that have no terrestrial television coverage. Vivid carries the three SABC channels and eTV, and has no subscription fee. Sentech plans to introduce a one-way broadband satellite Internet access service over its Vivid platform, offering TV-based web-browsing and e-mail to its DTH customers.

Sentech has implemented a subscriber management system, including a call centre for the Vivid DTH platform, effectively positioning itself for the future provision of pay TV services via satellite and, later, DTT. The multimedia licence that Sentech acquired in May 2002 includes the provision of TV-based Internet services, pay-per-view, VoD, electronic transactions and e-commerce. In November 2003, Sentech launched the country's first broadband fixed wireless service, ostensibly aimed at consumers and small businesses.

Sentech paid a total of US\$4.93 million for its multimedia and International carriers' carrier licenses in 2002 and plans to invest a further US\$8 million in its operations between 2002 and 2006. Reported Group revenues for 2002 were R426.2 million. The company focuses on using ICT technologies to bridge the digital divide, concentrating its social investment efforts in this area. However the strong commitment to social investment may prove to be an inhibitor to its successful development as a commercial venture.

Sentech's multimedia licence and its DTH service footprint should place the company in an ideal position to compete against the pay-TV operator MultiChoice and its sister ISP, M-Web. Despite offering a range of residential services, however, Sentech remains primarily a provider of services to business users, as the revenue split charts above illustrate. However, the high pricing of its recently launched broadband wireless product will attract few consumers and we do not expect the company to make a significant competitive impact on the residential market in the short-to-medium term.

iii/ M-Web

History

The global media group, Naspers conducts most of its internet business in South Africa through its indirect wholly owned subsidiary, M-Web Holdings. Launched in 1997, M-Web Holdings is the largest ISP in both South Africa and the African continent, with a dialup customer base in South Africa of just over 240,000 and more than 1,000,000 unique visitors to its portals per month. M-Web provides e-commerce solutions, including a virtual shopping mall facility, through its Business Solutions division. M-Web offers debit-based banking facilities, shopping, investment and insurance services. With its HQ in Cape Town, M-Web has operations in Johannesburg and Durban. M-Web Holdings also provides the infrastructure for MultiChoice's South Africa's interactive platform. Both M-Web Holdings and MultiChoice are directly owned by Naspers' subsidiary, MIH.

In 2001 M-Web launched its first standalone product - the Learning and Library website. In February 2003, M-Web introduced South Africa's first instant messaging service. This was followed in November 2003 when the company implemented the country's first micro-billing service for online purchases

Recent Performance

M-Web Holdings had approximately 247,800 dial-up subscribers at March 31, 2003, representing on its own reckoning a 41 percent share of the consumer dial-up internet market in South Africa. By September 2003 the South African user base had dropped to 241,000, and M-Web's parent group Naspers expressed concerns over the stagnation of the dialup market, the limited availability of local broadband services and regulatory constraints on the development of the South African market.

Market Strategy

Exhibit 54: Service portfolio—Key Products and Services

Source: *The Yankee Group, 2003, M-Web*

Service Name	Service Description
m-web.co.za portal	Portal service
Premium connection	PSTN dialup Internet access
Super-Fast ISDN	ISDN (128kbps) Internet access
Always Available ADSL	ADSL Internet access
Learning & Library	Educational services website
	Access to online banking
Add-to-your-Account (A-2-A)	Micro-billing service for online purchases
Quicksurf	Prepaid dialup Internet access providing two-week's unlimited surfing.
QQ	Integrated Instant Messaging & chat services

Despite its status as the country's leading ISP, M-Web's consumer offers are highly priced compared to those of Telkom SA, with monthly fees standing at ZAR139 (PSTN dial-up), ZAR199 (64kbps ISDN), ZAR275 (128kbps ISDN) and ZAR299 (ADSL).

M-Web's Learning and Library site is available to all Internet users, including non-customers, for ZAR59 a month.

A joint venture with NedBank, icanonline, is South Africa's first virtual banking initiative and offers a full financial services platform including facilities for online banking, investing trading and shopping without the need for using a credit card. Additional value-added services include travel bookings and tracking investment fund payments are also offered. An estimated 81 percent of icanonline's clients are first time Internet bankers, while 71 percent of its customers are utilizing its additional services such as shopping and investing online. Online shopping transactions have grown 93 percent year on year in 2002/2003, with monthly transaction volumes exceeding ZAR100 million.

iv/ Tiscali

History and Recent Performance

Previously known as Tiscali World Online, Tiscali South Africa is now a wholly owned subsidiary of Tiscali International. The ISP has around 125,000 dial-up customers and a further 5,000 business connections, giving it an estimated 23 percent national market share. Tiscali South Africa claims to have 2 million visitors to its portal each month.

Market Strategy

Exhibit 55: Service Portfolio—Relevant Products and Services

Source: The Yankee Group, 2003, Tiscali

Service Name	Service Description
ADSL	Broadband ISP services over Telkom ADSL lines; speeds: 512/256kbps
Dial-up	PSTN dial-up Internet access
ISDN	ISDN dial-up Internet access
Pay-as-you-Use	Internet access for mobile users via POP server
Prepaid Internet	Internet access via prepaid cards
Satellite	One-way broadband service with download speeds of 64kbps using standard PSTN/ISDN return path
PC-Cillin	Re-selling of Antivirus software
Website In A Box	Web site design, development, implementation & maintenance
World Meeting	Multimedia instant messaging

Tiscali's ISP access products are priced as follows: ZAR145/month (PSTN dialup access); ZAR225/month (ISDN 64kbps access); ZAR350/month (ISDN 128kbps access, ADSL

512/256kbps access or one way 64kbps downstream satellite access using a dialup return path). Prepaid Internet access costs ZAR29, ZAR55, ZAR110, ZAR275 and ZAR1,000 for periods of 5, 10, 21, 50 and 300 days respectively. A pay-as-you-use service is also offered at standard cellular rates.

Tiscali's services are priced higher than those of both its main South African consumer ISP rivals, M-Web and TelkomInternet. As such, its prospects for penetrating the residential market beyond its current market share remain limited.

v/ SABC

History

The SABC is South Africa's national public service broadcaster and was established in 1936 through an act of parliament aimed at forming a national radio service. In 1950 SABC introduced a national news service, broadcasting bulletins in English and Afrikaans. African language radio broadcasting and regional services followed during the 1960s. In 1976 SABC launched the country's first national TV service and a second channel followed in 1982. The second service - TV2/3 was split in two in January 1983 and a fourth - TV4 was launched in March 1985.

As well as its four television channels (three free-to-air and one satellite pay channel) SABC also provides 18 radio stations broadcasting in 13 languages, plus an external radio service in four languages. Almost 19 million adults in South Africa tune in daily to the SABC radio network, while some 18 million adults watch its free-to-air television programming. Part of the SABC's function role is legislated, and the organization's full public service commitment is contained in its charter:

The 1990s was SABC's most developmental decade to date and the key developments of this period are summarised below.

Major Milestones and Events

- October 1991: TopSport Surplus (TSS) introduced as supplementary service on spare TV1 channel capacity
- October 1992: Consolidation of TV2, TV3 & TV4 into a single multicultural channel - CCV-TV (Contemporary Community Values Television)
- October 1993: Establishment of Independent Broadcasting Authority
- February 1994: TSS replaced by NNT (National Network Television)
- October 1994: Start of broadcasting on KU-band PAS satellite of all 11 PS radio & 3 TV services
- November 1995: start of analogue sports channel broadcasts via satellite for six hours daily
- February 1996: TV1, CCV-TV & NNTV relaunched as SABC1, SABC2 & SABC3
- July 1996: 2 analogue DTH channels launched: AstraSport & AstraPlus (movies)
- September 1996: Under instruction from IBA, SABC sold off its six regional radio channels & relaunched its radio portfolio of 16 new channels. This marked

completion of transition from a state broadcaster to a fully accountable public service broadcaster

- Feb 1998: discontinued AstraSport & AstraPlus
- March 1998: popular former homeland TV station TV-Bop formally integrated into SABC stable. Following the parliamentary abolition of other homelands - Transkei, Bophuthatswana, Venda and Ciskei - their services and facilities were transferred to the SABC and to Sentech.
- November 1998: in collaboration with MultiChoice, SABC launched two 24-hour digital satellite TV channels aimed at continental Africa, comprising a news channel beamed all over Africa and an entertainment channel broadcast to selected countries.
- May 1999: New broadcasting law providing for three categories of broadcasting: public service, commercial & community; SABC to become limited liability company with 100 percent state ownership & restructured into separate public service & commercial divisions

Recent Performance

Combined, SABC's free-to-air programming attracts more than 18 million adult viewers - 74 percent of all viewing adults - each day. Of the estimated 29 million adults in South Africa, more than 22 million listen to the radio everyday, and over 19 million of these tune in to an SABC radio station.

Exhibit 56: SABC Financial KPIs

Source: *The Yankee Group, 2003, SABC*

Revenues (ZAR '000)	31/03/2003	31/03/2002
Advertising	1,534,424	1,436,868
Sponsorships	313,528	223,455
Licence fees	361,007	351,935
Government grants	64,285	61,483
Other	178,824	161,709
Total	2,452,068	2,235,450

Exhibit 57: Revenues by Segment

Source: The Yankee Group, 2003, SABC

Information on activities segment 2003 (ZAR '000)	Revenue	Expenses	Net Interest	Net (loss)/profit
Television, Education, News & Sport	1,542,761	-1,516,112	-79	26,570
Radio	479,574	-240,790	0	238,784
Audience Services	361,141	-48,570	6	312,577
Technology	47,179	-357,230	-1,289	-311,340
New media & Business Enterprises	16,763	-12,623	0	4,140
Corporate & other	4,650	-476,429	53,007	-418,772
Total	2,452,068	-2,651,754	51,645	-148,041

Information on activities segment 2002 (ZAR '000)	Revenue	Expenses	Net Interest	Net (loss)/profit
Television, Education, News & Sport	1,407,497	-1,408,699	-46	-1,248
Radio	419,299	-229,215	-3	190,081
Audience Services	351,948	-55,960	-626	295,362
Technology	36,605	-316,928	42	-280,281
New media & Business Enterprises	13,839	-9,977	4	3,866
Corporate & other	6,262	-261,508	51,928	-203,318
Total	2,235,450	-2,282,287	51,299	4,462

Business Segment Net (loss)/profit (ZAR '000)	31/03/2003	31/03/2002
Public Broadcast Services	-292,993	-323,267
Public Commercial Services	25,274	-8,000
Corporate & other	119,678	335,729
Total	-148,041	4,462

Market Strategy

Exhibit 58: Service Portfolio—Key Products and Services

Source: *The Yankee Group, 2003, SABC*

Service Name	Service Description
SABC1	Free-to-air public service TV channel broadcast mainly in Zulu, Xhosa & English
SABC2	Free-to-air public service TV channel broadcast mainly in Sesotho, Afrikaans & English
SABC3	Free-to-air public commercial TV channel broadcast almost entirely in English
SABC Africa	Public commercial pay-TV channel distributed via DTH offering news, current affairs, sports & entertainment

SABC's television network comprises four channels: three free-to-air and one pay-TV. Two of the free-to-air channels are dedicated specifically to public broadcasting, and one (SABC 3) is a public commercial broadcaster. The national radio network comprises 18 radio stations, 13 of which are dedicated specifically to public service broadcasting. There are 11 full-spectrum stations (one for each of the official languages), a station for the Indian community broadcasting in English, and a community station broadcasting in the !Xu and Khwe languages of the KhoiSan people of the Northern Cape, and these commercial stations: Radio 2000, 5FM, Metro and Good Hope FM.

SABC is highly commercialised, with around 78 percent of its 2001/2002 operating revenues derived from advertising and sponsorships and just 16 percent from TV licences. It competes for advertising opportunities with the private sector broadcaster MultiChoice and its pay-TV subsidiaries M-Net and DSTv.

vi/ MultiChoice SA

History

MultiChoice SA is part of MultiChoice Africa, which is in turn owned by the MIH holding company. Originally the subscriber management arm of the pay TV channel M-Net, MultiChoice Africa has since grown into a full-scale multi-channel digital satellite television platform serving almost a million subscribers in nearly 50 countries on the African continent, Indian Ocean islands, Britain and the USA. The vast majority of these subscribers are in South Africa.

MCA operates over both analogue terrestrial and digital direct-to-home satellite television platforms. The company imports channels, mostly from Britain and the US, packaging them along with local channels to form discrete bouquets for its individual markets. Its operations include subscriber management services and the management of a digital satellite television platform broadcasting 55 video and 48 audio channels 24 hours a day that include several data channels, as well as Africa's first non-return path Interactive television offerings.

The premium entertainment and sports channels carried by MultiChoice on its pay-TV platforms throughout Africa are provided by M-Net and SuperSport respectively - both publicly traded South African registered companies belonging to MIH Holdings.

Major Milestones and Events

1986: Electronic Media Network Ltd (M-Net) launches an encrypted terrestrial channel, marking Africa's first true multi-channel pay-TV service.

1993: M-Net split out its operational function into MultiChoice, retaining its broadcasting function under the M-Net banner.

2001: M-Net's broadcasting license was renewed and runs until 2010

March 2002: MultiChoice launched return-path-based interactive services in South Africa

Exhibit 59: Recent Performance

Source: *The Yankee Group, 2003, Multichoice*

MIH South African Pay TV Customers (including MultiChoice SA & M-Net)

	March 2003	June 2003	September 2003	2nd Quarter Growth
Analogue	365,825	350,171	330,414	-6 percent
Digital	678,966	693,717	719,838	4 percent
Total Pay-TV	1,044,791	1,043,888	1,050,252	1 percent

Pioneering the introduction of interactive services has given MultiChoice a differentiator against the TV services offered by SABC and Sentech. By enabling a richer and more engaging viewer experience, the addition of interactive services should enhance customer stickiness and loyalty, ensuring MultiChoice's competitiveness against free-to-air and emerging pay-TV offerings.

MCA's iTV services have, however, had mixed success. Over 5,000 DStv subscribers had registered for iTV by November 2002, with over 90 percent using TV-mail. The fact that fewer than 20 percent of these new TV-mail users were existing M-Web subscribers (MCA's sister ISP) demonstrates the value of iTV as a new service channel. However e-commerce has struggled to take hold, with under 3 percent of registered iTV users using TV-shopping by November 2002. Gaming has proved somewhat more successful, with the PlayJam channel having attracted 80,000 individual users as of June 2003.

Market Strategy

Exhibit 60: Consumer Service Portfolio—Key Products and Services

Source: *The Yankee Group, 2003, Multichoice*

Service Name	Service Description
Direct-to-Home	Premium TV content distribution via digital or analogue satellite and analogue terrestrial platforms
DStv	English-language digital satellite television programming bouquet comprising 50 video, 6 data and 48 audio channels
Interactive TV (iTV)	Access to interactive services, with optional infrared keyboard for e-mail/messaging; iTV services & functionalities include e-mail/messaging, home shopping, gaming, voting, web surfing & online access to banking information
The DStv Guide	Interactive EPG providing access to TV guide, channel bouquets & other interactive services
TV Messaging /TV-Mail	TV-based messaging/e-mail
TV Shopping	T-commerce/home shopping
Channel 0	Free-to-air, 24-hour music channel
Summit TV	Free-to-air business information channel
Africa-to-Africa	Free-to-air general entertainment and lifestyle
PlayJam	Interactive gaming channel

Through its introduction of a dynamic technology platform and assembling an attractive bouquet, built around compelling and premium movie and sports channels, MultiChoice Africa claims to have added significant value for subscribers and television consumers through its joint ventures and franchise operations.

While the MultiChoice premium DStv bouquet primarily features English language channels, value added, and language specific bouquets and MultiChoice Africa actively encourages the creation of African oriented channels. Many are available, free-to-air, as part of the DStv premium bouquet.

As well as developing mini bouquets targeting specific language groups, MCA, through its sister company M-Net, is also involved in delivering local content for M-Net Africa, including the Channel O and SuperSport 3 channels.

MultiChoice has no effective competition in South Africa's pay TV market and its de facto control looks set to continue, despite Sentech's plans to introduce paid multimedia services over its free-to-air digital DTH platform. A current market review by ICASA may lead to the licensing of further platforms; however, MultiChoice's strong market position should ensure that it continues to dominate for some years yet.

2. Business and Fixed Line Service Providers

i/ Internet Solutions

History

Internet Solutions is a leading South African corporate ISP focusing on the supply of value-added Internet connectivity and services. Founded in 1993, the company has always specialized in the provision of Internet-related services and is steadily moving up the communications supply chain to focus on higher-value data solutions and services. The company has three owners: Dimension Data, the major South African network and systems integrator (60 percent); Nedcor, the bank (20 percent); and the investment house Old Mutual (20 percent).

Dimension Data first acquired a 25 percent stake in Internet Solutions in 1996, and swiftly followed with a full acquisition in 1997. The addition of Nedcor and Old Mutual as major investors occurred in 2000. All three owners are also users of Internet Solutions infrastructure and anchor tenants of their VPN and hosting services. Dimension Data, which is positioning itself as a full-service e-commerce solutions provider, relies on Internet Solutions infrastructure to deliver a variety of specialist services, such as bill presentment and payment.

The company claims that 60 percent of South Africa's leading businesses are customers. It is one of the leaders in the VANs market.

Exhibit 61

Internet Solutions: Major milestones

Source: *Internet Solutions, 2003*

Internet Solutions: Major Milestones

1993	IS company founded.
1996	Dimension Data acquires 25 percent share of IS.
1997	Becomes wholly owned subsidiary of Dimension Data.
1998	Connects 1000th customer to South African internet.
1999	IS lights 45Mbps connection to United States.
2000	Nedcor and Old Mutual acquire strategic stakes in IS (20 percent each)].
2001	IS launches both a unified messaging service and an MPLS VPN offering.
2002	IS becomes the only service provider outside of the United States to hold the Cisco Powered Network certification for Managed Security Services (CPN-MSS).
2003	IS exceeds 300Mbps of international bandwidth.

Recent Performance

In the 10 years since the company was established, Internet Solutions has garnered 4,000 business customers in the corporate space. The company also plays in the wholesale market where it resells dial services to smaller ISPs.

Internet Solutions does not reveal its revenues, but we provide those of its principal parent, Dimension Data.

Exhibit 62

Dimension Data Financials 2000-2002

Source: the Yankee Group and company reports, 2003

Dimension Data Company Profile			
	2000	2001	2002
Revenue (in millions of U.S. Dollars)	1,976	2,460	2,187
Net Revenue* (in millions of U.S. Dollars)	(151)	(1,723)	(2,583)
Earnings per share (in U.S. Dollars)	16.1	13.0	2.3
Employees	10,273	12,623	10,145
Headquarters	Bryanston, South Africa		

*After goodwill and amortization

As can be viewed through these financials, Dimension Data is under pressure to improve profit margins across its global operations. Internet Solutions' dependence on third-party connectivity places increased pressure on the company to build revenues in areas where it has greater control over profitability. Internet Solutions tells us that its revenue streams are allocated on the following basis: 55 percent are Internet access, 16 percent are hosting, 16 percent are VPNs and the remainder are in the growing area of valued-added IP services, including security and ASP solutions. The company currently has approximately 150 VPN customers after launching VPN services six years ago. Most of these customers are linked via frame relay, but the company notes that uptake of IP-based VPNs using MPLS is growing swiftly, while frame relay growth is slowing.

Market Strategy

Internet Solutions' long-term strategy is to bridge the gap between IT and communications in order to provide value-added ICT services to corporates, leveraging the expertise of its parent company Dimension Data. Its current service focus is on the provision of VPNs, corporate remote access, managed security, and application hosting services, based on a shared IP-based infrastructure.

By providing a complementary 'stack' of IT-related services through Dimension Data, Internet Solutions asserts that it is ideally positioned to provide ICT solutions throughout the value chain. Dimension Data and IS can now offer a range of options for companies requiring outsourced or out-tasked network and IT services. As a result, the opportunity to achieve incremental revenues from its existing 4,000 customers will be clearer through its combined expertise.

Recent service launches are under the Business Gateway brand. The three products now on the market should help to build high performance e-commerce environments.

Although the company believes that the South African business market is fairly sophisticated, it believes that there is pent-up demand for outsourcing services. This is partly due to the ongoing ICT skills shortage evident in the country.

The company is also attempting to build solutions that bridge the wired and wireless divide. In August 2003, the company launched corporate SMS services. The SMS AppLink is a managed service that allows virtually any company application or system to become SMS message enabled. Messages are routed through network links with three South African network operators.

In addition, through Dimension Data and its partnership with Cisco Systems, Internet Solutions has a head start in the convergence services business, but cannot employ these skills fully until the provision of voice over IP is liberalized. Effectively, the inability to provide VOIP services represents a gating factor to revenue growth. This is because the provision of MPLS-based IP VPNs - a growing revenue stream for IS - has become the classic platform for converged voice and data communications. Indeed, as recent Yankee Group research has shown, more than 70 percent of large multinational businesses have plans to converge voice and data backbones onto an IP VPN, which will require support for enterprise VOIP.

The South African Communications Environment

Internet Solutions notes that Telkom SA provides high-quality communications services to clients. In this context, the SNO will need to exhibit high levels of both network reliability and customer service in order to compete effectively on infrastructure provision.

Nevertheless, the greatest concerns that Internet Solutions expressed centered on transparency of pricing. Currently, the company asserts that there is little or no clarity or delineation of retail and wholesale pricing for various connectivity services. It would like to see better regulatory oversight with regard to the accounting for both the incumbent's costs and the determination of cost-oriented tariffs both in the wholesale and retail markets.

The requirement for such price transparency is acute for Internet Solutions since much of its revenues are dependent on the provision of services that are dependent on underlying Telkom connectivity, both domestically and internationally. Although it expects Telkom to reduce its prices in January 2004, the company doubts that the reductions will be substantial enough to make difference to its operational margins.

For diversity of connectivity options, the company is looking to wireless broadband and the provision of wholesale DSL, in addition to market competition on leased circuits introduced by the launch of the SNO.

The relationship between Internet Solutions and Telkom SA is fraught, and has already been the subject of a Section 100 complaint in 2002, brought by the incumbent. The issue regarded the alleged contravention of IS's VANs licence. This concerned the alleged provision of a private telecommunications link to a third-party (an MPLS-based IP VPN service that IS termed an enhanced service). This complaint was eventually thrown out as unfounded.

YG Appraisal: Strengths, Weaknesses, Opportunities and Threats

Internet Solutions' strengths and opportunities are linked to those of its parent company, Dimension Data. In Europe in particular, Tier 2 and 3 telecoms service providers view Dimension Data as the de facto network integrator for the enterprise and use the company's brand to gain enterprise exposure. Dimension Data takes a powerful place within the ecosystem as the player that owns the network requirements of the enterprise.

A key aim of Dimension Data is to reposition itself as an application network integrator, adding value to the core network build and integration play. All IP, security and service

provider solutions benefit from the investment made in new proprietary “Application Network” architecture.

Internet Solutions already leverages this expertise to serve South African businesses directly. But there is also an opportunity to develop value-added propositions in the nascent South African wholesale market.

Effectively, Internet Solutions could also sell packaged IP-centric, telecom and security solutions through Tier 2 and 3 channel relationships. A high-margin reseller business could emerge that would drive these solutions through the demand chain to South Africa’s small and medium-sized businesses, an area that we view as highly underserved.

Internet Solutions’ weaknesses and threats are directly related to its inability to provide competitively-priced connectivity to its customers. Effectively, we believe that the company is forced to compromise its profit margins due to the inflexible and high prices of its wholesale connectivity supplier, Telkom. As the company itself admits, more than 50 percent of its revenues are connectivity-related, an area where profit margins are small or non-existent. Indeed, it may be the connectivity is sold as a loss leader in order to attract customers to take solutions that lead to higher-margin services. The company’s drive toward value-added security, commerce and messaging solutions does not only reflect the evolution of the ICT market. Internet Solutions’ fortunes in the medium and long-term are dependent on this.

Internet Solutions remains one of the most important players in the South African business communications market. This is partly due to its unique heritage and company ownership that positions it strongly to meet corporate needs, not only in South Africa, but also on a global level. Over the past 20 years, Dimension Data has become a global player by designing, building, and managing network infrastructures for telecoms operators and increasingly enterprises. As a result, it is strongly positioned and highly credible in the global outsourcing market. This means it can attract businesses and telecoms operators looking for alternate locations for outsourced operations, including the burgeoning call center industry. However, as Internet Solutions and its parent company both fear, this is unlikely to happen due to the current environment for communications services in South Africa.

ii/ Transtel Profile

History

Transtel is one of the partners in South Africa’s SNO, holding a 15 percent stake in the organization. The state-owned Transnet Limited, Transtel’s parent company, owns all railways, pipelines, some roads, has a share in South African Airlines and also owns harbors. This provides excellent and diverse set of rights of way for the provision of communications services.

Transtel provides telecommunications services for Transnet. These networks include more than 40,000 telephones with national dialing, 30,000 radios, 20,000 computer terminals, marine radio and radar systems with a national infrastructure of coaxial cable, fibre optic, microwave and satellite transmission systems.

Transtel was set up in 1990 to serve the interests of Transnet. After the 1996 telecommunication act it began selling some services to third parties. Its initial lines of

business (from 1997) were around CPE installation and maintenance, primarily PBXs and LANs. After receiving a VANs license, the company began supplying managed data services. It mainly creates large bespoke networks for large enterprises. Its biggest external project has been a large network for travel agents.

In April 2001, Transtel's status within the Transnet Group changed to become a division of Transnet, and therefore reclassified as a profit center. A Transtel Divisional Board now directs the division's business strategies and operations. The board is made up of executive and non-executive directors of Transnet.

Transtel's existing network connects 50,000 subscribers and 25 percent of its current revenues are generated outside the Transnet Group. Through the SNO, Transtel is set to become a major service provider focusing initially in the wholesale market.

Recent Performance

With its partner Eskom, Transtel has invested ZAR 2 billion in the SNO's network infrastructure. Ericsson is acting as an ongoing consultant for this network modernization. Transtel's current data services are mostly frame relay, and it relies on Alcatel and Newbridge equipment. For its ATM and IP-based infrastructure, it employs Ericsson and Siemens equipment. Transtel also has an established relationship with Marconi. In 2001, Transtel contracted with Marconi to install an integrated network management system. Following this, in 2002, Marconi provided ZAR 2.6 million's worth of equipment and service concerning the SDH upgrade of Transtel's network and deployment of microwave transmission stations. The links include a system operating in 8GHz from the Isando Communications building to Sundra, while the other system is short-haul linking Cape Town, from the Paul Sauer building, to Kanonkop in the 13GHz range.

Transtel's national DWDM-based fiber network connects all major cities and provinces. Currently, capacity on main routes is 5Gbps, which equates to two 2.5Gbps wavelengths for protection. The company also has some metropolitan fiber deployment in Johannesburg, Pretoria, Cape Town, East London, and Durban. As with many utility telecoms operators, this metro fiber is provided in large city rings with a limited number of break-out points for granular connectivity. Current investment is focused on extending some of this metro fiber, connecting major PoPs where the SNO already has existing sites, such as railway stations and power stations. Currently, the network is said to go to every key Telkom point of interconnect to get lowest possible interconnect rates. Other wireless solutions are being considered for the access network, including LMDS and fixed-mobile solutions.

In the absence of an agreed investment partner for the remaining 51 percent stake in the SNO, Transtel is proceeding with network investment. Implicitly there is driving belief that with its existing partners, the infrastructure and SNO will soon be ready for official launch.

Market Strategy

The SNO's initial business revenues are likely to come from the wholesale market, connecting telecoms operators, ISPs and VANs. A second likely target is the large corporate market.

Like most second network operators, the SNO can be expected to price at a modest discount against Telkom. However, it may opt to introduce more innovative pricing in some parts of the market in order to attract a significant share quickly.

Although there is an opportunity in serving the small and medium-sized enterprise market, the SNO needs to resolve the issue of local access. Nevertheless, since there are a large number of South African infrastructure developments, such as new business parks and residential areas, the SNO could build some access revenues over time.

The South African Communications Environment

Transtel supports the concept of services-based competition and the issue of further services-based operating licenses. However, Transtel is concerned about the provision of additional infrastructure licences at a time when its partners in the SNO are trying to put together financing for the company.

The company's greater concern is the availability of transparency on pricing and availability of wholesale DSL at favorable rates. It is concerned by the current volume limits set on Telkom DSL, which it believes are unrealistic. Pricing is currently too high to spark the high broadband demand that has been seen in other countries.

A second key wish is that the regulator ends Telkom's monopoly over the fiber optic cables coming into South Africa and access to cable landing stations. Telkom currently regards cable landing stations as its own private property, restricting any type of third party access. In Transtel's view, this is an essential public facility that should be provided at cost.

In 2002, Transtel was involved in a dispute with Telkom SA regarding the termination of international calls. The fixed-line operator claimed that Transtel was illegally bringing international voice calls into South Africa and terminating them on the Telkom network. As a result, Telkom temporarily blocked Transtel's switchboard. This issue was again reviewed in 2003, but Transtel was exonerated.

Transtel is also concerned about Telkom pricing practices, especially its incentives designed to encourage enterprises to sign long-term contract that effectively take them off the market at the time that the SNO will be starting up.

YG Appraisal: Strengths, Weaknesses, Opportunities and Threats

Transtel is a worthy partner in the SNO, with an infrastructure that is being modernized, and diverse rights of way to exploit. Its prior involvement with the mobile operator MTN may also help it to develop innovative wireless solutions to the access problem, which remains the most significant obstacle to its market growth.

The wholesale market will likely provide the bulk of the SNO's revenues in the short to medium term is correct. However, the company will need to keep in mind that the price spiral in wholesale bandwidth is difficult to control once begun. Despite the limited number of infrastructure licenses expected to be granted in the 2004-2008 time period, there is still significant latitude for severe price erosion between a small number of suppliers. In the European market, competition across the region's major telecommunications routes saw price declines as high as 80 percent per annum in some instances.

Although the same phenomenon is unlikely in South Africa, Transtel only has limited control of the wholesale infrastructure market. This is because Telkom still possesses the best network capillarity for now. This means that while long-distance links will be subject to

competition, the local or 'tail' circuit price will remain largely within the incumbent's control.

Without regulation of tail circuit pricing, combined with wholesale DSL pricing that is commercially attractive, Transtel's market growth may be capped. At the same time, if regulatory developments allow greater freedom in the area of wireless technologies such as WiFi, LMDS and CDMA, then Transtel will be able to compete more effectively.

Transtel's positioning within the SNO underscores the fact the focus of South African competition in the fixed line market will be the larger enterprise and competitive operator. On this basis, although Transtel will have an impact on prices, the audience for these services at this point will be limited unless further regulatory action is taken.

iii/ UUNET Profile

History

UUNet SA is a leading provider of Internet-related services to South African and international corporations, and is a wholly-owned subsidiary of MCI, formerly known as Worldcom Inc. Along with Internet Solutions, it is the longest-established alternative corporate services provider in South Africa, with more than 1,500 customers.

UUNet SA was originally launched in 1993 under the name TICSA, the Internetworking Company of South Africa. TICSA was eventually bought by the South African integrator Datatec. Datatec subsequently operated a investment partnership in South Africa with the U.S.-based UUNet Technologies, a company later subsumed into Worldcom Inc. In 1997, Datatec also acquired the South African assets of Global One, the former joint venture between France Telecom, Deutsche Telekom and Sprint. During this time, UUNet also had a consumer focus and was developing a wholesale service arm, in addition to its corporate Internet revenue stream.

In 1998, UUNet formed an alliance with the local ISP M-Web. This involved transferring UUNet's consumer Internet dial customers to M-Web, in return for M-Web's corporate customer base, largely consisting of leased line service revenues. This agreement was recently renewed until the end of 2004. UUNet also provides satellite connectivity through its acquisition of SDN in 2000.

MCI initially owned 24 percent of UUNet, but upgraded its minority status by buying technology group Datatec's stake in 2001. Since then, UUNet SA has operated as a wholly-owned subsidiary of this global service provider with has operations in 65 countries. Its primary focus is the provision of Internet-related to corporates and wholesale services to other ISPs and telecoms operators.

In the summer of 2002, MCI was placed under bankruptcy protection following a series of allegations regarding its accounting practices. The company was also laboring under a debt load estimated at \$41 billion. Since October 2003, the parent company is officially emerging from Chapter 11. The company continues to be a leading service provider to large organizations in North America, Europe, South America and Asia Pacific, with little customer attrition reported as a result of its financial problems. The financial settlements reached by UUNet SA's parent company appear to have had no direct effect on its day-to-day operations.

Meanwhile, UUNet SA reports that its revenues are growing. According to UUNet SA executives quoted in local media, the company expects to generate approximately ZAR 890 million by year end 2003, compared to ZAR 650 million in 2002. UUNet SA also operates Internet services subsidiaries in Namibia and Botswana, in addition to a 50 percent investment Smartcom, a mobile service provider affiliated to Vodacom. Through a variety of business partner and reseller arrangements, the company also has presence in Kenya and Zambia, and has plans to expand into Angola, Mauritius, Tanzania and Uganda.

Recent Performance

UUNet SA recently saw the departure of its CEO David Meintjes, after seven years in charge. This will inevitably bring some changes at the service provider, which is now looking for a replacement.

The company operates four dedicated data centers in Johannesburg, Cape Town, Durban and Windhoek. These are linked via ATM connections provided by Telkom. Two core network nodes are in place in Johannesburg and Cape Town, with smaller nodes in other major urban centers.

UUNet operates four diverse paths each for international connectivity each terminating at different points in the United States and South Africa. The company's principal international circuit between North America and South Africa is a 34Mbps connection. In addition, UUNet SA operates a peering link in its New York City hub to obtain 300 Mbps of peering with its parent company. All traffic management is performed at a single point, which the company asserts will improve network efficiency and configuration management.

Market Strategy

UUNet is an advocate of converged voice and data services provided over an IP infrastructure, a strategy which its parent company is aggressively pursuing through other global subsidiaries. Despite its financial woes, MCI remains a leading supplier of voice and data services to the world's multinational organizations, which did not leave MCI during its crisis. Increasingly, these demanding organizations are demanding convergent services, which are not available through existing South African legislation.

In the meantime, the company focuses on providing dial-up access, connectivity, hosting, security and mobility solutions to South African businesses. The company's prime target is the larger enterprise, but it has built up a customer base in the small and medium-sized enterprise sector and has designed specialist bundle connectivity solutions for SMEs.

In the South African market, UUNet's interest in the SME market led to its sponsorship of a major SME survey, the South African Internet Economic Study in 2002 in partnership with the US Agency for International Development.

The South African Communications Environment

UUNet attended and spoke at the South African Convergence Colloquium in the summer of 2003. The company is concerned about the ongoing telecommunications monopoly in the country, but also highlights the impact this may have on a broader international level. As a pan-African Internet service provider, UUNet asserts that South Africa should take leadership in the development of communications in the region. However, from once being the ninth most connected country in the world in 1993, UUNet believes that South Africa has now dropped to 20th, due to the lack of alternative competition to stimulate and grow the telecoms sector. UUNet is concerned that since on its own reckoning less than 7 percent of South

Africans currently have access to the Internet, only substantive and proactive regulatory change can bring growth and sustainable development of the sector.

YG Appraisal: Strengths, Weaknesses, Opportunities and Threats

With the departure of its long-standing CEO, UUNet SA will become even closer to its parent company. MCI is emerging from Chapter 11 and is attempting to standardize all of its services and processes on a global level. The risk is that if South African deregulation is further delayed, financial pressures may force MCI to divest its South African assets should they not achieve the appropriate corporate-wide profit margin - although there is no suggestion of such a move at this time. If this were to occur, however, there could be a negative impact on the diversity of the corporate telecommunications market.

Parent company MCI is currently re-examining the contract values of its global customer base. In certain parts of the world, the company believes that it is too dependent on smaller organizations with low customer lifetime value. It is currently considering how to manage these contracts in the long term. It is not unlikely that the company will arrange to devolve these customers to third parties in order to focus on large organizations where it believes it can provide greater value - and achieve greater profit margins.

In the South African context, this could mean another partnership like the one it has established with M-Web, which means that UUNet becomes a wholesale traffic aggregator of consumer and SME traffic, focusing its direct sales and marketing efforts on the large corporate. This would not necessarily be a negative development if it were to occur. In a more liberalized telecoms market with the SNO in operation, this would mean that UUNet could negotiate better bulk discounts for connectivity services that it would hopefully pass onto its downstream customers.

On a global level, UUNet's parent company is a leader in both corporate and wholesale operations. Its commercial expertise (both positive and negative) is of substantial benefit to the development of the South African market.

3. Wireless/Mobile Service Providers

i/ Cell-C

History

Cell-C is wholly owned by 3C Telecommunications, which is owned by Saudi Oger (60 percent) and black empowerment group CellSAf (40 percent).

Cell C was the third and most recent mobile operator to launch in South Africa. It was awarded a dual-band GSM-900/1800 MHz license in February 2001 and launched in November 2001. Initially Cell-C provided services via a 15-year commercially negotiated roaming agreement with Vodacom as it rolled out a network of base-stations. However it has launched an aggressive roll out plan, with the intention of relying solely on its own access network in metropolitan areas by the end of 2004. This will reduce Cell-C's interconnection payments to Vodacom, which it claims are hindering its financial performance. It will continue to provide national coverage via its roaming agreement with Vodacom, which is for a 15-year period. At mid 2003, Vodacom carried approximately 50 percent of Cell-C's

traffic. But represented an improvement over November 2002, when Vodacom was carrying 70 percent of cell-C's traffic. By mid-2003 Cell-C had deployed approximately 1,100 base-stations. This is some way off the 2,000 planned for the end of the year. Siemens is the network infrastructure provider.

Cell-C claims it has experienced significant delays to its base station roll out program, due to slower than anticipated approval for base station sites in many regions. It is currently arguing in favor of faster approval processes to allow it to meet its network coverage commitments.

Due to rapid market growth, however, Cell-C has recently decided to accelerate its base station roll out schedule. It has introduced a new target of deploying 2,350 base stations by the end of 2005. To fund this network build, Cell-C has been attempting to source more funding from shareholders. The exact amount is not disclosed.

Until May 2003 Cell-C was the sole operator in the 1800MHz frequency band. At that date the South African government indicated that it would be prepared to award additional spectrum to the existing 900MHz operators. MTN and Vodacom are now both using 1800 MHz spectrum. This spectrum is licensed on a temporary basis. These MNOs expect to receive a permanent allocation, but the timing for this is uncertain. Cell-C claims it should be allocated more 900 MHz spectrum. This would allow it to compete more effectively with MTN and Vodacom.

Cell-C has committed to deploying 52,000 community telephones. It rolled out approximately 6,000 in its first year of operation.

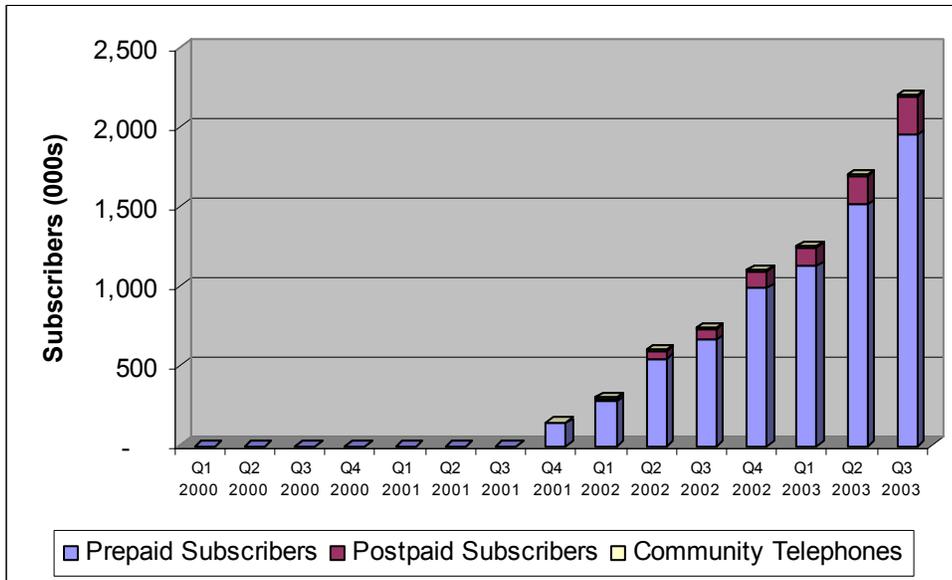
When it first launched Cell-C was keen to avoid subsidizing its handsets. However, the fact that both its rivals did so, quite substantially, meant that Cell-C could not compete without following suit. Its cost of acquisition (COA) is therefore high compared with the ARPU each customer is generating. This means its financial return on each customer is low, and, unless it can increase ARPU, it will take several years to see a profit from most customers.

Recent Performance

Since its launch, Cell-C has achieved a good level of success, and it now has approximately a 14 percent share of the South African market. It secured 32 percent of net additions during the twelve months to March 2003 and in the six months since this proportion has increased to over 40 percent. This growth has been fuelled by some enhancements to its media advertising campaigns and an increase in its distribution channels. With these growth rates Cell-C is well positioned to achieve a market share of around 20 percent by 2007. This is a strong performance as it has been in commercial operation for only two years. Compared with many other wireless markets, a 14 percent share after two years is a strong performance. However, Cell-C did enter the market at a time when mobile service penetration was relatively low (21 percent), and new customers were being added very quickly. It should also be stressed that Cell-C does carry a significant number of inactive customers in its reported customer base numbers. It has been estimated that the inactive proportion may be as high as 22 percent of the total. This based on the definition that a customer is considered inactive if they have not used the service for three months or more.

Exhibit 63
Cell-C Shows Healthy Subscriber Growth

Source: MNO, The Yankee Group, 2003

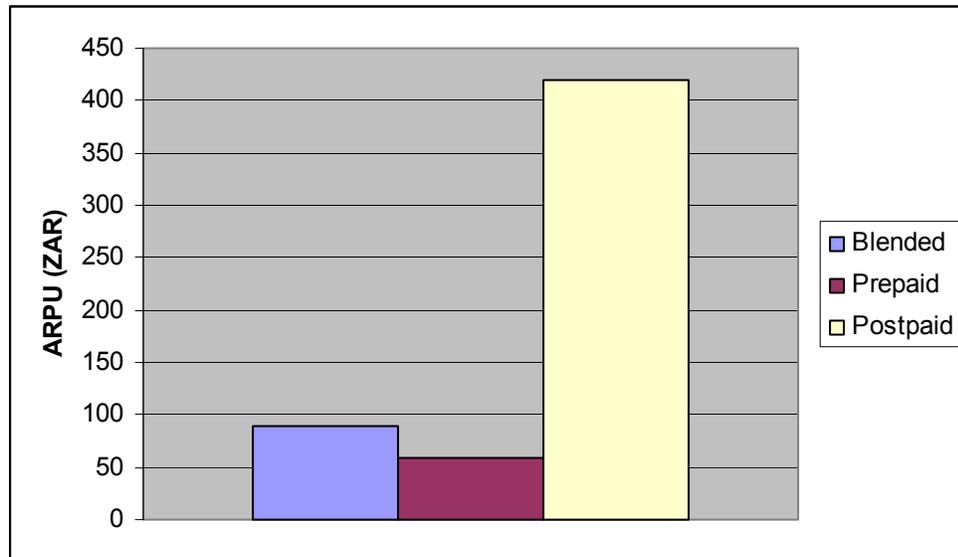


Because it has captured approximately 90 percent prepaid customers, Cell-C’s ARPU is low compared with Vodacom and MTN. We estimate that its current ARPU is approximately R60. However, this figure is trending lower, and it is likely to continue to do so while Cell-C fails to attract a significant proportion of contract customers. Cell-C estimates that the 10 percent of its customer base that are contract customers are generating approximately 50 percent of its revenues. This highlights just how low its prepaid ARPU is today (estimated R42), and the challenge it faces in trying to increase this figure. Cell-C’s CEO Talaat Laham has already stress the need to increase prepaid ARPU. He has indicated that they are actively devising a strategy to achieve this, but details are unclear.

Exhibit 64

Cell-C Estimated Annualized ARPU, 2002

Source: The Yankee Group



Cell-C does not currently disclose churn statistics, but we estimate that it is currently experiencing churn rates of at least 30 percent per annum. In November 2002, it did report churn rates of 30 percent for prepaid customers and 15 percent for post-paid customers. But that was quite early in its commercial operations, and those churn rates will have changed over the past 12 months.

Cell-C expects the introduction of mobile number portability (MNP) in 2004 to have a big impact on the South African mobile communications market. It believes loyalty to MNO brands is generally low among consumers, and it expects significant numbers to switch to alternative operators when MNP becomes available.

Mobile data services are currently generating approximately 5 percent of cell-C's total revenues. The vast majority of this is SMS. Beyond SMS, we do not expect Cell-C to generate large revenues from other mobile data services. With its focus on the prepaid consumer market, we do not expect the Cell-C's mobile data service portfolio to match that of its competitors for the foreseeable future.

Financially, Cell-C's performance is improving gradually. It expects to produce positive EBITDA in 2004 for the first time. It also anticipates cash flow turning positive during 2005. By international standards, if it achieves this goal, this will be an impressive performance for a latecomer to the market.

Market Strategy

As with most successful new entrants Cell-C has chosen to compete initially on price, undercutting its established rivals in order to build market share. The company is generally trying to maintain prices at 10-15 percent below those of its rivals. The clear disadvantage of

this strategy is that it means Cell-C secures a largely low-spending prepaid subscriber base. A strong market share does, however, give a good basis for subsequently building value. Attempting to compete on service differentiation for a new operator is difficult. The Cell-C brand had no presence in the South African market, and the only way to persuade customers to adopt this new operator is to give them substantive benefits, in the form of cheaper calls.

Overall, Cell-C's strategy is based on positioning itself in the market as an innovative company that provides simple, value-for-money services. It targets the youth market strongly. For example, it offers text-only service packages that are clearly targeted at younger customers. This strategy is in keeping with the approach taken by third or fourth market entrants in other wireless markets. One example of this approach is the fact that Cell-C was the first South African MNO to introduce per-second billing for voice calls. Soon afterwards the other MNOs followed suit and introduced per-second billing.

Cell-C has a fairly basic service portfolio, reflecting its status as the company targeting relatively low-spending customers, with simple, value-for-money services.

Cell-C's Service Portfolio:

- SMS
- Downloads:
 - Ringtones
 - Icons
- International Roaming
- Insurance
- Friends & Family Discount
- Telemetry

Cell-C works with three service providers, its own Cell-C Service Provider as well as Autopage and Nashua Mobile which both also sell the services of MTN and Vodacom. It therefore uses a diverse range of channels, in keeping with its competitors, and its distribution footprint is not comparable to those of MTN and Vodacom. By the end of 2003 Cell-C plans to have 80 franchises operational. In November 2002 it had approximately 4,000 retail outlets.

YG Appraisal: Strengths, Weaknesses, Opportunities and Threats

Cell-C benefits from the fact that it entered the South African mobile communications market at a time when mobile penetration was still rising sharply. This has allowed it to build market share quickly. In the early days of its commercial launch, Cell-C was also clearly differentiated from its rivals, and was basically positioned and perceived to be the low-price network operator. It also benefited from the fact that it entered into a roaming agreement with Vodacom, which, though the terms may not have been entirely to Cell-C's liking, did allow the company to deploy its own network in a phased manner. This helped it to reduce CAPEX expenditure in the short and medium term.

Cell-C's greatest weakness lies in the quality of the customers it has been able to attract. With 90 percent prepaid customers, its ARPU is inevitably very low. Perhaps unsustainably

low. The roaming agreement with Vodacom can also be viewed as a weakness for Cell-C. The company is unhappy with the interconnections terms that were negotiated, and would prefer more regulatory intervention to set lower interconnection rates that are based on Vodacom's costs.

Cell-C does have some opportunities to capitalize on developments within the South African Mobile Communications market. As the company with the smallest share of the market today, the introduction of MNP should represent an opportunity for Cell-C to gain market share at the expense of its two rivals. We therefore expect Cell-C to promote MNP strongly. Cell-C is already capturing a significant proportion of its customers from its two rivals. It has been reported that 45 percent of its customers have been captured from MTN and Vodacom. The remaining 55 percent are first-time users.

As it builds out its own network, it will rely less on Vodacom, and will reduce its interconnection payments. By continuing to focus price as a key differentiator, Cell-C can continue to grow its market share at current rates.

In terms of market share potential, at the time of entry to the market, Cell-C was aiming for a 15-20 percent of share, based on a total market size estimate of 13 million customers by 2006. That estimate for total market size has already been proved to be far too conservative. Cell-C is now targeting a 25 percent share of the market, but based on a higher estimate of 19 million total users by 2008. The bottom line is that Cell-C will continue to benefit from the faster than expected growth in the mobile communications market.

Cell-C's greatest challenge will be to achieve long-term financial viability, based on improved ARPU, lower churn rates, and lower operating expenses. It must therefore play a long-term game, by building market share aggressively in the short-term, and improving other operating metrics like ARPU, churn and data revenues in the medium and long term. One additional potential threat to Cell-C's position in the market is the introduction of limited-mobility services. If these are positioned as an alternative to full-mobility services, and targeted at less affluent regions and individuals, they will clearly pose a competitive threat to Cell-C. In this scenario, Cell-C must promote the main, unrivalled differentiator that its service provides, and that is full-mobility.

Cell-C is a very important player in the South African telecommunications sector. Its commercial launch has fuelled a new wave of competition among MNOs. It has generated real price competition, and forced Vodacom and MTN to focus more on best-value pricing and customer service. In most regions of the world we have experienced a similar trend, whereby a third mobile operator stimulates a new wave of market growth, typically involving a significant focus on prepaid customers. For the South African market, Cell-C has been an important step towards creating a mobile communications sector that is as competitive as any in the world, and creating real choice and value for consumers.

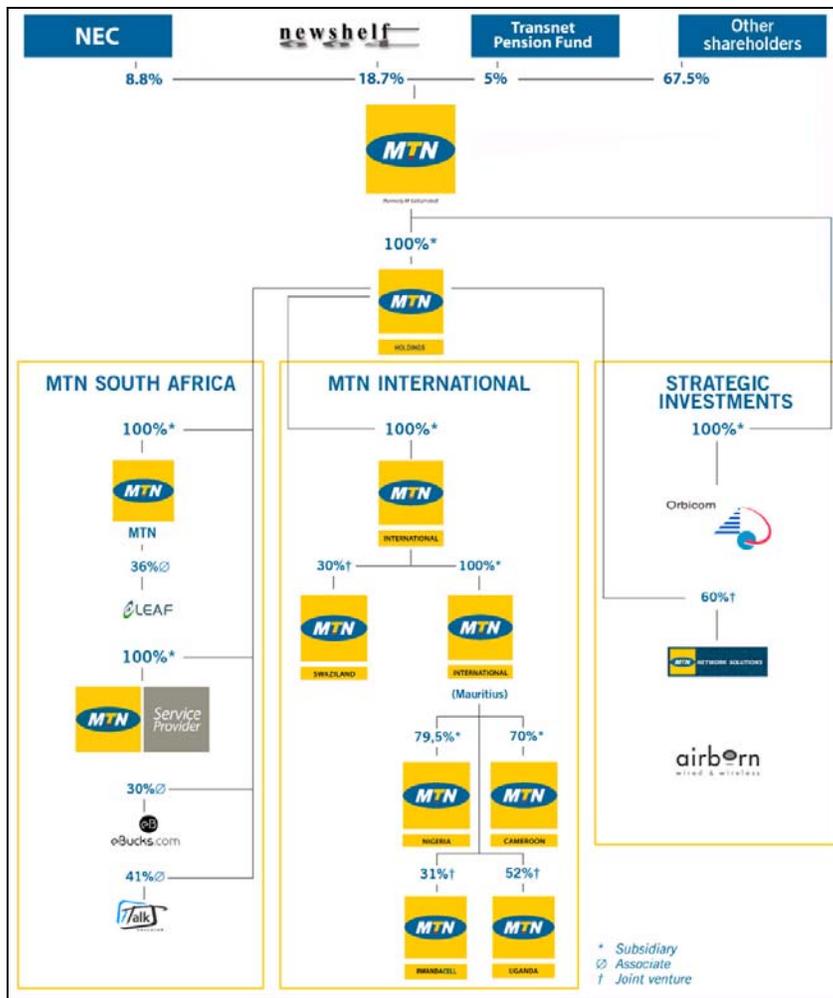
ii/ MTN

History

MTN (formerly M-Cell) launched services in June 1994 as one of two new GSM carriers in South Africa. Today MTN's network - exclusively provided by Ericsson - consists of over 4,000 base-stations covering 900,000km² and 95 percent of the population.

As shown by Exhibit 65 MTN is 100 percent owned by holding company MTN Group, which is majority floated on the Johannesburg Stock Exchange. In addition to its domestic operations, MTN Group - through its MTN International subsidiary - has wireless subsidiaries in Cameroon, Lesotho, Nigeria, Rwanda and Swaziland. International mobile operations are increasingly important for MTN. They accounted for ZAR7 billion or 36 percent of group revenue in the twelve months to March 2003, up from 19 percent the previous year. MTN also holds stakes in two service providers MTN SP (100 percent) and iTalk Cellular (41 percent), both of which are exclusively MTN providers.

Exhibit 65
MTN Ownership Structure
 Source: MTN, 2003



In October 2000 MTN was the first operator to launch HSCSD in South Africa. It followed this in July 2002 by beating rival Vodacom by three months in introducing GPRS. As of March 2003 MTN had approximately 30,000 active GPRS users. MTN has been a leader in

the development of advanced data services, having developed a number of web-based portals. It's MTNICE (MTN Information, Commerce and Entertainment) portal for WAP and SMS-based entertainment boasts a community of around one million users.

MTN currently holds frequency within the 900MHz range, and also has access on a temporary basis to 1800 MHz spectrum.

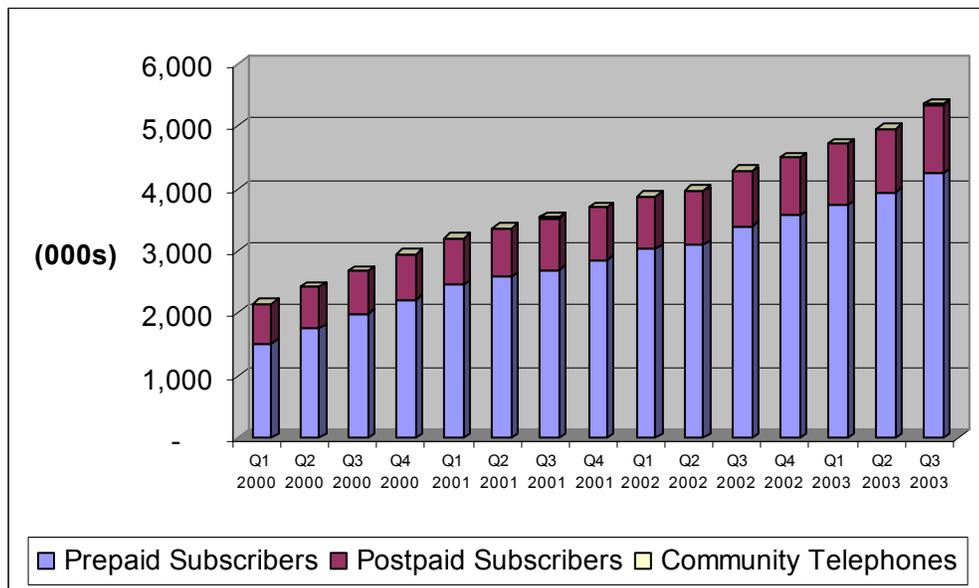
Recent Performance

As illustrated in Exhibit 66 MTN has seen solid customer growth for the last four years. The last full financial year, to March 2003 saw the operator boost its subscriber base by 22 percent to 4,723,000 “capable subscribers”, measured as those registered users that have made a call in the prior three months. Of these subscribers, 80 percent are prepaid, a proportion that has been creeping up from the 70 percent figure reported in Q1 2000. Despite this increase MTN has a lower proportion of prepaid subscribers than its two rivals. At the end of September 2003 MTN had increased its subscriber base to 5.4 million, of which 80 percent were prepaid.

Exhibit 66

MTN Subscriber Growth

Source: MTN, The Yankee Group, 2003

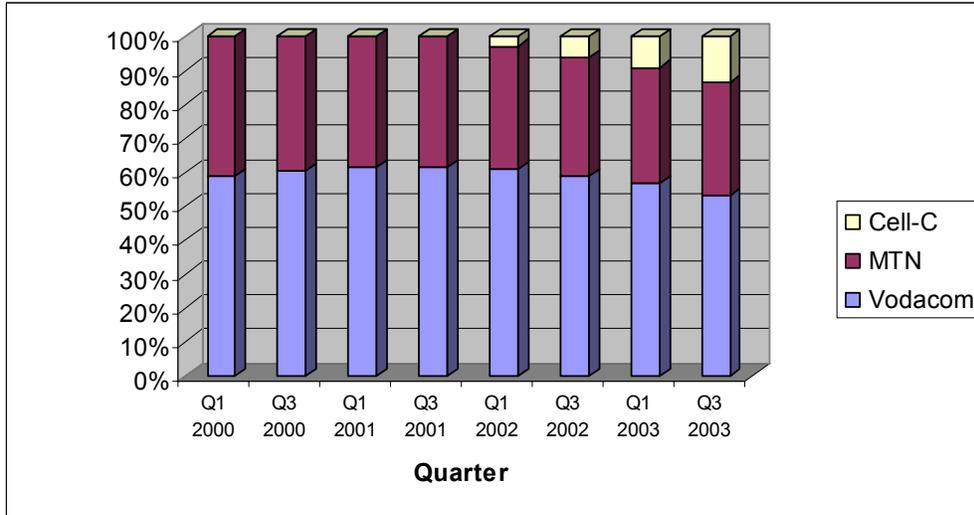


In spite of its consistently increasing customer base, MTN has gradually seen its market share erode since the beginning of 2000; from 41 percent to 33 percent. As illustrated by Exhibit 67 this decline was exacerbated in the fourth quarter of 2001 when further competition was introduced to the South African market in the form of new market entrant Cell-C. MTN suffered disproportionately at the hands of the aggressive newcomer, losing six percentage points of market share to date, while Vodacom, which started from a stronger position, lost eight percent. When considering market share, it is worth noting that figures for MTN, as reported, include only active subscribers, while Cell-C and Vodacom include all registered subscribers.

Exhibit 67

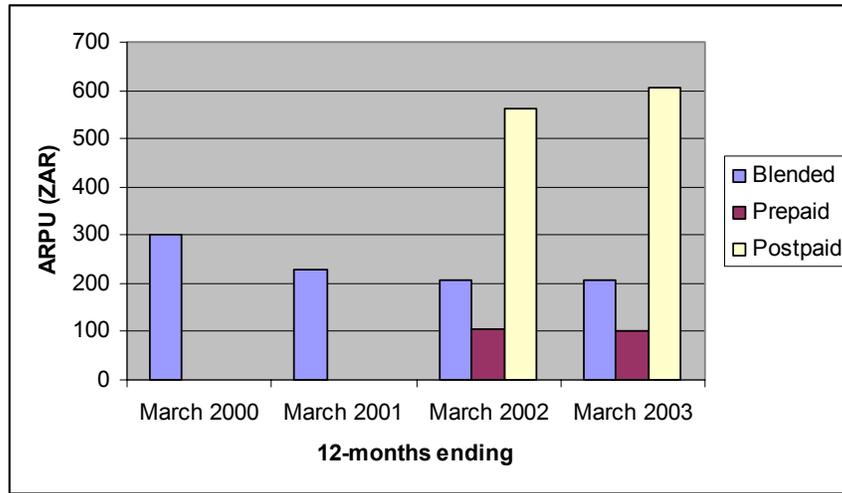
Mobile Market Share Historical Development

Source: MNOs



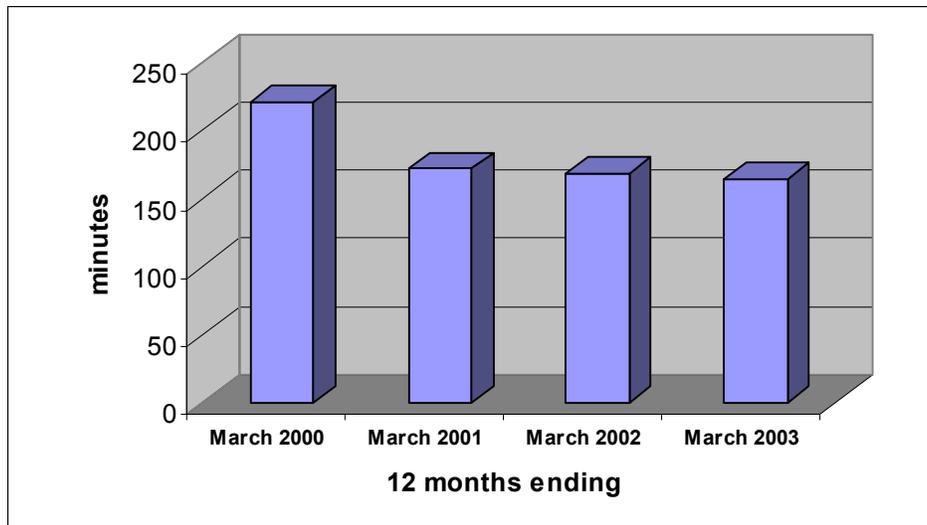
Predictably, MTN’s growing subscriber base has served to reduce ARPU levels as increasingly marginal (prepaid) users are signed up. As illustrated by Exhibit 68, annualized blended ARPU fell from over ZAR300 to a little above ZAR200 in the two years to March 2002. In the following twelve months, however MTN arrested the decline, with prepaid ARPU declining only slightly from ZAR105 to ZAR101 and postpaid increasing quite significantly from ZAR561 to ZAR607. The net result has been a stabilizing of blended ARPU at ZAR206. With the reported growth of this figure to ZAR207 in the six months to September 2003 it appears that the era of rapidly declining average revenue is over for MTN in South Africa.

Exhibit 68
MTN Annualized ARPU
 Source: MTN



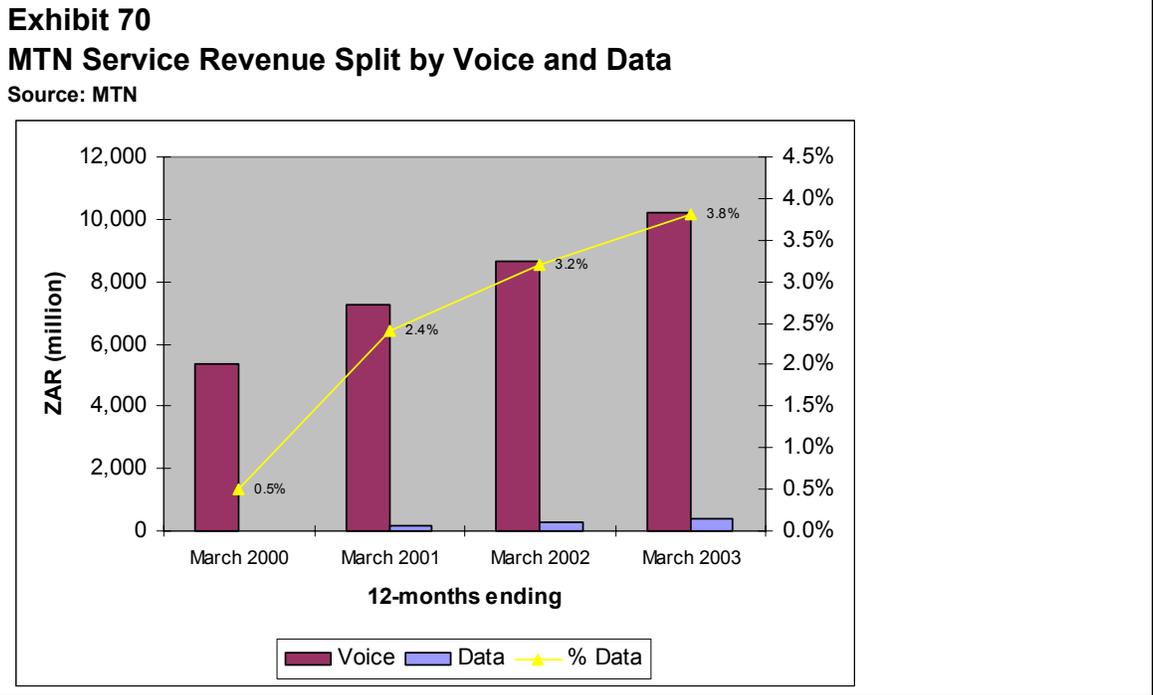
The stabilization of ARPU figures neatly reflects average usage in terms of call minutes. As shown in Exhibit 69 minutes of voice calling per user have declined substantially as more and more subscribers are attracted to the operator's network.

Exhibit 69
MTN Average Monthly Minutes of Use
 Source: MTN



In terms of overall financial position, MTN looks healthy, with growing revenue and EBITDA. Total revenue for South African wireless operations amounted to ZAR12.3 billion

in the year to March 2003, up from ZAR10 billion the previous year. Voice continues to account for the lion’s share of income, with only 3.3 percent coming from non-voice services. While this is increasing, the rate of growth is slow.



In December 2003 MTN posted strong results for the six months to September 2003. Although it was slightly shadowed by the success of some of the group’s international subsidiaries, MTN South Africa saw a 26 percent growth in revenue over the previous six months. There was also an improvement in South African EBITDA margin, from 26.4 percent to 28.5 percent.

Exhibit 71
MTN Financial Results
Source: MTN

	Year ending 31/3/03	Year ending 31/3/02	Growth
Revenue	19,405	12,432	56 percent
- of which South Africa	12,298	9,982	23 percent
EBITDA	6,217	3,626	71 percent
- of which South Africa	3,389	3,191	6 percent
Profit after tax	2,218	548	305 percent
- of which South Africa	1,485	1,452	2 percent

Market Strategy

MTN's focus is on the high-end prepaid and consumer postpaid sectors. Its success in targeting these sections of the market is illustrated by its disproportionately high post-paid market share, and the fact that its prepaid ARPU is 20 percent higher than main rival Vodacom.

As with all South African mobile operators customer acquisition, billing and care for MTN is handled by service providers. MTN subsidiaries MTN SP and iTalk Cellular both exclusively sell MTN mobile services, as does independent corporate service provider Orion Cellular. Three other service providers sell MTN services as part of a multiple operator portfolio: Nashua Mobile, Autopage Cellular and Supercall Cellular.

MTN has placed a lot of emphasis on ongoing reward schemes as a customer retention tool. With "eBucks" users receive reward points for incoming and outgoing calls and sending text messages. Further points are also awarded based on subscriber longevity. These can be exchanged for airtime or non-mobile goods and services. There are even more loyalty schemes available for prepaid customers, who tend to churn more frequently than postpaid customers. The "Big Bonus" plan consists of two main parts:

- Daily Free SMS Bonus sees users receive one free SMS for every chargeable call of over one minute, although the SMS must be used on that day.
- High Usage Bonus rewards users with airtime for spending over ZAR500 or ZAR1000 per month, with the rewards ramping up the longer the subscriber stays with MTN.

MTN has had some success in adopting a "services not technologies" approach to non-voice applications. In promotional literature there is no mention of GPRS or HSCSD, instead being substituted for brands such as MTNdataFAST and MTNdataLIVE. The terms SMS and MMS are used, but these have already entered common parlance to a significant degree.

In addition to data services, MTN offers a number of value-added voice services. These range from advice on legal matters or tax to flower delivery and providing real-time directions. These services are generally simple to access, with most requiring only a three or five digit number for access. It is interesting to compare these to similar services that European incumbents have consistently attempted to provide in a text-based format. Charging mechanisms, in the form of premium rate billing, or credit card charging are also very simple and accepted by consumers. This reliance in South Africa on voice services cannot be ascribed to low literacy levels. Literacy levels are in fact relatively high. The lack of advanced handsets is a more likely reason for advanced data services being stifled.

Currently MTN's marketing focuses heavily on data services. The implication is that MTN, as the established premium provider (its ARPU is higher and percentage prepaid lower) is keen on differentiation rather than pricing as the main way to attract customers. MTN has in the last three years been more successful at targeting the postpaid segment rather than the prepaid market. This is borne out by the fact that over the last three years it has slightly increased its postpaid market share from 40 percent to around 43 percent, while Vodacom has seen a steady decline, from 60 percent in March 2000 to 50 percent in June 2003.

Service Portfolio:

MTN's service portfolio is relatively sophisticated, and compares favorably with those of most European MNOs. Its service portfolio is summarized her

- **Communicate**
 - Call Barring
 - Call Forwarding
 - Call Holding & Waiting
 - CallBack
 - Short Message Service (SMS)
 - SMS Chat
 - Multimedia Messaging Service (MMS)
 - International Roaming
 - Voicemail
 - Enhanced Voicemail
 - Voicemail-Lite
- **Find Out**
 - Calling Line Identity (CLI)
 - Directory Enquiries and Call Connect
 - MTN Information Lines
 - Update Line

-
- **Get Help**
 - Customer Services 173
 - Directions
 - Emergency Call
 - Legal Assistance
 - Tax Assistance
 - **Get Organized**
 - Computicket Telebookings
 - MTN travelDirect
 - MTN Flowers
 - Wake-Up Call
 - **Connect**
 - Basic Data
 - Conference Calling
 - DataFAST
 - DataLIVE
 - Dual Call
 - Enhanced Fax and Data
 - Faxmail
 - Internet Solutions
 - Mobile Banking
 - Mobile Connect
 - Mobile-mail
 - **Get More**
 - CarryOver
 - eBucks@MTN
 - ICE

YG Appraisal

MTN has a well-defined position in the South African market. Targeting high-end users and focusing on new innovative services has kept ARPU high. MTN claims that while prices have continued to come down, the number of value-added services offered as part of the standard subscription package has increased. It claims the total cost of ownership for its services has come down over the past few years. This is when handset subsidization and all

other pricing factors are taken into account. Handset subsidization continues to be a significant part of MTN's customer acquisition costs.

MTN has done well to maintain its share of contract customers in the face of stiff competition from Cell-C. Since Cell-C launched Vodacom has seen its post-paid market share decline from 56 percent to 47 percent, while MTN has maintained its share at 43 percent. All the more surprising since Cell-C has expressly stated that it is targeting the low-end post-paid and high-end prepaid customers that are MTN's bread and butter. In the year to March 2003 MTN took 40 percent of new post-paid customers. If MTN can maintain its strong showing among low spending contract customers it can expect to pick up a disproportionately high percentage of future migrants from prepaid.

One major threat to MTN would be a price war sparked by Cell-C. Because it relies heavily on higher spending consumers, aggressive pricing tactics could significantly reduce its ARPU. If Cell-C decides to target MTN's core demographics it would force MTN into defensive price reductions that would have a knock-on effect on ARPU. However MTN has successfully gone some way to mitigating the danger of this. Through the launch of new voice and data value added services it is successfully differentiating its service offering. On the topic of subscriber churn, MTN highlights the fact that in South Africa today the use of multiple SIM cards is common among certain customer segments. This makes it difficult to accurately measure and track subscriber churn and market share. Multiple SIM card ownership tends to be a characteristic of sophisticated wireless markets, with a high proportion of price-sensitive customers.

MTN is increasing its presence in other African markets. 37 percent of revenues came from outside South African in the year to March 2003. These foreign investments do not appear to be draining MTN's resources and in the long term they should prove to be good revenue generators. Most currently have EBITDA margins better than MTN South Africa.

Liberalization of the fixed line telecommunications market in South Africa would benefit MTN in several ways. It would (if liberalized to the extent that it allows self-provision by MNOs) enable MTN to carry its own backhaul traffic, rather than relying on Telkom. This should produce lower interconnection fees. By reducing its operational costs MTN would be in a position to pass these savings on to customers in the form of further reduced tariffs, which would itself result in higher market penetration.

iii/ Vodacom

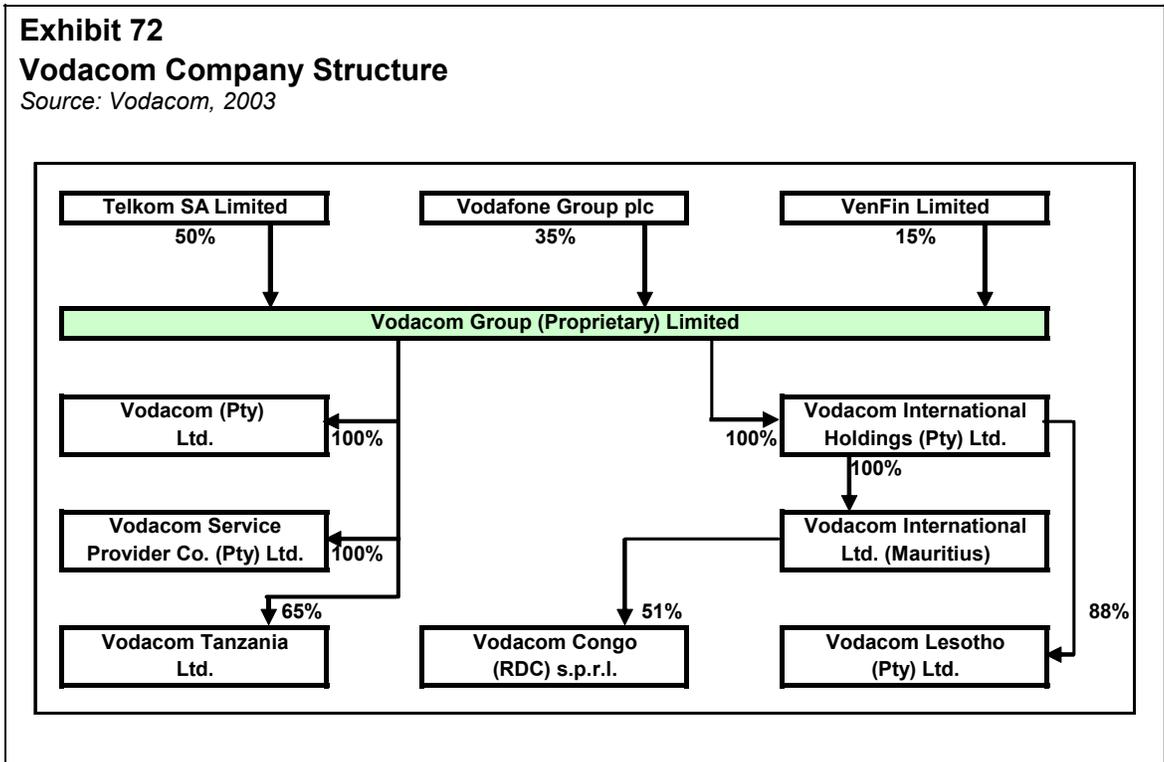
History

Established in 1993, the Vodacom Group is owned by Telkom SA (50 percent), Vodafone (35 percent), and VenFin (15 percent). It launched services in 1994 and is presently the largest mobile network operator in South Africa. Vodacom has also invested in mobile operations in Lesotho, Tanzania, and the Democratic Republic of the Congo.

Its majority shareholder, Telkom SA, is controlled by the South African Government, SBC Communications and Telekom Malaysia. It is currently the exclusive provider of fixed-line telecommunications services in South Africa and the country's second largest public company. In addition to mobile, Telkom also provides fixed-line telephony, Internet, e-

commerce, data communications and satellite services. Telkom made its debut on the Johannesburg and New York Stock Exchanges on March 4, 2003.

Beneath the group umbrella, Vodacom (Pty) Ltd is the operating company responsible for the construction and maintenance of Vodacom's GSM cellular network, while Vodacom Service Provider Company (Pty) Ltd, as the name suggests, is the actual service provider. Direct customers represent over 70 percent of the Vodacom's customer base, with the remainder provided by third-party service providers (see Appendix). In recent years Vodacom has sought to acquire and consolidate its large service provider partners in order to realize greater economies of scale and have a more direct and closer relationship with its end-users.



The company has invested around US\$1.2 billion in its network, which covers almost 13,000km of national roads, about 95 percent of the country's population and some 65 percent of the total land surface. The network switches 30 percent of telephone volumes in South Africa and 10 percent of the continent's total traffic.

Alcatel and Siemens are the major network equipment suppliers.

Exhibit 73

Vodacom: Background Information

Source: Vodacom

System	GSM900
Launch date	June 1994
Market share (Sep-03)	54.0 percent
Population coverage	95.0 percent
Mobile switching centers	37
Base station controllers	221
Base transceiver stations	5,393
International roaming agreements	230 operators in 127 countries
GSM community service phones	28,500

Vodacom pioneered the world’s first prepaid GSM community phone, developed in conjunction with Siemens in 1996. These units are now installed throughout communities either on an individual basis or grouped in a container with the Vodacom brand. Mobile units are preloaded with airtime minutes and purchased as subsidized rates by local entrepreneurs who then sell telephone time to community members. These units are placed in strategic locations such as taxi ranks, convenience stores, cafes, etc. in townships and other disadvantaged communities.

Recent Performance

In the year to March 2003, Vodacom reported total revenues of ZAR19.8 billion (US\$2.9 billion), a 22 percent increase over the previous year. Operating profit increased by 20 percent though net profit declined by 7 percent.

Exhibit 74

Revenue and Profit, 2000-1H 2004

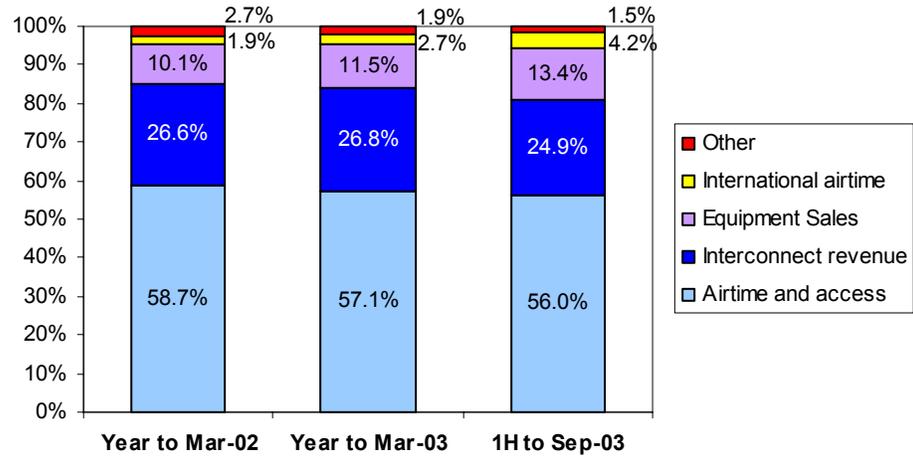
Source: Vodacom

Year ended March	2000	2001	2002	2003	1H 2004
Revenue (US\$ Mil)	\$1,402.6	\$1,945.4	\$2,366.7	\$2,898.3	\$1,655.3
Operating Profit	\$346.4	\$374.1	\$530.6	\$634.5	\$359.2
Net Profit	\$192.7	\$193.1	\$347.7	\$324.6	\$201.3

Vodacom’s revenue mix has changed in certain respects, mainly due to changing traffic patterns and rising competition. Interconnection revenues in particular, have declined in recent months as its market share has declined and fewer calls were terminated on its network.

Exhibit 75
Vodacom Revenue Mix

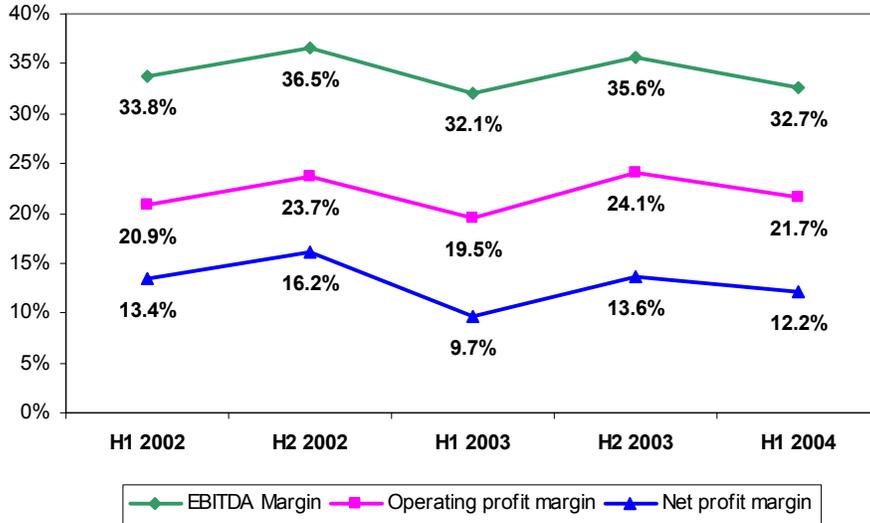
Source: Vodacom



As illustrated in Exhibit 76 below, margins have also been maintained despite rising competition in the South African market. At 32-36 percent, Vodacom's cyclical 6-monthly EBITDA margins are roughly 10 percentage points below that of most Western European operators, but are nevertheless high compared to operators in other developing markets.

Exhibit 76
EBITDA, Operating Profit and Net Profit Margins

Source: Vodacom



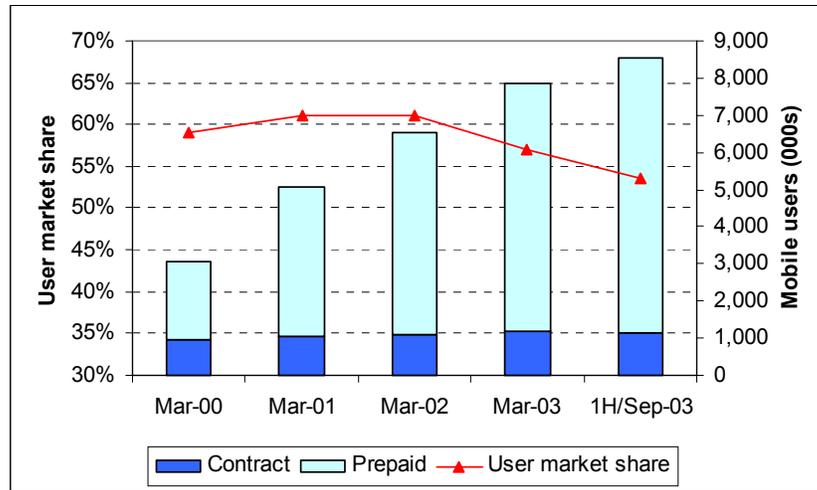
When Vodacom (and MTN) first launched services in 1994, they only offered contracts. The introduction of prepaid cards in 1996 opened up a new market to lower income users and fuelled extraordinary growth in the mobile sector. In 2001, Vodacom’s Vodago and 4U prepaid packages accounted for 78 percent of all new connections. By the end of March 2003, over 95 percent of all Vodacom’s new connections were prepaid customers.

Over the last 18 months Vodacom has experienced mounting competitive pressure, especially from the third placed operator Cell-C, which has grown its market share to 14 percent (Sep-2003) largely at Vodacom’s expense. As Exhibit 77 shows, Vodacom ended September 2003 with 54 percent of the total registered user base.

Exhibit 77

Vodacom Users and Market Share in South Africa

Source: MNOs, The Yankee Group, 2003

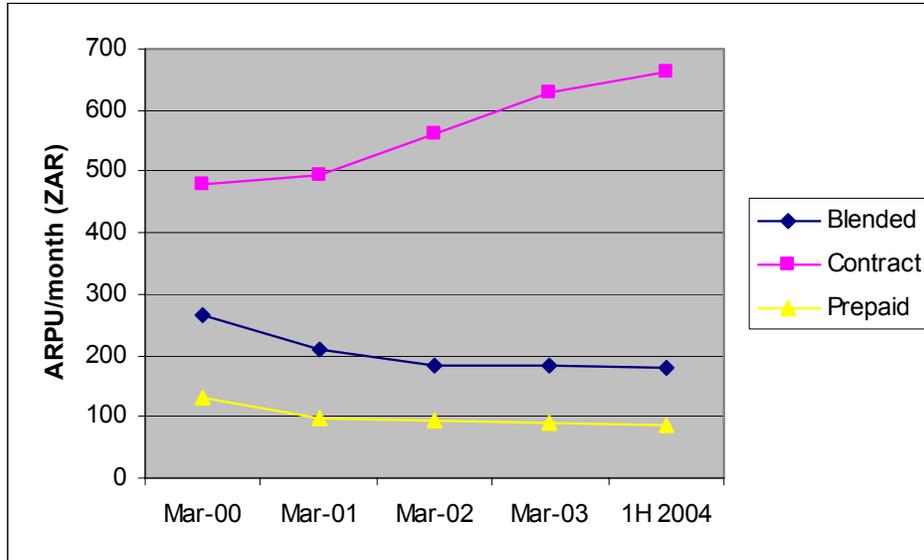


A large percentage of Vodacom's customer base is inactive (3-month definition). In the year to March 2003, 18 percent were inactive overall (5.3 percent contract / 20.5 percent prepaid). This was an increase over the previous year's ratio of 14 percent. This is not unique to Vodacom. But despite high levels of inactivity, ARPU continues to rise. The abrupt increase in contract ARPU in 2002 as can be seen in Exhibit 78 is mainly because since October 2001, value added service revenue from previously partially owned service providers has been included in contract and total average monthly revenue per customer. On that date Vodacom consolidated these previously partially owned service providers.

Exhibit 78

Vodacom Blended, Prepaid and Postpaid ARPU

Source: Vodacom



ARPU has also been supported by usage trends with growing contract average MOU and stabilizing prepaid MOU. In the year to March 2003, Vodacom’s contract users used an average of 269 minutes per month - an increase of 5 minutes over the previous year. Despite the large influx of new prepaid customers, prepaid MOU declined by only 4 minutes to an average of 54 minutes per month over the same period. The blended average dropped from 111 to 101.

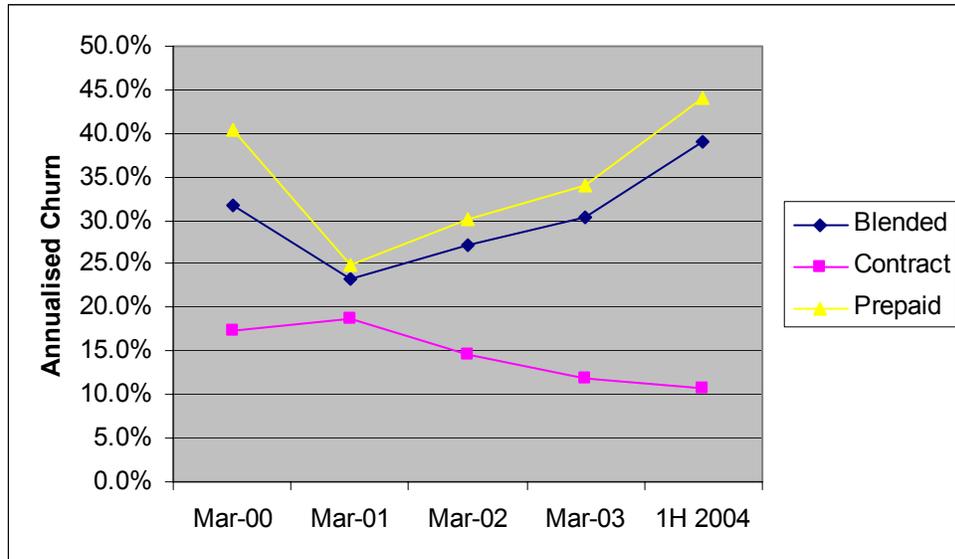
Data services in the year to March 2003 accounted for only 3 percent of Vodacom’s revenue, but in the subsequent six-month period to September 2003, this ratio apparently increased to 4.5 percent. This is derived almost entirely from SMS traffic for now, but GPRS is slowly gaining traction and mobile office services targeted at enterprise users will grow this revenue stream further.

As with most markets where prepaid is dominant, churn is a serious problem. This has been exacerbated in recent months by stronger challenges mounted by Vodacom’s competitors. As a result, churn rates have increased substantially within the prepaid segment.

Exhibit 79

Vodacom Prepaid, Postpaid and Blended Churn

Source: Vodacom



Market Strategy

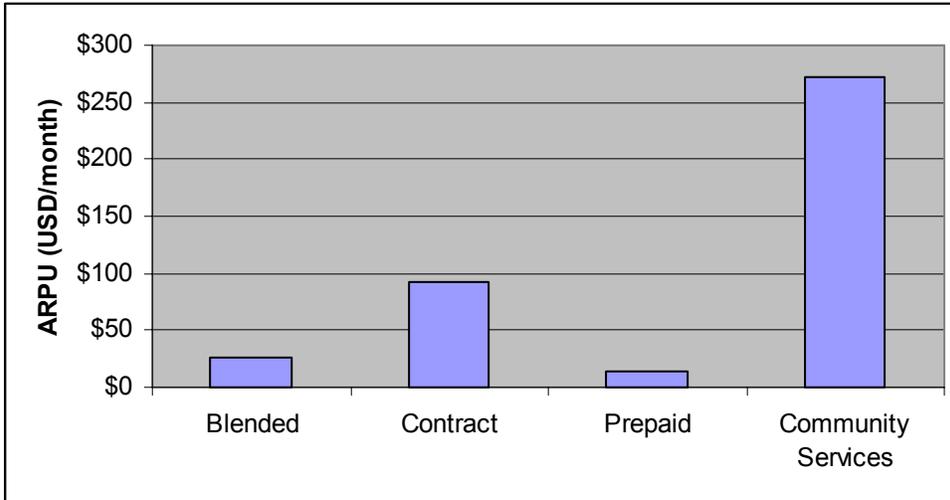
As the dominant mobile incumbent, Vodacom tries to position itself as the 'biggest and the best'. Leveraging its deep pockets it has been able to lead in product development and the introduction of new services. As with most incumbents, it has lost market share in recent years to a new entrant, but by focusing on higher value customers and offering data services it hopes to maintain high ARPU among its existing customers.

By mid-2001, Vodacom had 1,315 franchised operators providing telephony services in over 2,330 phone shop units and 868 other premises in under-served areas in all of the nine provinces of South Africa. People in previously disadvantaged areas are generating over 90 million call minutes per month at these community public phones and phone shop owners are receiving sizable commissions from the network operator every month. Community service phones are a cost effective method of significantly increasing traffic revenue on Vodacom's network due to their low rollout costs and low barriers to entry for customers.

Exhibit 80

Vodacom Blended, Prepaid, Contract and Community Phone ARPU, Year to Mar-03

Source: Vodacom



The first non-P2P mobile data service, Vodacom Infotext, was launched in May 2001, providing SMS-based information services. In mid-2003, Vodacom reported traffic of more than 250 million SMS messages every month on its network (up from 55 million a month in 2000). The cost of sending an SMS at peak rate tariffs is R0.75 and a premium rate SMS is charged at R0.95. During 2003, Vodacom’s customers sent an average of 15 SMS a month. The average in the month of March 2003 was 18.3.

Vodacom launched the country’s first mobile banking service in June 2001. It operates via encrypted SMS.

GPRS services were launched in October 2002 under the MyLife brand. Subscribers receive Internet access, photo messaging and text messages of unlimited length based on a tiered subscription model (Exhibit 81). MMS services were launched at the same time, and customers to its MyLife package can send messages for around R1,70 for messages of 10-20Kb in size.

Exhibit 81**Vodacom GPRS Price Plans***Source: Vodacom*

Item				
Connection fee	0	0	0	0
Monthly Subscription	0	R35 (\$5.13)	R110 (\$16.12)	R200 (\$29.31)
Inclusive Bundle (Per Month)	0	1 MB	5 MB	10 MB
Out of bundle rates	R45 (\$6.59)/MB	R20 (\$2.93)/MB	R20 (\$2.93)/MB	R15 (\$2.20)/MB
Additional data usage	4.5c (0.66c) per KB	2c (0.29c) per KB	2c (0.29c) per KB	1.5c (0.22c) per KB
Applicable Times	Anytime	Anytime	Anytime	Anytime

At year-end March 2003 there were 7,756 active GPRS subscribers - 0.1 percent of its total registered customer base five months after launch. By September 2003 the number of active users had risen to 35,642, along with 19,592 active MMS users. Still, this represented only 0.4 percent and 0.2 percent respectively of Vodacom's total registered customer base.

Vodacom does have a relatively sophisticated enterprise data portfolio, with a specialized department with its own marketing team and website. It offers mobile office services (using Microsoft Mobile Information Server), telemetry solutions (fleet management) and bulk SMS.

YG Appraisal: Strengths, Weaknesses, Opportunities and Threats

As the dominant mobile incumbent (majority owned by the monopoly fixed carrier), with a powerful brand and extensive distribution channels, Vodacom is likely to retain a 40-50 percent user market share in South Africa over the next few years. By targeting the broadest range of customers, its overall ARPU is lower than MTN's, but it nevertheless retains the largest share of high-end postpaid and business users. Given its dominance of the business market and its relationship with Telkom, Vodacom is best placed to extract further value from existing customers through advanced data services and convergent fixed-mobile services.

Vodacom will also benefit from its relationship with minority shareholder Vodafone. It has already launched mobile office services based closely on Vodafone's own products, and will be able to leverage Vodafone's unparalleled global coverage and lower roaming charges to appeal to corporate customers right across the African continent. Greater economies of scale in purchasing and advertising can also be leveraged from its association with Vodafone.

With the launch of a third mobile operator, Vodacom has lost some user market share, with Cell C being the main beneficiary. From a revenue standpoint, however, Vodacom has been less affected by heightened competition, as it currently carries the vast majority of Cell C traffic via a roaming arrangement. However, the 15-year agreement will expire in some regions soon and Cell C is aggressively building out its own infrastructure. Therefore in the medium term, Vodacom may have to introduce more targeted low-end packages or develop a sub-brand aimed at the prepaid market, in order to stem the loss of users, traffic and revenues to Cell C.

Over the longer term, as the South African market matures, its operations in other African countries will become increasingly important. Vodacom has stated that it hopes to capture 30 percent of revenues from outside South Africa in future. Vodacom will, however, face greater competitive pressure outside its home market, particularly from MTN. The success of Vodacom's expansion efforts will therefore depend on how effectively it competes without the same political base and entrenched position that it enjoys in South Africa. Vodacom is already facing problems in Nigeria, where its takeover of Econet Wireless - Nigeria's second largest operator after MTN - has been blocked by legal action from one of Econet's shareholders. The political, regulatory, and currency risk inherent in these countries provides further grounds for caution.

A successful second fixed network operator will place greater pressure on Telkom, which may in turn impact Vodacom in a number of ways:

- Lower interconnection rates offered to Vodacom's competitors, resulting in further mobile price competition,
- Less investment by Telkom, as it focuses on defending its fixed market share,
- Competitive fixed/mobile bundled services being introduced, negating any possible unique propositions.

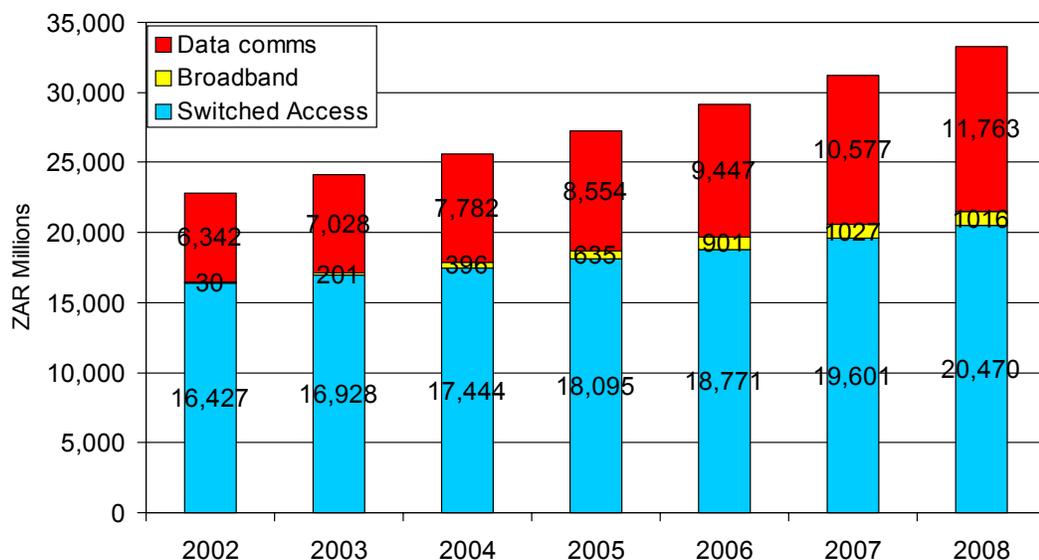
There is also the question of whether Vodafone will remain satisfied as a minority stakeholder forever, as majority control is a stated Vodafone policy. Further liberalization and willingness by Telkom and the South African government to relinquish majority control may become crucial, as the loss of Vodafone as an international partner would be severely detrimental to Vodacom's regional and long-term goals.

III Forecast for the South African Communications Market

A. Business Fixed Line Market

Exhibit 82. Total Business Revenues Forecast 2002 – 2008

Source: The Yankee Group, 2003

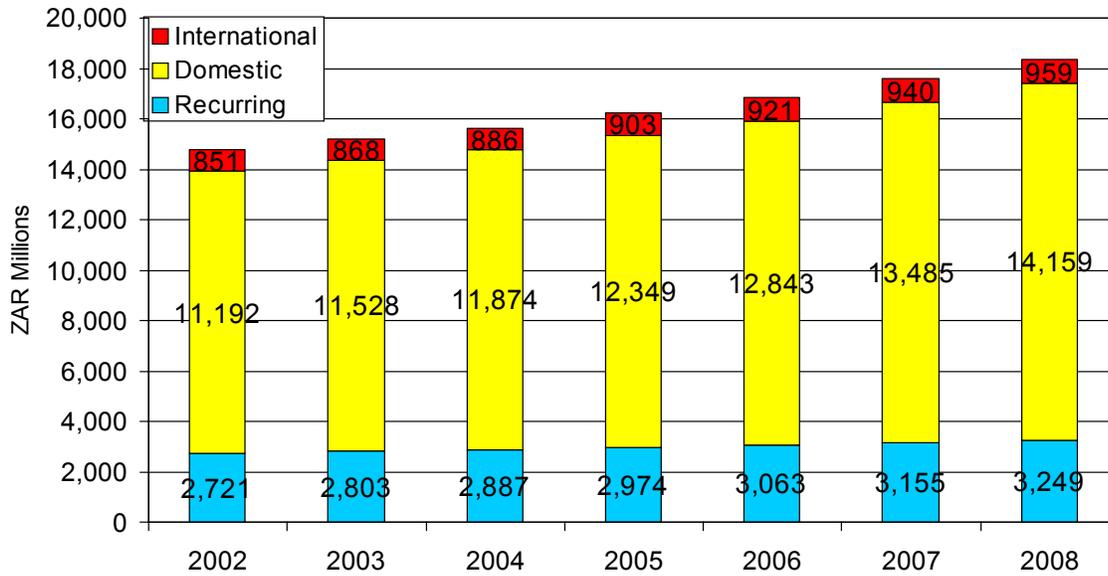


Overall the total fixed business market is set to grow by a CAGR of 6.6 percent over the next five years, reaching ZAR 33,249 million by 2008. Switched access revenues will continue to be the dominant business service in South Africa over this period, but higher growth rates of other data services will result in its share of the total fixed business revenues declining from 72.1 percent in 2002 to 61.6 percent by 2008. In comparison, data communications services are forecast to increase at a CAGR of 10.8 percent from ZAR 6,342m in 2002 to ZAR 11,763 during the same period. However, the strongest growth is accounted for business broadband, which at present is a limited service in the market (ZAR 201m), but is set to grow by a CAGR of 38 percent to ZAR 1016 million in 2008, albeit from a very low base.

More detailed analysis of the business switched access revenues identifies domestic calls as the key source for the bulk of revenues (68 percent), with minimal change over the next five-year period. This revenue excludes interconnection revenues. International outgoing calls will remain a relatively limited service in South Africa, increasing by only 2 percent between 2002 and 2008 to ZAR 959 million. The remaining retail business revenues can be accounted for by recurring revenues, which will experience 3 percent CAGR increase over the same period, contributing ZAR 3,249 million by 2008.

Exhibit 83. Business Switched Access Revenues 2002 – 2008

Source: The Yankee Group, 2003

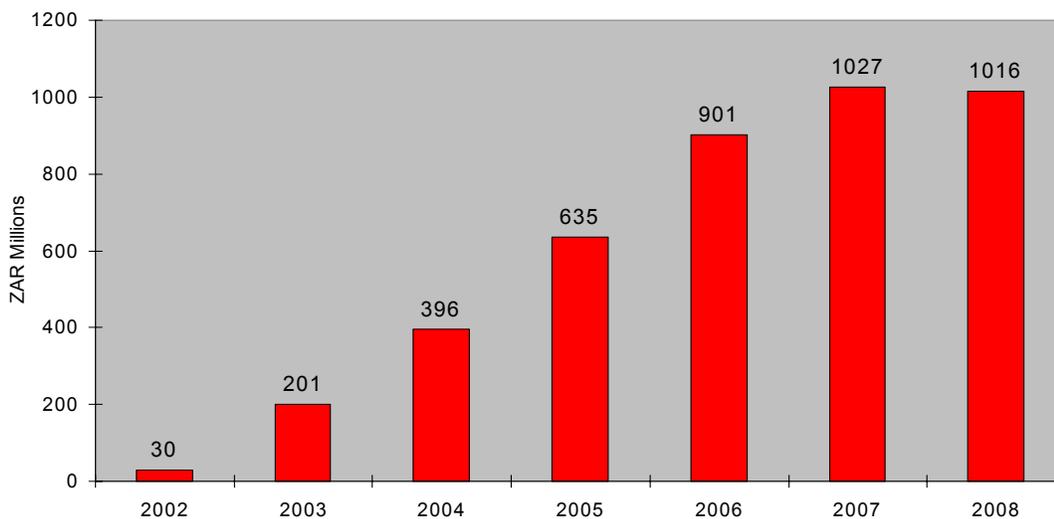


1. Broadband Market is Set for Growth

The number of business broadband subscribers is forecast to increase from just 2,400 in 2002 to 97,000 by 2008. This service is expected to increase in its subscriber numbers annually over this five-year period, with a CAGR of 41.7 percent.

Exhibit 84. Business Broadband Revenues between 2002 and 2008

Source: The Yankee Group, 2003



Business broadband revenues will experience considerable growth between 2002 and 2008. Despite continued increase in the number of subscribers for DSL services, it is forecast to tail off and experience slight decline by the end of this period, as a result of pricing competition and market saturation. The ARPU for this service is forecast to decline at an annual rate of 5 percent between 2002 and 2008, falling to ZAR 764 ZAR per month by the end of the period.

Exhibit 85. Business Broadband ARPU between 2002 and 2008

Source: The Yankee Group, 2003

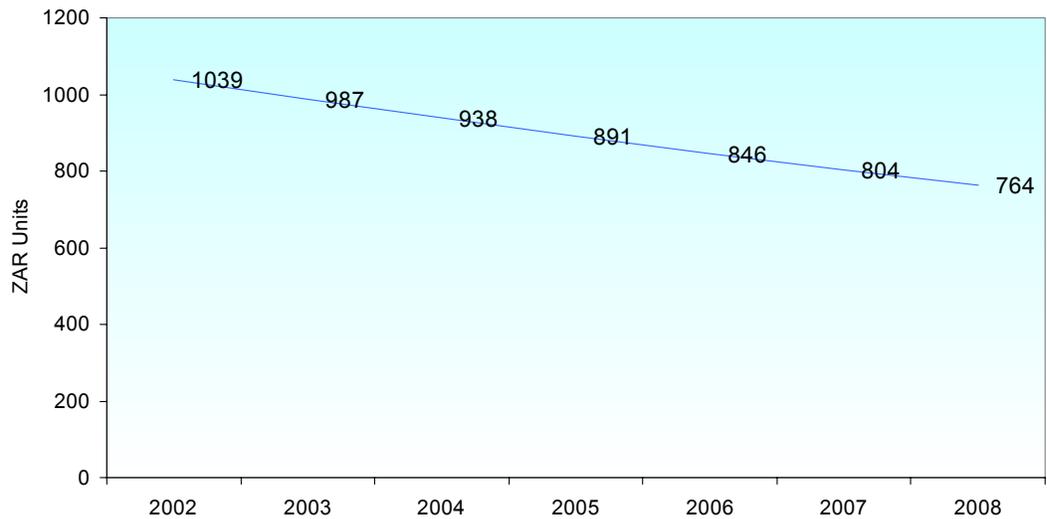
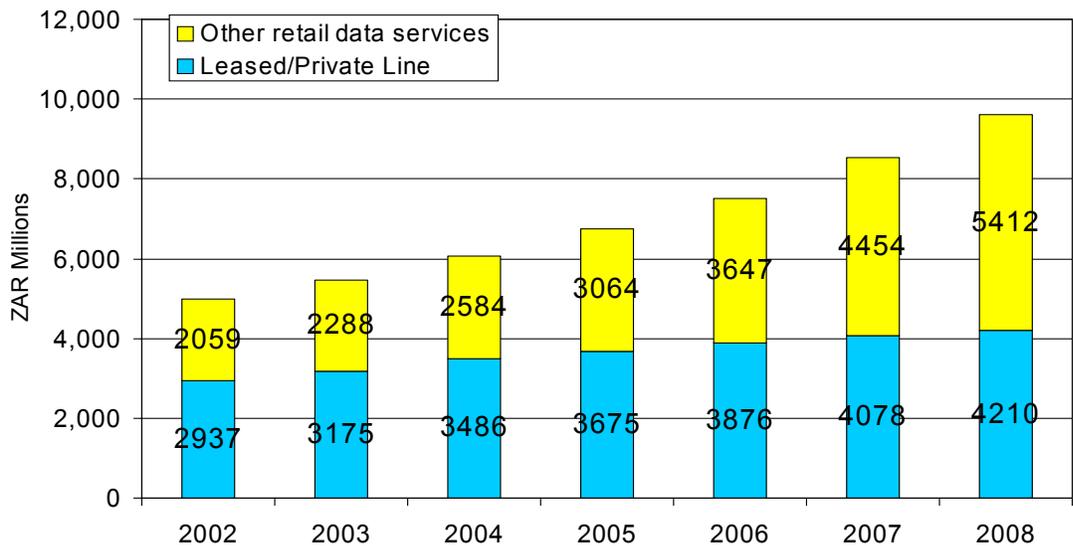


Exhibit 86. Retail Data Communications Revenues between 2002 and 2008

Source: The Yankee Group, 2003



The South African business market will increase its use of mainstream data communications over the next five years, with revenues representing ZAR 9622 million by 2008. This growth is a result of continued growth in both leased/private line and other retail data services. Retail leased lines are forecast to experience moderate growth over this five year period, with a CAGR of 6.8 percent, but other retail data services are set to increase by 16.7 percent CAGR, increasing revenues to ZAR 5412 million. Although leased lines account for the majority of the retail data revenues in 2002 (59 percent), the higher growth rates of other data services, such as frame relay and, more especially, IPVPNs means that by 2008, the combined total of these other data services will represent the bulk share of the revenues (56 percent). The split between wholesale and retail revenues remains largely unchanged between 2002 and 2008, with the dominant retail revenues portion rising slightly from 79 percent in 2002 to 82 percent of the total business data revenues by 2008.

Exhibit 87. Percentage split between total wholesale and retail data revenues

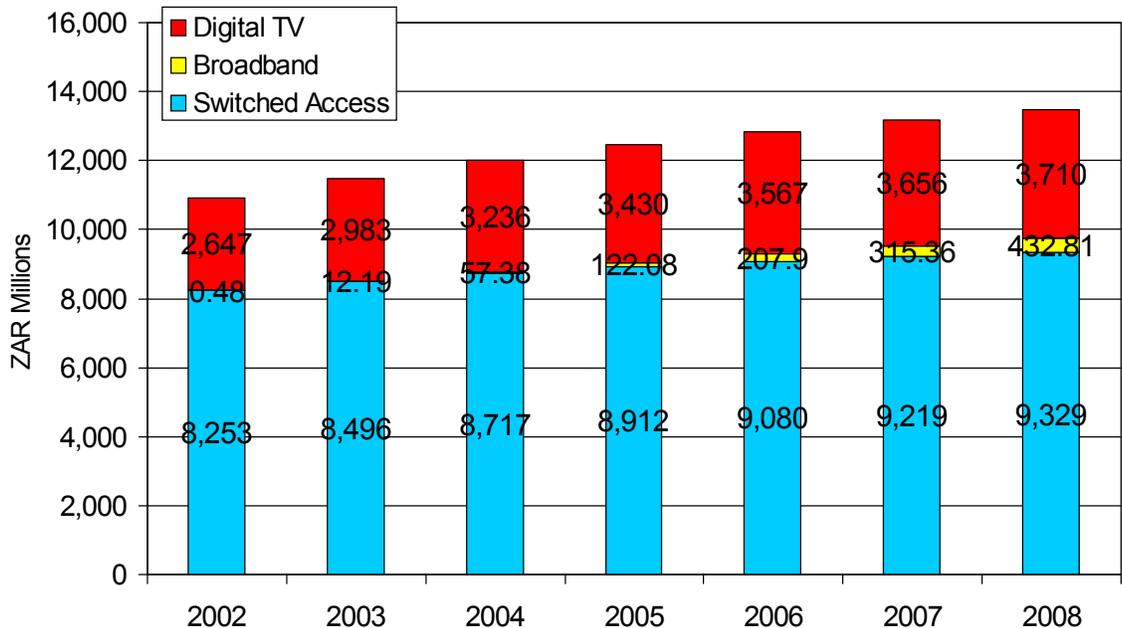
Source: The Yankee Group, 2003



B. The Consumer Fixed Line and Digital TV Market

Exhibit 88. Total Consumer Revenues Forecast 2002 – 2008

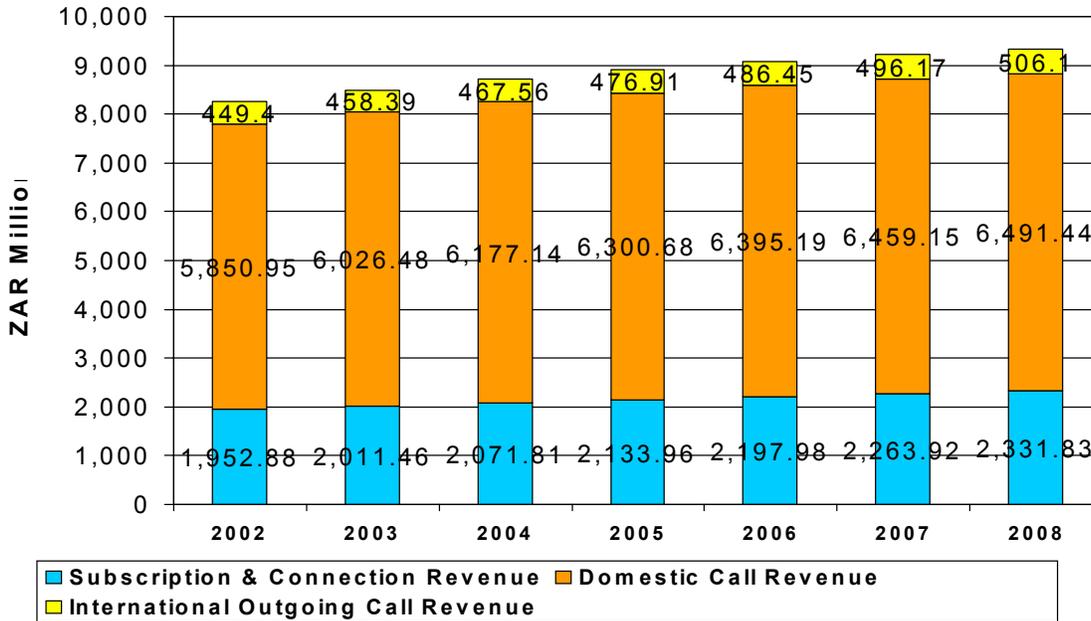
Source: The Yankee Group, 2003



Total consumer fixed line revenues, comprising switched access, broadband and digital TV revenues will rise from ZAR11.49 billion in 2003 to ZAR13.47 billion in 2008 at a CAGR of 3.2 percent. Switched access will remain the dominant component throughout the forecast period, although its share of total revenues will decline from 74 percent to 69 percent, while that of digital TV rises from 26 percent to 27.5 percent. Broadband will make the least impact, accounting for just 0.1 percent of revenues in 2003 and 1.5 percent in 2008. Beyond the forecast period, the broadband and digital TV shares of total revenues will continue to grow while that of switched access recedes slightly as its revenue base is increasingly displaced by IP and cellular services.

Exhibit 89. Switched Access Consumer Revenues by Segment Forecast 2002 – 2008

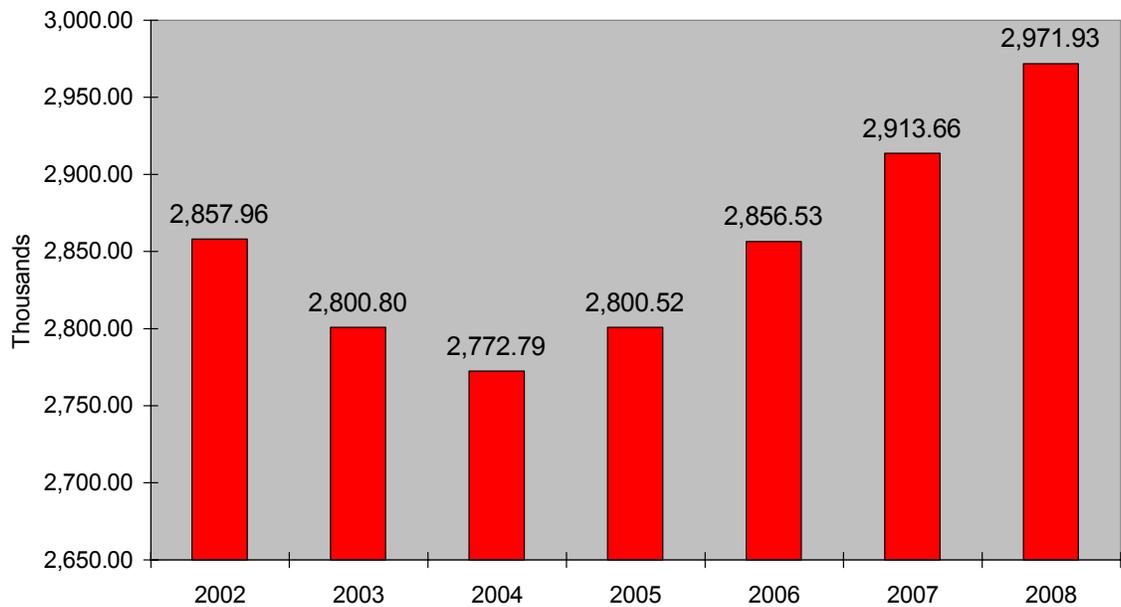
Source: The Yankee Group, 2003



Switched access represents the largest and most mature of our three consumer fixed line revenue elements and is set to grow at just 1.9 percent a year from a base of ZAR8.49 million in 2003 to ZAR9.22 million in 2008. Growth in the number of access lines will require cheaper subscription prices, resulting in modest growth of recurring revenues derived from connection and subscription fees. The main segment - domestic call revenue - includes revenue from local and national telephony traffic as well as from calls to mobiles and accounts for more than two thirds of switched access revenues throughout the period. Competition from the second network operator (SNO) from 2003/2004 onwards will have a downward impact on call prices, having a neutral effect on domestic call revenue growth, despite the expected increase in line rentals. Meanwhile, competition from callback operators, as well as possible regulatory pressure, will dampen the growth of International outgoing call revenues.

Exhibit 90 Number of Switched Access Consumer Lines Forecast 2002 – 2008

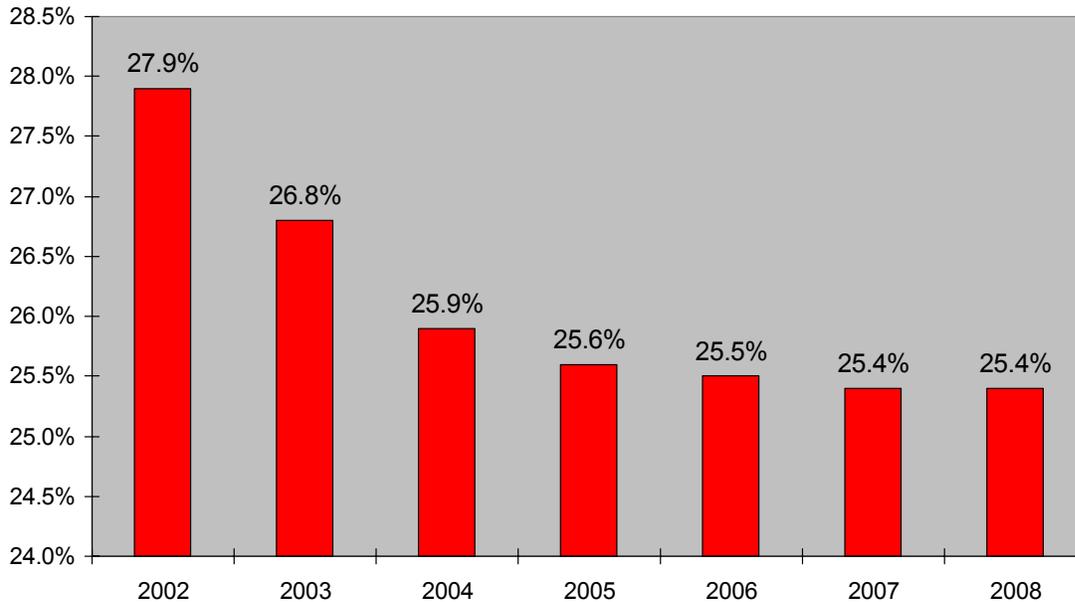
Source: The Yankee Group, 2003



The fall in switched line numbers is partially explained by high subscription fees and increased call costs resulting from tariff balancing, which have resulted in large numbers of disconnections due to non-payment of bills. The relatively high penetration of prepaid cellular services has further contributed to the decline in switched access lines. As Telkom gradually addresses the underserved rural areas and competition from the SNO increases downward pressure on prices, an upturn in switched access line take up is expected from 2005 onwards. However, the net increase over the forecast period from 2003 to 2008 will be just 114,000 lines, with a CAGR of 1.2 percent

Exhibit 91 Switched Access Household Penetration Forecast 2002 – 2008

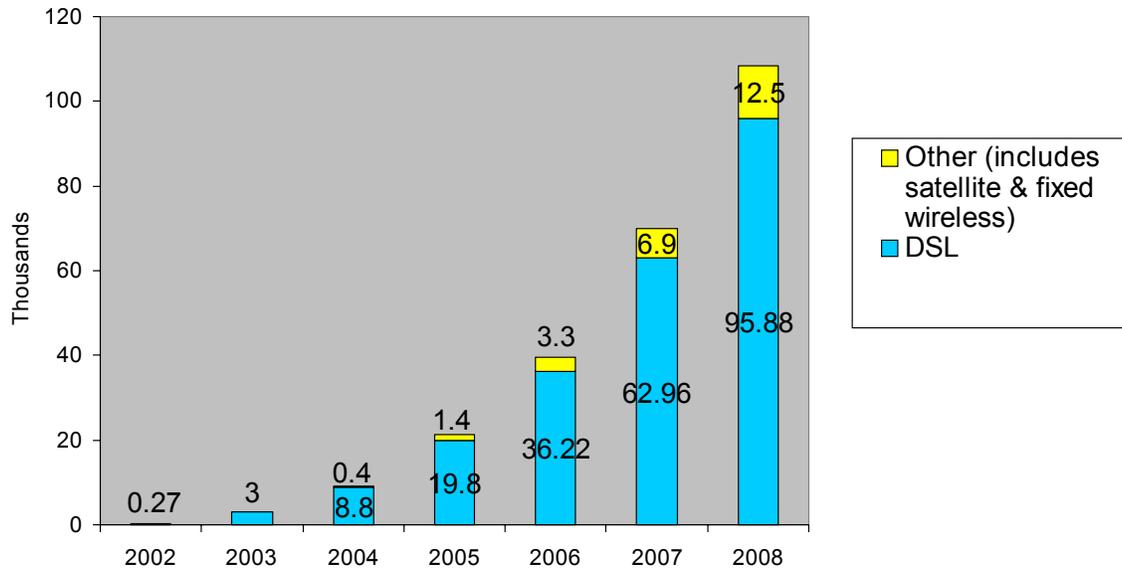
Source: The Yankee Group, 2003



Despite the expected rise in take-up of switched lines from 2005, household penetration of residential lines will drop from just under 27 percent in 2003 to 26 percent in 2005, settling at just over 25 percent in 2007 and 2008. Further fixed line penetration growth will be slowed by the continued success of cellular services, whose overall installed base will grow from 39 percent to 48 percent population penetration between 2003 and 2008. Another dampening factor will be the relative growth in the number of households in South Africa, which will rise at a CAGR of 2.3 percent, compared with a population CAGR of just 0.6 percent

Exhibit 92 Number of Consumer Broadband Subscribers Forecast 2002 – 2008

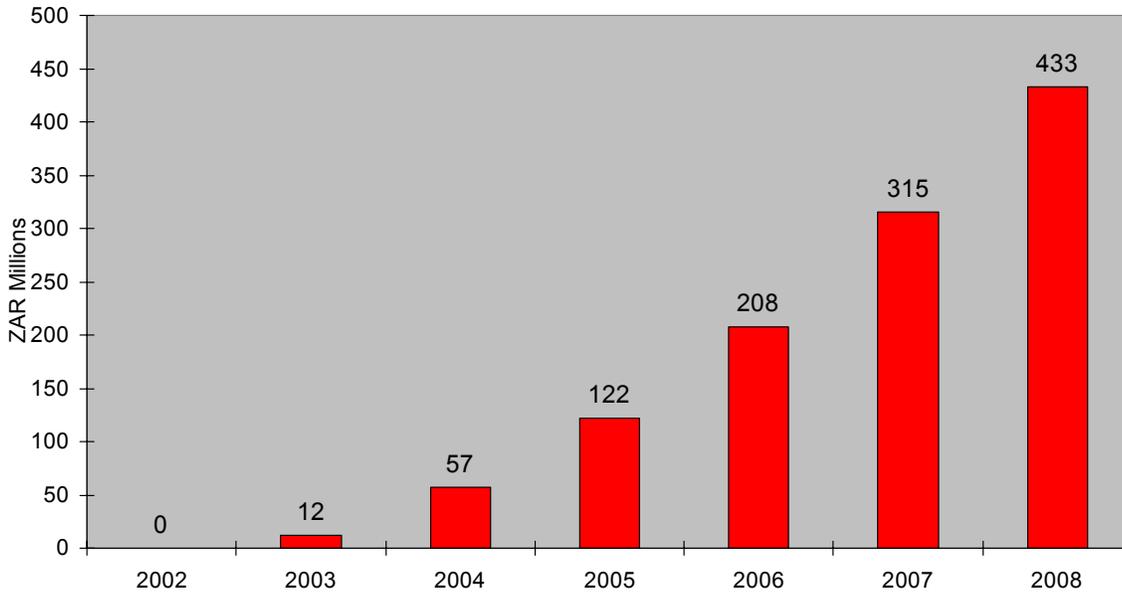
Source: The Yankee Group, 2003



Take-up of consumer broadband will remain modest, largely as a result of the high prices of Telkom's ADSL product and the lack of effective competition, which will keep prices high and restrict consumers' choice of service options. We estimate that as of 2003, only 10 percent of Telkom's ADSL customer base comprises residential users, and that this proportion will rise to 50 percent over the forecast period. Other forms of broadband access such as satellite and fixed wireless will help connect customers in rural and remote areas outside of the fixed line ADSL footprint. However, existing alternative access offers from Telkom, Sentech and Tiscali are priced at levels that will not attract significant numbers of residential customers. The end of the forecast period shows broadband penetration remaining below 1 percent of households.

Exhibit 93 Consumer Broadband Revenues Forecast 2002 – 2008

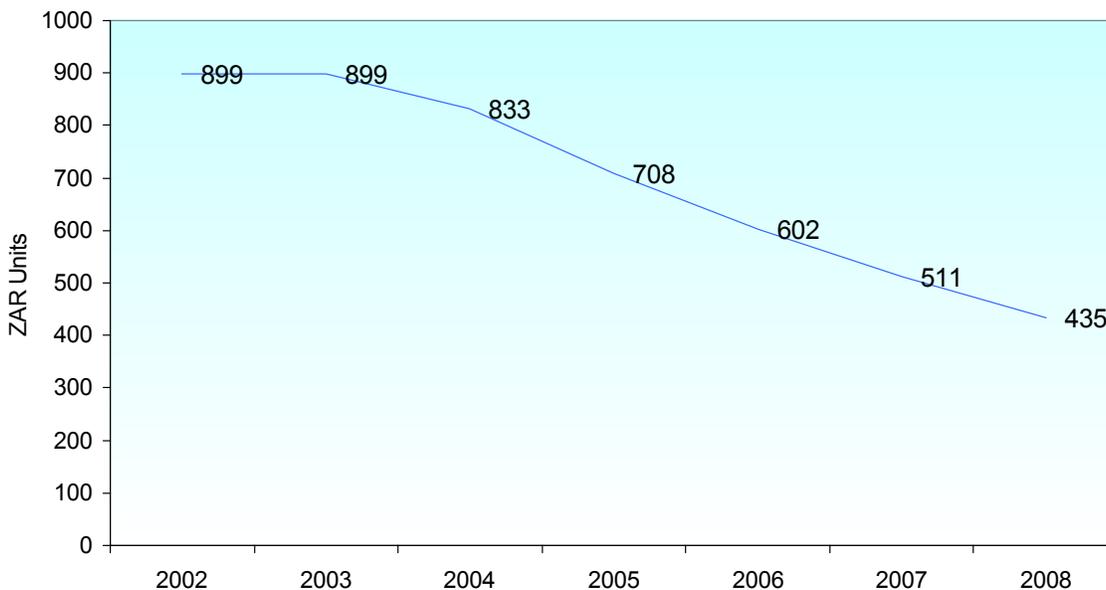
Source: The Yankee Group, 2003



Broadband revenues will grow at 104 percent CAGR, similar to that of residential subscriptions (105 percent). Revenue growth will be offset by a fall in ARPUs resulting from expected price cuts that will be necessary to drive adoption. Until ADSL is positioned as a viable consumer product, it will remain a niche product for SMEs, representing only a negligible consumer revenue stream.

Exhibit 94 Monthly Consumer Broadband ARPU Forecast 2002 – 2008

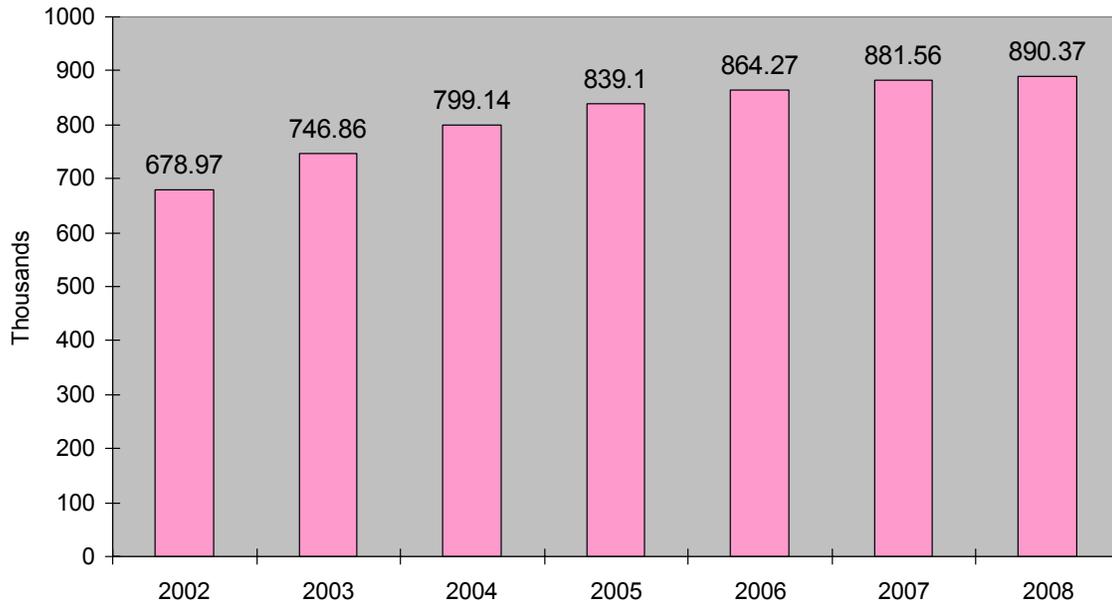
Source: The Yankee Group, 2003



Price cuts are inevitable if broadband is to have any traction within the consumer market. Connection and subscription fees are currently set far too high to attract any significant mass market interest. We expect regulatory and competitive pressure to have a downward impact on flat-rate monthly broadband access prices, thereby reducing ARPUs at compound rate of 13.5 percent annually. Even the anticipated 2008 ARPU of ZAR435 is more than three times the price of today's typical monthly dialup fees, suggesting that broadband will remain a niche, high-end product for several years to come.

Exhibit 95 Number of Digital TV Subscribers Forecast 2002 – 2008

Source: The Yankee Group, 2003



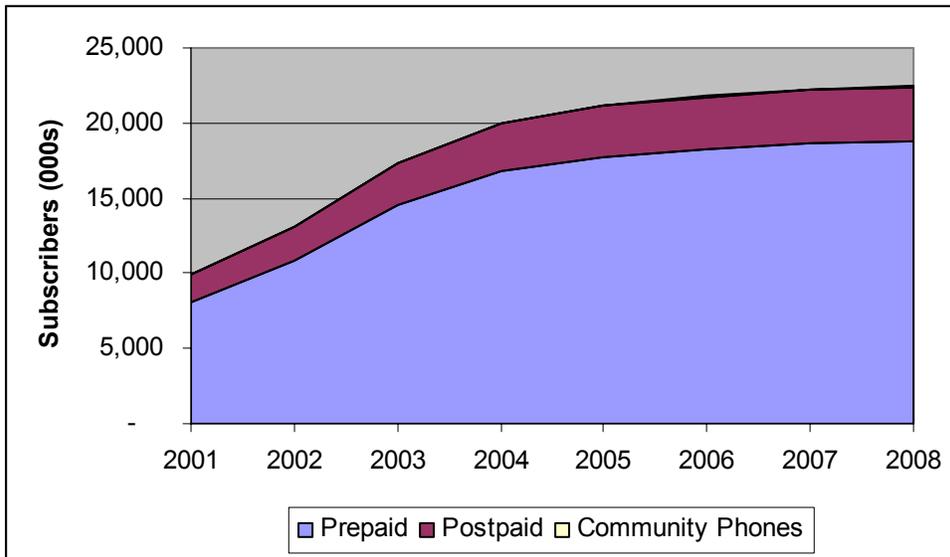
South Africa's pay TV market is approaching maturity and overall has flattened during 2002-2003, with more migrations from analog to digital than new additions to the digital customer base. We anticipate a CAGR of 3.6 percent, taking account of the fact that, at ZAR360 per month, MultiChoice's digital pay-TV subscription service has a limited audience of high-income viewers. Without competition for paid-for services, there is no downward pressure on pay-TV prices and therefore little incentive for the de facto monopoly provider to introduce lower-cost service for lower income households.

C Wireless/Mobile Communications Market (WME)

Exhibit 96

Forecast: Mobile Subscribers 2001-2008

Source: the Yankee Group, 2003



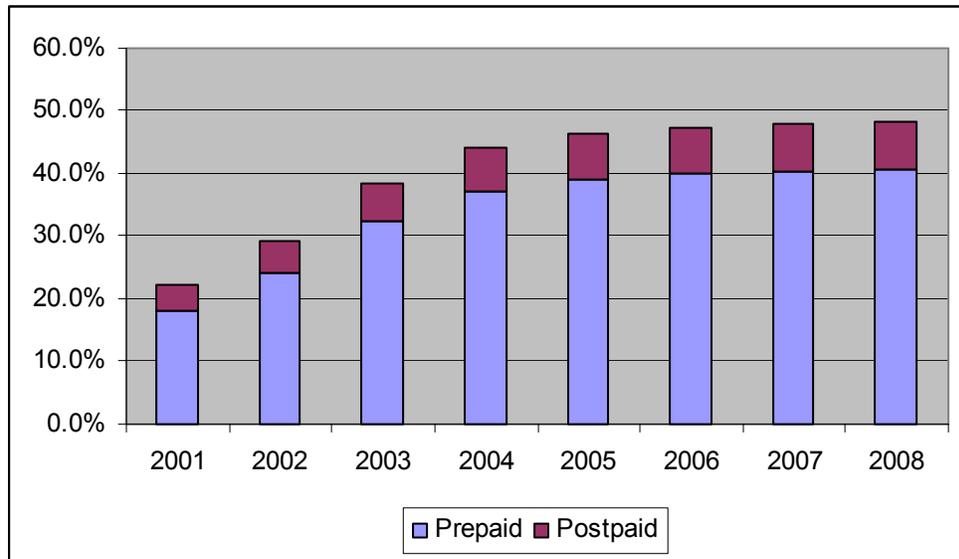
000s	2001	2002	2003	2004	2005	2006	2007	2008
Prepaid	8,004	10,870	14,537	16,765	17,760	18,281	18,634	18,812
Postpaid	1,916	2,191	2,786	3,161	3,350	3,454	3,527	3,564
Community	33	42	45	48	63	73	83	90
Total	9,952	13,104	17,369	19,974	21,172	21,807	22,244	22,466

- Total subscriber base to reach 22.5 million by the end of the projection period.
- In 2004 growth will be 15 percent, but in subsequent years this declines significantly as saturation occurs. By 2007 and 2008 growth is a modest 2 percent per annum.
- Between 2003 and 2008 prepaid subscribers will increase by 29 percent to 18.8 million. Postpaid subscriptions will rise by 28 percent to 3.6 million. Prepaid will account for 84 percent of all new subscriber additions.
- Buoyed by Cell-C's obligation to roll out 52,000 community phones, there will be a total of 90,000 by 2008. Note - we did not investigate the MNOs individual plans for community phone rollout. We have applied our best estimates based on recent trends.
- Overall prepaid will maintain its 84 percent share of the total market in 2008. While new additions to the South African mobile subscriber base over the period will almost exclusively be prepaid, there will also be some migration of prepaid customers to contracts, thus boosting the number of contract customers.

Exhibit 97

Forecast: Mobile Penetration 2001-2008

Source: the Yankee Group, 2003



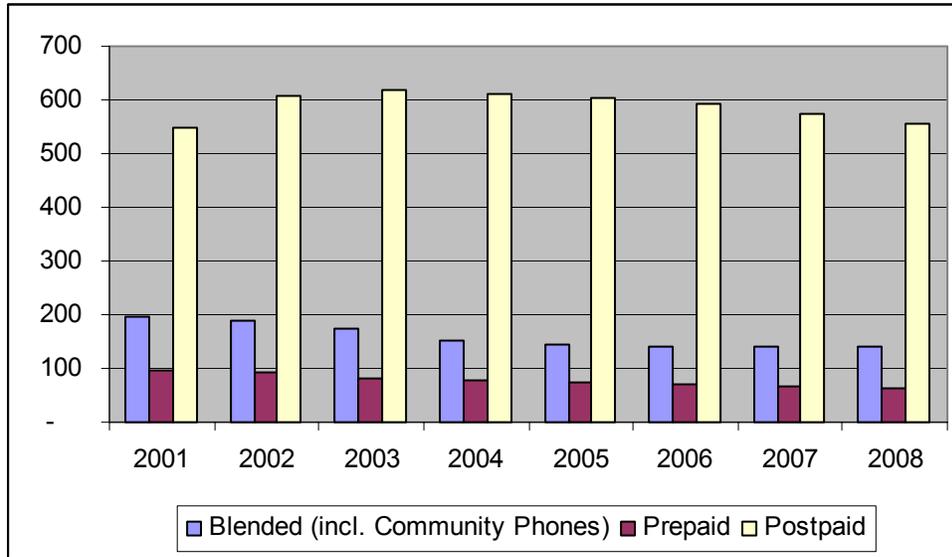
Penetration	2001	2002	2003	2004	2005	2006	2007	2008
Prepaid	17.9 percent	24.3 percent	32.3 percent	37.0 percent	39.0 percent	39.9 percent	40.4 percent	40.6 percent
Postpaid	4.3 percent	4.9 percent	6.2 percent	7.0 percent	7.4 percent	7.5 percent	7.7 percent	7.7 percent
Total	22.2 percent	29.3 percent	38.6 percent	44.1 percent	46.5 percent	47.6 percent	48.3 percent	48.4 percent

- At the end of 2003 penetration of the South African mobile market will stand at 39 percent, up from 29 percent at the beginning of the year.
- Having witnessed a 10 percentage points increase in penetration during 2003 market growth is set to continue - albeit at a slightly reduced rate - during 2004 and to a lesser extent 2005. One spur to this continued growth over the next five years will be the planned requirement for Vodacom and MTN to issue four million free SIM cards in exchange for 1800 MHz spectrum. Note - we have not assumed that all four million free SIM cards will translate into either registered or active customers.
- Barring any significant changes to South Africa's socio-economic environment the Yankee Group believes mobile market saturation will remain below 50 percent in 2008.
- By 2008 market penetration will have stabilized at just above 48 percent, with further increases being in fractions of percentage points.

Exhibit 98

Forecast: Mobile ARPU 2001-2008

Source: The Yankee Group, 2003



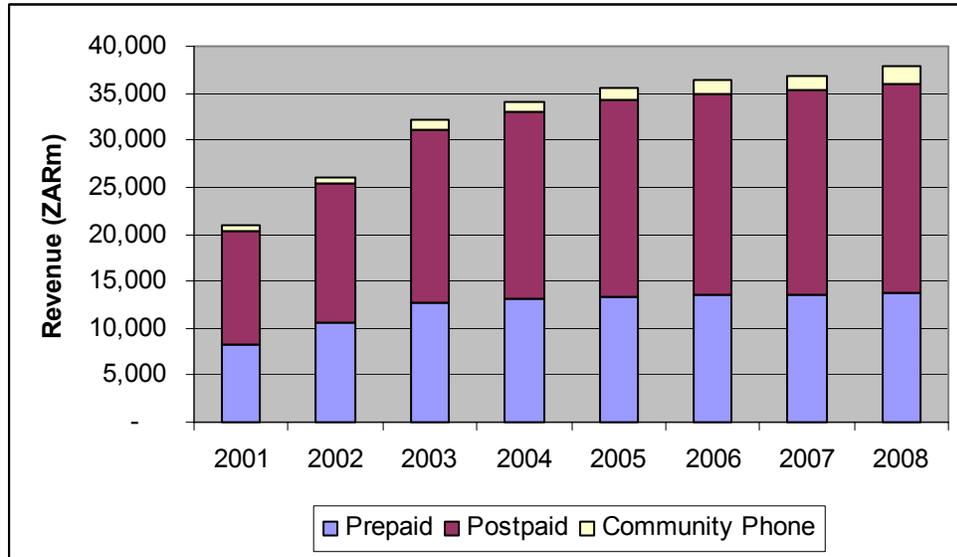
ZAR	2001	2002	2003	2004	2005	2006	2007	2008
Prepaid	98	93	83	77	74	71	68	64
Postpaid	548	608	620	610	604	592	575	555
Community	1,650	1,808	1,904	1,976	2,011	2,038	2,068	2,101
Blended	196	189	176	152	144	141	140	141

- ARPU has fallen in recent years driven lower by the steady growth in lower-spending subscribers. The addition of further low-use customers to the prepaid subscriber base will drive ARPU down.
- The migration of some prepaid customers to post-paid services will also reduce prepaid ARPU.
- Further competition, either in the form of a newly licensed carrier, or a virtual operator, will also push down prices and thus ARPU.
- Blended ARPU is set to fall 7 percent during 2003 and a greater drop is expected during 2004.
- The wide disparity between prepaid and post-paid ARPU is one of the most notable features of the South African market. This is set to continue as prepaid ARPU declines.
- Overall ARPU will stabilize in 2007 and The Yankee Group expects to see a small increase in ARPU in 2008, due to customer stabilization and a gradual increase in data service usage.

Exhibit 99

Forecast: Mobile Service Revenue 2001-2008

Source: Source for this exhibit



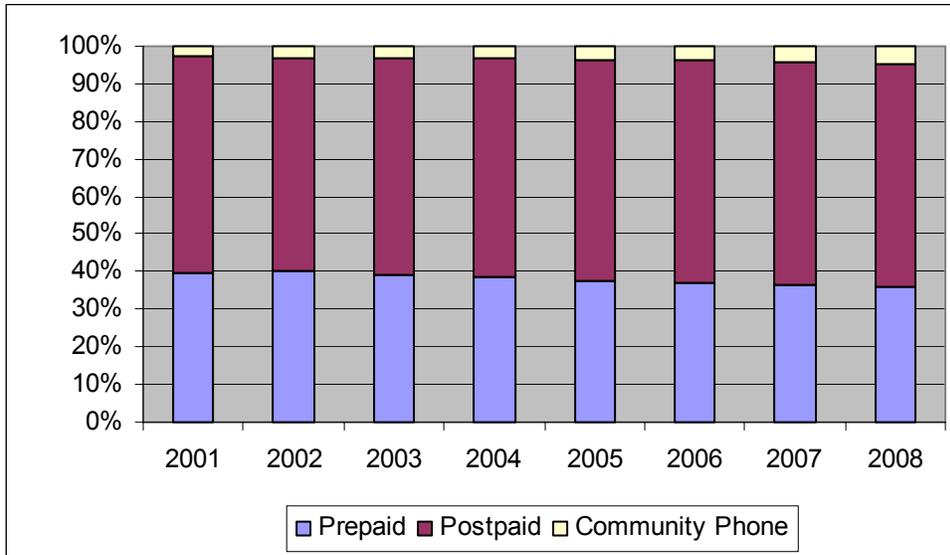
ZAR million	2001	2002	2003	2004	2005	2006	2007	2008
Prepaid	8,275	10,535	12,653	13,072	13,423	13,524	13,534	13,661
Postpaid	12,043	14,826	18,514	19,894	20,788	21,392	21,777	22,395
Community	596	820	1,002	1,080	1,289	1,439	1,596	1,740
Total	20,914	26,180	32,169	34,046	35,500	36,356	36,907	37,796

- In 2003 the South African mobile market will be worth ZAR32 billion, up 23 percent on the ZAR26 billion recorded in 2002. The equivalent increase during 2002 was 25 percent.
- Projected growth rates until 2008 will be more modest as a result of falling ARPU and slowing growth in the subscriber base.
- By 2008 the market will be worth ZAR38 billion, an increase of only 18 percent on the projected figure for 2003.
- The prepaid market will be first to stagnate. Growth during 2006-2008 will be less than 1 percent per annum. The majority of growth will therefore come from the post-paid market, which will see 2-3 percent growth during those three years.
- There is a noticeable pick-up in revenues during 2008, which can be accounted for by the reverse in the prevailing ARPU decline. For both prepaid and post-paid revenues, growth is higher in 2008 than 2007.

Exhibit 100

Forecast: Mobile Service Revenue Splits 2001-2008

Source: The Yankee Group



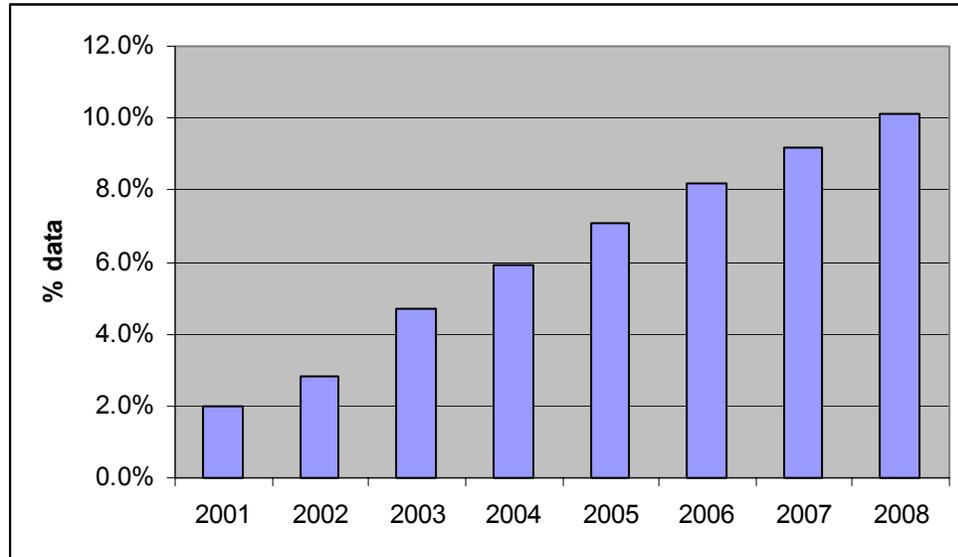
	2001	2002	2003	2004	2005	2006	2007	2008
Prepaid	39.6 percent	40.2 percent	39.3 percent	38.4 percent	37.8 percent	37.2 percent	36.7 percent	36.1 percent
Postpaid	57.6 percent	56.6 percent	57.6 percent	58.4 percent	58.6 percent	58.8 percent	59.0 percent	59.3 percent
Community	2.9 percent	3.1 percent	3.1 percent	3.2 percent	3.6 percent	4.0 percent	4.3 percent	4.6 percent

- Revenue from post-paid continues to outstrip that for prepaid despite the fact that 83 percent of subscribers are prepaid. This neatly sums up the whole market: a very high spending post-paid elite and a large low spending prepaid mass market.
- The relative financial importance of prepaid and post-paid in the South African market will remain broadly the same over the projection period.
- Prepaid will see its share of revenues decline from 40 percent in 2002 to 36 percent in 2008 as a result of declining ARPU and slowly increasing subscriber numbers. The post-paid share grows from 57 percent to 59 percent.
- The proportion of the market taken by community phones is set to rise. The reason for this is two-fold. Firstly Cell-C has obligations to install a total of 52,000. Secondly, price erosion is unlikely to affect community phones to the same extent as it does prepaid and post-paid ARPU.

Exhibit 101

Forecast: Mobile Data Revenue 2001-2008

Source: The Yankee Group



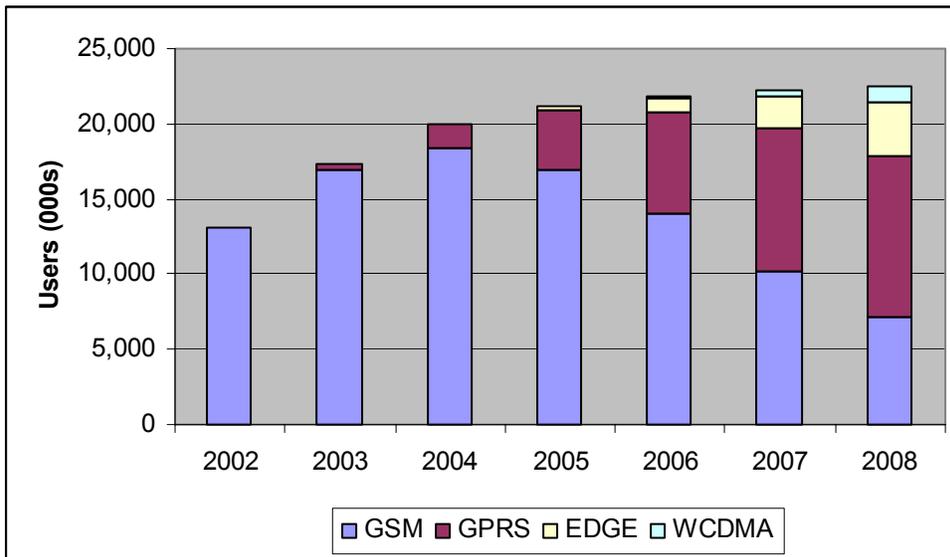
ZAR million	2001	2002	2003	2004	2005	2006	2007	2008
Voice Revenues	20,496	25,447	30,657	32,037	32,979	33,374	33,511	33,979
Data Revenues	418	733	1,512	2,009	2,520	2,981	3,395	3,817
Total Revenues	20,914	26,180	32,169	34,046	35,500	36,356	36,907	37,796
percent Data	2.0 percent	2.8 percent	4.7 percent	5.9 percent	7.1 percent	8.2 percent	9.2 percent	10.1 percent

- Mobile data use is low in South Africa, but definitely rising. In 2003 almost 5 percent of revenue will come from non-voice services, up from 2.8 percent in 2002. In absolute terms that reflects a doubling in data revenues over the year.
- Growth to 2008 will be steady, by which time the total data market will be worth ZAR3.8 billion, 10.1 percent of total revenue.
- Data will be one of the major growth drivers going forward. While voice revenues will see around 1 percent average annual growth between 2006 and 2008, data will be increasing by 10-20 percent per annum.
- Further data revenue growth will be spurred by the introduction of more data-friendly handsets and the eventual launch of EDGE and 3G towards the end of the projection period.
- Average data revenue per registered user is predicted to be ZAR8.27 per month in 2003 rising to ZAR14.23 per month in 2008.

- Average revenue per active data user in 2003 will be ZAR64, but as usage permeates further across the subscriber base this will fall to ZAR50. This assumes penetration of data usage will rise from 15 percent in 2003 to 30 percent in 2008.

Exhibit 102
Forecast: Users by Technology 2001-2008

Source: The Yankee Group



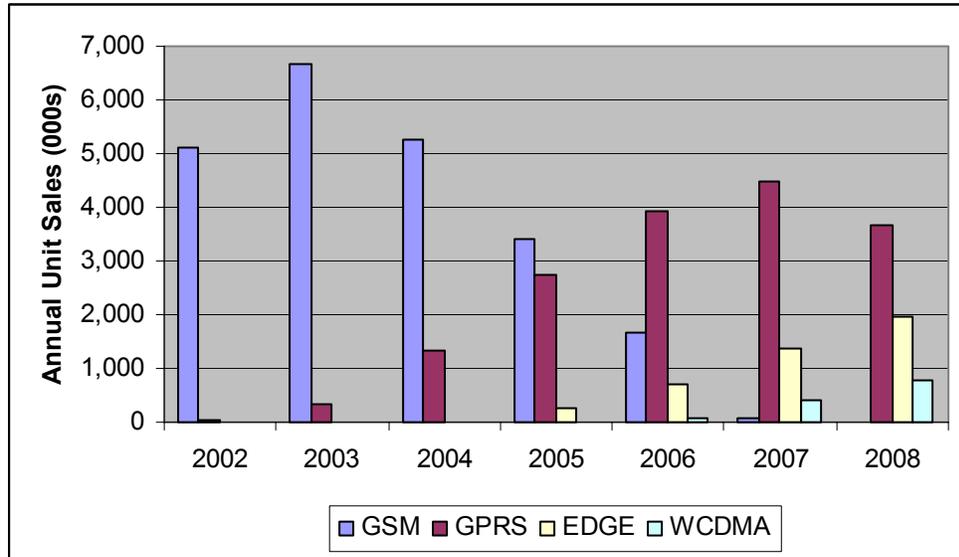
Users 000s	2001	2002	2003	2004	2005	2006	2007	2008
GSM	9,952	13,072	16,993	18,358	16,992	14,064	10,213	7,098
GPRS	-	32	375	1,616	3,919	6,743	9,508	10,760
EDGE	-	-	-	-	260	925	2,080	3,532
WCDMA	-	-	-	-	2	76	441	1,076
Total	9,952	13,104	17,369	19,974	21,172	21,807	22,244	22,466

- Handsets with GPRS will outstrip those sporting simple GSM functionality in 2008.
- South Africa is a market ripe for the deployment of EDGE: it has relatively new GSM infrastructure allowing easy upgrades, operators have tight CAPEX restrictions and 3G is unlikely to arrive in significant volume before 2006 or 2007.
- By 2008 20.5 percent of handsets in use will be either WCDMA or EDGE enabled.
- This forecast assumes that if a fourth carrier is licensed it will not use a non-GMS technology like CDMA.
- Note - the technology split refers to the most advanced technology present on the terminal. Therefore a handset with both GPRS and EDGE functionality would be classed as EDGE. No element of usage is required.

Exhibit 103

Forecast: Handset Sales by Technology 2002-2008

Source: The Yankee Group



Units (000s)	2002	2003	2004	2005	2006	2007	2008
GSM	5,110	6,666	5,273	3,409	1,677	87	-
GPRS	32	350	1,334	2,723	3,933	4,485	3,676
EDGE	-	-	-	260	691	1,387	1,972
WCDMA	-	-	-	2	74	392	789
Total	5,142	7,016	6,608	6,393	6,376	6,351	6,437

- Total handset sales in 2003 will be 7 million units, up 36 percent on the 5.1 million sold in 2002, reflecting the high growth rate seen in subscriber numbers during 2003.
- With the gradual slowing down of the market, total handset sales from 2004 onwards will level off at around 6.4 million per year.
- From 2006 onwards the majority of new handsets sold into South Africa will feature GPRS.
- By 2008 EDGE and WCDMA will also be taking substantial shares of the market, 31 percent and 12 percent respectively.

IV. Conclusions and Implications for Regulatory Policy

In this section, we present a phased approach for South African market telecommunications reform, based on our analysis of global trends and the specific South African situation.

The most important aspect of this approach is Phase One: we regard this as an essential step if South Africa is not to fall further behind some of its peers on the world stage. Phase One includes a series of action items, both for immediate implementation and immediate initiation of review processes that will support both short and medium-to-longer term decisions on further liberalization.

The timing and detail for Phases Two and Three are policy-dependent, and require further consultation both within the industry and more generally within the South African community at large. Much depends on the weight given to different policy objectives. Ultimately, further regulatory reform will be necessary precipitated by technology developments and customer demand and in line with global liberalization trends. However, the issue of whether South Africa wants to lead those changes or simply keep step with them is one for South Africa alone to take.

Given that the Yankee Group project brief is primarily focused on a market review and prognosis, this regulatory and liberalization prescription is not exhaustive and is subject to more detailed analysis across all legislation, Ministerial determinations and regulatory guidelines both in force and in progress in South Africa.

A. Phase One

Introduction

In Phase One, there are no major changes beyond those already agreed; however, there is some clarification to existing rules, a program to enforce reforms already envisaged in existing legislation, and selective review of existing arrangements in order to improve the

Strategic Objective: To Create a Period of Stability for Existing Stakeholders While Also Protecting and Strengthening the Competitive Environment in the Services Market

competitive environment and to position South Africa to develop a holistic liberalization agenda in 2004.

This phase involves six key action items:

- 1. Implementation of selected provisions of the Telecommunications Amendment Act of 2001**
- 2. Review of the implications of implementing certain provisions within existing legislation, with definitive decisions to lift or retain such provisions made in 2004**
- 3. Establishment and implementation of thorough market and competition review processes**
- 4. More stringent enforcement of existing anti-competitive conduct provisions**

-
5. **Increased independence of ICASA and greater role demarcation between the sector regulator and the Ministry**
 6. **Initiation of a process to clarify national policy and prioritize objectives to set a liberalization plan and timeframe**

Phase one, to be implemented during 2004, envisages the following key measures.

1. Implementation of Existing Legislative Provisions

- **SNO is licensed and begins operations in early 2004**
 - The delays in the licensing of the SNO have created uncertainty and may make it more difficult for the SNO to get established. It is clearly important that there are no further delays. The license must include clear, fair rules in a variety of ancillary areas: see below
- **SNO is permitted to run limited mobility access and BFWA**
 - The limited mobility right was conferred in the Telecommunications Amendment Act of 2001, and is an expedient way for the SNO to get full end-to-end access to customer sites. Experience in other liberalized countries has shown that it is very difficult for new competitors to get fair access to incumbent access networks.
 - However, it is essential that LMS services run by fixed-line operators are restricted to local exchange areas as envisaged in the Act. In other nations where near-full mobility services have been permitted without amendment to existing fixed-line licenses, competitive neutrality has been compromised and grounds for wide industry disputes have developed.
- **Voice over IP permitted in limited and specific circumstances.** We recognize three common implementations of VOIP, namely:
 - **IP-PSTN:** A call originates at the enterprise as a VoIP call and is converted to TDM either at the customer premises through an on-site gateway, or at the service provider point of presence (POP) through a media gateway.
 - **PSTN-IP:** A call originates at the enterprise as a PSTN call, and then is converted to a VoIP call through a media gateway in the service provider network. The call is then transported over IP in the core of the service provider network.
 - **IP-IP:** A call originates at the customer premises as a VoIP call, is passed along to the service provider without conversion to the PSTN, and is consequently peered through to another service provider as a pure VoIP call.
 - In Phase One, only IP-PSTN would be allowed, but PSTN-IP would be allowed for all companies registered as VANs providers.
 - The aims of this action are to reduce the cost of telephony on corporate networks; and to enable call centers and similar facilities to operate efficiently
 - As envisaged in the USAL policy, underserviced area licensees are also permitted to offer VoIP services in this phase

- **Allocation of 1800 MHz spectrum is expedited**
 - MNOs require certainty in available spectrum during the license period. Current uncertainty surrounding permanent allocation of 1800 MHz spectrum to MTN and Vodacom is counter-productive because it has the potential to delay MNO investment in 1800 MHz technology and services.
 - Licensing 1800 MHz spectrum on a permanent basis to MTN and Vodacom aims to remove uncertainty surrounding future access to 1800 MHz bands, leading to more investment in network capacity, and improved quality of service for end-users.

- **New license regime to encourage network development in underserved areas**
 - Prospects for USALs have been severely limited by setting of large service areas with associated high costs of service delivery.
 - Delay in USAL licensing and the introduction of free SIM cards are further undermining the viability of the USAL model as currently conceived.
 - Announcements by the USA of increased funding (non-loan) commitments to USALs are encouraging although the administration of this funding process and the licensing of operators requires urgent review and clarification. In the first instance, geographic license areas must be reduced enabling viable business models for small rural operators.

- **Carrier pre-selection introduced**
 - The introduction of carrier pre-selection was foreshadowed in the Telecommunications Amendment Act of 2001, and is an important means to boost competition in the provision of telephone services, especially long distance and international phone services. Although some countries initially delayed implementing CPS on the grounds that it would discourage the construction of alternative infrastructure, most subsequently implemented it because of its proven success in reducing the dominance of incumbents and reducing prices.

- **Number portability introduced**
 - Provisions to implement and ensure number portability in 2005, as envisaged in the Act, should be expedited.
 - The absence of number portability is an important entry barrier for new competitors, since most people want to retain their old number. Number portability can be technically complex, so it needs to be thought through and introduced early in the newly competitive regime.
 - A public consultation on the introduction of Mobile Number Portability must therefore be initiated as soon as possible; The implementation of MNP needs to be accompanied by regulator supervision of its implementation by the MNOs. Evidence from other markets has shown that the process can be unnecessarily slow and cumbersome.

2. Review of the Implications of Implementing Certain Provisions within Existing Legislation and Regulatory Guidelines

- **Duopoly is extended to 2006 (subject to review)**
 - The current legislation calls for the duopoly to be reviewed and for the issue of a third PSTS license to be considered from 2005. However, this provision was based on the assumption that the SNO would begin operations from May 2002. The delay of almost two years in the licensing argues for an extension to the SNO's "exclusivity" period, to give it time to establish itself. Without such an extension, the SNO might find it difficult to raise further funds.
 - The date for the end of the exclusivity period should be the subject of further study, but we suggest it should be not less than two years and not more than three years from the moment the license is issued and the SNO can begin to operate
 - The guaranteed interconnection rights of the SNO to Telkom facilities should also be extended beyond the two-year time frame envisaged in the Act. This is a peculiar departure from global practices, where such sunsets have not been the norm, and where alternative operators continue to use and require access to incumbent infrastructure years after being licensed.

- **No fourth cellular license for the time being**
 - Maintaining the status quo in the number of cellular licenses will enhance a level of certainty for all industry players and will support the objective of the SNO building a viable and sustainable business
 - MNO competition is sufficiently robust already. The introduction of a fourth licensee would not make a significant contribution to the overall level of competition, and, on balance, would probably hinder future investment by the existing players.

- **More stringent price controls on key Telkom products (DSL, leased lines, international telephony)**
 - Although price comparisons are always difficult to make, we believe that the prices of some Telkom services are significantly above cost, and there is room for ICASA to apply tougher price caps than those that are currently being used. ICASA should order a neutral benchmark of pricing, especially on the price of DSL, long distance leased lines and international telephony and leased lines, and consider raising the CPI-1.5 percent price cap to a level that is more in line with global norms
 - South Africa's Price Cap productivity factor of CPI-1.5 percent is significantly lower than the global norm for liberalized markets of between 5 and 10 percent
 - Set by negotiation in 1997, there is urgent need for review of the impacts and continued appropriateness of this low productivity factor
 - The Competition Commission should be encouraged to investigate potential discriminatory and predatory practices by Telkom in terms of product bundling and pricing and long-term contracts.

- **Initiate a public consultation on the lifting of certain VANS restrictions with a view to expediting a decision on regulatory relief within 6 months**
 - While section 40(2)(a) maintains restrictions on VANS provision via Telkom facilities until 7 May 2002 (§40(2)(a)), multiple clauses of the legislation enable the lifting of several VANS restrictions including:
 - §40(2)(b) Allows for use of own facilities by all VANS on a date set by the Minister and subject to a Ministerial notice
 - §41(5) Allows for the Minister to issue a notice to entitle private telecommunications network operators with telecommunications facilities to resell spare capacity on such facilities
 - §S44(2-4) Provides for the leasing and resale of PSTS provider facilities
 - In addition, while local loop unbundling is prohibited for 2 years after the licensing of the SNO, provisions for shared access are articulated in facilities leasing guidelines
 - Public consultation and review before any lifting of VANS restrictions is recommended at this point for the following reasons:
 - Phase One anticipates only incremental and limited adjustment to the existing regime
 - There is a need for the SNO to establish a viable and sustainable business model
 - There is a need to avoid unintended outcomes of piecemeal moves to lift VANS restrictions in the absence of a more comprehensive liberalization policy
 - This review should also consider the §37(2) prohibition on MCTS operators from using fixed lines other than those of Telkom or other licensed PSTS operators subject to change by Ministerial notice

- **Review Existing Interconnection Guidelines**
 - The role of ICASA has been extended to enable the regulator to finalize interconnection terms and conditions and agreements. While new interconnection guidelines have been established for under-serviced area licensees, revision of the broader interconnection guidelines from 2000 and 2002 should be undertaken
 - This process should tie directly to item 3 below, whereby granular market-by-market competition assessment is advocated. In this case, this granular assessment would also necessarily focus on review of existing essential facilities interconnection mandates on a network element basis across all communications services markets.
 - This review must consider the setting and enforcement of wholesale rates as anticipated in the Telecommunications Amendment Act 2001 and subsequently in the Convergence Bill clauses, under which ICASA must develop interconnection guidelines and ‘may’ develop interconnection and wholesale pricing rules

3. Establishment and Implementation of Thorough Market and Competition Review Processes

- **Arrangements for dominant operator/Significant Market Power designation are established and comprehensively applied**
 - With the introduction and development of competition, the focus of market investigations, especially operator market positions, is on the identification of dominance or SMP. This is usually on a case-by-case and market-by-market basis. Hence, while the Essential Facilities Doctrine continues to apply, competition forces more granular analysis and justification of obligations formerly applied to monopoly operators.
 - Arrangements for dominant operator/SMP designation and associated interconnection obligations have not been comprehensively applied in South Africa. For example, none of the MNOs in South Africa are deemed to have SMP except in relation to the under-served area licensing regime and associated interconnection arrangements.
 - South Africa must address the designation and enforcement of dominant operator rules. Regulatory intervention should be based on the SMP status of each competitor on a market-by-market basis.
 - In this process of review, based on at least 35 percent market share, reference to the detailed market assessment criteria and triggers for the removal of ex ante regulations established by the European Commission provide a strong framework to guide the development of comprehensive SMP rules in South Africa

4. More Stringent Enforcement of Existing Anti-competitive Conduct Provisions

- **Overhaul and rigid enforcement of Telkom's cost accounting requirements to increase transparency, aid wholesale price regulation and help to lower wholesale prices for leased lines, DSL, telephony**
 - Clear, transparent rules on incumbent cost accounting are designed to determine where the costs are incurred in the provision of a specific network service (a leased line, for example). The primary aim of this accounting is to develop fair and consistent rules on wholesale pricing.
 - In the context of the current COA/CAM arrangements in place in South Africa, review of the existing network and service categories, business unit reporting requirements and the broader guidelines on regulatory accounting will support greater delineation of Telkom's costs by service and business unit and its associated reporting requirements.
 - Greater scrutiny of Telkom's accounts should facilitate a more timely resolution of disputes with competitors who claim that Telkom is discriminating in favor of its own subsidiaries.

- As anticipated in interconnection guidelines, the shift from FAC to LRIC wholesale price setting and reporting will also support greater transparency in Telkom's reporting requirements.
- **Telkom mandated to follow non-discriminatory policies in pricing and supplying basic resources for its own retail operations**
 - This needs to be tied to the cost accounting provision above. The objective of this policy is to ensure that basic services such as bandwidth are supplied at the same price and on the same terms and conditions to the incumbent's own retail operation as they are supplied to competitors.
 - The key here is enforcement. Multiple legislative provisions provide for monitoring and remedial action against discriminatory and preferential supply practices on the part of Telkom.
 - Anti-competitive conduct provisions within the Telecommunications Amendment Act 2001 include and are not isolated to:
 - §53 Clauses for ICASA action against undue preference or undue discrimination practices
 - §44(2) Process for Ministerial determination of interconnection fees and charges in respect of Telkom in "fields where no or insufficient competition exists."
 - §44(7) Notwithstanding Telkom interconnection guidelines (§43) "where the Authority is satisfied that Telkom is unwilling or unable to make suitable facilities available...may authorize that person to...obtain any necessary telecommunications facilities other than from Telkom..."
 - In addition, Section 8 (b) of the Competition Act, prohibits a dominant firm from refusing to give a competitor access to an essential facility when it is economically feasible to do so, allowing the Competition Commission to apply the essential facilities doctrine

5. Increased independence of ICASA

- Notwithstanding the provisions contained in the Convergence Bill, the major structural regulatory impediments identified here are in relation to the compromised independence of ICASA. This is primarily because Ministerial approval is required for regulations developed by the Authority, and because of the dual responsibilities of ICASA and the Minister in relation to licensing
- Separate legislation is required to augment and strengthen the enforcement powers of ICASA and to clarify role demarcation between the Ministry and the sector regulator
- There are multiple additional aspects to the reform of the regulator that must be considered, as canvassed in the regulatory review chapter of this report.

6. Initiate a Process to Clarify National Policy and Set a Liberalization Plan and Time Frame

- Unclear and shifting liberalization policy and timetables, matched with multiple unprioritised objectives in both the Telecommunications Act of 1996 and the new Convergence Bill, are at the heart of the problems encountered in implementing reform since 1996.
- The Convergence Bill is not a panacea for these problems. It sets no liberalization plan or timescale matching the Act's objectives. It reduces but does not entirely remove unclear distinctions between the roles of ICASA and the Minister. It is too short on specifics, leaving broad interpretation, discretion and responsibility with the ill-equipped ICASA to determine, with insufficient guidelines for the regulator in assessing market conditions and implementing new licensing provisions. The Bill also lacks specifics in terms of licensing criteria. All of this creates the basis for continued delays and disputes, despite greater specification of dispute resolution processes. The Bill is also silent on reformed universal service policy.
- This policy review process must in our view be directly linked to prioritized national objectives and the process of building this plan must involve broad stakeholder consultation and negotiation
- This policy review should incorporate a thorough review of the proposed new licensing structure as envisaged (but not detailed) in the Convergence Bill. Notwithstanding the current Bill, existing licensing provisions in the 2001 Amendment Act nominally provide for the licensing of additional operators at the discretion of the Minister and on conditions set by ICASA. The associated provisions are unclear and the intent of the legislation in terms of new licensing is ambiguous, again opening grounds for industry confusion and criticism of regulators for acting or not acting upon existing enabling legislation.
- Review of licensing arrangements within the context of a broader sector policy review is vital to ensure that the implications and implementation of a modified or unified licensing regime are coordinated with review of associated regulations and their adjustment

B. Phase Two

In Phase Two, significant changes are envisaged to existing rules to create a more competitive environment. The policy review processes outlined in Phase One will provide a strong consultative basis for decision-making on further liberalization initiatives as anticipated in Phase Two. The timing of these changes is a matter of policy, for further discussion, and will depend strongly on the outcome of Phase One, in particular the overall policy review outlined in part 5 of Phase One.

Strategic Objective: To Significantly Increase Choice and Lower the Price of All Key Communications Services, Especially in the Business Market

- **Voice over IP generally permitted, but with some restrictions**
 - Under this scenario, both **IP-PSTN** and **PSTN-IP** services as previously described, would be allowed, without restrictions.

- **Introduction of FRIACO regime for dial-up Internet**
 - Evidence from other markets shows that flat-rate pricing of dial-up Internet services with no usage (per-minute) phone costs has two key beneficial effects: it encourages take-up, and it increases usage (time spent online). This has beneficial knock-on effects for the development of Internet-related business and consumer applications such as e-commerce.

- **Simple resale permitted, with some restrictions (this might potentially already be lifted in 2004, pending review as anticipated in Phase One above)**
 - Simple resale enables competitive telcos and VANs to benefit from economies of scale in purchasing and pricing their services more competitively.
 - Existing legislative provisions (§S44(2-4) 2001 Amendment Act) allow for the leasing and resale of PSTS provider facilities
 - Simple resale of voice and data services would be provided on a regulated cost plus basis for basic services such as voice minutes and the provision of leased lines. This would prescribe and control the margins that Telkom can achieve in provision of these services to other operators and the margins achieved from selling to its own retail customers.

- **Local loop unbundling introduced and enforced, but restricted to licensed operators**
 - If third party service providers cannot get access to incumbent local loops, it makes it much more difficult to establish a competitive broadband access market. This is especially true in South Africa because there is no cable TV operator. Local loop unbundling is one of a range of options available; others include shared access, bitstream access and wholesale DSL service. Local loop unbundling is the most desirable in principle because it enables service providers to innovate on price and product feature. However, it is also difficult to implement, and requires expert, robust enforcement by the regulator.
 - The introduction of local loop unbundling will require legislative amendment in terms of its current prohibition within the first two years of an operational fixed-line duopoly.
 - However, as noted previously, shared access is mandated under existing facilities sharing rules and could be a compromise position here.

- **Self-provisioning permitted for ISPs, VANs, and Enterprises (this might also be implemented in Phase One, depending on the outcome of the review set out there—see 2 above)**
 - Enables localized construction and use of facilities where existing facilities holders cannot supply on reasonable terms, or to encourage specific outcomes
 - The aim of this policy is to encourage technical innovation and to bypass slow or expensive service provision by licensed operators. A general relaxation of self-provisioning would likely lead, for example, to lower pricing of business services and the development of services such as wide area Ethernet.

- As noted, provisions under current legislation allow for the lifting of such restrictions on VANS.
- **Much more stringent price controls on key Telkom products (wholesale DSL, leased lines, international telephony) to bring prices below average against international benchmarks (comparable countries)**
 - Generally speaking, we believe that Telkom's prices are currently average or above average by comparison with similar countries in other regions, such as Mexico and Poland. This measure would introduce price caps that were explicitly intended to position South Africa as a low-cost middle-income telecommunications environment. As note in Phase One discussion, the current price cap on Telkom is benign by international standards.
- **Asymmetrical pricing of interconnect to favor new entrant(s)**
 - As envisaged in the Supplementary Guidelines for USAL interconnection, asymmetrical termination charges for national long distance services is designed to enable new operators to win market share without extensive capex on facilities.
 - Extension of asymmetric pricing principles for all new entrants and across all operators declared as major operators should be considered in Phase Two.
- **Key cable resources (SAT3, SAFE) become a public resource available on the same basis to all licensed PSTS**
 - The price of basic international resources such as leased capacity and telephony has a major impact on the competitiveness of South Africa as a location for ICT services. There is evidence that these prices are relatively high, in part because Telkom has exclusive access to cable resources and is therefore able to control prices. Making cable resources available at cost to licensed providers would increase competition and lower prices.
 - Specifically, competition in provision of backhaul from any cable landing station should be allowed. This would involve the construction of alternative fiber access to the cable landing station by either the SNO or a consortium of operators allowing sale of capacity to all potential wholesale customers.
- **Sentech permitted to offer international services to end users**
 - Sentech's international license currently only permits carrier-to-carrier services. As a result, and because the wholesale market is undeveloped, it has made little headway with this license. Permitting it to supply to end users would increase competition and lower prices for international telephony.
- **Sentech permitted to offer voice over IP via multimedia license**
 - Sentech was specifically prohibited from offering voice over IP under the terms of its multimedia license. However, Telkom could offer voice over IP (or other voice services) bundled with its broadband DSL service, putting it an arguably unfair advantage. Allowing Sentech to offer voice over IP would increase competition in the local loop.
- **Creation of a separate wholesale division within Telkom**
 - Telkom's retail division to 'buy' services on equal terms as other service providers.

- All sales to be itemized by type in a separate wholesale division profit and loss statement.
- **Consider licensing a fourth mobile operator**
 - Licensing of a fourth operator is designed to improve competition, leading to lower retail prices and higher mobile service penetration. However, this would need to be subject to a further market review to assess whether South Africa can support a fourth operator.
- **Designation of MNO SMP, if appropriate, following detailed market assessment as envisaged in Phase One**
 - Current major operator designations (based on a market share of 35 percent) and associated interconnection obligation are inconsistently applied.
 - If SMP criteria met, legislation is required to ensure fair access e.g. cost-based interconnection. The aim is to enhance the competitiveness of third and potential fourth MNO.

C Phase Three:

In Phase Three, further incremental change is designed to create a more competitive environment.

Strategic Objective: To Position South Africa As A Leading Environment For ICT Services by Creating a Much More Competitive Environment

- **Facilities licenses issued to some existing service providers and other parties (eg MSPs, municipal authorities) on a case by case basis**
 - Encourages service and technology innovation and reduces the cost of basic resources, particularly bandwidth, broadband services.
- **Voice over IP generally permitted via minimal class license regime**
 - Permitted for all three designations of VOIP: IP-PSTN, PSTN-IP and IP-IP calls, as defined earlier.
- **Much more stringent price controls on key products (wholesale DSL, leased lines, international telephony) aimed at making South Africa a low-cost environment for telecommunications by global standards**
 - The aim of this policy would be to send a signal that South Africa wanted to position itself as a leading ICT environment, not just by comparison with “benchmark” countries but by comparison with all countries. This would imply a much tougher price regime that very substantially reduced pricing of key resources.
- **Full divestiture of Telkom’s wholesale operations into a separate company**
 - This would involve the transfer of ownership of the network to the wholesale company; ownership of all retail customers would be separated into a Telkom Retail division within the remaining group.

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- Experience in other countries shows that it is extremely difficult to create and enforce workable rules on cost accounting, especially where the incumbent enjoys superior resources.
 - Divestiture would force Telkom to price resources correctly, and a threat to implement it might speed up negotiation of a cost accounting regime.
 - This proposal would be necessarily dependent on the success (or failure) of earlier regulatory action to reveal Telkom's costs.

 - **License one new-entrant 3G operator, with mandatory roaming on incumbents' 2G/2.5G networks**
 - The aim is to promote aggressive voice price competition and improved data service availability.
 - As with the fourth cellular license, this action would be dependent on the outcome of a further market review on the feasibility and impact of a 3G license on the existing market.

 - **License MNOs for self-provision of transport infrastructure, and capacity re-sale (as reviewed in Phase One)**
 - To facilitate lower MNO operating costs, leading to reduced retail prices, and, ultimately, increased mobile service penetration.

 - **License MNOs for international services**
 - To facilitate lower international mobile call charges, leading to improved communications between South Africa and rest of the world, particularly the rest of Africa.

 - **Existing licensing system for underserved areas abolished; anyone permitted to build facilities, subject to minimal class license on technical standards etc.**
 - This approach envisages the tendering of universal service obligations and targeted public funding of universal service projects. The USF is maintained as are universal service obligations imposed on Telkom.
 - This policy objective would only be initiated if earlier attempts to improve this system did not yield desired results.

D. Conclusions and Summary Remarks

The foregoing liberalization steps and associated actions show that South Africa can take one of several paths to reach its objectives. Everything depends on the political, social and economic priorities which policy makers see as the main objective.

Our key conclusions, based on our knowledge of global markets and convergence trends, and our study of the specifics of the South African situation, are as follows.

- **South Africa could potentially position itself as an important international location for ICT services**
 - It benefits from a low-cost but educated workforce that mostly speaks English—three key benefits for multinational companies looking for suitable locations
 - It has certain geographical and time-zone advantages, being close to the European timezone but with a unique location in Africa
 - It has a relatively sophisticated business IT environment; local corporations tend to use the same kinds of technologies that are typical in high-income economies, providing a good springboard for future success

- **Doing so will require some significant changes to the current environment**
 - There is a clear need for a more liberalized telecommunications service environment, especially in the business sector, and a clear, simple licensing environment that encourages market entry by network innovators
 - Enforcement of competition rules for those with SMP is the second major priority; without that, those with SMP can continue to dominate and even extend their dominance, to the potential detriment of local businesses

- **Subjecting those with SMP to more robust oversight, and introducing further competition, need not compromise the aim of improving access in rural areas and among HDIs**
 - Even with a virtual monopoly, the universal service regime has not worked in the fixed line market. Ironically, access has in fact been extended via vigorous competition among mobile service providers
 - Through a mixture of US incentives and liberalization, the universal service environment can be reformed within the context of a more competitive market.