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LOCAL LOOP UNBUNDLING AND COMPETITION IN SOUTH AFRICA

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Abstract

Over the past thirty years, telecommunications markets the world over have begun liberalising, heralding a new era for both players and regulators. As developing country markets have started liberalising regulators have utilised policy tools, like local loop unbundling and price regulation, to aid this liberalisation. A debate has sprung up around whether these tools do what they intend, and whether they are relevant in developing markets. This study examines the potential impact of one such tool – local loop unbundling – on competition in one such market – South Africa. Based on this examination a framework is presented that policymakers in South Africa and other emerging markets can use when considering their own LLU implementations. The framework considers the type of competition desired and the rationale for the unbundling exercise, informed by the cost, complexity and control related to each specific type of unbundling, in order to guide policymakers and regulators in deciding on the form of unbundling most likely to result in a desired form of competition.

Declaration

I declare that this report is my own, unaided work. It is submitted in partial fulfilment of the requirements of the degree of Master of Management in ICT Policy and Regulation at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in any other University.

Samantha Jain Perry
30 March, 2012

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Dedication

To Nic, for being there, and my parents, who couldn't.

List of acronyms:

ADSL – asynchronous digital subscriber line

CDMA - code division multiple access

DSL – digital subscriber line

EDGE – enhanced data rates for GSM evolution

HSPA+ – high-speed packet access plus

ICASA - Independent Communications Authority of South Africa

ICT – information and communications technology

ITU - International Telecommunication Union

LLU – local loop unbundling

LTE – long term evolution

OECD – Organisation for Economic Co-operation and Development

POTS – plain old telephone system

SADC - Southern African Development Community

SNO - second network operator

UMTS – universal mobile telecommunications system

VAN/S – Value-added network service provider/s

WiMax – worldwide interoperability for microwave access

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Glossary of terms

Bitstream – a type of local loop unbundling whereby the incumbent gives entrants a wholesale xDSL product that they can resell to consumers – full control of the lines is retained by the incumbent (OECD, 2003: p7,8).

Call termination rates – the rates operators charge each other to terminate calls on their networks. For example, if a customer of operator A makes a call to a customer of operator B, operator A has to pay operator B to terminate that call, and vice versa.

Carrier pre-selection – a policy intervention that enables consumers to pre-select which carrier to carry a call, before that call is made, via their handset.

CDMA-2000 – code division multiple access 2000. One of the CDMA family, used to provide high-speed, wireless Internet access.

Colocation – where an operator's equipment is housed in a facility belonging to another operator or a neutral facility provider, for example, equipment housed by an entrant in an incumbent's exchange for the purposes of providing services to consumers via the incumbent's copper infrastructure.

DSL – digital subscriber line. DSL is used to deliver high-speed broadband services, uses copper-line infrastructure and digital-enabled exchanges. xDSL refers to a variant of DSL like ADSL (asynchronous digital subscriber line) or HDSL (high bit-rate digital subscriber line).

EDGE – enhanced data rates for GSM evolution. EDGE is a technology that allows the delivery of data over GSM networks. Also known as Enhanced GPRS or enhanced data for global evolution.

Entrant – a company entering an industry. In this context, entering an

industry dominated by a monopoly incumbent.

Exchange – the physical facility where telecommunications equipment connecting local copper loops to the provider's network and enabling calls to be routed and carried appropriately is housed.

Fibre optic cable – fibre optic cables are strands of glass that carry data at high-speeds and are used for high bandwidth applications, like carrying data from continent to continent via the sea bed (undersea cables).

Fixed line telephony – also known as POTS (plain old telephone system), fixed line telephony is a telephony service provided over fixed copper cable infrastructure.

Facilities-based competition – eg. describes competition between providers of the same or similar, for example, telecoms services, where the service is delivered by different or proprietary means or networks. For example a broadband over powerline provider competing with a cable TV network to provide broadband Internet service is considered to be facilities-based competition. Also called infrastructure-based competition. (Webopedia)

Full unbundling – a type of local loop unbundling whereby the incumbent's copper is leased to a new entrant to offer services over, and the incumbent ceases to provide services but still owns the infrastructure and has to maintain it (OECD, 2003: p7,8).

HSPA+ – high-speed packet access plus. HSPA is a protocol used to deliver high-speed broadband over a mobile network.

Incumbent – a monopoly provider of services in an industry, in this case telecommunications. Often put in place and subsidised by a country's government in an industry where it was thought it would not be feasible to

have more than one player (so called natural monopoly industries) like transport, utilities and such.

Line sharing – a type of local loop unbundling whereby the new entrant is afforded access to some of the copper pair so, for example, the incumbent offers voice and the entrant offers broadband to the same consumer over the same (shared) line. (OECD, 2003: p7,8)

Local loop unbundling – is a policy intervention intended to make the last mile of copper wire between a telecommunications exchange and a consumer available to telecommunications operators to offer services competing with those offered by the incumbent telecommunications company, which owns the infrastructure.

LTE – long term evolution, a high-speed wireless broadband protocol, the successor to CDMA-2000.

Mobile telephony – telephony provided wirelessly over various types of cellular telephone networks.

Policy intervention – a plan of action designed to create a set outcome in a particular market, enacted by policymakers, usually government and/or regulatory bodies.

Price squeeze – in this context, where last mile services where subsidised in the past and are thus provided at below cost by incumbents, and entrants coming into the market are obliged to pay the incumbent at cost to lease the local loop and thus rendered unable to deliver services to consumers at a lower price than the incumbent offers.

Retail market – where providers sell services to end-consumers.

Service-based competition – competition between providers where each

provides services using the same infrastructure, for example, where a local loop has been unbundled and the incumbent and entrant are both using copper wire to provide voice services, or, “when the entrant uses the facilities of the incumbent, competition is called service-based and can be realised either through resale or through unbundling schemes” (Bourreau & Doğan, 2004: p289).

Sub-loop unbundling – where the entrant connects to a point in the local loop (usually at the primacy connection point or street cabinet) on a full or shared basis. Best suited to fibre to the curb environments where high-speed bandwidth connections are being provided. (Telecommunications Authority of Trinidad & Tobago, 2009: p15)

UMTS – universal mobile telecommunications system, a mobile technology used to deliver data at high-speed.

Wholesale access services – services provided to a company for resale, for example, bitstream access provided to an entrant by an incumbent to enable the entrant to resell said services to consumers.

WiMax – worldwide interoperability for microwave access, a high-speed, wireless, broadband access technology.

Chapter 1 A comedy of errors in LLU regulation

1.1 Introduction

South Africa's telecommunications market is still lacking competition in the fixed line sector despite government efforts to liberalise. One of the policy interventions aimed at remedying this is local loop unbundling. The local loop is the last mile of copper between a telephone exchange and a customer's premises. Local loop unbundling is a process whereby that last mile of copper wire is made available to telecommunications operators to offer services competing with those offered by the incumbent telecommunications company, which owns the infrastructure. Local loop unbundling has been implemented worldwide by at least 25 countries since it was first posited in the 1980s.

In this chapter the researcher briefly outlines the problem of telecommunications access in South Africa. The access discussion is followed by an outline of the reform of the telecommunications sector to date, specifically the government's efforts at remedying the access situation. Thereafter, the researcher sketches the objective, questions, methodology and theoretical framework for this research, before concluding with a brief note on how this research will contribute to policy as a whole.

1.2 The problem of telecommunications access in South Africa

Access to telecommunications services in South Africa has been restricted, historically, and access to some services is still limited based on the consumer's location or ability to pay for such services. Access was initially restricted by the monopoly incumbent's inability to roll out services to all areas, and later due to the high cost of fixed line and mobile services. Today, while the fixed line network has consistently shrunk for at least the past decade, mobile telephony has become ubiquitous and Internet access is increasing, mainly thanks to mobile data connectivity

(although it is not universally available or affordable by any means). Growth in the mobile space is not expected to slow, while fixed is expected to decline further, following the trajectory outlined in the tables 1 and 2 below.

Table 1: Telecommunications penetration 2002 – 2011

Year	Fixed lines[#]	Mobile subscribers
2002	4 924 000	11 000 000*
2003	4 844 000	16 000 000[§]
2004	4 821 000	21 000 000[§]
2005	4 726 000	30 000 000[§]
2006	4 708 000	35 000 000[§]
2007	4 642 000	41 000 000[§]
2008	4 533 000	46 000 000[§]
2009	4 451 000	51 800 000*
2010	4 273 000	50 000 000*
2011	4 152 000[$]	52 000 000[±]

 # - Muller (2011)

** - Creamer Media Research Unit (2010)*

$ - Telkom (2011)

§ - van Eeden (2009)

± - Cell C (2012), MTN (2011), Vodacom (2010)

Table 2: Estimated telecommunications penetration 2012 – 2015

Year	Fixed lines[§]	Mobile subscribers[*]
2012	3 471 000	57 820 000
2013	3 297 000	60 140 000
2014	3 143 000	62 000 000
2015	2 994 000	63 600 000

** - African Telecoms News (2011)*

[§] *- Economist Intelligence Unit (2011)*

South Africa's regulator and policymaker believe a bottleneck exists at the last mile of the fixed line telecommunications network in that this infrastructure is still controlled by historical monopoly incumbent Telkom, and is too expensive for new entrants to duplicate. Freeing up this bottleneck, it is believed, will enable competition in the last mile sector of the market and give customers more choice of provider for both voice and Internet services, consequently reducing costs and improving availability and quality of these services. LLU has been posited as a means to unplug this access bottleneck.

LLU is a policy intervention designed to increase competition as part of the process of liberalising a telecommunications sector, and unplug the bottleneck at the last mile. It involves making the last mile of copper wire between a telecommunications exchange and a consumer available to telecommunications operators to offer services competing with those offered by the incumbent operator, which owns the infrastructure.

LLU was first discussed in South Africa in 2003. A Ministerial directive issued four years later made it possible for LLU to be implemented, provided the regulator, ICASA, published regulations to make it so. At the time of writing in early 2012 it had still not been implemented, and as regulatory and industry attention has turned to the issue of frequency spectrum and the allocation thereof for use by the operators to provide 4G services, it is unlikely to be introduced this year either. Technology, and the market, is moving on apace, however, and some commentators have noted that the time for local loop unbundling has passed, while others still believe it is a crucial intervention to ensure competition in the sector.

1.3 Government's efforts at reform

1.3.1 Managed liberalisation

Until 1993, telecommunications services in the country were provided

solely by the incumbent monopoly provider – Telkom (Pty) Ltd. The licensing of two mobile network operators (MNOs), Vodacom and MTN, in that year, brought competition to the voice telephony sector for the first time while the country was undergoing a profound political transformation, from an exclusionist society split along racial lines (per the apartheid policy of the National Party government) to what the country's first President Nelson Mandela called a rainbow nation – inclusive, equal, open.

The country's first democratic elections took place in 1994, and the policies the ANC government put in place following its taking power would profoundly affect the telecommunications sector going forward. It was ANC intervention that saw 50 percent of mobile operator Vodacom go to Telkom (ANC, 2010: p2), for example. Additionally, it was the ANC's wariness of letting institutions provided for in Section Nine of the Constitution have a degree of independence that has proven problematic for ICASA (Currie & Horwitz, 2007: p6). Other examples exist but are beyond the scope of this background discussion.

1996 saw the promulgation of the Telecommunications Act, which aimed to regulate telecommunications and broadcasting “in the public interest” (Telecommunications Act, 1996) and which served as one of a number of government initiatives aimed at realising government's vision of an inclusive information society (Gillwald, 2003: p5). South Africa, as a member of the Southern African Development Community (SADC), adopted the policy framework adopted by the region for telecommunications sector reform. “The framework made provision for privatization, an exclusivity period, followed by further review of options for introducing competition” (Riley Allen, 2003: p1). In South Africa this was called the 'Managed Liberalisation' policy, and was announced by then President Thabo Mbeki in a Parliamentary address on 9 February 2001, and referred to in an address by then Minister of Communications Ivy Matsepe-Casaburri (2001, p1) on 11 February 2001. In said speech, Matsepe-Casaburri stated that:

> ... government has started with the process of introducing managed liberalisation of the telecommunications industry with the hosting of the national telecommunications colloquium in February 2001. The colloquium was aimed at providing a platform for different sectors of society to make inputs on the future of the telecommunications policy, and the industry in general. Government envisages finalising the policy by the end of the first quarter of 2001 (Minister of Communications, 2001: p1).

The concept of managed liberalisation was first introduced with the Telecommunications Policy White Paper drafted in 1995 and 1996, which informed the provisions of the amended Telecommunications Act of 1996. The paper was hammered out through a series of consultations with industry, and provided for a timeline for liberalisation. The final Act, however, differed from the Green and White Papers.

> If there is an “original sin” moment, an event that cast South African telecommunications reform along a particular path, it was the alteration of the White Paper as draft legislation went to Parliament in 1996. The Telecommunications Act vested in the Minister several of the powers the White Paper had reserved for the Regulator and eliminated the White Paper’s painstakingly achieved liberalization timetable in favor of ministerial discretion regarding when and if various segments of the sector would be opened to competition (Republic of South Africa, 1996b). … Although the White Paper, like the Telecommunications Act, gave Telkom a 5-year period of exclusivity to fulfill a universal service mandate (the Act offered an optional sixth year), two elements of the White Paper would likely have opened the sector relatively quickly, without damaging Telkom. Resale of communications service by other private entities was to be permitted after three years, and self-provision of links to the backbone network was always to be permitted if and when Telkom could not accommodate the request with reasonable quality in reasonable time (Currie & Horwitz,

2007: p7, 8).

As Horwitz and Currie note, all the exclusivity period did was enable Telkom to entrench its interests in the sector, and raise its prices to punitive levels (Currie & Horwitz, 2007: p1).

> By the end of the five year exclusivity attached to the privatisation, there were fewer residential lines than in 1997, which have continued to decline; Telkom's prices and costs continued to be protected for the (IPO) initial private offering; and ineffective regulation of the incumbent resulted in anti-competitive behaviour which had a chilling effect on the liberalised segments of the market (Comninos, Esselaar, Gillwald, Moyo & Naidoo, 2010: p5).

Telkom's exclusivity period was scheduled to come to an end on 7 May 2002, as per the Telecommunications Act (1996 as amended by Act 64 of 2001). By then it was due to have installed "2.69 million new access lines (including 1.67 million lines in under-serviced areas)" as well as connected "3 204 villages, and install[ed] 120 000 payphones" (Schofield & Sithole, 2006: p9). In fact, it had disconnected 1 766 000 lines by 2002 (Hodge, 2003: p6). Ministerial Directions issued by the late Minister Ivy Matsepe-Casaburri in September 2004 went some way towards liberalising the market, by enabling mobile telecommunications providers to acquire fixed lines from a provider other than Telkom, enabling value-added network service providers (VANS) to supply voice over any protocol, enabling VANS to provide services over facilities provided by operators other than Telkom or the Second Network Operator and enabling private telecommunications network operators to resell or lease spare capacity, amongst other things, as of 1 February 2005 (Minister of Communications, 2004). These determinations were very positively received by industry. Headlines like 'VOIP to be legal at last', from *ITWeb* (Vechiatto & Weidemann, 2004), were common, and the news that VANS would be able to self-provide their own facilities or lease from alternative providers was particularly well-received. Unfortunately, the Minister reversed her

decision on self-provisioning just before it was due to come into effect, in a press statement issued on 31 January 2005 (no longer available online but cited by ISPA, amongst others, in reference to the subsequent Altech court case). This would later lead to the Altech court case which overturned her reversal and enabled more than 500 value-added network service providers (VANS) in South Africa to provide their own infrastructure or lease it from whichever provider they preferred (Ellipsis, 2008).

The much anticipated second network operator was licensed in December 2005, following “significant delays” (Aproskie, Hodge, Lipschitz, Sheik, 2008: p6). That same year, the liberalisation process was continued through the drafting and promulgation of the Electronic Communications Act (2005), previously known as the Convergence Bill. The Convergence Bill was drafted with the aim of enabling the Department of Communications and ICASA to respond to the convergence happening in the ICT sector, in terms of technology and the converged services it enables (Department of Communications, 2003: p3). A strong driver for the regulatory reform envisaged by the Department of Communications (the driving force behind the Colloquium) was the need to provide universal access and service, as evinced by the prominence this is given both in the National Convergence Policy Colloquium report and the subsequent Convergence Bill. The bill provided for a strengthened regulator through providing the regulator with funding from licensing fees as well as a technology-neutral licensing structure. Where previously operators were licensed to provide, for example, telecommunications services over a mobile telephone network, they would now be licensed to provide communications services or communications network services irrespective of the technology used.

Competitive interventions like LLU, while raised at the Colloquium (Department of Communications, 2003: p9), were not included in the draft. Interconnection fees, which determine what fee an operator pays to another operator to connect a call to its network, and facilities-leasing

guidelines, which determine the parameters for operators to lease facilities from each other, were. Both are essential to ensuring a level playing field in a liberalising market (Melody, 1997 & 2001).

LLU would only become a matter for serious debate with the Telecommunications Pricing Colloquia held in July and October 2005, when the matter was tabled for debate by the Ministry (Hellkom, 2005). The Colloquia addressed retail pricing but also noted that:

> the local loop had to be either unbundled or opened for shared access; self-provisioning of VANS providers had to be revisited; ownership or custody of SAT-3 [the submarine cable that runs down the east coast of Africa and was South Africa' sole submarine cable until recently] had to be re-examined and access expanded; the wholesale rate on line rentals for ISPs and the question of leased line costs needed urgent attention (Sutherland, 2007: p91).

The finalised Convergence Bill was promulgated as the Electronic Communications Act and signed into law by then President Thabo Mbeki in April 2006 (Act 36 of 2005). It made provision for LLU to take place, provided ICASA made regulations to enable it (Telkom, 2008).

1.3.2 Protectionism

Any discussion on competition in the South African electronic communications sector would be incomplete without a discussion on Telkom, and government's protectionist policy towards the monopoly incumbent. Telkom was originally part of the Department of Posts and Telecommunications, which was spit into Telkom Ltd, and the SA Post Office in 1991. Under the Telecommunications Act, promulgated in late 1996, Telkom was issued with three licenses - PSTS for telephony, VANS for Internet/data services, radio frequency transmission for radio/wireless transmissions. It was also granted a five year exclusivity period in May 1997, granting it the exclusive right to provide telecommunications services in South Africa, subject to roll out obligations. VANS were only allowed to provide services using infrastructure provided by Telkom, and

were thus subject to Telkom's pricing and service decisions.

1997 was also the year the government embarked on its managed liberalisation programme. The South African Telecommunications Regulatory Authority (SATRA) was formed in February of that year and rate rebalancing was introduced in an effort to redress the cross-subsidisation Telkom had been engaging in, and adjust pricing so that customers paid prices that more closely resembled the cost of the service provided. Telkom had until then been 100 percent state-owned. Thirty percent was sold to Thintana, a consortium made up of SBC (US) and Telekom Malaysia Berhad, for R5,58 billion in May that same year (Telkom, 2010) as part of a government bid to reap some reward from the assets it owned.

While Telkom had an exclusivity period, it didn't have the market all to itself. VANS provided service-based competition in the fledging Internet service provision space, although Telkom stymied the ISPs that competed with it and relied on it for infrastructure at every opportunity, and its relations with other ISPs could only be called litigious. The mobile operators, MTN and Vodacom (part owned by Telkom) provided competition for voice services, although, as Telkom was providing all fixed links to the operators, it was not losing out on revenue there either.

Following the formation of ICASA in 2000, the third mobile network operator, Cell C, was licensed in June 2001 and the Telecommunications Amendment Act was introduced in November that year. It prohibited LLU for at least two years after the licensing of a second network operator, scheduled for 2002. It scheduled carrier pre-select, which would enable consumers to select which provider to make a call with on a call by call basis, for 2003 and mobile number portability (MNP), which would let consumers change operators without losing their mobile number, for 2005.

All of the above steps in the liberalisation process were delayed by several

years. Telkom's exclusivity ended in May 2002, the SNO was eventually issued with a license in 2005. MNP happened a year later and carrier pre-select (CPS) came into effect in 2010, although to date it has not been implemented by any operator. This is partly because the incumbent has set the call origination fee at 43c, making it too expensive for any other player to be able to offer services using CPS. This is because a local call costs a minimum of 57c, plus the operator handling the call would likely have to pay interconnect fees (12c on a local call and 19c on a national call) and then need to make some revenue on the call too. LLU, which South Africa could theoretically have started implementing in 2004, is still not a reality.

Telkom listed on the Johannesburg and New York stock exchanges in 2003. Its shareholders were government (39.3 percent), Thintana (30 percent), Ucingo (3 percent) and the public (27.7 percent). The ongoing government ownership provided a clear conflict of interest for the Minister of Communications – tasked with determining policy for the sector as a whole while simultaneously protecting the state's interest in Telkom. This ongoing problem has been frequently likened to the Minister being both referee and player on the telecommunications pitch (McLeod, 2012).

The Convergence Bill was eventually promulgated as the Electronic Communications Act (ECA) and went some way to remedy the protectionist policies put in place by the Telecommunications Act of 1996 (as amended). The first draft was released in December 2003. Introduced in a bid to prepare SA for the future electronic communications environment, it converged the regulation of broadcasting and telecommunications, and aimed to move the licensing regime away from technology-based licensing into a horizontal regime. The bill was also intended to clarify the cross-jurisdictions that existed between ICASA and the Minister of Communications and provide ICASA with better financing, thus strengthening it as an independent regulator. Whether it achieved all of its aims is a matter for debate, but the licensing regime proved crucial to

the ongoing liberalisation of the sector.

Telkom and the SNO were guaranteed exclusive rights to PSTS (fixed line voice) licences in the Telecommunications Act (1996). The legal exclusivity period expired in 2002. The SNO was also granted the right to use Telkom's infrastructure from the time it was licensed until 7 May 2004. The extensive delays in issuing this license meant that Neotel never had the opportunity to do so.

The legalisation of Voice over IP (VoIP) could probably be called the first concrete step towards real competition in the market. VoIP was prohibited in terms of the Telecommunications Act (1996). It was then legalised by Ministerial Directive in late 2004, opening up the market for alternative voice over wire provision. This same directive allowed VANS to self-provide, a right many in the sector had been lobbying for heavily for years. This right was subsequently revoked by the Minister via a press statement. ICASA then implemented the initial decision in 2008 when the time came to convert VANS licenses to the new licenses as stipulated in the Electronic Communications Act (2005), following a court challenge.

Draft new license types as specified under the ECA (2005) - individual and class Electronic Communications Service and individual and class Electronic Communications Network licenses - were issued in February 2009. Once it became clear that VANS would not be able to self-provide Altech took the matter to court, and won, thus striking the single biggest blow for liberalisation and against government's 'protect Telkom at all costs' stance. Unfortunately, as this happened so suddenly, new licensees were not in a position to take advantage of this unforeseen market opportunity, and network roll outs by new licensees have been limited.

Competition in the telecommunications sector has to be balanced against the need for consumer protection and market sustainability (ITU & InfoDev, 2010: p13) rather than being driven purely by financial considerations. In

South Africa, this has not happened. The interests of the state as a shareholder in a monopoly telecommunications company have been put ahead of the interests of the country. Privatisation happened ahead of liberalisation, and liberalisation is still happening very slowly.

Due to the importance of the sector to both social and economic development, governments and regulators have to consider what type of competition will have what impact. Competition is important not in and of itself, but rather because of the benefits it brings, to whit: Lower prices, more products and services, increased choice for the consumer (ITU & InfoDev, 2010: p13).

As policy and regulatory decision-making unfolds in South Africa, regulators, government and private sector players need to consider what type of competition is appropriate: That which achieves government's aim of universal access? That which aids private sector goals related to market share and profit? That which delivers the most benefit (and protection) to consumers? All three? Two out of three? The state seems to view itself as a benevolent intervener. Is that view appropriate and accurate? Would a totally different paradigm not be more appropriate? For example, one in which the state adopts a hands-off approach and uses policy and regulation to enable players in the sector to roll out services to areas where they see a market and can deliver services for profit.

A further factor is the technology itself. The advent of mobile telephony and broadband has profoundly changed the telecommunications sector. Models of competition and regulation that served the industry for decades may well be headed for obsolescence and regulators need to consider that what is regulated today might be irrelevant in six months.

South Africa also does not exist in a vacuum - global regulatory trends are moving away from static (controlling) to dynamic (encouraging investment and innovation) regulation (Bauer & Bohlin, 2007: p1). The country needs

to evolve its own policy and regulatory environment in line with global trends as much as it needs to keep adopting new technologies so as to not fall behind and prejudice its citizens and its future.

1.3.3 Regulating for LLU

In her 2006 Budget Speech (May 2006), the Minister announced that LLU needed to be investigated. She appointed a Local Loop Unbundling Committee later that year (Sutherland, 2007: p91). The Committee delivered its report, 'Local loop unbundling: A way forward for South Africa', on 23 May 2007 and the Minister subsequently issued a Policy Decision that ICASA should implement LLU by 2011 (Telkom, 2010). In 2010, Minister of Communications Roy Padayachie indicated that the Department was still working to a November 2011 deadline (Minister of Communications, 2010: p5), but market sentiment and discussion, mainly in the media, considered this unlikely given the scope of work to be done.

ICASA released a discussion document on LLU on 22 June 2011 (ICASA, 2011a: p2), calling for comment by stakeholders by 14 September 2011. According to the document, ICASA is of the opinion that LLU is mandated under the facilities leasing regulations, and that these regulations cover the terms of any agreements drawn up under that section of the Electronic Communications Act (2005) - section 43. This is problematic for two reasons. Firstly, this has implications in terms of how LLU will play out as it largely leaves industry to negotiate its own agreements, something that local telecommunications history would indicate is likely to end up in long running legal disputes that advance no-one's interests, and once again leave consumers stuck with high costs and ineffective service.

Secondly, Telkom doesn't agree that facilities leasing regulations apply to LLU and refused access to its local loops to Neotel, which has lodged a dispute with ICASA as a result. The case went before ICASA's Complaints and Compliance Committee in May 2012 and the Committee found that Neotel's request was valid and that Telkom had contravened the regulations in its response. The Committee stated that ICASA must finalise

LLU regulations for a “practical and reasonable solution” to be found (Vermeulen, 2012).

The regulator announced a phased roll out of LLU on 30 November 2011. In the press statement (ICASA, 2011b) announcing its Framework for Introducing Local Loop Unbundling, ICASA chairman Stephen Mncube said that the Authority is taking a phased approach to LLU. He said that a public consultation process will be undertaken to establish an Access Line Deficit Recovery Scheme. Additionally, ICASA was to engage with industry on the pricing of Telkom's IP Connect service and expected this to be reduced by 31 March 2012. Telkom's IP Connect service is crippled form of bitstream unbundling. ICASA said it aimed to ensure a true bitstream offering was introduced by 1 November 2012 (ICASA, 2011c). So far, Telkom reduced the cost of its IP Connect service in April 2012, but no bitstream alternative has been introduced (Mochiko, 2012). As a separate process, the regulator has stated its intention to investigate wireless LLU, something the mobile operators have been opposed to, to date.

As the debate on LLU plays out in South Africa, the regulator has a role to play both in fulfilling its mandate and in contributing to the debate from the perspective of the consumer, and the local policy framework. Private industry is adept at lobbying and speaking up for its own interests. The regulator has a mandated role to play here in ensuring universal service and access goals are met, in line with government's plans for the country. South Africa's government wants to implement LLU in a bid to increase innovation, increase the quantity and quality of services, reduce the prices paid by customers and increase the number of available business opportunities (Local Loop Unbundling Committee, 2007: pi). It also aims to: “facilitate affordable open access, lower prices of telecommunications and offer a wide choice of access to ICT services” (Local Loop Unbundling Committee, 2007: pviii).

It is not clear, however, given all the problems and challenges raised by

the authors writing on the subject, whether LLU should be attempted in South Africa at all. Very little conclusive research has been done on the use of LLU to unplug the last mile access bottleneck in developing markets, which have only recently reached a stage of market liberalisation where an intervention like LLU would be appropriate or desirable. As such, there has been very little research into whether or not LLU can increase competition in a developing market or not. This question is important for policymakers and regulators who tend to believe that a de facto outcome of a LLU exercise is increased competition. If this is not so, many policies and approaches will need to be revisited.

1.4 Research problem

South Africa has an electronic communications access problem, which the government has to date tried to remedy using a policy called 'managed liberalisation'. As it became apparent that this approach was not appropriate to telecoms sector development, policymakers began to liberalise the market. As part of this liberalisation, LLU has been posited as a remedy to unplug the access bottleneck at the last mile. This research studies LLU as a measure to increase competitiveness, and its appropriateness for the local market.

This research covers the period from 1994 when the first mobile network operator licenses were issued to early 2012 as the LLU process was unfolding. South Africa's telecommunications market is still lacking competition in the fixed line segment despite government efforts to liberalise. One of the policy interventions aimed at remedying this is LLU. LLU has been implemented worldwide by a number of countries since it was first posited in the 1980s.

The objective of the research was to describe and analyse the issues pertaining to LLU and competition in South Africa and to assess the implications of LLU for policymakers.

This research utilises a model developed by Hausman and Sidak (2005)

and amended by the researcher, draws on the body of literature on LLU, interviews with experts and documentary analysis in order to analyse LLU, competition and the anticipated outcomes of an unbundling exercise in the local telecommunications market.

1.5 Purpose statement

This study utilises a model developed by Hausman and Sidak (2005), which empirically tests four major rationales for LLU, to compare the academic literature on LLU and competition and a series of characteristics and consequences of LLU highlighted by the regulator, policymaker and industry players in the South African market.

The data that this comparison produces is analysed, broad themes are identified, and a framework is constructed. This framework can be used by policymakers and regulators to determine if a specific rationale for unbundling, coupled with a specific type of unbundling, will result in a certain type of competition.

This is the first time the Hausman and Sidak (2005) model has been applied in an ex ante context in a developing country with a market that has not fully matured.

1.6 Research questions

Main Question: In which ways would LLU influence competition?

Sub Questions:

1. What effects is LLU expected to have on competition in the South African market?
2. How does LLU impact entrants, the incumbent and consumers?
3. How should policymakers exploit the opportunities and address the challenges that arise out of LLU?

1.7 Research methodology

The researcher conducted a social research study into an aspect of the telecommunications sector that has real world applicability.

Both primary and secondary research techniques were used. Qualitative research was conducted – using surveys and in-depth interviews. The findings were analysed and a framework was drafted to guide policy and regulation.

In designing the research methodology, the study utilises a model developed by Hausman and Sidak (2005), which takes four major rationales for LLU and empirically tests them, as well as other academic literature on LLU and competition to explore and understand the documentation on LLU - produced by the regulator, policymaker and industry players in the South African market - and the process thus far in South Africa. Further data was generated through primary research conducted amongst a purposively selected group of industry participants.

1.8 Policy Contributions

The research report contributes to an understanding of LLU as an efficient and effective regulatory intervention. Furthermore this research report produces policy recommendations that may address issues of i) regulatory effectiveness, ii) competition and iii) overall consumer welfare in South Africa. The recommendations made are largely directed towards improving the formulation, adoption and implementation of LLU in South Africa. It has implications for regulators, policymakers and operators.

This research is important because of the enormous social and economic importance of the electronic communications sector, since it supports efficient communications in all economic sectors. According to the ITU (1997, p7):

> Good telecommunications impact positively on all aspects of economic, cultural and social development. In agriculture, fisheries, and forestry, markets for produce and production can be matched with supply, weather and environmental information can be made available, and "best practice" techniques can be shared. Manufacturing benefits from more efficient markets, both for input

> resources and for goods produced. On the service side, tourism is enabled, bringing visitors to newly feasible locations, and remote financial transactions become possible. Public service and governance improve because of information flow and transaction possibilities. Health care can be improved through telemedicine applications. Access to educational opportunities and available information is made possible.

This holds true not only in rural areas, but at a macro-economic level. Cronin, Colleran, Herbert and Lewitzky (1993: p677) argue that:

> ...telecommunications investment enhances economic activity and growth, while economic activity and growth stimulate demands for telecommunications infrastructure investment. This relationship has been found, in general, to hold at the national, state and sub-state level of analysis and for definitions of telecommunications infrastructure investment including total investment, cable and wire and central office equipment.

For a developing economy like South Africa, widespread and affordable electronic communications infrastructure is crucial. Regulatory interventions need to be efficient and effective. This research extends the understanding of LLU as an efficient and effective regulatory intervention.

1.10 Summary

In this chapter the researcher has outlined the problem with the access market in South Africa, starting with a look at fixed and mobile penetration rates. The researcher then delves into the relevant history of the sector. This is followed by a brief discussion of the current state of the sector in terms of policy and regulation. Thereafter, LLU is defined and explained and a brief history of LLU as a regulatory intervention, and as it has played out in South Africa, is given. The chapter concludes with a brief outline of the objective, questions, methodology and theoretical framework for this research, before concluding with a brief note on how this research will contribute to policy as a whole.

Chapter 2 A conceptual framework for examining LLU

2.1 Introduction

In this chapter, the researcher places LLU within the broader framework of economic theory. Various aspects of LLU are then examined by means of a review of the academic literature – its definition, types, rationales, impacts and effects, the market conditions under which it thrives, or fails, as well as case studies from a number of countries.

Even drawing on a small selection of the literature, it is apparent that this is a complex endeavour, requiring a high degree of economic and regulatory expertise on the part of the national regulatory agency. Viewed through an economic lens, LLU aims to promote competition. Viewed through a social lens, it aims to improve access to and reduce the cost of telecommunications services. The literature shows, however, that it doesn't necessarily achieve either.

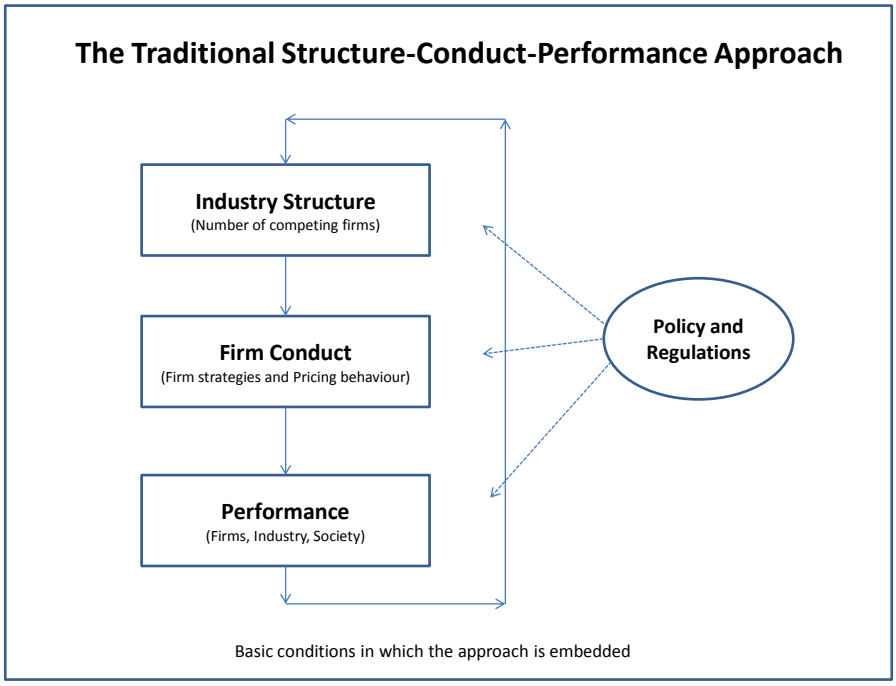
2.2 Industrial organisation theory and LLU

Regulatory interventions like LLU have a place within the broader sphere of economic theory – specifically within the realm of industrial organisation (IO) literature. The theory has been commonly used to address questions of overall economic efficiency in markets.

As stated earlier, the researcher explores the contribution of IO theory in general and the SCP paradigm in particular to understanding the fixed line telecoms market in South Africa.

The general approach suggested by the IO model focuses on three interrelated concepts, namely industry structure, industry conduct and industry performance (Scherer & Ross, 1990).

Figure 1: Traditional Structure-Conduct-Performance Approach diagram



Source: Adapted from Scherer and Ross, 1990

Industrial organisation, according to Cabral (2000, p3):

> is concerned with the workings of markets and industries, in particular the way firms compete with each other... its emphasis [is] on the study of the firm strategies that are characteristic of market interaction: price competition, product positioning, advertising, research and development, and so forth.

Industrial organisation has a specific goal, Cabral (2000, p3) states, to address the four questions of whether there is market power, how firms acquire and maintain said power, what the implications of market power are and if there is a public policy for market power.

Jacquemin (2000, p9) says that IO looks at the number of competitors in a market, the distribution of market share, entry and exit conditions, product standardisation and substitutable goods, how interdependent upstream

and downstream activities are, information asymmetry and risk.

According to Jacquemin (2000, p9):

> Market analysis, either from the point of view of the firm that operates or desires to operate in it, or from the viewpoint of the public authorities, requires proper characterization. The principal objective of industrial organisation has been precisely to provide this characterization, resorting to a scheme that relates the market structure with the behaviour of the economic agents who operate in it and with the performances that such a relation generates.

Such schemes include what is called the structure-conduct-performance paradigm (SCPP). SCPP is an approach that states that a market's structure will influence the conduct of the firms which operate in it, which will accordingly influence their, and the market's, performance. This applies both ways, thus a market's or company's performance affects the conduct of all the players, which then affects market structure. SCPP is used to analyse structure, conduct and performance and the relationships between these elements.

Says Schmalensee (1989, p954):

> In any complete market model, such as the textbook models of monopoly and competition, market structure determines market conduct - the behavioral rules followed by buyers, sellers, and potential entrants to choose the variables under their control. Market performance is assessed by comparing the results of market conduct to first-best ideals, such as perfect competition, or feasible alternatives.

Policymakers today are concerned with such matters in part because of two things – the drive to liberalise monopoly industries, ie, to create competition where there was none, and because of the impact markets and firms have on social welfare. The conduct and performance of

organisations and markets impacts both consumers and employees. It is in a bid to ensure that this conduct maximises said welfare (through allocative and productive efficiency) that governments regulate, the view being that organisations will not behave in a way that maximises either competition or social welfare without regulation to compel them to do so.

Telecommunications has traditionally been a monopoly sector, and, as such, some governments have, either directly or through issuing policy to independent regulators, intervened to move it along the road from monopoly to a state of competition - perfect or imperfect. Local loop unbundling is one of the interventions that have been used by governments and regulators to alter a market's structure in a bid to introduce more competition.

For the purposes of this study:

- Industry Structure: Refers to the potential of LLU to change monopoly access (Telkom) to a more competitive access model (new entrants) since the unbundling of the local loop is intended to lower cost and entry barriers to new entrants.
- Firm Conduct: Refers to the potential of LLU to change the strategic pricing behaviour of Telkom and new entrants. New entrants in particular will seek to price their offerings in such a manner as to gain competitive advantage.
- Performance: Refers to the potential of LLU to change the performance of Telkom and new entrants in ways that improve overall consumer welfare.

2.2.1 Why regulate telecommunications?

According to the ITU and InfoDev (2011), as telecommunications markets have liberalised, regulation has been put in place by governments to ensure a smooth transition from monopoly telecommunications markets to liberalised markets with multiple players. Regulation is put in place to combat the potential problems that arise during such a transition, for example, disputes and anti-competitive abuses. Regulation also exists to

protect consumers and ensure the national interest is served, in this case governmental goals of universal access, competitiveness, industrial development and so on.

Regulation, say the ITU and InfoDev (2012, p10):

> is the vehicle to attain, and subsequently sustain, widespread access, effective competition and consumer protection. The liberalisation and introduction of competition in the market requires strategic policies and regulations that establish an effective regulator, remove explicit barriers to entry (eg, the inability to interconnect with the incumbent operator), and dismantle implicit barriers (such as the potential influence of the incumbent telecommunications operator over the regulator).

As such, regulation serves to prevent market failure, protect consumers, prevent abuses and create effective competition. (ITU & InfoDev, 2012: p10).

2.2.2 Competition theory

“The presence of competitive pressure in the market is associated with more employment, higher output, faster network expansion, and higher labor and total factor productivity,” note Li and Xu (2002, p3). Competition, as such, is desirable as far as governments and policymakers are concerned, and much economic theory is concerned with it, and how it should be created or encouraged, specifically in traditional monopoly sectors such as telecommunications. LLU, with which this paper is concerned, is a regulatory intervention aimed at stimulating competition in telecommunications markets that were historically served by a monopoly incumbent. There are other interventions, including facilities leasing and carrier pre-select.

2.3 Implications of key industrial organisation concepts for LLU

The local loop is the last mile of copper between a telephone exchange

and a customer's premises. LLU is one of a number of possible interventions aimed at liberalising the last mile, the others include facilities leasing, and carrier pre-select, plus facilities-based entry and resale of services (Bacchiocchi, Florio, Gambaro, 2007: p5).

Historically built and owned by the monopoly operator, local loops are expensive to build and maintain. Because of this, and because of the time period in which they have had sole access to a market in which to build up a customer base, monopoly operators are considered to hold market power with respect to an essential facility. “Market power prevails if a natural monopoly exists in conjunction with sunk costs,” states Gabelmann (2001, p21), who notes that LLU is a means to discipline this monopoly market power. “Competition has never really emerged in this area and it would be prohibitively expensive for a competitor to build an alternative fixed local loop of this nature,” comments Rowe (2001, p1).

Initially seen as a means to liberalise the voice telephony market, LLU is now, as de Bijl and Peitz (2004, p1) note, more often seen as a means for new entrants to be able to offer broadband services. Technological innovations like the ability to carry voice over data networks (voice over Internet protocol or VoIP), however, look to take voice back into the spotlight and have once again rendered LLU a potential means to drive competition in that space.

LLU is considered a means to encourage facilities-based competition in a market. As Bourreau and Doğan (2005: p174) note: “Facility-based competition in the telecommunications industry is perceived as a necessary condition for long-term efficiency. For the full functioning of competition, it is necessary that each operator controls its supply chain to the largest possible extent.” The drive for efficiency is often a governmental motive for regulating the sector in the first place.

Mandatory LLU is a controversial topic, however, and whether the benefits

outweigh the risks is still a matter for debate. Says Doyle (2000, p35): "...mandatory ULL can yield benefits, but these must be weighed against the costs. Regulatory schemes requiring ULL should trade-off the various benefits and costs, where costs due to regulatory intervention should be minimised."

De Bijl and Peitz (2005, p3) expand on this:

> No matter how advanced the nature of the regulatory intervention, there will always be a tradeoff between promoting static efficiency through competition in the short run, and stimulating dynamic efficiency through inducing entrants to roll out their own networks in the longer run. This tradeoff, a 'classic' dilemma in many utility/network sectors, is given an interesting twist though, because of the possibility of IP-based voice telephony. This development is not only important in itself, it may also facilitate competition in telecommunications over different types of networks, such as fixed, mobile and WiFi.

LLU is complex, complicated and requires an involved and well-informed and well-funded regulator. This alone makes its implementation in developing countries, where regulators are not known to be any of the above, controversial and problematic. Part of the reason for this complexity is that LLU involves obliging an incumbent to grant access to its facilities to its competitors, something most incumbents have no urge or incentive to do. "The appropriate framework for the assessment [of] whether an incumbent carrier should be forced to grant competitors access to his local infrastructure is the essential facilities doctrine," comments Gabelmann (2001, p21) and it is this concept which is found in South Africa's law, specifically the Electronic Communications Act (2005).

Gabelmann (2001, p21) continues:

> For a facility to be 'essential' several conditions have to be fulfilled simultaneously (see Glasl, 1994: 308). The facility in question must

be owned by a monopolist who refuses access to potential downstream competitors although this would be feasible. Further the facility has to be not reasonably duplicable by potential entrants with the consequence that they cannot enter the downstream market without being granted access to precisely this facility - in short, if there exist neither active nor potential (perfect or imperfect) substitutes.

Incumbents have found plenty of grounds to argue against the conditions outlined above. In South Africa the incumbent is arguing that the local loop does not constitute an essential facility because there is a substitute in the wireless local loop (ie the mobile network), and it is no longer the dominant player in the sector, the mobile operators are. The fact that market power or significant market power, which is the concept used in South African law, has not been established because the regulator has not yet conducted a market study in a clearly defined market, provides the incumbent with further grounds for contestation.

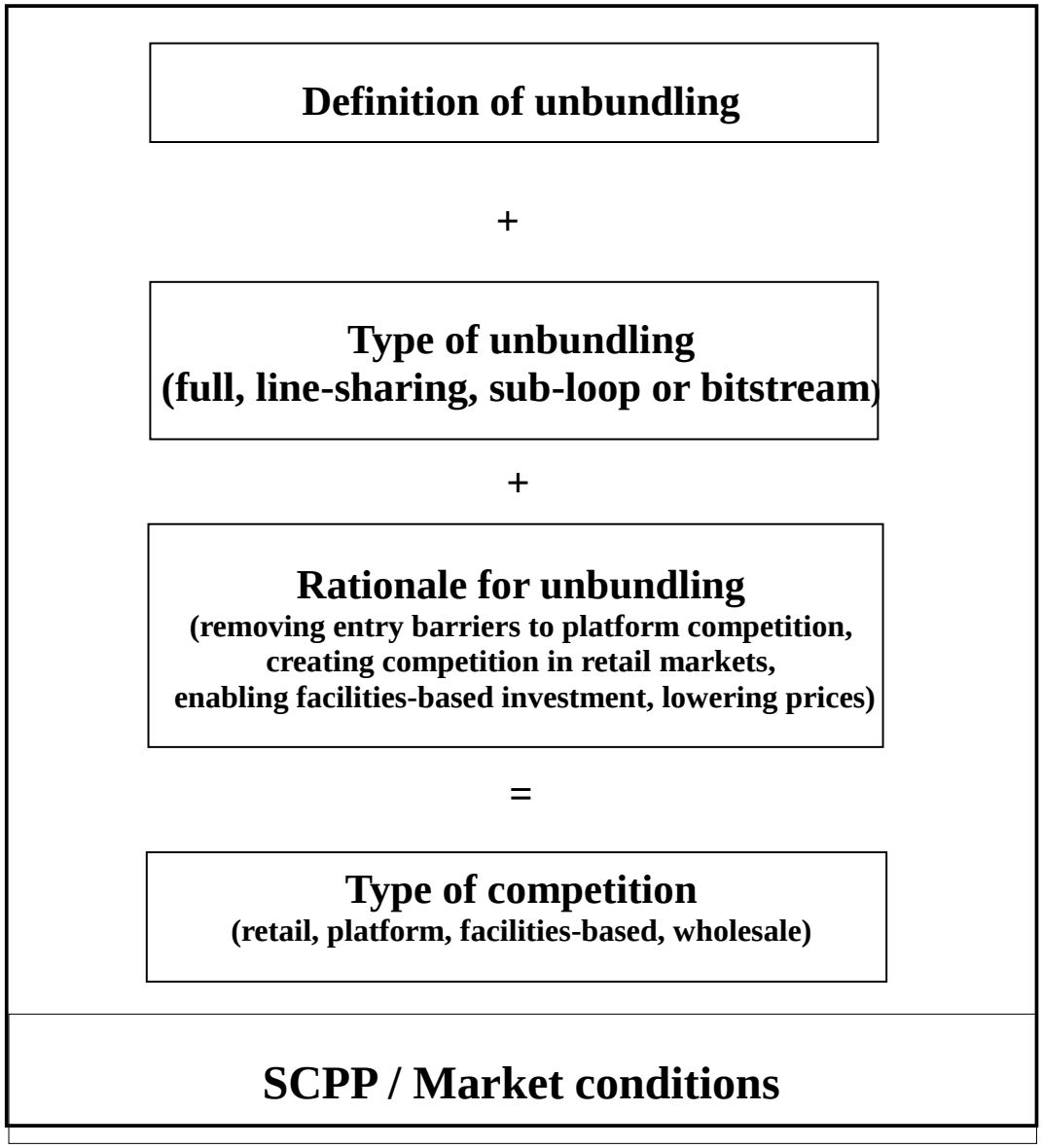
2.4 A framework for LLU

As discussed earlier, the traditional SCPP method is combined with a regulatory economic approach adapted from Hausman and Sidak (2005). The latter is intended to supplement the SCPP model and is used as the framework for collecting evidence that was used to answer the research questions.

The model developed by Hausman and Sidak (2005) defines LLU, takes the four major rationales for unbundling and tests them empirically. The researcher is adopting the viewpoint that there is an inter-relationship between LLU and competition: that a stated definition of LLU, paired with a stated rationale for LLU, paired with a specific type of unbundling (full unbundling, line-sharing, bitstream, or sub-loop) will result in a specific type of competition - retail, platform, facilities-based or wholesale. This takes the Hausman and Sidak (2005) model a step further by introducing the type of competition that results from an unbundling exercise.

Unbundling, as indicated in the research model, developed by the researcher, in Figure 2 below, affects competition in a fundamental way, determining both the type and effectiveness of said competition within a specific market context, this competition then affects the structure of the market in turn, in a continuous feedback loop. Policymakers need to take this into account when considering the most appropriate framework for implementing unbundling, so as to ensure that the benefits of competition are realised, and to ensure the long-term sustainability of the market concerned.

Figure 2: Research model



The research model is adapted from Hausman and Sidak (2005). It takes the four major rationales highlighted in their research paper plus the four types of competition that will result and adds a definition of LLU and the types of LLU to the Hausman and Sidak (2005) model. The adapted model assumes an interrelationship between LLU and competition. It assumes that there is a relationship between the stated definition of LLU, rationale for and type of unbundling and the various forms of competition (retail, platform, facilities-based or wholesale) that will result from an unbundling exercise. According to the model, the type of unbundling implemented affects competition in fundamental ways – it determines both the type and effectiveness of competition that will result. The type of competition will in turn affect the structure of the market and the conduct and performance of the players in the market.

2.4.1 Definitions and types of LLU

LLU is variously, and often broadly defined. The OECD states (2003, p4):

> Unbundling, as a policy, is built on the recognition that incumbent carriers have a dominant position in the provision of local communication access by virtue of their control over the local loop, which in some OECD countries is considered as an essential facility that cannot be economically replicated by alternative operators. This position of dominance has resulted from the many years during which incumbents had a monopoly in the provision of telecommunication infrastructure and voice telephony services. Despite liberalisation of telecommunication markets, it has proven extremely difficult in some OECD countries to reduce the bottleneck control of incumbents over the local loop and access to this loop. The market power of incumbents can vary in different geographic and service markets. Details of unbundling policies may therefore vary according to market conditions.

Bachiocchi, Florio and Gambio (2007, p7) are more brief: “Unbundling the local loop refers to a series of regulatory measures aimed at providing

access to the incumbent's local network, the less duplicable part of telecommunication infrastructure." Baranes and Bourreau (2005, p13) are equally so, "Unbundling of the local loop refers to a series of regulatory measures aimed at providing access to the incumbent's local network."

South Africa's Local Loop Unbundling Committee believes LLU to be "the process of allowing both the incumbent operator and the new entrants to have access to use the copper-pair of the local loop infrastructure, which are the fixed line telephone connections from the telephone exchange to the customers' premises" (Local Loop Unbundling Committee, 2007: p2).

The various commentators tend to focus on LLU as a regulatory effort which seeks to enable other entrants to access an incumbent's physical infrastructure. While this is generally taken to mean the copper wire between an exchange and a customer premises, it is not strictly defined as such, and can include any last mile technology.

The types of LLU are more clearly, and simply, defined. The OECD (2003, p 7,8) states that full unbundling happens when the incumbent's copper is leased to a new entrant to use to offer services over, and the incumbent ceases to provide services but still owns the infrastructure and has to maintain it. Line sharing gives the new entrant access to some of the copper pair so, for example, the incumbent offers voice and the entrant offers broadband to the same consumer over the same (shared) line (OECD 2003, p 7,8). Bitstream access involves the incumbent giving entrants a wholesale xDSL product that they can resell to consumers – full control of the lines is retained by the incumbent (OECD 2003, p 7,8). Sub-loop unbundling occurs when the entrant connects to a point in the local loop (usually at the primacy connection point or street cabinet) on a full or shared basis. This is best suited to fibre to the curb environments where high-speed bandwidth connections are being provided (Telecommunications Authority of Trinidad & Tobago, 2009: p15).

2.4.2 Rationales for LLU

The most commonly cited rationales for LLU are to increase competition in the last mile and reduce costs (Bourreau, 2002; Christodolou & Vlahos, 2001; De Bijl & Peitz, 2005; Rowe, 2001). Intven (2000: p3-40) states that: "The purpose of unbundling policies is to lower economic and technical barriers to competitive entry." According to Hausman and Sidak (2005), LLU has four major rationales: to promote retail competition; to remove entry barriers that prevent platform competition; as a stepping-stone to facilities-based competition; and to promote wholesale access market competition (Hausman & Sidak, 2005: p173, 192).

Another rationale for LLU is that giving access to competitive operators serves to give a new market entrant a chance to build a subscriber base without incurring the cost of rolling out a complete infrastructure before earning any income (Sutherland, 2007: p4). It is also used to ensure that new entrants and incumbents compete on a level playing field (Baranes & Bourreau, 2005: p14).

The potential benefits of unbundling include enabling entry into the market of new players, bringing forward the offering of new services over the existing (incumbent's) network depending on what technology it uses, and increased competition in terms of services offered over the existing network (ITU & InfoDev, 2010: p50).

2.4.3 The Impact on consumers, incumbent operators, new entrants

According to de Bijl and Peitz (2005), LLU has proven challenging for regulators, who battle to balance the trade off between stimulating short term competition through interventions like LLU or encouraging network roll outs and the associated facilities-based competition. De Bijl and Peitz (2005) state that LLU should be seen as a step between carrier-select (also known as carrier pre-select) and full facilities-based competition.

The OECD in its 2003 report, 'Developments in Local Loop Unbundling', notes that LLU had taken off with varying degrees of success depending

on, variously, how many DSLs had been rolled out, whether incumbents had unbundled their loops or made facilities available for colocation, whether all of the relevant parties had managed to reach agreement on colocation processes and pricing, whether there was space in exchanges for colocated equipment or not, how regulators were responding to problems with LLU (specifically how quickly they were responding), how far along price rebalancing was, and how much room for price squeezing of new entrants was left.

The OECD (2003) states that “technical complexity” and the need for the regulator to be very involved at times causes delays in unbundling the local loop, that incumbents and entrants have been unable to easily set pricing, and that the regulator has to balance the needs of both in finding a solution.

Frieden (2005) attempts to determine whether or not developing nations should adopt a LLU policy or not by considering the costs and benefits thereof. He outlines the benefits – increased competition – and costs – market distortion, and disincentivisation of incumbents and entrants to invest in new infrastructure and roll out new technologies. Further, he states, regulators have the challenge of convincing an incumbent to give an entrant access to its infrastructure so that the entrant can take market share and revenue away from it. Incumbents, he says, would have every incentive to legally challenge this confiscation of their property, as well as to do everything possible to delay LLU and delay complying with regulations once LLU is in place.

Governments in many countries, however, Frieden (2005) notes, have proved unsympathetic to incumbent claims of imminent financial disaster if they're forced to play fair with new entrants in terms of the charges they levy for leasing local loops. The courts have also proven unsympathetic to claims that LLU amounts to the confiscation of property, he says. In the US, at the time Frieden (2005) was writing, incumbents were still disputing

whether or not the Federal Communications Commission (FCC) could compel LLU and whether or not it was a sensible thing to do. The outcome, he notes, was that LLU hadn't been very successful as players had gone out of business, exited the market or found other things to do while the dispute rolled on.

Regulators in developing markets will need to develop the skills and resources to deal with the same arguments that operators in developed countries have had to face, Frieden (2005) comments, also highlighting the risk involved for regulators trying to get pricing and provisions right. He suggests regulators look for new incentives to encourage incumbents to co-operate. He concludes that, despite the challenges, LLU should be attempted because if it results in even a smidgeon more competition in a market, it will have been worthwhile.

2.4.4 Conditions under which LLU succeeds or fails

Whether or not an unbundling initiative can be said to have succeeded or failed depends largely on what the aim of the unbundling initiative was in the first place. That said, several challenges are frequently raised in relation to unbundling exercises.

According to the OECD (2003), LLU is fraught with challenges for entrants and regulators, and much needs to be worked out and agreed upon before it can be made to work. For example, how will an entrant's equipment be housed in an incumbent's exchange? Which type of colocation is appropriate or possible? Is there space for equipment? How long is a reasonable amount of time for an incumbent to take to make space available? What is a reasonable price for an incumbent to charge an entrant to lease a local loop? Do entrants need to provide forecasts of expected requirements to incumbents? If several entrants are requiring access to loops at a variety of exchanges how are these requests prioritised? How are requests from entrants to incumbents processed administratively? If a business client wishes to switch providers can this be done after hours so as not to disrupt the customer's business? What

service level agreements should be entered into? What penalties can or should be imposed for service failures? How will billing take place? How are faults managed? In the case where each operator (entrant and incumbent) insists fault lies with the other, how will disputes be resolved? Is self-regulation a better option than regulation?

Bourreau (2002, p173) comments that if prices are set too low new entrants have no incentive to roll out their own facilities and may be slow to adopt new technologies, with negative consequences from a social welfare point of view. Pricing of the local loop is thus a factor in network roll out, and network roll out is frequently a rationale for LLU. Another factor is the impact of unbundling on an operator's decision whether or not to enter a market and what strategy to adopt as the terms and price of an unbundled loop affect the viability of operations in that market (Baranes & Bourreau, 2005: p19). If prices are too high or conditions unfavourable, entrants will stay away.

De Bijl and Peitz (2005, p51) note that LLU seems to have a far greater impact on broadband penetration than telephony penetration, and that it is ineffective in driving competition in the voice telephony space, mainly because consumers are more price-sensitive with regards to broadband, and the cost of leasing facilities and reselling them (for new entrants offering voice services) is just too high. Whether the unbundling exercise aims to stimulate voice or broadband competition is thus also a factor.

De Bijl and Peitz (2004, p5, 6) note that LLU has resulted in lively competition in the corporate sector and densely populated metropolitan areas in the United States. Geographical area and the types of customers to be found in a specific locale are thus a further factor.

The OECD (2003, p10, 11) notes that regulator has to motivate the incumbent to cooperate in implementing LLU and that both incumbents and new entrants need to work closely together because of the way LLU is

implemented. It says that as this cooperation is hard to enforce, it's ideally done via self-regulation, but given that the incumbent has no incentive to cooperate, regulation is needed. What this adds up to is that the regulator, its expertise, resources, and ability to manage relations between parties is crucial to the success or failure of an LLU implementation.

2.4.5 How LLU affects a market

According to de Bijl and Peitz (2005), LLU had failed to give strong competition in the fixed line telephony sector in Europe, with only 6.5 percent of consumers using lines provided by entrants or unbundled lines provided by entrants in 2004.

While unbundled loops hadn't been used by new entrants to roll out voice services, de Bijl and Peitz (2005) note these have been used to offer broadband offerings, by incumbents and entrants alike.

They comment that while full unbundling had not achieved its aims, despite three years of LLU, line sharing and bitstream unbundling initiatives had overall been relatively successful in introducing competition in the voice arena, not necessarily via fixed lines though, but rather via newer technologies like voice over Internet Protocol (VoIP), and in introducing competition in the Internet access space.

Bourreau and Doğan (2005) argue that incumbent operators are incentivised to price local loops below cost in order to encourage new entrants to use said loops and only compete on a services basis, and not on a facilities basis. This, they say, impacts the building out of alternative technologies.

Facilities-based competition is the ultimate long term goal of LLU interventions, as facilities-based competition provides the needed level of innovation and product diversity to meet consumer needs (Oftel, cited by Bourreau and Doğan, 2005: p174), As a prelude to this network roll out, LLU provides an opportunity whereby the entrant can provide services to

generate income to use to invest in a network. They say this doesn't often happen due to the pricing of the access loop, which results in delays in rolling out networks and new entrants falling behind, technologically speaking. The authors note that LLU has shown itself to be complicated and slow in both the US and the EU, where it has been mandated since 1996 and 2001 respectively.

De Bijl and Peitz (2004) provide an analysis of LLU, noting that it hadn't taken off as expected (they don't say who was expecting any specific take up, however) and that carrier pre-select was far more predominant in Europe at that time, despite there being 307 unbundling agreements across 15 European countries by 2003. De Bijl and Peitz (2004: p3) note that the general idea is that LLU will open the market and serve as a means to deal with “persistent network monopolies” but that LLU discourages entrants from innovating or rolling out their own networks and should, at some point, be withdrawn once competition has matured. They comment that LLU had promised to open telecommunications markets in Europe but had seen meager success in that regard at the time of writing, which the authors found surprising given that it offered market players an easy means to reach subscribers not already on their own networks.

Frieden (2005) notes that in the USA, LLU has been the cause of much controversy and litigation, mainly due to incumbent operators who did not initially object to unbundling loops changing their minds once they realised the upside potential wasn't as profitable as they had thought it would be.

2.5 Case Studies

Bourreau's 2002 review of France's LLU process revealed that only 800 lines had been unbundled, and that of 27 operators that participated in trials, only eight had signed unbundling contracts (Bourreau, 2002, p19). He notes that services-based competition had barely been affected, but infrastructure-based has taken off, with some 169 000 broadband subscribers in the country in 2001 (Bourreau, 2002, p19).

Hausman and Sidak (2005), consider LLU in five countries – the US, UK, Germany, Canada and New Zealand with the intention of determining if unbundling did what it was intended to do according to the rationales the authors outline in their paper. In each case, the outcome wasn't certain, with only Germany showing clear price reductions since the introduction of LLU, and then, as the authors note, competition from mobile networks had started to result in price decreases in any event.

Hausman and Sidak (2005) conclude after surveying LLU efforts in five countries that two of the rationales for unbundling violate the principles of economic theory and thus cannot work. The first rationale is that competition in retail markets cannot be achieved without unbundling. The second rationale is that mandatory unbundling promotes wholesale access market competition. The first rationale is disproved by the existence of competition in the facilities space that emerged separately to unbundling activities in the US market, for one. And the second rationale is disproved by the lack of players in the wholesale access market. If it was a viable market segment, they argue, players would have arisen. The other two rationales for unbundling – lower prices and the so-called stepping-stone hypothesis – are viable in theory but didn't play out in practice, possibly, the authorsr note, because of other factors, not anticipated by the regulators (Hausman & Sidak, 2005, p243).

Bauer and Bohlin (2007), note that the problem may not be LLU per se, but the pricing approach used. They state that the TELRIC approach aims to imitate the “long-run equilibrium price of an efficient supplier”, but that real markets don't work like that, rather, they are characterised by “sunk costs and uncertainty”, and that if option value isn't taken into account when models are put in place, investment decisions are distorted (Bauer & Bohlin, 2007, p15).

Whether or not LLU is worthwhile in terms of the effort required to implement it resulting in sufficient economic and social returns remains

unclear. An OECD report (de Ridder, 2007), sets out to explain the reasons for OECD broadband penetration rates in 2002 and 2005. It determines, based on six previous studies and the analysis undertaken by the author, that LLU is positively correlated with increased broadband penetration and lower broadband prices. On the other hand, a New Zealand report (Boyle, Howell, Zhang, 2008), which studied whether or not LLU impacted broadband penetration in response to the OECD report, states that in fact the statistical impact is negligible once errors in the OECD report data had been accounted for. This is important, they state, because it's considered that LLU will almost de facto result in improved broadband services and costs, plus increased competition, its downsides, such as that incumbents become reluctant to invest in existing or new infrastructure and new entrants delaying rolling out their own networks, notwithstanding.

If LLU does not result in improved broadband services and reduced costs plus improved competition then developing countries which have yet to unbundle local loops can take this into account when discussing the issue and weighing up policy options. Further, they note, it should also inform the debate on other access regulation going forward.

A case study on Cyprus' liberalisation efforts conducted by Symeou (2009) reveals that four years on the incumbent still held 97 percent of fixed national and 87 percent of international call revenues, and that while 27 new fixed line operators had been licensed, few had made any impact in the market (Symeou, 2009, p221).

A 2010 paper by Nippon and Ware that examined the US and European markets found that:

> ...the apparent association between unbundling and increased broadband penetration is not statistically significant when relevant economic, demographic and supply determinants are included in the analysis. As communications networks converge and the

> demand for wireline services decreases globally, intermodal competition is more prevalent and the benefits of unbundling are more difficult to assess, and unbundling arguably becomes a regulatory tool of the past. Given the dynamic nature of the communications industry, the costs and the risks of implementing mandatory unbundling, and the international differences in geographic, demographic, and market conditions, policy makers should use a case-by-case approach that carefully examines the contours of the relevant market(s) at issue as well as the costs and benefits of any regulatory intervention.

In short, the best way to unbundle the local loop in a bid to achieve the objectives determined by the rationales for its implementation has still not been determined or agreed upon.

2.6 Theoretical Framework

The objective of this study was to assess the impact of a regulatory intervention (LLU) on specific competition outcomes in the telecom sector. The point of departure is that of industrial organisation theory in general and the commonly used concepts of Structure-Conduct-Performance Paradigm (SCPP) in particular (Shepherd, 1996).

For purposes of analysis, the traditional SCPP method is combined with a regulatory economic approach adapted from Hausman and Sidak (2005).

The researcher understands that there is an inter-relationship between LLU and competition: that a stated definition of LLU, paired with a stated rationale for LLU, paired with a specific type of unbundling (full unbundling, line-sharing, bitstream, or sub-loop) will result in a specific type of competition - retail, platform, facilities-based or wholesale (Hausman & Sidak, 2005).

The Hausman and Sidak (2005) model has been used as the basis for analysis. According to Hausman and Sidak (2005), LLU has four major

rationales: to promote retail competition; to remove entry barriers that prevent platform competition; as a stepping-stone to facilities-based competition; and to promote wholesale access market competition (Hausman & Sidak, 2005: p173, 192).

2.7 Summary

In this chapter, the researcher has provided a review of the theory within which this research falls, namely Industrial Organisation theory. Thereafter the academic literature is used to create a framework for investigating LLU in South Africa's regulatory landscape. LLU is a policy intervention aimed at increasing competition and improving access to telecommunications services in a market that was dominated by a monopoly but is now liberalising. Four types exist – full, line-sharing, bitstream and sub-loop unbundling.

Rationales for LLU include lowering costs, improving access and increasing competition in a market. LLU impacts both incumbents and new entrants and influences how each operates. It has been criticised for not resulting in improved fixed line access, but credited with increased broadband roll out in several markets. LLU is also said to discourage new entrants from rolling out their own networks or newer technologies, as they rely on the incumbent, which provides the network at less cost than is required to build a new one.

The subject is complicated, opinions vary and different case studies draw different conclusions. As such, it can reasonably be concluded that whether or not LLU achieves it aims, according to its rationales, has yet to be conclusively proven.

Chapter 3 Research methodology

3.1 Introduction

In this chapter the researcher broadly outlines the research project, the researcher's chosen methodology, and the data sources used. The researcher discusses why qualitative research was done using primary and secondary research methods, making use of research subjects and documentary sources.

3.2 Research process outline

The researcher is presenting a social research project conducted within the telecommunications sector in South Africa. This research tackles a question of relevance to participants in the sector and is thus applied rather than basic research. Applied research allows researchers to meet specific information needs (Ritchie & Spencer, 1994: p306), such as answering a specific research question, relevant to a real world scenario, like that presented herein.

At the commencement of this research project, the researcher decided to conduct a survey. The specific survey tool chosen was a questionnaire, which sought to poll the attitudes of a set of experts within the South African telecommunications sector. Once the questionnaires had been completed and the responses studied, however, it became clear that the survey instrument was not appropriate and the respondents had not supplied sufficient data for the researcher's purposes.

The researcher needed sufficient data to conduct an analysis and identify the themes and characteristics related to LLU. Due to this lack of indepth data, the researcher then decided to expand the project, and conduct a series of semi-structured interviews to add both depth and substance to the findings garnered from the questionnaires that comprised the initial survey. These semi-structured interviews were conducted with a view to compiling a comprehensive set of factors that experts consider to be

important for LLU in South Africa.

The secondary research covered publicly available documentation that provides some insight into the views of the policymaker, regulator and a variety of industry stakeholders.

The data that the researcher extracted from the two research phases provided the broad themes that the researcher used for analysis and to build the framework that is the ultimate output of this study.

3.3 Methodology

The researcher elected to do qualitative research for a number of reasons. Firstly, qualitative research methodologies provide a way for a researcher to study matters where there are few subjects (Neuman, 1991: p13), and there are too few players or experts on LLU to do meaningful quantitative research in South Africa. Further, qualitative research allows for thematic analysis (Neuman, 1991: p13), which is critical in a study which needs to gather data, organise it into themes and develop a framework using those themes, as this one does. Qualitative research, additionally, enables the researcher to address evaluative questions (Ritchie & Spencer, 1994: p307), to extract textual rather than numerical data, and to capture and discover meaning (Neuman, 1991: p157).

The researcher conducted primary and secondary research in order to obtain data on LLU – specifically the views of the policymaker, the regulator, a selected group of expert participants and academic experts.

Primary research is conducted by the researcher him or herself, and involves the researcher designing and conducting a research project with the aim of collecting data that is not otherwise available with which to answer a particular research question. Secondary research involves making use of existing data that can be found in a variety of sources – publicly available policy documentation, organisational submissions related to policy processes, discussion documents and frameworks are all

examples of secondary research sources, and all are used in this particular study.

The main question – What impact will LLU have on competition and what are the resulting implications for policymakers? - is answered through posing a series of sub-questions.

The first of these is: What impact is LLU expected to have on competition in the South African market? This is answered through the primary and secondary research studies, which draw on experts within the sector, including representatives from the incumbent, new entrants and consumer representatives, and public policy documents, including the original report on LLU, the discussion document published by the regulator, ICASA, and submissions on the latter made by industry players late in 2011. The second sub-question: How does LLU impact entrants, the incumbent and consumers? is answered using the same expert panel and documentary sources.

In this study, the researcher is asking empirical questions, ie, those that relate to real world problems, in order to extract evaluative answers from the research subjects. The primary research was conducted using a survey. A survey method involves asking questions of the subjects directly. The survey was split into two parts – questionnaires were sent to the respondents, then once the results had been collated, a series of interviews was conducted. Surveys are typically used for quantitative research, and if the researcher is to be totally honest, she is not certain that a survey was the best choice for this qualitative research project. The amount of data that resulted was not sufficient to allow the researcher to develop a framework, and follow-up interviews asking indepth questions were conducted to provide sufficient data for analysis. The researcher used expert sampling, a subset of the purposive sampling method, to select the survey respondents. It is a non-probability method of sampling that enables the researcher to purposively choose a pool of respondents

that are known to have expertise on a subject (Socialresearchmethods.net, 2013).

On completion of the questionnaires, and once it had become clear that further data would be needed, the researcher again used the expert sampling method to select a group of respondents for the indepth interviews. In the second sample, some of the respondents to the questionnaire were involved, as well as a number of new respondents, chosen on the basis of their ability to provide the depth of knowledge needed based on their involvement in the sector. The researcher decided to conduct semi-structured interviews because interviews are a recognised survey method, and interviews thus fit within the researcher's chosen method. Semi-structured interviews allow the researcher to prepare questions ahead of time, and are formal interviews, but also allow the researcher to stray off the strict questions and order thereof if need be, and provide room for respondents to express their views and opinions (Qualitative Research Guidelines Project, 2012). This was necessary given the nature of the subjects (experts within their field, not necessarily willing to follow the strict interview structure that other types of interviewing would require).

The secondary research component involved completing a review of the documentation directly related to the LLU process as it has unfolded thus far, extracting qualitative data that identifies the views and reasoning of key stakeholders.

The third question – How should policymakers exploit the opportunities and address the challenges that arise out of this? – is answered through the creation of a framework that policymakers can use to decide which form of unbundling, given a specific rationale and a stated definition, will likely lead to a specific type of competition.

The framework is developed from the themes derived from comparing the

results of the study and the data derived from documentary sources with the academic literature within the context of a model developed by Hausman and Sidak (2005) and adapted by the researcher. In order to create this framework, the researcher took the data sets from the primary and secondary research projects and compared them, using the factors outlined in the adapted Hausman and Sidak (2005) model, in order to establish what impact LLU has on competition in the local market, the impact on entrants, the incumbent and consumers, and to draw conclusions around how these impacts must be taken into account by policymakers when drafting unbundling policies.

3.5 Data sources

The first and second questions – how does LLU impact competition in a market and what effect does it have on incumbents, new entrants and consumers – were answered through the primary and secondary research phases.

3.5.1 Primary research – survey and indepth interviews

As is typical in a survey, the researcher selected a sample of respondents and administered a standard questionnaire to each (Babbie & Mouton, 2001, p231), via e-mail in the questionnaire portion, and then either face to face or telephonically for the interview portion.

The questionnaires consist of questions directly related to the rationales for and types of unbundling, and the types of competition that result. Respondents were asked to give yes or no answers, to aid in the translating the data into a framework, although many provided commentary too (see attached questionnaire – Appendix B).

The questionnaire was submitted to a selection of representatives from the second fixed line operator (Neotel), the Internet Service Providers Association, consumer advocacy website My Broadband and several new entrants – Cell C, MWeb, Internet Solutions, and Vox Telecom, see Appendix A.

Eight participants from seven organisations responded to the initial questionnaire (others did not respond within the given timeframe) and eleven participants were interviewed (with some overlap between the two groups), additional experts having been included in order to broaden the pool of views, see Appendix A. These additional experts were drawn from ICASA, the University of the Witwatersrand, Cell C, Africa Analysis and Vodacom.

In surveys the subjects either fill in the responses themselves or the responses are filled in by the researcher. In this study the respondents filled in the questionnaires themselves, while the researcher wrote up the interview responses.

Once the questionnaires were complete the researcher collated and categorised them according to the broad themes into which the questions could be categorised – type of LLU, rationale for LLU or impact on competition. By recording the answers by type (yes, yes with comment, no or no with comment), the researcher could then add up the answers to provide a majority view on each question.. This provided a broad overview of what market players consider the rationales for LLU to be, what they understand the types of LLU to be and what types of competition were likely to result, but was not sufficient to draw up a framework that would be of use to policymakers.

The researcher then conducted semi-structured interviews, using a series of questions specifically designed to extract comment on how implementing LLU would affect the players in the market, competition in the market and the market overall (see Appendix D - Information Sheet, Consent Form and Interview Questions).

The interviews were semi-structured, conducted telephonically, for the main, due to the geographic dispersion of researcher and respondents,

and the busy schedules of all of the respondents. The semi-structured interview questions were specifically constructed to elicit more comprehensive feedback than had been obtained by the questionnaires.

Following the completion of the interviews, transcripts were prepared and and by using a process of categorisation the researcher translated the responses into a set of factors formatted as definite statements, for example: “LLU will increase competition in the retail space”. In categorising the responses the researcher organised similar responses, and eliminated responses that were unsubstantiated opinions.

The findings obtained from the primary research are arranged as they relate to three specific factors outlined in the amended Hausman and Sidak (2005) model – rationales for LLU, types of LLU and types of competition likely to result after a LLU exercise – and were contrasted with the themes and perspectives derived from the literature review.

3.5.2 Secondary research – document analysis

In sourcing and selecting documentation to review with a view to extracting data to be added to the framework for LLU, the researcher reviewed documents on the LLU process published by the policymaker, regulator and industry players responding to requests for input from ICASA.

In Chapter 4, the data collected in the research phase is contrasted with the academic literature reviewed in Chapter 2, and this lays the foundation for the data analysis conducted in Chapter 5. The academic literature used was extracted from the literature review in the Chapter 2 of this research report. Only that literature which could be categorised according to the factors outlined in the amended Hausman and Sidak (2005) model was used – ie that related to a definition of, rationales for and types of LLU, and the types of competition likely to result from a LLU implementation.

In selecting documentation from the policymaker, the researcher reviewed the Local Loop Unbundling Committee Report (2007) commissioned by

Minister of Communications Ivy Matsepe-Casaburri. It was intended to provide everything the regulator would need to unbundle, but, as noted in Chapter 4, it has barely been referenced in the latest stage of the process, save by some of the operators. Certainly neither the Department of Communications nor ICASA has used it as a reference.

With respect to documentation from the regulator, the researcher reviewed the Local Loop Unbundling Discussion Document published by ICASA on 22 June 2011. This outlined ICASA's approach, and asked stakeholders to provide input on a number of matters. Industry input came from the responses that this request elicited. The researcher was able to locate 12 submissions from a number of stakeholders – Neotel, Telkom, trade unions the Communication Workers Union, Solidarity and the South African Communications Union, consumer activist MyBroadband, private individual Paul Hjul, and a number of ISPs/VANS and mobile operators.

In presenting the findings in Chapter 4, the findings from the documentary analysis are presented in general terms, before the primary research findings. The academic literature is contrasted directly with the primary findings as they relate to three specific factors outlined in the amended Hausman and Sidak's (2005) model. The literature is used purely for contrast, not analysis, and lays the foundation for analysis of the data in Chapter 5.

3.5.3 Drawing up a Framework

To answer the main question, the researcher utilised the data gathered from the primary and secondary research phases to develop a Framework for Local Loop Unbundling. This Framework draws on the clear themes that emerge across all of the data. The data in the findings chapter is arranged based on the factors outlined in the model developed by Hausman and Sidak (2005) and amended by the researcher. The analysis of these findings and the significance thereof is detailed indepth in the chapter that follows the presentation of the findings.

3.6 Delimitations

This research deals exclusively with LLU as a policy intervention intended to stimulate competition in the provision of telecommunications services and infrastructure. It does not deal with other policy interventions designed to achieve the same aims.

3.7 Summary

In this chapter, the researcher outlined the research project undertaken, and provided details pertaining to the research purpose, methodology, data sources, and delimitations. The researcher conducted a social research study into an aspect of the telecommunications sector that has real world applicability to the respondents. Both primary and second research techniques were used. Qualitative research was conducted because it allows a researcher to study an matter even though there are few subjects (Neuman, 1991: p13), it allows for thematic analysis (Neuman, 1991: p13) and enables the researcher to address evaluative questions (Ritchie & Spencer, 1994: p307), to extract textual rather than numerical data, and to capture and discover meaning (Neuman, 1991: p157). Two research methods were utilised – surveys and interviews, and document analysis. Once both were complete the researcher used the findings to design a framework for policymaking.

Chapter 4 Contemplating the impact of LLU on competition

4.1 Introduction

In collecting data for analysis of the local environment, both primary and secondary sources were used. This chapter begins with a documentary analysis of the Local Loop Unbundling Report produced by the Local Loop Unbundling Committee, which was meant to guide South Africa's LLU implementation. This is followed by documentary analysis of the stakeholder submissions to the most recent LLU process, conducted by the regulator in 2011. Thereafter the researcher comments on the Local Loop Unbundling Framework published by ICASA as an outcome of this process.

The researcher then presents the findings from a stakeholder survey and semi-structured interviews presented in a format specific to the adapted Hausman and Sidak model. All three sets of results are compared, for validation purposes.

4.2 Regulating LLU

4.2.1 Local Loop Unbundling Committee recommendations on LLU

The report prepared by the Local Loop Unbundling Committee (2007) which is meant to guide South Africa's implementation of LLU, is widely known to have been plagiarised from a 2003 OECD report (OECD, 'Developments in Local Loop Unbundling', published September 2003). It is very clumsily written, as if its authors were writing about a topic they'd heard of but weren't particularly familiar with. Phrases like: “In spite of the telecommunication services to be offered, the main difference between the incumbent and the new entrant is that the incumbent already has a very widespread fixed line infrastructure for both national and international connectivity, while the new entrants do not have any” (Local Loop Unbundling Committee, 2007: p2), is indicative of both the stilted writing

style and very basic understanding of the matter.

The real difference is that the incumbent has had years, and a monopoly environment, in which to build a network and a customer base while the entrant hasn't had either. LLU intends to stimulate competition by redressing this imbalance through enabling other players to use incumbents' infrastructure rather than building their own (Baranes & Bourreau, 2005; Local Loop Unbundling Committee, 2007; OECD, 2003; Sutherland 2007).

The report's writers appear to discount entirely the impact mobile network operators have had on the sector. For example, they state that Telkom's customer base is 47 percent business and 53 percent residential and that, as business customers account for 75 percent of its revenue, opportunities for growth exist in the SME and government sectors. But, they say: “Other segments like residential and the top business customer have been experiencing decreasing growth compelling Telkom South Africa to seriously market ADSL and be prepared to put forward WIMAX and Internet based television” (Local Loop Unbundling Committee, 2007: p4), without considering what the reasons for the decreasing growth are, and that aggressive marketing or introducing new products and services may not solve the problem.

The report asserts that unbundling the local loop will place “strong downward pressure on tariffs for high speed voice and data services and diminish significantly the cost of Internet access” (Local Loop Unbundling Committee, 2007: p4) without providing comment on how this will happen or data to support this assertion.

The authors admit that the report was written based on information derived from desktop research and case studies from the US and Europe. Little primary research appears to have been done and few experts consulted, at local, regional or international level though South Africa has access to

experts in country, in SADC, and internationally at the ITU.

The authors repeatedly refer to the ICT market in contexts which make it clear they do not understand the significance of the I and the T in the acronym. For example, “The introduction of the SNO and the freeing up of the ICT market” (Local Loop Unbundling Committee, 2007: p4). The IT market has never been subject to capture, not in the sense the authors seem to mean in any event. Such basic errors are common throughout the report and make the reader question just how much research the writers did, and what level of academic rigour was applied to that research.

The report refers to the legalisation of “the international VOIP” (Local Loop Unbundling Committee, 2007: p5), and states that this is a ground for competition between Telkom and the SNO and the basis for a duopoly between them, neglecting entirely to mention the VANS providers (some 500 of them), which can and do provide VoIP services, both locally, nationally and internationally, and have done since 2005.

Puzzlingly, the report makes the assumption that the local loop infrastructure will be split into a separate organisation ala BT Openreach (Local Loop Unbundling Committee, 2007: p39), which has been functionally separated from the larger BT organisation, without supplying any detail on what led it to make that assumption or why it recommends this approach.

The report does provide a comprehensive outline of the technologies involved, the complexities of co-location, the role of the regulator and the expected impact on the incumbent.

The report mentions only three types of LLU – full unbundling, line-sharing and bitstream – and does not consider sub-loop unbundling (Local Loop Unbundling Committee, 2007: pix) in its introduction, but mentions sub loop as a subset of bitstream in its explanation of each type (Local Loop

Unbundling Committee, 2007: p21).

The LLU Committee's stated rationales for LLU are:

> [to] facilitate telecommunication providers to innovate and differentiate their product offerings; promote competition in the provision of broadband services; offer opportunities for innovation to drive product and price differentiation; permit providers to give a better choice of applications and improved service levels; allow customer to have alternatives in terms of telecommunication services and price; speed up national economic growth and increase competitiveness in the global market; and support ICT in the country and hence promote economic and social growth in addition to employment opportunities (Local Loop Unbundling Committee, 2007: p3).

The report does not delve specifically into the types of competition that could result from each type of unbundling. It states that: “new entrants would like to compete in this space to provide data communications services and broadband access to customers” (Local Loop Unbundling Committee, 2007: p2), which is retail competition. The competition scenario illustrated further on in the report (Local Loop Unbundling Committee, 2007: p5) again specifies consumer market – retail – competition. The report's authors clearly have not considered that platform, facilities-based or wholesale competition could result from an unbundling exercise.

4.2.2 Stakeholder submissions on LLU 2011

The LLU process in South Africa kicked off (after a hiatus of three years) with the publication of a discussion paper on LLU by ICASA on 22 June 2011 (Local Loop Unbundling Discussion Paper, ICASA, 2011a). It does not pay much attention to the Local Loop Unbundling Committee's Report, despite said report laying out how LLU should be implemented. The Marwala Report, as it is known, after the Local Loop Unbundling Committee chairperson, has barely received a mention since the new

process kicked off.

ICASA's discussion document lays out the legislative background to South Africa's open access approach to telecommunications, as well as detailing the four types of unbundling. It asked interested parties for input on whether its approach to unbundling the local loop via the facilities leasing regulations was feasible, reasonable and acceptable; which type of unbundling the market preferred; cost items that should be included; whether a standard set of specifications and ordering system was needed and whether or not players would be willing to contribute to an access line deficit (ALD) recovery scheme should an access line deficit be discovered (ICASA, 2011a: p2). An access line deficit occurs when the revenue received from line rental and service provision does not cover the cost of said rental and service.

The document requested comment from stakeholders to be submitted by 22 September, which left the regulator very little time to meet the November 2011 deadline originally set by late Minister Ivy Matsepe-Casaburri.

Following the submission of comments, public hearings were held, which allowed stakeholders to present their submissions to the regulator. As can be seen from the data below, the submissions vary widely both in the depth of understanding of the matter at hand, and the proposals on how the regulator should tackle LLU.

4.2.2.1 Broadband InfraCo

By it's own admission, infrastructure provider Broadband InfraCo (2011) does not play in the fixed or mobile market and has no direct interest in LLU. It does believe LLU will increase competition and thus improve its economies of scale due to the higher volumes of traffic it expects will result. The company considers LLU to be naked ADSL (which is a digital line without any voice functionality), which is technically incorrect. The company concurs with ICASA that the facilities leasing regulations enable

LLU but says that the fact that LLU has not happened yet indicates the regulations are not efficient.

It has no preference for a particular type of LLU but wants ICASA to ensure that under-investment in the loop does not result. It is positing an open access model that includes access to facilities like ducts and points of presence and says that full unbundling may be the only way to achieve this. It wants ICASA to include the cost of upgrading or replacing the local loop in its cost considerations. It is supportive of an access line deficit recovery scheme but comments that this should not be open-ended and that it must be transparent and not constitute a barrier to entry.

4.2.2.2 Cell C

Mobile network operator Cell C (2011) raises concerns around procedural issues (inconsistencies between the media statement announcing the framework, the discussion document itself and information provided in a meeting it held with the regulator), and informational issues (noting that the working groups to deal with pricing and technical issues as posited in the discussion document will not achieve much without technical and financial audit information of Telkom's exchanges, electronic facilities information and subscriber information).

Cell C (2011) recommends that the regulator use the Marwala Report to guide the LLU process but does not state why it makes this recommendation. It notes that it does not believe the wireless local loop should be unbundled, which is not surprising given the investment it is making in rolling out such a network at the moment.

4.2.2.3 Communication Workers Union (CWU)

Trade union, the Communications Workers Union (2011) notes that LLU is a very costly exercise, which requires coordination between the incumbent and new entrants on a number of processes, and that agreement is needed on a number of things – like pricing, colocation and spectrum management. It believes such costs will be offset by operators cutting

costs in other areas – like labour.

LLU, it states, represents a threat to national security. Different types of communication are at risk of being intercepted despite legal protections and despite there only being one player with access to the network, it says This view suggests that that it does not understand how telephony, e-mail and other communications take place over any given communications system. Extending access to different network elements to different service providers, the Communications Workers Union (2011) believes, will increase the risks.

The Communications Workers Union (2011) says that because the network does not extend to poor or rural areas, citizens in townships and rural areas will not benefit from LLU and competition will be restricted to urban and business districts.

The Communications Workers Union (2011) regards technical interoperability (or the lack thereof) to be a threat to the process, stating additionally that the technological co-operation of incumbents and entrants may need to be provided for by technical specifications that do not yet exist. It is advocating technology neutrality as a remedy to this.

The Communications Workers Union (2011) notes that the timing of LLU is a little late as the incumbent is no longer the dominant player in the sector, a view Telkom (2011) has also espoused.

4.2.2.4 Paul Hjul

Private individual Paul Hjul (2011) states that he has no interest in the sector other than as a user of communications products and services. Hjul (2011) believes that if LLU is enabled under the facilities leasing regulations then ICASA has no option but to implement them. He says the problem in the regulatory environment relates to failure by ICASA to "tackle certain ICT players head on". He says consumers want "value for money and quality service", and that as all forms of unbundling are

mandated the Authority should go ahead and make sure LLU is implemented. He suggests bitstream and sub-loop unbundling be prioritised, because bitstream allows for quick wins, and sub-loop will drive fibre roll outs thus mitigating the effects of the inevitable cherry-picking of profitable exchanges that is going to happen.

4.2.2.5 Internet Service Providers Association

The Internet Service Providers Association (2011) references the open access approach, and comments that, with that in mind, the LLU process cannot restrict itself to copper lines. It argues for taking a broader approach and including media like radio frequency and fibre, as well as copper, in the unbundling process so that the process results in the establishment of principles that can apply to any media. The technicalities of unbundling various access media should be left to industry working groups, it comments, while requesting that the Authority broaden the scope of the process underway.

The Internet Service Providers Association (2011) states that the increased competition and lower costs further up the telecommunications value chain (for example in submarine cables) are not being felt by consumers due to the limited number of players in the last mile, and that LLU is critical to reducing broadband prices, as a result.

It further notes that mobile broadband is not a substitute for fixed, that this issue is not relevant within the unbundling discussion and that the existence of a wireless broadband market is no reason not to fix market failures in the fixed-line market.

It expresses concern that pricing is not addressed in the discussion document, citing the recent failed implementation of carrier pre-select (which has been stymied by the monopoly operator putting high prices in place in the absence of regulations to guide cost-setting). The Internet Service Providers Association (2011) states that unless wholesale pricing is regulated, the entire LLU exercise will be pointless.

4.2.2.6 MyBroadband

Consumer activist and publisher MyBroadband (2011) says consumers are faced with both “a lack of service offerings and predatory pricing” due to systemic failure with regards to the implementation of the Electronic Communications Act. It agrees with the regulator that LLU is enabled by the facilities leasing regulations. A poll conducted on the MyBroadband site saw 90% of users expressing a preference for full unbundling. A phased approach is also preferred, starting with bitstream and line-sharing and moving up to full unbundling. The group has requested that the Authority review the access line deficit to investigate how it is calculated. Consumers do not want the access line deficit recovery fee to either be used to substitute for revenue lost to LLU or subsidise inefficiency.

The group, like Telkom, feels that mobile and other access networks should be included in unbundling. MyBroadband (2011) says maintenance and upgrading the loop may be an issue once it is unbundled and that the Authority needs to specify clearly defined service levels and enforce such.

4.2.2.7 MWeb

VANS MWeb (2011) concurs with and supports ICASA's goals (as laid out in the framework), and says that additionally, it believes LLU will result in job creation, increase competition and improve the customer experience in terms of broadband products and services.

It believes that while LLU will go some way to remedying issues in the broadband market, short-term remedies are needed, specifically to address problems with Telkom IP Connect pricing, the quality of the IP Connect service, the lack of availability of Naked ADSL and lack of access to the wholesale wireless network (in other words it agrees with the Internet Service Providers Association and Telkom that wireless networks should also be unbundled).

MWeb (2011) says that ICASA should subsidise organisations that invest in last mile infrastructure, with funding from the Universal Service Fund,

with the infrastructure being made available to all on an open access basis (or no subsidy be issued).

The company acknowledges the complexity of, costs involved with and lengthy time periods needed to properly implement LLU and recommends a phased roll out.

4.2.2.8 Neotel

Second network operator Neotel (2011) supports efforts to unbundle the local loop, stating that, among other things, unbundling results in increased innovation, job creation, reduced prices, investment increases and facilities competition. It believes LLU should be restricted to the copper fixed-line loop, that all four options should be implemented, and that an Ordering Specifications System is very important. It does not support an access line deficit charge.

Neotel (2011) believes LLU gives an entrant an opportunity to get to know the market, to become familiar with customer expectations and build a brand and customer trust before embarking on its own roll-outs. It refers to Martin Cave's ladder of investment theory (Cave, 2006), citing case studies where operators in Norway, Sweden and Denmark took advantage of unbundled loops to expand infrastructure into other geographical territories. It says LLU will reduce prices in part because in South Africa up to 77% of the cost of an ADSL service goes to Telkom by way of its IP Connect product, which is what connects other providers to Telkom's network. Telkom does not use the public Internet like other service providers in South Africa do.

Neotel (2011) says Telkom has a number of options which it can implement to counter-act any losses it experiences due to LLU, including launching new retail products, differentiating its offerings, partnering new entrants and developing “attractive wholesale offerings” (Neotel, 2011: p14).

4.2.2.9 Solidarity

Trade union Solidarity (2011) says it finds ICASA's "attempted ex-ante regulation premature" (Solidarity, 2011: p1). It states there is no research to prove that LLU will result in greater competition or lower prices, and is not certain that there is enough demand for broadband to justify an unbundling exercise. It comments that there is increasing evidence that less regulation may be needed in terms of retail pricing and LLU, and more needed in terms of spectrum allocation, particularly for the supply of broadband services into the small office, home office and residential market.

It argues that wireless technology offers a fixed line substitute and that "scarce regulatory resources" would be better used for frequency spectrum allocation (Solidarity, 2011: p2). The trade union asserts that as so few households (17%, according to Statistics South Africa, as quoted by the union) have fixed lines only urban users stand to gain from LLU.

It says government's shareholding in the incumbent is "surely contrary" to its universal access objectives (Solidarity, 2011: p1). It says jobs will be lost if LLU is implemented, quoting figures from Telkom, which state that LLU will cost it between R159m to R850m and result in lost revenue amounting to R466,4m over five years. Solidarity is proposing bitstream unbundling as a means to open up the sector while not having the same "technical and practical drawbacks" (Solidarity, 2011: p3). It concurs with Telkom that LLU should apply to all communications licensees, including mobile network operators.

4.2.2.10 South African Communications Union (SACU)

The South African Communications Union (SACU) (2011) says the discussion document does not "set the context for the detailed questions which it poses", commenting that it "lacks something of an overarching narrative" (SACU, 2011, p1).

It says 15 years of competition in the sector have not been hugely

successful and that competition has not resulted in better pricing or service quality, although consumers have much more choice. It criticises the policy of encouraging network competition as having led to infrastructure duplication and little innovation plus huge job losses. ICASA has not always produced detailed regulations and this has cost the industry, it states. It says there is a "lack of regulatory strategy" (Solidarity, 2011: p2). It outlines a set of broad principles that it thinks should shape and underly telecoms regulation going forward:

> LLU Regulation should take account of the interests of those who work in the industry and the need to work with trade unions to secure skills and training at the highest levels and promote decent labor standards and practices throughout the ITC industry;
>
> LLU Regulation should support the delivery of the strategic needs of South African public in as a whole (sic);
>
> LLU Regulation should focus less on attempting to promote network competition, but more on securing the necessary investment in the network designed to facilitate universal access and the production for new innovative products and services (sic);
>
> LLU Regulation should be based on telecommunications as a global market and not simply a South African one;
>
> LLU Regulation should be less telecommunications sector specific and more generic with more reliance on competition act (sic) and move towards a strategic model that promotes investment, innovation and development in the network;
>
> LLU Regulation should be less tactical and intrusive and more strategic and enabling;
>
> LLU Regulation must deliver effective funding arrangements for universal access to ever-increasing bandwidths speeds (sic) and ensure that minimum standards on quality of service are maintained throughout the ITC sector;
>
> LLU Regulation should be less mechanistic and more humanistic,

empowering workers in the ITC sector and creating sustainable employment;

LLU Regulation should take account of the interests of those who work in the industry and not the exclusive interest that of business (sic) (SACU, 2011: p3).

SACU notes that LLU will be technically and organisationally difficult to define and implement. It would also delay broadband roll outs, it asserts, as South Africa is now doing well in broadband terms (it does not define 'well' or say who South Africa is doing well in relation to) thanks to Telkom and that LLU would disrupt this as well as result in “innumerable” job losses (SACU, 2011: p5).

It states that LLU has never worked anywhere and that ICASA is headed into shaky territory, and introducing LLU would be a “betrayal of investors, customers and employees – for no good reason” (SACU, 2011: p6).

4.2.2.11 Telkom

Monopoly incumbent Telkom (2011) expresses numerous concerns about LLU in its submission. It says LLU is outdated and not suited for developing countries that do not have high levels of fixed-line teledensity.

As mentioned by Solidarity (2011), Telkom (2011) prescribes to the principles of open access to the loop and believes said principles should be applied to all licensees, including mobile network providers. It says conditions specific to South Africa, like the concentration of revenue in a few profitable exchanges, means LLU poses a threat. It states that LLU is costly, and complicated, as international case studies have shown, and it wants any costs to unbundle the local loop to be funded by access seekers, and not Telkom.

It comments that it is unclear how “LLU will promote South Africa's developmental agenda” (Telkom, 2011: p3). It believes LLU is contrary to that policy, and, further, that it does not support government's universal

service and access or job creation goals. It says LLU will negatively impact both network roll outs and employment.

In addition to the substantive challenges, it challenges the Authority on procedural issues too (in great detail, and at length), stating that it is incorrect “in law” for ICASA to be using the Minister's 2007 Policy Decision as a policy framework for LLU (Telkom, 2011: p4). It also does not believe the facilities leasing regulations enable the unbundling of the loop, stating that “the Authority's reliance on its facilities leasing regulations is flawed in law and open to legal challenges” (Telkom, 2011: p4). It further states that ICASA has not followed the provisions of the ICASA Act correctly in initiating the section 4B inquiry into LLU.

Telkom (2011) makes the comment that there has been a lack of discourse on the subject, that ICASA has not “considered the implications and unintended consequences of LLU”(Telkom, 2011: p4). It notes that “Telkom believes the Authority should not proceed prior to having considered government's policy objectives, conducted a Regulatory Impact Assessment and having addressed Telkom's ALD” (Telkom, 2011: p4).

It further notes that ICASA has outlined neither a rationale for nor any objectives of LLU, nor has it highlighted what benefits would accrue to the poor or those in under-serviced areas. It disputes ICASA's assertions that Telkom's network is under-utilised and that LLU will thus result in increased broadband penetration. It does not agree that LLU will secure jobs, nor does it agree that LLU represents a revenue-generation opportunity for Telkom, with potential new revenue of R1bn available to all operators, which could be used for network expansion. It further notes that ICASA has provided no data or evidence to back up its claims.

4.2.2.12 Vodacom

Mobile network operator Vodacom (2011) quite carefully and specifically states that it supports LLU, as set out in the Marwala Report ie, the unbundling of the copper line network owned by Telkom and located

between the subscriber's premises and the main distribution frame (MDF). It supports ICASA in its decision to use the facilities leasing regulations to enable LLU. Should ICASA wish to unbundle any loops not contemplated by the Local Loop Unbundling Committee (ie any loops that are not Telkom's copper loop), then an entirely new process, it believes, will need to be started.

It believes that neither bitstream unbundling nor the wireless local loop are facilities that could be leased under the facilities leasing regulations, and a market review process will be needed before either can be introduced. It wants all four types of LLU to be made available, but notes that bitstream is a service not a facility and thus cannot be regulated in terms of the facilities leasing regulations. It requests that the Authority issue supplemental regulations to deal with practical matters such as ordering procedures, policies, colocation, rental arrangements and so on.

Vodacom (2011) says the Local Loop Unbundling Discussion Document does not provide information around exchange location, lines, geographical coverage, condition of the copper lines, quality of the lines and other critical information, without which it cannot evaluate the viability and benefits of LLU. It recommends an audit be undertaken. It also recommends that a regulatory impact assessment be done to determine the “implications, benefits and costs associated with implementing LLU” (Vodacom, 2011: p7), and to help the Authority to determine if LLU will meet its objectives. Vodacom does not point out that the Authority has not stated its objectives.

Vodacom raises a number of questions on the issue of the access line deficit (ALD), including asking how the ALD is defined in SA, how it came about, what the size of the ALD is, how it is calculated, what options are being considered to address it and if the ALD came about because of poor management or inefficiency.

4.2.3 ICASA's Determinations

Following the oral presentation of the above submissions on 11 and 12 October 2011, ICASA released its Local Loop Unbundling Framework on 30 November 2011 (ICASA, 2011c), and did not give industry much hope that LLU would be implemented quickly or effectively. ICASA (2011)b has decided to implement LLU in a phased process. Having determined that there is an access line deficit (ie that Telkom charges less than it costs it to own and maintain its copper lines), it announced it was undertaking a public consultation process to establish an Access Line Deficit Recovery Scheme. This process was due to kick off in February 2012 but did not.

ICASA (2011c) stated that it planned to “engage with industry” to ensure that the price of Telkom's IP Connect product (the cost it charges ISPs to interconnect their IP networks to its) was dropped (ICASA, 2011b: p3). It wanted this to happen by 31 March 2012. A 30 percent cut was announced on 4 April 2012 (Mochiko, 2012).

Further, ICASA (2011c) planned to ensure that a bitstream product was introduced by 1 November 2012. A working group was going to be established in February 2012 to work out the technical issues and develop an Ordering System Specification. To the best of the author's knowledge this had not happened by early April 2013.

ICASA (2011c) planned to conduct a regulatory impact assessment in mid-2012 on the costs and benefits of the three other types of LLU – full, sub-loop and line sharing. This has also not happened as far as the author is aware. Depending on the outcome of this process, ICASA (2011c) says, it will conduct a market review on the fixed line local access market with a view to introducing supplementary regulations.

4.3 Rationales for LLU

This research was conducted in several phases, the first involved secondary research into the documentation guiding South Africa's efforts in this regard, and the formal industry input into this process, as detailed

above.

As part of the second phase – where primary research was conducted – a survey was presented to eight local stakeholders, posing 24 questions on LLU and its expected impact on competition and pricing in the local market.

Following on the survey, a series of interviews was done with an expanded panel of experts (11 participants in total). The semi-structured interview questions were structured to elicit more comprehensive feedback than had been obtained by the surveys. Respondents were selected for indepth interviews to provide the researcher with a more comprehensive view of the respondents' views and reasoning on the matters raised in the survey. LLU is a complicated topic and the questionnaire only scratches the surface of the issues at hand.

Once respondents were selected and agreed to participate, telephonic and face to face interviews were conducted. The respondents' interview transcripts were then typed up, factors related to the rationales for LLU, types of LLU and types of competition were extracted, these were then collated, compared, de-duplicated (many of the respondents had stated the same or very similar things) and compiled into a set of factors related to the questions the researcher sought to answer.

The findings of both data collection phases are presented below, categorised according to the amended Hausman and Sidak (2005) framework. These are directly contrasted with the academic literature, which is presented below.

4.3.1 Data on rationales for LLU

According to some of the survey respondents, a rationale for LLU is to give new/alternate entrants access to the incumbent's infrastructure. They say LLU should be implemented because it fosters competition in the market. LLU also provides a means to avoid the cost of duplicating fixed line

infrastructure, they note.

The respondents believe LLU will enable the delivery of services to under-served areas, and encourage broadband roll out. LLU, they maintain, also enables service-based competition, and will thus increase the return on investment on installed copper infrastructure and enable the copper network to be used efficiently.

4.3.2 Contrasting perspectives on the rationales for LLU

The most commonly cited rationales for LLU are to increase competition in the last mile and reduce costs (Christodolou & Vlahos, 2001; Rowe, 2001; Bourreau, 2002; De Bijl & Peitz, 2005).

Intven (2000: p3-40) states that: “The purpose of unbundling policies is to lower economic and technical barriers to competitive entry.”

According to Hausman and Sidak (2005), LLU has four major rationales: to promote retail competition; to remove entry barriers that prevent platform competition; as a stepping-stone to facilities-based competition; and to promote wholesale access market competition (Hausman & Sidak, 2005, p173, 192).

Other rationales include what is called the essential facilities doctrine (Gabelmann, 2001), which states that the local loop is an essential facility that cannot be easily duplicated. This concept is found in South Africa's law in the Electronic Communications Act of 2005.

4.4 Types of LLU

4.4.1 Data on types of LLU

Full unbundling, according to the survey respondents, is the most expensive option for new entrants but gives new entrants the most control and the option to utilise new technology. Full unbundling, they note, is also complex and complicated. They comment that full unbundling will enable the introduction of innovative products and services as it gives entrants

access to the entire circuit. Further, the respondents say, full unbundling will have the biggest impact on the market because it enables players to introduce new technologies that enable advanced services.

Sub-loop unbundling, according to the respondents, gives the facilities seeker access to the local loop from the streetbox. The facilities seeker has to invest in its own backhaul from there, they note. It is relatively low cost for the incumbent, they add, and sub-loop unbundling unbundles the line at the closest possible point to the subscriber. Sub-loop unbundling allows for shorter loops and thus faster bandwidths, they state.

According to the respondents, line-sharing gives the new entrant access to the high frequency spectrum portion of the line over which to provide data services, while the incumbent retains the low frequency portion for voice services. It requires less investment from new entrants than full or sub-loop unbundling, they comment, and allows the incumbent to retain voice revenues.

Bitstream, the respondents say, is not a physical unbundle, nor a facilities share, it is a wholesale product that brings competition to the retail space. They comment that bitstream opens access to the incumbent's network at minimal cost to the new entrant/alternate carrier. Bitstream takes place furthest from the consumer and the required capital expenditure is significantly reduced but control over the product is reduced too, the respondents note. Bitstream lets new entrants access the incumbent's loop to deliver data traffic to consumers.

4.4.2 Contrasting perspectives on types of LLU

The OECD (2003: p7,8) states that full unbundling happens when the incumbent's copper is leased to a new entrant to use to offer services, and the incumbent ceases to provide services but still owns the infrastructure and has to maintain it.

Line sharing gives the new entrant access to some of the copper pair so,

for example, the incumbent offers voice and the entrant offers broadband to the same consumer over the same (shared) line (OECD 2003, p7,8).

Bitstream access gives entrants a wholesale xDSL product that they can resell to consumers – full control of the lines is retained by the incumbent (OECD 2003: p 7,8), meaning entrants are restricted by what the incumbent makes available to them. For example, if the incumbent only makes an ADSL product available then the entrants can only resell an ADSL product to consumers.

Sub-loop unbundling occurs when the entrant connects to a point in the local loop (usually at the primacy connection point or street cabinet) on a full or shared basis. It is best suited to fibre to the curb environments where high-speed bandwidth connections are being provided (Telecommunications Authority of Trinidad & Tobago, 2009: p15).

4.5 The impact of LLU on competition

4.5.1 Data on the impact of LLU on competition

The respondents and interviewees believe the impact on competition will be high. According to them, implementing any of the four types of LLU will result in increased retail competition. LLU, they maintain, fosters service-based competition and it opens the fixed line market to competition in the retail space. LLU opens the market to new players and lets existing players grow, they comment, and should impact the price and variety of services and products available, but that depends on how it is costed. The respondents further concur that full unbundling, sub-loop unbundling or line-sharing will result in platform competition, but are equally divided on whether bitstream will or won't. The respondents are almost unanimous in believing that mandatory unbundling will result in facilities-based competition, whether it is full unbundling or sub-loop unbundling, only ISPA and Vox disagree. The respondents also agree that bitstream unbundling or line-sharing will not result in facilities-based competition. On wholesale access competition, all agree that LLU will further competition in this sector

of the market, irrespective of type of unbundling implemented.

The respondents believe the impact on consumers will be high. The respondents concur that retail competition will occur without the imposition of mandatory unbundling. They further agree that LLU will result in lower prices for both consumers and new entrants, as well as encourage new players to enter the market and roll out their own infrastructure. All of these will have positive consequences for consumers and entrants and negative consequences for the incumbent. Some of the respondents noted that LLU will increase contractual complexity in the sector because of the nature and variety of agreements needed to govern the commercial arrangements.

The impact of LLU on the fixed line market will depend on what type of LLU is implemented and how much longer it takes, some respondents noted. LLU will ultimately result in a deepening of the copper network in terms of subscribers, volumes and products as it will bring competition to the infrastructure space, and stimulate roll outs as demand increases, some respondents believe.

LLU is costly for the incumbent, and the incumbent will lose market share and revenue, according to some of the respondents. LLU can also reduce the incentive for operators to roll out their own infrastructure if not priced correctly.

4.5.2 Contrasting perspectives on the impact of LLU on competition

According to de Bijl and Peitz (2005), LLU had still failed to give strong competition in the fixed line telephony front in Europe by 2005, with only 6.5 percent of consumers using lines provided by entrants or unbundled lines provided by entrants in 2004. While unbundled loops hadn't been used by new entrants to roll out voice services, de Bijl and Peitz (2005) note these have been used to offer broadband offerings (by incumbents and entrants alike). They comment that while full unbundling hasn't achieved its aims, line sharing and bitstream unbundling initiatives have

overall been relatively successful in introducing competition in the voice arena, not necessarily via fixed lines though, but rather via newer technologies like voice over Internet Protocol (VOIP), and in introducing competition in the Internet access space.

Dippon and Ware (2010: p2) are less positive:

> Wholesale unbundling in some instances may have contributed to increased competition. However, our analysis suggests that the apparent association between unbundling and increased broadband penetration is not statistically significant when relevant economic, demographic and supply determinants are included in the analysis. As communications networks converge and the demand for wireline services decreases globally, intermodal competition is more prevalent and the benefits of unbundling are more difficult to assess, and unbundling arguably becomes a regulatory tool of the past. Given the dynamic nature of the communications industry, the costs and the risks of implementing mandatory unbundling, and the international differences in geographic, demographic, and market conditions, policy makers should use a case-by-case approach that carefully examines the contours of the relevant market(s) at issue as well as the costs and benefits of any regulatory intervention.

Facilities-based competition is the ultimate long term goal of LLU interventions, as facilities-based competition, says Oftel (as cited by Bourreau and Doğan (2005: p174)), provides the needed level of innovation and product diversity to meet consumer needs. As a prelude to this roll out, LLU provides a gap in which the entrant can provide services to generate income to use to invest in a network. They say this often doesn't happen, however, due to the pricing of the access loop, which results in delays in rolling out networks and new entrants falling behind, technologically speaking.

The terms and price of an unbundled loop affect the viability of operations

in that market (Baranes & Bourreau, 2005: p19). If prices are too high or conditions unfavourable, entrants will stay away, which illustrates the complexity of an unbundling exercise, and the need for an informed and highly-involved regulator.

Bourreau and Doğan (2005), argue that incumbent operators are incentivised to price local loops below cost in order to encourage new entrants to use said loops and only compete on a services basis, and not on a facilities basis. This, they say, impacts the building out of alternative technologies.

De Bijl and Peitz (2004: p3) note that the general idea is that LLU will open the market and serve as a means to “deal with persistent network monopolies” but that LLU discourages entrants from innovating or rolling out their own networks and should, at some point, be withdrawn once competition has matured.

According to Hausman and Sidak (2005), retail competition is a frequent rationale for mandatory unbundling, because it is believed that retail competition is a good thing, that incumbent operators prefer their own downstream affiliates (meaning natural market forces would thus not deliver retail competition without mandatory LLU), and that natural competition is inhibited by entry barriers.

In the five country case studies conducted by Hausman and Sidak (2005), retail prices dropped in only one country (Germany), in all others pricing went up, and investment by incumbents dropped, providing inconclusive evidence for the influence of LLU on retail competition.

A case study on Cyprus' liberalisation efforts conducted by Symeou (2009) reveals that four years after LLU the incumbent still held 97 percent of fixed national call and 87 percent of international call revenues, and that while 27 new fixed line operators had been licensed, few had made any

impact in the market (Symeou, 2009, p221).

Bourreau's 2002 review of France's LLU process revealed that only 800 lines had been unbundled, and that of 27 operators that participated in trials, only eight had signed unbundling contracts (Bourreau, 2002, p19). He notes that services-based competition had barely been affected, but infrastructure-based had taken off, with some 169 000 broadband subscribers in the country in 2001 (Bourreau, 2002: p19).

Hausman and Sidak (2005) point out that access-based competition is seen as a stepping stone to facilities-based competition (which is highly desirable), and that this has become a rationale for mandatory LLU, ie that facilities-based competition is enabled by it. The expectation is that by allowing new entrants to use an incumbent's infrastructure it enables them to earn revenue, which they can then use to build their own facilities. As the authors point out, however, this is generally not the case, and the five country case studies conducted found “no evidence to support” the theory (Hausman & Sidak, 2005: p243).

According to the accepted theory, LLU will promote wholesale competition, as Hausman and Sidak (2005) note. New entrants building their own facilities means new players entering the market in the future would not be solely reliant on incumbents' unbundled network elements, while simultaneously resulting in lower pricing of said elements, which would theoretically result in lower prices for consumers. The case studies conducted by Hausman and Sidak (2005) revealed some form (albeit very slight in one case) of wholesale competition had arisen in three of the countries, while it had not in the other two, but that there was a lack of wholesale players in the market.

According to Hausman and Sidak (2005), consumers are meant to benefit from unbundling because regulation theoretically results in lower retail prices. Regulation, in a dynamic market, say Hausman and Sidak (2005),

impacts the return on investment in network infrastructure by new entrants and incumbents, and risks reducing it because incumbents are forced to let new entrants use their infrastructure, and new entrants have no motivation to build out their own infrastructure while they have access to the incumbent's.

According to Hausman and Sidak (2005) another major rationale for mandatory LLU is that entry barriers inhibit platform competition. Simply put, factors like the cost of investing in a new network, achieving economies of scale, and being able to operate and compete with an incumbent while trying to achieve said network roll out and economies of scope and scale were seen to be huge barriers to entry to new entrants, and mandatory LLU is seen as a means to remedy this. Hausman and Sidak (2005) refute this, based on their case studies, citing competition in the cable market in many countries in the absence of mandatory unbundling.

Hausman and Sidak (2005), considered LLU in five countries – the US, UK, Germany, Canada and New Zealand – with the intention of determining if unbundling did what it was intended to do. In each case, the outcome wasn't certain, with only Germany showing clear price reductions since the introduction of LLU, and then, as the authors note, competition from mobile networks had started to result in price decreases in any event.

4.6 Summary

While the debate in South Africa has centred on the need to introduce retail competition, the debate in other countries, such as the five selected by Hausman and Sidak (2005) for their study, dealt with the complexity of stimulating competition in the wholesale, platform, facilities and retail segments of the market.

South Africa's debate on LLU has centred on a specific desired outcome - the need to make telecommunications services available to the entire

population - while in the US, UK, Germany, Canada and New Zealand a variety of rationales motivated each unbundling exercise. The major rationales identified by Hausman and Sidak (2005) are that mandatory unbundling promotes wholesale access market competition, that LLU is a stepping-stone to facilities-based competition, that LLU removes entry barriers to platform competition and that competition in retail markets cannot be achieved without unbundling. Only the latter has received substantial attention in South Africa, as shown by its prominence in the Local Loop Unbundling Committee report (2007), and the responses and comments given by the respondees and interviewees.

Chapter 5 Cost, complexity and control as factors influencing the application of LLU

5.1 Introduction

In this chapter, the researcher presents an analysis of the data, leading to the design of a Framework for Local Loop Unbundling. The aim of this research was to develop this framework, utilising the factors identified by the expert respondents, using the amended Hausman and Sidak (2005) model as a basis for comparison, and using the data extracted from documentary sources to inform the design. The framework is intended to be of use to the South African government and possibly also to governments in other developing countries in exploiting the opportunities and overcoming the challenges inherent in a LLU exercise.

Given the problems and challenges raised by many authors (including De Bijl & Peitz (2004 & 2005); Bourreau & Dogan (2005); Baranes & Bourreau (2005); Hausman & Sidak (2005); Symeou (2009); Dippon & Ware (2010)) it is not clear whether LLU should be attempted in South Africa. Very little research has been done on the use of LLU to unplug the last mile access bottleneck in developing markets, which have only recently reached the stage of market liberalisation where regulatory interventions to stimulate competition are being considered.

There has been very little conclusive research into whether or not LLU can increase competition in a developing market. This question is important for policymakers and regulators who tend to believe that the de facto outcome of a LLU exercise is increased competition. If this is not in fact so, many policies and approaches will need to be revisited.

It is perhaps pertinent to note that the discourse on LLU in South Africa has been lacking – both in quantity and quality. This is relevant because it goes some way to explaining how some players (including the policymaker) do not understand even the basics, as evinced by the Marwala Report and by the submissions presented earlier in this chapter as well as the information contained in their documentation, submissions and interviews.

It is considered in the local market that LLU will de facto result in increased competition, but very little evidence to that effect is presented in the public presentations and submissions made by the players, or in any of the regulations (draft or otherwise) published by the regulator. Certainly nothing has been published by the Ministry of Communications to that effect.

Very little has been said as to exactly how LLU will increase competition. Comments like this one from a *TechCentral* story are indicative of the level of discourse in the media: “Siyabonga Madyibi, executive for regulatory affairs at Internet Solutions, says the service provider hopes bitstream access, which allows other operators wholesale access to Telkom’s “last mile” of copper, is comprehensively addressed” (Wilson C, 2011). Bitstream unbundling happens much further up the line than at the last mile, and isn't actually an unbundling at all, something neither the journalist nor service provider appear to be aware of.

Another *TechCentral* piece quotes Vodacom managing executive for

regulatory affairs, Pakamile Pongwana as saying, at the LLU hearings, that “...these regulations could not be used to regulate wireless services. It also said the regulations could not be used to introduce “bitstream” access, one of the unbundling models proposed by ICASA in an earlier discussion document” (McLeod, 2011). In neither instance does Vodacom or the journalist say 'why', however. Later in the same piece Vodacom is quoted as saying that operators should use whichever of the four models posited by ICASA that they prefer, in direct contradiction to its earlier statement, quoted above.

Telkom's stance has been defensive, as shown in a *Brainstorm* piece by this author which quotes a 'Telkom spokesperson', “It does not make economic sense to single out Telkom, with less than ten percent of market share in voice services and less than a third in broadband services, for LLU. To the extent that promoting competition through the unbundling of access infrastructure is seen as necessary, the mobile operators, which collectively cover 90 percent of the voice market and 66 percent of the broadband market, should also be part of this kind of regulation” (Perry, 2011).

Numerous further examples exist. ICASA does not engage. The private sector players do not publicly engage each other. Statements and viewpoints are not meaningfully substantiated. Nothing that could be considered engaged debate happens, short of when submissions are made and public hearings held, when all the relevant parties make their respective points. ICASA takes note, or not, and then releases documentation accordingly. Should industry disagree with a given outcome, this is then taken up through other channels, including ICASA's Complaints and Compliance Commission, the Competition Commission, the Competition Tribunal and the courts should the public consultation process have been concluded.

No research exists to provide more insight into the lack of debate and

superficiality of the local discourse on the matter. This lack of meaningful debate, and lack of a substantial theoretical foundation means that views on LLU, its impact, its effects, the complexities and consequences of its implementation, and views on its appropriateness, or not for the local market are all roughly where they were when the process started – eight years ago in 2005.

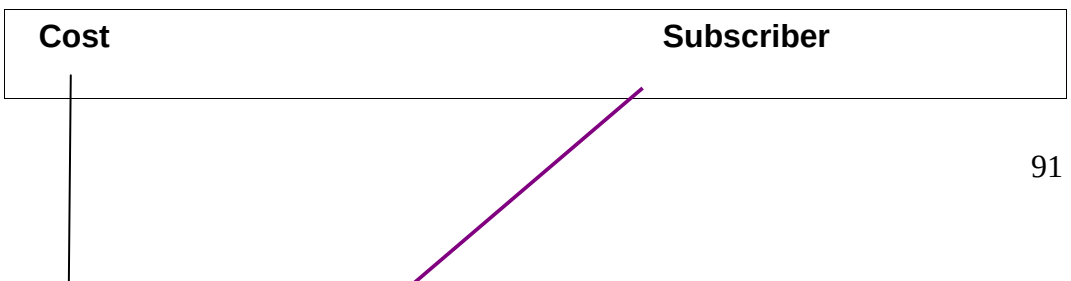
The findings presented in Chapter 4 differ in some respects with the literature presented in contrast. The findings provide a summary of what the industry believes LLU is, what it can do, and where the challenges lie in its implementation. Compare that to the literature and there are definite points of disagreement. This suggests that either the literature is incorrect, or a number of the respondents and stakeholders do not necessarily have an indepth or expert grasp of LLU and all of its implications and complexities.

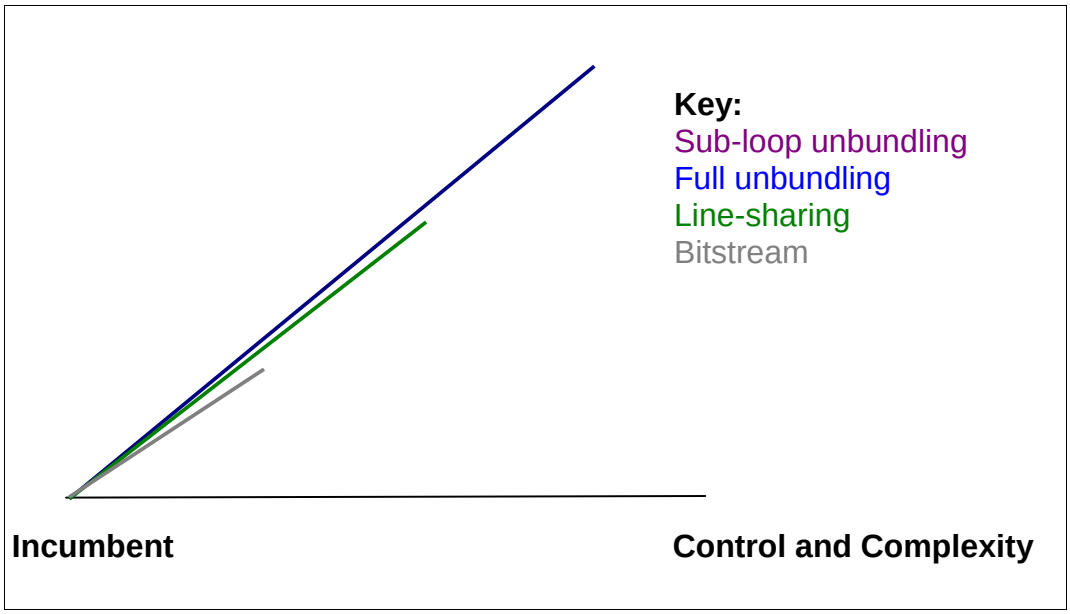
One could almost conclude that in South Africa a flawed policy document (the Marwala Report) is being used by an ill-equipped regulator, informed by an industry which does not necessarily have an expert view on the matter, to determine how LLU should take place in a market where it is not clear that it will make any substantial impact.

5.2 Towards a framework for LLU

In conducting this research and analysing the results the researcher made the following discovery: Each type of unbundling has variable costs for the incumbent and the new entrant, gives the new entrant and incumbent varying levels of control and is complex to a great or lesser degree for incumbents, new entrants and the regulator. This can be illustrated by the below diagram, created by the researcher:

Figure 3: LLU Cost, complexity, control diagram





Simply put, the closer to the subscriber the loop is unbundled, the higher the cost for either the incumbent, the new entrant or both, the greater the complexity for incumbent, entrant and regulator, and the more control given to the entrant/alternate carrier. The reasons for this cost and complexity are outlined briefly below.

Full unbundling takes place at the DSLAM (ie the exchange), and gives new entrants/alternate carriers the most control and the opportunity to install and utilise new technology (either in the incumbent's exchange, at an appropriate co-location facility, or at the street box). As such, it enables the introduction of innovative products and services. Full unbundling is complex and complicated, but serves to make the entire circuit available to other players. It is the opinion of the research participants that full unbundling will have the biggest impact because of the scope of access given to alternate carriers.

Full unbundling requires substantial investment from the new entrant, which has to do everything a fully-fledged telco would have to do to operate a profitable business, except lay and maintain the copper cable loop. The incumbent has to invest in order to make unbundling workable, including reworking business models to accommodate the rental income

from other carriers on copper circuits, plus paying ongoing maintenance costs, and compensating for the loss of the revenue it would have derived had it retained the unbundled loops.

Sub-loop unbundling happens at the closest possible point to the consumer, as it gives the facilities seeker access to the local loop from the street box. Street boxes typically do not have space in them so the new entrant would need to invest in that infrastructure as well as investing in its own backhaul from there to its own exchange facilities.

Line-sharing gives the new entrant access to the high-frequency portion of the line for the provision of data services, while the incumbent retains the low-frequency portion for the supply of voice services. This functional split takes place at the exchange (DSLAM). Control of the infrastructure is retained by the incumbent. Line-sharing is reasonably complex but requires less investment from both incumbents and new entrants than full or sub-loop unbundling but it still requires the new entrant to invest in the infrastructure to reach the incumbent's customer base (billing, marketing, systems, etc), backhaul infrastructure, and likewise requires investment from the incumbent to render it workable (as do all forms of LLU). Line-sharing allows the incumbent to retain voice revenues, as well as derive rental from new entrants for the other portion of the line.

Bitstream, as mentioned, isn't a physical unbundling or a facilities share but rather a wholesale access product. It opens the incumbent's network to new entrants at minimal cost and allows new entrants to provide data services to consumers. It takes place at the furthest point from the consumer and the capital expenditure requirement is significantly reduced, as is control over the product.

5.2.2 Formulating a definition of LLU

Given the research responses, literature reviewed, and the main theoretical foundation (Hausman & Sidak, 2005), LLU can be defined as follows: LLU is a policy intervention. It recognises that an incumbent

telecommunications operator has a dominant position in its market as a result of years of monopoly provision of services to that market and sole access to and control over the local loop (also referred to as the last mile) that links the telecommunications company to its customers. It is based on the premise that regulatory intervention is required to enable new entrants to challenge this dominance as it is not economically feasible to duplicate the local loop and, as such, competition will not result without policy and regulatory intervention. LLU enables competing operators to access the incumbent's loop, for a fee, and provide services to consumers using said loop. The incumbent is thus deprived of an opportunity to derive retail revenue from an unbundled loop, while it retains responsibility for maintaining that loop (OECD (2003); Baranes & Bourreau (2005); LLU Committee (2007); Bachiocchi, Florio & Gambio (2007)).

5.2.3 Identifying the types of LLU

There are four types of LLU – full unbundling, sub-loop unbundling, line sharing and bitstream.

On the basis of all of the above, we can define the various types of LLU as follows:

Full unbundling happens when the incumbent's copper is leased to a new entrant which can then utilise it to provide a full range of voice and data telecommunications services. The incumbent ceases to provide services but still owns the infrastructure and has to maintain it (OECD, 2003).

Sub-loop unbundling happens when the entrant connects to a point in the local loop (usually at the primacy connection point or street cabinet) on a full or shared basis. This is best suited to fibre to the curb environments where high-speed bandwidth connections are being provided (Telecommunications Authority of Trinidad & Tobago, 2009, p15). It requires investment from the entrant in back haul connectivity, street boxes, and the rest of the normal infrastructure required by a telecommunications company (as do all four types).

Line-sharing gives the new entrant access to some of the copper pair so, for example, the incumbent offers voice and the entrant offers broadband to the same consumer over the same (shared) line (OECD, 2003). This requires less investment from the new entrant than full or sub-loop unbundling, and allows the incumbent to retain voice revenues on the line.

Bitstream gives entrants a wholesale xDSL product that they can resell to consumers – full control of the lines is retained by the incumbent (OECD, 2003). Bitstream opens the incumbent's network to new entrants at minimal cost and allows new entrants to provide data services to consumers. It takes place at the furthest point from the consumer and the capital expenditure requirement is significantly reduced, as is control over the product.

5.2.4 Stating the rationales for LLU

There are four rationales for LLU, according to Hausman and Sidak (2005, p173).

Rationale one – LLU removes entry barriers to platform competition, state Hausman and Sidak (2005). This rationale did not receive much comment or input from the respondents in this study because it is not relevant in the South African context, where cable television does not exist so telephony competition via cable networks is not a possibility.

Rationale two – “competition in retail markets cannot be achieved without mandatory unbundling”, according to Hausman and Sidak (2005), Intven (2000) and respondents to this study. LLU gives new entrants access to the incumbents loop to provide services without investing in infrastructure themselves (Sutherland (2007); ITU InfoDev (2010)). This is also part of the essential facilities doctrine (Gabelmann, 2001), which states that the local loop is an essential facility that cannot be easily duplicated.

Rationale three – “mandatory unbundling enables future facilities-based investment (‘stepping-stone’ or ‘ladder of investment’ hypothesis)”

according to Hausman and Sidak (2005) and research respondents. However, while the respondents state it as a matter of fact, Hausman and Sidak (2005) state that the validity of the hypothesis is not confirmed in practice.

Rationale four – “competition in wholesale access markets is desirable”, according to Hausman and Sidak (2005) and LLU will result in wholesale access competition, according to the research respondents.

5.2.6 Considering the Impact of LLU on competition

There are four types of competition - retail competition, platform competition, facilities-based competition and wholesale competition, according to Hausman and Sidak (2005).

The researcher, as per the theoretical framework (Chapter 2), understands that there is an inter-relationship between LLU and competition: that a specific definition of LLU, paired with a stated rationale for LLU, paired with a specific type of unbundling will result in a specific type of competition (Hausman & Sidak, 2005, as adapted).

Competition is by and large considered to be the de facto outcome of a LLU exercise, and the impact on competition is thus expected to be high. The participants in the study as well as those that contributed input into the documentary sources certainly seem to think so. The academic literature is divided in its view.

5.2.6.1 Retail competition

Access to the copper loop itself needs to be priced correctly if LLU is to drive retail competition, as Baranes and Bourreau (2005) note. Input costs (ie cost to the operator) that enter the value chain at wholesale (operator to operator) level drive retail costs. Thus if access to the local loop is priced too high, new entrants will not have any commercial motivation to take up unbundled loops and use them to offer alternative services.

This means the regulator needs to be in a position to set and enforce pricing on unbundled loops that gives the incumbent a reasonable return (it would not be fair to pay the incumbent less than fair value for its infrastructure), allows a reasonable profit margin for new entrants, and will thus ensure a retail price that consumers will find both acceptable and affordable (or they will not use said services).

The various costs of the different types of unbundling will impact retail competition – both the scope and scale. The higher the investment required by incumbent and entrant, the higher the retail price will be. Full unbundling, for example, requires substantial investment, which few operators in the South African market, for example, have the financial resources to make.

Should the regulator want to encourage many competitors in the sector, full unbundling would likely not achieve that aim, whereas bitstream, considerably cheaper for both incumbent and new entrants, has greater potential to do so.

Retail competition is considered to be a good thing because it is believed to be a driver of innovation. According to Hausman and Sidak (2005), however, LLU resulted in a decrease in investment in the local loop by incumbents. This likelihood was raised by the research respondents too, and is an important consideration for policymakers. Further, full unbundling is the only type of unbundling that enables new entrants to invest meaningfully in technology and thus be able to innovate on that basis.

The respondents to this study also consider that retail competition will occur without the imposition of mandatory unbundling, a position supported by the competition in the mobile cellular and Internet services provision retail markets. While the question of whether the mobile local loop is a viable substitute for the fixed-line local loop is a long, complicated argument that is beyond the scope of this research paper, it must be noted

that both voice and data competition exists in the retail space in South Africa because of mobile and wireless products and services, as well as the ADSL products the incumbent makes available to its competitors.

If driving retail competition is the sole purpose of an unbundling exercise, policymakers and regulators could consider alternative interventions that may result in the same outcome without the disadvantages of being as costly and complex as LLU implementations typically are. Such interventions include adopting regulatory policies that enable operators to roll out networks using any technology, and to target any market segment that they can make a profit out of targeting, or making scarce resources like frequency spectrum available to foster wholesale competition.

5.2.6.2 Platform-based competition

Platform-based competition is inhibited without LLU, or so the theory goes, comment Hausman and Sidak (2005). While this type of competition could not arise in the local market as there is no cable network to unbundle, as previously noted, Hausman and Sidak (2005) observe that if platform-based competition was impossible without LLU then new cable, wireless or other providers would not have arisen in the markets the authors' study covered.

5.2.6.3 Facilities-based competition

Facilities-based competition is often the ultimate long term goal of LLU interventions, as facilities-based competition, according to Oftel (as cited by Bourreau and Doğan (2005: p174)), provides the needed level of innovation and product diversity to meet consumer needs.

As a prelude to this roll out, LLU provides a gap in which the new entrant can provide services to generate income to use to invest in a network. They say this often doesn't happen, however, due to the pricing of the access loop, which results in delays in rolling out networks and new entrants falling behind, technologically speaking.

LLU tends to disincentivise entrants from rolling out their own infrastructure, as noted by Bourreau and Doğan (2005) and De Bijl and Peitz (2004). As shown by MWeb, which offers an uncapped ADSL service, however, product innovation is possible even with a bitstream service, which gives very little control to entrants/alternate carriers.

Hausman and Sidak (2005) found no evidence in their five country case studies to support the assertion that LLU leads to facilities-based competition. Possibly, they note, due to factors that the regulators had not anticipated. Regulation, in a dynamic market, the authors say, impacts the returns on investment in network infrastructure by new entrants and incumbents, and risks reducing it because incumbents are forced to let new entrants use their infrastructure, and new entrants have no motivation to build out their own infrastructure while they have access to the incumbent's.

5.2.6.4 Wholesale competition

According to the accepted theory, LLU will promote wholesale competition, as Hausman and Sidak (2005) state. New entrants building their own facilities means new players entering the market in the future would not be solely reliant on incumbents' unbundled network elements, while simultaneously resulting in lower pricing of said elements, which would theoretically result in lower prices for consumers. The case studies conducted by Hausman and Sidak (2005) revealed some form (albeit very slight in one case) of wholesale competition had arisen in three of the countries, while it had not in the other two, but that there was a lack of wholesale players in those markets. Hausman and Sidak (2005) consider that the economic theory disproves this rationale - if wholesale was a viable market segment, they argue, players would have arisen.

5.2.7 Considering the impact of LLU on the incumbent, new entrants and consumers

The impact on the incumbent, new entrants and consumers is variable – depending on the type of unbundling implemented (or how many of the four types are rolled out). As outlined below, different types of unbundling

require different things from the regulator, incumbent and new entrants, and will accordingly affect the consumer in a variety of ways.

The respondents to the research all consider LLU to be a means to offer lower prices, a wider variety of services, and more innovative products and services to consumers, and thus it can be concluded they deem the impact to be high.

Retail pricing, an indicator of increased retail competition, increased in four out of five country case studies conducted by Hausman and Sidak (2005), however, and declined in only one – the German market.

LLU is further considered by the respondents in this study to be essential to new entrants successfully entering a market. That South Africa's second network operator has fared badly, in the absence of LLU, is apparent. How much better it would have fared had LLU been implemented much earlier, or had it been allowed access to Telkom's network after it was licensed as was originally planned, is a matter for debate, or perhaps another research study.

Some respondents consider LLU to herald a death knell for the incumbent - including in this instance the incumbent itself, judging from its submission to ICASA (Telkom, 2011) and general reaction to the LLU process. Others believe that it will give the incumbent a new source of revenue and result in full utilisation of a currently under-utilised local loop.

Bourreau and Doğan (2005), comment that incumbent operators are incentivised to price local loops below cost in order to encourage new entrants to use said loops and only compete on a services basis, and not on a facilities basis.

De Bijl and Peitz (2004) also note that LLU tends to disincentivise entrants from rolling out their own infrastructure. Here the cost of unbundled loops

is a factor – as stated previously, new entrants have no incentive to roll out their own infrastructure if they can utilise someone else's at an acceptable price. The challenge here is for the regulator to manage the pricing of local loops in such a way that new entrants are incentivised to roll out their own infrastructure over time. De Bijl and Peitz (2004) suggest withdrawing LLU once competition has matured as a means to do this.

Another strategy may be for the regulator to only enable some types of unbundling, for example sub-loop unbundling and line-sharing, which enable broadband services to be rolled out but are not attractive enough to discourage ongoing network roll out. Network roll out is important because increasing broadband penetration is a major factor in many countries today, and particularly in developing markets. Both sub-loop unbundling and line-sharing have specific drawbacks in terms of the cost, complexity, and control each involves, as outlined in the LLU Cost, Complexity and Control diagram, that make them less than ideal without rendering them totally unattractive to operators, for example those that do not have the resources to invest in fully unbundled loops.

In South Africa in particular, many operators have already started rolling out their own infrastructure. The regulator will want to encourage this, while continuing to liberalise this last section of the market that is still subject to monopoly control. Implementing less than ideal types of unbundling will enable these operators to take advantage of the opportunity to offer different and more diverse products and services over Telkom's infrastructure while roll outs are underway. What the fate of the local loop will be once those roll outs are complete and the market becomes significantly more competitive has not been studied, but respondents to this research considered it likely it will fall into disuse without LLU driving increased use of the network.

Respondents to this research commented that LLU will result in a deepening of the incumbent's copper network in terms of subscribers,

volumes and products. They believe this is likely because making the loop available to other operators to provide innovative products and services over will likely result in increased use of the loop, resulting in more demand, which will then drive expansion of the copper network.

As de Bijl and Peitz (2005) noted, unbundled loops have been used to offer broadband services (by incumbents and entrants alike). This is important for regulators who fear incumbents will be driven out of business by LLU and other competitive measures. Certainly the respondents to this study considered LLU to offer a lifeline to the copper access network, which has shrunk from 4,9m lines in 2002 to 4,1m lines in 2011 (Creamer Media Research Unit (2010); Telkom (2011)), and is continuing to decline annually.

LLU was originally posited as a means to create competition in the fixed line market. Technology has advanced, and voice services are increasingly the domain of mobile cellular operators, and VoIP providers, which supply voice services over data connections.

As Bijl and Peitz (2005) comment, while full unbundling hasn't achieved its aims, line sharing and bitstream unbundling initiatives have overall been relatively successful in introducing competition in the voice arena, not necessarily via fixed lines though, but rather via newer technologies like voice over Internet Protocol (VoIP), and in introducing competition in the Internet access space.

Bourreau and Doğan (2005) note that LLU has shown itself to be both complicated and slow in both the US and the EU, where it has been mandated since 1996 and 2001 respectively. Regulators and policymakers attempting to unbundle the local loop to drive voice competition should, as such, possibly be looking elsewhere. The time taken to unbundle the local loop means that the market will almost certainly have moved on, and found a way around the fixed line obstacle (as South Africa's has) before

LLU can show any real returns. But, the LLU process continues in South Africa, regardless, and in other territories like the EU where it is mandated. This framework for LLU is intended to be of use in South Africa and possibly of use to other countries facing an unbundling exercise.

Several participants in the primary research process noted that a clear objective, coupled with an economic analysis and clear rationale for LLU are critical. Yet South Africa's initiative has started and gone some way towards completion with neither a clear objective nor an economic analysis, the rationale for unbundling this country's local loop is also not clear.

5.3 Perry's LLU Analytical Framework

A given definition of LLU plus a stated rationale for LLU plus a desired form of competition informed by the cost, complexity and control factors that each type of unbundling involves will enable policymakers to select the type of LLU most likely to result in the type of competition desired in a given market.

Or, more simply put: (rationale for y + type of competition desired)/(cost, complexity, control factors of each type) = likelihood of success

As a general rule, policymakers and regulators need to consider several factors when it comes to LLU.

Firstly, the more expensive the type of LLU, the fewer players are likely to be able to afford it and it will result in a higher burden on the incumbent.

Secondly, the more complex the type of LLU to implement, the higher the level of skills and resources required by the new entrant and incumbent and the higher the regulatory overhead and the more crucial the need for the regulator to be accordingly expert and well-resourced.

Lastly, the more control a type of LLU gives to new entrants, the more cost

and more complexity is involved, but, more control also equals more opportunity to install new technologies and innovate in product and services offerings.

The regulator or policymaker thus needs to go back to the rationale for unbundling, or the objective of the unbundling exercise, and map the relevant factors outlined above, to establish the likelihood of a desired type of competition resulting from an unbundling exercise.

5.4 Summary

In this chapter the researcher has presented a framework for LLU that can be used by policymakers and regulators to guide their own LLU approaches and implementations.

The researcher has defined LLU, identified the four types of LLU, stated the four rationales for LLU, and considered the impact on the four types of competition that will likely result from an LLU implementation.

The researcher has proceeded on the basis that an inter-relationship between LLU and competition: that a specific definition of LLU, paired with a stated rationale for LLU, paired with a specific type of unbundling will result in a specific type of competition (Hausman and Sidak, 2005) .

The researcher has analysed the input provided by the research respondents and the documentary sources within the parameters outlined by Hausman and Sidak (2005) to compile this framework.

In studying the above the researcher has identified three characteristics common to all four types of unbundling – control, cost and complexity - each of which is variable depending on the type of unbundling, and will accordingly have an impact on the outcome of an implementation.

The researcher has also provided the means to link the characteristics of the different types of LLU with the rationales for LLU and types of

competition that result so that regulators and policymakers can plot the variables relevant to their situation and select a type of LLU most likely to be successfully implemented given their situation and desired outcome. The means to link these variables has been presented in a framework - called Perry's LLU Analytical Framework.

Chapter 6 Utilising Perry's Analytical Framework on a case by case basis

6.1 Introduction

In this chapter, the researcher provides a brief overview of the state of the telecommunications market in South Africa, along with some comments on possible areas of future research. Hausman and Sidak's model is evaluated, particularly in reference to its usefulness in analysing the local market. Some adaptations are suggested. The researcher presents the model she has developed based on the amended Hausman and Sidak (2005) model and the LLU Cost, complexity, control diagram she developed alongside some brief commentary on the framework and its intended purpose and possible insights further research could provide.

6.2 The state of the telecoms sector in South Africa

South Africa has an estimated 4.1m copper lines (Telkom, 2011), to a population of 51.8m people (Deloitte, 2013). Copper line penetration has steadily declined over the past seven years with Telkom reporting 4,752m lines in 2005 (MyBroadband, 2011). Internet penetration remains low, with an estimated 8.5 million subscribers in 2012 (World Wide Worx, 2012). The researcher has compiled the below snapshot (Table 3) of the consumer access market using the publicly available data cited above and below.

Table 3: The South African Consumer Access Market

Total population	51.8m
Fixed line subscribers	4.1m
Mobile subscribers	40.7m
ADSL users	548 015
Internet users	8.5m

Telecommunications prices remain high (Comninos, et al, 2010), and there is a need for increased competition to drive down pricing. The landing of the Seacom and Eassy cables has reduced wholesale prices but national backbone access is still expensive.

Telkom has been offering broadband ADSL to its customers, and to other providers, since 2002, and it is available on 93 percent of the operator's network (Telkom, 2009). According to its 2009 annual report, Telkom had 548 015 ADSL subscribers, an insignificant number given the size of the population. High pricing and limited availability remain a problem, due to lack of competition in this sphere of the market.

South Africa has 66.1 million active SIM cards, 40.7 million mobile users and 128% mobile penetration (Deloitte, 2013).

The introduction of fixed line competition has been unsuccessful, however, with the SNO, Neotel, not having achieved significant market penetration.

The second network operator and wireless voice and data communications notwithstanding, the local loop remains the sole preserve of Telkom, and there is no competition for the provision of fixed-line services to businesses or consumers.

Operators today offer fixed-wireless access on the CDMA-2000 standard (Neotel) and WiMax (Neotel, iBurst, Vodacom), and mobile access via UMTS (3G), HSPA+ 900/2100 (Cell C) and EDGE (MTN, Vodacom, Cell C) and telecommunications services uptake has progressed, as detailed above, mainly in the mobile arena. Both Vodacom and MTN are trialling so called 4G (LTE) services. They say they are waiting for spectrum and devices before rolling out commercially.

There is no competition in the fixed line arena, and as the requirement for

faster and more reliable bandwidth increases, this will become increasingly problematic as wireless protocols do still not allow for the same bandwidths as wired, and are negatively affected by bad weather.

The licensing of frequency spectrum aimed at enabling operators to offer LTE, or 4G services was postponed in 2010 but is expected to take place in 2013.

As outlined in chapter one of this research, and as the Internet Service Providers Association notes in its submission (ISPA, 2011) on ICASA's Local Loop Unbundling Discussion Paper (ICASA, 2011), international peering and transit is highly competitive, international submarine connectivity is becoming increasingly so and national long distance connectivity is improving (although supply is still constrained and pricing thus distorted) thanks to several ongoing roll outs. The metropolitan backbone remains dominated by Telkom but self-provisioning is easing this. Only the last mile is still problematic, due to the infrastructure being owned and operated by a single provider (fixed) or group of providers (mobile). LLU is intended to relieve this last bottleneck, yet the results of this research suggest that it is not at all certain that it will do so.

Says ISPA (2011): “The lack of progress in opening up the local loop to competition has been exacerbated by the lengthy delays experienced in the issuing of new licences for radio frequency spectrum suitable for the deployment of access networks.”

There are other options available to regulators, which can be implemented more quickly, with more predictable results and with far less complexity – like spectrum allocations, as highlighted above by ISPA (2011). Several research respondents noted that if LLU does not happen in South Africa soon technology will have overtaken it, making the time period needed to do a full and proper LLU implementation even more of an issue. That no market study has been done, and thus no-one can comprehensively say

what state the market was in when LLU was first posited, what state it is in now and what the likely impact of LLU will be is further argument against an uninformed unbundling exercise. This requires further research.

6.3 Reflections on Hausman and Sidak (2005)

Hausman and Sidak (2005) consider the matter of whether or not LLU interventions achieved what they were intended to do by putting together a model that states that each of the four major rationales for LLU can be proven or disproven through empirical testing.

They evaluate five countries' implementations of LLU (or lack of unbundling in the case of New Zealand), against each expected outcome based on the four stated rationales. They do not evaluate whether each implementation achieved the aims the regulatory authorities had in mind, however.

This is important not only because the desired outcome may not have been one of the four stated rationales, but because the success or not of any LLU initiative is very difficult to gauge due to the sheer volume of economic and competitive factors at play.

Several of Hausman and Sidak's (2005) conclusions state that it is uncertain whether or not LLU was responsible for a specific price reduction or market entry etc, because of the presence of other variables that could well have resulted in the same outcome. Evaluating against the regulator's desired outcome, in addition to the major rationales, would have provided valuable context within which to view the data presented by the two.

They further do not consider time as a variable. One of the aims of LLU is to enable new entrants to utilise the incumbent's infrastructure so they can begin to generate revenue without incurring the enormous expense associated with rolling out a network (plus associated supporting infrastructure), as noted by Gabelman (2001) and Intven (2000) among others.

A LLU exercise needs to happen either before or at the same time as new entrants are licensed in order to enable said entrants to benefit. Unbundling the local loop years after new entrants have been licensed and begun operating, as is happening in South Africa, must have an impact on the success or failure of the implementation. The matter has not been researched, but this could have had an impact on the second network operator in South Africa, which has performed badly since it was launched.

The Hausman and Sidak (2005) model is a very useful as a framework for studying the South African market, as it highlights the short-comings in the approach taken by South Africa's regulator. The regulator has not stated a desired rationale for LLU, although the desire to stimulate retail competition is heavily emphasised in the documentation on the matter (Local Loop Unbundling Committee Report (2007); ICASA, 2011a & b). The regulator has also not stated a desired outcome of an unbundling exercise. Again, retail competition is frequently mentioned Local Loop Unbundling Committee Report (2007); ICASA, 2011a & b). There is also a the lack of critical examination of the types of LLU and the types of competition that can result. Hausman and Sidak (2005) outline these clearly, and it offers a stark contrast to the approach taken in South Africa thus far.

That said, the model would be even more useful had the variable of time taken and stated desired outcome been included.

6.4 Taking Perry's LLU Analytical Framework further

Perry's LLU Analytical Framework - A given definition of LLU plus a stated rationale for LLU plus a desired form of competition informed by the cost, complexity and control factors that each type of unbundling involves will enable policymakers to select the type of LLU most likely to result in the type of competition desired in a given market.

Or: (rationale for y + type of competition desired)/(cost, complexity, control

factors of each type) = likelihood of success

Perry's LLU Analytical Framework is based on the adapted Hausman and Sidak (2005) model presented in Chapter 2, and the LLU Cost, complexity, control diagram, presented in Chapter 5. The framework has come from the documentary analysis and interviews conducted over the course of this study and is intended to simply illustrate what policymakers and regulators need to consider when embarking on a local loop unbundling exercise.

The success of any LLU implementation seems to be based on, and subject to, so many variables that it is impossible to state that if an unbundling exercise is successful in a market, or even a segment of a market, it will be successful in any other market.

Policymakers and regulators face significant challenges in ensuring that policy and regulation act as enablers in their markets, and meet the needs of a sector that moves increasingly quickly, leaving regulators and policymakers scrambling to keep up. This is particularly true in developing countries where there is a lack of resources, a lack of expert regulatory skill and a lack of research that could be used to guide initiatives. This is important because it means that each policy intervention is almost starting from scratch, and cannot take into account the lessons learnt in other developing markets, because these have not been adequately documented, studied and analysed.

Perry's LLU Analytical Framework is intended to be an resource for policymakers and regulators. By taking the combined academic literature, documentary sources and expert input into account it is designed to be a tool that can be used quickly and efficiently to aid decision-making. Its usefulness remains to be seen, as does its relevance in markets other than South Africa's. To that end, if it is applied locally or elsewhere, a study on that application and its results would be useful.

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Appendix A: Respondents

Requests sent to:

Internet Service Providers Association
MTN
ICASA
MWeb
Neotel
Telkom
LINK Centre
Vodacom
My Broadband
Vodacom
Cell C
Vox Telecom
Internet Solutions
Africa Analysis

Participated in round one – questionnaires:

Neotel
Internet Service Providers Association
MWeb
My Broadband
Cell C
Vox Telecom
Internet Solutions

Participated in round two - interviews:

Internet Service Providers Association
MTN
ICASA
LINK Centre, University of the Witwatersrand
Vodacom
My Broadband
Cell C
Vox Telecom
Africa Analysis

Appendix B: Questionnaire

Masters Research Paper: The impact of local loop unbundling on competition and the implications for policymakers

Please answer yes or no to each of the below and return to samantha.perry@gmail.com – many thanks!

Name:
Position:
Company:

Questionnaire:
1. Will competition in retail markets be achieved without unbundling the local loop?
2. Will mandatory unbundling promote wholesale access competition?
3. Will mandatory unbundling promote retail competition?
4. Will mandatory unbundling promote platform-based competition?
5. Will mandatory unbundling promote facilities-based competition?
6. Will local loop unbundling result in lower prices for consumers?
7. Will local loop unbundling result in lower prices for new entrants?
8. Will unbundling the local loop encourage new players to enter the market and begin rolling out their own infrastructure?
9. Will bitstream unbundling result in wholesale access competition?
10. Will bitstream unbundling result in retail competition?
11. Will bitstream unbundling result in platform-based competition?
12. Will bitstream unbundling result in facilities-based competition?
13. Will line-sharing result in wholesale access competition?
14. Will line-sharing result in retail competition?
15. Will line-sharing result in platform-based competition?
16. Will line-sharing result in facilities-based competition?
17. Will full unbundling result in wholesale access competition?
18. Will full unbundling result in retail competition?
19. Will full unbundling result in platform-based competition?
20. Will full unbundling result in facilities-based competition?
21. Will sub-loop unbundling result in wholesale access competition?
22. Will sub-loop unbundling result in retail competition?
23. Will sub-loop unbundling result in platform-based competition?
24. Will sub-loop unbundling result in facilities-based competition?

Definitions:
Bitstream – a type of local loop unbundling whereby the incumbent gives entrants a wholesale xDSL product that they can resell to consumers – full control of the lines is retained by the incumbent (OECD, 2003, p7,8).

Entrant – a company entering an industry. In this context, entering an industry dominated by a monopoly incumbent.

Facilities-based competition - is used in the telecommunications industry to describe competition between providers of the same or similar services, but where the service is delivered by different or proprietary means or networks. For example a broadband over powerline provider competing with a cable TV

network to provide broadband Internet service is considered to be facilities-based competition. Also called infrastructure-based competition. (Webopedia)

Full unbundling – a type of local loop unbundling whereby the incumbent's copper is leased to a new entrant to offer services over, and the incumbent ceases to provide services but still owns the infrastructure and has to maintain it (OECD, 2003, p7,8).

Incumbent – a monopoly provider of services in an industry, in this case telecommunications. Often put in place and subsidised by a country's government in an industry where it was thought it would not be feasible to have more than one player (so called natural monopoly industries) like transport, utilities and such.

Line sharing – a type of local loop unbundling whereby the new entrant is afforded access to some of the copper pair so, for example, the incumbent offers voice and the entrant offers broadband to the same consumer over the same (shared) line. (OECD, 2003, p7,8)

Local loop unbundling – is a policy intervention intended to make the last mile of copper wire between a telecommunications exchange and a consumer available to telecommunications operators to offer services competing with those offered by the incumbent telecommunications company, which owns the infrastructure.

Retail market – where providers sell services to end-consumers.

Service-based competition – competition between providers where each provides services using the same infrastructure, for example, where a local loop has been unbundled and the incumbent and entrant are both using copper wire to provide voice services, or, “when the entrant uses the facilities of the incumbent, competition is called service-based and can be realised either through resale or through unbundling schemes” (Bourreau, Doğan, 2004, p289).

Sub-loop unbundling – where the entrant connects to a point in the local loop (usually at the primacy connection point or street cabinet) on a full or shared basis. Best suited to fibre to the curb environments where high-speed bandwidth connections are being provided. (Telecommunications Authority of Trinidad and Tobago, 2009, p15)

Wholesale access services – services provided to a company for resale, for example, bitstream access provided to an entrant by an incumbent to enable the entrant to resell said services to consumers.

Appendix C: Information Sheet, Consent Form and Interview Questions

Information Sheet:

Masters Research Report: Local loop unbundling and competition in South Africa

Dear Key Participant

You are invited to take part in this research study. Before you decide whether or not to take part, it is important for you to understand why the research is being done and what it will involve. Please read the following information carefully.

Background & Overview of the study

This study is being conducted by Samantha Perry in partial fulfillment of the requirements for a Masters of Management in ICT Policy and Regulation at the Graduate School of Public and Development Management at the University of the Witwatersrand.

The study investigates local loop unbundling as a policy intervention in the electronic communications sector.

South Africa's telecommunications market is still lacking effective competition in the fixed line segment, despite government efforts to liberalise. One of the policy interventions aimed at remedying this is local loop unbundling – a process whereby the last mile of copper wire between a telecommunications exchange and a consumer is made available to telecommunications operators to offer services competing with those offered by the incumbent telecommunications company, which owns the infrastructure. Local loop unbundling has been implemented worldwide by a significant number of countries since it was first posited in the 1980s.

This research will draw on a model developed by Hausman and Sidak (2005), as well as on insights gained from interviews with players in the sector, and document analysis of submissions on local loop unbundling, to understand the policy and regulatory dimensions of local loop unbundling in the South African context. In order to do that, the researcher investigates local loop unbundling, the competition landscape and the expected outcomes of an unbundling exercise in the local market, through primary and secondary research.

The organisation and funding of the research

Samantha Perry is a private student and the study is not being funded.

Deciding whether to participate

Taking part in the research is entirely voluntary. If you do decide to take part you will be given this information sheet to keep and be asked to sign a consent form. If you decide to take part you are still free to withdraw at any time and without giving a reason.

There are no risks in participating in this interview although you may be inconvenienced by taking time out of your busy schedule to be interviewed. There will be no direct monetary benefit to you for your participation. However, the study may have several beneficial outcomes. In particular, it will further our understanding of the topic and contribute to the knowledge in the field.

Confidentiality

Any personal information collected about you will be kept strictly confidential. Identifiers will be removed from the data when the research findings are consolidated into a report and will not be included in any subsequent publications. The anonymised data generated in the course of the research will be kept securely in paper or electronic form for a period of five years after

the completion of a research project. It may be used for further research and analysis.

Research Ethics

If you have concerns about the research, its risks and benefits or about your rights as a research participant in this study, you may contact Luci Abrahams, see contact details below.

Contact for Further Information

Please contact the below for any further information you require pertaining to the study.

Luci Abrahams Director, LINK Centre University of the Witwatersrand Johannesburg, South Africa luciennesa@gmail.com +27 82 569 7675 •	Samantha Perry Student, LINK Centre University of the Witwatersrand Johannesburg, South Africa samantha.perry@gmail.com +27834145586

Thank you for taking time to read the information sheet.

Consent Form:

Masters Research Report: Local loop unbundling and competition in South Africa

Please initial box

1. I confirm that I have read and understand the information sheet for the above study and have had the opportunity to ask questions. ☐

2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving reason. ☐

3. I understand that the researcher will not identify me by name in any reports using information obtained from this interview, and that my confidentiality as a participant in this study will remain secure. ☐

Please tick box	Yes	No
4. I agree to the interview being audio recorded.	☐	☐
5 I agree to the use of anonymised quotes in publications.	☐	☐
6. I agree that my data gathered in this study may be stored (after it has been anonymised) in a specialist data centre and may be used for future research.	☐	☐

_____	_____	_____
Name of Participant	Date	Signature
_____	_____	_____
Name of Researcher	Date	Signature

Semi-structured Interview Questions

A. Introductory comments on local loop unbundling

1. Do you believe the local loop should be unbundled, and if so/if not – why/why not?
2. Do you believe that local loop unbundling (local loop unbundling) is an essential policy tool to promote competition in the South African electronic communications market? Why/why not?

B. Types of unbundling and possible impact

3. In which ways can local loop unbundling contribute to creating competition in the retail electronic communications market?
4. What do you understand the term 'bitstream unbundling' to mean and what impact would it have?
5. What do you understand the term 'full unbundling' to mean and what impact do you believe it will have?
6. What do you understand the term 'sub-loop unbundling' to mean and what impact would it have?
7. What do you understand the term 'line-sharing' to mean and what impact would it have?

C. Affects of local loop unbundling on electronic communications ecosystem

8. How would local loop unbundling affect the fixed line communications market?
9. How would local loop unbundling affect the mobile communications market?
10. How would local loop unbundling affect the Internet services provision market?
11. How would local loop unbundling affect the electronic communications value chain as a whole?

D. Comments on local loop unbundling policy and regulation

12. What are your comments on the policy and regulatory processes for local loop unbundling to date?
13. What impact do you believe the delays in unbundling the local loop will have on the success or failure of the exercise?

Ends