INFRASTRUCTURE SHARING AND ACCESS TO BROADBAND: THE ROLE OF POLICY AND REGULATION

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ABSTRACT

Infrastructure sharing is seen an opportunity to reduce the costs of deploying infrastructure and of gearing investment towards underserviced areas. It has since emerged that there is duplication and concentration of infrastructure in urban areas and limited infrastructure in many parts of the country. This complicates the sharing of infrastructure and the effectiveness of the infrastructure sharing instruments on essential facilities, facilities leasing and interconnection regulations in granting access to a wide range of services such as voice and broadband.

The purpose of this study is to explore policy and regulatory instruments in infrastructure sharing and access to broadband. The study took into account the literature on policy and regulation and infrastructure sharing, the industry views and considered the trends in infrastructure sharing and the provision of ubiquitous networks to underserviced areas. The study found that network infrastructure sharing has the potential of providing the rapid development of access infrastructure capable of handling high bandwidth requirements suitable for an information society.

DECLARATION

I declare that this dissertation is my own, unaided work. It is submitted in partial fulfillment of the requirements for the degree of Masters in Management in ICT PR in the University of Witwatersrand, Link Centre, Johannesburg. It has not been submitted before for any degree or examination in any other University.

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Mankakane Violet Magagane
28 May 2012

DEDICATION

I wish to extent my heartfelt gratitude to my family, Norman Malao and especially my adorable son, Mokgethwa who have been very supportive throughout this journey over the past four years.

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LIST OF ABBREVIATIONS

DoC- The Department of Communications

ECS-Electronic Communications Services

ECNS- Electronic Communications Network Service License

EIA- Environmental Impact Assessment

EU- European Union

KZN-Kwa Zulu Natal

ICASA- Independent Communications Authority of South Africa

ICT- Information and Communication Technologies

ITU- International Telecommunications Union

LLU- Local Loop Unbundling

NGO- Non Governmental Organization

NLD- National Long Distance

OECD- Organization for Economic Cooperation and Development

OEMs- Original Equipment Manufacturers

OPEX- Operational Expenditure

SITA- State Information Technology Agency

SMME- Small Medium Middle Enterprise

SNO- Second Network Operator

SOE- State Owned Enterprises

UK- United Kingdom

USAASA- Universal Service and Access Agency of South Africa

USAF- Universal Service and Access Fund

USO- Universal Service Obligations

UAS- Universal Access Service

VANS- Value Added Network Service Licensees

WBS- Wireless Business Solutions

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CHAPTER 1: BACKGROUND TO INFRASTRUCTURE SHARING AND ACCESS TO BROADBAND

1.1. Introduction

This study reviews the theory and practice of infrastructure sharing in increasing access to broadband and analyses the role of policy and regulation with respect to infrastructure sharing since the liberalization of the telecommunications market. The study takes into account the trends observable from the content review and exploratory study on infrastructure sharing in the South African market.

The research will examine infrastructure sharing and evolution of the broadband market, with emphasis on network infrastructure sharing in removing barriers to entry for new entrants and service providers and the extent to which policy and regulation played a role. The study emphasizes the need for policy and regulatory interventions in shaping the market rather than leaving the process of shaping the market to operators and service providers.

The reports that this study focuses on outline the different aspects of infrastructure sharing while other reports explore trends in broadband access in South Africa. However, it has been observed that none of the reports explore network infrastructure sharing and access to broadband specifically or the role of policy and regulation in promoting access to broadband in South Africa. This report therefore, presents experiences and ideas from literature and the ICT sector that can help policymakers to pursue the goal of

having high broadband access as a means of becoming an information society. The study will analyse the data in order to understand the role of policy and regulation in infrastructure sharing and in increasing access to broadband. While the focus is on network infrastructure sharing, the report synthesises many lessons learned in broadband policy and regulation over the past years. Analysis of data collected will lead to a set of conclusions regarding the extent to which policy and regulation has influenced infrastructure sharing. This means giving all players, for example, telecoms operators, broadcasters and service providers the opportunity to provide telecommunications services at the same level and type of geographic coverage.

Telecoms operators share infrastructure in many forms depending on the regulatory framework in a particular country. Infrastructure sharing includes sharing of passive and active infrastructure. In this case, telecoms operators are able to share support structures such as towers, masts, ducts, conduits, trenches, manhole and street pedestals as well as the sharing of electronic power supplies, air condition and alarm systems. Infrastructure sharing also encompasses the sharing of the electronic telecommunications elements of infrastructure such as lit fibre, access node switches and controllers (InfoDev, 2005). Other emerging forms of sharing other than the traditional forms of infrastructure sharing are spectrum sharing, network sharing and geographical splitting.

In South Africa, telecoms operators have engaged in network infrastructure sharing such as the co-build arrangements for the joint construction of fibre infrastructure network which allow parties to have individual ownership of

various network elements, or in terms of less costly options, to share ownership of certain elements. These variations on the co-build approach vary from the parties only sharing the costs involved in digging the trench and managing the project, to scenarios where parties share ownership of all elements, with each individual operator merely having its own fibre strands within a fibre cable utilised by more than one operator. In other cases, operators investigate the possibility of the cross-metropolitan swapping of infrastructure or the swapping of sections of fibre network within a single metropolitan area. This option works on a “pair per kilometer basis” but differ from instances where operators already have existing infrastructure they intend to share.

The research on network infrastructure sharing is of express relevance in the development of broadband in South Africa. This is because operators share resources and are able to eliminate the capital costs associated with deploying telecommunications networks. In South Africa the massive uptake of wireless broadband led to capacity problems necessitating the need for high bandwidth telecoms infrastructure. The FCC (2010) defines broadband as “data transmission speeds exceeding 200 kilobits per second or 20 000 bits per second, in at least one direction, downstream from the internet to the user’s computer or upstream from the user’s computer to the internet”. On review of various regulatory instruments and literature on the subject there are various technologies that are or can be deemed to fall under the broadband terminology. These include, amongst others, digital subscriber line (XDSL), power line cable (PLC), broadband wireless (WiFi, WiMax, digital broadcast infrastructure including satellite, cable, and terrestrial technologies) and mobile technologies (2.5G, 3G and 4G).

The subject of broadband is not new and continues to develop around the world both in developing countries and developed countries. In the UK, for example, government established the Ministry for Broadband to deal specifically with issues of broadband. What has been observed is that there are common issues that continue to be important in South Africa namely, lack of infrastructure, affordability of telecommunications costs and limited bandwidth. In order for South Africa to become an information society, the issues relating to availability of infrastructure, affordability and unlimited bandwidth are considered as some of the key developmental issues. The key developmental issues have a potential of leading to sustainable economic growth, where there is better life, better jobs and greater social cohesion. In the information society, broadband is common cause in the use of online transactions, online shopping, e-education, social networking, online advertising and website traffic. These activities are applicable to a wide range of users, for example, corporate users, individuals, small medium enterprises and academics.

1.2. The state of infrastructure development and sharing in South Africa

1.2.1. Telecommunications infrastructure development

South Africa serves as a hub for several of its neighbouring countries which are connected to the submarine international fibre optic cables through terrestrial or satellite links. Besides the SAT 3 cable, there are various undersea cables that are landing in South African shores which include, for example, the East Africa Submarine Cable System (Eassy), a 9,900

kilometer long optical submarine cable between Durban and Port Sudan, The South East Africa Cable System (Seacom), a 1,7 00 kilometer fibre optic cable linking the Southern Regions, South Africa, Mozambique, Tanzania and Kenya. This has the onward connectivity to India, the Middle East and Europe.

Telkom SAT 3/WASC/SAFE cable has landing points in fifteen countries from Portugal to Malaysia. The cable comprises of two fibre optic pairs with ultimate potential capacity of 12 Gbps for the SAT3-WASC segment and 130 Gbps for the safe segment. The West African Festoon System (WAFS) is a Telkom SA managed project aiming to connect countries along the West coast Africa, including Nigeria, Cameroon, Equitorial Guinea, Congo Brazzaville, Angola, Namibia and South Africa. The purpose of the cable is to cater for redundancy with the SAT 3 cable. There is also the West Africa Cable System (WACS) submarine fibre cable under the auspices of Infraco. The cable connects the South African East coast in Kwazulu Natal with Cape Town, and splits into two 3Tbps branches, to London and Fortaleza in Brazil (Lange, 2010).

1.2.2. Infrastructure sharing

Infrastructure sharing in South Africa is broadly dealt with under the EC Act, the interconnection and facilities leasing regulations. The provisions on interconnection and facilities leasing means that anyone who owns or controls electronic communications facility, including cables, antennae's, masts and even satellite transponders must share with ECNS operators that need to use such facilities. Interconnection and facilities leasing involve the

linking of two or more electronic communications networks in order to allow customers of one network or service provider to have access to the customers of another network. According to Thornton (2009) in interconnection and facilities leasing:

> Geographically adjacent networks interconnect so that customers on one network are able to have access to customers on the one network; technologically different networks (such as wired and wireless) interconnect so that customers on one network are able to have access to customers on the other network; downstream services providers obtain access to the facilities of an upstream network provider over which the services provider will provide services; new entrants interconnect with and obtain access to the facilities of incumbents in order to compete effectively and new service providers offering VoIP interconnect with traditional services providers to complete voice telephony calls.

The aim of the interconnection and facilities leasing regulations is to unlock bottlenecks to electronic communications facilities and those electronic communications facilities that are regarded as essential that have the effect of preventing effective competition in the telecommunications market. The

effect of the regulations is that the sharing arrangements by operators have the potential to realize certain efficiencies in the form of an increased pace of development of the fibre infrastructure and related network infrastructure that cannot be easily duplicated by other operators. Section 43 of the EC Act provides that “an electronic communications network service licensee must, on request, **lease** electronic communications facilities to any other person licensed and persons providing services pursuant to a license exemption, unless such request is unreasonable” (RSA, 2005, p. 64). On the other hand, Section 37 provides that “every licensee must **interconnect** on request, on terms negotiated, unless the request is unreasonable” (RSA, 2005).

The facilities which are mostly the subject of sharing are essential facilities which cannot be easily duplicated. This also takes into account the local loop of Telkom. Local loop unbundling (LLU) is specifically mentioned in the EC Act. ICASA issued draft regulations in 2007 in which it listed backhaul circuit, international gateways, land-based fibre cable, cable landing stations, co-location space, earth stations, main distribution frame and undersea based cables as essential facilities. Local loop unbundling has been a top priority of ICASA and the deadline was set for November 2011. With the unbundling of the local loop, Telkom will have to give up sole custody of its exchanges and internet service providers will be able to offer their own internet services at lower cost. It is assumed that the costs of internet will reduce and that this will open up markets for competition in the internet and broadband market. Local loop unbundling also has the potential of reducing telecommunications by eliminating large investments of building telecommunications infrastructure for last mile connectivity.

Telecoms operators are continuously looking at innovative ways of sharing infrastructure to optimize the costs of trenching and other related activities. They are however, cautiously redirecting the market into adopting various sharing methodologies such as network sharing, where they enter into co-build arrangements despite uncertainties in the regulatory and competition frameworks. In areas where neither party has a fibre network in place, operators intend to follow the hybrid approach to sharing and development of new infrastructure. In other cases, operators lease capacity from Dark Fibre, a company that constructs fibre network in the form of trenches, ducting and fibre optic cables, which infrastructure is then made available to other telecoms network operators who, in turn, onward-sell the capacity to their respective customers. Dark Fibre only offers "dark fibre" (optic fibre is known as "unlit" ie - dark when not in use). What is more interesting is that operators continue to acknowledge that in order to enable the provision of quality services, an essential component of the business is the establishment and development of fibre network. This is because fibre networks allow for vastly improved data transmission speeds and overall network capacity.

As we have seen with infrastructure, most municipalities own fibre networks which they intend to lease to other operators and service providers on "open access". Cohen and Southwood (2008, p. 5) refer to the concept of "open access infrastructure sharing as a way of allowing multiple downstream competitors to share a bottleneck facility that is a critical input for the services that are provided". Open access is defined in InfoDev (2005) as:

> a creation of competition in all layers of the network allowing a wide variety of physical networks and

> applications to interact in an open architecture. It encourages market entry from smaller, local companies and seeks to prevent any single entity from becoming dominant. Open access requires transparency to ensure fair trading within and between the layers based on clear, comparative information on market prices and services (p. 5).

Open access principle supports fairness and transparency in the manner in which infrastructure is shared between operators. In order to ensure fairness and transparency, the EC Act provides for a framework in which other operators and service providers may be granted and denied access to an electronic facility and the manner for submission, review and filing of agreements with ICASA.

1.3. The broadband market in South Africa

The broadband market is skewed by the growth of broadband services by mobile operators. The growth of wireless broadband led to capacity problems which translated to poor quality of service. The study undertaken by Goldstuck (2010) demonstrates that the total South African internet user base reached 4.6 million in 2008, with the number reaching 5.3 million by end of 2009. Of this 5.3 million only 1.5 million of the population have access to broadband. The majority of internet users are based in the affluent urban areas while the rural and semi urban areas are falling behind in the

broadband uptake. This is one of the challenges for government considering that it has a vision of providing universal broadband access to every area by 2019.

According to Goldstuck (2010, p. 100) a third of the South Africans using wireless broadband also use another form of connectivity as their primary form of internet access. Goldstuck emphasizes that of these, most have access to the internet in their place of work using corporate networks that are linked to the internet via high capacity leased lines. This clearly indicates that broadband home usage is still restricted to the minority of the population, for example, the academic and corporate market (Goldstuck, 2010).

Illustration 1: Broadband usage per sector

Year	Broadband Unique	Broadband additional	Cellular	Dial up	Academic	Corporate	Total
2009 subs	2124 000	756 000	3 500 000	499 000	650 000	2 060 000	9 589 000
2009 primary	156 000	506 000	450 000	250 000	540 000	2 060 000	5 366 000 (15%)

Source: World Wide Worx (2009)

Goldstuck research shows an optimistic expectation of the development of broadband services rather than the lack of private investment in infrastructure which has continued to take place outside the policy framework on broadband in South Africa. Given the statistics of broadband, government acknowledges the need for increasing access to broadband for the development of an information society. For instance, the introduction clause of the broadband policy clause 1.1.1 reads as follows:

> In 2007, the South African government approved the building of an information society. The decision was based on the outcome of the United Nations World Summit on the information society. This summit resolved that information and Communication Technology (ICT) infrastructure is the foundation to the development of an information Society. (World Summit on Information Society (WSIS) Action Line C2, Information and Communications Infrastructure is an essential foundation for the Information Society). The development of a broadband policy is in line with the world trends and is critical for South Africa to ensure the realization of the goal of an all inclusive information society that can enjoy the economic benefits associated with broadband in both urban and rural areas (RSA, 2010, p.7).

The broadband policy stresses the provision of universal broadband access to every area either individually, or as a household, where there is subscription to a broadband service or where every South African is able to access a broadband service directly or indirectly at a private or public access point and the highest penetration by 2019 (RSA, 2010, p. 10).

According to the annual population estimates, South Africa's population is estimated at 49,32 million of which around 16 million are economically active (Statistics SA, 2009). Illustration 2 below is an indication of the South African population per metropolitan area. The major metropolitan areas are Gauteng, Kwazulu Natal followed by the Western Cape. According to illustration 2, KwaZulu Natal has the highest number of the population and the lowest land area at 1.4%, while Gauteng has 22.4% with a land area of 7.6% followed by the Western Cape with a land area of 10.1% with a population rate of 10.4%. Network operators such as Telkom, Neotel, MTN, Vodacom, Cell C and service providers such as DiData, have their business models based on metropolitan settings where there is high usage and disposable income and hence a high return on investment.

Illustration 2: Land area and annual population estimates

Land Area by Province		Population by Province	
Western Cape	10.60%	Western Cape	10.40%
North West	9.50%	North West	6.40%
Northern Cape	29.70%	Northern Cape	2.20%
Mpumalanga	6.50%	Mpumalanga	7.20%
Limpopo	10.20%	Limpopo	10.90%
Eastern Cape	13.90%	Eastern Cape	13.50%
Free State	10.60%	Free State	5.70%
Gauteng	1.40%	Gauteng	22.40%
Kwa-Zulu Natal	7.60%	Kwa-Zulu Natal	20.90%

Source: Statistics SA (2009)

Illustration 2 indicates that many South Africans migrate to the economic hub of the country such as Gauteng. These are the areas where operators prefer to deploy infrastructure mainly because other areas in the country do not have the attracting formula as evidenced in urban areas such as Gauteng. For example, Gauteng has the highest proportion of corporate companies,

institutions of high learning and high income earners with the highest usage of mobile and data, while this is not the case with other provinces in the country. As a result, telecoms operators target areas which contribute positively to their bottom lines. This approach has denied the majority of South Africans in underserviced areas to participate fully in the global economy. The majority of South Africans continue to lack the essential tools of ensuring that they are self- sustainable where they would be able to create jobs and ultimately reduce the level of poverty in the country. South Africa needs the ubiquitous provision of ICT infrastructure that will enable all South Africans to enjoy the economic benefits associated with broadband.

1.4. Background to policy and regulation in advancing infrastructure sharing

1.4.1. Policy initiatives

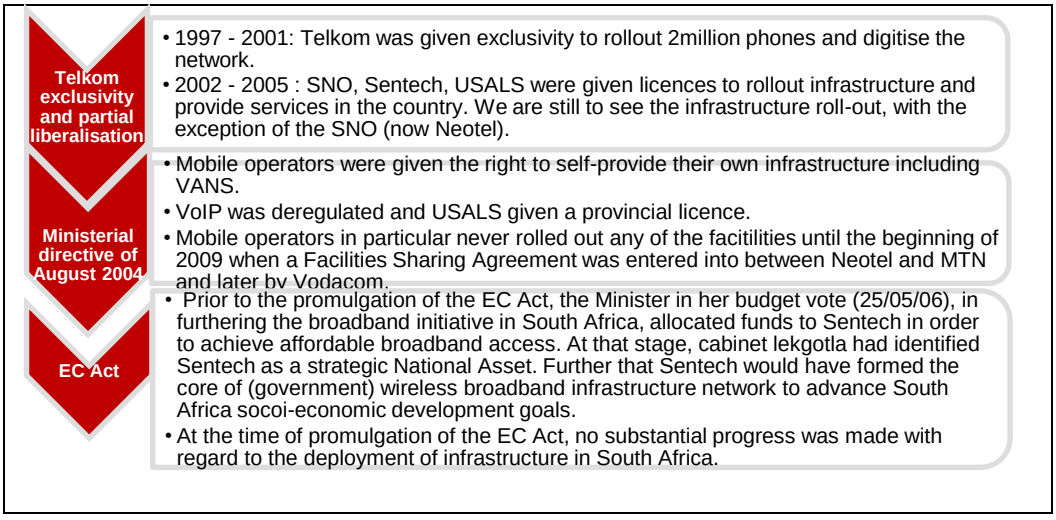
Various initiatives were undertaken during the period 1997 to 2005 in an effort to address the roll-out of infrastructure to various parts of the country. Soon after the 1st of February 2005, and after the Minister refused to confer the rights on the VANS to self-provide, the converged legislation (EC Act) was tabled in Parliament and was promulgated in 2006. The EC Act sought to expedite the implementation of its provisions and detailed the timelines within which ICASA had to comply in converting and granting of licenses. ICASA missed the early period of 24 months and had to finalise the conversion process during the last 6 months of the stipulated period.

ICASA also delayed in the implementation of the various provisions of the EC Act relating to infrastructure sharing and therefore could not create the

necessary regulations timeously and wind down certain activities under the Telecommunications Act, No 103 of 1996. During the transitional period, in order to transform the infrastructure sector and to increase access to broadband, government initiated a further policy initiative which led to the amendment of the EC Act seeking to license Broadband Infraco. Broadband Infraco was one of the innovative solutions for government in providing ubiquitous infrastructure for the development of the country. It was marketed on the basis that it will ensure availability and affordability of access to infrastructure and service by providing long distance national and international connectivity to previously underserviced areas.

Illustration 3 explores in detail the initiatives that were undertaken for the period 1997-2005 in relation to the provision of infrastructure.

Illustration 3: ICT development in South Africa between 1997- 2005



Source: M Magagane (2011)

Around December 2003, a Yankee report was published by the Department of Communications (DoC) which sought to give a reflection of the state of development of the ICT sector and the end state that was envisaged in South Africa. The study noted that the ICT sector could be improved by implementing and enforcing existing legislation. There was specific reference to, amongst others, the licensing implementation delays and non-transparent processes, access and interconnection arrangements lacking detailed legislative criteria and comprehensive guidelines and universal service policy unmatched with clear funding and implementation mechanisms and a well-equipped implementation agency (ITweb, 2004).

In 2008, the City of Johannesburg showed a renewed energy in the management of its infrastructure and published the proposed bye-laws on the rights of way for electronic communications facilities in provincial gazette notice 2920, 2008. The aim of the by-law was to govern issues of rights of way owing to the new convergence environment and proposed that all network operators would have to obtain a permit and pay an administration fee which may be reviewed by the city from time to time. In short, the proposed by-laws have the effect of increasing the costs of access to electronic communications networks and as a result operators and service providers alike, would transfer such costs to the end-users.

1.4.2. Licensing framework

The licensing regime as currently exist in the country is stipulated in Chapter 3 of the EC Act. It provides for the Electronic Communications Network Licenses (ECNS), Electronic Communications Services (ECS), Broadcasting

Services (these are also divided into class and individual licenses), Frequency licenses and license exemptions. The EC Act's model of licensing is designed to promote convergence of technology and services. It allows a potential licensee to choose the area where they would want to invest and compete in the value chain of the industry. The transitional provisions of the EC Act enabled licensees to have their licences converted into technology-neutral ECNS licenses, which permits the building of infrastructure and provide electronic communication.

In dealing with the historical licenses, ICASA had to proceed in terms of section 92 (6) of the EC Act read together with section 92 (1). These provisions stipulate that "all licenses granted, issued or considered to have been granted or issued in terms of the Telecommunications Act, the broadcasting Act or the IBA Act…remain valid under this Act until converted by the Authority in terms of this Chapter" (RSA, 2005, p.118). Furthermore, section 92 (6) reads that "existing licenses referred to in subsection must be converted by the Authority in terms of this Chapter within 24 months from the commencement of this Act or such extension period, which must not exceed an additional 6 months from the expiry of the 24 months period" (RSA, 2005, p. 119).

A decision affecting the licensing framework was taken in the Altech judgment, which allowed a number of players to invest in infrastructure. The judges finding was that the applicants existing license permitted it to self-provide its own telecommunications facilities under its existing VANS license which include the right to provide networks and connectivity services (Davis, 2008). However, the judgment created a number of uncertainties with regard

to the availability of frequency spectrum and access to network facilities. Secondly, not all licensees have or will have the financial capacity to establish their own network infrastructure due to the costly, tedious, regulatory and environmental regulations including property rights issues that licensees are required to comply with before they can engage in infrastructure deployment.

1.5. What is causing the problem?

One of the features of liberalization of the telecoms market in South Africa was to create a regulatory environment that encourages the sharing of infrastructure among telecoms operators as a medium to encourage competition, optimize investments and increase access to ICT's. However, the Department of Communication International peer benchmarking report (2009) indicated that South Africa has the lowest internet penetration rate and that the cost of broadband access remains excessively high for end users.

Although South Africa serves as a hub for several of its neighbouring countries, there is still limitation with regard to terrestrial networks which are able to meet the demands of an information society. There are challenges in providing availability, accessibility and affordability of broadband services in the country. As indicated earlier, operators continue to deploy infrastructure in the urban dense areas, thus hindering progress in other parts of the country. This is mainly because it does not make economic sense to roll out new infrastructure in many parts of the country due to the costs of access to high sites, electricity, regulatory requirements such as obtaining way leave

permits and environmental impact assessments and lastly, delays in securing land to build infrastructure both from government institutions and private individuals.

Recent collaborative partnerships between South African network operators, albeit in fibre sharing, on the deployment of optical fibre network infrastructure offers new opportunities for the reduction of capex and ploughing of the savings in other areas for the development and growth of the sector. Telecoms operators MTN, Neotel and Vodacom collaborated to create a ring around the country linking key cities such as Johannesburg, Cape Town and Durban to build a 5,000-kilometer fibre optic network. This private sector initiative is intended to cut the costs of links which have been leased from Telkom and to eventually provide broadband capacity through fibre optic cables. Still the focus was on the main cities. The question that remains is why this trend continues?

It is clearly obvious that the objectives of government and telecoms operators differ immensely. Therefore, in order for South Africa to achieve an information society, government requires a strategic shift in the manner in which infrastructure can be leveraged to promote access to broadband for sustained economic growth. This includes undertaking expansion in areas that are underserved with respect to broadband infrastructure.

For the purposes of this study, network infrastructure sharing refers to gaining access to high speed telecommunications networks and to aid the diffusion of broadband, particularly in underserved areas in order to enable

fixed broadband penetration in the transition to becoming an information society.

1.6. Research Structure

This research contains six chapters. Chapter 1 fulfills the role of introducing the study and the framework on which the study is based upon. It focuses on the legislative framework on infrastructure sharing, observable trends in infrastructure sharing and the broadband market in South Africa. Chapter 2 offers a review of the literature related to infrastructure sharing and access to broadband and the role of policy and regulation. Chapter 3 focuses on the research methodology. Chapter 4 presents the findings on infrastructure sharing and broadband access. Chapter 5 presents the analysis on weaknesses in the policy and regulatory environment for infrastructure sharing. Chapter 6 presents the conclusion and recommendations for policy and regulation in enabling infrastructure sharing and access to broadband.

CHAPTER 2: LITERATURE REVIEW AND THEORETICAL FRAMEWORK: INFRASTRUCTURE SHARING, ACCESS TO BROADBAND AND THE ROLE OF POLICY AND REGULATION

2.1 Introduction

Research has been undertaken to look at various methods and business models undertaken by operators in infrastructure sharing. This study is particularly interested in understanding the concepts and theories around infrastructure sharing, the policy factors and driving forces pertaining telecommunications infrastructure and the rise of an information society. The research will be linked to the theories of the information society and public interest to lead to an optimal conceptual framework.

This study will explore the existing body of literature with the aim of setting out the concepts, theories, arguments and debates around infrastructure sharing and access to broadband, policy and regulation. The report draws on literature dealing with experiences of countries such as South Korea, the EU and USA that dramatically increased access to broadband. In every case, governments' role in the development of an information society is of crucial importance. In this literature review, the following themes are explored;

- Sharing telecommunications infrastructure
- The rise of an information society
- Policy and regulation in enabling infrastructure sharing
- Theories of regulation applicable to infrastructure sharing
- Conceptual framework

2.2 Sharing telecommunications infrastructure

Relevance of infrastructure sharing in South Africa

Prior to the promulgation of the convergence legislation, the EC Act, the South African telecommunications market had the fixed line operator (Telkom), Mobile Cellular Telephone Companies, VANS, Trunk Networks operators, Multimedia operator, USAL's, the PTN's such as Transnet and Eskom. Telkom had a monopoly of all international calls originating from within and outside South Africa and of traffic over the SAT 3 fibre that provides most of South Africa's international bandwidth and was also allowed to build network in the monopoly protected environment. Telkom was given five year exclusivity in the fixed line segment. Because operators had no right to self- provide infrastructure, they were reliant on Telkom.

The licensing of Vodacom, MTN and the VANS paved the way for the operators to deploy infrastructure in some parts of the country. Mobile operators continued to deploy mobile infrastructure but still had to access backhaul connectivity from Telkom. They instead continued to deploy infrastructure in the dense metro areas. When the SNO was established, the company inherited telecoms infrastructure (mainly in urban areas) from Transnet and Eskom.

In an attempt to increase access in rural areas, the Act made provision for the establishment of licenses for the under serviced areas (USAL's). These were envisaged to be small regional monopolies operating where Telkom had reached less that 5% penetration, with special permission to establish infrastructure and use voice over data technology to deliver telecoms

services. The objective of government in increasing access to the underserviced areas was also never realised. In the meantime the costs of telecommunication continued to rise and there was limited ubiquitous provision of infrastructure in many parts of the country, thus contributing to the current state of ICT development in the country. While taking into account the state of ICT's in the country, it is in this instance that the concept of infrastructure sharing finds itself. Failure to unlock the value chain in infrastructure sharing would mean continued barriers to entry and failure by South Africa to become an information society.

According to Cohen and Southwood (2008, p. 8), sharing infrastructure is one strategy for achieving a national broadband infrastructure more quickly than through simply letting the market take its course. Hasbani *et al*. (2007, p. 4-5) argue that there are various advantages of infrastructure sharing by operators, which are to; reduce investment, decrease barriers to entry for new players, shift the focus to service innovation and expand investment to less dense areas to meet universal targets. The traditional forms of infrastructure sharing that have been adopted are restricted to site sharing, co-location and national roaming. According to Hasbani, El-Darwinche, Mourad & Chanab (2007, p. 4-6);

> In site sharing operators agree to share available infrastructure including site space, buildings and easements, towers and masts, power supply and transmission equipment, while co-location deals with housing of radio and cable transmission facilities. In

> addition, national roaming allows new operators to provide national service coverage by means of sharing incumbent's networks in specific areas while their networks are still deployed. However, given the competitive landscape, operators had to adopt and explore other infrastructure sharing business models especially where these have the potential of significant financial benefits to them, for example fibre sharing and network sharing of base stations equipment.

Despite the methods of infrastructure sharing mentioned earlier, Hasbani *et al* (2007) refer to other forms of infrastructure sharing to include, amongst others;

> Spectrum sharing, as a model where operators lease their spectrum to other operators on commercial terms. The writers conclude that the sharing methodologies by operators depend on whether telecoms operators prefer either passive sharing or active sharing. They refer to passive sharing as involving the joint use of the network, collocation and national roaming and furthermore, active

> sharing as involving the joint use of active components such as switches, antennae's and base stations (p. 5-7).

While infrastructure sharing may have a role in opening up barriers to entry and increasing competition, the literature is divided. Hultel, Johansson and Markendahl, (2004) are of the view that this type of geographical sharing is still associated with considerable risks. In other jurisdictions, policymakers continue to grant permission to share infrastructure with certain conditions. For example, the Indian Regulator granted permission on condition that service providers announce a program of passive infrastructure sharing on the existing infrastructure (where feasible) and for future investment while setting up mobile towers (Bhawan & Marg, 2007). According to Mansell (1994, p. 590) the traditional relationships between telecoms operators in different national markets continue to be supported by revenue sharing arrangements that are less than transparent and are recognized as resulting in distorted relationships between the costs and prices of service supply.

Whalley (2002, p. 181) argues that policymakers are of the view that infrastructure sharing will encourage companies to collude with one another and any cost savings that arise from sharing will not be passed on to end users. However, Hasbani *et al*. (2007, p. 4) argue that infrastructure sharing does not induce collusive behavior when managed properly. In fact growing competition and encouraging new entrants may be impossible if infrastructure sharing is not mandated and enforced. On the other hand, Mansell (1994, p. 590) is of the view that there is as yet little consensus as to the criteria that should be used to assess whether such ventures represent anticompetitive tactics on the part of incumbent operators and should

therefore be discouraged or disallowed, or whether they should be encouraged as a means of strengthening the participation of nationally based and foreign owned firms in the communication markets of the future. However, according to Cohen and Southwood (2008, p. 9), sharing national infrastructure can address the issue of bottleneck facilities, where incumbents question the commercial rationale for providing others access to key infrastructure and has an unfair advantage over its competitors at all levels and secondly, where none of the market players are investing in rolling out high capacity infrastructure to unserved or underserved areas.

Costs related to the ubiquitous provision of infrastructure

There are high costs associated with the deployment of infrastructure particularly in areas where it is not economically feasible taking into account, costs associated with, amongst others, transport, regulatory requirements relating to obtaining of permits, security, maintenance and the demographic levels of the population in a particular area. As a result, investors base their business models on urban dense areas which have resulted in concentration and duplication of infrastructure in those areas. Infrastructure sharing is of particular interest in ensuring that infrastructure is deployed in underserviced areas. Infrastructure sharing has the benefits of reducing the cost of existing operations or building out new telecoms network. It offers the opportunity to lower the total cost of ownership by reducing duplication in other areas and leveraging economies of scale.

One feature of Cohen and Southwood (2008, p. 34) is that policymakers should create the financial incentives for operators to make it commercially

beneficial to share infrastructure. Without appropriate incentives it is unlikely that operators will find it commercially valuable to share infrastructure. Infrastructure sharing gives an opportunity for better network utilization, especially in the case where the roll-out is coverage driven (Harno, 2002, p. 160). This is the case in sparsely populated areas where ICT usage is low.

According to Kettinger (1994, p. 357) a nations industry depends on a modern and improving infrastructure. He argues that this is true in advanced transportation, logistics and telecommunications, all integral to introducing modern technologies and to competing in foreign markets. Both firms and governments have a responsibility in creating and upgrading infrastructure. Generally, the high cost of network deployment makes it difficult for new entrants to fully compete with incumbent operators. This creates an un-level playing field.

Mansell (1994, p. 594) argues that the gradual (or rapid) introduction of infrastructure competition is extremely risky in the absence of clear principles of non-discrimination and transparency. He argues that uncertainty in this area can result in overinvestment or underinvestment in physical plant by the incumbent and or by the new entrants since they must base their investment decisions on cost and revenue forecast which may bear little or no relationship to the underlying cost of supply. Mansell (1994, p. 588) subsequent disposition is that although it is generally acknowledged that competition in the supply of the communications infrastructure can provide a stimulus to innovation and efficiency, the timing of the relaxation of entry restrictions is the subject of vigorous debate. The requirements and costs associated with infrastructure provisioning should shape regulatory

decisions. However, according to Picot and Wernick (2007, p. 661) regulators have to evaluate their decisions in the light of whether they promote the rolling out of parallel, competing infrastructure (infrastructure competition) or whether they further competition in a single network with regulated access (service competition).

Mansell (1994, p. 589) argues that when competitive entry is permitted, the critical sites for the negotiation of long term industry outcomes are the terms and conditions of network interconnection, the degree to which telecoms operators are obliged to unbundle network functionality and the political and economic choices as to who bears the costs of underlying information and communication infrastructure. This is evident in Lau *et al*. (2005, p. 355), where government in South Korea liberalized the cable TV market in 1997, which led to the proliferation of small operators who used power utility Korea Electric Power Corporation through its subsidiary PowerCom, fibre-optic cable which it had developed for its own use, but was just using 10% of the network capacity.

Mansell (1990, p. 501) however argues that in fact, the telecommunication infrastructure is in danger of superseding the "firm" as the "black box" upon which the potential of the "information technology" paradigm rests. He argues that a host of institutional and technical alternatives is confronted with every investment decision and with every shift in the structure and organization of telecommunication supplying and using firms. In his consequent outlook Mansell (1994, p. 589), argues that although the players in the telecommunications market have different views on the optimal supply structure of the future public network, larger business users have been vocal

in their advocacy of competition in the supply of services as well as the network infrastructure.

Koski and Kretschmer (2004, p. 3) argue that in the telecoms industry, new entrants, who lack the financial muscle, view entering a network market as a highly risky bet from the outset as technologies and their sponsors end up in one or two buckets to total success or dismal failure. However, Martin (2005, p. 20) is of the view that the key issue in this context is to separate the industries natural monopoly elements, usually the main physical infrastructure from elements that do not have natural monopoly features. This way, there will be a clear separation of the retail and wholesale market segments and this will assist in regulating the elements that cannot be easily duplicated by new entrants. This process has been catered for in terms of Chapter 10 of the EC Act. The process is still ongoing. Ofcom, the UK Regulator, for instance insisted on the structural separation of British Telecom to ensure that these elements are easily identifiable. According to Mansell (1994, p. 590) a complex pattern of strategic interests in national information infrastructure supply is emerging as market liberalization takes hold.

Pickot and Werner (2007, p. 667), however argue that when the market is opened, the regulator should enable market entry with limited sunk costs on the basis of service competition. They argue that as soon as new entrants consolidate their market positions and start to earn, the regulator should increase access prices, starting from network elements easier to duplicate. This is estimated to increase incentives for competitors to invest more,

enabling them to offer differentiated products and thus eventually participate in infrastructure based competition.

2.3 The rise of an information society

The South African government has been placing great emphasis on the building of an information society since 2007. This is because information societies are able to enjoy the economic benefits associated with broadband in both rural and urban areas. The availability of broadband in both rural and urban areas serves as a key enabler to achieve the development goals and reducing the costs of doing business. The current status of broadband in South Africa shows that there is a growing digital divide with only 5.3 million having access to broadband compared to the entire population in the country. The literature touches on the role that governments play in creating enabling environments for broadband diffusion. It further shows that equitable access to broadband is a critical component for enhancing an information society (Souter, 2008).

The role of broadband in building an information society

According to Preston and Cawley (2008, p. 813) much policy have been predicated on the assumption that, once adequate infrastructure is in place, socially useful- and usable- applications and services will follow. He quotes Sharon Stower where she argues that broadband policy should not be calibrated around the (somewhat determinist) perspective of the infrastructures 'last mile' in reaching the user. Rather, policy should place greater emphasis on understanding the 'first mile' of the infrastructure from

the perspective of the people actually using it and developing new social routines and practices around the technology.

According to Picot and Wernick (2007, p. 663) although broadband has not yet become formal part of the USO's in most countries, some national governments practice attempts in furthering demand for and diffusion of broadband especially with regard to digital demand issues (between metropolitan and rural areas or between certain segments of users and non-users) thereby underlining the societal and economic relevance of broadband. The quick scan of the literature highlights that universal and affordable access to ICT's is a key component of ensuring the broader development goals.

Governments in information societies apply a range of factors to ensure the rapid deployment and adoption of broadband services. According to Preston and Cawley (2008, p. 813), the European Union (EU) aligned broadband to the knowledge economy and information society developments, as a means of keeping European economies competitive in the global economy, as a channel for more efficient delivery of social and information services, and as opening new possibilities for communication and lifestyle among European cities. Preston and Cawley (2008, p. 814) further argue that knowledge based economies achieve a balance between supply side and demand side dimensions. They argue that where infrastructure goals have been largely achieved, policy has shifted to supporting the development of innovative applications that make broadband adoption compelling, and is sensitive to the social learning process by which citizens integrate new ICT's into their lives.

According to Choudrie, Papazafeiropailou and Lee (2003), the government in South Korea did not seek a detailed economic case to justify its policies and investment in broadband diffusion. Instead its commitment was based on a belief that the country's long term economic development rested on its ability to compete in a global knowledge based economy. On the other hand, Lau *et al*. (2005, p. 352) argue that in moving to stimulate the creation of national network in South Korea, the Korean government pushed forward broadband deployment even for conventional businesses. Although mediated via privatised service provider companies, industrial policy, including modest national subsidies, have undoubtedly been instrumental in accelerating the speed of deployment to achieve remarkable levels of adoption. In their subsequent disposition, Lau *et al*. (2005, p. 355), argue that increased competition among broadband service providers has also triggered lower prices for consumers. As a result of both market and technological competition, broadband price schemes in Korea are among the lowest in the world.

Picot and Wernick (2007, p. 664) argue that in a field with a high economic and socio-political impact such as broadband, governments use the whole variety of such measures to increase market penetration and promote competitiveness. For example, according to Mansell (1994, p. 596) the Clinton Gore administration had a hope that by the year 2000 all classrooms, libraries, hospitals and clinics in the USA will be connected to the national information infrastructure. The vision was to foresee a network of competing communication networks made seamless and transparent by government standards and operated and maintained by private industry. The competitive

market place will benefit consumers' small and large yielding better services at lower prices. The phone companies, wireless companies, long distance providers and many others who have the know- how to give consumers what they want.

On the other hand, Preston and Cawley (2008, p. 815- 817) argue that the EU adopted multilayered policy mixes (iNetWorked Society) to facilitate broadband development. As a result the European citizens are embracing broadband as part of a new digital 'lifestyle paradigm'- that broadband offers access not just to entertainment but also to new communicative abilities, information, ideas, education and new abilities in conducting relationships with family, friends and the public sphere. Preston and Cawley (2008, p. 820) conclude that in the iNetWorked Society, because more people are using the network, there are greater incentives for organizations to develop and provide innovative broadband services. These developments are interlocking and operate to reinforce each other. They form a virtuous circle that stimulates further innovative applications and uses of broadband technologies and infrastructures. This shows the significance of governments in creating an enabling environment for the deployment of ICT's.

In South Africa, people in the dense metro areas are the beneficiaries of high speed, high quality broadband than those in rural areas who mainly rely on mobile broadband because of lack of infrastructure. Cohen & Southwood (2008, p. 8) argue that given the role that ICT's play in the information economy, broadband access is a similar public good to roads and railway and evidences strong positive externalities as a result of their existence. Furthermore, Picot and Wernick (2007, p. 663) argue that the potential

benefits of broadband and the common concerns about the digital divide between those connected to high speed networks and those unable to access them characterizes the public good character of broadband networks.

Equitable access to broadband in building an information society

Chapter 2 of the Bill of Rights ensures the rights of all people in the Republic and affirms the democratic values of human dignity, equality and freedom. This equality refers to the full and equal enjoyment of all rights which includes the right to have ICT's irrespective of their social standing in the community (RSA, 1996). Access to broadband includes concepts of fairness and non-discriminatory access to facilities. Souter (2008, p. 5) explains that, equitable access to consumers means that access to network services should not be dependent on social advantages (wealth, education, landownership, gender etc) but should be as easily available to the disadvantaged as it is to their more advantaged neighbours.

One feature of Souter (2008, p. 5) is that equitable access is a phenomenon that relies on the concepts of availability, accessibility and affordability. It is on this basis that infrastructure sharing should be encouraged in areas where it is not feasible to deploy infrastructure and moreover, to encourage competition in the industry. Therefore, all users must be treated alike, without discrimination, irrespective of their location. Affordability is an important factor in ensuring that people wanting to access the service are able to afford it.

It is common knowledge that the growth of an information society depends on the level and extent to which markets are structured. However, Adam (2008, p. 3) argues that the provision of universal and affordable access is a key challenge for today's ICT policymakers in developing societies. He furthermore, argues that it has been difficult to formulate, implement and enforce effective universal service strategies due to lack of specialist expertise and the inability of the regulator to challenge powerful incumbents and operators. As has been noticed, the key challenge for South Africa is to encourage ubiquitous access and growth into previously uncovered areas. Dymond and Oestman (2003, p. 58), emphasize that to achieve equitable access governments should first eliminate the market efficiency gap, through sector reforms and market development, before they consider mechanisms designed to correct the true access gap.

On the other hand, Lau *et al*. (2005, p. 357) argue that the internet explosion in South Korea flows, in particular, from appropriate government policies that have stimulated demand as well as fierce market competition based on responsive supply and has been a combination of drastic cost reductions and pro-internet government policy. Taking into account the dynamics of South Africa broadband landscape, network presence should be encouraged to ensure universal and affordable access. Egan (1996, p. 14) argues that relatively large businesses in rural areas, whether in the service or manufacturing sector, often require broadband communications capability to maximize operating efficiency and compete with their urban and suburban counterparts.

The challenge for the country is that in some rural areas, there is neither electricity nor network infrastructure to ensure the provision of broadband services. On the other hand, many people in rural areas do not have the capability, nor are aware of the benefits of utilizing broadband services. Teenagers need awareness, including the emerging business community, particularly the farmers so that they can participate at an equal level with their urban counterparts. According to Lau et al. (2005, p. 356), the rapid explosion of broadband in Korea was mainly due to the fact that its users, mainly teens adopt broadband once they understand its benefits.

The literature demonstrates that governments generally take a leading role in promoting broadband as a public good. It further demonstrates that governments are actively involved in developing policy measures that encourage infrastructure provisioning and hence the diffusion of broadband.

2.4 Policy and regulation in enabling infrastructure sharing

The regulatory framework in South Africa is governed by the Electronic Communications Act, No, 36 of 2005 (EC Act). The EC Act mentions broad policy objectives dealing with the creation of an enabling environment under convergence and demonstrates the presence of a forward looking approach in the development of ICT's in the country. The provisions state the following, amongst others:

> promotes and facilitates the development of interoperable and interconnected electronic networks, the provision of services contemplated in the Act and to create a

> technologically neutral licensing framework; promotes the universal provision of electronic communications networks and electronic communications services **and connectivity for all**; encourages investment, including strategic infrastructure investment, and innovation in the communication sector (RSA, 2005, p. 14).

The regulator is tasked with the responsibility of ensuring the effective implementation of the Act and that regulations are in place to promote economic growth and development in the country. As a result, facilities leasing and interconnection regulations are a way of opening up barriers to entry in the sector. It has, however, been a challenge for the regulator in creating an enabling environment for infrastructure sharing. For example, LLU is still a farfetched reality for most operators. ICASA has failed to ensure that LLU is implemented by November 2011 pursuant to the Ministerial Directive. On the other hand, the policymaker put pressure on ICASA to ensure that the costs of termination are reduced amongst operators.

In order for a country to thrive and become part of the global economy there is a need for an independent regulator and effective policies which result in an increase in penetration and low costs of telecommunications. In South Africa, the trend has been that ICT developments are often challenged and in some cases follow on decisions by the courts of law. As observed in the Altech Judgment of 1 September 2008, the court ruled that;

> The right to self-provide the by VANS licensees vests in the prior provisions contained in section 40 (2) of the Telecommunications Act. The judge's finding is that the applicants existing license permitted it to self-provide its own telecommunications facilities under its existing VANS license which include the right to provide networks and connectivity services. He found that the applicant is entitled in terms of section 93 (1) of the EC Act to a conversion and issuing of not only a replacement Individual ECS license but also to a replacement Individual ECNS license. The judge declared that the applicant was entitled to self provide its own telecommunications facilities with effect from I February 2005 and by extension to all other VANS who are approximately 450 in number (Davis, 2008).

ICASA should be able to initiate regulatory arrangements and policies that could be necessary and useful to sustain private investment and to deliver the benefits of ICT's to the end users at low costs.

Policy and regulatory governance

Melody (1997, p. 22) argues that regulation is necessary to provide a foundation upon which markets can function more effectively that they could otherwise. On the same disposition, Frieden (2005, p. 604) argues that the promotion of ICT's is best achieved when governments effectively calibrate the scope of intervention to the degree of market stimulation required and the extent to which ICT development would not occur but for government subsidization, demand aggregation and sponsored pilot projects.

Levy and Spiller (1994, p. 242) emphasize that if countries are unable or unwilling to create and sustain effective regulatory governance arrangements, state ownership and finance of infrastructure industry investment becomes the fall back solution. However, according to Stern and Holder (1999, p. 38) government needs to provide and sustain the legal framework under which the regulator operates and needs support enforcement of the regulatory framework and the rules of the game. On the same disposition, Frieden (2005, p. 605) argue that governments willing to undertake an active role need to reach closure on a vision of what constitutes ICT development success and what steps they should take to achieve these outcomes.

Stern and Holder (1999, p. 38) are of the view that the regulatory system should ensure the efficient provision of services to consumers at the minimum necessary price and support private investment by continuing to allow companies the reasonable expectation of a normal real rate of return. According to Mansell (1994, p. 598) regulatory intervention which seeks to

be effective in creating transparent and non-discriminatory 'rules of the game' is likely to have a beneficial impact if it focuses on the minimum conditions required for fair competition in a complex network environment. However, according to Martin, Roma and Vansteenkinste (2005, p. 37) the quality of the regulatory framework has a considerable effect on the extent to which regulatory reforms in network industries will result in price falls and other positive economic effects. In their subsequent exposition, Martin *et al*. (2005, p. 9) emphasize that the regulatory reforms and the associated increase in the level of competition may accelerate technological progress and this is regarded as an important prerequisite for the emergence of an economic environment that would sustain higher rates of economic growth, higher real wage increases and lower levels of unemployment without increased risks to price stability.

However, Stern and Holder (1999, p. 38) note that in consequence, the regulatory processes are fragile in all countries, including the most developed. They are particularly fragile in countries with relatively insecure or embryonic parliamentary and legal systems, especially in highly politicized countries with no tradition of enforcing the separation of powers. Stern and Holder (1999, p. 37) argue that although economic regulation exists in state owned as well as privately owned infrastructure industries, the concerns of regulatory governance and the development of explicit regulatory frameworks primarily relate to the issue of how private investment can be encouraged and sustained.

However, according to Mansell (1990, p. 514) the policy problem is one of finding innovative institutionalized ways of creating the incentives for the

emergence of telecommunication infrastructure that support flexible networking and software based service applications, and at the same time, permit access for a wide range of users to services at prices that realistically differentiate between different types of service applications. On the other hand Teljeur, Gilwald, Steyn and Storer (2003, p. 17) argue that to optimise the existing network capacity in the country and to drive down the price to more competitive global levels, all restrictions on facilities provisioning should be lifted. One feature of Cohen and Southwood (2008, p. 32) analysis is that policymakers need to decide if their role is to promote innovation, affordable pricing and high speed penetration or to act as an economic stimulation in the form of being actively involved in the sector.

Mansell (1994, p. 600) argues that changes in the organizational 'infrastructure' of regulation will be required to ensure that the means to achieve universal advanced services are negotiated on a continuing basis. He further argues that there is a need to redress imbalances in network access, for example, to what extent is public financing needed to strengthen incentives for investment in infrastructure and services, could investments be created to speed up market led investment plans? at one extreme, it may be decided that access to a copper wire pair at a reasonable price is all that is required for the majority of customers. At the other, access to broadband networks and gigabit-speed information applications could be required on a universal basis. He argues that in between lies the reality of network and service investment decisions guided by the pressures of a global marketplace and public policy decisions.

Coordination of policy initiatives in the provision of infrastructure

There are various policy initiatives in national, local government and private institutions on issues affecting the provision of infrastructure and broadband. For example, local government is involved in the provision of ICT's and building of fibre networks while operators are engaged in co-built arrangements for the provision of fibre networks to enable them to provide high quality, high speed networks. These efforts continue to result in duplication and concentration of infrastructure.

The above suggests that there is a need for co-ordination of all the activities at all levels to ensure proper planning in infrastructure provisioning that support infrastructure sharing for the creation of an information society. According to Frieden (2005, p. 609) ICT development, including investment in a robust broadband infrastructure, requires extensive co-ordination and co-operation among private and public sector players. Frieden (2005, p. 609) concludes that for government the empirically proven role involves neither a laissez faire abdication of responsibility, nor intrusive, heavy handed, command and control regulation that predominated when private or government monopolies largely controlled the roll out of ICT.

This lack of coordination of ICT initiatives in South Africa led to conflict of interest which in some cases had the effect of distorting development in the industry. For example, the City of Johannesburg issued the proposed bye-laws on the management of infrastructure on its property. Clause 2 of the proposed by-laws states the following;

> all electronic communications operators…, whether licensed or exempted under the EC Act, must obtain a permit from the city to enter onto city property and to install, construct and operate electronic communications equipment, facilities and/ networks…, shall be required to obtain within 60 days of publication for enactment of this by-laws for existing electronic communications facilities and networks located on city property.…an application and administration fee for the permit which may be reviewed by the city from time to time which shall be payable; permit holders shall pay a reasonable monthly fee, to be determined by the city, in advance for the installation, construction and operation of electronic communications facilities and networks on city property alternatively, the city and the permit holder may agree that capacity on the electronic communication facility or network be made available to the city in lieu of payment of the monthly fee (City of Johannesburg, 2008, p.3).

The local government has a constitutional obligation to ensure the provision of services to communities in a sustainable manner and to promote

economic development. According to Cohen and Southwood (2008, p. 35) government should assist operators with facilitating rights of way and access to ducts and poles, set up clearing points for rights of way if multiple agencies are responsible for rights of way at different points of the network, provide information such as site surveys and geographic information systems for public land, speed up the processes for granting rights of way, reduce the cost to operators for obtaining rights of way.

Cohen and Southwood (2008, p. 24) furthermore note that the emergence of municipal networks provides an additional source of financing ICT service development. They however, argue that most of these are proving to be operational failures because the cost of technical complexity of building the networks for reliable operation is high; the revenue base had been largely unproven before the plans were laid. In this instance, operators should be required to bring the necessary expertise regarding the maintenance and operation of fibre networks. Sharing the fibre infrastructure could also reduce the duplication and or concentration of fibre infrastructure. Operators and local government may exploit synergies to determine where there is a need for infrastructure and how they can best use the existing infrastructure. Egan (1996, p. 25), argues that the role of state government may be most helpful in identifying where public and private communication network activities may complement one another and strengthen the overall infrastructure.

Lau, Kim and Atkin (2005, p. 357) argue that the synergy created by competitive policies, promoting market entry, incentive based regulation, and technology innovation have created true digital opportunities in South Korea. According to Egan (1996, p. 24), planners should coordinate network

interconnection and development activities, exploiting synergies for the benefit of all subscribers, and that the goal will be to share network facilities with advanced facilities, stressing network compatibility. According to Koski and Kretschmer (2004, p. 36) if market power is self-reinforcing in network markets, intervention by policymakers has to be balanced delicately. Small mistakes by policymakers may have large consequences. This is typically evident in the network infrastructure provisioning in the country.

In the same disposition, Pickot and Wernick (2007, p. 670), argue that contrary to the national policy, one can find different forms of co-operation between local authorities and private firms as well as subsidies for the construction of infrastructure on the local level. Mansell (1994, p. 599) argue that cooperation will be essential to competition in a convergent communication environment because networks are systemic technologies. Regulation, imperfect as it is, will play a crucial role in monitoring and guiding decisions by the players in the market.

The literature explores the strategies that will counter the effects of a weak policy and regulatory instruments which demonstrate how markets develop. It demonstrates that effective regulatory system is rooted in and influenced by the continued acceptability of government in improving sector performance and ensuring participation in the global economy.

2.5 Theories of regulation applicable to infrastructure sharing

The ICT environment is a dynamic sector often with conflicting interests between government and the operators. The role of government is to ensure

there is economic growth so that its people become part of the global economy whilst on the other hand operators intend to maximize profits. Research has shown that despite serving as a hub for several of its neighbouring countries, South Africa is still lagging behind in terms of access to broadband. One of the reasons is that infrastructure is concentrated and duplicated in the dense metro areas, hindering access in many parts of the country. In the circumstances, the question is whether policymakers should relax and leave the process of shaping the market to the operators? It is however, highly improbable that if the market is left in the hands of operators alone, they can adequately and honestly fulfill the public interest.

Over the years, various theories have been advanced to explain the evolving regulatory framework and the various driving forces of access to ICT's. This is because there is constantly a need to encourage competition where feasible and to ensure continuous improvement of regulatory processes that provide for regulation under the law, transparency and credibility of the regulatory system. There are various theories that are relevant in the field of telecommunications. This research focuses on the public interest theory and the information society theory.

Public interest theory

Public interest theory remains the yardstick by which regulation is measured and that can be seen in the mammoth literature assessing regulatory failure (Horwitz, 1989, p. 27). The public interest theory is essential since the primary object of the EC Act in section 2 is posited as a measure for the regulation of electronic communications in the Republic. The public interest

theory is deeply rooted in the EC Act and ICASA Act and therefore shapes and informs the policy formulation process and decisions of ICASA. It is significant to note that the public interest theory is depended on how one perceives the role of ICT's in society.

Accordingly, the public interest theory can be located within the socio-economic and political aspects of life and this embodies the public interest values of providing broadband networks that fulfill the broader ICT needs and interest of the public. Mcquail (1992, p. 71) argues that drawn from the field of public planning, something is in the public interest if it serves the ends of the whole society rather than those of some sectors of the society. On the same premises, Baldwin and Cave (1999, p. 20) argue that the concept has a debatable meaning from a theoretical, practical and political perspective. In addition, they contend that a further problem stems from doubts concerning the disinterestedness, expertise and efficiency that the public interest approach attributes to regulators.

Napoli (2001, p. 71-74) is however of the opinion that the public interest theory is an ambiguous concept and refers to three different conceptual levels as the preponderance theory, common interest theory and the unitary theory. According to Napoli (2001, p. 72) the preponderance theory assumes that the role of the regulator is that of the interpreter of community policy preferences, who must then translate these policies into effective policies. He argues that the common interest theory can largely be determined by the process used and that the procedural conceptualization proposes the view that if consensus is reached "… reflects the input of various interests, then the public interest has been served" (Napoli, 2001, p. 74). In his subsequent

disposition, Napoli (2001, p. 23) asserts that the public interest is best conceptualized as our “highest common concerns”…that are informed by the ultimate interest of all man. The highest common concerns do not discriminate against the minority, but rather promotes the principle of equity by virtue of their role as a member of the public.

Baldwin and Cave (1999, p. 19) are of the view that public interest theories centre on the idea that those seeking to institute or develop regulation do so in pursuit of public interest related objectives (rather than group, sector or individual interest). In a fragmented society like South Africa, the public interest nature can best be served by addressing the needs of the underserved population that do not have access to ICT’s. These are the people who vote with the hope of a better life but have no means of partaking in the mainstream media and civil society activities.

Picot and Wernick (2007) are of the view that governments (as representatives of the public) play an active role by deliberately influencing markets for public welfare. In addition, they emphasize that this is clearly related to two different perspectives on the broadband market; government as an “enabler” vs government as the “rule maker” in emerging markets, corresponding to the public good and the competition based perspective. In their subsequent exposition, Picot and Wernick (2007, p. 663) accentuate the role of broadband as a public good and further that the potential benefits of broadband and the common concerns about the digital divide between those connected to high speed networks and those unable to access them characterize the public good character of broadband networks. The non-

availability of high speed networks in many parts of the country continue to compromise the public interest nature of access to ICT's in the country.

Information society theory

This theory is informed by the assumption that for South Africa to be an information society and become part of the global economy, it is essential to examine public interest nature of encouraging infrastructure sharing and investment, particularly in underserved areas. Related studies on the significance of information society conform in its analysis of the social, economic and political significance in the information society in that it brings about fundamental changes in society. Koutroumpis (2009, p. 472) however, links the availability of telecommunications infrastructure to changes in lifestyle and improvements in society. Information society is not a new concept and it continues to be on the national and international agenda as governments attempt to be part of the global economy.

In the information society theory, the society is interdependent with technology while the economy is more dependent with government and the political process. The underlying premise for the information society theory is that modern productive systems no longer depend on labour, land and capital as their primary input; rather they require information thus creating new production systems and new ways of working (Mackay, 2001, p. 8). This will mainly depend on technology. However, According to Mackay (2001, p. 21) technological determinism is probably the most common way in which relationships between technology and society is concerned…. the notion that technology shapes society, that technology is an independent factor,

somehow outside society and that technological change causes and is responsible for social change…. in its stronger variants it assets that technology is the main determinant of social change.

In this premise, Grantham and Tsekouras (2004, p. 362) refer to information as a component of the broader concept of postindustrial society. According to them, it does not have the defining characteristic of society, or represent a new era. They argue that according to Castel the information society is more than an expression of technological determinism. However, Jung (1998, p. 165) argues that additional factors are required to bring about an information society, they are for example, firstly, the availability of information tools and services that present new opportunities to society…. affordable access to such services for everybody…. therefore, an infrastructure is required which provides access for everybody: to tools, application and services at fair and reasonable costs, secondly, the opportunities offered by the information society can also be seen as potential threats, in particular those individuals and societies who are lagging behind, thirdly, the evolution of the information infrastructure will be driven primarily by private investors.

2.6 Conceptual framework

The literature review highlighted a number of issues relating to infrastructure sharing. The arguments were presented within the context of the role of policy in enabling infrastructure sharing and the stimulation of broadband access. The theories and concepts describing this research are noted and widely discussed. Furthermore, the literature has shown that there are different viewpoints on sharing of telecommunications infrastructure. On the

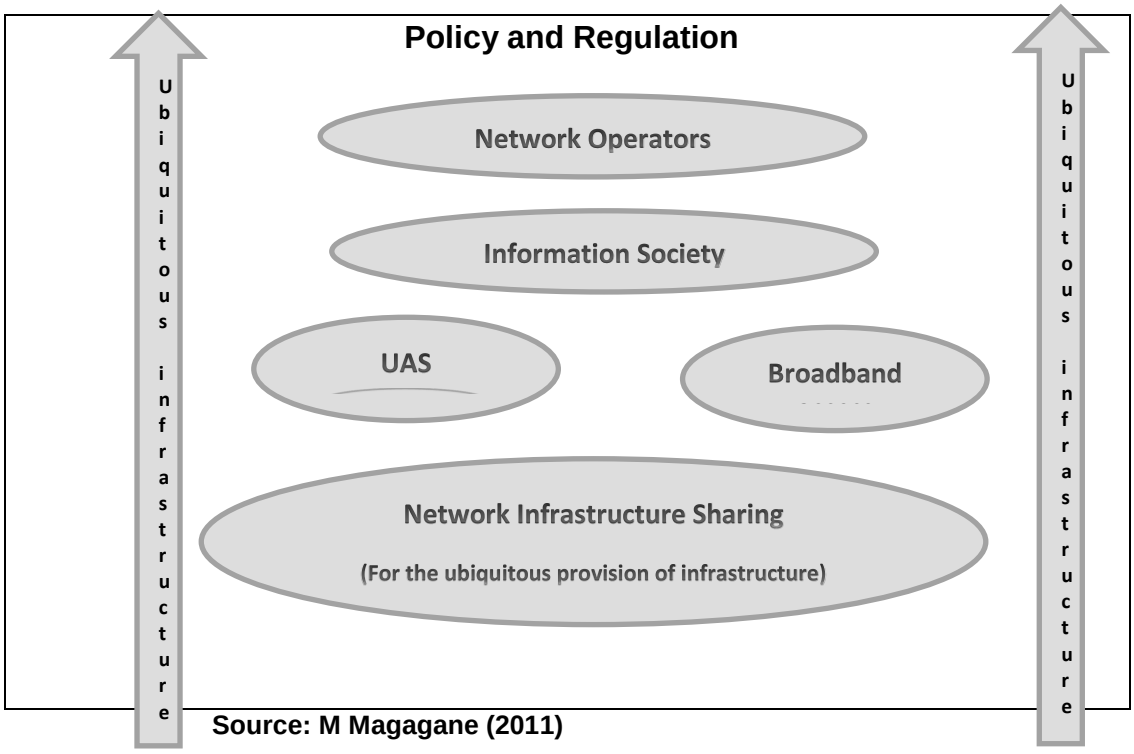
other hand, the role of policy in fostering an information society highlights the need to find the right balance and to be flexible when intervening in the market.

The diagram in illustration 4 on infrastructure sharing suggests that the conceptual framework for this study should incorporate the concepts of UAS and broadband access, role of policy and regulation and operators towards the achievement of an information society. It illustrates that information society is achieved directly as a result of the presence of ubiquitous networks which have a direct influence on UAS policies and broadband policies. It is in this instance that network infrastructure sharing serves as an opportunity to promote the provision of ubiquitous networks.

UAS policies and broadband policies influence each other in promoting the regional spread of internet services and stimulating demand, which in turn can increase the demand for broadband. The concept of information society assumes that to be globally competitive, there is a need for the technological infrastructure underpinning the global economy to support investment. This is therefore concerned with the social, economic and political significance of the information society which is depended on the regulator's commitment to stimulate the infrastructure market that is required to facilitate completion of national information infrastructures capable of providing universal access. According to Jung (1998, p. 167), the infrastructure and the platforms together are the backbone of the information society, the nerve system through which all information flows. The policy environment needs to recognize the complex and evolutionary nature of the infrastructure market. This entails taking into account the value chain in network infrastructure

sharing suitable for enabling an information society. Therefore, the benefits of network infrastructure sharing and increase in the spread of broadband cannot typically be realised if left to market forces alone.

Illustration 4: Diagram for Infrastructure sharing



Source: M Magagane (2011)

This way, intervention by government in enabling network infrastructure sharing will ensure the ubiquitous provision of networks in underserviced areas which will ultimately translate into universal access service and access to broadband.

CHAPTER 3: RESEARCH METHODOLOGY: NETWORK INFRASTRUCTURE SHARING

3.1 Problem statement

Research has shown that broadband infrastructure is deployed in urban areas and that growth in rural areas is hampered due to the high costs of deployment and low return on investments. It appears that infrastructure sharing instruments like facilities leasing and interconnection regulations and initiatives such as LLU have not yielded the required results. In particular, these instruments fail to offer favourable regulation and economic incentives that will enable advances in infrastructure sharing. Therefore, the problem being investigated is the lack of effective policy and regulatory instruments that can be used to encourage infrastructure sharing and accelerate the deployment of high capacity infrastructure networks in underserved areas and respond to the demand for broadband.

The assumption behind this research is that broadband access has the potential to increase economic growth but there is a challenge in the spread of ubiquitous broadband networks in other areas in the country. The low level of broadband access in South Africa is due to failure by telecoms operators and policymakers to respond to the specific access challenges of South Africa, instead concentrating and duplicating infrastructure in metropolitan centres and failing to deploy sufficient infrastructure in other parts of the country.

Despite reports that there is low level of access to broadband compared with other countries and also evidence that access to broadband is skewed

towards the dense metropolitan areas, no research has been conducted to review the concepts, trends and reasons for the low level of disparity between broadband availability in urban and rural areas despite the regulatory instruments and initiatives in infrastructure sharing. It is therefore, significant for the researcher to understand how network infrastructure sharing, for example, where a network infrastructure is expressly for sharing resources or where there is swapping of sections of the fibre network is created, can provide access to high speed broadband networks to all South Africans.

3.2 Purpose statement

The purpose of this research was to explore infrastructure sharing and access to broadband and the regulatory instruments that can be used to facilitate and encourage network infrastructure sharing in South Africa. The study took into account the co-ordination and facilitation of infrastructure, concentration of infrastructure in dense metro areas and drivers that influence and inhibit operators to share and deploy infrastructure in other parts of the country. An improved understanding of these issues led to specific recommendations regarding policy and regulatory instruments that can be used to facilitate and encourage network infrastructure sharing in South Africa, particularly in underserviced areas. The research findings and conclusions can be used to improve the regulatory instruments relating to the sharing of infrastructure and will also inform the formulation of a national broadband policy that will contribute to accelerating the rollout of broadband infrastructure in South Africa, including in the poorer and less-populated rural regions. This will in turn, facilitate greater levels of investment leading to economic growth, social and economic development.

At the end, the research should be able to demonstrate an in-depth understanding of the characteristics of infrastructure sharing and access to broadband. This is because if infrastructure sharing is managed effectively it would have a profound impact on economic growth. The research referred to the theoretical framework adopted in various countries in the development of broadband and in this regard explored the role of policy and regulation in fostering infrastructure sharing in an effort to achieve an information society. The research considered the approach and the initiatives that have been undertaken in various countries, for example, the USA, South Korea and Malaysia in an effort to achieve an information society.

3.3 Research question

Within the paradigm of broadband diffusion and its role in building an information society, the primary question for this research is:

How has policy and regulation shaped the market for infrastructure sharing?

In order to get clarity and respond proficiently to the primary question, the following sub-questions have been researched;

(a) What is the scope of infrastructure sharing in South Africa?
(b) What are the factors that influence operators to share infrastructure?
(c) What are the regulatory obstacles to infrastructure sharing and how do they affect operator's behavior and the provision of ubiquitous infrastructure?
(d) How has policy and regulation shaped the infrastructure sharing environment for the achievement of an information society?

3.4 Research method

There are various methods that can be used to conduct research and these can either be qualitative, quantitative or a combination of both (mixed method). According to Leedy and Ormond (2005, p. 160) quantitative research is based on positivist theory and is systematic, objective investigation of phenomena and their relationships. They illustrate that quantitative research is normally characterized by quantification and mathematical model development, while qualitative research is based on interpretive theory and involves in depth understanding within a context and is characterized by rich, complete and detailed descriptions. Leedy and Ormond (2005, p. 160) argue that the research problem will usually define how the research will be conducted and the researcher selects the research methodology based on the purpose of the research. If the purpose is to explain, predict, confirm, validate or test a theory, then the quantitative method is selected. If the purpose of the research is to describe, explain, explore, interpret or build a theory then qualitative research methods is recommended.

3.4.1 Qualitative research

The study adopted a qualitative approach. This gave the researcher an in depth understanding of a range of factors and variables relating to policy and regulation in infrastructure sharing and the provision of ubiquitous networks for an achievement of an information society. The strength of the qualitative research is its ability to provide complex textual descriptions of how people

experience a given research issue. Qualitative research provides information about experiences at an individual level which are often contradictory behaviours, beliefs, opinions, emotions and relationships of individuals. According to Bryman and Burgess (1994, p. 219) qualitative research is assumed to generate concepts that are then able to form the building blocks of theory.

This research followed a holistic approach so that the meanings ascribed are set within a context of values, practices, underlying structures and multiple perceptions relating to infrastructure sharing. As a result, the multidimensional aspect of the research considered the societal, political and economic aspects that drive policy and ultimately affect market structure, particularly on issues relating to infrastructure sharing. Therefore, the study explored the economic and political choices relating to infrastructure sharing and the perceived weaknesses arising therefrom and the reasons for these choices.

This research adopted the exploratory study as a primary method and a combination of content analysis study. The proposed studies offer an in-depth understanding of the issues around infrastructure sharing, broadband access and the role of policy and regulation.

3.4.2 Exploratory study

While other studies reveal different models of infrastructure sharing, some facts about the effectiveness of policy and regulation in infrastructure sharing are needed. This study is aimed to obtain a greater understanding of the

concepts of infrastructure sharing and access to broadband. According to Barbie and Mouton (2001) an exploratory study is considered when the subject of the study is relatively new. This therefore, requires the researcher to conduct an extensive preliminary work to gain familiarity with the phenomenon.

According to Barbie (1998, p. 90) exploratory studies are typically done for three purposes: (1) to satisfy the researchers curiosity and desire for better understanding, (2) to test the feasibility of undertaking a more extensive study, and (3) to develop the methods to be employed in any subsequent study. As a result, the researcher conducted in-depth interviews with operators (e.g MTN, Vodacom, Telkom) government (the Department of Communications, ICASA), OEM's (e.g Nokia Siemens and Ericson) and telecommunications infrastructure companies such as Darkfibre SA. This will assist in obtaining an in depth understanding of the telecommunication industry, their choices with regard to infrastructure sharing and deployment and the setting within which these choices are made and the reasons emanating from those choices. Rubin and Rubin (1995, p. 46-47) argue that design in qualitative interviewing is iterative. That means that each time you repeat the basic process of gathering information, analyzing it, winnowing it, and testing it, you come closer to a clear and convincing model of the phenomenon you are studying. The continuous nature of qualitative interviewing means that the questioning is redesigned throughout the project. The researcher believes that the participants, although coming from different backgrounds in terms of their business models, were able to unpack a number of issues and reasoning relating to their preferred choices regarding infrastructure sharing.

The researcher also focused on articles on infrastructure sharing from a theoretical perspective and the reports by the ICT consultants who have conducted extensive research on infrastructure sharing and who also provided assistance to operators on appropriate models relating to infrastructure sharing. The advantage of the exploratory method is that the research questions are open-ended and give the researcher an opportunity to probe for clarity. Participants are able to respond in their own words, rather than forcing them to choose from fixed responses. Open ended questions have the ability to evoke responses that are meaningful and culturally salient to the participant, unanticipated by the researcher and rich and explanatory in nature. This assisted the researcher to form categories for making sense of the observations and also to easily identify the variables that were worth pursuing. Qualitative interviewing process has qualities that make it appropriate for this study. Babbie (1998, p. 292) describes the seven stages of qualitative interviewing as;

(1) Thematizing: clarifying the purpose of the interviews and the concepts to be explored.
(2) Designing: laying out the process through which you'll accomplish your purpose, including a consideration of the ethical dimension.
(3) Interviewing: doing the actual interviews.
(4) Transcribing: creating a written text of the interviews.
(5) Analyzing: determining the meaning of gathered materials in relation to the purpose of the study.
(6) Verifying: checking the reliability and validity of the materials.
(7) Reporting: telling others what you have learned.

According to Babbie and Mouton (2004, p. 80), exploratory studies usually lead to insight and comprehension rather than the collection of detailed, accurate and replicable data and these studies frequently involve the use of in-depth interviews, the analysis of case studies and the use of informants which may lead to insight and comprehension. However, Babbie (1998, p. 91) indicates that the shortcoming of exploratory studies is that they seldom provide satisfactory answers to research questions, though they can hint at the answers and give insights into the research methods that could provide definite answers. On the other hand, Babbie & Mouton (2001) argues that any research design should be based on the kind of evidence that would be required to meet the actual objectives of the study. In order to have a better understanding of the study the researcher conducted an active inquiry on issues relating to infrastructure sharing and ubiquitous provision of infrastructure in underserviced areas.

According to Herbert and Rubin (1995, p 43) qualitative research is more appropriate in that it is flexible, iterative, and continuous, rather than prepared in advance and locked in stone. Research has been conducted on infrastructure sharing focusing mainly on open access while this study focused on infrastructure sharing and access to broadband, the role of policy and regulation. The attitude of operators in infrastructure sharing, particularly the duplication and concentration of infrastructure in urban areas was the main focus.

3.4.3 Content Analysis

The study has features of content analysis. This was mainly to gain a better understanding of infrastructure sharing methodologies taking place in South Africa and the extent to which policy and regulation enables it. According to Leedy and Ormond (2001, p. 142) content analysis is a detailed and systematic examination of the contents of a particular body of material for purposes of identifying patterns, themes or biases. Content analysis gave the researcher an understanding of existing trends in the market and updates on developments currently taking place regarding infrastructure sharing. The study was aimed at the analysis of government policy relating to facilities leasing and the enabling of competition for the achievement of an information society. This also included analysis of the broadband policy, facilities leasing and interconnection regulations and reports on South Africa's network environment to determine the extent to which provision has been made for the acceleration of ubiquitous networks for an information society. This also focused on the themes and meanings applied in various jurisdictions on infrastructure sharing and the approach followed in increasing access in order to provide an understanding of the hindrances and progress experienced in such jurisdictions were analysed to form a view of infrastructure.

According to Neuman (2006, p. 323) content analysis lets a researcher reveal the content (ie. messages, meanings, etc) in a source of communication (ie., a book, article, movie, etc.). The study was aimed to understand further the patterns, biases in broadband and trends that characterises infrastructure sharing in South Africa. The study was through analysis of public documents such as policy and regulatory information,

government gazettes, media reports, industry data, international data indicators from the ITU, OECD and World Bank which has information relating to trends in infrastructure sharing, broadband access and costs of telecommunications in South Africa compared to the rest of the world. The reports include the collection of already available data that has been published by reliable sources such as World Wide Worx and South African Technology Market Research reports. Some of these reports are research projects that are conducted at regular intervals to help track progress in the ICT market.

3.5 Research design

The qualitative approach coupled with the exploratory study was augmented by elements of descriptive and explanatory research. The descriptive research focuses on information that is readily available in the form of policy directives and industry reports, Statistics South Africa on population indexes and economic information on the level of an information society. The objective was to contextualize the concept of infrastructure sharing and to have a holistic understanding of the subject from a historical perspective and going forward. For the explanatory research, Routio (2007) explaining the phenomenon can be done in a number of ways where the reasons are fetched either from the concurrent context of the phenomenon, from the past or alternatively from the future. He refers to the following examples of the usual types of explanation;

(1) Explanation by earlier events. The explanations are traditionally sought in the past: what were the reasons which caused the later state of things?

(2) Contextual explanation. Sometimes the explanation is found by showing the function that the activity fulfills its context.
(3) Explanation by later events. This is common when explaining the acts of people: intentions can be documented and they correlate well with the factual behavior of people.

Focus was more on infrastructure sharing in context, the behavior of operators and the duplication and concentration of infrastructure in certain parts of the country. According to Yin (1989, p 29), research design deals with a logical problem and not a logistical problem. Therefore, focus was on obtaining evidence to enable the researcher to answer the initial question as unambiguously as possible. The research design includes an analysis of data on infrastructure sharing and access to broadband to draw observations and ultimately derive a set of propositions for the role of policy and regulation.

For content analysis, the researcher analysed various reports in the industry and secondary data of existing reports including academic literature. This included information from 1997, on the state of the ICT industry. Focus was mainly on infrastructure sharing and the policy directives that influenced the provision of ubiquitous networks. Other information was obtained from reports of research conducted by telecoms experts who shed light on the state of developments on infrastructure, the impact of licensing frameworks and broadband access in South Africa.

In order to gain more information and an understanding of infrastructure sharing and the role of policy, the researcher conducted interviews with

representatives of various organisations that play an active role in the ICT sector. The structured interviews took into account that telecoms operators and OEM's are drivers of the market and therefore, this demanded interviews with OEM's, telecoms operators who have been actively involved in developments in the industry and infrastructure companies on their views regarding the acceleration of ICT's in particular, infrastructure sharing.

3.6 Sampling methodology

The primary purpose of sampling is to collect specific cases, events, or actions that can clarify and deepen understanding (Neuman, 2006, p.219). Purposive sampling was used for this research. This is a non-random sample in which a researcher uses a wide range of methods to locate all possible cases of a highly specific and difficult to reach population (Neuman, 2006, p. 222). In depth interviews were held with key individuals in the telecommunications industry which included, amongst others, MTN, Vodacom, Telkom and government (the Department of Communications and ICASA).

In total a sample of fifteen respondents were interviewed. The sampling was adequate to provide the researcher with particular types of information for in-depth investigation. The respondents were group executives, councillors and senior regulatory specialists to incorporate user experiences in a number of perspectives. Table 1 refers to a list of participants who took part in the interviews;

Table 1: List of respondents

Category	Organizations	Level in organization	No of interviewees
Telecoms operators	MTN, Altech, Vodacom, Telkom	MD, GE and Senior Managers	7
OEMs	Nokia Siemens, Erickson	Group Executives	2
Forum	South African Communication forum	Chief Executive	1
Policymaker	Department of Communications	Technical Advisor to the Minister	1
ICASA	ICASA	Councillor and Senior Manager	2
Other	Darkfibre, Consultants	Executive	2

The individuals interviewed are those that have informed and shaped policy and regulation and infrastructure sharing in their respective organisations. For example, Karel Pienaar, the MD of MTN SA, Zolisa Masiza, former ICASA Councillor and a Regulatory Group Executive at MTN Group, Joe Makhafola from Altech, Khulile Boqwane, a consultant, Carmen Cupido, a Senior Legal Advisor at Broadband Infraco, Loren Brathwidth Kabosha, a Chief Executive Officer at SACF and JP Crouse from Darkfibre. Other three interviewees from Vodacom and Telkom who asked to remain anonymous.

On the part of OEM's, respondents are those that head respective divisions that influence the market in diverting to a particular technology. Lucky Masilela, Chief of Corporate Affairs at Nokia Siemens and Thabiso Thukane from Ericson. The respondents from ICASA are Councillor Joseph Lebooa and the Pieter Grootes, a Senior Manager in Markets and Competition at ICASA and Mothibi Ramusi, former technical advisor to the Minister. The South African Communication Forum (SACF) was represented by Loren Brathwidth Kabosha. The interview incorporated experiences from her role in

the telecoms market which included a number of initiatives that the SACF participated in as industry representative and her views about the industry as a whole. The interviewee was able to refer the researcher to various projects that the SACF is engaged in including the research documents that they conducted relating to the forum's perceptions of accessibility of infrastructure and broadband penetration in South Africa compared to the rest of the world.

Darkfibre was purposely selected because they focus mainly on infrastructure sharing on open access. This included issues relating to infrastructure sharing model and an increase in access to ICT's. The questions directed at telecoms operators and industry groups were about their views on what should inform policy formulation, the role of government in ensuring a sustainable development of infrastructure sharing and whether it is possible to get broadband to the vast majority of the consumers. The questions directed at OEM's range from their views on infrastructure sharing and the provision of ubiquitous network to attain broadband diffusion. For more information, refer to the interview guide in Annexure "A".

3.7 Research instrument

The researcher developed a semi-structured interview questionnaire for purposes of gathering information on;

(1) Infrastructure sharing- the role that policy and regulation play on infrastructure sharing
(2) Policy and regulation- on their influence in enabling infrastructure sharing
(3) Broadband diffusion
(4) OEM's- on their views about infrastructure and how they influence it.

The questionnaire was designed in such a way that interviewees give information with little stress as possible. The questionnaire was simple and relevant to the target market. For the purposes of this research, it was important to have relevant experience in the industry and some form of influence. Therefore, it was important to have objective data, able to be corroborated by facts on infrastructure sharing. Neuman (2006, p. 188) argues that reliability and validity are central issues in all measurement. It suggests that the same thing is repeated or recurs under identical or very similar conditions. The data was recorded consistently, accurately and thoroughly, where the researcher took notes and at the same time recorded the interviewees responses.

3.8 Data collection

Data was collected through face to face interviews with the respondents. The semi-structured interview questionnaire was used to gather information. Interviewees were predominantly held at the interviewees place of work and in some cases at private residences. Opdenakker (2006,) argue that face to face interviews are characterized by synchronous communication in time and place. As a result, due to the synchronous communication, face to face interview can take its advantage of social cues such as voice, intonation and body language of the interviewee and can give the interviewer a lot of extra information that can be added to the verbal answer of the interviewee on a question. The face to face interview enabled the researcher to explore the subject in depth through open ended questions.

The second unique aspect of face to face interview is that there is no significant time delay between question and answer, the interviewer and interviewee can directly react on what the other says or does (Opdenakker, 2006). Furthermore, according to Opdenakker (2006), the synchronous communication of time and place in face to face interview has an advantage that the interviewer has a lot of possibilities to create a good interview ambience and the most important thing is that compared to other interview methods, the termination method of face to face interview is easy, for example, an explicit way of thanking the interviewee for co-operation and asking him or her if there are further remarks that might be relevant to the topic or the interview process.

In some cases semi structured interview questionnaires were sent to the interviewees prior to the meeting to give them the freedom to investigate some issues carefully and the flexibility to acclimatize themselves with the issues at hand. The research was followed by face to face interviews. The researcher sought permission to write down the notes and use an audio tape to record the respondents' reponses. As a result, the researcher had an opportunity to gather information from key individuals in a private setting where they are less likely to be influenced and where they will easily volunteer information. Interviewees were requested if they would appreciate transcripts of the interviews to confirm their responses. About ten interviewees preferred that transcripts be forwarded to them for confirmation of the interview. The remaining five were happy with the notes taken and recording.

In-depth interviews were transcribed and thereafter forwarded to the respondents who appreciated receipt of the transcripts for confirmation. This allowed the researcher to review the transcript and observe emerging themes and recurrent events that guided the development of the research. The interviewee also had an opportunity to listen to the audio and compare it with written notes taken during the interview. This ensured reliability of data and validity of data collected from the interviews. According to Babbie (1998, p. 293), your notes should include both your empirical observations and your interpretations of them. The interviews yielded a great deal of information in that the researcher was able to derive maximum benefit. The researcher asked probing questions for clarity where answers were open ended.

3.9 Methods of data analysis

According to Babbie (1998, p. 316) the process of data analysis is inductive in that it primarily begins with observation, and it is analytic because it goes beyond description to find patterns and relationships among variables. From the data collected, the researcher developed themes and was able to examine the relationship among concepts. The data collected from the interviews and the primary sources such as policy documents and municipal bye-laws provided useful information for mapping general patterns in the industry and in investigating the units of analysis for social scientific research. Babbie and Mouton (2004, p. 84) argues that the units of analysis refers to what of your study, what object, phenomenon, entity, process or event you are interested in investigating. Babbie (2010) furthermore suggests six different ways of looking for patterns in research as;

(1) Frequencies

(2) Magnitudes: what are the levels of…?
(3) Structures: what are the different types of…...? Are they related in any particular manner?
(4) Processes: Is there any order among elements of the structure?
(5) Causes: what are the causes of….? Does it occur more often in….. areas?
(6) Consequences: how does it affect …..?(p. 421).

The researcher followed the above steps in analysis of the findings of this study. The first unit of analysis relates to the extent to which telecoms operators share infrastructure, the initiatives and hindrances in accelerating infrastructure sharing. The second unit of analysis relates to the extent to which sharing of infrastructure play a role in broadband diffusion. The third unit of analysis relates to the role of policy in enabling infrastructure sharing. This includes the extent of collaboration with relevant stakeholders prior to policy formulation and the analysis of other legislative frameworks having an impact on the provision of ICT's.

According to Babbie and Mouton (2004, p. 101), collected data is interpreted for the purpose of drawing conclusions that reflect on the interests, ideas and theories that initiated the inquiry. The data analysis includes organized method of categorizing data and identifying interrelationships and aims to understand which of the factors that have been identified are commonly experienced in South Africa. The researcher was able to identify the frequency of each characteristic discovered and analyzed the importance of it given the South African environment. The analysis further identified the patterns that the data reflects. Data gathered from interviews was used to

summarize the perspectives of various stakeholders particularly in attempting to characterize and understand the market structure relating to provision of ICT's.

3.10 Significance of the study

Despite infrastructure sharing, South Africa still has some key challenges with regard to access to broadband. The majority of South Africans still lack the means to affordable access to telecommunication services and access to broadband still remains low. There is a trend by operators to develop infrastructure in urban dense areas where they are able to recover their expenses, thus hindering progress in underserved areas. Yet, by encouraging infrastructure sharing, telecoms operators will be able to undertake network expansion in areas that are underserved with respect to broadband infrastructure.

The main focus was on whether infrastructure sharing will have the effect of limiting various constraints to the deployment of infrastructure which includes costly regulatory obstacles such as requests for way-leave permits, environmental impact assessments and delays in securing land to build infrastructure both from government institutions and private individuals. This further focused on whether infrastructure sharing may be the primary solution for South Africa to increase broadband access in underserved areas.

3.11 Limitation of this research

The research focused on exploratory study and content analysis of literature relevant to this study. The focus of the study was on how operators share

infrastructure, their preferences in terms of sharing of infrastructure and any other factor relating to the role of policy and regulation in achieving an information society. The study did not go into detail on various sharing methodologies and therefore the advantages or disadvantages were not discussed. Limitations ranged from a variety of factors which include, amongst others, the following:

(1) Given the category of respondents, the researcher had to customize questions depending on the class of respondents to be interviewed. This is because other respondents did not have a holistic approach of the issues ranging from policy, broadband, infrastructure sharing and the role of OEM's. Eleven out of fifteen interviewees were far more advanced with the issues raised in this research. Others preferred to be interviewed on specific issues.

(2) Data in respect of other countries proved challenging because countries requirements are unique with regard to, for example, the level of funding, literacy and the extent to which they depend on ICT's as a major growth to stimulate the economy or to the extent that they want to attract economic activity in their respective countries. This proved challenging where common trends needed to be identified that can be used and may be relevant across the various countries.

(3) Securing appointments to interview key personnel to gather information about their attitudes, knowledge, preferences and behaviors with regard to this research. Some of the respondents who agreed to be interviewed preferred to remain anonymous because

they felt that the research topic was sensitive and preferred to respond in their personal capacity. In this instance, some respondents felt that they should not be engaging with the researcher at all given the extent of the competition laws on sharing of information with a competitor.

(4) There is lack of publicly available information on the activities of telecoms operators and economic literature and costing models to verify the capex and opex benefits that are derived from infrastructure sharing in South Africa and the continent. Therefore, the research did not quantify the benefits that could be derived from sharing infrastructure if extended to underserved areas.

CHAPTER 4: FINDINGS: INFRASTRUCTURE SHARING AND BROADBAND ACCESS

4.1 Introduction

In order to have a better understanding of the trends that emerge from the research and to present information in a coherent and logical manner, the researcher conducted interviews with experts involved in the telecommunications industry, particularly ECNS Licensees and the OEM's amongst others. The assumption was that operators are drivers of the telecoms landscape and invest where market conditions are favourable to them while on the other hand, OEM's bring new improved technology and products in the market.

In addition, the researcher collected information through analysis of industry documents on infrastructure sharing and broadband access and household surveys conducted by Statistics South Africa. The aim was to review the trends in infrastructure sharing in South Africa, the basis for operators' business models and the trends in access to broadband.

The findings will present results of the interviews and of the secondary study conducted by the researcher.

4.2 Interview results

This chapter provides a brief description of the lessons learnt into three broad themes with each theme comprising of various sub-themes. All the

themes and sub-themes have been influenced by the aims and objectives, research question and the interview guidelines. The said themes are,

- Infrastructure sharing in South Africa.
- Industry perception about policy and regulation in enabling infrastructure sharing.
- Information society.

4.2.1 Infrastructure sharing in South Africa

The relevance of the question was mainly to have an understanding of the scope of infrastructure sharing in South Africa and in addition to have an understanding of the operators preferred business models in infrastructure sharing. The question considered the incumbent operators, new entrants and infrastructure companies' attitudes in their approach to sharing of infrastructure. These questions further highlight issues of barrier to the provision of ubiquitous networks and entry by new entrants.

The majority of the respondents indicated that infrastructure sharing is driven from a different context compared to what the EC Act had envisaged. In their view, although there are interconnection and facilities leasing regulations, operators are still not certain on how to deal with certain forms of sharing, particularly because this is a competitive environment. The respondents, mainly mobile operators, indicated that they are currently focusing on passive sharing, such as towers and ducts but they are unilaterally migrating to active sharing with preferred partners. They indicated that the latest business models of infrastructure sharing are in terms of collaboration with other

operators regarding the NLD fibre network, where operators share the costs of trenching and capacity swapping which includes pairing with “like for like”. The other respondent from the infrastructure company indicated that they lease telecommunication facilities to operators on “open access” model. The respondent indicated that “open access” has the potential of stimulating the market and opening up barriers to entry. There was however, a division of thoughts on the open access model and managed transmission model. According to the respondents, the managed transmission model creates barriers to entry since the costs are not transparent while on the other hand, others believe that “open access” model gives all parties equal access to the facility at the same cost.

Factors influencing the sharing of infrastructure

The respondents indicated that there are various factors influencing the sharing of infrastructure. Incumbent operators indicated that their business models are based on certain dense locations which have the characteristics of high income earners and where there is a potential demand for high usage of data. They indicated that this way they are able to recoup the costs quicker. The majority of the respondents are aware that their business models have resulted in concentration of infrastructure in urban dense areas, thus hindering progress in other parts of the country. Respondent A illustrated that Infrastructure sharing reduces the barrier to entry by new entrants. According to Respondent A, Cell C was able to operate because the company was allowed to roam on Vodacom network. Currently, 8ta, a Telkom mobile operator, is roaming on MTN’s network to allow it to have full coverage immediately. However, respondents from the smaller operators

indicated that incumbent operators prefer sharing infrastructure amongst themselves, excluding smaller operators. They indicate that this is because incumbent operators are able to swap facilities where they do not have existing infrastructure benefiting both parties.

Costs of deployment

The overwhelming majority of the respondents were more concerned with the costs they incur in civil works such as digging and trenching the roads in deploying infrastructure. They indicated that the costs oblige operators to engage in revenue sharing models to deploy fibre and to support sharing of infrastructure. In their view, the requirements for compliance with EIA impacts on profits because they are costly, tedious and time consuming. Thus, driving them towards the dense metro areas where they would be able to recoup their costs quicker.

According to the respondents, the costs of deployment of infrastructure in rural areas are high because of costs relating to transport, insurance, security and handling. They further indicate that the lack of basic infrastructure such as electricity and roads increase the costs of doing business. Respondents expressed their frustration in dealing with landowners while trying to secure land for building of electronic communications facilities or while renewing leases in respect of existing facilities. They indicate that landlords require exorbitant amounts for leasing of land or premises. One respondent referred to the SMI trading matter where MTN tried to renew the lease and the landlord insisted on a higher amount. When MTN refused to increase the rental the landlord applied to

court to have MTN evicted from the premises. The court held in favour of the landlord. MTN therefore, was immediately faced with a duty to arrange for alternative accommodation for itself and other operators who had leased facilities on its electronic communications facility. The respondent indicated that it is therefore critical for the policymaker to issue guidelines in terms of section 22 of the EC Act in respect of deployment of telecommunications facilities.

4.2.2 Industry perception about policy and regulation in enabling infrastructure sharing

The aim of the question was to have an understanding of the factors relevant to policy and regulation that enables infrastructure sharing in South Africa. This is mainly because it is commonly acknowledged that effective policies and a strong regulator are regarded as the foundation for an effective telecommunications sector.

The overwhelming majority of the respondents indicated that policy formulation should be informed by;

(1) the specific objectives and the deliverables of government programme or the developmental scenario of an area. According to respondent A, the policymaker should then be able to draft an evidence based policy that will address the identified gaps;

(2) the developmental programs of a particular area or a profile of an area before being able to impose license obligations on telecoms

operators. The respondents indicated that from an infrastructure point of view, in a developed world, there is an assumption that there is ubiquitous infrastructure and focus is on the advantaged communities and enabling the rich. In developing countries, the assumption is more about developing SMME's and rural people. Furthermore, the respondents indicated that developed countries tend to focus on ensuring that infrastructure is made available to support business "enabling the rich to be richer"– whilst in developing countries focus is on availing services to the marginalized communities and ensuring that basic services are provided "enabling the poor to be rich". According to the respondents, government must move away from adopting a one-size-fits-all approach. Lastly,

(3) take into account the political environment of the country. For example, if the President pronounces his service delivery plan, the question should then be, how do then as a Minister of Communications position ICT to be an enabler to achieve the desired objectives? The policymaker's contribution should be to come up with conditions and engage with ICASA on the best way to achieve its obligations.

Research and development

The respondents indicated that a big component of policy formulation is research and development. The respondents indicated that ICASA should be in the forefront of the industry in enabling infrastructure sharing. This however, according to the respondents, requires adequate skills and a

credible institutional design. For example, in the UK, Ofcom (the UK Telecommunications Regulator) have deployed experienced engineers in the industry and has a fully functional research and development unit. The general view is that research and development assists policymakers in ensuring that it formulates policies that are in line with technological developments and adapt quicker to changing requirements. The respondents indicated that this is done through engagement with OEM's as drivers of technology. According to them, the challenge in developing countries is that there are no OEM's except for countries like India and Brazil. The essence is that South Africa has to begin by developing skills around innovation and manufacturing.

The respondents indicated that policy formulation is disjointed because there are various pockets of ICT initiatives in almost all government departments. For example, the CSIR, the policymaker and on the other hand, academics tend to be involved in similar projects at different levels. The respondents however expressed their frustration about ICASA's tendency to just come up with policies and thereafter expect industry to react to it.

The respondents indicated that there is a great disregard by ICASA and the DoC of the recommendations by industry. The recommendations are according to them, future looking and aimed at improving the livelihood of the people and investors interests. They further indicated that there is no evidence of ICASA being involved in the due diligence process once there is a prior position or a developmental objective that needs to be improved. In their view, the due diligence will look at the cost implications and the

contributions industry is willing to make in resolving particular problems and concerns that industry would like to bring forward.

Cost benefit analysis and time frames

Generally, prior to any policy formulation policymakers conduct a cost benefit analysis to verify if the proposed draft policy will be achieved on time and within cost. However, according to the respondents no policy formulation has ever been subjected to a cost benefit analysis by the policymaker more so even in terms of implementing those particular policies. The respondents indicated that although timeframes are important for the implementation of policies because of innovations within the technological space, whilst cost and benefit should be the exercise for the public office, the true effects of such are always felt by the operators as they are usually the parties that have to drive the success of the policy through various programs. The respondents indicated that there is a tendency for government to think of implementing something midterm without the necessary budget in place in terms of opex and capex.

The overwhelming majority of the respondents indicated that the failure to conduct cost benefit analysis could be attributed to the lack of capacity at the DoC and ICASA. They indicated that there are no economists and engineers who will design an almost perfect policy where gaps can be identified and addressed prior to policy formulation.

Urban and rural settings

According to the respondents, policy must ensure that the operational and investment foundation is properly developed. For example, the current policy

is not specific on what needs to be done when rolling out infrastructure on issues such as band planning (spectrum allocation) and concentration of infrastructure in metro areas. Respondent B indicated that ICASA failed to specify where infrastructure should be rolled out and also failed to review the licenses regularly for compliance purposes. In his view, this has partly contributed to the reason why the national development policy would be difficult to achieve.

The overwhelming majority of respondents emphasized the need for availability of robust ubiquitous infrastructure. One respondent indicated that the DoC established a “project implementation team” consisting of operators, WBS, Sentech, USAASA and ICASA to evaluate infrastructure provisioning in certain underserved areas as per license obligations and to ensure that all outstanding obligations are complied with. The respondent however indicated that the project was still ongoing because it requires a lot of effort from all relevant parties. As other respondents put it, ICASA and USAASA should take a proactive lead in ensuring that the digital divide is bridged, particularly because of the contributions to the universal service fund and e-rate by operators in terms of the EC Act.

The majority of the respondents indicated that even though the perception is that broadband is still not accessible to people in rural areas, broadband in urban settings including wireless broadband is extremely expensive. On the other hand, the quality of service of wireless broadband is poor. The majority of the respondents believe that local loop unbundling should be able to increase access to broadband in underserved areas and that access to mobile broadband should be complimentary to fixed broadband.

Since South Africans in rural areas live in sparsely populated areas there is a need for affordable technologies that can operate in low frequencies which can cover huge areas once deployed (Masilela, personal communication, February, 16, 2011). Some respondents illustrated that in order to ensure that infrastructure is deployed in rural areas and urban undeserved settings, ICASA should conduct an impact assessment of areas where telecoms infrastructure have been deployed and where there is a need for infrastructure and should on the other hand, release spectrum specific to the demands of an area.

The respondents indicated that there should be incentives to ensure that rural settings are adequately taken into account in deploying infrastructure. According to them, this should include property rights, promotion of competition, sharing of costs for maintenance of the network, cost of equipment, developing and upgrading of networks to keep up with technological developments and carrying out of competitive procurement on how to reduce capex in such areas.

According to the respondents the bottom of the pyramid can be better served by new entrants or smaller operators who are more agile, innovative and cost efficient. Some respondents indicated that the traditional telecommunications co-operatives such as the USAL's business models are ideally suitable for rural areas. The USAL's were intended to provide services to areas that have not been served by the incumbent due to high costs of expanding the network in those areas in relation to the low purchasing power of households located within an area (Gillwald, 2002).

Integration amongst government departments and sector regulations

The respondents indicated that ICT's are better leveraged if they are elevated at the national governmental level where all government departments' activities are integrated. According to them, this includes an understanding of the provincial and local government's objectives, requirements and plan of engagement in laying out fibre in their respective municipalities. The respondents illustrated the need for government to deal with ICT's in an integrated manner so that the country can avoid duplication and waste of resources. According to the respondents, proper planning centrally and an engagement with various stakeholders is needed before government could engage in any activity relating to ICT's. In this regard the guidelines in terms of section 22 will serve the purpose of coordinating the activities relating to the deployment of electronic communication facilities in the country.

The respondents indicated that due to lack of infrastructure in some areas, South Africa has not been able to achieve its policy objectives. According to the respondents, policy has allowed operators and relevant stakeholders to work independently resulting in concentration and duplication of infrastructure. The respondents indicated that ICASA and USAASA have a role to play in addressing the access gap to ensure that other parts of the country receive the benefits of ICT's. The respondents indicated that previously, USAASA issued policy directives for universal service and underserved areas to determine which areas can be classified as

underserved. The approach was mainly on the “district” as opposed to the “municipality”, and this has proved not to be a success. In their view, universal service and access should be achievable through the use of USAF and rollout of UAS and USO by licensees through incentives to encourage infrastructure roll-out.

The respondents indicated that USAASA is currently looking at new models of rapid deployment of infrastructure – and where to fuse the provisioning of services to a municipality rather than the district areas. This new model aims to create incentives for investors and an opportunity to provide government with services. However, other respondents were critical of the fact that the policymaker has been developing policies in isolation without evidence based information and integrating with other government departments including the municipalities. In their view, Local Government and the Department of Environmental Affairs may facilitate rights of way issues, granting of permits without delay. This is because local government have jurisdiction over large parts of land in the country while the department of environmental affairs has a responsibility of ensuring the sustainability of the environment. On the other hand, according to the respondents, other departments such as the Department of Education, Science and Technology may provide end-users with training on the use and economic benefits of ICT’s.

The majority of the respondents indicated that local government's fibre networks can play a role in increasing access to broadband. Hence at least national departments which have ICT related projects should be communicating and contributing to the policy on telecoms infrastructure roll-out and also addressing physical infrastructure sharing as a means of providing ubiquitous infrastructure. This way, this will play a role in ensuring that the national governments objective of increasing access to ICT's is achieved.

4.2.3 Information society

The aim for this question was to determine whether sharing of infrastructure may have the potential to influence the achievement of an information society. This addressed the views of the respondents on the broadband policy and of South Africa becoming an information society. Statistics reveal that the cost of broadband in South Africa is high compared to the rest of the world. According to the presentation by the SACF on draft call termination regulations (2010), South Africa shows an alarming decline in continental and global ICT competitiveness. The broadband speed as set up in the Broadband Policy (2010) is 256 mbps which is way too low compared to the majority of the countries. For example, some countries have legislated speeds of about 2mbps while others have legislated speeds of about 100mbps.

The majority of the respondents were critical of the policymakers approach in setting up goals for the achievement of the broadband policy and instead attributed this to lack of indecisiveness, which they regard as one of the biggest impediments to South Africa's success as a country. The general

view by the respondents was that the policymaker didn't pay much attention to the whole broadband initiative. According to them, the NGO's, think-tanks and various ICT forums spent time, efforts and resources in directing the policymaker on the best way to craft the broadband policy that will potentially increase access to broadband but their recommendations were disregarded.

The respondents however indicated that the notable exciting feature about the broadband policy is that broadband will be extended to the rural areas and that spectrum allocation will be on the basis of the concept of "use or loose". They indicated that the broadband policy should be reviewed to ensure proper costing and garner suitable inputs on broadband diffusion from industry. The respondents concern is that the assumption by the policymaker is that there would be zero literacy by 2019 and that the majority of the population will be employed which will translate to the full utilization of broadband services. According to them, this assumes that there will be ubiquitous infrastructure, the cost of telecommunication will be drastically reduced, there will be improved quality of service and that all people will have access to the service and affordable equipment.

The respondents illustrated that for South Africa to thrive economically and compete fully with the developed world, it has to move away from being a country of two tales where there is a full realization of the information society while other areas still represent the "dark ages". According to the respondents, an ideal information society is a community which is computer literate to an extent that ICT's is used as a catalyst in linking and providing the support structure to business, communities and civil society. In this respect, every aspect of the people's lives revolve around information and as

a result spans across a number of areas, including education, medicine (telemedicine), commerce (e-commerce) and e-government. There should be accessibility of the service to all citizens and a reputable and accessible information hub and affordable communication services (broadband services). This includes having access to robust telecoms infrastructure and availability of equipment to enable people to interact with one another.

The overwhelming number of the respondents indicated that education is a cornerstone for achieving an information society. This requires that Mathematics, Science and Technology programs should have more emphasis on ICT programs from the primary school level.

The respondents illustrated that the availability of ICT tools should be through subsidization or a different classification of taxation. In their view, infrastructure sharing will serve a role of providing ubiquitous infrastructure which is able to carry large amounts of data. This will improve user experience and the quality of service. End-users will be encouraged to access ICT services once they are educated upon its use and relevance. This way in underserviced areas, operators will be able to share the operating costs relating to maintenance of the infrastructure. However, according to the respondents this requires the co-ordination of various government departments such as, the Department of Education, the Department of Science and Technology, the DoC and the Department of Trade and Industry in terms of funding SMME's. Schools in the Gauteng province are connected to the internet via the **Gauteng-Online** initiative through the provincial department of Education. The respondent indicated that Altech is working on a project in KZN for the Multimedia centre but out of

all the government departments only the Department of Education expressed a keen interest in the project.

4.3 Content Analysis

The researcher analysed literature relevant in telecoms infrastructure sharing, the interconnection and facilities leasing regulations in order to have an understanding of policy in the infrastructure sharing environment in South Africa. The analysis also included internet access studies and the extent of telecom infrastructure investment in the country. This chapter will therefore present the findings of the content analysis. The identified themes are;

- Policy and regulation in enabling infrastructure sharing
- The rising of an information society
- Network investment

4.3.1 Policy and regulation in enabling infrastructure sharing

Hasbani *et al* (2007), indicate that governments and regulators are faced by significant challenges in telecom infrastructure sharing which include:

- Interconnection regulation which is a tool to facilitate the entry of new players in a telecom market.
- Access regulation which is created mainly to support entrants to the fixed telecom market and to regulate the unbundling of an incumbent's local loop.

- Competition safeguards. In this case, incumbents and new entrants may reach certain market share thresholds that would present them with substantial market power or even dominance.
- Infrastructure sharing. While new entrants tend to build their own networks, regulators favor faster deployment and investment optimization in the telecom sector. According to Hasbani *et al* (2007) infrastructure sharing limits duplication and gears investments towards underserved areas, product innovation and improved customer service.

Hasbani *et al* (2007) argue that infrastructure sharing receives diverse interpretations from stakeholders. They indicate that regulators perceive it as a medium to grow competition, incumbents as a potential source of revenue and new entrants as a given right that should come at an affordable price.

Specific regulations

Investing in telecommunications requires large capital investment at the outset. As a result, this causes a bottleneck in the industry since most investors are weary of the costs associated with investing in telecommunication infrastructure. In order to address the barrier to entry to new entrants the facilities and interconnection regulations provides a solution

to those new entrants and other service providers who require access to telecommunication facilities.

In South Africa, interconnection and facilities leasing are similar but are dealt with separately in the EC Act and the associated regulations. According to Part 111 of both regulations the principles for interconnection and facilities regulations are (RSA, 2010):

- Quality of service and standards. This should contain the technical standards of both parties and comply with all relevant international standards and recommendations of the ITU.
- Service level parameters which include service levels, remedies and penalties for any failure to meet such service levels.
- Confidentiality. According to the ICASA Act an agreement may not have a provision preventing the public disclosure of the Agreement.
- Non-discrimination. This includes applying similar terms and conditions including rates and charges, in similar circumstances to itself, affiliates and other interconnection seekers, providing similar services.

- Transparency relating to billing and settlement procedures and charges for interconnection and electronic facilities must be sufficiently unbundled.
- Information relating to facilities leasing and interconnection. The information relates to a list of products or services offered by the other provider, process and commercial information that may assist the facilities seeker and technical information that will assist the other party in planning, establishing and maintaining their network.

The EC Act empowers ICASA to regulate the sharing of infrastructure. The rules and procedure for managing the relationship between the facilities seeker and facilities provider follow a basic outline. In this regard, ICASA makes the rules; the parties negotiate a commercial agreement in line with the rules and principles as set out in the regulations. In order to ensure compliance with the rules and principles ICASA is empowered to review the sharing agreements.

The EC Act provides that “every licensee must interconnect on request, on terms negotiated unless the request is unreasonable” (RSA, 2005). Similarly, section 43 (1) of the EC Act provides that “all ECNS licensees must provide facilities on request, on terms and conditions according to the facilities leasing agreements unless the request is unreasonable”. A licensee may

however, be exempt from the obligation to interconnect or to provide facilities but only in the event that ICASA has not found such network licensees to have significant market power in the relevant market. The other exemption is with regard to the obligation to lease fibre loops and sub-loops serving residential premises if constructed after the coming into force of the EC Act in situations where the network licensee has significant market power (RSA, 2005). In this case, a licensee has significant market power where the regulator was to find that it is dominant in a relevant market or market segment. The operators must also have control of essential facilities that if access is denied it could harm competition in the market or market segments applicable to the particular category of the license (RSA, 2005).

ICASA has in terms of the EC Act an obligation to prescribe a list of essential facilities that must be provided in terms of section 43(1). Once a facility has been listed as an "essential facility" by ICASA it will be subject to strict regulatory measures such as, imposing costs based structures, since they are regarded as facilities that cannot easily be duplicated by other operators. The regulator has already issued regulations on call termination rates. However, the effect of this has only been felt at the wholesale level where the termination costs between operators has been reduced but this has failed to translate to cheaper cost at the retail level. The costs of telecommunications are still high compared to other countries.

LLU is specifically mentioned in the EC Act. LLU is still a contentious issue and it seems to be extremely challenging for ICASA to move forward with its implementation. This is because Telkom will still want to maintain market power in this segment because local loop is an essential facility that cannot

easily be duplicated. Local loop allows the connection from the street level distribution boxes to the customer premises equipment in homes or businesses. It is thus critical in allowing new entrants to offer voice and broadband offerings without having to deploy their own telecommunications infrastructure.

A further requirement in the EC Act is that ECNS licensees may:

> not enter into agreements for access to or use of international facilities, which agreements contain exclusivity provisions, provisions that create undue barriers for accessing or using such facilities or otherwise restricts any party from leasing, selling or otherwise providing such facilities to other service providers (RSA, 2005).

Sharing of telecommunications infrastructure also includes carrier pre-selection although there is no physical change to the current infrastructural set up. Carrier pre-selection is the ability of a subscriber of an electronic communications service to access and use the electronic communications services of another electronic communications service licensee or person exempted as provided (RSA, 2005). This form of sharing allows new entrants to access and make use of existing infrastructure. A customer uses a carrier selection code and the local exchange is instructed to divert the call. This does not form part of the research since there is no physical infrastructure sharing.

Promoting competition in infrastructure sharing

The EC Act deals with competition issues. On the other hand, the Competition Act deals with competition issues in as far as an act is ex post facto. In dealing with ex post regulation, section 67(1) provides that:

> ICASA may direct a licensee or exempt a service provider to cease to refrain from engaging in an anti-competitive act, if such a person has engaged in an act or intends to engage in any act that is likely to substantially prevent or lessen competition by giving undue preference to or causing undue discrimination (RSA, 2005).

In dealing with ex ante regulations section 67(2) provides that ICASA may prescribe regulations:

> setting out what actions will be to give an undue preference or cause undue discrimination against; detailing procedures for complaints, and for monitoring and investigations; and indicating penalties that may be imposed for failure to comply with an order to cease or refrain from taking an anti-competitive action (RSA, 2005).

In dealing with competition issues ICASA has a duty in terms of the EC Act to define relevant markets and market segments which it considers to have ineffective competition. In addition it has a duty to determine the service providers that have significant market power in the relevant markets and market segments and thereafter impose pro-competitive license conditions on those licensees. The competition Act defines market power as “the power of a firm to control prices, or to exclude competition or to behave to an appreciable extent independently of its competitors, customers or suppliers” (RSA, 1998).

ICASA should when imposing pro-competitive conditions on licensees, take into account the entry barriers that have an effect on the structural, legal and regulatory and also the dynamic character and functioning of the subject markets or market segments (RSA, 2005). The EC Act highlights specific factors that ICASA must take into account when determining the effectiveness of competition in the relevant market or market segment. This includes amongst others, a forward looking assessment of the market power of each of the market participants over a reasonable period, control of essential facilities, an assessment of relative market share of the various licensees in the defined markets or market segments and ease of entry into the market, including market and regulatory barriers to entry.

ICASA may furthermore impose pro-competitive license terms and conditions on licensees such as the conditions relating to interconnection and facilities, penalties for failure to abide by terms and conditions, obligation to publish information, obligations requiring separate accounting and accounting

methods, pricing and South African broadcasting content (RSA, 2005). The pro-competitive terms and conditions are subject to review by ICASA.

All these are expected to open up barriers to entry to new entrants and smaller operators in the telecommunications market. If implemented properly, new entrants and smaller operators will be enabled to become more efficient and to focus on innovative products. The Act prevents incumbent operators from showing favoritism to its affiliates or any other business. Most incumbent operators have subsidiaries that are providing services at the retail level. As such Telkom has been accused previously of squeezing the market because it used to offer wholesale services at cost or rather at competitive prices to its subsidiaries. This restricted competition because other service providers found it difficult or almost impossible to compete with Telkom's subsidiaries. The Act also prevents discrimination between operators. Therefore, incumbent operators are prevented from giving preference to their own subsidiaries or to give preference to other incumbent operators when sharing facilities. New entrants or smaller operators are entitled to be treated equally while requesting access and sharing telecommunications facilities to enable them to compete fully and fairly with incumbent operators and their subsidiary companies.

4.3.2 The rising of an information society

Statistics indicate that there is a significant gap between South Africa and the OECD countries in terms of broadband rates and broadband service quality (Netbridge, 2010). Netbridge (2010) argue that the OECD report highlighted the role of communications infrastructure in economic recovery and the

importance of well-developed broadband networks. The Department of Communications therefore has a mandate to create favourable information and communication technology environment ensuring that South Africa has the capacity to advance its socio economic development goals and support the renewal of Africa and the building of a better world. This is one of the reasons why the DoC has been instrumental in ensuring that the developmental objectives relating to access to broadband are achieved. The DoC published the National Broadband Policy in 2010 which seeks to address and build an information society and promote the uptake and usage of broadband. This was clearly articulated in the Broadband policy as indicated below (RSA, 2010):

> In 2007 government undertook a policy decision to take the lead in the formation of "people-centred, inclusive and development-oriented information society, where everyone can create, access, utilise and share information and knowledge, enabling individuals, communities and people to realize their full potential in promoting sustainable development and improving the quality of their life". This has informed the country's vision "To establish South Africa as an advanced information society in which information and ICT tools are key drivers of economic and societal development" (p. 8).

According to Goldstuck (2010), the number of South Africans accessing the internet via broadband connection has grown by more than 50% in the past year where the internet user base grew by 15% from 4.6 million to 5.3 million. World Wide Worx indicated that:

> the landing of a new undersea cable on the South African coast and the granting of ECNS licenses to more than four hundred organisations played a major role in the internet growth. This pushed the market to introduce competitive packages as more and more companies began to participate in the industry. He further indicated that there has been a continued uptake of broadband connectivity by small and medium enterprises migrating from dial up to ADSL connectivity which added an additional one to twenty new users to the internet user base for every small business installing ADSL (Bizzcommunity.com, 2010).

The Broadband policy discussed

The South African government has committed itself to the building of an information society. The development of the Broadband policy is in line with world trends and is critical for South Africa to ensure the realization of the goal of an all-inclusive information society that can enjoy the economic benefits associated with Broadband in both rural and urban areas (RSA,

2010, p. 4). The long term goal of the policy is to ensure universal access to broadband by 2019 at the download speed of 256 kbps. The policy indicates that “broadband should be accessible either individually, or as a household, subscribes to a broadband service or are able to access a broadband service directly or indirectly at a private or public access point” (RSA, 2010, p. 7). This requires the existence of ubiquitous infrastructure in the country and therefore necessitates for greater investment in infrastructure.

We have witnessed operators investing in the roll out of fibre optic cables around the key cities in the country to be able to cope with the demand for huge amount of bandwidth. Municipalities have also joined hands and for example, the City of Johannesburg has developed policies on the provision of broadband services. Major municipalities have fibre optic cables in their cities while other municipalities are in the process of rolling out fibre optic cables to provide broadband access at reasonable cost. Convergence of services such as video on demand, and telephony services require high bandwidth and internet access speeds need to scale in order to meet the demands of applications of services, specifically those that are video enabled. Many workers in South Africa perform their jobs in or out of the office- “the connected life”- which allows workers to be productive, responsive and creative in or out of their traditional office spaces (SAinfo reporter, 2010).

The policy emphasises the need for physical infrastructure sharing such as sharing of masts, buildings, roads and power supply. It indicates that world trends reveal that the sharing of infrastructure is a powerful mechanism for cost reduction, as this reduces the cost base of the infrastructure. It further

provides that the benefit of sharing is that citizens gain access to broadband at lower prices that would have been the case if operators each had to construct their own physical infrastructure (RSA, 2010, p.14). Research has shown that greater investment in infrastructure has taken place in urban areas resulting in concentration and duplication of infrastructure. What we need, is greater investment in infrastructure in underserviced areas to be able to improve the affordability and accessibility of broadband. The question that remains is whether infrastructure sharing will be able to enable greater investment in underserves areas and improve access to broadband?

According to the Broadband policy (RSA, 2010) the implementation of the broadband policy is to be undertaken by the Broadband Inter-Governmental Implementation Committee. The Committee will comprise of all spheres of government which include, national, provincial and local government and State Owned Enterprises. What is clear though is that the policymaker failed to recognize the importance of involving the private sector in the committee. It has been emphasized in the research that the private sector is driving the roll-out of broadband infrastructure and services. As has been seen, the ICT spending has been mostly concentrated in the affluent urban areas. According to the APC (2010) in a statement by the Minister of Communications, Simphiwe Nyanda (retired), identified the role of the private sector as follows:

> The greatest challenge is on how to approach infrastructure development in rural areas where it is clear that the private sector does not show interest to invest in infrastructure

> capability for internet connections and high speed access to data. The issue we would discuss includes options for ICT infrastructure development in rural and semi-rural areas across the country and the question we would ask ourselves is “has our State-Owned Enterprises delivered the requirements for an integrated infrastructure in rural areas inter-connected with existing ones”. In this instance, we also need the private sector to play a key developmental role in partnership with government for the benefit of all our people.

The challenge is to lure and incentivise operators to deploy infrastructure in underserviced areas. According to Frieden (2005, p. 609) ICT development including investment in a robust broadband infrastructure requires extensive co-ordination and co-operation among private and public sector players.

4.3.3 Network Investment

The rapid transformation of our economies and societies resulted in a range of technological and related economic drivers. For global markets to operate effectively, high bandwidth planetary infrastructures are needed to link the financial centres across the planet to conduct their businesses at the speed of light (Gillwald, 2001). Gillwald (2002) indicates that:

> it is apparent that the development of broadband networks and application of the associated technologies is intrinsic to the development of the information and communications sectors specifically and the economy as a whole. She argues that with sound infrastructural planning and innovative regulation, broadband has the potential not only to provide high end services to the business sectors but a range of low cost, high quality services to all.

These days, usage is not only about voice but data. Users access the internet for games, facebook, music, email, banking services, sms and voice.

Operators have been instrumental in deploying various investment projects to boost bandwidth that will support their business models going forward. They have, as such, together with local government been deploying infrastructure at an alarming rate to meet the demands of consumers in terms of access high bandwidth intensive services. For instance, the City of Johannesburg and Ericsson are investing R1,2 billion in the Johannesburg Broadband Network Project where they will roll out 940 kilometres of 1000 kilometres of fibre optic cable in the city over three years with the aim of linking the City of Johannesburg municipal offices and entities, such as schools, utilities, clinics and hospitals to improve service delivery and communications between the facilities. They have already rolled out 300 kilometres of fibre optic cable having been laid in the core network from the south of Soweto to Midrand at a cost of R250 million (Engineering news,

2011). What is apparent is that the City of Johannesburg and Ericsson have focused in areas where there is already concentration of infrastructure.

Telkom upgraded its network to the next generation network to ensure the provision of converged services. Since 1997 after privatization, Telkom invested more than 45 billion to upgrade and expand the countries telecommunications network resulting in about 1.2 million kilometres of optical fibre in the public network (Lange, 2010, p.41).

Neotel acquired 1.300 kilometres of fibre optic cable in the six metropolitan areas from Transnet. In addition it built 8000 kilometres of its own national fibre routes and laid 2000 kilometres of fibre in Johannesburg, Pretoria, Cape Town and Durban (Lange, 2010). Neotel and Seacom partnered to land the SEACOM cable in South Africa to cater for the growing local bandwidth demand. The SEACOM cable has a design capability of 1.28 terabits. For international connections, Neotel uses the VSNL, its equity shareholder, to connect over 400 operators in more than 200 countries (Lange, 2001).

Broadband Infraco, which was legislated to provide low cost bulk broadband access to the service providers provides broadband capacity through fibre optic cables to other operators in the country. The objectives of Broadband Infraco are to expand the availability and affordability of access to electronic communications including but not limited to underdeveloped and underserviced areas in accordance with the Act and international best practice (RSA, 2008). Sentech on the other hand, provides internet connectivity through wireless systems rather than fibre optic cables. It focuses on delivering connectivity to the government and wider public sector.

Dark fibre Africa has been laying fibre in major metropolitan areas which it leases to other carriers on open access. The aim is to reduce barriers to entry to new entrants. Dark fibre Africa is an ECNS licensee in terms of the EC Act and has been deploying fibre in metropolitan areas, which it in turn leases or sells to other telecoms operators for the provision of telecommunication services. Darkfibre Africa's business model is different from other ECNS licensee's business model because their focus is mainly on the deployment of fibre and has adopted an open access network infrastructure model different from the traditional telecom operator's model in order to alleviate the lack of infrastructure as demonstrated above. There is no intention to provide services directly to end-users. They seek to attract all telecoms operators regardless of service offering. Internet Solutions is investing heavily in fibre infrastructure in South Africa. It is now investing in the WACS international submarine fibre optic cable (Lange, 2010). Internet Solutions partnered with convergence partners under the umbrella of FibreCo to deploy 12 000 kilometres of terrestrial fibre optic cable in the country.

The metropolitan municipalities have also recognised the need for fibre network to increase economic growth and are as such focusing their energies on the deployment of City fibre optic cables for broadband usage. These metropolitan municipalities, for example, the City of Cape Town, eThekwini, Tshwane and Johannesburg are expanding their networks to provide their residents with cheaper voice and data services. For example, the joint venture project between Ericsson and the City of Johannesburg.

CHAPTER 5: ANALYSIS: WEAKNESSES IN THE POLICY AND REGULATORY ENVIRONMENT FOR INFRASTRUCTURE SHARING

5 Introduction

The main focus of this chapter is on the interpretation and analysis of the results of this research. It answers the research questions and clarifies comments raised in this research and interviews. Further, the analysis articulates for a more evolving view on infrastructure sharing in South Africa that takes into account industry and technological developments taking place elsewhere and still has an impact in the country.

In the recent past (2009 - 2011), telecoms operators have piloted extensive infrastructure sharing arrangements which in certain respects were ahead of policy and regulatory frameworks. Therefore, in an attempt to explore infrastructure sharing in South Africa, focusing on the role of policy and regulation, the analysis of the results concerns itself with the research question presented below;

Within the paradigm of broadband diffusion and its role in building an information society, the primary question for this research is:-

How has policy and regulation shaped the market for infrastructure sharing?

In order to get clarity and respond proficiently to the primary question, the following sub-questions were investigated;

(a) What is the scope of infrastructure sharing in South Africa?

(b) What are the factors that influence operators to share infrastructure?

(c) What are the regulatory obstacles to infrastructure sharing and how do they affect operator's behaviour?
(d) How effective are the policy and regulatory interventions that enable infrastructure sharing and the provision of ubiquitous infrastructure?
(e) How has policy and regulation shaped the infrastructure sharing environment for the achievement of an information society?

The researcher interpreted and analysed the responses by various respondents and the secondary data obtained from various studies and reports in order to contextualise the information in an attempt to answer the research questions above. The objective was to evaluate the extent to which policy and regulation shaped the market for infrastructure sharing in South Africa. This took into account the key debates arising from the facilities leasing and interconnection provisions and other related regulations as well as broadband policy and access in South Africa. The analysis also took into account the extent of network availability in the country.

5.1 Policy and regulation in enabling infrastructure sharing

The respondents were asked about policy and regulatory interventions that enable infrastructure sharing in South Africa. The question was aimed at establishing the respondents understanding of the factors relevant to policy and regulation in the telecommunications environment, particularly in infrastructure sharing. Infrastructure sharing has been seen as a way of opening up barriers to entry to new entrants, smaller operators and to introduce competition in the industry. The purpose was to establish whether the respondents believe that policy and regulation is aligned with industry

expectations taking into account the evolving nature of the telecommunications market. This would allow ICASA and the DoC to assess the approach in policy and regulation in the ICT sector.

The regulations on infrastructure sharing impose certain requirements on operators when offering access to their telecommunications facilities. Stern and Holder (1999, p. 38) illustrate that government needs to provide and sustain the legal framework under which the regulator operates and need support enforcement of the regulatory framework and the rules of the game. As a result, section 3 of the EC Act empowers the Minister to make policies on matters of national policy applicable to the ICT sector and to issue to the Authority policy directions consistent with the objects of the Act and of related legislation (RSA, 2005). The policy directives dealing specifically with the unbundling of the local loop, regulations on termination rates and the adoption of a broadband policy document which emphasises the need for physical infrastructure sharing are as a result of the powers envisaged in section 3 of the EC Act.

The regulatory body

The independence of the regulator in enforcing regulations is of great importance to ensure lower telecommunications costs and global competitiveness. The EC Act gives an unfettered discretion to the regulator to make regulations with regard to any matter in terms of the Act or any related legislation (RSA, 2005). This however, requires a regulator who is in the forefront of the industry with regard to any developmental matter in the ICT industry. In this case, the respondents indicated that a key issue in policy

and regulation is research and development. Their views were that the policymaker and the regulator should be able to formulate policies which are in line with technological developments and adapt quicker to changing requirements. For instance, the regulator should be able to have a clear picture of the value chain activities in infrastructure sharing prior to formulation of regulatory instruments. For instance, from a public policy perspective, for the infrastructure sharing instruments to become a reality and to realize the desired results, there is a need for ubiquitous infrastructure. Therefore, facilities leasing, interconnection and LLU will not in itself achieve the desired results if one aspect of the value chain is missing.

On the other hand, the Altech judgment was overpowering to ICASA seeing that they had other challenging issues to deal with, for example, LLU and spectrum allocation. As a result they never followed up on the regulatory structure that was necessary to accommodate the Altech judgment. It merely followed the decision of the court by granting all those eligible operators ECNS licenses. For instance, the Altech judgment granted a number of telecoms operator's (former VANS) licenses to install and maintain their own infrastructure and to invest in infrastructure. Because this was licensing by a court of law, there was no clarity with respect to the rollout of telecommunications infrastructure, the duplication of that infrastructure, availability of frequency spectrum, the rural urban concentration of infrastructure services and the universal service obligations attached thereto.

The overall impression of the study is that ICASA should have conducted a market analysis to inform regulations on infrastructure sharing taking into account the decision in the Altech judgment. The market analysis, with a

clear value chain framework, would complement interconnection and facilities leasing regulations and deal specifically with issues of concentration of infrastructure in urban areas, the approach in the provision of ubiquitous infrastructure in underserved areas and most of all the allocation of spectrum to deserving licensees.

Policy and regulatory interventions

According to Melody (1997, p. 22) regulation is necessary to provide a foundation upon which markets can function more effectively than they could otherwise. The Telecommunications Act was the first attempt to address the issue of network investment and infrastructure sharing in legislation. There was an amendment to the Telecommunications Act following the end of exclusivity given to the incumbent telecom operator (Telkom) which purported to allow the introduction of a second national operator (Neotel), granting of more rights to Sentech to provide infrastructure and services and underserviced area licenses.

With the promulgation of the EC Act, the infrastructure deficit albeit modernized was still evident. As a result, the EC Act was intended to stimulate new investment in infrastructure and to increase demand in communication services, particularly for people living in underserviced areas. The EC Act makes provision for the use of existing infrastructure as an economic means of multiplying the number and variety of networks and forms of access to services for the population whether they are in urban or rural settings. It provides that a request to share facilities must be reasonable, technically and financially feasible and promote the efficient use

of electronic communications networks and services taking into account the public interest nature of ICT's (RSA, 2005). According to Mquail (1992, p. 71) something is in the public interest if it serves the ends of the whole society rather than those of some sectors of the society.

There are areas in South Africa where existing infrastructure in rural areas is generally poor and in some areas non-existent despite the fact that Telkom was given 5 year exclusivity to deploy infrastructure in underserviced areas. During the study, the respondents emphasised the importance of conducting a cost benefit analysis to verify whether the proposed initiatives will achieve its intended objectives. Illustration 3 above shows that there have been various policy interventions that yielded little results in terms of promoting the efficient use of electronic communications infrastructure. In this way, Picot and Wernick (2007) indicate that "governments play an active role by deliberately influencing markets for public welfare. They indicate that this is related to two different perspectives on the broadband market, government as an "enabler" vs government as the "rule maker" in emerging markets". This requires ICASA to create an enabling environment to encourage efficient behavior by market participants and to deliver advanced ICT services, including access to broadband, facilitate the deployment of shared infrastructure, address barriers to entry, encourage competition and to furthermore improve the lives of consumers and boost the country's global competitiveness.

In so doing, ICASA should be able to engage in activities that assess the level of infrastructure availability in the country and the type of infrastructure that is required to satisfy the user's requirements. Illustration 5 below is an

indication of infrastructure availability per category in the country that takes into account the national, provincial, metro and municipality areas. The exercise, if undertaken would assist ICASA to draw up a licensing schedule that would prioritize the 'developmental objectives' of the country. However, this requires capacity and the availability of relevant skills with the ability to formulate and implement policies that are in line with technological developments. In this case, Stern and Holder (1999, p. 38) emphasises that government needs to provide and sustain the legal framework which the regulator operates and needs support enforcement of the regulatory framework and the rules of the game.

Illustration 5: An assessment of availability of infrastructure

Availability of infrastructure	National	Provincial	Metro/ District Municipality	Municipality	Critical nature of infrastructure in attaining information society objectives
Fibre/cable	✓	?	✓ / ?	? or N/A	
Mast/BS	✓	✓	✓	✓limited	
Frequency availability	?	limited	✓	✓	
Electricity	✓	✓	✓ / limited		

Source: M Magagane (2011)

Whether policy and regulation creates opportunities for infrastructure sharing

The literature highlights the relevance of creating opportunities for the provision of ubiquitous telecommunications infrastructure and of optimizing the existing network capacity in the country to drive down prices to a more competitive level. According to Lau *et al* (2005, p. 357) the synergy created by competitive policies, promoting market entry, incentive based regulation and technology innovation have created true digital opportunities in South

Korea. The research highlighted that policy failed to ensure that the operational and investment foundation in the creation of an information society is properly developed. As a result, this has contributed to a number of issues ranging from concentration and duplication of infrastructure in the urban dense areas thus hindering progress in other areas of the country and the growth of mobile networks rather than fixed networks. The massive uptake of wireless broadband led to capacity problems, necessitating a need for faster, high capacity transmission links (Gedye, 2011).

Furthermore, infrastructure companies such as FibreCo, DarkFibre and local government continue to deploy fibre networks in major municipalities further resulting in the duplication and concentration of infrastructure in urban areas. This is despite the digital divide which continues as a result of lack of telecommunications infrastructure in underserviced areas. It appears that the policies dealing specifically with infrastructure sharing fail to promote innovation and high speed penetration of access to ICT's, particularly in underserviced areas. There is no evidence of success in creating synergies with relevant stakeholders and encouraging co-ordination and integration in activities relating to telecommunications infrastructure. Pickot and Werner (2007, p. 670) argue that contrary to the national policy, one can find different forms of co-operation between local authorities and private firms as well as subsidies for the construction of infrastructure on the local level. According to Southwood and Cohen (2008):

> government should assist operators in facilitating rights of way and access to ducts and poles, setting up clearing points of rights of way if multiple agencies are responsible

> for rights of way at different points of the network, provide information such as site surveys and geographic information systems for public land, speed up the processes for granting of rights of way, reduce the cost to operators for obtaining rights of way (p. 35).

The research highlights that the regulator is regularly constrained to enforce the initiatives for infrastructure sharing. For instance, there have been delays in the unbundling of the local loop where multiple telecoms operators will be allowed to use connections from Telkom's local exchange to the customer's premises. According to Teljeur *et al* (2003, p.17) to optimise the existing network capacity in the country and to drive down the price to more competitive global levels, all restrictions on facilities provisioning should be lifted, while Cohen and Southwood (2008, p. 32) argue that policymakers need to decide if their role is to promote innovation, affordable pricing and high speed penetration or to act as an economic stimulation in the form of being actively involved in the sector. In order to achieve this, policymakers should be able to identify the challenges and prioritise those issues that encourage investment in infrastructure in areas where no one wants to invest. So far, the research highlighted the grant of subsidies, appropriate incentives and sponsored pilot projects as issues that encourage investment in underserviced areas. In this way, policymakers should drive the market rather than leaving the process in the hands of operators and investors alike.

5.2 Challenges associated with policy and regulation in infrastructure sharing

Incumbent operators have tended to be cautious in addressing infrastructure sharing given the existence of the Competition Act, uncertainty with certain provisions of the EC Act and security of revenue. This is mainly because there is a policy vacuum with respect to network infrastructure sharing where operators enter into co-build arrangements or where a network infrastructure is created expressly for the purpose of sharing resources. The study revealed that infrastructure sharing involves reference to various laws and regulations and a multiplicity of issues that need proper co-ordination and clarity by policy and regulation.

Competition issues in network infrastructure sharing

The general problem in infrastructure sharing is that operators are cautious to engage in any activity which may be a prohibition of competition law principles. One of the reasons is that failure to comply with the Competition Act provisions results in payment of penalties which are substantially higher whilst the EC Act results simply in a written notice to cease or refrain from engaging in such act.

The literature highlighted that the EC Act deals with competition issues whilst on the other hand there is the Competition Act. The Competition Act has an objective to promote and maintain competition in the Republic in order to promote the efficiency, adaptability and developments of the economy (RSA, 1998). This has a direct bearing on the theme of infrastructure sharing. The research has illustrated that infrastructure sharing ensures the cost effective

way of rolling infrastructure and covering the broader community (urban/rural) and also leads to economic development, particularly in the rural environment. Taking this into consideration, this is the theme that ICASA is charged by the EC Act to promote. The only jurisdictional basis that set the two institutions apart is when it comes to restricted horizontal practices. These practices are:

> An agreement between, or concerted practice by, firms, or a decision by an association of firms, is prohibited if it is between parties in a horizontal relationship and if – **it has the effect of substantially preventing**, **or lessening competition in a market, unless a party to the agreement, concerted practice, or decision can prove that any technological, efficiency or other pro-competitive gain resulting from it outweighs that effect;** or directly or indirectly fixing a purchase or selling price or any other trading condition; dividing markets by allocating customers, suppliers, territories, or specific types of goods or services (RSA, 1998).

The above has a direct bearing on network infrastructure sharing. From the study, it was indicated that telecoms operators have entered into a collaboration to create a ring around the country linking key cities. If for

instance, direct competitors were to enter into a collaboration activity regarding network infrastructure sharing, be it fibre sharing, or capacity swapping, the arrangement would qualify as a horizontal relationship in terms of the Competition Act, which is not regulated by ICASA. In other words, if two competitors have agreed to fix selling or purchase prices, or for that matter have agreed to allocate each other's customers or suppliers, these competitors would be guilty of engaging in conduct that is in breach of the Competition Act even though they may want to show that the pro-competitive benefits outweigh the anti-competitive results.

Sharing the costs involved in joint construction or deployment of fibre network infrastructure could lead to a degree of commonality in costs. High commonalities of costs may increase the likelihood of collusive behavior, typically in the form of price manipulation. Where competitors share a significant component of their respective cost structures, tacit collusion with regard to price behavior is easily facilitated as there is now less uncertainty in the competitive environment regarding competitor's pricing. Co-operative agreements between competitors in concentrated markets also run the risk of becoming forums for the collusive exchange of commercially sensitive information. The literature has illustrated that some policymakers are of the view that network infrastructure sharing will encourage companies to collude with one another and any cost savings that arise from sharing will not be passed on to end users (Whalley, 2002, p. 181).

In fact, on a strict interpretation of the provisions of the Competition Act, if competitors purchase the construction services jointly, this could be regarded as fixing of a purchase price between competitors. However, according to

the European Competition Commission (**"the EC"**) Guidelines on the applicability of Article 81 of the EC Treaty to Horizontal Co-operation Agreements (**"the EU Guidelines"**) provides that:

> Other types of co-operation such as agreements on production or purchasing typically cause a certain degree of commonality in (total) costs. If this degree is significant, the parties may more easily co-ordinate market prices and output. A significant degree of commonality in costs can only be achieved under certain conditions: First, the area of co-operation, e.g. production and purchasing, has to account for a high proportion of the total costs in a given market. Secondly, the parties need to combine their activities in the area of co-operation to a significant extent. This is, for instance, the case, where they jointly manufacture or purchase an important intermediate product or a high proportion of their total output of a final product (European Commission, 2009).

In the South African environment there are no guidelines that are in existence to provide for similar type of exercise in respect of the roll out of infrastructure nor is there agreement that is envisaged in terms of the EC Act between ICASA and the Competition Commission in dealing with matters

that the two bodies should expressly deal with in giving guidance to the industry on issues of network infrastructure sharing. However, Hasbani *et al* (2007, p. 4) indicated that infrastructure sharing does not induce collusive behaviour when managed properly. As a result, the regulatory intervention which seeks to be effective in creating transparent and non-discriminatory rules of the game is likely to have a beneficial impact if it focuses on the minimum conditions required for fair competition in a complex network environment (Mansell, 1994, p. 598).

Cost of investment issues

The cost of deployment of infrastructure is another inhibiting factor in the provision of ubiquitous networks. It has emerged that in rural areas, the low population demographics and the deployment costs tend to discourage investment. Research has also illustrated that there are various parties such as landowners, municipalities and lobby groups with different vested interests in the process of deploying telecommunications infrastructure in general.

Further, there is an anticipated interest from the City of Johannesburg to benefit from the deployment of telecommunications infrastructure on its property. According to the proposed bye-laws, rights of way will only be granted in return for a fee. On the other hand, landowners require exorbitant rentals for leasing of their premises. The environmental lobby groups are a further addition to the delay in granting of permits to operators resulting in operators engaging specialists to try and convince the relevant departments about the value of telecommunications. All these issues contribute to the

delay in the deployment of infrastructure thus having an impact on the overhaul costs of investment.

According to Cohen and Southwood (2008, p.35) government should assist operators with facilitating rights of way and access to ducts and poles, set up clearing points for rights of way if multiple agencies are responsible for rights of way at different points of the network, provide information such as site surveys and geographic information systems for public land, speed up the processes for granting of rights of way, reduce the costs to operators for obtaining rights of way. The government consistently failed to address these issues which have translated into market failure in the telecommunications sector resulting in higher costs of telecommunications and operators deploying infrastructure in metro areas to reduce operational failures.

Coordination issues

The literature highlights that ICT development, including investment in a robust broadband infrastructure requires extensive co-ordination and co-operation among private and public sectors. The EC Act recognises the importance of coordination in that it emphasises the need for the Minister, in consultation with the Minister of Land Affairs, the Minister of Environmental Affairs, the Authority and other relevant institutions to develop guidelines for the rapid deployment and provisioning of electronic communications facilities (RSA, 2005). These guidelines have not yet been issued and as a result operators continue to experience delays in deploying infrastructure.

Frieden (2005, p. 609) illustrates that ICT development including investment in a robust broadband infrastructure requires extensive co-ordination and co-operation among private and public sector players. If government clearly intends to move towards an information society and fulfil the objectives set out in the broadband policy by 2019, there is a need for government to capture the value generated by each activity in infrastructure sharing and prioritisation of such activities for the achievement of an information society. In this instance, Frieden (2005, p. 609) argues that for government the empirically proven role involves neither a laissez faire abdication of responsibility, not intrusive heavy handed command and control regulation that predominated when private or government monopolies largely controlled the roll out of ICT. What is needed is focus in creating an enabling environment for infrastructure sharing and the provision of robust broadband infrastructure.

5.3 Information society and network investment

This research is rooted in the examination of the public interest theory and the theories of the information society. The public interest theory does not look at the bargaining power of the various interest groups that one has in the formulation of policies. It is however, able to rally the population to the higher goal that should be achieved and also to obviate the issue of policy and regulatory capture.

The underlying premise of the information society theory is that “modern productive system no longer depends on labour, land and capital as their primary input but rather they require information thus creating new production

systems and new ways of working – fundamental change in the forms of production driven by technology" (Mackay, 2001, p. 29). The negative of the information society theory is that in a developmental society, where there are competing needs for services, for example houses, water, sanitation, food et al., the objectives driven from that perspective would be regarded as elitist. However, given that South Africa operates in a global village, there is a need to attain certain levels of infrastructure development to allow the free flow of information in the network world.

Research has shown that widespread sharing of infrastructure is one strategy for achieving a national broadband infrastructure more quickly than through simply letting the market take its course (Cohen and Southwood, 2008, p.8). Network investment is therefore an integral part for the achievement of an information society. The research has shown that South Africa has a mature network environment in other parts of the country and that operators and local government continue to invest in telecommunications infrastructure in the urban areas resulting in concentration and duplication of infrastructure. This is because investors fail to take into account the public interest nature of providing ubiquitous infrastructure in underserviced areas to ensure the achievement of an information society. For many, there is no good commercial rationale for rural deployments. Local government, although narrowly focused, have realized the need for infrastructure to accommodate their bandwidth requirements. In this case, in an effort to move towards an information society, the City of Johannesburg approved the broadband policy (2009). The policies perspective on infrastructure sharing provides as follows:

> to clear direction on usage of rights of way encouraging wholesale pricing that is competitive; low cost interconnection with the city network infrastructure by telecoms operators and service providers in order to promote a competitive telecoms and broadband environment; Continuous migration to next generation networks bringing technological advances to the city (City of Johannesburg, 2009, p.3).

The City of Johannesburg aims to share facilities on an open access model. The same approach is followed by FibreCo and DarkFibre. Open access infrastructure sharing according to Southwood and Cohen is a way of allowing multiple downstream competitors to share a bottleneck facility that is a critical input for the services that are provided (2008, p. 5). Research has shown that operators are not in favour of open access sharing model, whereas infrastructure companies and municipalities are in favour of the model. This is because operators still want to retain some form of control over the facility.

The literature illustrates that open access model is a way of addressing bottlenecks quicker rather than managed services preferred by operators. The same approach, if properly co-ordinated, could be extended to underserviced areas. What is needed is sound infrastructural planning and innovative regulations which will provide broadband which has the potential not only to provide high end services to the business sectors but a range of

low cost, high quality services to all (Gillwald, 2002). If relevant models are piloted in underserved areas, the benefits of broadband services will be extended to all.

The literature illustrated that much policy has been predicated on the assumption that once adequate infrastructure is in place, socially useful and usable applications and services will follow. Further, that broadband policy should not be calibrated around the (somewhat determinist) perspective of the infrastructures “last mile” in reaching the user rather greater emphasis on understanding the “first mile” of the infrastructure from the perspective of the people actually using it and developing new social routines and practices around the technology (Preston and Cawley, 2008, p. 813).

Illustration 6 below is an assessment of availability and affordability of services. It has been highlighted in the research that every aspect of people’s lives revolve around information and therefore consumers should be enabled to have access to a number of areas including education, telemedicine, e-government and e-commerce services. The illustration shows that South Africa is still lagging behind regarding critical aspects relating to information society. The categories show that there are areas which still need attention in terms of the provision of services. This in itself emphasises the need for government to have an understanding of the “first mile” of the infrastructure.

Illustration 6: An assessment of availability and affordability of services

Availability and Affordability of Services	National	Provincial	Metro/ District Municipality	Municipality	Critical nature of infrastructure in attaining information society objectives
Voice,	✓	✓	✓	✓	
Internet,	✓	✓	✓	?	
B/B	✓	✓	✓	?	
e-services and multi-media/cloud computing	✓	?	?	N/A	

Source: M Magagane (2010)

The literature highlights a number of initiatives that governments took to invest in infrastructure that support high bandwidth intensive technologies. Lau *et al* (2005, p. 325) indicated that in moving to stimulate the creation of national network in South Korea, the Korean government pushed forward broadband deployment even for conventional businesses, although mediated via privatized service providers, industrial policy including modest national subsidies have undoubtedly been instrumental in accelerating the speed of deployment to achieve remarkable levels of adoption. At this stage, the services that are been accessed are high bandwidth intensive and require infrastructure that will be able to sustain the demand in the long run.

The biggest advantage of network infrastructure sharing is the potential to have operators to fully compete in the provision of high speed and high quality services that are able to accommodate high bandwidth requirements, which continue to create challenges for wireless broadband. This study has shown that sharing of infrastructure is one strategy for achieving a national broadband infrastructure more quickly than through simply letting the market

take its course (Cohen and Southwood, 2008, p. 8). Therefore, the policymaker need to take advantage of the renewed energy by infrastructure investors and offer incentives that would encourage the deployment of infrastructure in underserviced areas for the achievement of an information society.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS: POLICY AND REGULATION IN ENABLING INFRASTRUCTURE SHARING AND ACCESS TO BROADBAND

6 Introduction

The research recorded the findings and conducted an analysis to derive meaning from them. In this research, there were key issues that were raised in an attempt to answer the research question. Therefore, the aim of this chapter is to draw together the analysis of the previous chapters based on the literature review, industry reports and interview results. It also focuses at the key issues that emerged from the study.

6.1 Infrastructure sharing: policy and regulatory interventions

In answering the main research question it emerged that infrastructure sharing is driven from a different context compared to what the EC Act envisaged. The sharing of infrastructure has the ability to increase competition allowing multiple telecoms operators to deploy services in areas where they do not have physical infrastructure. However, in order for the entire country to benefit from infrastructure sharing, there should be policy and regulatory interventions which seek to engage in the value chain mapping and analysis to unlock the gridlock and ultimately to achieve the maximum benefits of becoming an information society. The research has illustrated the initiatives that were undertaken in an effort to address the roll-out of infrastructure in various parts of the country. It is clear, given the status quo that there is a policy vacuum. To begin with, in infrastructure sharing and for the specific regulations on facilities leasing, interconnection and

associated regulatory intervention on LLU and essential facilities to be effective there is a need for the availability of ubiquitous infrastructure in many parts of the country. The effect of the operators business models have resulted in concentration and duplication of infrastructure in urban areas. Therefore, the specific regulations and regulatory interventions on infrastructure sharing benefit the end-users in those areas where there is an abundance of high capacity telecommunications networks. Many people in underserviced areas rely on wireless broadband which often has limited capacity.

Therefore, for South Africa to become and information society there is a need for a strategic shift in policy and regulatory interventions in infrastructure sharing. This will require high capacity broadband networks that are able to accommodate high bandwidth requirements which support the future needs. The question that often poses an unprecedented challenge is how to expand the access network infrastructure in the underserviced areas?

Research has shown that operators collaborate either in co-build arrangements to deploy infrastructure with the aim to reduce the operational and capital costs of deployment and in other cases a network infrastructure will be created for the purpose of sharing resources. It is in this instance that network infrastructure sharing will play a role. Network infrastructure sharing in underserviced areas will be able to serve the need for telecommunications networks with higher capacity and this will have the effect of reaching a wider geographical region hence ensuring availability of broadband access. According to Hultell et al., (2004), the cost of savings achieved by sharing networks has been established to be in the order of 10-15% calculated over

a period of 6-10 years. He illustrates that these savings stem from reduced capital and operational expenditure related to the network which constitute 40% of the total costs.

Once there is infrastructure in the underserviced areas, the regulatory interventions on specific regulations on facilities leasing and interconnection will provide the desired results. This will bring more competition where new entrants will be able to enter the market, improved customer service and end users will be able to access voice, data, video and multimedia applications at the highest speed and quality. Given the dynamics of the country on broadband access and the need by government to increase access to broadband for the development of an information society, network infrastructure sharing is key to the rapid deployment of infrastructure in underserviced areas with low population density and sparsely populated areas. However, for network infrastructure sharing to realise the expected benefits, there are a number of initiatives that policy and regulation should consider.

6.1.1 Policy initiatives

From the study it has emerged that the policy environment has a history of being plagued by a variety of issues ranging from the dynamic nature of the telecommunications environment, multiple and often conflicting objectives contained in unrelated legislation governing the sector and often unprioritised policy objectives. Research has shown that the various policy initiatives seeking to create an enabling environment range from the period 1997 where Telkom was given exclusivity to rollout 2 million phones and digitise the

network. Thereafter, the SNO, Sentech and USALS were given licences to rollout infrastructure and provide services in the country. On the other hand, mobile operators and the VANS were given the right to self-provide infrastructure.

At the time of promulgation of the EC Act, no substantial progress was made with regard to the deployment of infrastructure in South Africa. There was a further policy initiative which led to the amendment of the EC Act seeking to license Broadband Infraco. In addition to that, the court of law passed the Altech judgment which compelled ICASA to grant electronic communications licenses to the VANS operators.

The delay by the regulator in implementing some of the provisions of the EC Act and the policy directives continue to create uncertainty in the industry and hinder progress in the provision of telecommunications facilities. For example, the process on unbundling of the local loop has been very slow and failed to be achieved by November 2011 as directed by the Minister of Communications, the late Matsepe-Casaburri in 2007.

Research has shown that there are various constraints in deploying telecommunications infrastructure. As a result, the EC Act attempts to introduce mechanisms to ensure the rapid deployment of infrastructure and to limit the constraints encountered by potential investors when deploying infrastructure. The constraints are in the form of lengthy processes that network operators have to engage in when seeking permission to deploy infrastructure. At the moment, there is no overarching framework which informs the deployment of electronic communications facilities and of existing

electronic communications facilities. The framework should be able to incorporate the needs of various departments such as the Department of Environmental Affairs, Provincial and Local government, the Department of Land Affairs and other relevant institutions whilst taking into account the objectives of the Department of Communications in the provision of ICT's.

Policy and regulatory processes in various national government and local government departments are incoherent and inconsistent with the EC Act including policy objectives of ICT's. In this case, local government has been involved in the issuing of bye-laws on sharing of facilities. There appears to be, given the proposed bye-laws that the City of Johannesburg intends to take away the regulatory rights conferred by the EC Act and ICASA Act from ICASA. The other effect of the proposed bye-laws is that it contradicts the provisions of section 22 of the EC Act which deals with the rights conferred by the EC Act on ECNS licensees to enter upon any land and construct and maintain facilities. The proposed bye-laws have the effect of creating barrier to entry and preventing effective competition.

There are also, various government departments which deal with issues of ICT infrastructure at various levels. For example, the Department of Communications, which has jurisdiction over Telkom, SABC and Sentech; the Department of Public Enterprises which has jurisdiction over Broadband Infraco and until recently Neotel which are SOE's that have substantial telecommunications infrastructure from Transnet and Eskom; the Department for Science and Technology which has jurisdiction over Satellite Communication and Earth station and now currently rolling out fibre in the Northern Cape for the SKA Project; and the Department for Public Services,

which has jurisdiction over SITA which is mandated to roll-out ICT services in government leading to the deployment of e-gov services.

Research has shown that policy and regulation failed to balance the requirements of enabling infrastructure investments in underserviced areas and to discourage the duplication and concentration of infrastructure in urban areas. This is despite provision for the creation of incentives for the deployment of infrastructure in underserved areas in section 3 of the EC Act. Proper structures are needed to ensure the creation of incentives to investors in underserviced areas. These incentives need not be in the form of funding, but in the relaxation of rules relating to obtaining of permits, tax breaks, assistance with maintenance costs and assistance in providing infrastructure such as electricity where there is none. This would have an effect on how operators approach their business models and will encourage competition and innovation in the provision of ICT's.

6.2 Scope of infrastructure sharing and provision of ubiquitous infrastructure

Telecoms operators always align their business models with technological developments and market realities. The market realities and related services are bandwidth intensive and demand infrastructure that can withstand the market demand. As a result, the constant changes in the ICT environment demand a huge shift on how operators deal with the new competitive dynamics. This is evidenced by the massive uptake of mobile broadband which led to capacity problems.

As the South African market has shown, infrastructure sharing is mandatory. The EC Act makes provision for open access principles, such as, the obligation to interconnect and lease facilities, exemption from the obligation to lease and interconnect essential facilities and international facilities. On the other hand, infrastructure companies introduced the leasing of facilities on open access model. Research indicated that open access model has the potential for promoting competition rather than the managed network access. Research indicated that South Africa is a country of two tales, where you find areas with a high concentration and duplication of infrastructure and areas where infrastructure is non-existent. There are however, areas where Telkom has coverage and where local loop unbundling may enable other operators to have access to Telkom's exchanges which links homes and offices. However, given the fact that Telkom was not able to deploy infrastructure in many parts of the country, LLU alone will not be able to increase access to broadband.

6.3 Recommendations

The current state of infrastructure development continues to hamper growth in other parts of the country. In order for South Africa to become an information society, the policymaker and regulator will have to adopt a process that will enable infrastructure sharing and encourage investors to invest in underserviced areas. Infrastructure sharing would therefore require guidelines on network infrastructure sharing, particularly with regard to co-build arrangements. Other issues that need to be addressed are regulations on essential facilities and even more stringent rules regarding the granting of spectrum and rural urban split scenario. The researcher trusts that the

policymaker and regulator will find the conclusion in this research useful in the achievement of its objectives in the infrastructure sharing market to allow for the development of an information society.

6.3.1 Prioritise the infrastructure sharing regulatory interventions

Research has indicated that for South Africa to achieve an information society, there is a need for a strategic shift in the manner in which infrastructure can be leveraged to promote access to broadband. There are areas where infrastructure is non-existent. Failure by government to provide a value chain framework which will provide seamless and transparent processes will continue to have the effect of the low level of broadband access in the country. This is because if there is limited infrastructure, the specific regulations on infrastructure sharing will only deliver the desired benefits to the selected few. Therefore, there is a need to ensure the ubiquitous provision of infrastructure in the underserviced areas. Broadband Infraco, the VANS and USAASA are some of the innovative solutions that could be targeted to provide network infrastructure sharing in underserviced areas.

6.3.2 Coordination of electronic communications network activities with national government departments and private investors

It is recommended that all the conflicting objectives in various government departments be reconciled and all stakeholders be involved in the process of developing an information society. This requires the development of an overarching framework in dealing with the deployment of telecommunications

infrastructure and existing infrastructure. This should deal with regulatory requirements such as obtaining of permits and the high deployment costs which discourage deployment in rural areas.

6.3.3 Enforce LLU on Telkom

It has been argued in this research that local loop unbundling is an important way of potentially reducing telecommunications costs and opening up barriers to entry to other operators in the broadband market. Therefore, it is important for ICASA to prioritise the unbundling of the local loop and to find innovative ways of ensuring that LLU is a reality. For instance, the EU made it mandatory in 2001 and as a result established a body that intervened and enforced the structural separation of the networks. If the process of unbundling the local loop is left in the hands of Telkom, Telkom will continue to resist giving up control of its infrastructure. However, as mentioned earlier in this research, LLU alone will not have the desired effects of increasing access to broadband, particularly because telecommunications infrastructure is limited in the country.

6.3.4 Focus on encouraging operators to share infrastructure and invest in underservices areas

With the advent of many players in the electronic communications network industry through the Altech judgement, the SOE's and other private operators there is a need for effective planning of the infrastructure market. As a result, there is a need for the policymaker to conduct an analysis of the rural- urban split to determine areas which are concentrated and those which are underserviced and come up with appropriate policies that will encourage the

deployment of infrastructure sharing in those areas where infrastructure is non-existent. This will reduce the concentration and duplication of infrastructure in urban areas while increasing the possibility of access to broadband in many underserviced areas. The policymaker should furthermore, conduct a cost benefit analysis which will inform the network infrastructure sharing in particular areas. This is because in low population densities there is no commercial rationale for infrastructure deployments because it turns out to be costly for investors.

On the other hand, operators and OEM's should be encouraged to assist with regard to the analysis of the possibility of introducing some technologies that can ensure the rapid deployment of broadband depending on the demands of a specific area. This is because OEM's and operators are drivers of the market and are better positioned to provide solutions that can enable access to quality and affordable services.

6.4 Areas for further research

The role of policy in infrastructure sharing and access to broadband in South Africa is a challenge, particularly due to the concentration and duplication of infrastructure in dense metro areas. The broadband policy offers further challenges in that it aims to achieve an information society by 2019. As a result this offers a range of possibilities for future researchers in extending the scope of the study in the following area;

- How can infrastructure sharing be achieved in a robust and systematic way that assist both the incumbent telecoms operators and the new

entrants in minimizing their Capex and Opex and lead to the implementation of the policy objectives?"

There is also a need for a detailed assessment of the options available to policy and regulation in enabling infrastructure sharing and the potential for increasing access in underserved areas, driven by private sector.

6.5 Conclusion

What emerges from the study is that it is critical for policy and regulation to take into account the value chain framework prior to formulation of specific regulations on infrastructure sharing. Research has shown that failure to omit one aspect of the value chain has the potential to create bottlenecks in the entire value chain. Therefore, in the absence of telecommunications infrastructure in a particular area, network infrastructure sharing has the potential of increasing access in that underserviced area. In this case, Preston and Cawley (2008, p. 814) argue that knowledge based economies achieve a balance between supply side and demand side dimensions. They argue that where infrastructure goals have been largely achieved, policy has shifted to supporting the development of innovative applications that make broadband adoption compelling, and is sensitive to the social learning process by which citizens integrate new ICT's into their lives.

It appears that there is a need for policy and regulation that is ahead of technological changes and market realities demand in order to achieve an information society. South Africa has a better chance of achieving the demands for infrastructure and access to broadband should network

infrastructure sharing be encouraged. However, this requires proper planning and prioritization of national objectives and commitment for the creation of an information society.

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APPENDIX A

Semi structured interview questionnaire

Dear Colleague

I am a student at Wits University, Link Centre studying Masters in Management (ICT PR). I require your assistance in completing my thesis as part degree requirements.

My research is in the area of infrastructure sharing and access to broadband, the role of policy and regulation. There is evidence that broadband is growing rapidly around the world. The issue being investigated is the policy and regulatory instruments that will enable developments in infrastructure sharing and respond to the demand for broadband.

At this stage, and hence the approach to your honorable self, is to finalize a qualitative study based on semi structured interviews to establish the views of different role players with regard to infrastructure sharing and the role of policy in accelerating broadband diffusion. This may take approximately 1 hour of your time. If there are any glaring omissions that you may identify, I would appreciate you pointing them out and a possible suggestion of incorporating them in my research. The collected data will be used to help determine patterns, themes, trends and how these contrast or merge with the literature reviewed. I attach herewith the interview guide for your perusal and review prior to the meeting.

Thank you in advance

Kind Regards

Violet Magagane

Interview Guide

Infrastructure Sharing and access to broadband, the role of policy and regulation

Name:
Company Name :
Position/Title:
Years in the ICT Sector:

Questions

Policy and Regulation
The role of the DoC as the policymaker is to make sure that the industry achieves certain objectives in the acceleration of ICTs • What in your view informs or should inform the policy formulation? • How should the policymaker engage with industry prior to policy formulation? • What should trigger policy formulation? • In the event a policy position has been outmaneuvered by technological developments and operational realities, how should this gap be closed? Given that SA wants to become an information society, • What in your view constitute an information society? • What step can be undertaken to achieve this? • How/ what approach would you suggest in developing a policy framework? Is there a role for Original Equipment Manufacturers (OEMs), telecoms operators, provincial and local government)?
• Is the impact of any policy subjected through any cost benefit analysis and to specific time frames? • What in your view should happen when these are not met or dragged

beyond their timelines?
Many blame ICASA for not being able to enforce regulations or direct the industry, • What model(s) do you think can be explored in the balancing of all interests in the ICT sector?
• Is there a different approach needed in developing policies for a developed world and developing world? o Does technological development and funding play a role in this regard? If so, what should policy formulation entail?

Infrastructure Sharing
• Is there a role that policy and regulatory framework can play on the issue of infrastructure sharing? o Over and above the current legislative framework, what should policy and regulatory actors do?
Given the initiatives undertaken by telecoms operators in South Africa on infrastructure sharing, • How can government and ICASA assist in ensuring a sustainable development of infrastructure sharing? o What factors do you think can be considered? ▪ Urban settings ▪ Rural settings
• Is the current infrastructure sharing model by telecoms operators the best?
• What other models can be considered?

Broadband diffusion
• What are the key issues that are attractive in the proposed broadband policy by the Department of Communications?   o What should be the firm building block in attaining the vision espoused for 2019?

• What are your views in furthering broadband diffusion in South Africa?
  o What role would policy play in the diffusion of broadband (South Africa)
  o Whether it is possible to get broadband to the vast majority of the households? How?
  o Which model do you think will increase access to broadband to the majority of the South Africans

• What is to blame for the country's low broadband diffusion?
  o Rural
  o Urban

• Is it possible for telecoms operators to reduce broadband prices without government incentives?   o What type of incentives can be considered?
• How would one breach the question of affordability, because affordability equals usage? If there is a difference what is the best mechanism for subsidizing broadband rollout?

Original Equipment Manufacturers (OEMs)

• What is the view of OEMs with regard to
  o infrastructure sharing ?
  o provision of ubiquitous network to attain broadband diffusion?

• Does Facilities Leasing pose a threat in the profitability of OEMs?

○ Does the cost of equipment play a role in the development of broadband and an information society?
• What regulatory impediments exist in the deployment of current technology that may assist in broadband diffusion?
• What is the technology landscape for the next 5 to 10 years?

Infrastructure Sharing in relation to local government
• Is there a role that local government can play on the issue of infrastructure sharing? ○ What are the current initiatives by the City of Johannesburg? ○ Over and above the current initiatives, what should local government do to enable infrastructure sharing and the provision of ubiquitous network? • How in your view has local government encouraged infrastructure sharing and the development of an information society? • What is local government strategy regarding the existing fibre? • What factors do you think can be considered? ▪ Urban settings ▪ Rural settings