



CCRED
Centre for Competition,
Regulation and Economic
Development

Review of economic regulation of the telecommunications sector

Primary author:
Ryan Hawthorne
Endesha

Input on mandate of regulators:
Tembinkosi Bonakele
Bonakele Advisory Services

Input on fixed line regulation:
Dominic Cull
Ellipsis Regulatory Solutions

Reviewer comments and input from:
Charley Lewis
LINK Centre, Wits University

April 2014

V4

This paper is an output of the Regulatory Entities Capacities Building Project that was undertaken by the Centre for Competition, Regulation and Economic Development, funded by the South African government's Economic Development Department under an MoA with the University of Johannesburg.

Abbreviations and Acronyms

BTS	Base Transceiver Station
CC	Competition Commission of South Africa
CDMA	Code Division Multiple Access
CIB	Connection Incentive Bonus
CLEC	Competitive Local Exchange Carrier
ComCom	New Zealand Commerce Commission
CRTC	Canadian Radio-Television and Telecommunications Commission
CT	Competition Tribunal of South Africa
DOC	Department of Communications
DSL	Digital Subscriber Line
EC	European Commission
ECA	Electronic Communications Act
ECN	Electronic Communications Network
ECS	Electronic Communications Service
EPC	European Parliament and Council
FCC	Federal Communications Commission (USA)
IBA	Independent Broadcasting Authority
ICASA	Independent Communications Authority of South Africa
ILEC	Incumbent Local Exchange Carrier
ISO	International Standards Organisation
ISP	Internet Service Provider
LCR	Least Cost Routing
LLU	Local Loop Unbundling
LRIC	Long Run Incremental Cost
MTR	Mobile Termination Rate
NRA	National Regulatory Authority
PCC	Parliamentary Portfolio Committee on Communications
RegTP	Germany's Regulator of Telecommunications and Post
SATRA	South African Telecommunications Regulatory Authority
SAVA	South African VANS Association
TA	Telecommunications Act
TELRIC	Total Element Long Run Incremental Cost
TRAI	Telecommunications Regulatory Authority of India
TSLRIC	Total Service Long Run Incremental Cost
VANS	Value Added Network Services
VOIP	Voice over Internet Protocol

Table of Contents

Executive Summary	ix
1. Introduction	2
2. Overview of economic regulation of the telecommunications sector	2
2.1. Introduction	2
2.2. Interconnection and facilities leasing	3
2.2.1. Interconnection	3
2.2.2. Facilities leasing	4
2.2.3. Economic features common to both the facilities leasing and interconnection regulations	7
2.3. Competition, price setting and collateral rules	8
2.3.1. Overview of competition analysis	8
2.3.2. Competitive characteristics of markets	10
2.3.3. Remedies, including price controls	11
2.4. Economic principles for spectrum pricing and assignment, and universal service	14
2.4.1. Spectrum pricing and assignment	14
2.4.2. Universal service and access	16
2.4.3. Common principles between spectrum assignment and universal access: Auction theory	17
2.5. Legal mandate and framework	20
2.5.1. Institutional framework and history	20
2.5.2. Information gathering powers	21
2.5.3. Experience with implementation of the powers and mandate of the regulatory institutions	22
2.5.4. Concurrent jurisdiction between the competition authorities and ICASA	23
2.5.5. Proposed changes to the institutional framework	25
2.6. Summary	25
3. Links between economic regulation of the telecommunications sector and economic growth	26
3.1. Introduction	26
3.2. Linkages between the electronic communications sector and economic growth	26
3.2.1. International evidence	26
3.2.2. Evidence for South Africa	28
3.3. Linkages between broadband and the growth of small businesses	32
3.3.1. International experience	32
3.3.2. Experience in South Africa	33

3.4.	The link between the employment potential of business process outsourcing and economic regulation	34
3.4.1.	Employment potential	34
3.4.2.	Telecommunications cost factors that impact on competitiveness	35
3.5.	Linkages between regulation and policymaking in the electronic communications sector and economic growth	36
3.5.1.	International best practice	36
3.5.2.	Outline of initiatives in South Africa	38
3.6.	Summary	39
4.	Sector performance review	40
4.1.	Introduction	40
4.2.	Access, coverage and usage	40
4.2.1.	Internet access and cellphone penetration	40
4.2.2.	Fixed line coverage	43
4.2.3.	Mobile network coverage	45
4.2.4.	Mobile and fixed line voice usage	46
4.3.	Prices and quality	47
4.3.1.	Pricing	47
4.3.2.	Broadband	49
4.3.3.	Quality in South Africa	50
4.3.4.	Broadband	50
4.4.	Investment and employment	51
4.4.1.	Investment	51
4.4.2.	Employment	55
4.5.	Revenue and profitability	56
4.5.1.	Mobile revenue and profitability	56
4.5.2.	Fixed line revenue and profitability	57
4.6.	Competitive intensity	58
4.7.	Overall sector development	62
4.7.1.	ICT Development Index (ITU)	62
4.7.2.	Network Readiness Index	64
4.8.	Summary	65
5.	Regulator performance review	66
5.1.	Introduction	66
5.2.	Methodology	67
5.3.	Government objectives and the demand for regulation	73

5.4.	Review of regulatory governance	74
5.4.1.	Introduction	74
5.4.2.	Legal framework	75
5.4.3.	Legal powers	75
5.4.4.	Property and contract rights	77
5.4.5.	Clarity of roles in regulation and policy	77
5.4.6.	Clarity and comprehensiveness of regulatory decisions	78
5.4.7.	Predictability and flexibility	78
5.4.8.	Consumer rights and flexibility	78
5.4.9.	Proportionality	78
5.4.10.	Regulatory independence	79
5.4.11.	Financing of regulatory authorities	81
5.4.12.	Regulatory accountability	82
5.4.13.	Regulatory processes and transparency	83
5.4.14.	Public participation	84
5.4.15.	Appellate review of regulatory decisions	85
5.4.16.	Ethics	85
5.4.17.	Summary	86
5.5.	Review of the substance of regulatory decisions	88
5.5.1.	Overall assessment	88
5.5.2.	Market access	90
5.5.3.	Competition	94
5.5.4.	Consumer protection	97
5.5.5.	Summary of regulatory substance review	98
5.6.	Summary	99
6.	Call termination rate intervention	100
6.1.	Introduction	100
6.2.	Economics of interconnection	101
6.2.1.	Network interconnection I: No price discrimination	101
6.2.2.	Network interconnection II: Price discrimination	103
6.3.	Evolution of call termination rates in South Africa	104
6.3.1.	Regulatory framework for call termination rates and call termination rate setting prior to 2010	104
6.3.2.	2010 call termination rate regulations	108
6.3.3.	Call termination rate regulations published in 2014	110

6.4.	The SA call termination rate interventions in the context of experience in other countries	112
6.4.1.	Experience with call termination rate interventions in developed countries	112
6.4.2.	Experience with call termination rates in other African countries	118
6.5.	Impact of call termination rate interventions in South Africa	121
6.5.1.	Operator competition in South Africa and the call termination rate regime in the context of the Laffont, Rey and Tirole (1998a, 1998b) model of network competition	121
6.5.2.	Operator claims about impact of intervention	123
6.5.3.	Impact on prices and usage	123
6.5.4.	Impact on operator revenue, profitability, investment and competition in adjacent markets	126
6.5.5.	Impact on employment	128
6.5.6.	Impact on access to mobile services	128
6.5.7.	Impact on competition	129
6.5.8.	Assessment of call termination rate intervention outcomes against the Laffont, Rey and Tirole (1998a, 1998b) model	132
6.6.	Summary	134
7.	Opening up the fixed line network	136
7.1.	Introduction	136
7.2.	Economic theory and evidence on providing access to monopoly facilities upstream	138
7.2.1.	Theoretical approaches to refusal to deal	138
7.2.2.	Empirical evidence on unbundling	140
7.3.	International best practice for unbundling interventions	147
7.3.1.	Unbundling in the European Union	147
7.3.2.	Local loop unbundling in other developing countries	149
7.4.	ICASA's local loop unbundling interventions	150
7.4.1.	Legal framework	150
7.4.2.	Role of legislature and government	151
7.4.3.	Overview of LLU regulation making process	153
7.4.4.	ICASA CCC decision in Neotel LLU dispute	158
7.5.	Competition authority interventions in markets for fixed line services	159
7.5.1.	Telkom / BCX and MTN / Verizon merger decisions	159
7.5.2.	Abuse of dominance complaints against Telkom and functional separation settlement agreement	160
7.6.	Summary	163
8.	Conclusion	164

9. Recommendations	170
10. References	172
10.1. Articles	172
10.2. Cases, legislation and policy	182
10.3. ICT companies	189
Appendix A: Interviews	190

List of Figures

Figure 1: Economies of scale	Figure 2: Economies of scope	6
Figure 3: Ranking of countries by contribution of the internet to GDP		31
Figure 4: Communication channels for customers engaging with suppliers (BPESA, 2012)		36
Figure 9: Internet use by South African adults (AMPS, 2007 - 2013)		41
Figure 10: Data customers, 3G devices and smartphone penetration (millions)		42
Figure 11: Telkom fixed lines (2003-2012)		44
Figure 12: Telkom ADSL and MDNS sites (2003-2012)		44
Figure 13: 3G % population coverage, MTN and Vodacom (2007 - 2012)		46
Figure 14: Vodacom 3G and non-3G base stations (2005 - 2012)		46
Figure 15: MTN, Vodacom and Telkom minutes of use (2004-2012)		47
Figure 5: Implied average voice prices (Rands per minute), MTN and Vodacom (2005 - 2012)		48
Figure 6: Lowest available SADC prepaid prices (USD), OECD usage basket (2010 - 2013)		49
Figure 7: Broadband price comparisons (USD, monthly basket) (ITU, 2012)		49
Figure 8: Broadband speeds in Brazil, Russia, India, China and South Africa (2008 - 2013)		51
Figure 16: Capital expenditure by mobile operators in South Africa (Rm) (2004 - 2012)		53
Figure 17: Capital expenditure by mobile operators as a % of revenue (2004 - 2012)		53
Figure 18: Capital expenditure by fixed line operators (Rm) (2005 - 2012)		54
Figure 19: Capital expenditure by fixed line operators as % of revenue (2005 - 2012)		54
Figure 20: Mobile operator revenues, 2003-2012 (Rbn)		56
Figure 21: Mobile operator EBITDA as a % of revenue, 2004-2012		57
Figure 22: Fixed line revenues (2005 - 2012)		58
Figure 23: Fixed line EBITDA (2005 - 2012)		58
Figure 24: All media products survey results for cell-phone providers (2007 - 2013)		59
Figure 25: Market shares based on revenues (2005 - 2012)		60
Figure 26: Mobile provider subscribers (Millions, 2005 - 2012)		60
Figure 27: Mobile provider market shares (%), based on subscribers (2005 - 2012)		61
Figure 28: Vodacom prepaid, postpaid and blended churn rates (2003-2012)		62
Figure 29: ITU Access sub-basket comparison, BRICS (2002 - 2012)		63
Figure 30: ITU Use sub-basket comparison, BRICS (2002 - 2012)		64
Figure 31: Network readiness index for Brazil, Russia, India, China and South Africa (2013)		65
Figure 32: ICASA expenses (Rm) and employees, 2005 - 2012		89

Figure 33: Number of ICASA decisions that were appealed, and which were decided in favour of ICASA, withdrawn or settled.....	90
Figure 34: Mobile termination rates in the EU (Cents, at ZAR14.12 / EUR).....	115
Figure 35: Call termination rates and average revenue per minute, EU 27 (ZAR cents per minute, Jan-12).....	116
Figure 36: Mobile subscribers: operator market shares at EU level, October 2004 – October 2012.....	116
Figure 37: Call termination rates EU average, 2005-2013 (ZAR cents per minute, ZAR14.18/EUR).....	117
Figure 38: Mobile call termination rates (peak), average mobile retail prices and peak fixed to mobile prices (ZAR / minute).....	125
Figure 39: MTN and Vodacom minutes of use (Billions, 2004-2012).....	125
Figure 40: Net interconnection revenue for MTN, Vodacom and Telkom, 2008-2012 (Rbn)	126
Figure 41: MTN, Vodacom total revenue, EBITDA, voice revenue, investment in their South African operations (2004 - 2012).....	127
Figure 42: Market shares using all media products survey results for cell-phone providers (2007 - 2013)	130
Figure 43: Market shares based on revenues (2007 - 2013).....	130
Figure 44: One monopoly profit Figure 45: Double marginalisation.....	139

List of Tables

Table 1: Remedies that can be imposed by the Competition Tribunal and ICASA.....	11
Table 2: Comparison of legal features of ICASA and the Competition Commission	21
Table 3: National broadband plans (Katz, 2012)	37
Table 4: Call quality of service assessments (Gauteng, 2011, 2013)	50
Table 5: Gross fixed capital formation in the ICT sector, 2005	52
Table 6: World Bank Handbook for Evaluating Infrastructure Regulatory Systems: Critical standards for effective regulation of infrastructure	68
Table 7: ECTA scorecard (2010).....	71
Table 8: Components of the Telecommunications Regulatory Governance Index.....	72
Table 9: Elements to be evaluated as part of the regulatory substance evaluation.....	73
Table 10: Summary of assessment of governance standards for the economic regulation of the telecommunications sector in South Africa	86
Table 11: Number of radio frequency spectrum licences issued, 2005 - 2012.....	91
Table 12: Geographic and mobile numbers ported (2006-2013)	92
Table 13: Complaints evaluated by ICASA, 2007 - 2012.....	97
Table 14: Summary of regulatory substance	98
Table 15: Call termination rate increases for mobile to mobile calls (1999-2001)	106
Table 16: Mobile call termination rates, from March 2011	108
Table 17: Proposed mobile call termination rates.....	110
Table 18: Summary of studies on impact of mobile call termination rate reductions (Bohlin & Kongaut (2012))	118
Table 19: Mobile call termination rates in selected African countries (Cents, at ZAR11 / USD, 2010) (Stork, 2012)	119

Table 20: Mobile call termination rate reductions, price changes, subscriber base changes and incumbent profitability in Botswana, Kenya, Namibia, Nigeria and South Africa, Stork (2012)	120
Table 21: Matrix of Laffont, Rey & Tirole model factors mapped to South African context.	121
Table 22: Mobile numbers ported (2006-2013).....	132
Table 23: Justifications and testable hypotheses for LLU (Hausman & Sidak, 2005)	141
Table 24: Summary of Hausman & Sidak findings on the impact of LLU (2005).....	144
Table 25: Policy lessons from international experience with the development of broadband	145

List of Boxes

Box 1: Entry and exclusion equilibria with network effects (Motta, 2004: 2.6.3.4, based on Katz & Shapiro, 1984).....	3
Box 2: Encouraging infrastructure competition through the ladder of investment (Cave, 2006)	5
Box 3: Exclusionary strategies for dominant firms in markets with network externalities, in the absence of interconnection (Motta, 2004)	9
Box 4: Regulatory accounting practices (ITU, 2009)	13
Box 5: Auction theory summary (Klemperer, 1999)	18
Box 6: Innovations developed around broadband and mobile services in South Africa (Analysys Mason, 2010; World Wide Worx, 2012)	30
Box 7: SMEs that have websites and those that do not (World Wide Worx, 2012)	33
Box 8: Regulatory framework for the telecommunications sector in the European Union ..	112
Box 9: Specific costing methodologies set out in the EC Recommendation (2009) for bottom-up LRIC models for mobile call termination rates	114
Box 10: Six degrees of separation (Cave, 2006)	140
Box 11: Reference offer for unbundled access requirements under EU LLU Regulation (ECP, 2000)	148

Executive Summary

The telecommunications sector is characterised by incumbent firms that benefit from network effects, which occur where belonging to a network is more valuable the greater the number of people that belong to that network, in addition to other incumbency advantages (see, for example, Economides, (2004)). This means that the telecommunications sector is often dominated by a small number of firms.

The telecommunications sector is regulated in terms of the Electronic Communications Act (no. 36 of 2005, the ECA) and the Competition Act (no. 89 of 1998, the Competition Act). In addition to provisions designed to address market power in the sector (including interconnection, facilities leasing and price regulation), the ECA regulates a number of other matters, including radio frequency spectrum, type approval and numbering. The Independent Communications Authority of South Africa Act, no. 13 of 2000 (the ICASA Act), provides for the establishment of the industry regulator, ICASA as well as for the Complaints and Compliance Committee (CCC). The Competition Act established the Competition Commission (the Commission), Competition Tribunal (the Tribunal) and Competition Appeal Court (the CAC). The Commission makes decisions on small and intermediate mergers and investigates complaints and large mergers, makes recommendations to the Tribunal in the case of large mergers and decides to whether or not to refer complaints to the Tribunal. The CAC hears appeals of the Tribunal's decisions from complainants, parties to a merger, trade unions or employees, or from the Commission.

The ECA and the Competition Act provide an economic regulation mandate to the competition authorities and ICASA in a number of areas, including interconnection and facilities leasing, spectrum management and universal service and access and competition and price regulation. The interconnection regulations are in place to ensure that incumbents are not able to benefit from network effects and the consequent exclusion of rivals. The facilities leasing regulations are designed to ensure that new entrants are able to gain access to facilities in order to climb the "ladder of investment". Furthermore, the regulators have a wide mandate to regulate prices to protect consumers on the one hand and to ensure that firms climb the "ladder of investment" on the other hand, with the ultimate goal of removing price regulation where there is sufficient competition. The regulation of spectrum assignment and licencing involves ensuring that spectrum is made available to users who value it the most. This is ensured by auctioning spectrum to the highest bidder on the one hand, and ensuring that incumbent holders of spectrum pay for it according to its value on the other. Similarly, the optimal means of ensuring that universal service and access is achieved is by means of reverse auctions, whereby the firms with the lowest costs are awarded with the contract to build networks in an under-serviced area.

The two sets of regulators have overlapping powers and mandates which has led to several revisions of the laws governing them. While the ECA allows ICASA to intervene with significantly less evidence and analysis, ICASA has rarely done so. This may require a revision of institutional design, processes and procedures rather than extensive revisions to the legislation governing the sector.

There are important links between regulation of the telecommunications sector and economic growth. For example, there is a strong and positive relationship between broadband penetration and economic growth, and the regulation of broadband inputs (discussed below) has a significant impact on broadband penetration and quality. In developing countries, a 10% increase in broadband penetration leads to a 1.38% increase in economic growth (Zhen-Wei Qiang *et al*, 2009). In South Africa, the ICT sector accounts for 4.3% of Gross Domestic Product (GDP), while the telecommunications sector accounts for 3.4% of GDP (Statistics South Africa, 2013a). The internet economy, including spend on internet access, investment in infrastructure, spend on internet retail and spend by government, accounts for approximately 2% of GDP, and this share will rise to approximately 2.5% by 2016 (World Wide Worx, 2012). The current share of GDP accounted for by the internet in South Africa is very low by developing country standards, particularly when compared to China (5.5%), India (4.1%), Mexico (2.5%) and Brazil (2.2%) (BCG, 2010). The lack of the development of the internet has a significant impact on South Africa's growth potential: small and medium enterprises account for the bulk of South Africa's output and employment and need internet access in order to be globally competitive, including in relation to market access and information and improvements in productivity. 30% of SMEs say that their businesses could not exist without their website, according to a survey by World Wide Worx (2012). Furthermore, the business process outsourcing sector in South Africa is shifting towards higher value outsourcing arrangements, including the outsourcing of legal processes and shared financial and accounting services, which require high speed broadband.

In order to address the lack of internet availability, a range of interventions are required including in respect of training on information and communication technologies (for SMEs particularly), incentives for the uptake of broadband (including significantly lower import duties), the assignment of as much spectrum as possible for broadband purposes, and economic regulation of the fixed line network as part of the Local Loop Unbundling process. The Department of Communications is taking steps towards these goals with the publication of the draft National Broadband Plan. However, the plan does not go far enough in terms of providing details on spectrum to be re-allocated for broadband nor does it mention Local Loop Unbundling or the Universal Service and Access Fund, which could otherwise be used to roll out broadband in rural areas. There are therefore significant gaps in South Africa's policy and economic regulation framework that need to be addressed in order for the electronic communications sector to be a catalyst for economic growth.

While broadband has important links to growth, ICASA has largely focused its interventions in markets for voice services. The telecommunications sector in South Africa has seen significant decreases in mobile voice prices over the last 8 years, from more than R1.50 per minute on average in 2005 to just over R1 per minute in 2012. Call success rates and dropped call rates on mobile networks were mostly within the bounds set by ICASA in 2013, having improved to some degree from an initial, indicative quality of service report prepared by ICASA in 2011. The prices and quality of broadband in South Africa are less encouraging: while mobile broadband prices in South Africa are cheaper than they are in Brazil and China for most products, they are more expensive than in India and Russia. Fixed broadband prices in South Africa are significantly more expensive than in all other BRICS countries. At the same time, South Africa's broadband speeds are significantly slower than speeds in Brazil, Russia and China. South Africans are paying more for broadband than consumers in other countries, and

experiencing slower speeds. Investment, revenues and profits for the mobile sector have increased significantly over time for MTN and Vodacom, despite the call termination rate interventions which introduced lower call termination revenues and introduced more intense price competition. Churn has increased to more than 50% for mobile prepaid customers. Churn for postpaid customers, however, is a more sedate 10%, and the latter rate did not change significantly after the introduction of mobile number portability. This suggests that competition for prepaid mobile customers is more intense than it is for postpaid customers.

While Telkom's fixed line voice minutes are declining, a significant proportion of this decline is accounted for by other fixed line and VOIP operators growing their voice volumes. Telkom's fixed line revenues have declined marginally over time as has their profitability (measured by EBITDA margins) due to an overall decline in fixed line connections. Telkom's broadband, business voice and data services grew significantly over the last decade, however. Telkom's rates of investment into its fixed line network have fallen as it focused on capital expenditure on its mobile network. This has changed somewhat recently, however, with Telkom announcing that it plans to "de-risk" its mobile investments and has increased investment in its fixed line network. While internet service providers and alternative fixed line operators have connected enterprise customers and the mobile operators, DFA having connected over 4,000 mobile sites for example and Neotel having connected approximately 2,500 business customers, alternative fixed line services have been rolled out in relatively small geographic areas and their reach is limited.

As a consequence of the limited competition among operators, particularly in the fixed line sector, South Africa has a poor ranking in terms of information and communications technology (ICT) sector development, in terms of both the World Economic Forum's Network Readiness Index (NRI) as well as the International Telecommunication Union ICT Development Index (IDI). South Africa ranks at number 70 out of 144 countries in the NRI and number 84 out of 154 countries in the IDI. And South Africa's ranking has slipped over time, from ranking at number 72 in 2002 in the IDI, though South Africa's rankings have improved marginally over the last year. This suggests that policymakers and regulators have an important role to play in improving economic regulation of the telecommunications sector in South Africa in order to ensure more competitive outcomes and the development of the sector, in order to bring South Africa in line with its BRICS rivals.

These sector outcomes are at least in part due to poor regulation. There are important flaws in the regulatory framework for the telecommunications sector in South Africa. Key among these flaws is the ownership of regulated entities by the state and the policymaker (the DOC) having shareholding responsibility for these regulated entities. This undermines the independence of the regulator. ICASA's independence is also undermined in other ways, including through performance monitoring of councillors by the Minister of Communications and the inability for ICASA to appoint experts without ministerial approval where experts are not in ICASA's approved budget. Finally, and linked to the lack of independence of the regulator from regulated entities, ICASA engages in private negotiations with regulated entities (discussed in more detail in section 7 below). While the competition authorities, which are not directly linked to regulated entities, have intervened in the sector they have done so partially and in relation to specific products and markets where ex-post evaluation of conduct has been

possible. A better approach would be for the sector specific regulator, ICASA, to regulate the sector holistically.

There are also significant problems with the independence of the competition authorities and ICASA in respect of funding and appointments by line ministers. Best practice is for economic regulators to be funded through industry levies and to have regulated entities pay for consultants required to provide expertise on regulatory decisions. There is no common appeal authority for economic regulators in South Africa: while the competition authorities have dedicated appellate bodies, ICASA's decisions are appealed to the High Court, which means fewer appeals as outcomes are uncertain, and therefore less accountability for ICASA. There are other gaps in the regulatory framework, or regulatory "governance" regime, including a lack of regulation of the quality of broadband services, ICASA's lack of information gathering powers, and the unwieldy size of the ICASA council which makes decision-making difficult. The open access regime and other aspects of regulation employed in the ECA are disproportionate, and create onerous regulatory obligations for small new entrants.

In terms of regulatory "substance", while ICASA has issued thousands of spectrum licences, and deals with thousands of complaints and hundreds of number applications every year, in respect of key actions to bring about competitive broadband services, ICASA and the competition authorities have not had the desired impact. Some of the delays, including in respect of licensing of spectrum, are caused by government interference. Telkom has used various legal means of delaying decisions by the competition authorities in the various abuse of dominance complaints against it. Furthermore, the delays in the implementation of local loop unbundling is at least partly due to the fact that ICASA is under-resourced due to the state's ownership of a significant stake in Telkom, which reduces the state's incentive to properly resource the regulator. Finally, the licensing framework creates artificial barriers to new entry, and the management of numbers, particularly non-geographic numbers, as well as the rules regarding rights of way, inhibit new entry.

The implications of this are that ICASA and the competition authorities need to be further insulated from political interference and be properly resourced through industry levies and fees. Furthermore, a single appellate body for economic regulators ought to be established in order to improve accountability of the regulators and improve outcomes in the sector.

A useful case study to assess regulatory effectiveness is in respect of interventions in markets for call termination services. Laffont, Rey & Tirole's (1998a and 1998b) model on competition between networks suggests that the call termination rate that operators would choose collusively, and indeed the optimal rate set by regulators, depends on the competitive setting and regulatory context. In certain circumstances, where operators compete using two-part tariffs, where networks are symmetric in size, and where fixed costs are high and where substitutability between networks is low, operators will likely choose a relatively benign, low call termination rate. Where there are new entrants, pricing is more linear, where fixed costs are low and where substitutability is high, which more closely characterises the South African market, operators collusively select a high call termination rate.

An important departure from the Laffont, Rey and Tirole (1998a and 1998b) model is that many (if not most) of South Africa's population owns more than one SIM card, which means that

operators compete for call volumes rather than for customers, which means the call termination rate should have less of an impact on competition. Nonetheless, asymmetry between fixed and mobile call termination rates mean that operators were able to disadvantage the fixed line networks significantly through setting high mobile call termination rates and earned substantial call termination revenues on net. Furthermore, consumers on average do not have more than two SIM cards, and so MTN and Vodacom still had a significant incentive to set high call termination rates in order to limit competition to between their two networks. This suggests that there is significant scope for ICASA to intervene in markets for call termination rates, which it has successfully done.

The regulation of call termination rates in South Africa evolved from almost no regulation since the mobile operators were licenced in 1993 until March 2011, when the new call termination rate regulations developed by ICASA came into effect. Major operators ostensibly were required to set call termination (interconnection) rates at long run incremental cost (LRIC) since the interconnection guidelines were brought into being by ICASA's predecessor, SATRA, in 1999. Since MTN and Vodacom were not declared major operators, these regulations had little impact on the level of call termination rates, other than to prohibit discrimination which caused the mobile to mobile call termination rate (initially set at R0.20) to increase to the level of the fixed to mobile call termination rate (which eventually rose to R1.25), all of which occurred prior to Cell C's entry in 2001.

Between March 2010 and March 2013, the peak mobile call termination rate for MTN and Vodacom was reduced by 68% through political pressure initially, followed by regulatory intervention by ICASA. This resulted in mobile retail prices declining by between 30% and 35%, and fixed to mobile retail prices declining by between approximately 30% and 45%. While this resulted in mobile voice revenues declining in real terms, aggressive investment by the mobile operators into mobile data services and significant increases in demand for data services resulted in higher overall revenues and EBITDA margins over the period. While employment among MTN and Vodacom declined, this effect was relatively small, and took place over a period in which Telkom Mobile and Cell C expanded their services and, at least in the case of Telkom Mobile, increased employment. Furthermore, competitive pressure in the voice services market created an incentive for MTN and Vodacom to enter new, adjacent markets including mobile money and offering fixed line services to businesses, which increased competitive intensity in those markets. While the least cost routing (LCR) business model was all but eliminated, many LCR operators were able to convert their customers to voice over internet protocol (VOIP) services which increased competitive intensity in the fixed line voice market. The call termination rate intervention therefore facilitated significantly greater competition, not only in voice markets but in a range of adjacent markets.

The successful outcome of the call termination rate intervention in South Africa was not guaranteed: the results from empirical studies in other jurisdictions are inconclusive on the impact of high call termination rates on consumers. Cross-country empirical studies have shown everything from a decrease, to no impact, to an increase in retail prices arising from lower call termination rates.

The call termination rate intervention also had important distributional consequences: while high call termination rates preserved high prepaid voice prices to some extent and more limited

switching from incumbent networks to new entrants, these effects were reduced as call termination rates declined. At the same time, connection incentives for postpaid customers were decreased when call termination rates were reduced, as lower call termination revenues meant lower incentives for signing up new customers.

ICASA has since proposed further reductions in mobile call termination rates, to R0.10 per minute for MTN and Vodacom from 1 March 2016. This is very near to a bill and keep regime, and will test whether the significant access growth in South Africa can be maintained and whether the last 5m unconnected consumers in South Africa will be connected. To the extent that access continues to increase, ICASA should consider moving towards a bill & keep regime in order to save its own costs as well as those incurred by the operators for developing and maintaining a bottom-up LRIC model. A bill and keep regime for voice services also becomes more attractive as the operators continue to shift their focus to investment into data services over the short to medium term. The expansion of Cell C and Telkom Mobile has partly been as a consequence of asymmetrically high call termination rates, which ICASA has decided to maintain going forwards. The extent of asymmetry is dramatic: Cell C and Telkom Mobile may charge more than double what MTN and Vodacom may charge, and asymmetry will have been in place more than 15 years after Cell C at least was licensed. This is considerably longer than in the EU for example where asymmetry is allowed for a maximum of 4 years. The extent of asymmetry will also likely mean that consumers will pay higher prices for longer. While Cell C faced an adverse call termination rate environment for a decade prior to the first call termination rate intervention in 2011, ICASA does risk favouring competitors at the expense of competition by allowing Cell C these high levels of asymmetry.

A further useful case study on the regulation of the sector is in respect of regulatory decisions to open (or keep open) the fixed line market. Economic theories associated with the Chicago School suggest that input foreclosure of an upstream input in order to favour the downstream operations of a vertically integrated upstream monopoly is unlikely: Why could a monopolist not simply extract its monopoly profit upstream and leave downstream firms to compete as fiercely as possible in the resale of the upstream monopoly input? Even where input foreclosure does occur it would be good for consumers, due to the elimination of double-marginalisation. There are a number of reasons why the Chicago School theories about input foreclosure might not hold, however. The first is that the vertically integrated upstream monopolist might avoid regulation upstream, where the price of the monopoly input is regulated and the monopoly profit therefore cannot be extracted. A further anti-competitive incentive for input foreclosure is the credibility problem faced by a monopolist facing multiple downstream buyers who the monopolist interacts with sequentially and who refuse to accept the monopoly price given the monopolist's incentive to discount to the following reseller. A further theory of harm to competition is that downstream firms may in the medium to long term enter the monopoly upstream market, or will provide custom for new upstream entrants. Monopolists therefore do have incentives under these circumstances to foreclose downstream rivals.

In order to alleviate the effects of this conduct regulators have developed means of separating the upstream and downstream divisions of vertically integrated upstream incumbents and have developed open access frameworks for third parties to make use of monopoly inputs, being Local Loop Unbundling (LLU). While Hausman & Sidak (2005) find that LLU did not

significantly improve competition and broadband in a number of developed countries, this was largely due to the presence of inter-modal competition there between cable and copper networks. South Africa does not have any cable networks: there is only one fixed line network that has significant coverage, Telkom's. Other studies, including the Berkman Centre (2010) report and Nardoto *et al* (2013) found that LLU and open access policies generally (in the case of the Berkman Centre report) lead to better outcomes for consumers, including through lower prices and better quality, even where inter-modal competition exists.

In South Africa, the DOC set a deadline for ICASA to implement LLU by the end of 2011. Due to political interference or at the very least a lack of political will, ICASA did not achieve this target and has not to date implemented LLU. This is despite a dispute successfully brought by Neotel against Telkom and numerous false starts in the implementation of LLU regulations. At the same time, the competition authorities have limited Telkom's ability to extend its market power in markets for managed network services by prohibiting the Telkom / BCX merger. The competition authorities have also implemented a limited form of functional separation through a settlement agreement with Telkom but have left a significant amount of discretion to Telkom in the implementation of the agreement. Without energetic co-ordination between ICASA and the competition authorities on the settlement agreement through the exercise of concurrent jurisdiction over Telkom, the functional separation and LLU process may not be effective.

The following recommendations flow from this report:

- a) In relation to market access and lowering barriers to entry:
 - i. Telecommunications licensing should be simplified. A basic notification process for both services and infrastructure licensing should be put in place. ICASA should be allowed to issue i-ECNS licences without a Ministerial policy direction.
 - ii. There should be greater access to spectrum for smaller operators on a local or community basis, particularly in respect of television white spaces.
 - iii. The ECA's "open access" principles for interconnection and facilities leasing are too wide and catch all licensees, which is disproportionate for small licensees. At the very least, facilities leasing and interconnection agreement obligations should be limited to providers with market power in terms of chapter 10 in order to reduce compliance costs.

- b) In relation to providing greater clarity to the sector:
 - i. The MOU between ICASA and the competition authorities should be updated. It has not been updated since the ECA was put in place.
 - ii. The ECA is not clear as to whether ICASA must conduct a market enquiry before setting tariffs for interconnection and facilities leasing matters. This should be clarified in the ECA.

- c) In relation to ICASA's independence:
 - i. ICASA should be allowed to employ experts outside of its approved budget without ministerial approval.

- ii. State ownership of Telkom limits ICASA and the DOC's independence. The state's interest in Telkom and other regulated entities should be divested in order to remove this conflict of interest.
 - iii. The requirement for ICASA to consider ministerial policies and policy directions should be removed as this undermines ICASA's independence and results in considerable delays.
- d) In relation to consumer protection:
- i. ICASA's consumer protection rules do not set out what consumers are responsible for, and while quality for voice services is dealt with, quality of broadband services is not. This needs to be remedied.
 - ii. ICASA should establish the consumer advisory panel, as required in terms of the ECA.
- e) In relation to ICASA's legal powers:
- i. ICASA needs to be provided with sufficient legal powers to obtain information.
 - ii. ICASA's fines should be linked to the magnitude of the contravention rather than have fixed maxima.
- f) In relation to the decision makers at ICASA and the competition authorities:
- i. The ECA and Competition Act should be amended to ensure that an independent investigation is required prior to removal of decision makers.
 - ii. ICASA's 9 council members should be reduced to the number recommended Brown et al : 3 or 5 commissioners.
 - iii. ICASA council members and the Competition Commissioner and Deputy Commissioners should be appointed by the President, and their terms of service should be capable of being changed while they are in office.
 - iv. ICASA councillors should not be accountable to the Minister of Communications and should rather be accountable to Parliament for their performance.
- g) In relation to ICASA and the competition authorities' funding:
- i. ICASA and the competition authorities' funding should generally be raised through special levies from regulated entities rather than through appropriations from Parliament.
 - ii. A rule should be put in place that prohibits government cuts in spending unless they apply consistently to all agencies.
 - iii. ICASA and the competition authorities should be given the authority to have regulated entity fund the costs of consultants.
 - iv. State ownership of Telkom reduces government's incentives to fund ICASA. This means that independent funding for ICASA is particularly important and this underlines the importance of the state divesting its interests in the telecommunications sector.
- h) In relation to transparency and accountability of ICASA and the competition authorities:
- i. ICASA and the competition authorities should seek outside expert advice on their performance.

- ii. There should be a dedicated appellate body for ICASA's decisions to enable regulated entities to regularly appeal ICASA's decisions.
 - iii. ICASA in some instances enters into private negotiations with regulated entities instead of conducting transparent proceedings. This should be prohibited.
- i) In relation to ICASA's staff, training and internal procedures:
- i. ICASA should put in place a case management system to preserve confidential information and to facilitate provision of access to documents that are public in terms of the ECA.
 - ii. Training on the procedures and practices adopted by ICASA when implementing the ECA needs to be implemented.
 - iii. A track for specialists to progress outside of management structures should be implemented in order to attract and retain highly skilled staff.
 - iv. A key area for training that should be developed is technical training (Interviews with DOC staff members). This is particularly important for areas such as Local Loop Unbundling and Spectrum assignment.
 - v. There should be prohibitions on a variety of ethical problems set down in legislation, and there should be requirements for all regulatory personnel to disclose their financial interests.
- j) Consideration should be given to moving towards a bill and keep regime for call termination in South Africa. The mobile operators are focusing their investments on the rollout of data networks, which are to some degree at least independent of markets for voice services. The introduction of bill and keep will facilitate competition and will result in lower costs of compliance for regulated entities and reduced complexity for the regulator.
- k) The call termination rate intervention highlights the importance of politicians and policymakers in the regulatory environment. The change in the interests of the DOC after Telkom divested its share of Vodacom shows how bringing about change in the sector requires alignment of interests between the state, regulated entities and consumers. In order to bring about LLU, consideration should be given to housing Telkom's copper local loop assets as well as its collocation facilities and related infrastructure in a separate legal entity falling under the Department of Public Enterprises rather than the Department of Communications. This should more closely align the interests of consumers, politicians, the DOC and ICASA which should facilitate LLU and ultimately the development of broadband and small businesses in South Africa.

1. Introduction

The telecommunications sector is characterised by incumbent firms that benefit from network effects, which occur where belonging to a network is more valuable the greater the number of people that belong to that network, in addition to other incumbency advantages (see, for example, Economides, (2004)). This means that the telecommunications sector is often dominated by a small number of firms.

The telecommunications sector is regulated in terms of the Electronic Communications Act (no. 36 of 2005, the ECA) and the Competition Act (no. 89 of 1998, the Competition Act). In addition to provisions designed to address market power in the sector (including interconnection, facilities leasing and price regulation), the ECA regulates a number of other matters, including radio frequency spectrum, type approval and numbering. The Independent Communications Authority of South Africa Act, no. 13 of 2000 (the ICASA Act), provides for the establishment of the industry regulator, ICASA as well as for the Complaints and Compliance Committee (CCC). The Competition Act established the Competition Commission (the Commission), Competition Tribunal (the Tribunal) and Competition Appeal Court (the CAC). The Commission makes decisions on small and intermediate mergers and investigates complaints and large mergers, makes recommendations to the Tribunal in the case of large mergers and decides to whether or not to refer complaints to the Tribunal. The CAC hears appeals of the Tribunal's decisions from complainants, parties to a merger, trade unions or employees, or from the Commission.

This paper assesses the regulatory framework for and regulatory effectiveness in addressing market power in the telecommunications sector. First, an overview of the economic regulation of the telecommunications sector is provided, followed by an assessment of linkages between economic regulation of the sector and economic growth. A review of sector performance is then produced, followed by a review of regulatory effectiveness. Two case studies of regulatory interventions in the sector are then developed: one on the call termination rate intervention, and one on the local loop unbundling intervention.

2. Overview of economic regulation of the telecommunications sector

2.1. Introduction

There are three main areas of economic regulation in the electronic communications sector under the ECA (bearing in mind that economic regulation is one part of the ECA):

1. Interconnection and facilities leasing;
2. Competition, price setting and collateral regulations, including reporting (as a remedy after a market review); and
3. Spectrum pricing, assignment and management, and universal service.

The questions that this section seeks to address are:

1. What economic problems arise in the electronic communications sector?

2. What regulations have been put in place to address these problems?
3. What legal powers and mandates are provided to the regulators to give effect to the regulations that are in place?

Interconnection and facilities leasing lie at the heart of the economic regulation framework for the telecommunications sector in South Africa, discussed next.

2.2. Interconnection and facilities leasing

2.2.1. Interconnection

Industries are characterised as having network effects where the utility gained by each customer of a network increases with the number of customers on that network over and above the intrinsic utility the customer derives from using the service. Positive externalities are generated as each customer joins the network, the benefit of which flows to all other customers on the network (Motta, 2004: 7.3, see Box 1 below). Where networks are incompatible (where there is no interconnection) consumers may fail to co-ordinate their decisions to ensure that new more efficient entrants are able to enter the market, even where these new entrants have lower costs (see Box 1). Firms with market power in industries characterised by network effects have an incentive to protect their market power by denying rivals access to customers on their networks, which reduces compatibility between networks. Since customers derive utility from the number of additional customers on a network, denying compatibility between networks can cause the market to “tip” in favour of the monopolist, which is able to corner the market (Motta, 2004: 7.3).

Box 1: Entry and exclusion equilibria with network effects (Motta, 2004: 2.6.3.4, based on Katz & Shapiro, 1984)

Consider a consumer's utility function for network good i :

$$U_i = r + v_i(n) - p_i$$

Where:

r is the intrinsic value of network good i

$v_i(n)$ is the value of the network effect for network good i , and n is the number of consumers that join network i .

p_i is the price that the consumer pays for network good i

Now assume that there are two networks that are incompatible with one another, one operated by an incumbent monopoly, I , and one operated by a new entrant, E . Assume further that the network effect if only one consumer joins a network is 0, such that $v_i(1) = 0$, since there is no value in joining a network with only one consumer (who would that consumer call?). Assume that fixed costs for the new entrant are minimal and that the intrinsic value of the network good, r , is zero.

Assume further that the maximum network effect (positive externality), $v_i(n)$, is obtained when there are z customers. The incumbent's existing “old” customers already achieve the maximum utility, $v_i(z)$. There is a set of “new” customers, also that have a size z which the incumbent and the new entrant compete for. Finally, assume that the new entrant has lower costs than the incumbent: $c_E < c_I$.

There are two types of equilibria in this case: Entry equilibrium and Persistence of Monopoly (mis-coordination equilibrium).

Entry equilibrium: The new entrant, E, is able to enter the market and sets prices just below the incumbent's costs, c_I , and all customers, z, join the new entrant's network. This is an equilibrium because if any consumer deviated and bought the monopolist's good they would obtain utility $v(z) - c_I$ which is less than the utility that they would obtain from buying the cheaper new entrant's product. Note that the incumbent cannot charge a lower price than c_I to capture the market as it would be making losses.

Persistence of monopoly (or mis-coordination) equilibrium: In this equilibrium, E does not enter and I sets prices at $p_I = v(z)$ which means that the monopolist is able to obtain all of the consumer surplus. No consumer has the incentive to deviate from this position because if they did, they would obtain $v(1) - c_E = -c_E$ as $v(1) = 0$ (there is no value in being part of a network with only one user). The new entrant has no incentive to enter the market as it will not be able to recover its fixed costs even though these are minimal.

In order to prevent the monopoly persistence outcome, an example of which is described in Box 1, the ECA imposes a duty to interconnect on all Electronic Communications Network Services (ECNS) Licensees. Interconnection is regulated in terms of the interconnection regulations (ICASA, 2010b). This ensures that customers obtain utility from the network size of all networks aggregated as opposed to one network. This also ensures that large incumbent licensees, such as Telkom SOC Limited (Telkom), Vodacom (Pty) Ltd (Vodacom) and MTN (Pty) Ltd (MTN) are not able to benefit from network effects, although these can be generated in other ways, to be examined in a forthcoming paper on ICASA's call termination rate decision.

Interconnection is defined as the "Physical or logical linking of two or more electronic communications networks, electronic communications services, broadcasting services, services provided pursuant to a licence exemption or any combination thereof" (ECA: section 1). Interconnection is therefore broadly defined and encompasses both voice and data interconnection. In practice, interconnection agreements typically cover voice and messaging rather than internet or other data services. The latter are governed by privately negotiated network to network interface (NNI), peering and transit arrangements, which are not typically lodged with ICASA.

2.2.2. Facilities leasing

In addition to network effects, the electronic communications sector is also characterised by significant economies of scale and other barriers to new entry. These barriers to entry include regulatory (or legal) barriers to entry. For example, the licensing framework under the Telecommunications Act, no. 103 of 1996 (TA), for example, gave Telkom an exclusive right to provide the services it provided prior to its licence issued in the mid-1990s, largely fixed line services. This exclusivity period lasted until May 2002. Similarly, licences to provide mobile services were provided exclusively to MTN and Vodacom initially. This significantly limited the number of new entrants into the market until relatively recently. While the ECA introduced a technology neutral licensing framework in 2005 which allowed for greater entry, there are still

limits on new entry.¹ These barriers to entry mean that providing access to existing infrastructure are particularly important.

While these regulatory barriers have been removed to some degree with the Altech judgement (case No. 20002/08), which created a significant number of national individual electronic communications network service licences, the incumbent operators created under the Telecommunications Act continue to benefit from significant scale advantages. Telkom, for example, has copper access lines reaching more than 5m homes and businesses and MTN and Vodacom have between 9,000 and 11,000 Base-station Transmitter Sites (BTS) each (Telkom, 2001; MTN, 2013; and Vodacom, 2013). These facilities are difficult to duplicate and provide incumbents with significant economies of scale and economies of scope.

In order to address these barriers to entry the ECA provides for facilities leasing, implemented through facilities leasing regulations (ICASA, 2010c). This is intended to allow for a “ladder of investment” (see Box 2), whereby smaller operators lease facilities while they build out their own networks (Cave, 2004; Cave, 2006). The ladder of investment allows smaller operators to gather information on customer requirements, including the locations of customers which reduces uncertainties of investments into new infrastructure. The intention of this intervention is that ultimately facilities based competitors will emerge thus substantially reducing or even eliminating the need for regulation of the sector. The ladder of investment is generally used in reference to the fixed line segment of the electronic communications sector and Local Loop Unbundling in particular, to be discussed more in detail in a forthcoming paper on opening up the fixed line network to competition in South Africa.

Box 2: Encouraging infrastructure competition through the ladder of investment (Cave, 2006)

Cave (2006) finds extensive evidence of the replication of fixed line broadband infrastructure in the EU, and particularly the Netherlands and Germany, through the use of the parts of the incumbent’s infrastructure that are difficult to replicate and investments into infrastructure that can be replicated, including Digital Subscriber Line Access Multiplexers (DSLAMs) and backhaul services from exchanges. Where Average Total Costs are falling over the entire range of demand in a market, economies of scale are such that a natural monopoly exists. Similarly, economies of scope may be such that the average incremental cost of a good are so low that they represent a considerable barrier to new entry. Where average total costs or incremental costs for a product or service have these features then they are not replicable.

¹ Operators wishing to roll out a national network may only apply for a licence to do so in response to an Invitation to Apply from the Minister of Communications in terms of section 5(6) of the ECA.

Figure 1: Economies of scale

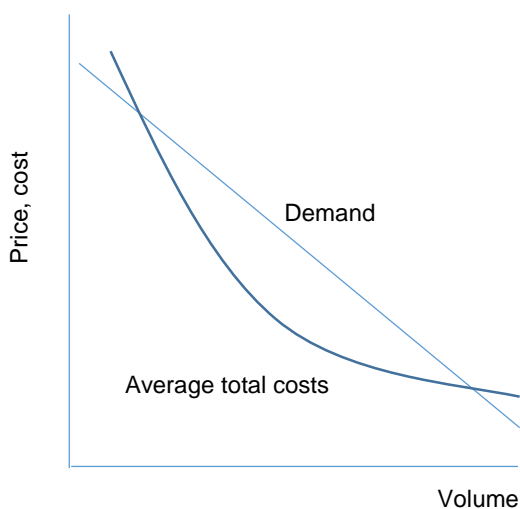
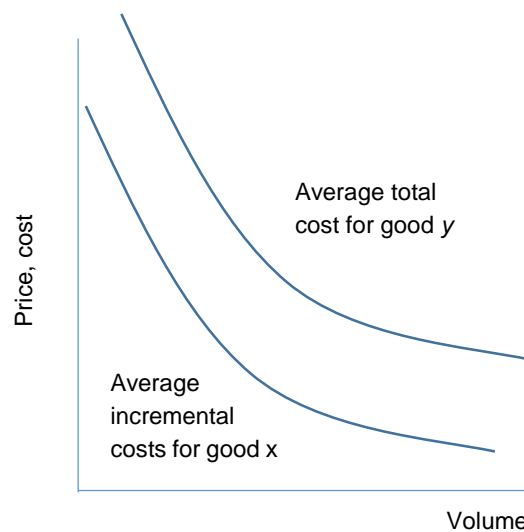


Figure 2: Economies of scope



There is a scale of replicability in the fixed line part of the telecommunications sector. The copper loop is not widely replicable in most countries, since the average total costs of the service fall over the entire range of demand in most geographies. The DSLAMS, backhaul, core IP network, access to the internet, and retailing services (marketing, billing, support etc.) are indeed replicable, depending on geography and the scale required to establish services at (including colocation) and to (including connectivity) the incumbent's exchanges. Cost modelling and evidence of replication in other countries should be used when regulators assess which parts of networks ought to be identified for "ladder of investment" interventions.

It is important here to ignore "false negatives" such as the US where investment was ultimately not sustainable as access prices for potentially competitive parts of the network were set too low by the Federal Communications Commission (Cave, 2006).

Cave (2006) suggests a series of steps when regulating for access:

1. Assess which aspects of the network are replicable and which are not. Note that even if an asset is replicable, a brief period of access intervention may be required while new entrants establish their infrastructure.
2. Establish where new entrants and incumbents are located on the ladder of investment. The key here is to create an environment that encourages uptake of the incumbent's services that are not replicable while providing limited support for access to infrastructure that is currently invested in by new entrants.
3. Assess the business potential for investment in the relevant rung of the ladder of investment by new entrants.
4. Choose the mode of intervention required to enable investment in the relevant rung on the ladder.
5. The intervention then needs to be calibrated. The regulator needs to ensure that entrants pay the Long Run Incremental Costs of the incumbent plus an appropriate common cost. Since the new entrant also has an option to continue to "buy" from the incumbent, which the incumbent did not have during the course of entry, this should be added to the cost that new entrants pay. Undertaking investments when demand and costs are uncertain is risky. New entrants are able to avoid this risk as they are able to "buy" and this cost should be added to the incumbent's LRIC plus its common costs. This should incentivise new entrants to "make" their own infrastructure as opposed to continuing to "buy" it. The option value is difficult to calculate but is likely to be in the region of 5-50% of the sunk costs of investment.
6. It is important to make a credible commitment to the ladder of investment policy. If the regulator cannot credibly threaten to remove access pricing to the components of the network that are replicable, then entrants may not have an incentive to invest.

All licensees have a duty in terms of the ECA to lease all facilities to other licensees. The list of facilities includes (ECA, Section 1):

- a) *Wire;*
- b) *Cable (including undersea and land-based fibre optic cables);*
- c) *Antenna;*
- d) *Mast;*
- e) *Satellite transponder;*
- f) *Circuit;*
- g) *Cable landing station;*
- h) *International gateway;*
- i) *Earth station; and*
- j) *Radio apparatus.*

The definition of facility refers to the use of the above list *for or in connection with:*

- i) Collocation space;*
- ii) Monitoring equipment;*
- iii) Space on or within poles, ducts, cable trays, manholes, hand holds and conduits; and*
- iv) Associated support systems, sub-systems and services, ancillary to such electronic communications facilities or otherwise necessary for controlling connectivity of the various electronic communications facilities for proper functionality, control, integration and utilisation of such electronic communication facilities.*

This suggests that services such as the lease of collocation space and ducts, as a stand-alone service, is not required in terms of the ECA. This means that licensees may not approach facilities providers and request collocation space, for example, by itself: it must be provided in conjunction with another facility.

2.2.3. Economic features common to both the facilities leasing and interconnection regulations

The ECA and the regulations on interconnection (ICASA, 2010b) and facilities leasing (ICASA, 2010c) have several common features including grounds for rejection of a network access request, non-discrimination and un-bundled access.

Interconnection and facilities leasing agreements may be rejected by the provider on the grounds that the request is not technically feasible or on the grounds that the request is not economically feasible. Technical and financial feasibility in turn are defined as “not having adverse material consequences”. In practice, facilities leasing and interconnection requests have not been rejected in accordance with these criteria and brought before ICASA or the CCC for adjudication, and there is therefore little guidance on the grounds on which requests may be rejected where technical and financial feasibility are concerned.

Both regulations prohibit discrimination. They require that a provider of either interconnection (ICASA, 2010b, para. 10(3) and ICASA, 2010c, para. 9(3)):

“...must apply similar terms and conditions, including those relating to rates and charges, in similar circumstances to itself, affiliates, and other [interconnection or facilities leasing] seekers, [providing or requiring] similar services, unless otherwise requested...”

Furthermore, both regulations require that unbundled access to facilities leasing (ICASA, 2010c, para. 10(3)) and interconnection (ICASA, 2010b, para. 11(3)) is provided. The provider must ensure that:

“Charges for [interconnection or the facility] must be sufficiently unbundled so that an [interconnection or facilities leasing] seeker does not have to pay for anything it does not require for the requested [interconnection or facility]”.

The unbundled access and non-discrimination requirements apply to all licensees, except those that ICASA has found to not have market power after concluding a market enquiry in terms of Chapter 10 of the ECA, discussed further below under the section on Competition, price setting and collateral rules.

A provider must respond to any request for interconnection or facilities leasing within 7 days and an agreement must be concluded within 45 days, which may be extended by agreement between the parties to 60 days. The agreements must be lodged with ICASA within 5 days of being concluded, and ICASA has 30 days to object to the agreement before it is deemed approved. Interconnection and facilities leasing agreements are publicly available in terms of the ECA. In practice, it is sometimes difficult to obtain these agreements however. Experience with facilities leasing agreements is discussed in relation to the Neotel / Telkom Local Loop Unbundling (LLU) dispute in section 7 below.

2.3. Competition, price setting and collateral rules

2.3.1. Overview of competition analysis

There are a variety of ways in which firms with market power can cause harm to competition or consumers that *ex-ante* regulation of interconnection and facilities leasing may not adequately address (see, for example, Box 3). A dominant firm might lease facilities but at an excessive price that leads to consumer detriment or at a predatory price that exclude facilities based entrants from the market. Finally, a dominant firm might lease facilities or offer interconnection at a wholesale price and offer downstream services at a retail price such that the margin between wholesale and retail prices is not sufficient to allow new entry. This is known as a margin squeeze, and is of particular concern in electronic communications markets (Cave, 2004).

Where competition and the abuse of dominance are concerned, the competition authorities and ICASA have concurrent jurisdiction. The competition authorities are only mandated to

intervene in markets once evidence of abuse of dominance exists (Competition Act, no. 89 of 1998, sections 8,9). The competition authorities therefore provide backward looking or *ex-post* regulation. ICASA is able to conduct market reviews (ECA, Chapter 10) after which it can impose forward looking remedies on firms that have significant market power. ICASA therefore has a mandate to impose *ex-ante* regulations. Both regulators are mandated to ensure that monopolies do not persist in markets through anti-competitive means, such as the example presented in Box 3.

Box 3: Exclusionary strategies for dominant firms in markets with network externalities, in the absence of interconnection (Motta, 2004)

Continuing from the model described in Box 1, assume that the incumbent's costs are low enough to allow for: $2c_I < v(2) + c_E$. Set z (the market size that defines the maximum network externality) = 2, and assume that there are two buyers, 1 and 2. Now assume that the incumbent can price discriminate, that is charge different prices to each of the buyers, $p_1 = c_E - x$ and $p_2 = v(2)$. The entrant sets a price c_E . Recall from Box 1 that a buyer receives zero utility if no-one else joins the network they choose ($v(1) = 0$), since they are not able to call anyone on a network with only one customer.

The payoff matrix is as follows:

	Buyer 2	Buy from incumbent	Buy from new entrant
Buyer 1			
Buy from incumbent		$v(2) - (c_E - x), v(2) - v(2)$	$v(2) - (c_E - x), -c_E$
Buy from new entrant		$-c_E, v(2) - v(2)$	$v(2) - c_E, v(2) - c_E$

Buyer 1's dominant strategy: If buyer 2 buys from the incumbent, buyer 1 obtains a higher payoff from buying from the incumbent, $v(2) - (c_E - x)$, since buyer 1 will obtain $-c_E$ if she buys from the new entrant. If buyer 2 buys from the new entrant, buyer 1 should buy from the incumbent since she receives a discount x off the new entrant's price, c_E . Buyer 1's dominant strategy is therefore to buy from the incumbent as she is always better off doing so, irrespective of what buyer 2 does.

Buyer 2's strategy: If buyer 1 buys from the incumbent, then buyer 2 should buy from the incumbent, since $v(2) - v(2) > -c_E$. If buyer 1 buys from the new entrant, then buyer 2 should buy from the new entrant too. However, since Buyer 2 knows that Buyer 1's dominant strategy is to buy from the incumbent, buyer 2 should also buy from the incumbent.

The incumbent has an incentive to offer these discriminatory prices since $2c_I < v(2) + c_E$, by assumption. In this way, the new entrant can be excluded from the market and the monopoly market structure persists.

Both authorities go through the process of market definition and assessing market power. In fact, the ECA refers to the Competition Act for the definition of dominance. At the market power stage, however, the ECA empowers ICASA to find firms that control essential facilities or are vertically integrated as having market power. After the assessment of market power, the competition authorities and ICASA have different processes. ICASA may proceed directly to imposing remedies on firms with market power. The competition authorities on the other hand need to assess the conduct in question and define a theory of harm, then assess anti-competitive effects and pro-competitive effects (except where assessing excessive pricing or refusal to supply an essential facility, in which case this is not required). Where the conduct in

question has anti-competitive effects that outweigh pro-competitive effects, the competition authorities may proceed to impose remedies. Intervention by the competition authorities therefore requires considerably more evidence and analysis than intervention by ICASA.

2.3.2. Competitive characteristics of markets

ICASA is explicitly mandated to take into account many competition-related factors that the competition authorities are not explicitly required to assess when examining abuse of dominance cases. ICASA must take into account entry barriers, relative market shares and must prepare a forward looking assessment in terms of section 67(6) of the ECA, including (but not limited to):

- *Actual and potential existence of competitors;*
- *Level, trends of concentration and history of collusion;*
- *Overall size of the market participants;*
- *Control of essential facilities;*
- *Technological advantages or superiority of a market participant;*
- *Countervailing power;*
- *Easy or privileged access to capital;*
- *Dynamic characteristics of the market, including growth, innovation, products and services;*
- *Nature and extent of vertical integration; and*
- *Ease of entry, including regulatory and market barriers.*

These factors are similar to those set out in section 12A(2) of the Competition Act, which deals with mergers:

- *The actual and potential level of import competition in a market;*
- *The ease of entry into a market, including tariff and regulatory barriers;*
- *The level and trends of concentration, and history of collusion, in a market;*
- *The degree of countervailing power in a market;*
- *The dynamic characteristics of the market, including growth, innovation and product differentiation;*
- *The nature and extent of vertical integration in the market;*
- *Whether the business or part of the business of a party to the merger or proposed merger has failed or is likely to fail; and*
- *Whether the merger will result in the removal of an effective competitor.*

While the latter factors are considered when assessing mergers rather than abuse of dominance, the competition authorities and ICASA examine similar competitive characteristics when assessing markets.

There is a significant number of licensed telecommunications entities in South Africa, and it is therefore reasonable for ICASA to impose remedies on dominant firms only. This complies with the proportionality requirement for effective regulation, as suggested by Brown *et al*

(2006), discussed in more detail in section 5 below. The detailed set of criteria set out in the ECA and the Competition Act provide clarity for sector participants on how markets are assessed by ICASA and the competition authorities.

2.3.3. Remedies, including price controls

The remedies that can be imposed by the two regulators are different (see Table 1 below). The key difference between the remedies that the two regulators can impose is in respect of price controls. The Competition Tribunal has indicated that it does not see the competition institutions as price regulators (case no. 13/CR/Feb04), which is consistent with the approach of Evans & Padilla (2005), who find that there is no rule for excessive pricing that matches objectivity and efficiency in practice, other than where there are legal protections of a monopoly, in which case a sector regulator is in a better position to set prices.

Table 1: Remedies that can be imposed by the Competition Tribunal and ICASA

Competition Tribunal remedies	ICASA remedies (Chapter 10 of the ECA) ²
Interdict a prohibited practice	Impose a duty to act fairly
Order a party to supply or distribute goods	Impose a duty to comply with licence conditions
Impose an administrative penalty	Prohibit discrimination
Order divestiture	Impose an obligation to publish information for transparency purposes
Declare conduct to be a prohibited practice	Impose an obligation to publish information on terms and conditions
Declare an agreement to be void	Impose an obligation to maintain separation for accounting purposes
Order access to an essential facility	Impose price controls
	Impose cost recovery
	Provide accounting information
	Levy a penalty if regulations are contravened

The Tribunal therefore avoided price comparison and price/cost tests in the Mittal complaint (case no. 13CRFeb04). However, the Competition Appeal Court (CAC) held that price comparison and price/cost tests are relevant where assessing excessive pricing under section 8(a) of the Competition Act, and include (CAC, 2009):

1. Price vs. production costs;
2. Profitability: Comparing a firm's profitability with its cost of capital;
3. Price of comparable products in competitive markets;
4. Rewards for risk taking or innovation; and
5. Inherent characteristics of the market, including the fact that if there is cyclical demand prices may rise periodically with increases in demand.

² Note that ICASA may also impose remedies in the case of contraventions of the interconnection and facilities leasing regulations.

The CAC therefore follows the approach of Roberts (2009) who finds that prices should be compared with measures of the outcomes of competitive markets include prices in competitive markets (including prices to industrial customers who face competition from suppliers that use alternative inputs) as well as costs.

There are risks particularly in the assessment of a firm's accounting profits against competitive benchmarks since accounting profits do not take into account the risks involved in undertaking investments (Evans and Padilla, 2005). Accounting profits also are difficult to use where a firm produces several products and supplies these to several geographies due to difficulties with allocating joint and common costs (Evans and Padilla, 2005). Any analysis of accounting profitability should therefore be used with caution.

Evans and Padilla (2005) further argue that a finding of excessive pricing should be made according to a structured rule of reason approach and intervention should only take place where:

1. Innovation and risk taking investment is low in the industry concerned: the firm in question did not obtain its monopoly position in the market by making risky investments or through innovation;
2. There are significant barriers to new entry;
3. Prices compared to average total costs are excessive; and
4. The incentives to invest, take risks and innovate (ex-ante benefits from high prices) are weighed against ex-post effects of high prices. Part of this assessment should include assessing whether prices are so high that they prevent the emergence of products or services in adjacent markets.

Where segments of markets could be competitive, regulators might consider a more nuanced approach by setting prices above costs in order to encourage new investment and ultimately facilities based competition (as described in Box 2 above).

Sector specific regulators (ICASA in this case) tend to have better information on the monopolist being considered than the competition authority and are generally in a better position to monitor compliance (Evans and Padilla, 2005). That is not to say that there are no information asymmetries between regulated entities and sector specific regulators. Nonetheless, sector specific regulators are in a good position to gather information. For example, they are able to set out rules for accounting frameworks and reporting mechanisms and impose these on incumbent firms.

According to the International Telecommunication Union (ITU, 2009), there are 7 phases of regulatory accounting (see Box 4 for further details):

1. Defining accounting principles (accounting standards and norms);
2. Specifying services that should be included in the accounting model (usually defined by the relevant markets in which entities with Significant Market Power are identified);
3. Specifying the accounting period;

4. Establishing criteria for asset valuation (historical costs, indexation, absolute valuation, modern equivalent asset);
5. Developing cost standards (Marginal cost, Long Run Average Incremental Cost, Stand-alone cost, Fully allocated cost);
6. Choosing between types of cost accounting models (historical cost accounting vs. current cost accounting); and
7. Establishing rules for internal transfers (to ensure that monopolies do not favour their own downstream divisions).

Further considerations are whether to use a top-down or bottom-up model. A bottom-up model uses the actual engineering costs for a model network taking into account the characteristics of the relevant market, including expected demand and traffic. A top down model uses annual company accounting information from the firm in question and adapts the information to suit the model.

Finally, an important aspect of the regulation of prices is that the regulator should allow for a reasonable return on assets. This is usually calculated using a Weighted Average Cost of Capital (WACC), which is the costs that a firm incurs in obtaining debt capital and equity capital. While the allocation of capital between debt and equity is relatively easy to ascertain as is the cost of debt capital, the cost of equity capital includes a measurement of risk which can be difficult to estimate. Nonetheless, international benchmarks, particularly for European Union countries are available for many regulated industries.

Box 4: Regulatory accounting practices (ITU, 2009)

The key debates on costing models relate to the criteria for asset valuation, cost standards and types of cost accounting models since these have the greatest impact on costs and therefore prices.

In relation to criteria for asset valuation:

1. **Historical costs** use the purchase price of the asset and can lead to significantly under-valued assets where prices for assets have increased over time, or over-valuation if technological change has meant lower costs over time.
2. **Indexation** means applying a relevant index to the purchase price using historical costs. This requires careful selection of the relevant index.
3. **Absolute valuation** means finding the costs of replacing the asset as it is. This is applicable when there is a significant difference between historical costs and the current value of the assets in question.
4. **Modern equivalent asset (MEA)** is relevant when the asset being valued is no longer marketed and an equivalent replacement asset is available. This method should be used wherever possible since it reflects the costs of an efficient competitor and would cover the costs of a new entrant.

There are several cost standards that can be used to evaluate prices against:

1. **Fully distributed costs:** These include direct variable costs and direct fixed costs (costs that are directly attributable to the product or service in question), joint costs (costs that do not vary with the supply of one service, where an activity yields two or more outputs) and common costs (costs of inputs that are shared among a variety of outputs).
2. **Stand-alone costs:** These costs include the direct variable and fixed costs attributable to a service and include *all* joint and common costs of the firm for all services. This cost standard assesses the costs of a service as if the only output that the firm produced was the service in question. This is the upper limit for the costs of the service being examined.

3. **Marginal costs:** These are the costs of producing one more unit of output, and are the lower limit of the costs of the service being examined.

4. **Long run average incremental costs (LRAIC):** This introduces a time dimension to costing and takes into account the fact that all costs are variable in the long run. LRAIC is calculated as the difference between total costs inclusive of a defined increment of output and total costs without that increment of output. This is evaluated by means of a cost / volume relationship (CVR). This includes the variable and fixed costs that are attributable to a fixed increment in production. This is the cost standard used by the European Commission. LRAIC does not include joint and common costs which can be considerable in markets for telecommunications services. A mark-up on LRAIC can therefore be used, using distributed LRAIC or consumption-based allocation. Distributed LRAIC is calculated using an Equal Proportionate Mark-up (calculated using the difference between LRAIC for each element and overall joint and common costs). Consumption based allocation allocates joint and common costs according to consumption of resources. LRAIC is commonly implemented as Total Service Long Run Incremental Cost (TSLRIC), known as Total Element Long Run Incremental Cost (TELRIC) in the USA.

Source: ITU, 2009

The application of these accounting principles is dealt with below in section 6 on the call termination rate intervention and in section 7 on opening up the fixed line network.

2.4. Economic principles for spectrum pricing and assignment, and universal service

2.4.1. Spectrum pricing and assignment

ICASA is mandated to control, plan, administer and manage radio frequency spectrum except insofar as this relates to participation in international bodies such as the International Telecommunication Union, which is a duty that falls to the Minister of Communications. ICASA is mandated to develop a radio frequency spectrum plan in conjunction with the Minister of Communications (ECA, sections 30 & 34).

There are a number of potential uses of spectrum. The main area of contention in the assignment of spectrum is in high demand, low frequency spectrum ranges less than 3,5GHz. According to ICASA, there is approximately 450MHz of spectrum below the 3,5GHz range that could be assigned for broadband services but which is currently used for other purposes, including broadcasting (Ngwenya, 2011). There are many externalities generated from widespread broadband coverage that are discussed below in section 3 on the linkages between broadband and economic growth. Delays in the assignment of spectrum for broadband, including arising from delays with the digital migration process, are hampering the extension of broadband services to more consumers and are hampering economic growth.

Even if a policy decision is made as to how much spectrum should be assigned for broadband as opposed to broadcasting, it is not clear how many competitors ought to be assigned valuable, scarce access spectrum for broadband. More competition in markets for mobile broadband services is desirable as it drives innovation and leads to a reduction in prices. However, access to financial markets and existing infrastructure is required in order to roll out a mobile broadband network. In South Africa, only two of the four large scale, national mobile broadband networks are profitable: those belonging to MTN and Vodacom. Neither Cell C nor Telkom Mobile have ever been profitable, even though Cell C has been in the market since

2001. This suggests that assigning spectrum to yet more new entrants would unlikely result in the creation of sustainable, effective competition (Interviews with Department of Communications staff).

At the same time, developments in cognitive radios, which are able to identify and utilise unused spectrum within defined radio spectrum bands, mean that very large amounts of spectrum used by broadcasters, for example, can be shared. The efficient use of television white spaces (unused spectrum licenced to the broadcasters) could yield significant benefits for consumers in SA (see, for example, Carlson *et al* (2013)). Neotel, for example, shares spectrum with the TV broadcasters in TV channels 65 and 66 in South Africa in the 850MHz band. There are various regulatory mechanisms for the shared use of TV white spaces, including self-administration by members of industry associations. If shared use of TV white spaces spectrum were allowed on a greater scale by ICASA, this could lead to the further extension of broadband services in South Africa and greater competition.

It is therefore important that spectrum be assigned to the users that value it the most while ensuring that effective competition is maximised. The optimal way to assign spectrum to its highest valued use is by means of an auction, discussed below.

Existing spectrum allocations also need to be priced to ensure that they are retained by the entities that value the spectrum the most. This is different to using auctions to assign spectrum to users that value it the most prior to assigning it. In South Africa's case, for example, much of the high demand spectrum was assigned to operators at no or at a relatively low charge. It is important to ensure that such spectrum continues to be utilised efficiently. To this end, ICASA has promulgated regulations setting out prices for different kinds of spectrum that reflect their economic value (ICASA, 2010d). Fees are payable annually for different kinds of spectrum. The main formulae are the Point to Area and Point to Point formulae. The former are used for mobile and fixed wireless access networks (and backhaul to some extent), while the latter are used predominantly for backhaul but can also be used for fixed wireless access.

The point to area formula provides a good example of how radio frequency pricing works:

$$Fee = UNIT * FREQ * BW * CG * GEO * SHR * ASTER * UNIBI$$

Where:

UNIT is the prescribed unit price as set out in the regulations, per MHz of bandwidth. This varies according to the type of frequency. Low frequency spectrum is more valuable than high frequency spectrum as less infrastructure is required to deliver the same bandwidth.

BW is the amount of bandwidth expressed in MHz.

FREQ is an adjustment factor and ranges from 0 to 1. It is designed to provide a discount for less valuable, higher frequency spectrum.

GEO is the geographic factor which provides a discount for low density locations and allows for a premium to be charged for high density locations.

CG is the congestion factor which allows for a premium where there is a waiting list for the spectrum and allows for a discount where there is no waiting list.

SHR is the degree of sharing and allows for a discount where radio frequency spectrum is shared with another user.

ASTER means area sterilised in terms of square kilometres. This is designed to take into account the geographic area over which the spectrum is used and can lead to very high fees.

UNIBI is the unidirectional factor. Bi-directional spectrum is usually more valuable since it allows for uplinks and downlinks and therefore provides for data connectivity for most applications. This factor allows for a discount for unidirectional spectrum. In the Point to Area formula (as above), the unidirectional discount applies when an unpaired frequency is used.

The radio frequency spectrum fee regulations are an important example of economic regulation of the telecommunications sector in SA aimed at ensuring that the spectrum remains with the entities that value it the most.

2.4.2. Universal service and access

USAASA is mandated to promote the goal of universal service and access, defined as the universal provision of electronic communications services, electronic communications network services and broadcasting services and universal access to electronic communications services and broadcasting services.

Universal Service and Access raise important economic questions about what thresholds to use for the definition of an under-serviced area and what datasets to use to identify under-serviced areas. For example, Vodacom claims that its 3G network services (which amounts to broadband in the South African context) cover more than 80% of South Africa's population (Vodacom, 2013). In respect of thresholds, key concerns include the prices at which broadband is made available and what percentage of the population is able to access broadband at those prices.

ICASA develops the regulations governing the definition of Under-serviced areas (ECA, 2011c and ICASA, 2012a) and has targeted geographic areas that are very widely defined, including for example all five of the Metropolitan Municipalities.³ The definition includes:

³ These regulations were developed after USAASA prepared definitions for under-serviced areas in 2008. The latter definitions were gazetted by the Minister of Communications in 2010 because USAASA is not empowered to develop their own regulations. These definitions were then re-gazetted by ICASA in 2012.

- i. Areas where no electronic communications network (ECN) has been constructed; or
- ii. Where an ECN has been constructed but where coverage of the inhabited parts of the area falls below the national average; or
- iii. Areas where an ECN has been constructed but no or limited electronic communications services or broadcasting services are provided.

2.4.3. Common principles between spectrum assignment and universal access: Auction theory

Where large, irregular sales or purchases are involved and there are multiple buyers (in the case of a sale) or multiple sellers (in the case of a purchase), the socially optimal solution is to use an auction.⁴ This is applicable to both spectrum auctions (where the highest bidder wins) and to auctions for the supply of services to under-serviced areas (where the lowest bidder wins).

Auctions are usually the optimal policy choice largely because (Klemperer, 2000):

- Governments do not have the same information that private firms have on the value of the spectrum or the costs of rolling out services to under-serviced areas;
- Even if governments did have good information, any allocation could be perceived as guided by favouritism or corruption;
- Auctions of spectrum are a source of government revenues that do not create the disincentives to work that income taxes, for example, create; and
- It is very difficult to arrive at objective criteria for beauty contests which leaves them open to legal challenge and thus delays, whereas auctions are a quick and robust mechanism of allocating spectrum and building infrastructure in under-serviced areas.

There are several kinds of auction (Klemperer, 1999):

- Ascending bid auctions (also known as English auctions);
- Descending bid auctions (also known as Dutch auctions);
- First price, sealed bid auctions; and
- Second price, sealed bid auctions (also known as Vickrey auctions).

In an ascending (English) auction the auctioneer or bidders increases the price at each round until the winner pays the second highest bidder's valuation. In a descending (Dutch) auction the auctioneer decreases the price until the winner bids and the winning bidder pays their full valuation. The outcomes in ascending (English) auctions are equivalent to the outcomes in second price sealed bid auctions, since the winner under both settings pays the second highest bidder's valuation. Similarly the outcomes in first price, sealed bid auctions are

⁴ Note that, since South Africa did not assign spectrum using auctions initially, an alternative annual spectrum fee model is used to ensure that spectrum remains in the hands of firms that value it the most (discussed above in section 2.4.1 above).

equivalent to the outcomes in descending (Dutch) auctions since the winning bidder pays her valuation.

The Revenue Equivalence Theorem dictates that all auction designs yield the same revenues under private values settings (i.e. each bidder has an independent valuation for the good) as long as the setting includes bidders drawn from an increasing, atomless distribution, where the bidder with the highest valuation wins the auction and the bidder with the lowest feasible bid does not retain any surplus (Klemperer, 1999) (see Box 5 for details).

Box 5: Auction theory summary (Klemperer, 1999)

The key issue that arises in auction theory is asymmetric information. In private values settings, each bidder knows their own value of the good but this valuation is unique to that bidder and is unknown to all other bidders. In common values settings there is only valuation of the good in question but the correct value is unknown. Bidders signal their estimate of the valuation through their bids and bidders adjust their valuations accordingly.

The winners curse occurs in common values settings. The winner will pay the highest possible signal price, which will be higher than the average estimates of all the bidders. The winner will therefore likely overpay for the good.

The Revenue Equivalence theorem applies in private values settings and states that in auctions where bidders are drawn from an atomless and strictly increasing distribution and where the bidder with the highest value wins the bid and the lowest feasible bidder expects a zero surplus, this yields the same expected revenue to the auctioneer. This suggests that auctioneers should be indifferent between first price and second price auctions, where these assumptions apply.

The Revenue Equivalence Theorem does not apply in several settings, including where risk aversion is present. Where there is risk aversion, then bidders and sellers prefer auction designs where there is certainty to designs where there is none, and are therefore willing to pay more (or accept less) to avoid risk.

It is important to take into account situations where bidders' signals are correlated: if one bidder increases its bid, this has an impact on other bidders' offers. In private values settings, the bidder's surplus is due to the private nature of their valuation. If bid values are in fact made public, this reveals the surplus that each bidder achieves and such surplus is essentially bid away, such that the auctioneer obtains the entire surplus. The seller in this setting has every incentive to reveal as much information on the value of the good as possible. Where this setting applies, ascending price auctions yield higher prices than sealed bid or first price auctions.

It turns out that asymmetry in the size of buyers has an impact on the optimal auction design. For example, strong buyers prefer second price auctions since the buyer with the highest valuation always wins the second price auction.

If bidders have almost common values but one bidder has a small advantage and thus has a higher valuation, this leads to the higher valuation bidder bidding more aggressively. However, because this increases the chances of the "winner's curse" (paying a significantly higher price for the good than the average valuation), the less strong bidder bids significantly less aggressively. This encourages the stronger bidder to bid even more aggressively since their winner's curse is reduced. In an ascending auction, a small advantage can turn into a very large advantage. A bidder with a lower signal may win this auction, to the detriment of the auctioneer. At the same time, in a first price auction, small changes to symmetry have only a small impact and the bidder with the highest valuation wins.

Information advantages can also have an impact on auction outcomes, where bidders that have no private information in a common value setting do not earn any surplus.

In a private values setting, the optimal number of bidders enter if the reserve price is equal to the seller's cost. In a common values setting, the optimal number of bidders is 1 (to avoid the winner's curse). Bidders can prevent their rivals entering through jump bidding, where a bidder bids a very high price to deter rivals from incurring the costs of entering the contest. It is almost always the case that more bidders are better than fewer in a private values setting.

Collusion can impact significantly on auction outcomes, reducing the value obtained by the auctioneer. A second price auction creates a greater ability for collusion than an ascending price auction. In a second price auction, cartel members all agree that the winning bidder will bid a very high price and all others will bid a zero price. Cartel members do not have an incentive to deviate from this strategy since the costs of winning are significant. In a first price auction, however, the cartel members agree that the winning bidder will bid a low price and all other members will bid a zero price, creating a strong incentive to deviate since the costs of winning are small.

The revenue equivalence theorem does not apply where bidders or sellers are risk averse (discussed above), where firms have budget constraints, where there are externalities between bidders, jump bidding or a war of attrition setting. Where firms have budget constraints they are not able to bid their true valuations of the spectrum. Where there are externalities to the bidding outcomes, where bidders care about who wins the auctioned good, it may be better for a potential bidder to not enter an auction rather than encourage aggressive bidding from a competitor. Where the setting is common values, bidders prefer first price sealed bid auctions to ascending auctions, due to a lower winner's curse incurred. The highest value bidder, who would have won the auction anyway, will submit a "jump" bid in order to simulate the outcome of a first price sealed bid auction. Furthermore, if there are costs to submitting bids, the highest value bidder will find it profitable to submit a "jump" bid.

The key lessons to be drawn from auction theory and experience with auctions include ensuring that as many bidders as possible are attracted to the auction (where the value of the good is unknown, which is usually the case with spectrum for example) and ensuring that collusion is strictly prohibited. Exclusion of weaker bidders through jump bidding should be guarded against. Furthermore, as much information as possible on the value of the good being auctioned should be provided in order to attract the highest possible bids. Ascending price auctions are the best means of revealing the most of about the valuation of a good where its value is uncertain. In these circumstances, an ascending price auction yields the highest prices for the auctioneer.

Source: Klemperer, 1999

In practice, optimal auction design depends on a number of factors, including the likelihood of collusion and asymmetries among the bidders. For example, in the Italian 3G spectrum auction, there were five parcels of spectrum and six bidders, one of which was a weak bidder. There was also suspicion at the time that the bidders colluded to ensure a low bid price. The auction design selected was an ascending (English) auction, which yielded prices that were significantly lower than the 3G auctions for the same spectrum in Great Britain. (Klemperer, 1999). The optimal auction design in this instance would have been a sealed bid, first price auction which would have ensured that the strong bidders would have bid their valuations in case the weak bidder turned out to be lying about being weak (Klemperer, 1999). Another way to ensure that bidders are not able to benefit from collusion is to set a reserve price for the spectrum that will ensure that sub-optimally low prices are not realised.

The main feature of spectrum design is to maximise participation in the auctions as far as possible by ensuring that the costs of participation in the spectrum are minimised and that reserve prices for spectrum are not set above reasonable levels. One way to achieve this is to ring-fence spectrum for new entrants. These considerations apply equally to reverse

auctions for the construction of infrastructure and/or supply of services in under-served areas in which low cost bidders win.

Economic principles are therefore widely applicable to the assignment of spectrum and the construction of networks in under-served areas in addition to interconnection, facilities leasing, competition and price regulation. The legal mandates of ICASA and the competition authorities are discussed next.

2.5. Legal mandate and framework

2.5.1. Institutional framework and history

The telecommunications sector is highly regulated and consequently one of the challenges in the sector is to harmonise sector regulation and general competition regulation. Historically, Telkom, which was created out of the Department of Posts and Telecommunications in 1991, was both the regulator and operator of telecommunications in South Africa, including issuing Value Added Network Services licences. Telkom was partially privatised in 1997, after the Telecommunications Act of 1996 (TA) was promulgated. The TA creating the South African Telecommunications Regulatory Authority (SATRA). With the move towards convergence of various telecommunication technologies SATRA merged with the Independent Broadcasting Authority (IBA) when ICASA was established in terms of the ICASA Act in 2001. ICASA has wide ranging powers to regulate the telecommunications sector in the public interest, including some competition regulation provisions specifically directed at curbing Telkom's market power. Nevertheless ICASA's regulation, at least historically, was generally *ex ante* through licensing and monitoring compliance with licensing conditions.

Meanwhile in 1998 the Competition Act was promulgated and set up the Competition Commission as an investigative and prosecutorial body and the Competition Tribunal as an adjudicating body of the competition authorities. The competition authorities are concerned with *ex post* regulation through enforcement of compliance with abuse of dominance, restrictive horizontal and vertical agreements provisions. The competition authorities also regulate mergers, which are *ex ante* in nature. The Competition Act is a law of general application and section 3(1) only excluded from its jurisdiction acts subject to or authorised by public regulation. The Supreme Court of Appeal (SCA) in the Nedcor/Stanbic case interpreted this to mean that bank mergers were excluded from the competition authorities' jurisdiction by virtue of section 37 of the Banks Act (). In telecommunications this precedent would have meant that ICASA had exclusive jurisdiction over the sector. The Competition Act was amended to instead provide for concurrent jurisdiction in such instances. In addition, the Competition Commission is mandated to negotiate Memoranda of Understanding (MoUs) with sector regulators setting out how concurrent jurisdiction would be managed in a particular sector.

In 2002 the Commission entered into an MoU with ICASA regulating how they will relate to one another when they investigate cases in the telecommunications sector, including information sharing. While in some areas the delineation of jurisdiction between ICASA and the competition authorities is clear, such as in cartels, there are still a lot of uncertainties. After

protracted litigation between the Competition Commission and Telkom, in 2009 the SCA confirmed the jurisdiction of the Commission over telecommunication matters that may be the subject of ICASA jurisdiction (discussed in more detail below in section 2.5.4).

A new wave of confusion has now been caused by the legislature. The Electronic Communications Act which was promulgated to replace the Telecommunications Act in 2005 has further expanded ICASA's role over competition matters, and arguably, reduced the competition authority's jurisdiction. Section 67(9) provides that *subject to the provisions of this [ECA] Act, the Competition Act applies to competition matters in the telecommunications industry*. While some commentators have argued that it could not have been the intention of the legislature to have the Competition Act only applying to the extent that the ECA does not address a matter, a plain reading of this provision suggests that the Competition Act is subordinate to the ECA. In addition, the ECA gives ICASA powers to impose procompetitive conditions in certain defined markets where incumbents have market power. Concerns over these provisions led to the 2009 Competition Amendment Act giving the competition Commission primary authority over competition matters despite the ECA. However, the Competition Amendment Act has not yet come into effect for reasons not related to telecommunications specifically. Before these amendments come into effect, there is still a fair amount of confusion that is not cured by the MoU. Concurrent jurisdiction between ICASA and the competition authorities is discussed in more detail in section 2.5.4 below.

Table 2: Comparison of legal features of ICASA and the Competition Commission

Variable	ICASA	Competition Commission
Mandate	Ex ante	Ex post
Independence	Constitutional	Statutory
Appointing Authority	Minister and Parliament	Minister
Term of Office	Five years	Not prescribed
Decision Structures	Nine councillors	Two/three commissioners
Appeal Body	Complaints and Compliance Committee / High Court system	Competition Tribunal / Competition Appeal Court

2.5.2. Information gathering powers

ICASA may request information but does not have clear rights to compel the provision of information. ICASA may request information in terms of section 4(3)(g) of the ICASA Act, which says that ICASA:

“...may, by notice in writing, direct the holders of a licence in terms of the underlying statutes to produce or furnish to the Authority, at a time and place specified in the notice, any documents and information specified in such notice and relating to any matter in respect of which a duty or obligation is imposed on such licensee by this Act or the underlying statutes”.

ICASA may also request information in terms of the Standard Terms and Conditions of Licensees (ICASA, 2007b and ICASA, 2007c) which affect class and individual licensees. These regulations say that:

“The Authority may, in the course of carrying out its obligations under the Act, require a Licensee to provide information, so as to enable it to:

- (a) Monitor and enforce consumer protection, quality of service, competition and other requirements of the Act and related legislation;*
- (b) Allow for the assessment and allocation of applicable fees and related requirements;*
- (c) Facilitate the efficient use of scarce resources; and*
- (d) Collect and compile aggregate information to be used for the purposes of sectoral planning and reporting.”*

These information gathering powers are relatively weak compared to those of the Competition Authorities. The Competition Commissioner may in terms of section 49A of the Competition Act:

“...summon any person who is believed to be able to furnish any information on the subject of the investigation, or to have possession or control of any book, document or other object that has a bearing on that subject...”

Furthermore, it is an offence to knowingly provide false information to the Commission, in terms of section 73(2)(d). These information gathering powers are used regularly in practice and are an effective means for gathering information.

The differences between the rules empowering ICASA and the competition authorities to collect information are stark. The competition authorities have significantly greater information gathering powers. This means that the competition authorities are in some respects in a better position to regulate the conduct of firms in the sector than ICASA is, at least in respect of *ex post* regulation.

2.5.3. Experience with implementation of the powers and mandate of the regulatory institutions

The ECA, at least as far as competition matters are concerned, should be easy to implement in that the ECA empowers ICASA to go through a market review process and impose remedies, without proving that firms have acted anti-competitively as the competition authorities are required to do (Interview with ICASA staff member).

In practice, more legal training for ICASA staff is required to give effect to the Act, and on the job training in economics is required. In spite of the ease with which the ECA allows ICASA to intervene in markets, ICASA has rarely done so. This appears to be because ICASA's internal processes are too bureaucratic, which has led to very slow decision making (Interview with ICASA staff member). The process for any communication to leave ICASA is as follows:

- a. Staff member writes the letter and sends to their senior manager;
- b. The senior manager then sends the letter to their general manager for approval;
- c. the general manager then sends the letter to 2 council members on a committee;
- d. The letter then goes to a council meeting; and
- e. Finally, the letter goes to the chairperson, who sends out the letter.

Telecommunications regulators (such as ICASA) are also constrained by the nature of the holding power of powerfully politically networked incumbent operators (Khan, 2010) in the sector which limits ICASA's ability to transition the electronic communications sector to be an enabler of growth. The Competition Commission has been similarly constrained, particularly in respect of transitioning towards an open access fixed line network, in that Telkom's holding power delayed the final settlement by 8 years (discussed in more detail in section 7 below).

2.5.4. Concurrent jurisdiction between the competition authorities and ICASA

The relationship between the Competition Commission and ICASA and the basis for managing potential jurisdictional overlap and forum shopping is laid out in a Memorandum of Agreement entered into between them effective 16 February 2002 (ICASA & CC, 2002).

Acquisition and merger transactions requiring the approval of both bodies must be subject to independent applications and approvals processes although the two regulators may consult with one another. In the event that divergent determinations are reached the bodies should try and reach resolution through the imposition of appropriate conditions before making their determinations public. If either body does not approve a transaction then it will not be an approved transaction. Further provision is made for co-operation in applications which require the approval of only one of the two regulators.

In respect of complaints the Memorandum makes it clear that the Commission will deal with:

- *Restrictive horizontal practices prohibited in terms of section 4 of the Competition Act;*
- *Restrictive vertical practices prohibited in terms of section 5 of the Competition Act; and*
- *Abuse of a dominant position prohibited in terms of section 8 and 9 of the Competition Act, subject to the limitations in section 6 and section 7 of the Competition Act.*

(CC & ICASA, 2002)

The Authority deals with complaints relating to contraventions of telecommunications and broadcasting licence conditions; and contravention of telecommunications and broadcasting legislation.

Where a complaint is lodged about a practice in respect of which the Commission and the Authority have concurrent jurisdiction, the following process shall be followed:

- *The regulator that receives the complaint ("the recipient regulator") shall ensure that the said complaint is made available to the other regulator;*
- *The recipient regulator shall inform the complainant(s) that the matter will be discussed jointly by the Commission and the Authority in terms of the Memorandum of Agreement;*
- *The Commission and the Authority shall consult with each other and evaluate the complaint in order to establish how the matter should be managed in terms of this Agreement;*
- *The recipient regulator shall advise the complainant(s) of the decision of the consultation between the Commission and the Authority within 60 days of receipt of the complaint;*
- *The recipient regulator shall give the complainant(s) further directions regarding the prosecution of the complaint in question; and*
- *The party which does not hear the matter shall be entitled to participate in an advisory capacity.*

(CC & ICASA, 2002)

Provision is made for co-operation in the determination of complaints in respect of which only one of the two regulators has jurisdiction. The Memorandum further provides for the establishment of a Joint Working Committee charged with managing and facilitating cooperation and consultation in respect of matters dealt with by each regulator.

The application of the Memorandum of Agreement was considered by the Supreme Court of Appeal in the matter of Competition Commission v Telkom (*Telkom SA Limited v The Competition Commission of South Africa and The Competition Tribunal of South Africa, (623/2008) [2009], ZASCA 155*), in relation to complaints laid against Telkom under the Competition Act. Telkom made application to review and set aside the referral and the decision to refer on the basis, inter alia, that the conduct complained about fell within the exclusive jurisdiction of ICASA. This was because such conduct was authorised by the then applicable Telecommunications Act of 1996. The complaints related to interaction between different licensees and complaints of this nature, Telkom argued, were intended by the legislature to be resolved by ICASA under the Telecommunications Act. It followed, according to Telkom, that the Competition Act had no application to complaints of this nature. The High Court set aside the Commission's referral, and held that the Commission did not consult with ICASA as required in terms of the MOU (*Telkom SA Limited v The Competition Commission of South Africa and The Competition Tribunal of South Africa. [2008]. Pretoria High Court case no.11239/04*).

Telkom and the Competition Commission appealed the decision. In upholding the Commission's appeal and dismissing Telkom's cross-appeal, the SCA noted that "there is no room for the implication of exclusive jurisdiction vested in ICASA contended for" and found that the Tribunal was the correct forum for the hearing of the matter. The SCA held that:

The Competition Act applies to all economic activity within or having an effect within South Africa. It provides for wide powers and general remedies more effective than the

limited ones given by the Telecommunications Act. There is no room for the implication of exclusive jurisdiction vested in ICASA contended for. The authorising legislative and other provisions Telkom relied upon did not oust the jurisdiction of the Commission and the Tribunal but could well give rise to defences to the complaints referred. The competition authorities not only have the required jurisdiction but are also the appropriate authorities to deal with the complaint referred.

2.5.5. Proposed changes to the institutional framework

There is currently a process underway to reform policy holistically in the ICT sector. The ECA, promulgated in 2005, drew from EU law which has had several ramifications (interviews with DOC staff members). Firstly, broadcasting and telecommunications are treated very differently under EU law, a factor that was not sufficiently taken into account when drafting the ECA. EU law was developed in a context where competition was developing strongly while this has not taken place in South Africa. The ECA is seen as relatively open access as a result of the Altech judgement and in the context of the entry of numerous community broadcasters (Interviews with DOC staff members). Nonetheless, the provision of electronic communication network services may only be provided after an Invitation to Apply has been issued by the Minister of Communications. Legal barriers to entry therefore continue to apply and the ECA should be amended to facilitate new entry.

There is also a debate about whether an appellate body should be created for ICASA. A Presidential co-ordination commission was considering a super economic regulator some years ago. Furthermore, the MOU between ICASA and the Competition Commission should be re-assessed, not least because the ECA was passed into law after the MOU was published (Interviews with DOC staff members).

2.6. Summary

The ECA and the Competition Act provide an economic regulation mandate to the competition authorities and ICASA in a number of areas, including interconnection, facilities leasing, spectrum management, universal service and access, competition and price regulation. The interconnection regulations are in place to ensure that incumbents are not able to benefit from network effects and the consequent exclusion of rivals. The facilities leasing regulations are designed to ensure that new entrants are able to gain access to facilities in order to climb the “ladder of investment”. Furthermore, the regulators have a wide mandate to regulate prices to protect consumers on the one hand and to ensure that firms climb the “ladder of investment” on the other hand, with the ultimate goal of removing price regulation where there is sufficient competition.

Spectrum should be assigned to users that value it the most.⁵ This could be achieved by auctioning it to the highest bidder or by ensuring that incumbent holders of spectrum pay for it according to its value, and by allowing for the trading of spectrum after it has been assigned.

⁵ This is not, however, currently required under the ECA.

Similarly, the optimal means of ensuring that universal service and access is achieved is by means of reverse auctions (or least-subsidy auctions), whereby the firms with the lowest costs are awarded with the contract to build networks in an under-serviced area.

ICASA and the competition authorities have overlapping powers and mandates. This has led to several revisions of the laws governing them and to extensive litigation. The SCA ultimately arrived at the conclusion that the competition authorities do have jurisdiction to hear competition matters that arise in the telecommunications sector. While the ECA allows ICASA to intervene with significantly less evidence and analysis, ICASA has rarely done so. This may require a revision of institutional design, processes and procedures rather than extensive revisions to the legislation governing the sector.

3. Links between economic regulation of the telecommunications sector and economic growth

3.1. Introduction

The key question addressed in this section is how economic growth is linked to the regulation of the electronic communications sector. This will be addressed by assessing the linkages between the electronic communications sector (and broadband, specifically) and economic growth, linkages between broadband and the growth of small business and the employment potential of business process outsourcing and offshoring. The role of economic regulation, including in respect of broadband services will be assessed for each of these areas.

3.2. Linkages between the electronic communications sector and economic growth

3.2.1. International evidence⁶

Katz (2012) provides a useful review of the literature on the impact of broadband on economic growth. Broadband is widely considered to make an important contribution to economic growth, even though there are challenges in the estimation of this empirically (Katz, 2012).

There are several important outcomes of existing research on this question (Katz, 2012):

1. Broadband has a greater impact where it is more widely adopted (where it has “critical mass”);
2. Broadband has a high impact on sectors that have high transaction costs or high labour intensity;
3. Broadband leads to the substitution of workers for capital and loss of jobs in developing countries;
4. Small and medium enterprises take time to benefit from broadband due to the need to change business processes; and

⁶ This section largely summarises the work of Katz (2012), and references to works by third parties in this section are as quoted in Katz (2012).

5. Benefits from broadband are maximised when they are tied to the development of innovative businesses that use broadband.

Katz (2012) summarises the impact of broadband in five areas:

1. Contribution to economic growth;
2. Impact on productivity;
3. Impact on job creation;
4. Creation of consumer surplus; and
5. Impact on firm efficiency.

Broadband has two main areas of impact on economic growth: improved efficiencies of firms (better processes, better access to inputs and customers) and new consumer applications and services (Katz, 2012). Estimates of broadband's contribution to economic growth range from a zero contribution in a study on 48 US states over the period 2003-2005 (Crandall *et al*, 2007, quoted in Katz, 2012) to a 10% increase in broadband penetration leading to 1.38% increase in economic growth in developing countries (Qiang *et al*, 2009). While these studies tend to provide only an indication of broadband's likely effects and should not be read as proven facts, they provide some support for a positive impact on economic growth arising from greater broadband penetration.

There are some results that suggests that there are "critical mass" effects in respect of broadband diffusion, where it is only once broadband penetration is high that it has a significant impact on growth (Koutroumpis, 2009). There are other results that suggest that as broadband penetration exceeds a certain point, the benefits from additional penetration decline (Atkinson, 2009). It is important to note that there can be significant delays in the benefits from broadband adoption, depending on how rapidly businesses adopt new processes enabled by broadband (Katz, 2012). This is known as the accumulation of "intangible capital" within businesses, as they improve their processes over time using Information and Communication Technologies (ICT) (Basu & Fernald, 2006).

In respect of productivity, the higher the percentage of a workforce dedicated to information generation and processing, the greater the investment into ICT infrastructure (Katz, 2012). Waverman *et al* (2009), for example, found that a 1% increase in broadband penetration resulted in a 0.13% increase in productivity in developed countries over the period 1980 – 2007. Waverman *et al* (2009) find very little impact on productivity in countries with an insufficiently developed ICT sector, however. Micro-economic studies on productivity confirm the positive effect that broadband has, with estimates of improvements ranging from 5% (Atrostic and Nguyen, 2006) in the manufacturing sector to 20% (Fornfeld *et al*, 2008) in the services sector.

The construction of broadband networks has a positive effect on direct job creation through the construction of physical networks, on indirect job creation at input material providers, and on induced labour demand through consumption and income generated by direct and indirect jobs (Katz, 2012). The number of jobs that could be created is significant. For example a static

input-output analysis showed that a \$63.6bn investment in broadband in the US was predicted to create 140,000 jobs per year over 10 years (Crandall *et al*, 2003, as quoted in Katz, 2012).

Furthermore, broadband has positive externalities in that it contributes to innovation, which has a further impact on jobs, including (Atkinson, 2009, as quoted in Katz, 2012):

1. Innovative applications and services (such as cloud computing);
2. New ways of doing business, including financial intermediation; and
3. The “long tail” of product availability: products are available to suit consumers’ specific tastes (such as Amazon’s making available many more book titles than are available in book shops).

These effects include the creation of new services and more efficient markets (Katz, 2012). The employment effects of greater broadband penetration range between a 0.3% increase in employment (Crandall *et al* 2007, as quoted in Katz, 2012) and a 5.32% (Shideler *et al*, 2007, as quoted in Katz 2012) increase in employment for every 1% greater broadband penetration, though this can vary significantly by industry (Shideler *et al*, 2007, as quoted in Katz 2012).

Increased broadband penetration also has an impact on increased consumer surplus, which is not captured in GDP accounting data (Katz, 2012). Consumer surplus is the difference between a consumer’s willingness to pay and the price she has to pay for a service. The introduction of new services made possible by broadband allow for increases in consumer surplus. Consumer surplus derived from broadband has been estimated at \$7bn in Brazil and \$2.3bn in Mexico (Greenstein & McDevitt, 2010, as quoted in Katz, 2012), for example.

Again, while it is important to note that studies on the impact of broadband on economies provide only indicative results that should not be read as facts, they indicate that broadband has a positive impact on economic growth, productivity and consumer surplus. Further research in this area is needed, particularly for developing countries, in order to better understand linkages between broadband and economic growth.

3.2.2. Evidence for South Africa

There are very few existing studies on the impact of broadband penetration on economic growth in South Africa. There is some survey evidence on this (discussed below under the linkages between broadband and the growth of small business) and there has been research on the potential for business process outsourcing (discussed below), and the potential for greater wireless broadband in South Africa.

Statistics South Africa (2013a) has prepared a draft set of national accounting data for the information and communications technology sector as a whole. The study showed that the ICT sector accounted for 4.3% of Gross Domestic Product (GDP) in 2005 (the year for which data was available). Research ICT Africa (2013) estimates that currently the ICT sector accounts for approximately 6% of GDP, since the sector has grown more quickly than the rest of the economy since 2005. The telecommunications sector accounted for 3.4% of GDP and the bulk of value added by the ICT sector in 2005 (Statistics South Africa, 2013a).

The contribution of ICT to the economy in South Africa compares favourably to the contribution of ICT to GDP in Canada, where ICT contributed 4.9% of GDP in 2011 (Industry Canada, 2012) and Australia, where ICT contributed 4.6% to GDP in 2002-2003 (Australia Bureau of Statistics, 2006).

The analysis of broadband's contribution, specifically, to SA's economy are limited to quantifications of value added by various broadband providers, plus a multiplier based on experience in other countries. World Wide Worx (2012) estimates that all products consumed via the internet, as well as spend on internet access services and infrastructure in South Africa, amounted to R59bn in 2011 or 2% of Gross Domestic Product (GDP). This share will grow by 0.1% per annum to 2.5% in 2016 (World Wide Worx, 2012). Online retail, for example, has been growing at approximately 30% per year between 2006 and 2011 (World Wide Worx, 2012). Note that the internet economy size estimate of R59bn excluded B2B e-commerce which traditionally travels over private Internet Protocol networks, estimated at a further R30bn (World Wide Worx, 2012).

World Wide Worx's (2012) estimates of contributions to GDP are as follows:

1. R15.5bn in investment;
2. R9bn in travel bookings;
3. R2.6bn in online retail;
4. R29.2bn internet access and presence;
5. R1.5bn in online advertising; and
6. R1.28bn in government spend on broadband infrastructure.

While online retail and travel booking revenues are not value added exclusively by firms in the ICT sector, they are indicative of the growing contribution of ICT enabled activity in the economy.

Analysys Mason (2010) projects that wireless broadband alone will account for R72.4bn by 2015: R28.5bn in direct contribution, R12.6bn from the ecosystem developed around wireless broadband, and a further R31.3bn from "second order" effects (productivity and efficiency gains).⁷ Analysys Mason (2010) estimates that wireless broadband will account 1.8% of GDP in 2015.

A considerable ecosystem has developed around broadband networks in South Africa, including in relation to retail, financial services, media, education and health (see Box 6 below). The contribution of broadband to growth and development is therefore considerable.

⁷ Note that this work was commissioned by the GSM Association (GSMA), an industry body that promotes the interests of GSM mobile network operators worldwide.

Box 6: Innovations developed around broadband and mobile services in South Africa (Analysys Mason, 2010; World Wide Worx, 2012)

Analysys Mason (2010) also examines mobile broadband services and innovations introduced in South Africa. Several companies have been started up in South Africa to provide services over mobile phones, including:

- MXit (instant messaging, music, health, money, entertainment), a narrowband application;
- Fundamo (m-banking, now owned by Visa inc.);
- Oxigen-3 (m-Entertainment), Spin3 (m-gaming);
- Cellbook (e-books);
- Manobi (market information for rural farmers); and
- Sybase (m-commerce).

In respect of media, services such as Nokia's Ovi Music Store, Vodacom MusicStation, Zoopy TV and Apple iTunes have all been launched in South Africa. Online retail sites in South Africa include Kalahari.com, Pricecheck.co.za (owned by Naspers), bidorbuy.co.za, junkmail.co.za, netflorist.co.za, salewine.co.za, getwine.co.za, and cybercellar.co.za. There are also various online discount sites such as Groupon, Wowdeals and DaddysDeals. Grocery retailers Pick 'n Pay and Woolworths have significant online shopping portals too.

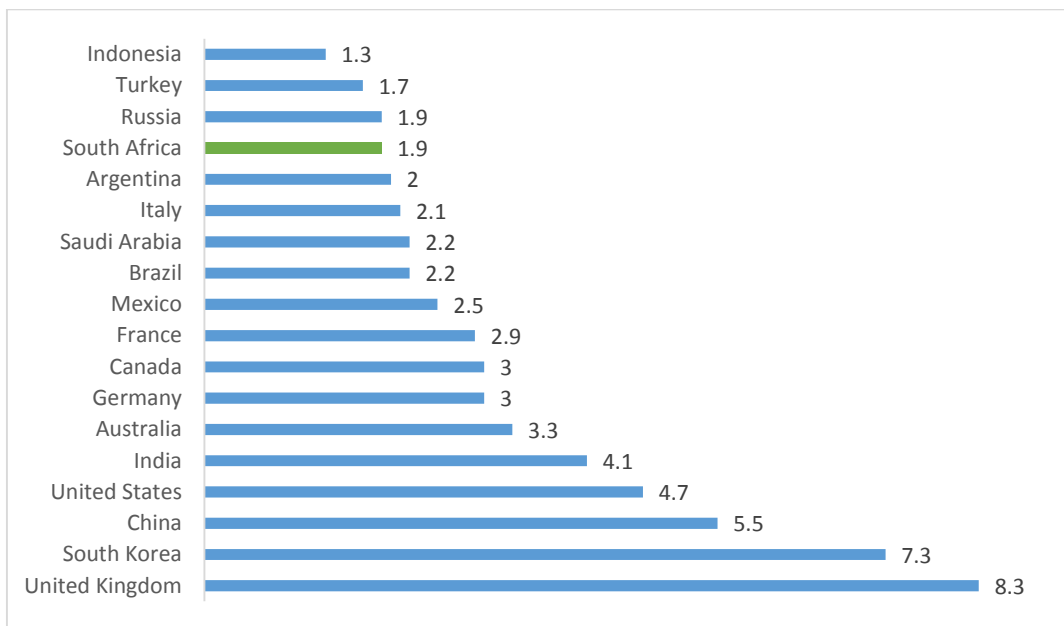
There are also a range of projects that provide or use broadband in rural areas offered in collaboration with the Council for Scientific and Industrial Research ("CSIR") including Broadband4All (BB4All) and Collaboration@Rural (e-procurement for rural traders, with collaboration from SAP).

Mobile networks have also allowed for the development of a rich system of mobile payments, including FNB's e-wallet and geographic-based payment system and ABSA's Mobile Pay Express. ABSA is also trialling Near Field Communication (a new technology deployed on the Google Android platform) as a payment method on cellphones. Education projects include the e-Schools Network, Khanya Project, and the Bridges to the Future Initiative. Health initiatives include the Department of TeleHealth at the University of KwaZulu-Natal.

Source: Analysys Mason, 2010; World Wide Worx, 2012

According to the Boston Consulting Group (BCG, 2012), South Africa ranks among the countries with the lowest internet expenditure as a percentage of GDP in the world. Note that BCG's estimate is in line with World Wide Worx's estimate for the contribution of the internet to South Africa's GDP, at approximately 2%. South Africa lags behind a number of developing countries, including China (5.5%), India (4.1%), Mexico (2.5%) and Brazil (2.2%).

Figure 3: Ranking of countries by contribution of the internet to GDP



Source: Adapted from Boston Consulting Group, 2012

BCG (2012) further points out that average consumer surplus from the consumption of the Internet is approximately R10,000 per person in South Africa, 15% of GDP per capita.⁸ While this number looks exceedingly high, consumer surplus is not accounted for in GDP accounting and therefore this is in addition to the GDP generated by the internet.

The ICT sector accounts for between 4% and 6% of SA's GDP (Statistics South Africa, 2013a, & RIA, 2013). Internet related businesses form one part of the ICT sector and account for less than 2% of GDP (WWW, 2012). The ICT sector and internet related businesses account for a relatively small percentage of GDP in South Africa compared to that in other countries: for example, internet businesses account for 5.5% of GDP in China and 7.3% of GDP in South Korea (BCG, 2012).

South Africa is therefore lagging behind other countries in respect of ICT sector development, and this imposes significant costs on our economy. This is at least in part due to poor regulation of the sector, discussed in section 5 below, as well as ICASA's failure to implement Local Loop Unbundling (see section 7 below).

The role of broadband in the development of small businesses is discussed next.

⁸ Consumer surplus is the difference between a consumer's willingness to pay and the price they pay for a good or service. BCG calculates this as \$1,215 per person which amounts to R9,960 per person at an average exchange rate in 2012 of 8.20 ZAR / USD. SA GDP per capita in 2012 was \$7,460 (World Bank, 2014).

3.3. Linkages between broadband and the growth of small businesses

3.3.1. International experience

Small and Medium sized Enterprises (SMEs) are widely considered to account for a significant proportion of a country's GDP and employment (see, for example, National Planning Commission, 2010). The development of SMEs therefore plays an important role in economic growth and job creation. The ICT sector, and broadband in particular, can be used to help develop SMEs and therefore support economic growth and job creation.

For example, in a BCG survey of 15,000 SMEs in 11 G-20 economies (BCG, 2012), high web use SMEs showed revenue growth that was 22% higher than low or no web use SMEs. Job creation is also significantly higher among high-web SMEs: 93% and 82% of high and medium web use companies, respectively, increased jobs over the last three years in Germany while only 50% of the no web firms increased jobs (BCG, 2012). Similarly, 94% of SMEs in South Korea that had high web use increased jobs while only 60% of SMEs that did not use the Web increased jobs (BCG, 2012). It might be the case that more dynamic and successful SMEs use the web and that the web played no role in the success of these SMEs. Nonetheless, the correlation between successful SMEs and web use is striking.

BCG (2012) highlights the following benefits of the Internet for SMEs:

- Geographic expansion beyond the country in which they are located;
- Improved marketing, including better data on customer tastes;
- Better customer interaction, in that SMEs can interact with customers in real time;
- Use of the cloud, which reduces upfront capital requirements for the use of sophisticated information technologies including finance and accounting, customer relationship management, inventory management; and
- Staff recruitment for SMEs is made cheaper and very large talent pools are made available to SMEs via the internet.

Katz (2012) suggests that there is limited uptake of broadband by small businesses in developing countries which limits productivity and global competitiveness. Constraints for the adoption of broadband by SMEs include limited training, lack of capital to invest in broadband, and the high cost of using technology (Katz, 2012).

In Chile, for example, a survey of SMEs showed that only 2.6% of companies used ICT for improvements in processes other than accounting and finance (Katz, 2012). 80% of companies reported that they did not understand how ICT could be used to improve their business outside of accounting and finance (Katz, 2012). This is partly due to a generation of people running SMEs that had no exposure to the internet while growing up, and so they resist ICT adoption (Katz, 2012). SMEs also struggle to employ people with ICT skills, and SMEs in rural areas often do not have access to broadband at all (Katz, 2012).

SMEs play a particularly important role in Asian economies: in Korea, for example, 87% of jobs are provided by SMEs; in India, 86% of formal jobs are provide by SMEs (Katz, 2012).

According to Katz (2012), government has an important role to play in creating awareness of ICT, training, and providing consulting and tax incentives for the adoption of ICT among SMEs (discussed below).

3.3.2. Experience in South Africa

SMEs in South Africa account for between 51% and 57% of Gross Domestic Product (“GDP”) and approximately 60% of employment (Kongolo, 2010, as quoted in World Wide Worx, 2012). A significant proportion of formal small and medium sized enterprises make use of ICT in South Africa. World Wide Worx (2012) estimates that approximately 63% of formal SMEs have a website (approximately 410,000 firms).⁹ SMEs that have a website also report higher levels of profitability: 79% of SMEs that have a website report that they are profitable while only 59% of SMEs that do not have a website report that they are profitable (World Wide Worx, 2012). 30% of SMEs that have websites say that they would not be able to operate their business without one (World Wide Worx, 2012). It might be the case that highly profitable businesses are more likely to be able to afford a website: having a website therefore might not be driving profitability. Rather, profitability is driving the uptake of websites. Nonetheless, the high correlation between website use and profitability is at least consistent with the hypothesis that high website use drives profitability.

Box 7: SMEs that have websites and those that do not (World Wide Worx, 2012)

Website adoption is highest among telecommunications and IT SMEs (89%). Interestingly, only 41 per cent of businesses offering professional services and 36% of SMEs in the education sector have websites. These SMEs typically are not characterised by low profitability (78% of professional services SMEs report that they are profitable, for example).

According to the World Wide Worx survey, websites are a key tool for:

- Keeping in touch with customers: 39%;
- Customers contacting the business: 41%;
- Keeping customers informed of inventory: 39%;
- General sustainability of the business: 40%;
- Contributing to business growth: 42%;
- Competing for market share: 40%

Source: World Wide Worx, 2012

Esselaar *et al* (2007) note that SMEs surveyed in 13 countries in Africa, including South Africa, prioritise the voice capabilities of electronic communications networks: 99% of SMEs that had a fixed line phone say that it is important or very important, and 58% of SMEs that did not have one say that it is important or very important; 99% of SMEs that have a mobile phone say that it is important or very important, and 69% of those that do not have a mobile phone say that it is important or very important. This compares to 95% of those that have an internet connection

⁹ World Wide Worx surveyed 2,500 SMEs, defined as firms employing less than 200 people.

responding that it is important or very important, and 39% of SMEs that do not have an internet connection saying that it is important or very important (Esselaar *et al*, 2007). Cyber café's fill an important gap for those SMEs that do not have access to the internet: 20% of the latter use Cyber café's instead (Esselaar *et al*, 2007).

Esselaar *et al* (2007) find using reduced form regression analysis that ICT intensity has a positive and statistically significant impact on SME profitability for the 13 African countries surveyed. ICT usage also had a positive and statistically significant impact on labour productivity (Esselaar *et al*, 2007). This is in contrast to findings by Chowdhury and Wolf (2003, as quoted in Esselaar *et al*, 2007) who found that ICT usage had no impact on productivity and profitability. The Chowdhury and Wolf (2003) study, however, failed to distinguish between informal and formal sector SMEs (Esselaar *et al*, 2007): Informal SMEs do not pay taxes and do not comply with regulations, and therefore are able to make higher profits than the formal sector (Esselaar *et al*, 2007). The largest inhibitors to ICT adoption are cost, unreliable infrastructure, lack of awareness of ICT and access to finance (Esselaar *et al*, 2007).

Website use and internet access play an important role in the success of SMEs (see World Wide Worx, 2012 and Esselaar *et al*, 2007, respectively). While these studies have theoretical limitations¹⁰ and use data that is not directly observed (they use survey data rather than firm level data) they do provide useful insights into the value that ICT can provide to SMEs. Where directly observable data is not available (as is most often the case in African countries), the use of survey evidence provides a useful means of assessing outcomes of the usage of ICT among SMEs.

3.4. The link between the employment potential of business process outsourcing and economic regulation

3.4.1. Employment potential

The business process outsourcing (BPO) sector in South Africa is highly ICT intensive and has the potential to create a significant number of jobs (see, for example, Department of Trade and Industry (DTI), 2013). Improving outcomes in the ICT sector through better regulation therefore has the potential to improve the competitiveness of SA BPO firms and thus generate jobs.

Currently, the BPO sector (including call centres) supplying offshoring services to overseas companies employs 14,000 people in South Africa, and is targeted to employ 40,000 people by 2015 (DTI, 2013). Some of the key advantages that South Africa has includes cultural affinity with the US, UK and Australia: 65% of offshoring operations service the UK, for example (DTI, 2013). High levels of customer service are also an important differentiator (Wilcocks *et al*, 2012a). Furthermore, South Africa's time zone is favourable for providing services to the UK and Europe and also for support outside of office hours in Australia, New

¹⁰ These studies use non-standard regression analyses using reduced-form regression equations, which suffer from omitted variable bias.

Zealand and the USA (Wilcocks *et al*, 2012b). South Africa has several other advantages including accent neutrality and a well-developed financial services system (Wilcocks *et al*, 2012b).

8,300 of the offshoring jobs (more than half of the total for the country) were created in Cape Town (Business Process Enablement South Africa – Western Cape, “BPESA-WC”, 2013). The retail sector accounts for 69% of the offshoring operations in the Western Cape, while the financial services sector accounts for 68% of domestic outsourced call centre / outsourcing operations (BPESA-WC, 2013).

Outsourcing services supplied to offshore financial services sector companies are atypically low as a proportion of total services supplied to offshore customers in South Africa. Globally, the financial services sector accounts for 45% of offshoring activities (Business Trust, 2009). There is therefore considerable scope to grow financial services offshoring jobs in South Africa.

3.4.2. Telecommunications cost factors that impact on competitiveness

The DTI (2013) has identified high telecommunications costs as one of the factors that are constraining development of the sector. Wilcocks *et al* (2012a) highlight the importance of the Philippines driving down the costs of broadband by 40% before rival offshoring destination countries as a key competitive advantage. While cost is not the only factor taken into account by companies deciding to off-shore services, it is usually cited as one of the top 3 factors taken into account (Wilcocks *et al*, 2012a). Businesses offshoring services to South Africa usually achieve an average cost saving of approximately 54% (Wilcocks *et al*, 2012a)). High telecommunications costs were also reported in studies by Nelson Hall (2011) and Frost & Sullivan (2012), as quoted in Wilcocks *et al*, 2012a.

For example, Amazon’s call centre in Cape Town (set up through Full Circle, now Capita) requires 100Mbps of internet bandwidth in order to provide technical support for a range of Amazon’s products services including the Amazon Kindle, Amazon Instant Video, the MP3 store, Cloud Drive and Cloud Player (Wilcocks *et al*, 2012b). South Africa’s prices for 100Mbps of broadband internet bandwidth are R37,575 per month from Neotel, for example (Neotel, 2013) whereas 1,024Mbps (1Gbps) of broadband internet bandwidth in the US from Google, for example, costs R700 per month) (Google, 2013).¹¹ South Africa’s poor broadband quality and high prices are discussed in more detail in section 4.3.

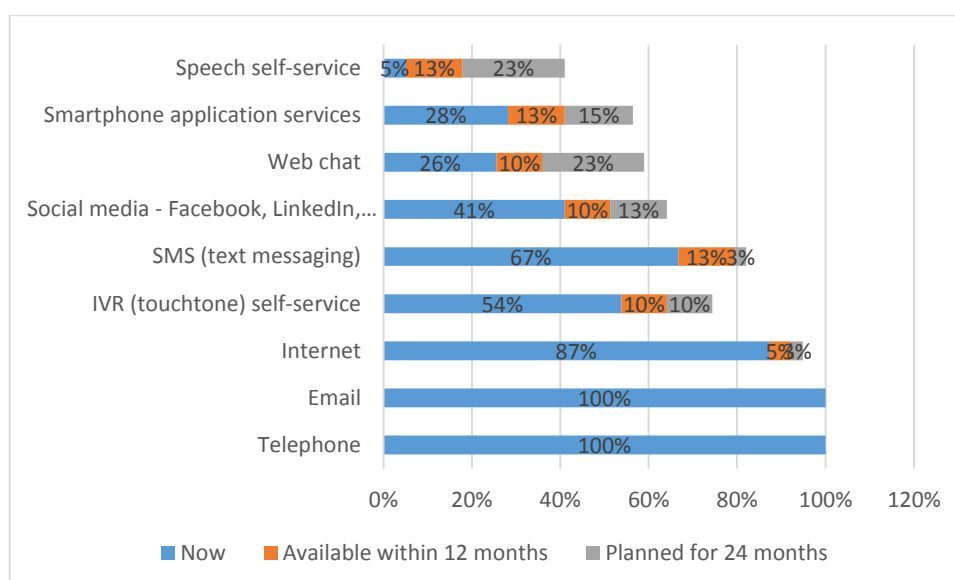
There are ad hoc solutions to high broadband costs for the South African BPO sector, such as the Western Cape’s offer to make free telecommunications services available for a six month period after start-up (Interviews with Department of Trade and Industry employees).

¹¹ While this comparison is not strictly fair since Google Fiber is not widely available across the US and Neotel’s NeoBroadband Fibre service is not a highly contended traditional broadband service and therefore offers significantly greater quality than traditional broadband, it illustrates the point. There are other examples of fibre broadband services that have even higher prices, such as a 100Mbps fibre broadband service from Network Platforms, priced at: R60,990 per month (including VAT) for 500GB and R91,485 for uncapped (New 5Mbps, 2013).

However, this is not a sustainable solution to ensuring that South Africa's costs are globally competitive on an-going basis.

Data related cost factors will become more important as South Africa targets higher value added BPO services, such as software testing, legal process outsourcing and knowledge process outsourcing (Wilcocks *et al*, 2012a and Interview with Department of Trade and Industry employees). Increasingly, customer service will also involve social media, web chat and smartphone applications (see BPESA, 2012 and Figure 4) which means that call centres will have to become even more data intensive. This means that telecommunications costs will become an even more important factor when companies choose a destination country to outsource to.

Figure 4: Communication channels for customers engaging with suppliers (BPESA, 2012)



Source: Adapted from BPESA, 2012

3.5. Linkages between regulation and policymaking in the electronic communications sector and economic growth

3.5.1. International best practice

There are a number of policy and regulatory issues that arise in the rollout of broadband services. The first of these, identified by Katz (2012), is national broadband planning. National broadband plans need to include plans for spectrum allocation for wireless broadband services, plans to stimulate uptake (including training and e-government services), choosing and pursuing a competition policy framework for broadband (facilities based competition where there are multiple fixed line networks or local loop unbundling allowing for services based competition where there is only one fixed line network), and finally alleviating any supply constraints, which include ensuring that rights of way are granted quickly and setting up rules

for infrastructure sharing (including ducts, poles and masts) (Katz, 2012). Broadband plans should also include coverage and speed targets (see Table 3 below).

Table 3: National broadband plans (Katz, 2012)

Country	Coverage target (as % of households)	Speed targets
United States	100% (2012)	4Mbps (100%, 2012) 50Mbps
Germany	100% (2014)	1Mbps (100%, 2014) 50Mbps (75%, 2014)
Singapore	100% (2012)	100Mbps (95%, 2012)
Australia	100% (2012)	12Mbps (100%, 2012)
United Kingdom	100% (2012)	2Mbps (100%, 2012)
Malaysia	75% (2010)	33% (50-100Mbps) 42% (1.5Mbps)
Brazil	50% of urban households 25% of rural households	75% (512Kbps – 784Kbps)
European Union	100% (2013)	30Mbps (100%, 2020) 100Mbps (50%, 2020)

Source: Katz (2012): Coverage and speed targets of selected national broadband plans

It is important to distinguish between different broadband availabilities in different geographies. Katz (2012) distinguishes between areas that are low density and have limited demand and have few or no broadband services, as is the case in sparsely populated rural areas, and areas which are densely populated and have high demand and in which 3 or more broadband operators provide services, which is the case for densely populated urban areas. In areas where the business case is not viable to roll out networks, government can intervene by adding its own demand for services (bundling the requirements of schools, clinics, government facilities) in the relevant area or could subsidise subscribers in that area (Katz, 2012). Governments can also subsidise new networks directly by providing capital expenditure grants to private sector players or investing and owning infrastructure directly (Katz, 2012). The latter approach has often led to the deployment of networks in areas where private sector capacity is viable, however, and there are examples of municipal networks behaving as commercial entities and denying access to their networks such as in Germany and Switzerland (Katz, 2012).

National broadband plans should be linked to overall Information and Communication Technology (“ICT”) strategies (Katz, 2012). For example, Japan targeted 2010 as the year in which 80% of the population should be able to use ICT to address social needs, particularly in the realm of e-government, and the same percentage of the population should be able to use the internet and computer technologies (Katz, 2012). ICT policy should be linked to industrial policy more generally: in the Republic of Korea, for example, there is a seed fund to finance infrastructure deployment and a series of master plans designed to develop the country into an information society (Katz, 2012). Brazil and Panama have policies in place to

develop broadband in order to support their software and call centre industries while Japan's broadband policy is linked to the development of its ICT manufacturing sector (Katz, 2012).

Stimulating demand for broadband is also important (Katz, 2012). There is a significant gap between the availability of broadband and its uptake in many countries: this can range from as low as 7% in South Korea to as high as 62% in Argentina (Katz, 2012). This is caused by a number of factors, including education and pricing (Katz, 2012). In order to address this, governments can put tax incentives in place for businesses to encourage uptake of ICT services (as is the case in Japan and Sweden), and can implement e-government services, including online tax filing and procurement (Katz, 2012). There is also a nexus between education, training and ICT adoption and this is particularly important where the adoption of ICT by SMEs is concerned: government has an important role to play in ongoing ICT education for SMEs (Katz, 2012).

3.5.2. Outline of initiatives in South Africa

South Africa has implemented some of the best practices suggested by Katz (2012) in respect of creating a policy and regulatory environment favourable for the development of broadband. The National Development Plan (2010) highlights the importance of broadband in fostering innovation and commits to making high speed broadband internet universally available at competitive prices as an "enabling milestone" for the 2030 vision which targets the elimination of poverty and a dramatic reduction in inequality. The Department of Communications has set a goal for 100% broadband penetration by 2020, which is supported in the National Development Plan (2010). This target is re-iterated in the Presidential Infrastructure Co-ordination Commission's (2012) Strategic Infrastructure Project 15 ("SIP 15"), which aims to roll out points of presence in district municipalities and extend fibre networks to deep rural communities.

Furthermore, South Africa has a national broadband plan (Department of Communications, 2013). There is also a dedicated ICT sector team at a state-owned bank (the Industrial Development Corporation). Business Process Outsourcing is identified as a key target sector for industrial policy (Department of Trade and Industry, 2013) and there are grants available for the construction of new telecommunications infrastructure to support new BPO operators, though this is not widely marketed (Interview with Department of Trade and Industry employees). Furthermore, South Africa has a Universal Service and Access Fund (USAF) and the government revenue collection services (SARS e-Filing) are available online. Finally, the Department of Communications has established an e-Skills institute in order to address the ICT training needs of individuals and SMEs.

Nonetheless, the regulatory and policy framework that is in place is incomplete. The national broadband plan for example does not have detailed plans for the development of broadband. For example, the plan does not set out how much spectrum, and in what bands, the government will reallocate for broadband purposes. The plan also does not mention how Local Loop Unbundling (LLU) should be implemented nor does it impose timeframes for its implementation, despite LLU being government policy since 2007.

Furthermore, a competition framework for broadband has not been effectively implemented. The ECA is an “open access” act and mandates infrastructure sharing through facilities leasing and services based competition. The ECA therefore advocates the services based model for competition in which there are relatively few vertically integrated providers of infrastructure and services and a number of competitors providing services. However, in practice the facilities leasing regulations (ECA, Facilities Leasing Regulations) have not been effective in allowing for services based competition (this is to be discussed in section 7 below). The national broadband plan reiterates support for services based competition (in addition to infrastructure based competition in economically viable areas) and open access “backbone networks” but does not set out the necessary steps to achieve this, including the role of LLU. Instead, the plan makes reference to using the fixed line incumbent for broadband rollout without explaining how services will be separated out from Telkom SA SOC Limited’s (Telkom) operations. The policy also refers to a wholesale open access network in areas where the provision of services is not economically viable without explaining whether there will be a bidding process for establishing a private wholesale operator or whether a publicly owned utility is envisioned.

Finally, while the use of TV white spaces is being trialled in South Africa by the Council for Scientific and Industrial Research (CSIR) Meraka Institute, Google and Microsoft in different parts of the country (see, for example, Carlson *et al*, 2013), very little of the spectrum available for broadband in South Africa is being used for broadband services. Universal service will only be achieved in South Africa using wireless technologies and government and regulatory delays in assigning available spectrum (let alone reallocating spectrum from its current users) are a significant impediment to broadband rollout.

3.6. Summary

There is a strong and positive relationship between broadband penetration and economic growth. In developing countries, a 10% increase in broadband penetration leads to a 1.38% increase in economic growth (Zhen-Wei Qiang *et al*, 2009). In South Africa, the ICT sector accounts for 4.3% of Gross Domestic Product (GDP), while the telecommunications sector accounts for 3.4% of GDP (Statistics South Africa, 2013a). The internet economy, including spend on internet access, investment in infrastructure, spend on internet retail and spend by government, accounts for approximately 2% of GDP, and this share is predicted to approximately 2.5% by 2016 (World Wide Worx, 2012). The current share of GDP accounted for by the internet in South Africa is very low by developing country standards, particularly when compared to China (5.5%), India (4.1%), Mexico (2.5%) and Brazil (2.2%) (BCG, 2010). The lack of the development of the internet has a significant impact on South Africa’s growth potential: small and medium enterprises account for the bulk of South Africa’s output and employment and need internet access in order to be globally competitive, including in relation to market access and information and improvements in productivity. 30% of SMEs say that their businesses could not exist without their website, according to a survey by World Wide Worx (2012). Furthermore, the business process outsourcing sector in South Africa is shifting towards higher value outsourcing arrangements, including the outsourcing of legal processes and shared financial and accounting services, which require high speed broadband.

In order to address the lack of internet availability, a range of interventions are required including in respect of training on information and communication technologies (for SMEs particularly), incentives for the uptake of broadband (including significantly lower import duties), the assignment of as much spectrum as possible for broadband purposes, and economic regulation of the fixed line network as part of the Local Loop Unbundling process. The Department of Communications is taking steps towards these goals with the publication of the National Broadband Plan. However, the plan does not go far enough in terms of providing details on spectrum to be re-allocated for broadband nor does it describe how Local Loop Unbundling will be implemented. There are therefore significant gaps in South Africa's policy and economic regulation framework that need to be addressed through the current ICT policy process in order for the electronic communications sector to be a catalyst for economic growth.

4. Sector performance review

4.1. Introduction

The key questions in this section relate to the outcomes of regulation in terms of sector performance in South Africa, specifically:

- How have prices for and quality of telecommunications services evolved over the last 5-10 years and how does this compare to the rest of the world, and developing countries in particular?
- How have access to services, network usage and network coverage changed over the last 5-10 years in the telecommunications sector, and how has investment and employment evolved over this period?
- What are the main trends in the revenues and profitability of operators in the telecommunications sector, and what impact has economic regulation had on these trends?
- What are the competitive dynamics in the telecommunications sector, and how has the information and communications technology sector in South Africa developed relative to the development of the sector in the rest of the world?

Each of these questions are explored in the sections that follow.

4.2. Access, coverage and usage

4.2.1. Internet access and cellphone penetration

According to the census 2011, 35.2% of households have access to the internet and 64.8% of households do not have access to the internet (Statistics South Africa, 2012a).¹² This is an improvement from the 2007 Community Survey, which found that only 7.2% of households had access to the internet (Statistics South Africa, 2007). 8.6% of households access the

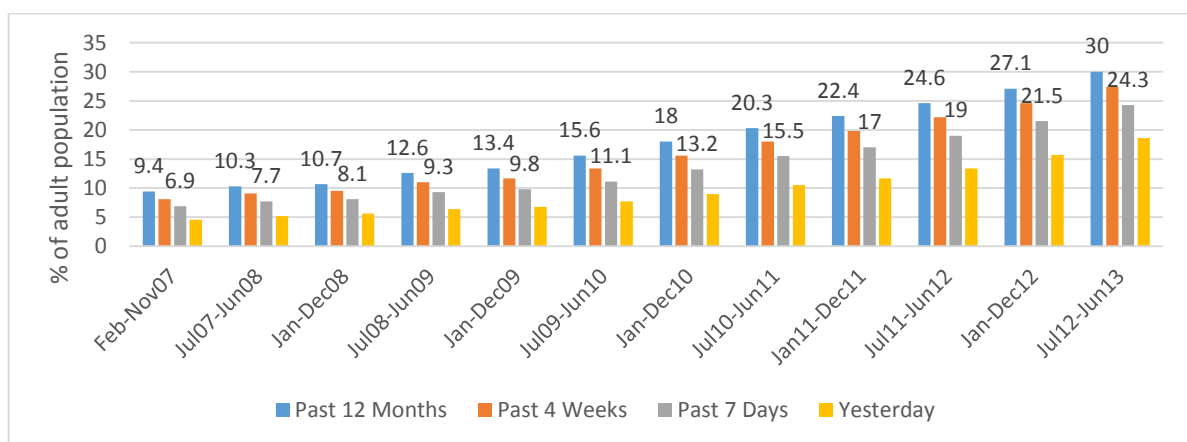
¹² Households were asked the following (Question H13A): "How does this household mainly access the internet"? The possible responses were: From home, From cellphone, From work, From elsewhere, No access to the internet.

internet from home, 16.3% use a cellphone, 4.7% of households access the internet from work and 5.6% from elsewhere (Statistics South Africa, 2012a).

Access to the internet is likely to be overstated in the census data, however. For example, Gillwald *et al* (2013) find significantly lower internet penetration among households (19.7%) than the census does (35.2%). Gillwald *et al* (2013) do find nonetheless that internet penetration among individuals is 33.7%. The key problem with the census data is that the fact that one person in a household has a Wireless Application Protocol (WAP) enabled feature phone (i.e. very limited internet access), this does not mean that the entire household has access to the internet. World Wide Worx (2012) for example estimates that there were 8.5 million internet users in South Africa in 2011, and that internet penetration was therefore approximately 17% in 2011. The World Wide Worx methodology counts the number of active subscriptions rather than shared access to the internet (though World Wide Worx does account for shared internet access at work).

The South African Audience Research Foundation’s (SAARF, 2005-2013) All Media Products Survey (AMPS) shows similar results to those of World Wide Worx, which suggest lower internet penetration than that suggested in the census results (see Figure 9 below). While 30% of survey respondents said that they had accessed the internet in the last 12 months, only 24.3% had accessed the internet in the last 7 days, which suggests a significant degree of intermittent internet access (see Figure 9 below). This is significantly lower than the 35.2% household internet penetration shown in the census. Nonetheless, the significant growth in internet access is consistent with Gillwald *et al* (2013), World Wide Worx (2012) and Statistics South Africa (2012).

Figure 5: Internet use by South African adults (AMPS, 2007 - 2013)

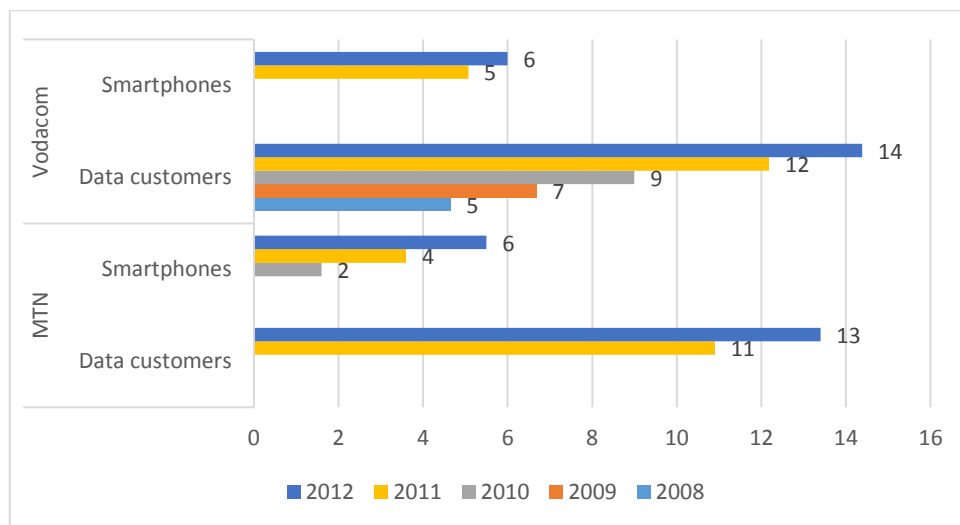


Source: South African Audience Research Foundation All Media Products Survey, 2005-2013

Note that there is considerable variance in internet access and coverage between provinces: While 46.4% and 43.7% of households in Gauteng and the Western Cape, respectively, have internet access, only 24.1% and 24.3% of households in the Eastern Cape and Limpopo, respectively, have access to the internet (Statistics South Africa, 2012b).

The overall number of data customers and smartphones in the market increased rapidly between 2008 and 2012 (See Figure 10). While a significant number of data subscriptions are used for machine to machine applications, such as for vehicle tracking, the number of data connections suggests that the internet penetration reported by the Census 2011 and World Wide Worx (2012) might be understated significantly. For example, Vodacom and MTN between them had 23m data subscriptions in 2011, and this increased to over 27m data subscriptions in 2012.

Figure 6: Data customers, 3G devices and smartphone penetration (millions)



Source: Analysis of MTN (2005-2013), Vodacom (2005-2013)

Note: Vodacom financial data corresponds to the calendar year prior to the year in which the financial results were reported, due to Vodacom’s financial year ending in March (their data therefore reflects the previous calendar year more than it does the calendar year in which results are reported).

Access to the internet is very different to access to a cellphone: household access to cellphones was 88.9% in 2011 (Statistics South Africa, 2012a), compared to 72.9% in 2007 and 32.3% in 2001 (Statistics South Africa, 2007). There is also considerably less variability in access to a cell-phone between provinces: the lowest availability is 81.1% in the Northern Cape and the highest is 93.8% in Gauteng. Note however that the census questionnaire was structured such that if any one person in a household owned a cellphone, the household was deemed to own a cellphone.¹³ This means that while household access to cell-phones was almost 90%, access to cellphones by the population could be significantly lower than this if many household members on average are unable to access the device.

¹³ Households were asked the following (Question H-13): “Does this household own any of the following in working order?”. Respondents could answer Yes or No to various household goods, including landline, cellphone and computer.

At the same time, access to landlines has fallen over time: while 23.9% of households had a landline in 2001, this declined to 18.5% in 2007 and 14.5% in 2011 (Statistics South Africa, 2012a). Access to a computer increased from 8.5% in 2001 to 15.6% in 2007 and 21.4% in 2011 (Statistics South Africa, 2012a). Gillwald *et al* (2013) arrived at similar results from a survey of households for access to fixed lines (18%), computers (24.5%) and cellphones (84.2%).

Similarly, World Wide Worx (2012) estimates that there are approximately 40m unique users of cellphones in South Africa, and cellphone penetration is therefore approximately 80%. This is less than what Statistics South Africa (2012a) estimated, for the same reason: Statistics South Africa (2012a) suggests that 88.9% of households own a cellphone but not that each person within those households have a cellphone.

The AMPS surveys (2007-2013) confirm the relatively high rate of cellphone penetration shown in the census (Statistics South Africa, 2012a), in Gillwald *et al* (2013) and in World Wide Worx (2012): cellphone penetration has grown from 67% of the adult population in 2007 to 86% in 2013. This does suggest though that cellphone penetration is not 100%, and that more than five million adult South Africans still do not have access to a cellphone.¹⁴

All of the data suggests that, while the census results show growing internet access over the last decade, actual internet penetration and use among South Africans is still limited. Cellphone penetration is significantly higher than internet penetration, although a large number of South Africans still do not have access to a cell-phone. Landline penetration has been falling significantly over the last decade.

4.2.2. Fixed line coverage

The data on fixed line penetration is less encouraging, at least in respect of traditional fixed lines. The total number of fixed lines reported by Telkom has fallen from 4.7m to 3.8m between 2003 and 2012 (see Figure 11 below). However, business connections reported by Telkom have grown from 600,000 business voice channels in 2004 to 760,000 business voice channels in 2013. The number of ADSL lines has also increased significantly, from 20,000 in 2004 to 870,000 in 2013 (see Figure 12). Similarly, the number of Telkom Managed Data Networking Services sites has increased from 9,000 in 2003 to over 44,000 in 2012. This suggests that while consumers are switching to using mobile networks for voice services, a significant group of customers, including businesses, continues to use the fixed line network for broadband and data services. Note that these numbers exclude the number of lines provided by other fixed line operators including Neotel, Internet Solutions, Vox Telecom and Mweb.

¹⁴ The 2013 AMPS survey uses an adult population of 37,214,000 people. AMPS surveys a sample of this population.

Figure 7: Telkom fixed lines (2003-2012)

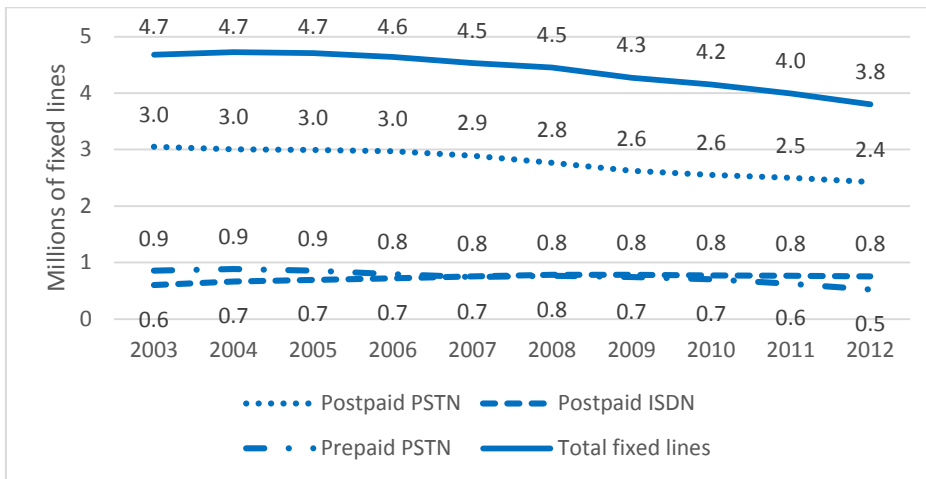
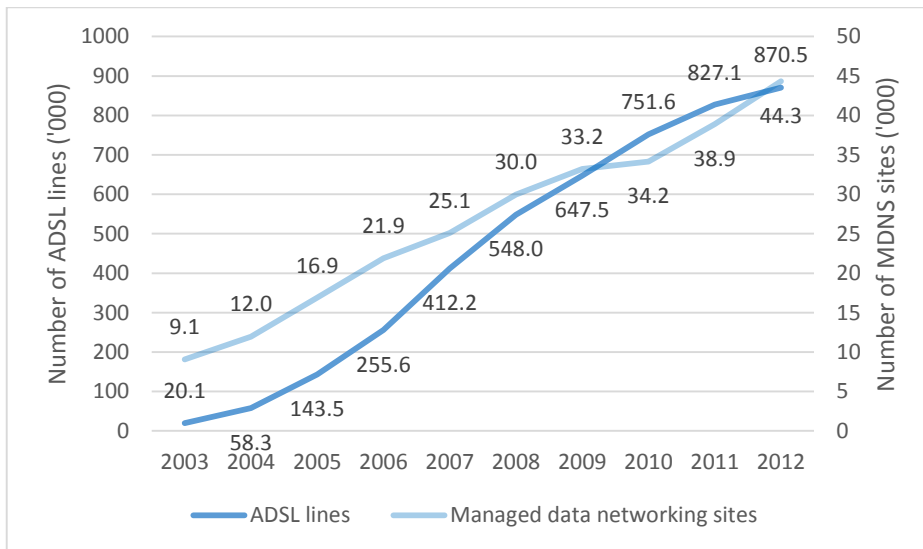


Figure 8: Telkom ADSL and MDNS sites (2003-2012)



Source: Analysis of Telkom (2005 - 2013)

Note: Telkom's data is allocated to the calendar year prior to the financial year in question, as Telkom's financial year end is in March and their data therefore reflects the previous calendar year more than it does the year in which results are reported.

It is difficult to measure the number of lines provided by new entrants like Neotel and DFA, partly because this information is not publicly disclosed. Furthermore, while DFA and Neotel may serve a relatively small number of customers, each customer may use a significant number of fixed lines. For example, DFA largely provides services to ECNS and ECS licensees, such as Internet Solutions and Vox Telecom. Internet Solutions and Vox Telecom in turn use DFA fibre to provide large numbers of lines for corporate customers. The extent of the networks operated by new fixed line entrants like DFA and Neotel can be measured in terms of kilometres built, which can be compared to information on the extent of Telkom's network. Telkom claims to have rolled out 147,000 cable kilometres of fibre optic cable (see Telkom, 2005-2013), though this may include some double counting of cable lying in the same

trench. After taking double-counting into account, BMI-T estimates that there are approximately 105,000kms of fibre-optic cable in Telkom's network (BMI-T, 2012).

While rival networks are growing, Telkom's fixed line network is significantly larger than those of its fixed line rivals. For example, DFA's fibre network has grown from 350kms in 2008 to 7,315kms in 2013 (Remgro, 2010-2013). Neotel's network is approximately 6,500kms (Tata Communications, 2011-2013). DFA has concentrated its network rollout on connecting mobile network Base station Transceiver Sites: by 2013, DFA had connected 4,276 of these sites (Remgro, 2010-2013). Both DFA and Broadband Infraco (BBI) provide wholesale services exclusively: DFA has 41 customers (Remgro, 2010-2013) while BBI has 11 customers (Broadband Infraco, 2008-2013). Neotel has approximately 2,400 business customers (many of which are connected to their fibre network), and more than 150,000 residential or small business customers, largely on their wireless CDMA network (Tata Communications, 2011-2013). The reach of fixed line alternative networks is therefore relatively limited compared to that of Telkom's network.

4.2.3. Mobile network coverage

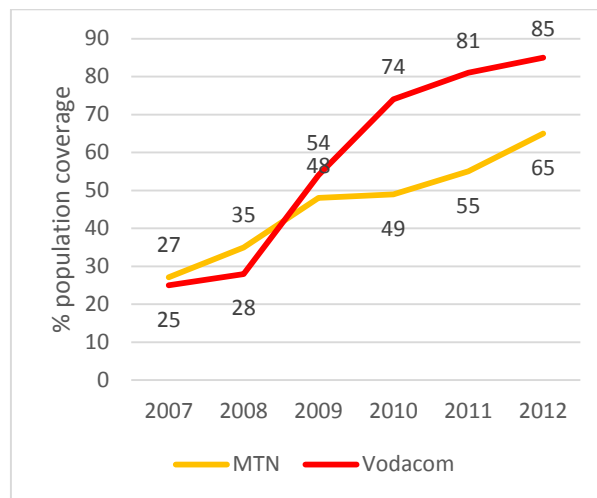
Mobile voice (1G and 2G) coverage in South Africa is close to ubiquitous: Vodacom reported 99.8% population coverage in 2012 while MTN reported 98.6% population coverage in the same year (MTN, Vodacom, 2005-2013). Cell C reported 63% population coverage in 2010 (Cell C, 2005-2013).¹⁵ This coverage has arisen from significant growth in the total number of sites: MTN's network grew from 4,245 sites in 2004 to 11,172 in 2012, while Vodacom's network grew from 5,713 sites to 9,348 sites over the same period.¹⁶ Telkom began its mobile network rollout in 2010, and grew from 970 sites in 2011 to 2,299 sites in 2013.

3G population coverage, while not as extensive, has grown significantly (see Figure 13). MTN's 3G coverage grew from approximately 27% in 2007 to 65% in 2012. Vodacom's 3G coverage grew from 25% in 2008 to 85% in 2013. This is despite the reduced revenues and increased intensity of competition arising from the call termination rate intervention (discussed below in section 6). This outcome is also reflected in the overall number of base stations in the Vodacom (see Figure 14) and MTN networks, as well as the number of 3G base stations. The number of 3G base stations has been growing as a proportion of the overall Vodacom network (see Figure 14).

¹⁵ Note that Cell C also roams on the Vodacom network and its customers therefore experience the same coverage that Vodacom customers experience.

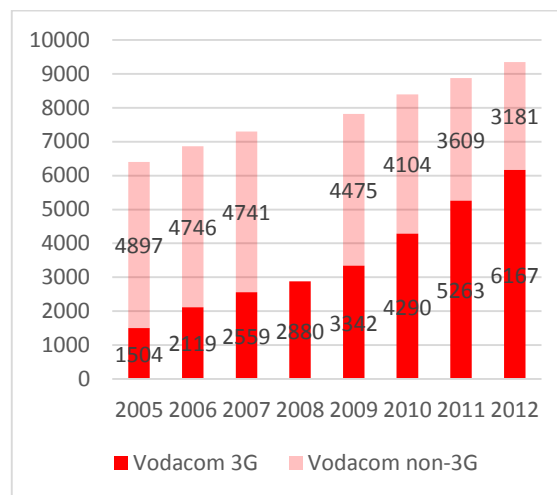
¹⁶ This relates to 2G sites. Most 3G sites, reported separately, would have been installed as a network overlay to the 2G network, though there may be some 3G sites that are deployed in addition to the 2G network, which means that this figure may understate the total size of the Vodacom network.

Figure 9: 3G % population coverage, MTN and Vodacom (2007 - 2012)



Source and notes: See figure below

Figure 10: Vodacom 3G and non-3G base stations (2005 - 2012)



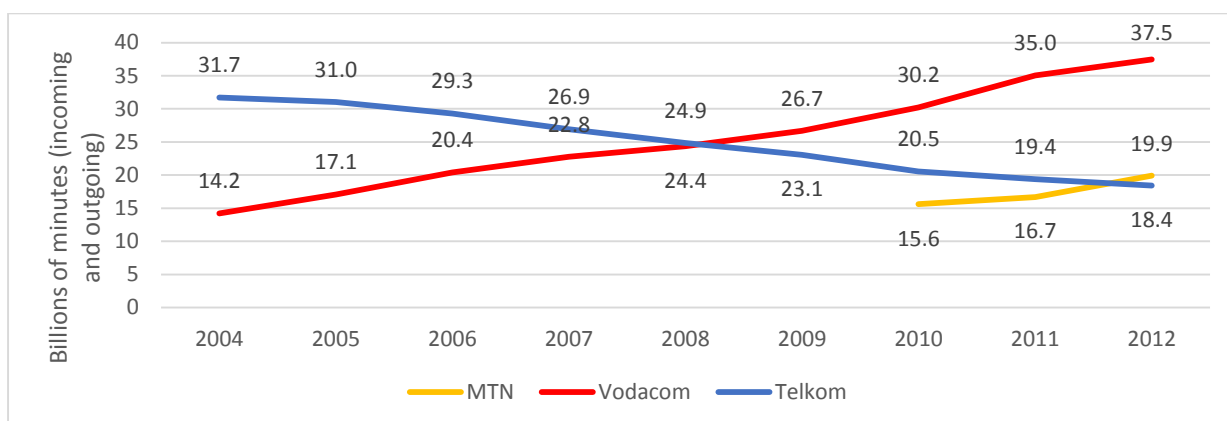
Source: Analysis of MTN (2005-2013), Vodacom (2005-2013)

Note: Vodacom data for financial year inserted for previous calendar year due to Vodacom having a March year end. MTN's year end is in December.

4.2.4. Mobile and fixed line voice usage

The data on usage of the fixed and mobile networks mimics fixed line and mobile penetration: while the fixed line network is declining in terms of number of minutes, the mobile networks are gaining significant volumes of minutes. It is important to note that, in terms of total volume of minutes, new entrants like Neotel and alternative operators like Internet Solutions and Vox Telecoms are able to compete with Telkom for large volume users of minutes: Telkom's decline in fixed line volumes of minutes therefore may be more than compensated for by increases in minutes on the Neotel, IS and Vox networks.

Figure 11: MTN, Vodacom and Telkom minutes of use (2004-2012)



Source: Analysis of MTN (2005-2013), Vodacom (2005-2013) and Telkom (2005-2013)

Note: Vodacom and Telkom have financial years ending in March. Their data is reflected for the calendar year prior to the year in which results are reported. MTN's year end is in December.

Data from at least one mobile operator confirms that traffic from Telkom's network, while it has declined, has been taken up by other fixed line operators (Interview with mobile operator). This was confirmed by two fixed line operators: that significant volumes of minutes have been won away from Telkom. At least one fixed line operator / ISP has seen an increase in voice minutes of 42% over the last year alone (Interviews with fixed line operators / ISPs). This suggests that Telkom's fixed line voice usage does not imply that the entire fixed line sector is in decline: rather, competitive intensity has grown significantly in the fixed line sector. This is also in contrast to Telkom's repeated assertions that the decline in fixed line voice traffic is due to fixed and mobile substitutability (Telkom, 2005-2013): while this is no doubt true in part this does not explain all of the decline in Telkom's fixed line minutes.

4.3. Prices and quality

4.3.1. Prices

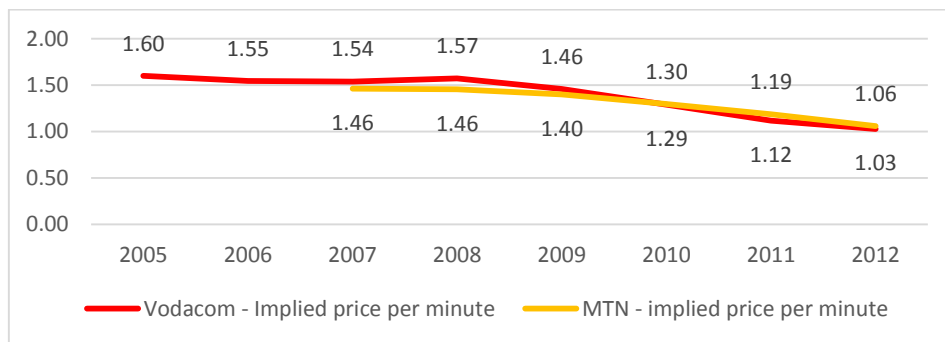
Voice

Mobile voice prices were relatively stable over time prior to the call termination rate intervention, which impacted wholesale call termination rates from late 2010 (when the mobile operators volunteered a cut in call termination rates), and in terms of the call termination rate regulations (ICASA, 2010a), from 1 March 2011. Retail voice rates had started to decline in 2009, prior to the call termination rate drop: Vodacom's average retail rate dropped by 7.2% between 2008 and 2009, and MTN's average retail rate declined by 3.8%.¹⁷ Subsequent to

¹⁷ For Vodacom, this is calculated by dividing outbound voice revenue (i.e. excluding call termination revenue) by outbound minutes. MTN does not report on the latter, and so total outbound minutes were calculated by multiplying outbound minutes of use per customer by MTN's average active subscriber base. Average retail voice prices for MTN were calculated as follows: Outbound voice revenue / (outbound minutes of use per customer * average active subscriber base).

the call termination rate intervention, averages prices declined more significantly: Vodacom's rates declined 11.6%, 13.5% and 7.9% in 2010, 2011 and 2012 while MTN's rates declined by 7.4%, 8.4% and 10.9% over the same periods. The call termination rate intervention therefore appears to have had a significant impact on retail prices (please see accompanying paper on the call termination rate intervention). This is contrary to assertions by at least one mobile operator that prices were falling significantly prior to the call termination rate intervention (Interview with mobile operator).

Figure 12: Implied average voice prices (Rands per minute), MTN and Vodacom (2005 - 2012)

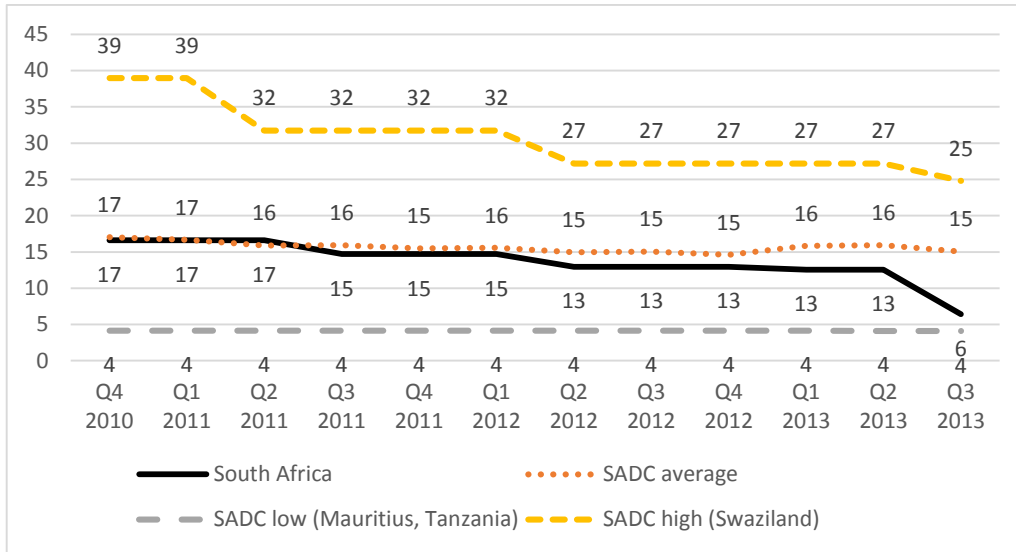


Source: Analysis of MTN (2005-2013) and Vodacom (2005-2013)

Note: Vodacom financial data corresponds to the calendar year prior to the year in which the financial results were reported, due to Vodacom's financial year ending in March (their data therefore reflects the previous calendar year more than it does the calendar year in which results are reported).

This is also borne out by data prepared by Research ICT Africa (2013b) on prepaid prices across Southern African Development Community (SADC) countries: Since 2010, South Africa's lowest prepaid basket has fallen significantly when compared with other SADC countries, and South Africa's lowest prices now compare with those in the cheapest SADC countries, Tanzania and Mauritius.

Figure 13: Lowest available SADC prepaid prices (USD), OECD usage basket (2010 - 2013)

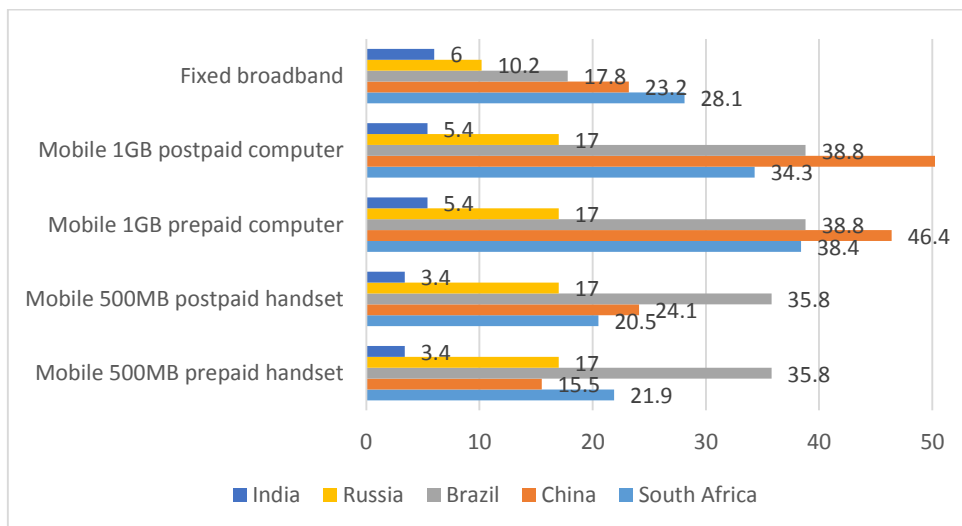


Source: Analysis based on data prepared by Research ICT Africa, 2013b

Broadband

South Africa's broadband prices are high by international standards, and this is particularly the case for fixed broadband (see Figure 7 below). South Africa's fixed broadband prices are significantly higher than those in Brazil, Russia, India and China which, including South Africa, form the BRICS group. South Africa's mobile broadband prices are significantly higher than prices in Russia and India but they are in line with or lower than prices in Brazil and China.

Figure 14: Broadband price comparisons (USD, monthly basket) (ITU, 2012)



Source: Analysis of ITU (2009-2013)

Note: The price of 1GB of mobile, postpaid computer data is in fact \$181.1 in China. The scale of the graph was limited to \$50 to preserve the scale of differences between broadband prices.

4.3.2. Quality

Voice

ICASA issued “regulations setting out the minimum standards for ender user and subscriber service charters” in 2009 (ICASA, 2009). These regulations require that service availability is 95% over a 6 month period and that dropped calls must not exceed 3%, over the same period. An initial quality of service report was prepared by ICASA in 2011 on the basis of drive test results. This report revealed that dropped call rates in particular were very high and exceeded the 3% target for MTN, Vodacom and Cell C (see Table 4 below; ICASA, 2011g). While this report carried disclaimers that the tests conducted were not representative and were “merely indicative” and the results of the report were contested by the mobile operators (see for example, Mawson, 2011), by 2013 the dropped call rate had improved significantly, at least on the Vodacom network for Johannesburg and Pretoria; the MTN and Cell C networks were compliant in Pretoria (ICASA, 2013f). The call set up success ratio measure met or exceeded ICASA’s target by most operators in most regions over both periods. This suggests that voice call quality has improved, at least in the Gauteng region, over time.

Table 4: Call quality of service assessments (Gauteng, 2011, 2013)

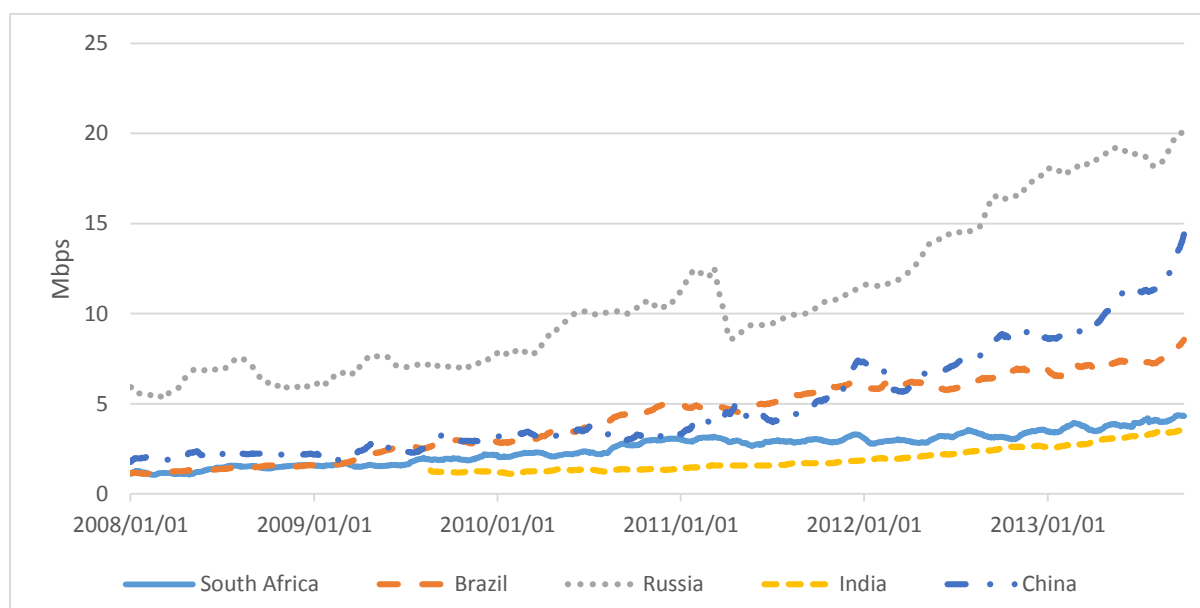
	Call set up success ratio			Dropped call rate		
	2011 - Gauteng	2013 - JHB	2013 - PTA	2011 - Gauteng	2013 - JHB	2013 - PTA
ICASA target	95%			3%		
Vodacom	100.0%	99.2%	99.7%	5.0%	2.9%	0.4%
MTN	78.0%	96.7%	96.7%	5.3%	4.6%	2.8%
Cell C	97.7%	96.0%	94.8%	6.9%	8.1%	1.8%

Source: Analysis of ICASA (2011g) & ICASA (2013f)

Broadband

South Africa is far behind Brazil, Russia, and China in terms of broadband speeds and this divergence is growing wider with time. Russia has always had significantly higher speeds than South Africa. Brazil and China had roughly similar speeds to South Africa in 2008 but have significantly higher speeds than South Africa in 2013 (Ookla, 2013a) (see Figure 6 below). While South Africa has consistently had higher average broadband speeds than India, India is catching up to South Africa.

Figure 15: Broadband speeds in Brazil, Russia, India, China and South Africa (2008 - 2013)



Source: Analysis of Ookla Netindex (2013a)

South Africa’s average download speed is 4.54Mbps, and South Africa ranks at number 119 in terms of download speeds globally, and is significantly lower than the EU (21.34Mbps), G8 (19.58Mbps), OECD (19.57Mbps) and APEC (15.75Mbps) (Ookla, 2013b).

South Africa therefore ranks among the highest priced BRICS countries for broadband and has extremely slow speeds when compared to other countries, including developing countries. This might be due to the fact that the index includes average mobile broadband speeds, which might be higher on average in countries that have assigned more spectrum for broadband.¹⁸ ICASA’s inability to allocate spectrum for broadband, therefore, might be at least partly responsible for the slow average broadband speeds in South Africa.

4.4. Investment and employment

4.4.1. Investment

Statistics South Africa (2013a) reports that gross fixed capital formation in the information and communication technology (ICT) sector amounted to R18.5bn in 2005 (the last year for which data is available), or approximately 7% of total capital formation in South Africa (see Table 5).¹⁹ The data does not provide details as to what the investments are, however, and is reported as “experimental in nature” (Statistics South Africa, 2013a). For example, it is not

¹⁸ This was noted by a participant in the CCRED seminar held on 29 November, 2013.

¹⁹ Note that measures of gross fixed capital formation do not include acquisition of land (since the stock of land in a country does not change) and it does not take into account the effect of depreciation or changes in other forms of capital, including inventory.

clear whether the data includes the civil construction activities of telecommunications operators, which account for a significant proportion of total capital investment, particularly for fixed line operators (Statistics South Africa, 2011 & 2012c).²⁰ Certainly, radio, television and communication equipment gross fixed capital formation, at R2.2bn, is very low when compared with the capital expenditures that the telecommunications operators report in their annual financial statements.

Table 5: Gross fixed capital formation in the ICT sector, 2005

	Rand (million)
Office, accounting and computing machinery	15,808
Radio, television and communication equipment	2,258
Miscellaneous ICT components and goods	274
Leasing or rental services without operator	-
Other professional, technical and business services	-
Telecommunications, broadcasting and information supply services	-
Content and media	190
Total ICT capital formation	18,530

Source: Statistics South Africa, 2013a

While the Statistics South Africa (2013a) satellite accounts are in draft form and “experimental” in nature, they do point to a very small contribution of the ICT sector when compared with countries that have similar national accounting data, including Chile, Australia and Canada.

Mobile operators have invested significantly more than R84bn over the last nine years, between 2005 and 2012. Capital expenditure by the mobile operators in South Africa, which includes construction of the networks, increased significantly over the period 2005 – 2013 (see Figure 16). While MTN decreased its capex in 2010 and 2011, this increased significantly in 2012. Vodacom increased its capex steadily between 2004 and 2012, except in 2009 when it decreased slightly. Telkom has been investing in its mobile network fairly consistently since it was first launched in 2010. While the call termination rate intervention, which was implemented from 1 March 2011 (there were voluntary mobile termination rate cuts in late 2010 too), may have had an impact on capital investment by MTN and Vodacom, this period also coincided with the financial crisis (which began at the end of 2008) as well as with Telkom Mobile’s entry, which may have deterred significant capacity expansion. Note that the data excludes Cell C’s investments, which are likely to have been considerable over this period.

²⁰ The 2011 Statistics South Africa discussion document explains that the methodology employed by the Australian Bureau of Statistics (ABS) will be employed in building the ICT satellite account for South Africa. While the ABS does include construction costs, the Statistics South Africa (2011) discussion document suggests that construction activities should be excluded, as “the approach would be more true to the traditional view of ICT products and their nature”. The Statistics South Africa (2011) document does nonetheless acknowledge that “however there would be great difficulty in separating the construction component from telecommunication equipment”. In the Statistics South Africa (2012c) discussion document, the document simply says that, referring to the Annual Financial Survey (AFS), “at this stage [as at December 2011] the disaggregated industry information only provides aggregated capital expenditure on new and existing capital per industry”.

Vodacom's capital expenditure as a percentage of revenue declined from 14.1% in 2005 to 9.9% in 2007, and remained relatively stable until 2011, when it increased to over 12%. This suggests that the call termination rate intervention in March 2011 did not have a significant impact on investment decisions: if anything, Vodacom invested more as a percentage of revenue after 2009. MTN's rate of investment has been more variable, and peaked at 18.2% of revenue in 2009, and then fell in 2010 to 10.9% of revenue, and subsequently increased to 15.5% of revenue in 2012. While MTN did decrease investment after the call termination rate intervention, investment rates have since recovered.

Figure 16: Capital expenditure by mobile operators in South Africa (Rm) (2004 - 2012)

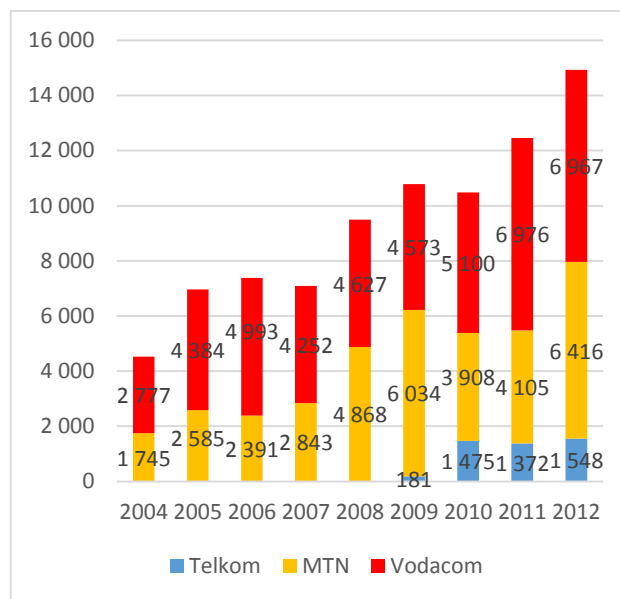
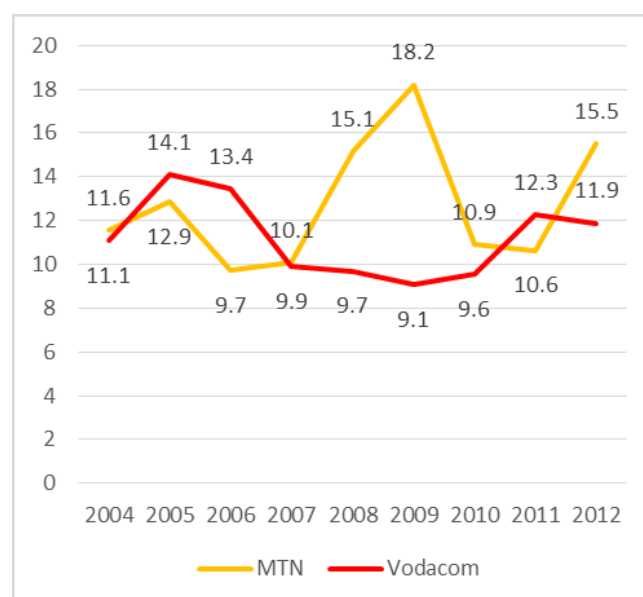


Figure 17: Capital expenditure by mobile operators as a % of revenue (2004 - 2012)

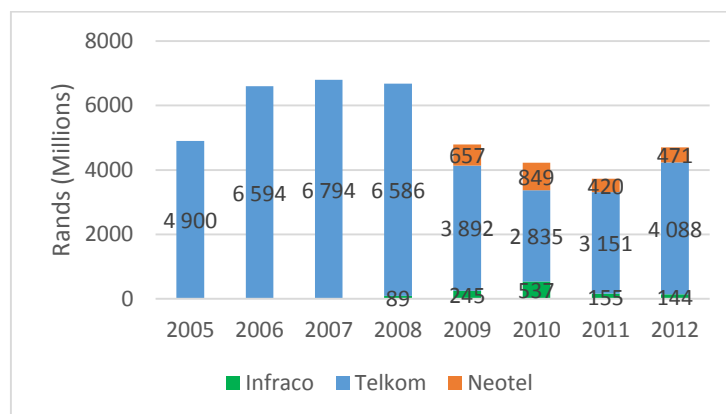


Source: Analysis of MTN (2005-2013), Vodacom (2005-2013), Telkom (2005-2013)

Note: Vodacom and Telkom have financial years ending in March. Their data is reflected for the calendar year prior to the year in which results are reported. MTN's year end is in December.

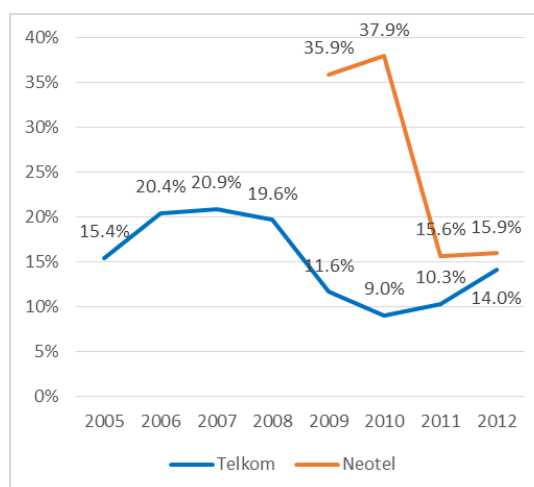
Fixed line operators have invested more than R42bn into the sector between 2005 and 2012, or approximately half of mobile operators' investments (see Figure 18 below). Note that this excludes investments by the mobile operators into their own fixed line infrastructure and it excludes investments by DFA and municipal fibre networks. Telkom's investment in its fixed line network declined from approximately 20% of fixed line revenues between 2006 and 2008 to less than 10% of revenues in 2010, although this recovered in 2012 to 14% of revenue (Telkom, 2005-2013). The decline in Telkom's fixed line investments coincides with the periods in which Telkom was building out its mobile network. Telkom is currently considering how best to "de-risk" its mobile investments (Telkom interim results, 2013). Neotel's investments have levelled off at less than R500m per annum (Tata Communications, 2011-2013) at a similar percentage of revenue to Telkom's rate of investment, while Broadband Infraco has invested less than R160m per annum in the last two years (Broadband Infraco, 2008-2013).

Figure 18: Capital expenditure by fixed line operators (Rm) (2005 - 2012)



Source and notes: See figure below.

Figure 19: Capital expenditure by fixed line operators as % of revenue (2005 - 2012)



Source: Analysis of Telkom (2005-2013), Infraco (2008 - 2013), Tata Communications (2011-2013)

Note: Telkom, Infraco, Neotel and DFA financial data corresponds to calendar year previous to the year in which the financial year closed, due to their having financial year ends in March (their data therefore reflects the previous calendar year more than it does the calendar year in which results are reported).

4.4.2. Employment

The ICT sector employs relatively few professionals in South Africa: Statistics South Africa (2013a) records that there were approximately 38,722 professionals employed in the ICT sector in 2005, or 0.3% of total employed persons.²¹ This compares to Australia, where computing professionals and technicians accounted for 2.5% of employed persons in 2002-2003 (Australia Bureau of Statistics, 2006), and all ICT employees (including in manufacturing) accounting for 3.2% of employment in Canada (Industry Canada, 2012). While this data is not necessarily comparable, since Statistics South Africa (2013a) counts only employed professionals, the data suggests that South Africa should be employing a significantly greater number of people in the ICT sector.

Vodacom (2005-2013) reports that it has 5,153 employees in 2013, having increased from 3,848 employees in 2004. Telkom (2005-2013) by contrast had 25,575 employees in 2006 and had 21,209 employees in 2013. Broadband Infracore employed approximately 144 people in 2013 (Broadband Infracore, 2008-2013). Neotel employs approximately 1,000 people and Cell C employs more than 2,000 people (according to LinkedIn company profiles for those two companies). This suggests that the telecommunications industry by itself employs more than 35,000 people (including MTN South Africa) but the sector's capacity to directly absorb significantly more people is limited. Note that this excludes the people employed in the construction and servicing of telecommunications networks, which is highly labour intensive, and which therefore likely employs considerably more people.

Employment at smaller fixed line operators / ISPs has not changed significantly over the last 3-5 years. While the mobile termination rate decreases did cause the Least Cost Routing business to decline, many of the fixed line operators / ISPs have been able to switch their customers over to using their fixed line based Voice over IP (VOIP) services (Interviews with fixed line operators / ISPs). One alternative operator reported a decline in middle management positions and an increase in lower skilled jobs as a result of the change to their business but no significant change to overall employment (Interviews with fixed line operators/ISPs).

The relatively small number of ICT professionals in South Africa and the lack of growth in employment at fixed and mobile operators suggest that the ICT sector is not generating as many jobs as it could. This is at least partly due to the lack of competition, lower prices and better quality broadband services would otherwise lead to a more vibrant ICT industry, discussed in more detail in sections 5 and 7 below.

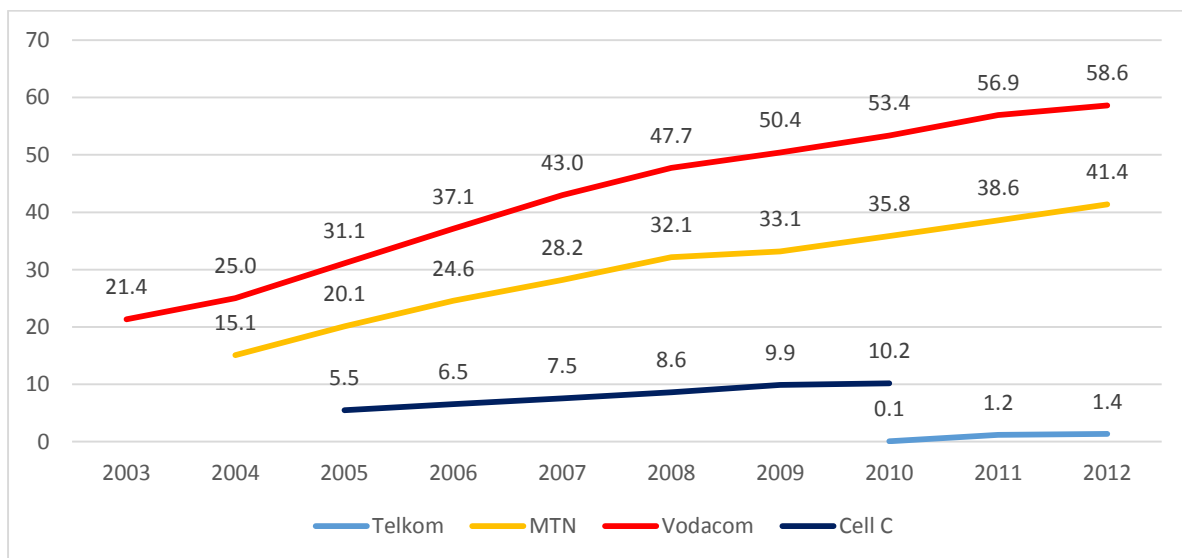
²¹ According to Statistics South Africa (2013a), *"Information and communication technology professionals include computer system designers and analysts, computer programmers, computer assistants and computing professionals not elsewhere classified"*.

4.5. Revenue and profitability

4.5.1. Mobile revenue and profitability

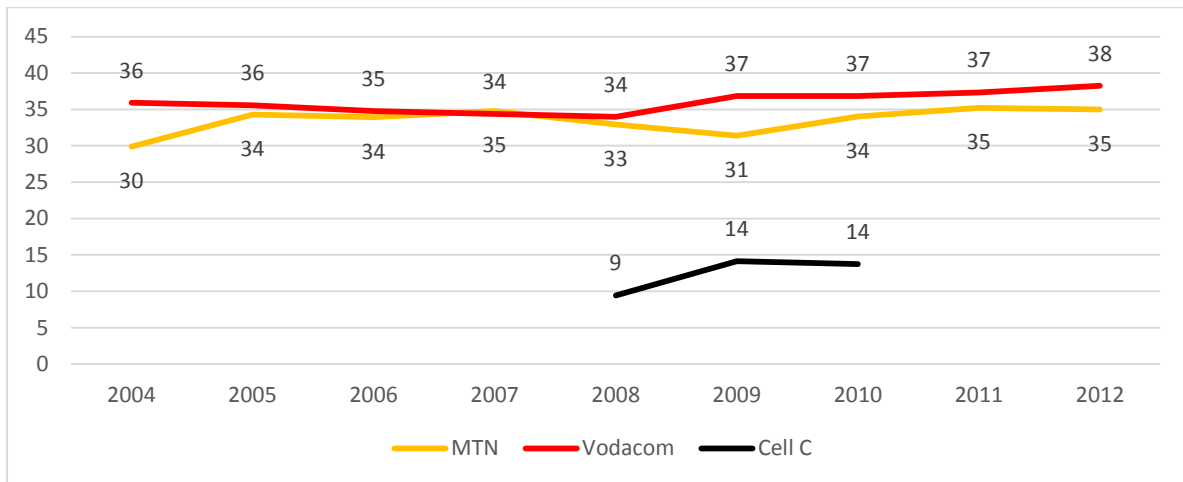
The mobile sector has grown considerably over the last 10 years, from approximately R30bn in total revenues in 2003 to over R110bn today (see Figure 20). MTN and Vodacom have consistently enjoyed Earnings Before Interest, Tax, Depreciation and Amortisation (EBITDA, a measure of profitability) margins of 30% and above, while Cell C, over the brief period that they reported results, has been significantly less profitable. Telkom Mobile is not yet EBITDA positive (and in fact makes significant EBITDA losses). Since the 2011 call termination rate intervention, MTN and Vodacom's EBITDA percentage in fact increased (i.e. these two companies became more profitable): MTN's increased from a low of 30% in 2004 (and 31% in 2009) to 35% in 2012, while Vodacom's increased from a low of 34% in 2008 to 38% in 2012. While the increase in EBITDA percentage is likely to be attributable to increased data revenues and not a reduction in call termination rates (Interviews with mobile operators), the call termination rate intervention did not appear to have a significantly negative impact on EBITDA.

Figure 20: Mobile operator revenues, 2003-2012 (Rbn)



Note: Telkom data represented here is for Telkom Mobile. For notes and sources see figure below.

Figure 21: Mobile operator EBITDA as a % of revenue, 2004-2012



Source: Telkom (2005-2013), MTN (2005-2013), Vodacom (2006-2013), Cell C (2005-2013)

Note: Telkom and Vodacom financial data corresponds to calendar previous to year in which the financial year closed, due to Telkom and Vodacom having financial year ends in March (their data therefore reflects the previous calendar year more than it does the calendar year in which results are reported).

4.5.2. Fixed line revenue and profitability

Fixed line revenues grew gradually between 2005 and 2009, from R31.8bn to R35.6bn per annum (see Figure 22). After the call termination rate cuts, which reduced retail rates for calls to mobiles significantly, sector revenues have declined to approximately R33bn per year. While Telkom's fixed line business EBITDA margin between 2006 and 2012 was relatively steady at close to 40% of revenues, a change in segment reporting saw this measure decline to 28% in 2013 (see Figure 23). On a restated basis to make FY2012 and FY2013 comparable, Telkom's FY2012 EBITDA margin was 33.7%. Telkom's fixed line EBITDA margin did therefore decline between 2012 and 2013. However, the 2013 financial year included several large, once-off provisions, including fines from the competition authorities (R592m) and voluntary severance packages (R434m).

Excluding these items, Telkom's FY2013 fixed line EBITDA margin would have been 31.7%. Neotel has over the same period grown its EBITDA margin (off a negative base), while Broadband Infracore's EBITDA margin has declined. DFA has reported headline earnings of R76m in 2012, having reported R72m in 2010 and R117m in 2011. Profitability among the alternative fixed line players has therefore improved (albeit off a negative base), while the incumbent's profitability has declined.

Figure 22: Fixed line revenues (2005 - 2012)

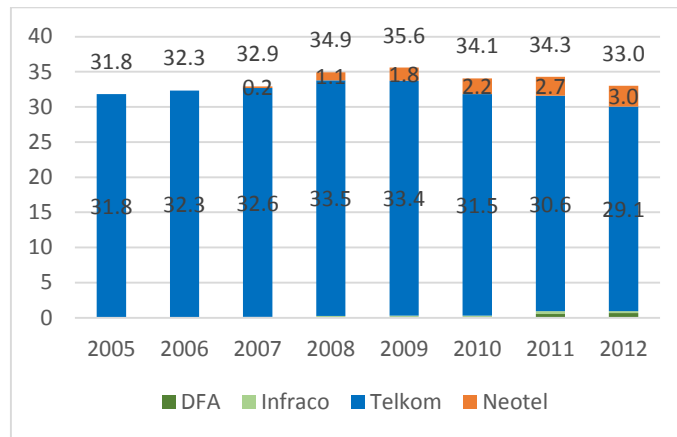
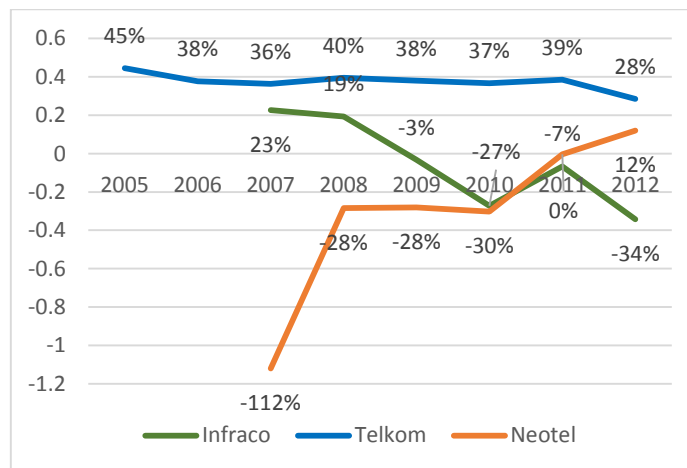


Figure 23: Fixed line EBITDA (2005 - 2012)



Sources: Broadband Infraco (2008-2013), Remgro (2010 - 2013), Tata Communications (2011-2013), Telkom (2005-2013)

Note: Telkom, Infraco, Neotel and DFA financial data corresponds to calendar year previous to the year in which the financial year closed, due to their having financial year ends in March (their data therefore reflects the previous calendar year more than it does the calendar year in which results are reported).

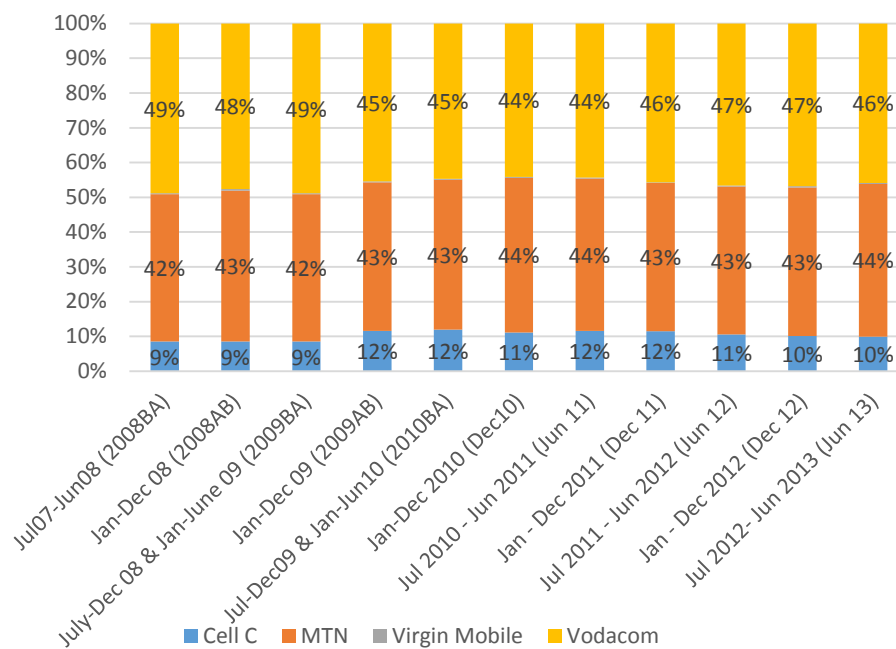
The call termination rate reductions did have a significant impact on revenue and profitability for certain fixed line operators / Internet Service Providers (ISPs) that relied on least cost routing (LCR), which relied on high call termination rates and on-net discounts to provide services to businesses to minimise their costs of calling cellphones. Nonetheless, many fixed line operators / ISPs that relied on LCR seem to have been able to shift their customers to voice over IP (VOIP) networks, which limited the impact on revenues and profitability (Interviews with fixed line operators / ISPs).

4.6. Competitive intensity

Market shares in the mobile sector appear to have remained relatively stable over time (see Figure 24 below). While the absolute number of active SIM cards in the market exceeds the

number of customers counted by the AMPS survey (South African Audience Research Foundation, “SAARF”, 2007-2013) by a significant margin, the AMPS survey does provide an indication of which providers customers see as their main provider.²² Vodacom’s market share has declined slightly over time, from 49% in 2007 / 2008 to 46% in 2012 / 2013, MTN has increased its market share by two percentage points over the same period and Cell C has gained one percentage point. The AMPS results therefore do not suggest that the market for mobile services is a dynamic, competitive one.

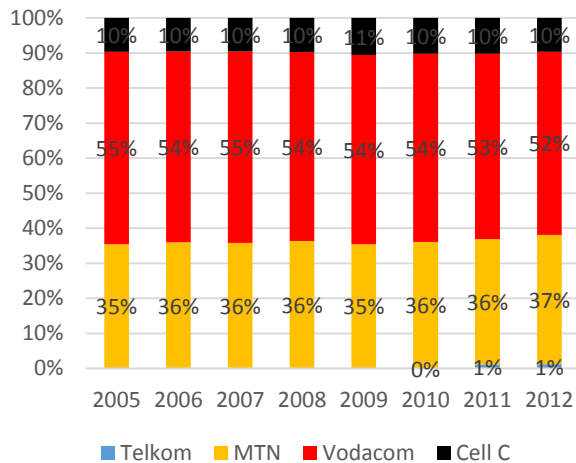
Figure 24: All media products survey results for cell-phone providers (2007 - 2013)



Source: Analysis of AMPS data, SAARF (2007-2013)

²² Question E3 of the AMPS survey asks the question: “Please think about the cellphone that you personally use most often... What make is it?” and then the following question E4 asks: “And to which network is this cellphone linked? Is it linked to...”. All of the mobile operators are on the list, which is read out and for which only one answer may be recorded (SAARF, 2013).

Figure 25: Market shares based on revenues (2005 - 2012)

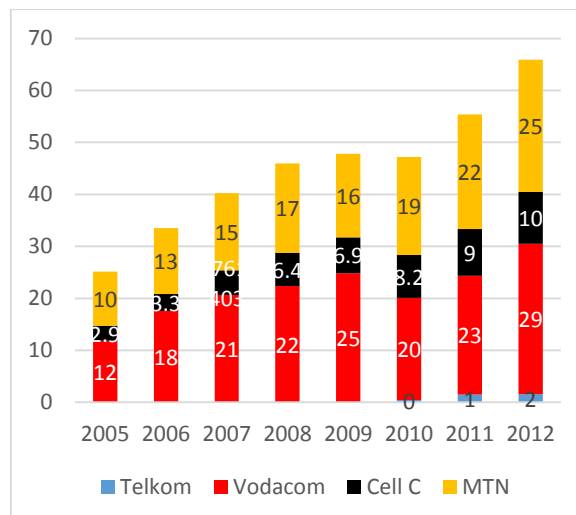


Source: Operator annual reports.

Note: Cell C data for 2011, 2012 are estimates and are based on growth in previous years of approximately 3% per annum

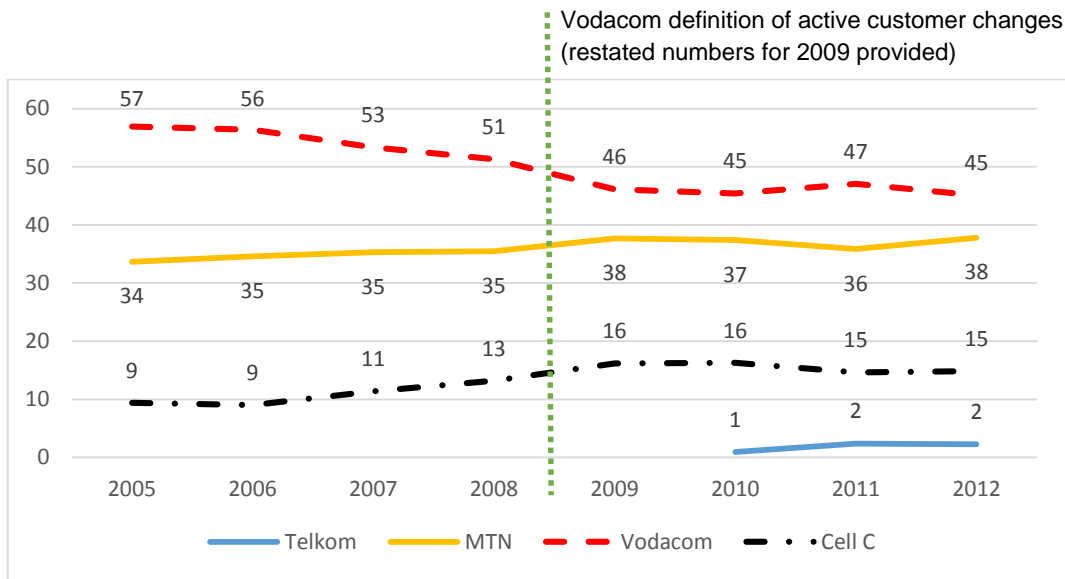
Data from operator annual reports depicts a more dynamic picture than the AMPS data (see Figure 26 and Figure 27). However, changes in subscriber numbers and market shares emanating from operator annual reports are more likely to do with changes in definitions of active subscribers and the implementation of RICA in 2010 rather than intensity of competition. For example, the definition of active subscriber was changed by Vodacom in 2010 which resulted in a significant reduction in the number of reported Vodacom subscribers.

Figure 26: Mobile provider subscribers (Millions, 2005 - 2012)



Source and notes: See figure below

Figure 27: Mobile provider market shares (%), based on subscribers (2005 - 2012)



Source: Telkom (2005-2013), MTN (2005-2013), Vodacom (2006-2013), Cell C (2005-2013)

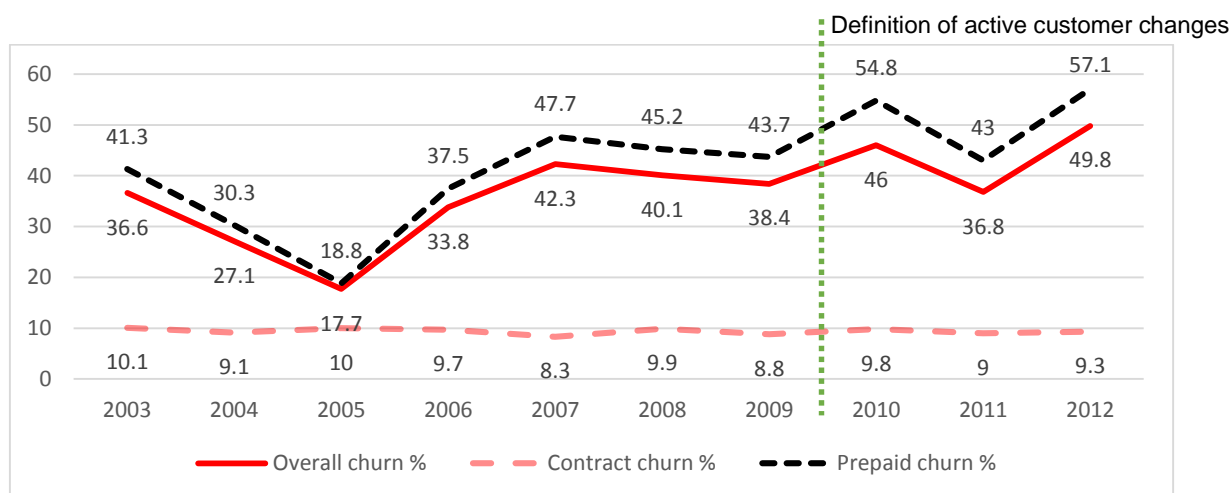
Note: Telkom and Vodacom financial data corresponds to calendar previous to year in which the financial year closed, due to Telkom and Vodacom having financial year ends in March (their data therefore reflects the previous calendar year more than it does the calendar year in which results are reported).

Another indication of the intensity of competitive rivalry is rates of churn, measured as the number of customers that exit the network as a percentage of the average subscriber base in a given period. Again, while prepaid churn increased between 2005 and 2012 (see Figure 28) Vodacom changed its definition of active subscriber base in 2010 (decreasing the denominator in the churn calculation, and thus “inflating” churn). Churn prior to 2010 is therefore not comparable to the churn from 2010 onwards. Nonetheless, over the period, competitive intensity did increase, at least for prepaid customers. Prepaid churn at Telkom Mobile is also very high, at 58.9% in 2012 and 56.8% in 2013.

The lack of change in churn for postpaid Vodacom subscribers is remarkable (see Figure 28), despite mobile number portability being introduced in November 2006.²³

²³ Note that the change in definition of active subscribers at Vodacom in 2010 does not appear to have affected postpaid customers and that postpaid churn has remained stable over the period 2003-2012.

Figure 28: Vodacom prepaid, postpaid and blended churn rates (2003-2012)



Source: Analysis of Vodacom (2005-2013)

Note: Vodacom's financial year end is in March. For this reason, the data represented here reflects the calendar year prior to the year in which results are reported. Cell C and MTN do not report data on churn.

The fixed line segment is overwhelmingly dominated by Telkom. While DFA, Neotel and Broadband Infracore have made some inroads in respect of capturing wholesale and enterprise customers, the limited reach of these networks means that competition takes place on a geographically limited basis for mostly wholesale and large enterprise customers.

Alternative operators, including Internet Service Providers (ISPs), have similarly been successful in providing internet access and voice over IP (VOIP) services, particularly to enterprise customers, and indeed have seen significant growth, particularly in respect of voice traffic (Interviews with fixed line operators / ISPs).

4.7. Overall sector development

4.7.1. ICT Development Index (ITU)

There are a number of measures of performance of an individual country's Information and Communications Technology (ICT) sector. Two of these measures are discussed here: the ICT Development Index (IDI) and the Network Readiness Index (NRI). The International Telecommunication Union (ITU, 2009-2013) publishes the ICT Development Index (IDI), which is an index comprising a range of measures of ICT sector development grouped into three areas: access, usage, and skills.

In the last reported measure, the ITU ranked South Africa at 84 out of 154 countries. South Africa's ranking has declined from 77 out of 154 countries in 2002, though the latest 2012 ranking is an improvement from 94 out of 152 countries in 2008 (ITU, 2009-2013). Over the same period, China improved its position from 90 to 78 and Russia improved from 52 to 40.

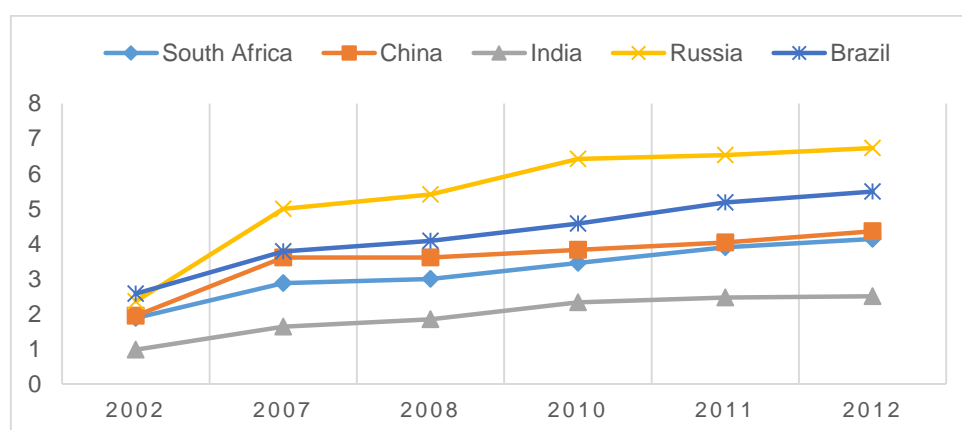
Brazil's rank slipped from 54 to 62 and India's from 117 to 121. South Africa has therefore slipped behind China in terms of ICT development, and is well behind Brazil and Russia.

South Africa's relatively poor performance against other BRICS countries is reflected particularly in the Access and Use sub-baskets.²⁴ The access sub-basket consists of (ITU, 2009 - 2013):

1. Fixed-telephone lines per 100 inhabitants;
2. Mobile-cellular telephone subscriptions per 100 inhabitants;
3. International internet bandwidth (bit/s) per Internet user;
4. Percentage of households with a computer; and
5. Percentage of households with internet access.

Each of these components is weighted equally in the access sub-basket. South Africa scores well below Russia and Brazil in terms of access to ICT (see Figure 29).

Figure 29: ITU Access sub-basket comparison, BRICS (2002 - 2012)



Source: Analysis of ITU (2009-2013)

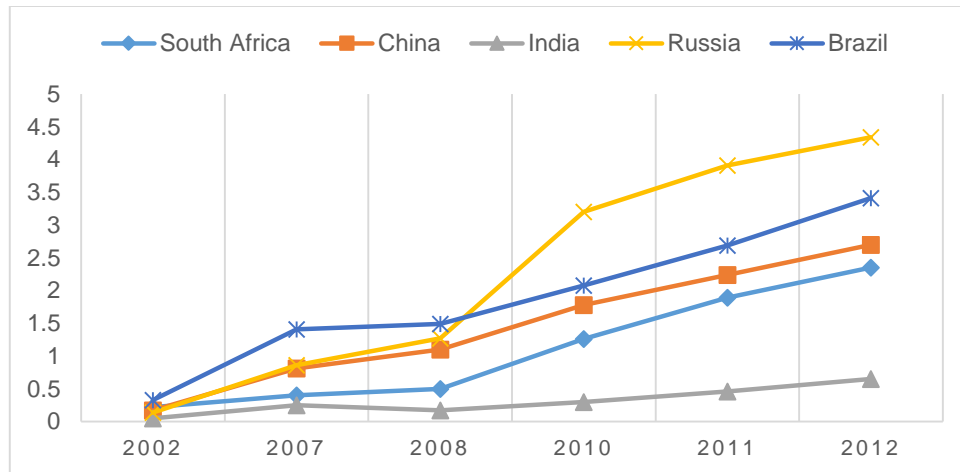
The ICT Use sub-basket includes the following metrics, also weighted equally in the sub-basket (ITU, 2009-2013):

6. Percentage of people using the internet;
7. Fixed (wired)-broadband internet subscriptions per 100 inhabitants; and
8. Active mobile-broadband subscriptions per 100 inhabitants.

²⁴ The ITU's ICT Development Index weights access at 40%, use at 40% and skills at 20% (ITU, 2009-2013). The latter is more reflective of literacy rather than the performance of the ICT sector itself. The ITU scores and rankings in each of the reports do differ when referring back to previous years. The most recent available result is reported here for each year (for example the 2013 report is used for the 2012 and 2011 scores, and the 2012 report is used for the 2010 score).

While all BRICS countries started from a relatively low score in 2002, Brazil, China and particularly Russia have increased their use score significantly, while South Africa has lagged behind (see Figure 30).

Figure 30: ITU Use sub-basket comparison, BRICS (2002 - 2012)

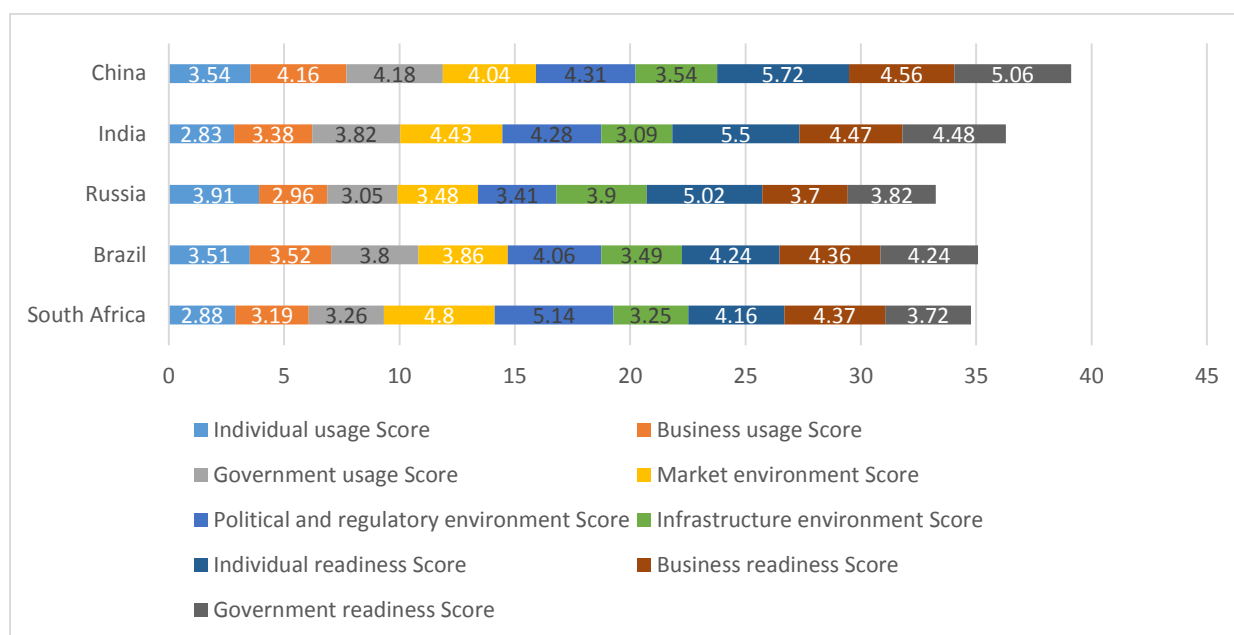


Source: Analysis of ITU (2009-2013)

4.7.2. Network Readiness Index

The World Economic Forum produces, annually, a Network Readiness Index (World Economic Forum, 2013). This assesses a number of factors to provide an overall score for a country's ICT usage and potential usage. Overall, South Africa ranks at number 70 out of 144 countries measured in 2013, an improvement from 72 in 2012 (World Economic Forum, 2013). South Africa ranks comparatively low when compared with Brazil, Russia, India and China: individual, business and government usage and readiness, and infrastructure, scores are lower than in other BRICS countries (see Figure 31 below). While this is compensated for by higher market (no. 25 out of 144 countries), political and regulatory environment scores (no. 23 out of 144 countries), this does mean that South Africa has a low rank in terms of network readiness. This provides yet more evidence that South Africa's ICT sector is underdeveloped relative to that of other developing countries.

Figure 31: Network readiness index for Brazil, Russia, India, China and South Africa (2013)



Source: Analysis of data from World Economic Forum (2013)

4.8. Summary

The telecommunications sector in South Africa has seen significant decreases in mobile voice prices over the last 8 years, from more than R1.50 per minute on average in 2005 to just over R1 per minute in 2012. Call success rates and dropped call rates on mobile networks were mostly within the bounds set by ICASA in 2013, having improved to some degree from an initial, indicative quality of service report prepared by ICASA in 2011. The prices and quality of broadband in South Africa are less encouraging: while mobile broadband prices in South Africa are cheaper than they are in Brazil and China for most products, they are more expensive than in India and Russia. Fixed broadband prices in South Africa are significantly more expensive than in all other BRICS countries. At the same time, South Africa's broadband speeds are significantly slower than speeds in Brazil, Russia and China. South Africans are paying more for broadband than consumers in other countries, and experiencing slower speeds. Investment, revenues and profits for the mobile sector have increased significantly over time for MTN and Vodacom, despite the call termination rate interventions which introduced lower call termination revenues and introduced more intense price competition. Churn has increased to more than 50% for mobile prepaid customers. Churn for postpaid customers, however, is a more sedate 10%, and the latter rate did not change significantly after the introduction of mobile number portability. This suggests that competition for prepaid mobile customers is more intense than it is for postpaid customers.

While Telkom's fixed line voice minutes are declining, a substantial proportion of this decline is accounted for by other fixed line and VOIP operators growing their voice volumes. Telkom's fixed line revenues have declined marginally over time as has their profitability (measured by

EBITDA margins) due to an overall decline in fixed line connections. Telkom's broadband, business voice and data services grew significantly over the last decade, however. Telkom's rates of investment into its fixed line network have fallen as it focused on capital expenditure on its mobile network. This has changed somewhat recently, however, with Telkom announcing that it plans to "de-risk" its mobile investments and has increased investment in its fixed line network. While internet service providers and alternative fixed line operators have connected enterprise customers and the mobile operators, DFA having connected over 4,000 mobile sites for example and Neotel having connected approximately 2,500 business customers, alternative fixed line services have been rolled out in relatively small geographic areas and their reach is limited.

As a consequence of the limited competition among operators, particularly in the fixed line sector, South Africa has a poor ranking in terms of information and communications technology (ICT) sector development. This poor ranking is reflected in the both the World Economic Forum's Network Readiness Index (NRI) as well as the International Telecommunication Union ICT Development Index (IDI). South Africa ranks at number 70 out of 144 countries in the NRI and number 84 out of 154 countries in the IDI. And South Africa's ranking has slipped over time, from ranking at number 72 in 2002 in the IDI. This suggests that policymakers and regulators have an important role to play in improving economic regulation of the telecommunications sector in order to make South Africa competitive with its BRICS rivals. This is developed in more detail in the sections that follow.

5. Regulator performance review

5.1. Introduction

The poor outcomes in the Information and Communications Technology (ICT) sector in South Africa, discussed above in section 4, may to a significant extent result from regulatory ineffectiveness. While regulator effectiveness is difficult to measure objectively, a range of methodologies have been developed to deal with this issue.²⁵ The key questions addressed in this section are:

1. What methodologies should be applied in the assessment of economic regulators?
2. How does economic regulation of the telecommunications sector in South Africa measure against standards of regulatory governance and substance?
3. How has ICASA performed against measures for regulatory effectiveness?
4. How effective has the Competition Commission been in regulating the sector?

Each of these questions is explored in the sections that follow.

²⁵ Much of the literature on regulatory performance reviews have as their main focus market outcomes (see, for example, NERA (2004)). Market outcomes are addressed above in in the sector performance review.

5.2. Methodology

There are a number of methodologies that can be used for the assessment of regulator performance. These include frameworks designed for the telecommunications sector, such as the NERA framework for evaluating the effectiveness of telecommunications regulators in Sub-Saharan Africa (2004), the LIRNEAsia telecommunications regulatory environment survey based methodology (2008), and the European Competitive Telecommunications Association (ECTA) scorecard (2009). There are also regulator performance assessment frameworks that are applicable in a number of sectors, including the World Bank's handbook for evaluating infrastructure regulatory systems (Brown *et al*, 2006).

The NERA framework for evaluating the effectiveness of telecommunications regulators in Sub-Saharan Africa (2004) focuses on the evaluation of the legal framework for regulation of the telecommunications and the implementation of this framework, including the outcomes it gives rise to. NERA (2004) proposes, among other things, evaluating regulators against government objectives, which typically include:

- Expansion of networks;
- Protect consumer rights, including privacy;
- Universal access;
- Prevent abuses of market power, including excessive pricing and exclusion;
- Foster competitive markets to promote efficient supply, good quality, advanced services, and efficient prices;
- Promote confidence in telecommunications markets through transparent licensing and regulation;
- Increased connectivity through interconnection; and
- Optimise use of scarce resources, including spectrum, numbers and rights of way.

When assessing regulation in practice, NERA (2004) recommends evaluating the laws governing the sector and the organisational processes used to make decisions, as well as the following areas:

- Universal access / universal service;
- Licensing;
- Interconnection;
- Price regulation;
- Dispute resolution;
- Spectrum management; and
- Competition policy.

The framework includes an overview of impediments to regulatory effectiveness as well as good governance criteria. Many of these issues are captured in more detail in the World Bank's handbook for evaluating infrastructure regulatory systems, which emphasises the evaluation of the wider regulatory system and not just the regulatory authority (Brown *et al*, 2006).

A regulatory system is (Brown *et al*, 2006):

“... the combination of institutions, laws, and processes that, taken together, enable a government to exercise formal and informal control over the operating and investment decisions of enterprises that supply infrastructure services.”

Brown (*et al*, 2006) stress the importance of assessing both regulatory governance and regulatory substance. The governance questions relate to regulatory processes (formal and informal), independence, transparency, accountability and predictability of decisions. Additional areas relating to governance include the relationship between the regulator and policymaker in decision-making and the resources and institutional structure of the regulator. The evaluation of the substance of a regulator involves assessing decisions made by the regulator, including decisions on tariff setting and market access.

While Brown *et al* (2006) focus on the evaluation of regulators in the power sector, they highlight 3 “meta-principles” for good regulators of any infrastructure sector:

1. Credibility among investors;
2. Legitimacy among consumers; and
3. Transparency for both investors and consumers.

The authors further propose assessing outcomes in the sector against goals set by the government, and the regulator’s role in helping or hindering the achievement of those goals, as the key to evaluating the regulatory environment. The detailed set of standards proposed by Brown *et al* (2006) are set out in Table 6.

Table 6: World Bank Handbook for Evaluating Infrastructure Regulatory Systems: Critical standards for effective regulation of infrastructure

1. Legal framework	1.1 Create a law (articulate the principles and practices in the law, create laws that are forward looking)
2. Legal powers	2.1 Grant final decision-making authority 2.2 Establish minimum jurisdiction (set tariffs, standards; set rules; carry out responsibilities; enforce rules; obtain information; require accounting standards; resolve disputes; prevent exercise of monopoly power; promote competition; protect consumers; prevent undue discrimination; monitor performance)
3. Property and contract rights	3.1 Respect for property rights 3.2 Respect contractual obligations 3.3 Undertake transparent and public actions 3.4 Clarify accountability
4. Clarity of roles in regulation and policy	4.1 Set out clear responsibilities 4.2 Set out formal policy 4.3 Enforce policy 4.4 Adhere to publicly articulated government policies 4.5 Influence decisions transparently
5. Clarity and comprehensiveness of	5.1 Set out clear methodologies in the law 5.2 Lay out complete rules for all stakeholders

regulatory decisions	
6. Predictability and flexibility	<p>6.1 Make decisions consistent with set precedents</p> <p>6.2 Provide sufficient public notice of decisions that deviate from precedent</p> <p>6.3 Apply change gradually and prospectively</p>
7. Consumer rights and obligations	7.1 Protect consumers (maintain quality standards; establish remedies for breach of standards; provide customers with easy access to resolve complaints; set out consumer obligations)
8. Proportionality	<p>8.1 Keep regulation the minimum necessary for efficiency and fairness (where there is demonstrable market failure that cannot be removed by other means; where the economic and social benefits of intervention can reasonably be expected to exceed the likely economic and social costs; where a natural monopoly is an important element of the industry; where significant market power exists; where fundamental consumer protection requires it; where government mandated social policy requires action and where regulation is likely to be the most efficient means for implementing this policy)</p> <p>8.2 Keep regulatory actions well focused and appropriate to the problem being addressed (act with proportionality; use remedies that are relevant to the regulated entity; delegate regulatory responsibilities)</p> <p>8.3 Review activities and methods regularly</p>
9. Regulatory independence	<p>9.1 Create regulatory agencies through primary law</p> <p>9.2 Establish legal powers and characteristics (delegate decisions to a board of commissioners; maintain a stable source of revenue for operations, offer staff competitive compensation packages and appropriate training; establish the administrative structure of the agency and make personnel decisions; set the rules and policies that are needed to carry out responsibilities; proclaim and enforce a code of ethics; retain the services of independent experts as needed and justified; participate in relevant professional organisations)</p> <p>9.3 Determine conditions of service for agency management (Commissioners and directors should be appointed to fixed terms of office; terms of office should not be coincident with the terms of governments and legislatures; commissioners or directors should be appointed only if they are not legally precluded from serving their full terms; appointments of single-person agency directors, commission chairs and other commissioners or board members should be made by the head of government or head of state, with possible legislative approval; in the case of collegial bodies, the terms of commissioners should be staggered to ensure continuity; directors or commissioners should be removed only for good cause as defined in law as found by an independent investigation; the terms and conditions of employment of commissioners or directors should not be altered during the course of a term; directors or commissioners should come from diverse professional backgrounds and training)</p>
10. Financing of regulatory agencies	<p>10.1 Maintain sufficient levels of funding for operations</p> <p>10.2 Obtain funding from special levies</p> <p>10.3 Allow for levied fees to be passed through to consumers</p> <p>10.4 Assess levies according to the revenues, not profits, of regulated entities</p> <p>10.5 Hold levied funds in a special account (return surplus funds to customers or use them for sectoral improvements; allow government cuts in spending authority only if they apply consistently to all agencies; follow the government's fiscal controls; retain consultant services, as needed, for specified tasks)</p>
11. Regulatory accountability	<p>11.1 Conduct hearings to review the agencies' performance (Define agency functions and the division of authority to prevent disputes; employ transparency, effectiveness and timeliness in procedures; make clear, coherent, consistent decisions in a timely manner; make decisions that are proportionate and targeted to the problem encountered; oversee the quality and sustainability of agency decisions; manage the agency's resources efficiently; ensure independence, integrity, and credibility in agency processes and actions)</p> <p>11.2 Hire outside experts to prepare reports on the agency's performance or other special topics</p> <p>11.3 Conduce periodic audits</p> <p>11.4 Submit an annual public report on activities to the government</p>
12. Regulatory processes and transparency	12.1 Make decisions according to all applicable provisions (give proper legal notice; provide appropriate, meaningful information in the public notice; allow the opportunity for meaningful input)

	12.2 Allow for ex post review of emergency actions
	12.3 Issue publicly available, written decisions (issue a clear statement of the decision, describe and analyse all evidence taken into consideration; provide a summary of the views; provide a full discussion of the underlying rationale)
	12.4 Publish clearly defined procedures for decisions
	12.5 Establish methods for making decisions (procedures for announcing decisions made with the majority voting method, procedures for announcing decisions made with the consensual approach)
	12.6 Make all supporting documents publicly available (the appropriate criteria for designating supporting documents as confidential should be applied; the primary law (or failing that, the regulatory agency) should publish in advance its criteria for judging whether documents (or some parts) will be treated by them as confidential and should also establish systems for handling and storing confidential material)
	12.7 Announce publicly the rules the agency will follow in making decisions
13. Public participation	Regulators should take all possible steps to ensure meaningful public participation.
14. Appellate review of regulatory decisions	14.1 Direct appeals to a single, independent appellate forum
	14.2 Handle appeals in a specifically designated court or a specialised appellate tribunal
	14.3 Provide parties with an opportunity to seek an appeal
	14.4 After a decision is made, provide a reasonable period in which an effected party can seek an appeal
	14.5 Prohibit new issues and evidence from appeals
	14.6 Use the appeals process primarily as a check on the agency's ability to act unlawfully or beyond its lawful authority
	14.7 Enforce decisions during appeal
	14.8 Send decisions that were overturned on appeal back to the agency for reconsideration
15. Ethics	15.1 Prohibit favours and gifts from parties involved in agency business
	15.2 Prohibit regulatory personnel from negotiating employment or business opportunities with parties having business before the agency
	15.3 Prohibit conflicts of interests for all personnel and close family members
	15.4 Prohibit favouritism and ethical compromises
	15.5 Require regulatory personnel to disclose their financial interests
	15.6 Prohibit agency personnel or family members from deriving financial benefit in companies related to agency work

Source: Brown et al, 2006, Annexure A

It is important to assess whether regulated entities are acting in their commercial best interests or whether they are pursuing a multiplicity of objectives mandated by the government: if it is the case that the entity in question is the latter, and in particular if it is state-owned, then the problem may not be with the regulatory system itself but rather corporate governance issues, which have a different set of recommendations to those proposed for regulatory systems (Brown et al, 2006).

LIRNEAsia (2008) offers a survey based approach, in which firms directly affected by regulators (operators, investors), analysts (consultants, law firms) and public interest stakeholders (academics, journalists, civil society) rate the regulatory environment on a scale of 1-5. The results of the survey are then collated and analysed by researchers. This approach, similar to the NERA (2004) approach, assesses:

- Market entry;
- Allocation of scarce resources;

- Interconnection;
- Regulation of anti-competitive practices;
- Universal service obligation;
- Tariff regulation; and
- Quality of service.

The LIRNEAsia (2008) model is not suitable for the analysis of an individual country for a single year; rather, aggregate scores, measured over time or across countries, are the most suitable means of assessing an individual country's regulatory environment. The LIRNEAsia (2008) model will therefore not be used in this paper.

The European Competitive Telecommunications Association (ECTA), the association of alternative network providers in the European Union, produced a regulatory scorecard on a number of dimensions (see Table 7 below) (ECTA, 2010). While the ECTA scorecards have been criticised for being too focused on assuming that more regulation will lead to better outcomes (Weeks & Williamson, 2006), the principles set out in the scorecard provide a reasonable basis for assessing the regulatory system of an individual country. It is not as detailed, however, as the Brown *et al* (2006) framework and does by its nature include certain measures that are specific to Europe (Galpaya & Samarajiva, 2009).

Table 7: ECTA scorecard (2010)

Measure	Details
A. General institutional environment	Implementation of EU regulatory framework NRA enforcement powers Scope and scale of NRA resources NRA independence Dispute settlement body procedure Appeals procedure
B. Market entry enablers	Rights of way Numbering Frequencies
C. NRA regulatory processes	Efficiency of dispute settlement body Market analysis process Transparency of NRA process Enforcement record
D. Application of regulation by the NRA	Forward looking approaches Operational conditions Accounting separation Non-discrimination and prevention of leverage
E. Regulatory and market outcomes	Narrowband voice services Mobile & wireless services Business services Broadband

Source: ECTA, 2010

Many of the ECTA measures under A, C and D in Table 7 are captured in the Brown *et al* (2006) standards for effective regulation (see Table 6 above). The measures for 'Market entry

enablers' expand on the assessment of the allocation of scarce resources in the LIRNEAsia (2008) TRE methodology and in NERA (2004).

Waverman and Koutrompis (2011) developed the Telecommunications Regulatory Governance Index (TRGI). The TRGI assesses regulatory governance across a range of countries. The TRGI does not take into account sector outcomes (in terms of investment, prices, etc.). Waverman and Koutrompis (2011) apply statistical methods, including factor analysis and principal component analysis, to develop the TRGI from the International Telecommunication Union's (ITU) ICT Eye dataset (ITU, 2013). While the ICT Eye dataset has its limitations (it has very outdated information on South Africa, for example), the TRGI framework ultimately developed provides a useful set of measures for regulator performance.²⁶ The TRGI includes five measures, each with an equal weighting of 20%, and each of the 18 sub-components have equal weighting for each of the five measures (see Table 8 below).

Table 8: Components of the Telecommunications Regulatory Governance Index

Regulatory transparency	Independence	Resource availability	Enforcement on licensees	Per capita income
Are interconnection agreements made public?	Does the NRA report to the legislature?	Experience (years of operation)	Licence revocation possible?	Gross domestic product per capita
Are interconnection prices made public?	Are members of the NRA appointed by the legislature?	NRA funded by government appropriations or industry fees and consumer levies?	Monetary fines possible?	
Are operators required to publish reference interconnection offers?	Interconnection rates set by NRA or government?	Status of ownership of fixed line operator	Licence suspension possible?	
Are licensing agreements made public?	Price regulation by NRA or government?		Modifications of licence possible?	
Is there public information on spectrum policy?			Additional licence obligations possible?	

Source: Waverman & Koutrompis, 2011

Other than the measure of gross domestic product (GDP) *per capita*, the measures described above in Table 8 above are broadly captured under the Brown *et al* (2006) standards on governance. The 18 sub-components in Koutrompis and Waverman (2011) are specific to the telecommunications sector and provide more depth to the analysis, and will therefore be assessed under the relevant Brown *et al* (2006) standards, other than GDP *per capita* and

²⁶ The ICT Eye dataset, for example, shows Mandla Langa as the Chairperson of ICASA when in fact he was succeeded as Chairperson of ICASA in 2005 by Paris Mashile (see, for example, ICASA, 2006-2012).

experience (years of operation). GDP *per capita* is not directly relevant to the assessment of regulatory governance, and will therefore not be used further in this assessment. Instead of using years of operation to assess the experience of the regulator, which is in turn an indicator of the resources available to the regulator (Koutrompis and Waverman, 2011), the regulator's resources will be assessed directly under the assessment of the substance of the regulator's decisions.

The methodology that will be followed in the rest of this paper for the assessment of regulatory governance will be to assess the South African regulatory environment against the standards proposed by Brown *et al* (2006) for effective regulation (see Table 6 above), supplemented by 16 of the 18 detailed sub-components set out in Koutrompis and Waverman, 2011, excluding GDP per capita and years of operation of the regulator (see Table 8 above).

This will be followed by an evaluation of regulatory substance, which will draw on criteria from the NERA (2004), LIRNEAsia (2008) and ECTA (2010) approaches, including:

Table 9: Elements to be evaluated as part of the regulatory substance evaluation

Category	Measure	Source
Market access	Spectrum allocation	ECTA (2010), LIRNEAsia (2008)
	Numbering management	ECTA (2010)
	Rights of way	ECTA (2010)
	Licensing	NERA (2004)
Competition	Accounting separation	ECTA (2010)
	Enforcement of prohibitions of abuse of dominance and assessment of mergers	NERA (2004), LIRNEAsia (2008), ECTA (2010)
	Interconnection	NERA (2004), LIRNEAsia (2008)
	Facilities leasing (Network access)	
Consumer protection	Quality of service regulation	LIRNEAsia (2008)
	Retail tariff regulation	NERA (2004), LIRNEAsia (2008)

Note that local loop unbundling, which falls under facilities leasing (often referred to as network access) as well as the Competition Commission's settlement with Telkom, and call termination rate setting (which falls, broadly, under interconnection) will be assessed in separate, forthcoming papers that are part of the series that this paper forms part of.

5.3. Government objectives and the demand for regulation

The NERA (2004) and Brown *et al* (2006) frameworks stress the importance of assessing regulatory decisions and interventions against the government's objectives and the demand for regulation. There are several government objectives that are remarkably consistent over time, including lower prices, wider reach and the rollout of digital terrestrial television. For example, the government's objectives five years ago (Matsepe-Casaburri, 2008) were:

1. Greater uptake and usage of telecommunications;
2. Better affordability of telecommunications services;

3. Greater investment in infrastructure;
4. Better quality of services;
5. Development of the business process outsourcing sector; and
6. Migration to digital television.

The government's most recent objectives for the electronic communications sector are similar, and can be summarised as follows (Carrim, 2013):

1. Further reduce the costs of communication;
2. Broadband must become more extensive, affordable and speedier;
3. Reduce the digital divide, and deliver services in rural and under-served areas;
4. State owned companies in the sector must be stable and effective; and
5. Roll-out of digital television.

Brown *et al* (2006) also explain that very often the “supply” side of regulation, in offering better technical support, training and education for regulators, is emphasised while the demand for regulation is limited. The latter is an important factor, as it determines the extent to which regulators are held to account for the implementation of sector reforms. This was emphasised by a member of parliament, who explained that consumers are “human beings and need to feel the improvement of services” (Interviews with members of the Parliamentary Portfolio Committee on Communications). The demand for regulation appears to be growing in South Africa, at least insofar as it is reflected in Parliamentary Portfolio Committee on Communications requirements for greater accountability from ICASA (discussed below).

While there has been considerable progress towards two of government's main objectives, being lower prices and greater access (discussed above in section 4), digital terrestrial television has not been rolled out. This has resulted in delays in the assignment of spectrum for broadband (discussed below) and therefore in lower broadband speeds (discussed above in section 4).

5.4. Review of regulatory governance

5.4.1. Introduction

The review of regulatory governance involves assessing the “how” of the regulatory framework (Brown *et al*, 2006). Brown *et al* (2006) are careful to caution against the close examination of governance standards without understanding first whether there are problems in respect of the corporatisation of regulated entities (a precursor to the effective regulation of a corporatized entity) and there does also need to be a minimum level of rule of law and a culture of independent institutions in the relevant jurisdiction.

There are concerns in South Africa with the corporatisation of Telkom: the government effectively continues to own almost 40% of Telkom SA SOC Limited (Telkom) directly, and the

Public Investment Commissioner owns another 10%.²⁷ The Department of Communications, the policymaker for the sector, continues to manage the government's shareholding actively (see, for example, McLeod, 2012b), and therefore has a conflict of interest in regulating Telkom. The ownership of the fixed line operator is an important determinant of the independence of the regulation of the sector, and is also a determinant of the government's incentive to provide the regulator with sufficient resources: to the extent that the fixed line incumbent is state owned, the sector regulator is likely to be less independent and less well-funded (Waverman & Koutrompis, 2011).

South Africa is in the top 50% of countries in respect of almost all measures in the World Bank's World Governance Indicator's database, with the exception of political stability and absence of violence / terrorism (where South Africa ranks in the 44th percentile) (World Bank, 2013). In fact, South Africa ranks in the 63rd percentile for regulatory quality (World Bank, 2013). South Africa is therefore a good candidate for independent economic regulation in that there is a minimum level of rule of law and a culture of independent institutions.

The fifteen regulatory governance standards set out in Table 6 above are each evaluated in turn in the sections that follow.

5.4.2. Legal framework

The sector is governed by the Electronic Communications Act and Competition Act, which articulates the principles and practices for the sector, and is forward looking in nature, and therefore complies with the relevant Brown *et al* (2006) standards on best practice legal frameworks. In fact, at least the broadcasting component of ICASA's activities (if not all of ICASA's activities) are protected as independent in terms of Chapter 9 of the Constitution of the Republic of South Africa (1996).

5.4.3. Legal powers

ICASA and the competition authorities have final decision-making authority (their decisions are not subject to ministerial approval) in almost all respects and the ECA establishes minimum jurisdiction for the two sets of authorities. An important exception to this is in respect of licensing: ICASA may only issue individual electronic network services (I-ECNS) licences after an Invitation to Apply (ITA) has been issued by the Minister of Communications²⁸. Furthermore, ICASA must consider policies and policy directions issued by the Minister of Communications²⁹.

²⁷ The government also owns Broadband Infraco (See, for example, Broadband Infraco, 2008 - 2013) and Sentech (see, for example, Sentech, 2013). Broadband Infraco operates a smaller, second long distance fixed line network and therefore is less likely to require economic regulation. While Sentech is a dominant firm in respect of terrestrial broadcasting, because Sentech is not a traditional incumbent telecommunications operator it is not dealt with in detail in this report.

²⁸ See section 5(6) of the ECA.

²⁹ See section 3(4) of the ECA.

While the competition authorities do not explicitly have powers to impose minimum accounting standards, set other standards, or set tariffs, ICASA has powers to do so and the Competition Commission in at least one settlement in the telecommunications sector imposed separation of accounting.

Obtaining information is a problem for ICASA (Interviews with ICASA staff members; Aproskie *et al*, 2008), which may only request information in terms of the following sections of the ICASA Act:

- Section 4C(2)(b) of the ICASA Act, where an inquiry has been duly notified (in the government gazette, and which allows 60 days for parties to provide written submissions); and
- Section 17F of the ICASA Act, which permits a duly appointed inspector to request information from any person during the course of an investigation into non-compliance by a licensee. Section 17G also provides such inspectors with powers to search for and seize any document or thing relating to non-compliance by a licensee.

This curtails ICASA's ability to request information for the purposes of ongoing market surveillance, which could otherwise inform prioritisation of ICASA's work, including in respect of potential enquiries to conduct. Section 4C(2)(b) of the ICASA Act also does not allow ICASA to issue summons for information, and the penalty for not providing information is a maximum fine of only R250,000.

Furthermore, ICASA may request information in terms of section 9 of the regulations on standards terms and conditions for class (ICASA, 2007b) and individual (ICASA, 2007c) electronic communications network services licensees but, again, ICASA is not able to issue summons for information in terms of these regulations.

This is in contrast to the competition authorities who may summons information from any person in relation to an investigation or hearing in terms of section 49A (Competition Commissioner) and section 54 (presiding member of the Competition Tribunal) of the Competition Act. Furthermore, it is an offence to provide the competition authorities with false and / or misleading information, in terms of section 72 of the Competition Act.

The rest of the standards set out by Brown *et al* (2006), including setting rules, being able to carry out responsibilities and enforce rules, resolve disputes, prevent exercise of monopoly power, promote competition, protect consumers, prevent undue discrimination, and monitor performance are all in place for both the competition authorities and ICASA.

Specifically, in respect of enforcement, Koutrompis & Waverman (2011) assess the following measures:

- Licence revocation possible?
- Monetary fines possible?
- Licence suspension possible?
- Modifications of licence possible?

- Additional licence obligations possible?

ICASA may suspend or cancel a licence in terms of section 14 of the ECA or modify individual (though not class) licences in terms of section 10. ICASA is also able to suspend or cancel a licence in terms of section 17E of the ICASA Act. Monetary fines are possible, as discussed below under section 5.4.9 (proportionality). Additional licence obligations are also possible in terms of section 10 of the ECA.

With the exception of ICASA's inability to amend class licences and its inadequate powers to gather information, ICASA is in a strong position to enforce the ECA. The competition authorities are in a better position to gather information than ICASA is and have wide powers to enforce the Competition Act.

5.4.4. Property and contract rights

The ECA, ICASA Act and the Competition Act all comply with standards on respect for property rights, including respect for contractual obligations and undertaking transparent and public actions. Clear accountability for regulated entities is established in terms of standards that are formally in place and are publicly available for the sector.

5.4.5. Clarity of roles in regulation and policy

The Competition Act, ECA and ICASA Act provide clarity for ICASA, the Minister of Communications, and the competition authorities in respect of their respective responsibilities, including policymaking, implementation and enforcement. In terms of the rules, neither ICASA nor the competition authorities need to adhere to publicly articulated government policies that are not stated in advance.

As discussed above, ICASA must consider policies and policy directions issued by the Minister of Communications.³⁰ The Minister of Economic Development may intervene formally in proceedings before the competition authority in terms of section 18 of the Competition Act. In terms of Chapter 2 of the ECA, the Minister may make policy decisions and give policy directions to ICASA. In terms of section 4(3) of the ICASA Act, ICASA may make recommendations to the Minister of Communications on policy matters and amendments to the ICASA Act.

The Competition Act provides for memoranda of understanding (MOU) between sector specific regulators and the Competition Commission where there is concurrent jurisdiction (section 82(3)). The Competition Commission and ICASA have entered into an MOU to govern this relationship (Competition Act, 2002). However, the MOU was not updated when the ECA was put in place in 2005.

³⁰ See section 3(4) of the ECA.

5.4.6. Clarity and comprehensiveness of regulatory decisions

The Competition Act is reasonably clear in respect of setting out the matters that it should take into account but the ECA is not precise, particularly where tariff setting for interconnection and facilities leasing is concerned. The ECA is not clear as to whether ICASA must conduct a market enquiry before setting tariffs for interconnection and facilities leasing services. This is discussed in more detail in the call termination rate and local loop unbundling case studies, discussed below in sections 6 and 7.

5.4.7. Predictability and flexibility

The competition authorities and ICASA make decisions that are consistent with set precedents and provide sufficient public notice of decisions that deviate from precedent. ICASA also applies change gradually and prospectively: for example, ICASA tends allowed for a glide path in its call termination rate intervention (discussed below in section 6). However, many of the rules are inflexible and lead to onerous compliance obligations for smaller licensees, discussed below under section 5.4.9 (proportionality) (Interviews with licensees).

There have also been instances, such as the sale of Vodacom shares to Vodafone, when ICASA has not been as predictable (see, for example, Van der Merwe, 2009) and there are numerous instances in which ICASA has failed to follow through in respect of regulation making processes (see, for example, the opening the fixed line sector case study below in section 7). This has created uncertainty in the sector.

5.4.8. Consumer rights and flexibility

The competition authorities do not have a mandate to regulate consumer protection. ICASA does have regulations in place for consumer protection, including in the regulations setting out the minimum standards for end user and subscriber service charters (ICASA, 2009), which provide for:

- The maintenance of quality standards;
- Remedies for breach of standards; and
- A process for customers to have easy access to resolve complaints.

The rules do not set out consumer obligations, however, and they also do not deal with quality of service measures for broadband services, such as latency, jitter and packet loss on IP networks. Furthermore, ICASA has not established the consumer advisory panel provided for in section 71 of the ECA.

5.4.9. Proportionality

The Competition Act establishes rules that are proportionate (fines, for example, are measured against turnover). The ICASA Act does not however establish rules that are proportionate, however. For example, fines have fixed maxima for many contraventions irrespective of the magnitude of the contravention (see section 17H of the ICASA Act and ECA, 2007a; and ECA,

2007b, and ECA, 2008), with the exception of operating a licensable service without a licence, which attracts a fine linked to turnover. In terms of section 17E(2)(b) of the ICASA Act, ICASA does have discretion to prescribe fines in regulations it makes that can be imposed after ICASA takes a decision in terms of section 17E of the ICASA Act after a finding and recommendation has been made by the Complaints and Compliance Committee (CCC) in terms of section 17D of the ICASA Act.

Furthermore, the ECA does not provide for interventions that are proportionate and flexible. The “Open access” requirements in the ECA, including interconnection (chapter 7) facilities leasing (chapter 8), apply to all Electronic Communications Network Services (ECNS) licensees, irrespective of their size or customer base. This is partially remedied by the ECA Amendment Act, no. 1 of 2014, which allows ICASA to exempt licensees from the obligation to interconnect or lease facilities.

5.4.10. Regulatory independence

The competition authorities and ICASA are both created through primary law, and are therefore not subject to as much political influence as agencies that fall under ministries or are created through executive decrees. The independence of at least ICASA’s broadcasting regulatory activities (and possibly its telecommunications and postal regulatory activities) is also protected in terms of Chapter 9 of the Constitution (RSA, 1996).

Brown *et al* (2006) recommend 3 or 5 commissioners, while ICASA has 9 council members. While this meets the ‘independence’ standard (in that there is more than 1 commissioner), it slows down decision making considerably.

ICASA and the competition authorities are also able to establish the administrative structure of their respective agencies and make personnel decisions, set the rules and policies that are needed to carry out responsibilities, and proclaim and enforce a code of ethics in many respects. While the competition authorities are able to retain the services of independent experts as needed and justified, ICASA must obtain the approval of the Minister of Communications before any expert not budgeted for in the relevant financial year is appointed.³¹ Brown *et al* recommend that the regulator be able to appoint outside experts at the expense of the regulated entities in question.

I

CASA staff do appear to be offered competitive compensation packages; however, there is very little way for specialist to progress in their careers without following a management track, which limits the ability of the organisation to attract and retain skilled staff (Interviews with ICASA staff and council members).

ICASA may not consider nor accept applications for individual electronic communications network service (i-ECNS) licenses, which is required for operating a network that is provincial or national in scope (among other things), unless the Minister of Communications issues a

³¹ See section 14 of the ICASA Amendment Act, no. 2 of 2014.

policy direction for them to do so (in terms of section 5(6) of the ECA). This is not remedied in the ECA Amendment Act, which continues to require a ministerial policy direction for consideration and acceptance of i-ECNS licences (clause 5(e)).

The competition authorities and ICASA may both participate in relevant professional organisations and determine conditions of service for agency management. Commissioners, Competition Tribunal members and ICASA Council members are appointed for fixed terms of office, which are staggered and are not coincident with the terms of governments and legislatures. There is no prohibition on the appointment of ICASA council members or competition authority decision makers that are legally precluded from serving their full terms but it is not clear the concern that Brown *et al* (2006) have, that mandatory retirement ages for example will force council members to resign before the end of their terms, is applicable in South Africa.

ICASA councillors are appointed by the Minister of Communications from a short list of candidates prepared by the National Assembly. Proposed councillors are approved by the National Assembly prior to being appointed by the Minister of Communications³². The Competition Commissioner is appointed by the Minister of Economic Development. The Competition Tribunal members are appointed by the President. Therefore, the appointments of key decision makers are not all made by the head of government, and do not in all cases require legislative approval. While the terms of decision makers are not formally staggered in terms of the law, they are staggered in practice. Decision makers at the competition authorities and at ICASA may only be removed for good cause as defined in legislation. Removal of an ICASA councillor requires a resolution from the National Assembly. No such resolution is required for the Minister of Economic Development to remove the Competition Commissioner or for the President to remove a Competition Tribunal member. The competition and electronic communications legislation does not require an independent investigation prior to the removal of a decision maker.

The terms and conditions of members of the Competition Tribunal may not be altered during the course of a term, in terms of section 34 of the Competition Act. However, there is no prohibition on altering the terms and conditions of a Competition Commissioner, Deputy Commissioner or ICASA council member's employment during their term of office. The Minister of Communications, in consultation with the National Assembly, establishes a performance management system for ICASA councillors. Both the Competition Act and the ICASA Act require that decision makers come from diverse professional backgrounds and training.

Waverman & Koutrompis (2011) assess the following factors where independence is concerned:

- Does the NRA report to the legislature?
- Are members of the NRA appointed by the legislature?
- Interconnection rates set by NRA or government

³² See section 5(1) of the ICASA Act, no. 13 of 2000.

- Price regulation by NRA or government?

As discussed above, the National Regulatory Authority (NRA) reports to the legislature but is not appointed by the legislature (although ICASA councillors are subject to parliamentary review and approval). Interconnection rates and price regulation are undertaken by ICASA (the NRA) and not the government. By the Waverman & Koutrompis (2011) measures, therefore, governance of the sector is conducted in a way that is partially independent from the government; the appointment of ICASA councillors by the Minister of Communications, however, weakens this independence.

However, state ownership of the fixed line incumbent limits the independence of sector regulation (Waverman & Koutrompis, 2011). Therefore, the South African government's significant stake in Telkom (discussed above) limits ICASA's independence.

5.4.11. Financing of regulatory authorities

ICASA and the competition authorities are not able to maintain sufficient levels of funding for operations.³³ While the Competition Commission obtains some funding from merger filing fees, the bulk of the Commission's funding is raised from an appropriation from Parliament (see section 40 of the Competition Act). The Competition Tribunal is also funded through an appropriation from Parliament (see section 42 of the Competition Act). While licensees do pay licence fees, these fees are paid into the National Revenue Fund and not into ICASA's bank account. ICASA is funded by an appropriation from Parliament. This suggests that neither the Competition Commission nor ICASA are independent from the government, in terms of this standard proposed by Brown *et al* (2006). Koutrompis and Waverman (2011) also use sourcing of finance through consumer levies and industry fees, rather than from government, as an important measure of the independence of the regulatory authorities.

In addition to this, state ownership of the fixed line incumbent negatively impacts on the government's incentives to provide resources to the sector regulator (Waverman & Koutrompis, 2011). The South African government's significant shareholding in Telkom (discussed above) therefore limits the government's incentives to provide sufficient resources to ICASA.

The fees that licensees pay are levied according to the revenues, and not the profits, of regulated entities, and the costs of these fees are passed through to consumers in that retail prices are generally not regulated in South Africa.

Because ICASA and the competition authorities' funding is not levied, at least for the most part, there is no provision that allows for excess levied fees to be passed through to consumers. While the Competition Commission is able to hold levied funds in a special account, ICASA and the Competition Tribunal do not generate levied fees. Both ICASA and

³³ Furthermore, both ICASA and the competition authorities' annual reports are submitted to their respective line ministries, which then submit them to the National Assembly.

the competition authorities rely on Parliamentary expropriations, and therefore they are not able to return surplus funds to customers or use them for sectoral improvements. There is no rule that prohibits government cuts in spending only if they apply consistently to all agencies.

The government's fiscal controls, as set out in the Public Finance Management Act (no. 1 of 1999), are followed by ICASA and the competition authorities. As discussed above, while the competition authorities may retain expert advisory services, as needed, for specified tasks, ICASA needs permission from the Minister of Communications to appoint experts not budgeted for. Brown *et al* (2006) explain that best practice would allow ICASA to have regulated entities pay for foreign experts, where required.

5.4.12. Regulatory accountability

ICASA is called to account regularly by the Parliamentary Portfolio Committee on Communications: one interview with an ICASA staff member revealed that ICASA presented in Parliament no less than 4 or 5 times over a 5 month period recently. ICASA appears before Parliament no less than once every three months (Interviews with members of Parliament). Parliament conducts hearings to review the performance of the competition authorities and ICASA.

As discussed above, agency functions and the division of authority between agencies is reasonable well defined to prevent disputes. Both the competition authorities and ICASA employ transparency, effectiveness and timeliness in procedures.

While the decisions of the competition authorities are reasonably clear, coherent, and consistent they are not always arrived at in a timely manner: one complaint in the telecommunications sector took 10 years before a decision was arrived at (discussed more in detail in section 7 below). ICASA's decision making processes are also very slow: the Local Loop Unbundling process was targeted for completion in November 2011, and still has not been implemented, as at November 2013 (also discussed in more detail in section 7 below). The ICASA Amendment Act, no. 2 of 2014, partially deals with this problem in that ICASA will have fewer days in which to publish the findings of an inquiry (90 days instead of 180 days).

As discussed above, ICASA is not able to make decisions that are proportionate and targeted to the problem encountered, particularly when it comes to the imposition of penalties, and applying the widely framed interconnection and facilities leasing provisions of the ECA. The competition authorities are better able to intervene in a more targeted and proportionate manner.

While the quality and sustainability of the competition authority's decisions can be assessed by assessing their record in cases that are appealed, there is very little oversight of the quality and sustainability of ICASA's decision-making, as regulated entities very rarely take ICASA's decisions on appeal (discussed below in section 5.5.1). ICASA's decisions may only be reviewed by a High Court on relatively narrow grounds, while the Competition Appeal Court has wide powers to overturn the Competition Tribunal's decisions. The competition authorities

participate in international fora where their positions on various matters are debated. ICASA is less reliant on external reviews of their decisions by third parties.

Both ICASA and the competition authorities are overseen by Parliament in respect of the management of the agencies' resources. ICASA councillors are also individually accountable to the Minister of Communications in terms of a performance management system, established in consultation with Parliament, in terms of section 6A of the ICASA Act. This limits the independence that ICASA has from the government. This is partly improved by the ICASA Amendment Act, no. 2 of 2014, which allows for the collective accountability of the Council to the Minister of Communications and Parliament.

The Competition Commissioner and Competition Tribunal members' remuneration and other benefits are established by the Minister of Economic Development, in consultation with the Minister of Finance. However, neither the Competition Commissioner nor the Competition Tribunal members have a performance management obligation to the Minister for Economic Development.

Parliament plays an important role in ensuring the independence, integrity, and credibility in ICASA's processes and actions (Interviews with members of the Parliamentary Portfolio Committee on Communications).

As discussed above, while the competition authorities hire outside experts to prepare reports on various topics, ICASA requires the permission of the Minister of Communications to do so. While the competition authorities debate their positions at international fora, ICASA does not do so, or at least not to the same extent. Neither ICASA nor the competition authorities have used external advisors to assess their performance. Both ICASA and the competition authorities submit annual public reports on activities to Parliament.

5.4.13. Regulatory processes and transparency

The competition authorities and ICASA make decisions according to all applicable provisions in their legislation: they give proper legal notice, provide appropriate, meaningful information in the public notice, and allow the opportunity for meaningful input. They also announce publicly the rules that they will follow in making decisions. All administrative action in South Africa, including that taken by the competition authorities and ICASA, must be taken in terms of the Promotion of Administrative Justice Act (PAJA, no. 3 of 2000), which provides for an additional layer of requirements for fairness and transparency.

ICASA and the competition authorities do not take emergency actions and therefore there is no need to allow for ex-post review of emergency actions. The Competition Tribunal does have interim relief proceedings in terms of section 49C of the Competition Act, which are followed by ordinary proceedings which could lead to the end of the relief imposed on an interim basis.

The competition authorities and ICASA also issue publicly available, written decisions: they issue a clear statement of the decision, describe and analyse all evidence taken into

consideration, provide a summary of the views, and provide a full discussion of the underlying rationale. These authorities also publish clearly defined procedures for decisions, and have established methods for making decisions. The ICASA Council makes decisions by majority vote (section 11 of the ICASA Act), as do Competition Tribunal panels (section 31(6) of the ECA).

The Competition Tribunal makes all supporting documents that are not confidential publicly available. The ICASA Complaints and Compliance Committee must keep a record of all proceedings, and must make this record publicly available, in terms of section 17(C)(7) of the ICASA Act. Both ICASA and the competition authorities apply appropriate criteria for designating supporting documents as confidential. The primary laws include criteria for judging whether documents (or some parts) will be treated as confidential, and at least the competition authorities have established systems for handling and storing confidential material; ICASA does not have a formal case management system in place (Interviews with ICASA council and staff members).

The measures used by Koutrompis and Waverman (2011) to assess transparency include:

- Are interconnection agreements made public?
- Are interconnection prices made public?
- Are operators required to publish reference interconnection offers?
- Are licensing agreements made public?
- Is there public information on spectrum policy?

In terms of section 39(3) of the ECA, interconnection agreements, including interconnection prices, are available to the public. In practice, access to interconnection documentation is limited, at least partly because ICASA does not have a formal case management system in place (as discussed above). The call termination regulations impose reference interconnection offers on MTN, Vodacom and Telkom (ICASA, 2010a). There is some public information on draft Invitations to Apply for spectrum in high-demand bands and spectrum management is set out in Chapter 5 of the ECA. ICASA makes available documentation relating to licences to the public in terms of section 9(4) of the ECA, subject to restrictions on the disclosure of confidential information. The current process in terms of which decisions are being made on the assignment of spectrum in high demand bands is not clear, however. Nonetheless, in terms of the measures proposed by Koutrompis and Waverman (2011), the regulation of the sector is reasonably transparent overall.

In practice, ICASA does conduct private negotiations with regulated entities to some extent, and does not always expose the full reasons for its decisions. This is discussed in more detail in section 7 below.

5.4.14. Public participation

The proceedings of the competition authorities and ICASA are all held in public. ICASA allows submissions to be made electronically via email. The Competition Tribunal publishes its diary on its website. These authorities generally encourage meaningful public participation.

Both ICASA and the Competition Commission could include greater public participation in respect of overarching research in the sector and strategic planning and prioritisation of their work, however (Comments at Open Society Institute seminar on review of ICASA's performance).

5.4.15. Appellate review of regulatory decisions

While the competition authorities have a dedicated appellate body, the Competition Appeal Court (established in terms of section 36 of the Competition Act), ICASA's decisions cannot be appealed to a dedicated appellate body. Nonetheless, parties may seek an appeal of decisions by ICASA and the competition authorities within a reasonable period. It is not clear whether new issues and evidence may be presented in appeals.

The appeals process for both the competition authorities and ICASA is primarily a check on the agencies' ability to act unlawfully or beyond its lawful authority. Some of ICASA's decisions are enforced during the appeal process: matters relating to interconnection and facilities leasing, for example, remain in force during the course of appeals in terms of sections 40(3) and 46(3) of the ECA, respectively.

The Competition Appeal Court, as a specialist appellate body, has wide powers to uphold, amend or overturn decisions by the Competition Tribunal. The High Court, however, may only review ICASA's decisions on more narrow grounds, such as whether administrative action by ICASA was fair in terms of the Promotion of Administrative Justice Act, no. 3 of 2000 (discussed above).

5.4.16. Ethics

ICASA is required to publish a code of ethics in terms of the ICASA Amendment Act, no. 2 of 2014. A Competition Tribunal member may not represent any person before a panel of the Competition Tribunal and may not participate in any hearings in which the member has a financial or other interest in the matter, in terms of section 32 of the Competition Act.

Nonetheless, there are no explicit prohibitions (at least currently, prior to the publication of ICASA's code of ethics):

- Of favours and gifts from parties involved in agency business;
- On regulatory personnel from negotiating employment or business opportunities with parties having business before the agency;
- Of conflicts of interests for all personnel and close family members; and
- On favouritism nor of ethical compromises.

All ICASA councillors and the ICASA CEO must disclose their interests, financial or otherwise, in a register that is available for inspection. There is however no explicit requirement for other regulatory personnel to disclose their financial interests. Furthermore, while ICASA councillors may not have a financial interest in the electronic communications, broadcasting or postal

industries, there is no prohibition on other ICASA personnel deriving financial benefit from companies related to ICASA's work.

5.4.17. Summary

There are important flaws in the regulatory framework for the telecommunications sector in South Africa. Key among these flaws is the ownership of regulated entities by the state and the policymaker (the DOC) having shareholding responsibility for these regulated entities. This undermines the independence of the regulator. ICASA's independence is also undermined in other ways, including through performance monitoring of councillors by the Minister of Communications and the inability for ICASA to appoint experts without ministerial approval where experts are not in ICASA's approved budget. Finally, and linked to the lack of independence of the regulator from regulated entities, ICASA engages in private negotiations with regulated entities (discussed in more detail in section 7 below). While the competition authorities, which are not directly linked to regulated entities, have intervened in the sector they have done so partially and in relation to specific products and markets where ex-post evaluation of conduct has been possible. A better approach would be for the sector specific regulator, ICASA, to regulate the sector holistically.

A summary of the assessment of the Brown *et al* (2006) governance criteria is shown on Table 10 below.

Table 10: Summary of assessment of governance standards for the economic regulation of the telecommunications sector in South Africa

Standard	Do laws / rules comply with standard?	Key problems identified	Do the amendment acts remedy the problem?
1. Legal framework	Yes		
2. Legal powers	Partially	ICASA does not have sufficient legal powers to obtain information.	No
3. Property and contract rights	Yes		
4. Clarity of roles in regulation and policy	Partially	The MOU between ICASA and the competition authorities has not been updated since the ECA was put in place. ICASA must consider ministerial policies and policy directions.	No
5. Clarity and comprehensiveness of regulatory decisions	No	The ECA is not clear as to whether ICASA must conduct a market enquiry before setting tariffs for interconnection and facilities leasing matters.	No
6. Predictability and flexibility	Partially	ICASA often does not follow through with regulation making processes and reversed itself after political pressure in respect of the Vodafone / Vodacom transaction. See also discussion under Proportionality.	No
7. Consumer rights and obligations	Partially	ICASA's consumer protection rules do not set out what consumers are responsible for, and while quality for voice services is dealt with, quality of broadband services is not.	No

Standard	Do laws / rules comply with standard?	Key problems identified	Do the amendment acts remedy the problem?
8. Proportionality	No	<p>ICASA has not established the consumer advisory panel.</p> <p>ICASA has fixed maximum fines not linked to the magnitude of the contravention.</p> <p>The ECA's "open access" principles for interconnection and facilities leasing are too wide and catch all licensees, which is disproportionate for small licensees.</p>	Partly: ICASA may exempt licensees from the facilities leasing and interconnection regulations.
9. Regulatory independence	No	<p>No independent investigation is required prior to removal of decision makers.</p> <p>Brown <i>et al</i> recommend 3 or 5 commissioners; ICASA has 9.</p> <p>ICASA council members and the Competition Commissioner and Deputy Commissioners are appointed by line Ministers and not the President, and their terms of service may be changed while they are in office.</p> <p>While staff are offered reasonable means of career progression, there is no track for specialists to progress outside of management structures.</p> <p>ICASA may not employ experts outside of its approved budget without ministerial approval.</p> <p>ICASA may not issue i-ECNS licences without a Ministerial policy direction.</p> <p>State ownership of Telkom limits ICASA's independence.</p> <p>ICASA councillors are accountable to the Minister of Communications (in addition to Parliament) for their performance.</p>	Partly: ICASA may employ foreign experts but must seek funding approval from Minister if additional funds are required. Best practice is to allow ICASA to have regulated entities fund experts. ICASA councillors will be collectively measured on their performance.
10. Financing of regulatory agencies	No	<p>Funding generally not raised through special levies from regulated entities.</p> <p>No rule that prohibits government cuts in spending only if they apply consistently to all agencies.</p> <p>No allowance for authority to have regulated entity fund the costs of consultants.</p> <p>State ownership of Telkom reduces government's incentives to fund ICASA.</p>	No
11. Regulatory accountability	Partial	<p>Both ICASA and the competition authorities' processes can be very slow, taking years (and in some cases more than a decade) to finalise.</p> <p>These authorities also do not seek outside expert advice on their performance.</p> <p>Regulated entities do not regularly appeal ICASA's decisions.</p> <p>See discussion above under proportionality on inability for ICASA to intervene in a proportionate and targeted manner.</p>	Partly: ICASA Amendment Act reduces time periods in which ICASA must publish findings.
12. Regulatory processes and transparency	Partial	ICASA does not have a case management system to preserve confidential information and facilitate provision of access to documents that are public in terms of the ECA.	No

Standard	Do laws / rules comply with standard?	Key problems identified	Do the amendment acts remedy the problem?
13. Public participation	Yes	ICASA in some instances enters into private negotiations with regulated entities instead of conducting transparent proceedings.	
14. Appellate review of regulatory decisions	No	There is no dedicated appellate body for ICASA's decisions to be appealed to.	No
15. Ethics	No	There are no prohibitions on a variety of ethical problems set down in legislation, and there are no requirements for most regulatory personnel to disclose their financial interests.	Partially. ICASA code of ethics to be developed.

5.5. Review of the substance of regulatory decisions

The review of regulatory substance is the review of “what” the regulator does (Brown *et al*, 2006). It is important to review the outcomes of regulation, as discussed above, which are addressed above in section 4. This part of the paper reviews the decisions and activities of the regulator. First, overall regulator capacity and quality of decision-making will be reviewed. This will be followed by a review of each of the substantive issues described in Table 9 above.

5.5.1. Overall assessment

Telecommunications regulatory environment

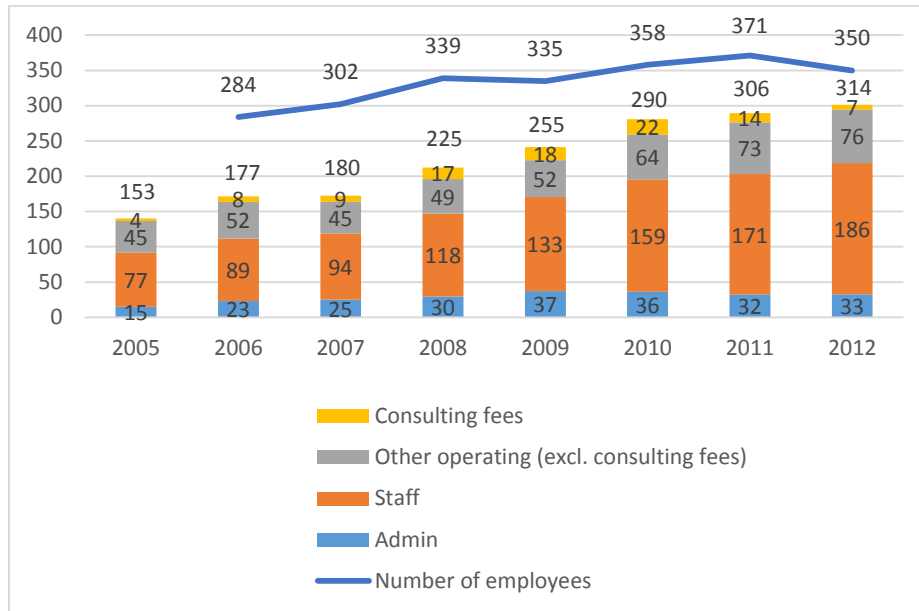
Research ICT Africa (2013) produced a Telecommunications Regulatory Environment (TRE) assessment for South Africa, based on the methodology developed by LinneAsia (2008), discussed above. The assessment compared perceptions of the telecommunications regulatory environment in 12 African countries. South Africa had the second lowest score, at almost -1 on a range of between -2 and +2. The only country that rated more poorly than South Africa was Ethiopia, which has seen the least regulatory reform in Africa (RIA, 2013a). While the TRE assessment uses a perception survey and relies on a very small number of respondents, the assessment is indicative of relatively poor performance of the regulators of the telecommunications sector in South Africa.

Regulator capacity

ICASA is widely perceived as having weak capacity due to resource constraints, which is used to explain ICASA’s perceived lack of performance (Interviews with operators; Comments at seminar). ICASA’s annual reports (ICASA, 2006-2012) show that its budget has increased significantly above inflation and that its staff complement has grown significantly, at least between 2005 and 2013. ICASA’s budget increased from R153m in 2005 to R314m in 2012,

and their staff complement increased from 284 employees in 2006 to 350 employees in 2012.³⁴

Figure 32: ICASA expenses (Rm) and employees, 2005 - 2012



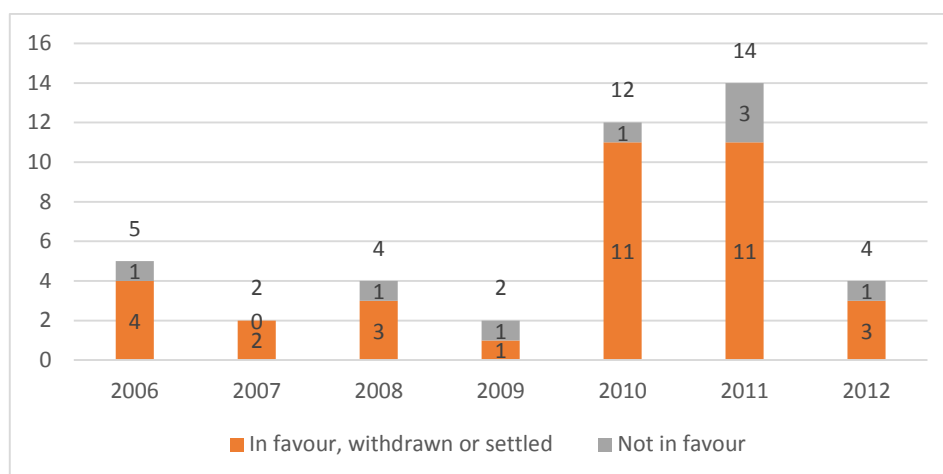
Source: ICASA, 2006 - 2012

Quality of decisions

The bulk of the matters on which ICASA's decisions were taken on appeal were subsequently decided in favour of ICASA, withdrawn or settled (see Figure 33 below). This suggests that ICASA's decision-making is of a high standard. Nonetheless, this outcome might be the result of the fact that regulated entities do not take ICASA on appeal very often, because regulated entities need ICASA to allocate scarce resources to them, including numbers and spectrum. Furthermore, ICASA may have conceded its position in cases that were settled.

³⁴ Note that the Postal Regulator was merged with ICASA in terms of the ICASA Amendment Act, no. 3, 2006. The Postal Division moved to ICASA's offices on 1 January 2007 (ICASA, 2006-2012). In 2007 ICASA had 302 employees, and in 2012 there were 350 employees, and this increase was not due to the incorporation of the postal regulator.

Figure 33: Number of ICASA decisions that were appealed, and which were decided in favour of ICASA, withdrawn or settled



Source: ICASA, 2006 – 2012

5.5.2. Market access

Research ICT Africa (2013) reports that the Telecommunications Regulatory Environment (TRE) assessment for South Africa, based on the methodology developed by LirneAsia (2008) discussed above, shows that the perception of access to scarce resources, including spectrum and numbers, is negative and has declined over time, from slightly greater than -1 but less than 0 in 2006 to less than -1 but greater than -2 in 2011. While this is based on a perception survey of a limited number of respondents, the TRE assessment suggests that South Africa’s regulatory environment is not conducive to new entry.

Spectrum allocation

Radio frequency spectrum allocation is managed in terms of Chapter 5 of the ECA and the radio frequency spectrum regulations (ICASA, 2012c). ICASA has issued a significant number of radio frequency spectrum licences in bands typically used for large business customers (spectrum in radio frequency bands greater than 3.5GHz) and for backhaul of mobile network base transceiver stations (BTS) sites. While ICASA’s data on radio frequency spectrum licences is limited in nature and reporting is not consistent from year to year, there appear to be tens of thousands of spectrum licences that have been issued, and thousands more are issued each year (see Table 11). The total number of licences in issue appears to have fallen significantly between 2007 and 2012, from more than 80,000 licences to less than 50,000 licences. This coincides with the introduction of radio licence fee spectrum regulations in 2010, which resulted in significant increases in charges for holding a spectrum licence (ICASA, 2010d).

Table 11: Number of radio frequency spectrum licences issued, 2005 - 2012

	2005	2006	2007	2008	2009	2010	2011	2012
Total licences - open / renewals				41886	39658	40062	72998	46109
New issued		2500	5100	3351		4962	5032	2635
Cancellations		8500	5550	3451	1627	1345	31921	1659
Total licences issued and renewed	86613	87000+	88300+			43679	46109	47085

Source: ICASA (2006-2012)

Note: ICASA does not report consistently on spectrum licensing over time.

However, ICASA has been less successful in issuing spectrum that could be used for mass market broadband services, even though there is a significant amount of spectrum that could be made available for broadband purposes. ICASA issued invitations to apply (ITA) for spectrum in high demand bands, which are bands that can be used for access networks to provide services to large numbers of customers, in terms of the high demand radio frequency spectrum licensing regulations (ICASA, 2010f) for the 2.6GHz and 3.5GHz bands in 2010 (ICASA, 2010g & ICASA, 2010h). These ITAs were subsequently withdrawn by ICASA (ICASA, 2010i), although the high demand radio frequency spectrum licensing regulations were not. The ITAs were withdrawn in order to allow ICASA to re-evaluate the design of the band in light of developments in technology, and in order to obtain expert advice on auctions (ICASA, 2010i).

Subsequently, in 2011, the Department of Communications (DOC) released 'draft policy directions for electronic communications services in high demand spectrum' (DOC, 2011a), which proposed combining the licensing of the 800MHz (digital dividend) band and the 2.6GHz bands. While the 800MHz band is suited to providing wider coverage and therefore facilitates deeper penetration of broadband into rural and other under-serviced areas, the 2.6GHz band is better suited to providing greater bandwidth in densely populated areas that have high demand. The policy also called for a wholesale open access network, new entrants, universal service, and the promotion of broad based black economic empowerment (BBBEE). Together with this draft policy direction, the DOC released draft policy directions on exploiting the digital dividend, which included amongst other things a proposal for ICASA to investigate the use of television white space technologies (DOC, 2011a).

At the end of 2011, ICASA released its draft 800MHz and 2.6GHz spectrum assignment plan for assignment of combinations of spectrum in these two bands as well as ITAs (ICASA, 2011e). This draft plan included some of the Minister's recommendations, including the construction of an "Open Access Network". The draft ITAs also included a proposal for a "spectrum park", where spectrum would be available on a shared basis and would be self-managed by users of the spectrum. Wholesalers in this model would not have been allowed to offer retail services. This assignment plan and set of ITAs were subsequently withdrawn by ICASA, pending a Ministerial policy direction on spectrum assignment (Ellipsis, 2012).

The substantial delays in assigning spectrum (almost four years), a scarce resource critical for new entry and for the rollout of broadband, has significantly hampered market access and the extension of broadband services to all South Africans. While ICASA must consider Ministerial policy directions in terms of section 3(4) of the ECA, they need not have waited for such directions before licensing radio frequency spectrum.

Numbering management

Number management is an important function of ICASA's. New entrants require telephone numbers in order to offer voice services to their customers. ICASA promulgated numbering plan regulations in 2012 (ICASA, 2012b) and issues numbers in terms of these regulations. The number of applications for numbers has increased significantly over time, from approximately 152 in 2008 to 309 in 2012 (ICASA, 2006-2012). This suggests that the allocation of numbers, in all likelihood to new entrants, is proceeding apace, which is supportive of competition.

The number portability regulations were promulgated in 2005 (ICASA, 2005), and governed fixed and mobile number portability. Mobile number portability was introduced in 2006 and has risen significantly since then, from less than 177,000 numbers ported in 2007 to more than 475,000 numbers ported in 2013 (see Table 12 below). Individual number portability for geographic (fixed) numbers was introduced in 2010 (ICASA, 2010j).

Table 12: Geographic and mobile numbers ported (2006-2013)

	Mobile numbers ported	Geographic numbers ported
November 2006 - December 2007	177,469	
January - December 2008	160,501	
January - December 2009	164,913	
January - December 2010	215,456	136,097
January - December 2011	235,975	64,738
January - December 2012	367,555	60,715
January - November 2013	475,616	71,895

Source: Number Portability Company, 2006-2013

The limited number of geographic numbers ported suggests that this intervention has not been as successful as mobile number portability. One operator reported significant problems with numbers ported away from the incumbent fixed line provider, Telkom, in that calls to ported geographic numbers from the Telkom network sometimes are not passed through by Telkom (Interviews with operators). This operator therefore actively discourages porting numbers away from the Telkom network. Furthermore, there is no number portability in place for non-geographic and non-mobile numbers, like 080, 0860 and 0861 numbers.

This suggests that ICASA's management of numbers, while reasonably fair and conducted in terms of regulations, has not had the impact that is possible, at least in respect of geographic

number portability. The lack of non-geographic number portability hampers competition for the supply of voice services to business customers.

Rights of way

The ECA requires that the Minister of Communications publishes guidelines for the rapid deployment of networks (see ECA, section 21). Section 22 of the ECA allows for any Electronic Communications Network Service (ECNS) licensee to build a network across any land, public or private, subject to applicable law. However, this has not prevented municipalities like Ekurhuleni from declaring a moratorium on approvals for new rights of way, which effectively stopped the construction of networks there for a period (McLeod, 2012a). More recently, Tshwane (2013) has made available online wayleave applications which should speed up approvals of rights of way, and which sets a useful precedent for other municipalities. Furthermore, South Africa Connect (DOC, 2013b) sets out specific measures to improve the approval of rights of way.

Nonetheless, the lack of implementation of rapid deployment guidelines significantly hampers market access, since new entrants are not able to build out their networks quickly and easily. The regulatory environment is not conducive to new entry in this respect.

Licensing

The licensing framework is set out in Chapter 3 of the ECA. As discussed above, ICASA may issue invitations to apply for Individual Electronic Communications Network Services (IECNS) licences only after the Minister has issued a policy direction in terms of section 3 of the ECA. There are approximately 467 licensees in total in South Africa, and there are approximately 450 IECNS licensees (ICASA, 2011e).

While this suggests a relatively liberalised, open access market, it is not. The significant number of licensees has arisen due to litigation by Altech rather than a market friendly approach by ICASA and the DOC. The *Altech Autopage Cellular (Pty) Ltd v The Chairperson of the Council of the Independent Communications Authority of South Africa & Others* (“Altech”) case led to the licensing, in 2009, of hundreds of Value Added Network Services licensees.

The only policy direction since the *Altech* case for new IECNS licences has been for Broadband Infracore (DOC, 2009). In order to obtain a licence for the rollout of a telecommunications network, therefore, a new entrant would have to buy an existing licensee. While class ECNS licences are available for new entrants and can be issued relatively easily through a registration process, they may not be issued for a network that is provincial or national in scope (see section 5(3)(a) of the ECA). Their activities may only take place within a local or district municipality. As a result, this licensing framework, and its implementation by the DOC and ICASA, is not conducive to new entry.

5.5.3. Competition

According to the Telecommunications Regulatory Environment (TRE) assessment, stakeholder perceptions of the regulation of anti-competitive practices improved between 2006 and 2011, from less than -1 but greater than -2, to greater than -1 but less than 0, on a scale of between -2 and +2 (RIA, 2013a). Again, while this is a perception survey with a limited number of respondents, the perception of the regulation of anti-competitive activities in telecommunications markets in South Africa has improved.

Accounting separation

Brown *et al* (2006) identify the lack of accounting separation as one of the key sins of omission of infrastructure regulators. Accounting separation has not been implemented in South Africa by ICASA. While MTN, Vodacom and Telkom notionally must comply with accounting separation in terms of section 7(c) of the Call Termination Regulations (ICASA, 2010a), this is in terms of Accounting Separation and Cost Accounting regulations to be prescribed by the Authority, which have to date not been prescribed.

In the settlement agreement arrived at in *the Competition Commission vs. Telkom SA SOC Limited* case (referred to as the settlement agreement hereafter) which related to various abuse of dominance complaints, the Competition Commission imposed functional separation, including accounting separation (at least to some degree), on Telkom. This is incorporated in Annexure A: Transfer Pricing Programme, which sets out the way in which Telkom plans to arrive at tariffs based on costs for various wholesale “fixed network products”, and then provide these products to Telkom’s internal retail divisions and other licensed operators in a non-discriminatory manner. In terms of the settlement, Telkom will submit the findings of an audit of the transfer pricing mechanism to be implemented between Telkom Wholesale and Telkom Retail to the Competition Commission.

While the settlement agreement provides for functional separation of Telkom Wholesale and Telkom Retail, the accounting separation arrangements are incomplete in that they do not specify the details of relevant costs that will be separated out, how joint and common costs will be allocated, nor indeed which cost accounting method will be used (such as long run average incremental cost, fully allocated cost, stand alone cost, etc.). The settlement agreement also does not fully provide for the mandatory submission of the accounts for regulated wholesale and retail products, as it simply requires that the auditor’s report be submitted to the Competition Commission. The accounting separation imposed in the Telkom settlement agreement is therefore incomplete. This is dealt with in more detail in section 7.

Enforcement of prohibitions of abuse of dominance and assessment of mergers

The Competition Tribunal ruled on approximately 24 mergers and decided 3 complaints in the telecommunications sector between 1999 and 2013 (Competition Tribunal, 2013). While the Competition Commission assessed many more cases, the Commission does not publish its reports, and its activities in the sector are therefore less quantifiable. Furthermore, many cases that are brought before the competition authorities are settled before a final decision is

published, and therefore assessing the competition authorities on the number of decided cases does not account for the full impact of their activities. Nonetheless, the limited number of decided cases, particularly in respect of abuse of dominance, indicates that the competition authorities' activities in the sector have been relatively limited. Furthermore, the competition authorities' processes are exceedingly slow. The abuse of dominance complaint against Telkom decided in 2012 was first lodged with the Commission in 2002, while some of the complaints settled in 2013 were lodged with the Commission in 2005.

Enforcement of prohibitions of abuse of dominance and the assessment of mergers in the fixed line sector are dealt with in more detail in section 7 below.

Interconnection

Interconnection is regulated in terms of Chapter 7 of the ECA and the interconnection regulations (ICASA, 2010b). This is set out in more detail in section 2.2.1 above. MTN, Vodacom and Telkom must each make available Reference Interconnection Offers in terms of the Call Termination Regulations (ICASA, 2010a).

The Complaints and Compliance Committee has adjudicated on several interconnection related matters, including *Telkom SA Ltd. vs. Vodacom (Pty.) Ltd.*, *Telkom SA Limited vs. MTN (Pty.) Ltd.* and *Telkom SA Ltd. vs. Cell C (Pty.) Ltd.* which related to call termination rates, and a dispute relating to transit of voice calls in *Thinta Thinta Telecommunications (Pty.) Ltd. vs. Telkom SA Limited*.

The complaints brought by Telkom against Cell C, MTN and Vodacom all related to Telkom Mobile, as a new entrant, wishing to charge an asymmetrically high call termination rate of R0.93 per minute for all calls including calls from Community Service Telephones (CSTs), compared to the lower R0.89 per minute rate charged by the incumbent mobile operators at the time for calls during peak hours, and R0.06 per minute for calls originating from CSTs. ICASA subsequently published call termination rate regulations which resolved the matter, including in relation to asymmetry (ICASA, 2010a). This is the only market enquiry conducted by ICASA in terms of Chapter 10 of the ECA which has led to the regulation of wholesale pricing.

The *Thinta Thinta Telecommunications (Pty.) Ltd. vs. Telkom SA Limited* matter appears to have been resolved by Telkom fairly quickly, and clarified the fact that voice transit (Telkom suspended the transmission of calls from the Thinta Thinta network to Econet in Zimbabwe) falls within the purview of interconnection regulation, in that the complaint and the CCC judgement related to the interconnection agreement between Telkom and Thinta Thinta.

The Telecommunications Regulatory Environment (TRE) assessment shows that the regulation of interconnection has improved significantly, from less than -1 (but greater than -2) in 2009 to more than -1 in 2011 (but less than 0), on a scale of between -2 and +2 (RIA, 2013a). While this survey is based on the perceptions of very few stakeholders, it indicates some improvement in the interconnection environment.

While the regulation of interconnection is largely a success in South Africa, the lack of an interconnection regime for toll free (080) and smartcall (0860) numbers is a significant gap and makes the provision of competitive services for these numbers difficult. 080 numbers are free to the caller, and callers pay only a “local” calling rate for calls from 0860 numbers. Calls from those numbers are paid for by the recipient of the call, usually a business customer. However, without an interconnection regime to deal with this, such as in which call termination flows in the opposite direction (from the operator receiving the call to the operator originating the call), operators may charge their customers to originate 080 calls and operators may charge a higher rate than the “local” rate for calls to 0860 numbers. While this is being dealt with partially by ICASA in their call for proposals for a framework on toll free numbers (ICASA, 2013d), the problem is not being dealt with for 0860 numbers.

The interconnection regime appears to be reasonably effective, save for the routing of ported numbers from the Telkom network (discussed above) and the lack of a regime for 080 and 0860 numbers.

Facilities leasing (Network access)

Facilities leasing is regulated in terms of Chapter 8 of the ECA and the facilities leasing regulations (ICASA, 2010c). This is set out in more detail in section 2.2.2 above. Unlike in respect of interconnection, there has been only one facilities leasing dispute, *Neotel vs. Telkom*. This dispute is discussed in more detail in section 7 below. For the purposes of evaluating the performance of ICASA, however, it is important to note the significant delays in arriving at a decision in this case. The facilities lease request was made by Neotel in November 2010 and the dispute was lodged with ICASA in March 2011. The matter was referred to the CCC in August 2011. The complaint was then heard by the CCC in May 2012, and a decision was made in August 2012. The 18 months it took for ICASA to arrive at a decision in this dispute is a significant delay for a new entrant, and weakens the credibility of the facilities leasing regulations.

There has been no market enquiry into broadband services, and no decisions on prices for electronic communications facilities, with the result that there is relatively limited competition in markets for fixed line broadband services in particular. This is in contrast to ICASA’s activities in markets for interconnection / call termination, which have been reasonably effective.

The facilities leasing regime, unlike the interconnection regulations, has failed to support competition. The lack of a market enquiry leading to price regulations of fixed line local loops, and the focus of ICASA on the regulation of access to services, including Bitstream and wholesale mobile network services, rather than network infrastructure, has led to significant delays in the rollout of competitive broadband services.

5.5.4. Consumer protection

Quality of service regulation

As discussed above, quality of service is regulated in terms of the end user and subscriber service charters (ICASA, 2009). ICASA has prepared relatively few quality of service analyses. Those that have been completed are set out in 4.3.2 above. The conclusion of that analysis was that while the initial quality of service analysis for mobile voice services completed by ICASA in 2011 was indicative, quality of service appeared to improve in 2013.

The Telecommunications Regulatory Environment (TRE) assessment of the regulation of quality of service showed a decline between 2009 to 2011, and were negative in 2011 at less than -1 (but greater than -2), on a scale of between -2 and +2. While the TRE assessment is a survey of perceptions of a small number of stakeholders, it indicates that the regulation of quality of service did decline over this period.

The decline in quality of service regulation perceived in the TRE assessment is supported in the data on complaints received by ICASA (see Table 13 below): the number of quality of service related complaints increased from 359 in 2007 to 1050 in 2012. While the complaints overall increased significantly from 924 to 4,553 in 2012, which means that there may have been a general increase in consumer awareness on their rights which caused them to lodge more complaints overall, the increase in quality of service complaints is cause for concern. Furthermore, a relatively small proportion of complaints are lodged with ICASA: many more complaints are lodged with the operators directly.

Table 13: Complaints evaluated by ICASA, 2007 - 2012

Complaints	2007	2008	2009	2010	2011	2012
Quality of service	359	403	797	1187	908	1050
Contract terms and conditions	169	87	183	339	708	1248
Billing	161	168	517	1017	1100	1401
Other	235	380	657	814	550	854
Total received	924	1038	2155	3356	3266	4553

Source: ICASA (2006-2012)

Note: ICASA does not report data on complaints consistently over time.

Stakeholder perceptions of quality of service are negative and have worsened over time, while the number of quality of service related complaints has increased significantly. At the same time, ICASA has reviewed quality of service for mobile voice services intermittently, the initial 2011 analysis having been reported on as “indicative” only. The regulator has not evaluated the quality of fixed or mobile broadband.

Retail tariff regulation

Retail tariffs for telecommunications services in South Africa are currently not regulated. There have been no market reviews of retail services, although a broadband value chain analysis is currently underway (ICASA, 2013e). Telkom was subject to retail tariff regulations until 2008,

after which it was issued a new licence under the ECA and the retail tariff regulations promulgated under the Telecommunications Act fell away.

The telecommunications regulatory environment (TRE) assessment shows a significant improvement in tariff regulation from less than -1 (but greater than -2) in 2009 to greater than -1 but less than 0 in 2011, on a scale of between -2 and +2 (RIA, 2013a). This in all likelihood relates to the regulation of call termination rates rather than retail tariffs, however, and is a perception survey with a limited number of respondents (as discussed above).

Tariffs for retail services are unregulated. While this would not be a problem if tariffs in markets for wholesale services, and particularly for network facilities used for broadband services, were regulated, wholesale broadband facilities are currently not regulated in South Africa and therefore the lack of retail tariff regulation is of concern.

5.5.5. Summary of regulatory substance review

The regulators' performance, in terms of substance, is summarised in Table 14 below.

Table 14: Summary of regulatory substance

Category	Measure	Performance
Overall assessment	Telecommunications regulatory environment	Score of almost -1 (out of between -2 and +2), ranked 11th out of 12 African countries.
	Regulator capacity	Regulator budget and staff complement have grown significantly, although ICASA is widely reported to be under-resourced, and state ownership of fixed line incumbent (proxy for financing of regulator) predicts that regulator is relatively under-resourced.
	Quality of regulatory decisions	Litigation brought against ICASA is usually won by ICASA, settled or withdrawn, which suggests good quality decisions but may be indicative of lack of appeals from operators who require scarce resources like numbers and spectrum from ICASA.
Market access	Spectrum allocation	ICASA has delayed the licensing of spectrum significantly while waiting for a ministerial policy direction, which is not required to issue spectrum licences.
	Numbering management	There is no non-geographic number portability in South Africa, and limited fixed number portability is driven by problems with calls from incumbent's network not reaching ported numbers.
	Rights of way	The lack of implementation of rapid deployment guidelines significantly hampers market access, since new entrants are not able to build out their networks quickly and easily.
	Licensing	The DOC and ICASA have not issued any new individual network services licences since Broadband Infracore was licensed in 2009. While there are approximately 450 network services licensees, the licensing framework and its implementation raise artificial barriers to entry.
Competition	Accounting separation	ICASA mandates accounting separation for MTN, Vodacom and Telkom in the call termination regulations in terms of forthcoming accounting separation regulations, which have not been developed. While the Competition Commission settlement with Telkom partially deals with accounting separation, this agreement is incomplete in respect of the cost accounting method to be employed and in respect

Category	Measure	Performance
		of the transparency of the Telkom accounting information, which Telkom is not required to submit to the Commission in full.
	Enforcement of prohibitions of abuse of dominance and assessment of mergers	There have been relatively few abuse of dominance cases in the telecommunications sector decided on by the competition authorities, and even those took an exceedingly long time (5-10 years) to reach a conclusion.
	Interconnection	The interconnection regime appears to be reasonably effective, save for the routing of ported numbers from the Telkom network (discussed above) and the lack of a regime for 080 and 0860 numbers.
	Facilities leasing (Network access)	The facilities leasing regime has failed to provide meaningful access to electronic communications facilities. The lack of a market enquiry leading to price regulations of fixed line local loops, and the focus of ICASA on the regulation of access to services, including Bitstream and wholesale mobile network services, rather than network infrastructure, has led to significant delays in the rollout of competitive broadband services.
Consumer protection	Quality of service regulation	Stakeholder perceptions of quality of service are negative and have worsened over time, while the number of complaints has increased significantly. At the same time, ICASA has reviewed quality of service for mobile voice services intermittently, the initial 2011 analysis having been reported on as “indicative” only. The regulator has not evaluated the quality of fixed or mobile broadband.
	Retail tariff regulation	Tariffs for retail services are unregulated. While this would not be a problem if tariffs in markets for wholesale services, and particularly for network facilities used for broadband services, were regulated, these are currently not regulated in South Africa and therefore the lack of retail tariff regulation is of concern.

5.6. Summary

There are important flaws in the regulatory framework for the telecommunications sector in South Africa. Key among these flaws is the ownership of regulated entities by the state and the policymaker (the DOC) having shareholding responsibility for these regulated entities. This undermines the independence of the regulator. ICASA’s independence is also undermined in other ways, including through performance monitoring of councillors by the Minister of Communications and the inability for ICASA to appoint experts without ministerial approval where experts are not in ICASA’s approved budget. Finally, and linked to the lack of independence of the regulator from regulated entities, ICASA engages in private negotiations with regulated entities (discussed in more detail in section 7 below). While the competition authorities, which are not directly linked to regulated entities, have intervened in the sector they have done so partially and in relation to specific products and markets where ex-post evaluation of conduct has been possible. A better approach would be for the sector specific regulator, ICASA, to regulate the sector holistically.

There are also significant problems with the independence of the competition authorities and ICASA in respect of funding and appointments by line ministers. Best practice is for economic regulators to be funded through industry levies and to have regulated entities pay for consultants required to provide expertise on regulatory decisions. There is no common appeal authority for economic regulators in South Africa: while the competition authorities have

dedicated appellate bodies, ICASA's decisions are appealed to the High Court, which means fewer appeals as outcomes are uncertain, and therefore less accountability for ICASA. There are other gaps in the regulatory framework, or regulatory "governance" regime, including a lack of regulation of the quality of broadband services, ICASA's lack of information gathering powers, and the unwieldy size of the ICASA council which makes decision-making difficult. The open access regime and other aspects of regulation employed in the ECA are disproportionate, and create onerous regulatory obligations for small new entrants.

In terms of regulatory "substance", while ICASA has issued thousands of spectrum licences, and deals with thousands of complaints and hundreds of number applications every year, in respect of key actions to bring about competitive broadband services, ICASA and the competition authorities have not had the desired impact. Some of the delays, including in respect of licensing of spectrum, are caused by government interference. Telkom has used various legal means of delaying decisions by the competition authorities in the various abuse of dominance complaints against it. Furthermore, the delays in the implementation of local loop unbundling is at least partly due to the fact that ICASA is under-resourced due to the state's ownership of a significant stake in Telkom, which reduces the state's incentive to properly resource the regulator. Finally, the licensing framework creates artificial barriers to new entry, and the management of numbers, particularly non-geographic numbers, as well as the rules regarding rights of way, inhibit new entry.

The implications of this are that ICASA and the competition authorities need to be further insulated from political interference and be properly resourced through industry levies and fees. Furthermore, a single appellate body for economic regulators ought to be established in order to improve accountability of the regulators and improve outcomes in the sector.

6. Call termination rate intervention

6.1. Introduction

ICASA, South Africa's telecommunications regulator, reduced maximum call termination rates by 68% between March 2011 and March 2013, from R1.25 (during peak hours) to 0.40 (for peak and off-peak calls) (ICASA, 2010a).³⁵ ICASA allowed 'new entrants' and smaller operators, including Cell C and Telkom Mobile, to charge 10% more than this. More recently, ICASA has reduced these rates further, setting R0.10 as the maximum that MTN and Vodacom may charge for call termination from 1 March 2016 (ECA, 2014).

The call termination rate reductions are ICASA's first and only tariff setting intervention completed in terms of Chapter 10 of the Electronic Communications Act (no. 36 of 2005, the ECA). Chapter 10 of the ECA deals with competition matters and enables ICASA to intervene in markets that are characterised by ineffective competition and where one or more entrant

³⁵ ICASA is the sector specific regulator for the telecommunications, broadcasting and postal services sectors in South Africa.

has significant market power. This intervention provides a useful case study for the evaluation of how ICASA goes about economic regulation of the telecommunications sector.

The main questions dealt with in this paper are:

1. How were call termination rates determined at the outset and how have they evolved over time?
2. How did ICASA intervene in markets for call termination?
3. How does ICASA's approach compare to call termination rate interventions in other countries?
4. What was the impact, if any, of ICASA's call termination rate intervention on competition, retail prices and voice usage?
5. How were investment and employment affected by lower call termination rates?

Each of these questions are explored in the sections that follow, starting with an overview of the economics of interconnection.

6.2. Economics of interconnection

The telecommunications sector in South Africa, like that in most other countries, imposes a duty to interconnect on incumbent networks in order to reduce the negative impact of network effects. The basic problems that arise from industries characterised by network effects are discussed in more detail in section 2.2.1 and are not repeated here.

6.2.1. Network interconnection I: No price discrimination

Laffont, Rey & Tirole (1998a, 1998b) model the competitive process for network operators that are able to negotiate call termination rates (access charges) under different settings. Their model produces implications for setting socially optimal access tariffs as well as likely outcomes from operators that are free to set rates collusively.³⁶

The basic model uses two operators selling differentiated services and competing on prices in the retail market (Laffont, Rey & Tirole, 1998a). In the basic model, operators do not distinguish between on-net and off-net tariffs. As retail prices of one operator fall, that operator's market share increases. The key intuition of the linear pricing case of the model is

³⁶ The LRT model (1998a, 1998b) also extends to fixed line services, which are not directly relevant for the discussion here which relates mainly to mobile call termination rates. In the fixed line setting, where a new entrant is able to lease unbundled network elements and all joint and common costs are fully depreciated, and there is also a call termination rate. In this instance, the regulator should set the lease charge at marginal cost, while the access charge (call termination rate) should be set below marginal cost to compensate for mark-ups arising from a lack of competition in retail markets. Where a facilities-based entrant enters the market, and the incumbent cannot discriminate between competitive and non-competitive market segments, the new entrant sets a low retail usage tariff and incurs an access deficit in order to attract customers to its network. The new entrant does not need full coverage, and might not invest in full coverage in order to ensure that the incumbent is a "pacific fat cat" in that the incumbent continues to charge high average prices since it cannot discriminate between competitive and non-competitive segments of the market. If the new entrant were to enter and build a full coverage network then the incumbent would have an incentive to drive retail prices downwards towards costs since it could not benefit from the lack of competition in areas not covered by the new entrant. Cost based pricing by the incumbent would lower the new entrant's profitability.

that, as call termination rates (access tariffs) increase, there is less incentive for each operator to build market share by reducing retail prices, as reducing retail prices causes subscribers to make outbound calls, which generates an access deficit (call termination rate expenses exceed call termination rate revenues). This is because the operator building market share lowers its retail prices relative to its rival and increases the propensity of its customers to make outbound calls relative to the number of outbound calls made by customers on the other network. Thus higher access prices result in a tacit collusive outcome where two operators are able to negotiate reciprocal access prices that give rise to high retail prices.³⁷

If operator fixed costs per customer (costs such as acquiring, billing and supporting customers) are high, then the incentive for attracting customers is reduced as the profitability of each customer is lower. This reduces the risk of retail price competition. In the presence of high fixed costs, therefore, the operators would choose a lower access price to reduce double marginalisation.³⁸ The latter occurs where there is a mark-up on the costs of call termination (a mark-up on the wholesale input price) as well as a mark-up on the retail price of a voice call.

If substitutability between operators is high, then a retail price reduction will attract more customers to an operator and will cause a greater access deficit (as customers of the price cutting network make more outbound calls), and so the operators collectively select a higher access charge to increase the cost of a greater access deficit. This ensures that retail prices remain high. Where substitutability between networks is small, then the call termination rate matters less to operators, since lowering retail prices is unlikely to bring about changes in demand for an individual operator. At the same time, increasing substitutability between the two networks also lowers prices overall since it reduces the double-marginalisation problem inherent in charging a mark-up over the costs of call termination as well as a retail mark-up over call termination rates. This is because the mark-up over retail prices is more limited the greater the substitutability between networks.

Where a regulator sets call termination rates rather than the operators, the regulator would choose the socially optimal outcome, which is known as the Ramsey outcome. In the absence of joint and common costs, where networks are not highly substitutable, the Ramsey outcome requires that call termination rates are set below cost. This is because the lack of substitutability between network operators allows them to charge mark-ups over costs for retail voice calls, which in turn requires compensation in the form of a lower access charge (call termination rate). The more that networks are substitutable, the closer that the call termination rate should approach costs. In the presence of joint and common costs, the Ramsey outcome would be a call termination rate set above the costs of call termination.

Laffont, Rey & Tirole (1998a) then develop their basic model to cater for a number of different settings. The first such variation is where access charges are not symmetrical. The effect of

³⁷ Equilibrium exists in the model as long as access prices are not too high or substitutability between networks is not too great.

³⁸ Double marginalisation would otherwise cause volumes (and therefore revenues and profits) to decline below those that even a monopolist would choose.

this is that, on the one hand, increasing one network's access price forces the other network to raise retail prices and lose market share, and this effect is more pronounced the greater the degree to which the two networks are substitutable. At the same time, the other network is more reluctant to increase its retail price the more substitutable the networks are, since it does not want to lose market share. This mitigates the effect of a higher access price charged by the first operator.

It is important to assess fixed costs in this context. If fixed costs are low and therefore winning customers is more profitable, then each firm may choose a high access price to force the other to raise retail prices and lose market share. If fixed costs were high and the profitability of winning a customer was low, then a lower access price may be chosen by operators since winning the customer would be less profitable for the operator choosing the access price.

Laffont, Rey and Tirole's (1998a, 1998b) basic model assumes two operators. Where there are lots of network operators, then setting an individual operator choosing an access charge has little impact on the final prices and market shares of other operators, and so operators choose infinitely high access charges and the industry closes. This highlights the risks of operator determined call termination rates where there are a large number of operators.

Where operators charge two part tariffs (i.e. where linear pricing is no longer assumed)³⁹, such as through a fixed monthly charge and a variable usage based charge, the access charge does not affect the profits of the operators. This is because, in order to increase market share, operators can lower their fixed fees rather than usage tariffs, which does not increase the operators' access deficits. The operators therefore do not have an incentive to set an access charge above costs in order to achieve the collusive outcome available under linear pricing, although equilibria may arise where access charges are set significantly above costs under non-linear pricing too.

An important feature of the Laffont, Rey and Tirole (1998a, 1998b) model is that it is a discrete choice model, in which operators compete for customers, each of which chooses a single network. Where customers choose multiple networks (multi-home), customers need not make off-net calls to the same extent and therefore the access charge will have less of an impact on final retail prices, since charging lower off-net retail prices may not be a key means of competing for customers.

6.2.2. Network interconnection II: Price discrimination

Laffont, Rey and Tirole (1998b) then examine the competitive process between network operators where they are allowed to charge lower on-net prices than off-net prices and where call termination rates are symmetrical. The authors model markets characterised by an incumbent and new entrants, as well as markets in which competitors are symmetrical in size. The model again assumes a balanced calling pattern, where the proportion of a customer's outgoing calls on a network that are on-net is equivalent to that network's retail market share.

³⁹ Two-part tariffs might take a number of forms, including a fixed monthly subscription fee and separate usage fees, or similar "connection" fees implicit in tiered volume pricing structures for prepaid services, for example.

The key feature of the price discrimination model can be understood by comparing it with the non-discrimination model. Under non-discrimination and linear retail tariffs, high access prices mean that operators are discouraged from lowering their retail tariffs in order to gain market share since this will increase off-net calls and increase that operator's access deficit. Where on-net discounts are allowed, operators need not lower off-net prices in order to gain market share but could use on-net discounts instead.

This can lead to tariff-mediated network effects, where the network effects that interconnection is implemented to eliminate are re-introduced and the consumer mis-coordination problem arises (discussed above in section 2.3.1). Network effects favour incumbents and stall new entry. This is particularly a problem where new entrants do not have full coverage and are not able to quickly build full-coverage networks. Price discrimination between on-net and off-net calls is also wasteful. In this setting, prices do not reflect demand or costs and give rise to allocative inefficiency.

Nonetheless, where price discrimination is allowed, high access charges are not used to facilitate collusion as they are under the linear tariff model. Rather, allowing on-net discounts introduces intense competition for customers as increasing a network's market share reduces the average cost of serving customers (where call termination rates are priced above costs). Allowing on-net discounts also reduces the double-mark-up problem that exists under linear tariffs where access charges are above costs.

Note that where networks are highly substitutable, both on-net and off-net prices are lower, since there is greater competition and less opportunity to charge mark-ups over costs. Access charges may still be used as a collusive device where on-net and off-net price discrimination occurs, since off-net price competition still results in an access deficit for the price cutter, and therefore operators may still choose an access price that is higher than costs in order to limit retail price competition.

Again, it is important to note that the Laffont, Rey and Tirole (1998a, b) model is a discrete choice model, in which operators compete for customers, each of which chooses a single network. Where customers choose multiple networks (multi-home), the impact of on-net / off-net discrimination may be more muted, since customers choose to belong to multiple networks irrespective of the tariff mediated network effects generated by on-net / off-net discrimination.

6.3. Evolution of call termination rates in South Africa

6.3.1. Regulatory framework for call termination rates and call termination rate setting prior to 2010

The Telecommunications Act, no. 103 of 1996 (TA) and interconnection guidelines (SATRA, 1999, SATRA, 2000 & ICASA, 2002a) governed interconnection between parties in South Africa (Lawrence, 2006) until 2010, when the call termination rate regulations (ICASA, 2010a) and interconnection regulations (ICASA, 2010b) were put in place in terms of the ECA.

The interconnection guidelines (SATRA, 1999, SATRA, 2000 & ICASA, 2002a) required that major operators set their call termination rates at the long run incremental cost (LRIC) of call termination (Aproskie *et al*, 2008). While Cell C started proceedings to have MTN and Vodacom declared major operators, it subsequently withdrew this complaint (Nyanda, 2009). The effect of this was that none of the operators set their call termination rates at LRIC (Aproskie *et al*, 2008). The lack of completion of the regulatory process to have MTN and Vodacom declared major operators between 1999 and 2001 as Cell C entered the market was a significant lapse on ICASA's part, and was followed by a decade of inaction on call termination rates. This inaction had a large impact on the sector: the call termination rate sets the floor price for new entrants, while incumbents are able to attract customers by charging low prices for on-net calls (such as for Vodacom to Vodacom calls). As a consequence, Cell C's entry into the market was significantly undermined, and competition was consequently hampered. At the same time, one of the reasons that Cell C may have withdrawn its case to have MTN and Vodacom declared major operators might be that Cell C too benefited from very high call termination rates for inbound calls from the Telkom network. Cell C may have calculated that they benefited more from inbound call termination revenues from the Telkom network than they lost from not being able to win market share from MTN and Vodacom.

Alan Knott-Craig (2009), former CEO of Vodacom (South Africa's largest mobile operator) and current CEO of Cell C (South Africa's third entrant to the mobile telecommunications market), provides a history of the development of call termination rates in South Africa from the perspective of the incumbent mobile operators, MTN and Vodacom. The rates were set, for calls terminated on Telkom's (the fixed line incumbent) network, at R0.21 per minute during peak hours and R0.14 per minute during off-peak hours because these were Telkom's retail prices for a local call at the time (Knott-Craig, 2009). The rates for calls terminated on MTN and Vodacom's networks and originating on Telkom's network were set at MTN and Vodacom's retail prices, which were R1.30 per minute (and approved by the regulator at the time), less Telkom's retail price of R0.21. The call termination rate was therefore set at R1.09 per minute, for calls made during peak hours (Knott-Craig, 2009). However, MTN and Vodacom charged each other R0.20 per minute to terminate calls originating on each other's networks, for peak and off-peak calls (Knott-Craig, 2009 & Aproskie *et al*, 2008).

The reason for the difference in MTN and Vodacom's call termination rates for calls from the Telkom network and for calls from each other's mobile networks was, according to Knott-Craig (2009), the fact that volumes of calls between mobile networks were expected to be small and so the call termination rate for mobile to mobile calls did not matter. This changed with the significant growth in subscriber numbers and usage of mobile networks such that in 1998 the call termination rates needed to be harmonised, according to Knott-Craig (2009). Furthermore, there was regulatory pressure to ensure that there was no discrimination in charges for terminating calls (TA, 1999; Knott-Craig, 2009; Aproskie *et al*, 2008). Accordingly, the regulator approved an increase in rates for mobile to mobile network call termination to the same call termination rates charged for fixed to mobile calls (Knott-Craig, 2009). Between 1999 and 2001, the mobile to mobile network call termination rate was increased to the rate charged for calls from Telkom's network (Knott-Craig, 2009; Cull, 2009) (see Table 15 below).

Table 15: Call termination rate increases for mobile to mobile calls (1999-2001)

Rate group	Applicable hours	Rate per minute with effect from:		
		1 July 1999	1 July 2000	1 July 2001
Peak	Mondays to Fridays, 7am to 8pm	50c	80c	R1.19
Off-peak	All hours other than peak	30c	45c	R0.65

Source: Cull, 2009

This increase in call termination rates coincided with the introduction of Cell C to the market. While there was a regulatory non-discrimination requirement, the incumbent mobile operators MTN and Vodacom benefited from increasing call termination rates during the course of Cell C's entry, and this could account for Cell C's poor performance in the market (Aproskie *et al*, 2008). Incumbent mobile operators MTN and Vodacom were able to charge low prices for on-net calls (such as for calls from one Vodacom customer to another Vodacom customer), while Cell C could not offer its own retail customers similarly low prices to Vodacom customers because of high call termination rates (see, for example, Laffont *et al*, 1998b). The mobile termination rate was subsequently increased gradually to R1.25 between 2001 and 2005 (for peak hours) (Aproskie *et al*, 2008).

The Telecommunications Act gave way to the ECA in 2005, though the regulations promulgated under the TA remained in force until they were amended or repealed in terms of the ECA. The ECA does not give ICASA full discretion to regulate prices. Rather, ICASA may impose price regulation as a remedy to a market failure assessed on an *ex ante* basis. The ECA prescribes a set of steps that must be followed prior to the imposition of remedies. ICASA must, in terms of section 67(4) of the ECA, define markets and assess whether any of these markets are characterised by ineffective competition. ICASA may then impose pro-competitive measures on operators that have significant market power (SMP).⁴⁰

There is a debate as to whether Chapter 10 of the ECA must be followed closely before remedies are imposed on operators with respect to call termination rates (see, for example, De Lille (2009)). Section 41 of the ECA, which deals with interconnection matters, says that:

"The Authority may prescribe regulations establishing a framework of wholesale interconnection rates to be charged for interconnection services or for specified types of interconnection and associated interconnection services taking into account the provisions of Chapter 10".

ECN, a former voice over internet protocol (VOIP) operator (now owned by Nashua Communications), obtained a legal opinion from Gilbert Marcus, SC, who found that the words "take into account" rather than "subject to" Chapter 10 meant that ICASA could use its own discretion to set interconnection rates in terms of section 41 of the ECA, rather than follow the

⁴⁰ The regulation making process set out in Chapter 10 of the ECA is discussed in more detail in section 2.3 above.

full process set out in Chapter 10 (De Lille, 2009). Whatever the merits of this approach, ICASA followed a Chapter 10 process, as discussed below.

During the course of 2006 ICASA held a public inquiry into call termination rates which culminated in the publication of a series of documents and public hearings in 2007 (Gillwald, 2009). ICASA ultimately found that regulations for Chapter 10 needed to be developed before they could intervene and set call termination rates (Gillwald, 2009). Between 2007 and 2009, the process stalled.

In 2009, the Parliamentary Portfolio Committee on Communications (PCC) proposed reductions in call termination rates from R1.25 (during peak hours) per minute to R0.60, which were to be implemented by November 2009. The PCC further proposed that this charge should decline at a rate of R0.15 per year until November 2012 to a final rate R0.15 per minute (Parliamentary Communications Services, 2009). The PCC subsequently held hearings into call termination rates in 2009, which led to a reduction in blended peak and off-peak mobile call termination rates of 19%, to R0.89 (peak hours) (Mcleod, 2009a). The reduction was agreed to among MTN, Vodacom and Cell C, and was announced by the then Minister of Communications, Gen. Sipiwe Nyanda (Ret.) (Mcleod, 2009a).⁴¹ The political pressure brought to bear on the operators and ICASA ensured that ICASA intervened in markets for call termination in 2010, discussed next.

During the same period in which the PCC was calling for lower call termination rates, the ICASA Complaints and Compliance Committee (CCC) adjudicated on several interconnection related matters, including *Telkom SA Ltd. vs. Vodacom (Pty.) Ltd.*, *Telkom SA Limited vs. MTN (Pty.) Ltd.* and *Telkom SA Ltd. vs. Cell C (Pty.) Ltd.* which related to call termination rates, and a dispute relating to transit of voice calls in *Thinta Thinta Telecommunications (Pty.) Ltd. vs. Telkom SA Limited*.⁴²

The complaints brought by Telkom against Cell C, MTN and Vodacom all related to Telkom Mobile, as a new entrant, wishing to charge an asymmetrically high call termination rate of R0.93 per minute for all calls including calls from Community Service Telephones (CSTs), compared to the lower R0.89 per minute rate charged by the incumbent mobile operators at the time for calls during peak hours, and R0.06 per minute for calls originating from CSTs. ICASA subsequently published call termination rate regulations which resolved the matter, including in relation to asymmetry (ICASA, 2010a). These interconnection disputes nonetheless provided pressure for ICASA to issue regulations to reduce call termination rates, discussed next.

⁴¹ The price reduction proposal from the PCC, and the intervention ultimately brokered by the Minister of Communications, provides an important counter-example to the lack of political and government pressure on Telkom SA SOC Limited (Telkom), a state owned enterprise, for reforms that would lead to lower prices. This is discussed in more detail in section 7 below.

⁴² Interconnection is regulated in terms of Chapter 7 of the ECA and the interconnection regulations (ICASA, 2010b). This is set out in more detail in section 2.2.1 above. MTN, Vodacom and Telkom must each make available Reference Interconnection Offers in terms of the Call Termination Regulations (ICASA, 2010a).

6.3.2. 2010 call termination rate regulations

ICASA published call termination regulations (ICASA, 2010a) in November 2010, which came into effect in March 2011. The regulations found, in line with international best practice, that all operators had significant market power (SMP) in respect of calls transmitted from third party networks terminating on their networks. This outcome arises because of the calling party pays principle applied in South Africa, which means that calling parties pay to originate calls and receiving parties do not pay to receive calls.⁴³

ICASA's finding applied to both fixed and mobile networks but different rates and markets were defined for each type of operator. This is unlike the case in Namibia and Nigeria, for example, where the same call termination rate is applicable to both fixed and mobile networks (Stork, 2012). The regulations allowed for asymmetry between established SMP operators and smaller operators: smaller operators are allowed to charge a higher call termination rate than established operators (ICASA, 2011f). This was to allow for poorer spectrum allocations for smaller operators which meant that their costs were higher, and this was also to allow for the fact that the smaller operators lacked economies of scale and scope. Licensees with a market share of less than 25% of the total minutes terminating in the respective markets would be allowed to charge higher call termination rates, currently set at a premium of 10%.

While this is broadly in line with the approach adopted in the EC directive (EC, 2009), the EC allows for higher rates for only a short period of time (4 years) and for operators that have less than 15-20% market shares. Cell C benefited from a higher, asymmetric call termination rate even though it had been licensed for almost 10 years prior to March 2011 and had almost the same spectrum assignments, including in the valuable 900MHz band that MTN and Vodacom had.⁴⁴

Accordingly, MTN and Vodacom would be able to charge R0.40 from 1 March 2013 for calls terminated at a mobile location, while Cell C and Telkom Mobile were allowed to charge 10% more (see Table 16 below). This was significantly above the R0.15 proposed by the PCC (discussed above). The regulations further allowed for a glide path between 1 March 2011 and 1 March 2013, to allow the operators time to adjust their business models.

Table 16: Mobile call termination rates, from March 2011

	Asymmetric allowance	Established SMP operators rate		Asymmetric rate	
		Peak	Off-peak	Peak	Off-peak
1 March 2011	20%	R0.73	R0.65	R0.88	R0.78

⁴³ The receiving party pays principle applies, for example, in the United States of America (USA), where the interconnection regime is "bill and keep" and the sending operator does not pay any interconnection / call termination fee. See discussion above on the regulatory framework for call termination rates in the EU, which has the same calling party pays framework that South Africa has.

⁴⁴ Cell C and Telkom (Mobile) did nonetheless have less 3G spectrum in the 2100MHz band: while MTN and Vodacom each were assigned 2 x 15MHz of Frequency Division Duplex (FDD) spectrum and 1 x 5MHz Time Division Duplex (TDD) spectrum, Cell C was assigned 2 x 10MHz FDD spectrum and 1 x 5MHz TDD spectrum and Telkom (Mobile) was assigned 2 x 10MHz FDD spectrum (ICASA, 2010e).

1 March 2012	15%	R0.56	R0.52	R0.64	R0.60
1 March 2013	10%	R0.40	R0.40	R0.44	R0.44

Source: ICASA, 2011

The call termination regulations also required MTN and Vodacom (in respect of their mobile services) to publish a reference interconnection offer (RIO) and to supply regulatory financial reports. The latter were to be provided in terms of forthcoming Accounting Separation and Cost Accounting regulations, which have not been published to date of this article.

It is not clear what ICASA intended in respect of the allowance for asymmetry relating to economies of scale and scope. While the regulation refers to the share of minutes terminated in the relevant markets, it is not clear whether ICASA was referring to the market overall for mobile services and the market overall for fixed services, or whether this refers to minutes terminated on the operator's own network. The latter approach would be consistent with ICASA's finding that each operator has a monopoly in respect of call termination on its own network. This would mean that the market share should be calculated by dividing an operator's on-net minutes by all minutes terminated on that operator's network (including on-net minutes). If the regulator was referring to all minutes terminated on all networks, then the market share should be calculated by dividing the total minutes terminated on a given mobile operator's network by all minutes terminated on all mobile networks.⁴⁵

If there was a balanced calling pattern between subscribers on different networks (callers had the same propensity to be called) and there was no price discrimination (on-net discounts) then an operator's market share of minutes terminated would be the same whether it is calculated by dividing on-net minutes by total minutes terminated on that network or whether they are calculated as total minutes terminated on a network as a percentage of total minutes terminated on all networks in a given sector (fixed or mobile).⁴⁶ However, if operators do not have a balanced calling pattern and do incentivise on-net calls (as is the case in South Africa), then if the relevant measure is on-net calls as a percentage of calls terminated on the operator's network, this will show smaller operators as having a greater share of the market.

This debate will become more important as Cell C and (eventually) Telkom Mobile approach the threshold market share for asymmetry, particularly if ICASA lowers the threshold for asymmetry from 25% currently present in the regulation to the 20% market share used by the EC as is currently set out in ICASA's 2014 call termination rate regulations (ICASA, 2014). Finally, the asymmetry provision should be reviewed to assess whether a revenue based model ought to be used instead of a minutes-based model. The latter may discourage operators that are close to the market share threshold from offering free minutes for promotional purposes. A greater number of minutes originated on a network could lead to the triggering of a lower call termination rate in circumstances where the operator should continue

⁴⁵ Similarly, a fixed operator's market share would be calculated by dividing all minutes terminated on that operator's network by all minutes terminated on all fixed networks.

⁴⁶ This result requires that if an operator's on-net minutes as a percentage of total minutes terminated on that network excludes minutes from fixed networks, then the operator's total minutes terminated as a percentage of all minutes terminated excludes minutes from fixed networks too.

to benefit from asymmetry due to the lower overall revenues earned from voice services by that operator.

At any rate, ICASA does not appear to have used the test established in the 2010 regulations since it appears to use share of termination revenues rather than share of minutes terminated in its proposed call termination rate regulations published in 2014 (ICASA, 2014). This is an area that requires more clarity from ICASA.

6.3.3. Call termination rate regulations published in 2014

ICASA published new draft regulations in 2013 and subsequently published final regulations in 2014. These final regulations were taken on review by MTN (subsequently joined by Vodacom) and were being considered by the courts at the time of the publication of this paper. ICASA maintained the same market definitions in the 2014 regulations, namely the market for call termination at a fixed location and the market for call termination at a mobile location (ICASA, 2014), as those defined in its 2010 determination (ICASA, 2010a). ICASA proposed even more aggressive mobile call termination rate cuts in 2013. ICASA proposed lowering call termination rates from R0.40 (for MTN and Vodacom) to R0.20 from 1 March 2014 and proposed a final rate of R0.10 from 1 March 2016 (see Table 17 below and ICASA, 2014).

Fixed line operators', including Telkom's, call termination rates are regulated according to between 0N (B0N) and within 0N (W0N) regions. The between 0N fixed termination rate is intended to cover the costs of a national call (such as 011 to 021), while the within 0N rate covers the blended costs of local and regional calls (such as 011 to 011 and 011 to 012). Mobile call termination rates are a blend of local, regional and national calls, and so should cover the average costs of local, regional and national calls. Instead, ICASA has proposed setting MTN and Vodacom's mobile call termination rate at the same level as the lowest fixed line call termination rate (R0.10). This is despite the fact that fixed line call termination rates typically are lower than mobile call termination rates since fixed line networks are able to recover their costs through monthly access fees, which mobile networks are not able to charge to all their customers.⁴⁷

Table 17: Proposed mobile call termination rates

Period	Rates applicable to MTN and Vodacom	Asymmetric rates
1 March 2014	R0.20	R0.44
1 March 2015	R0.15	R0.42
1 March 2016	R0.10	R0.40
1 March 2017	R0.10	R0.20

Source: ICASA, 2014

⁴⁷ Indeed, this was relied on to some extent in ICASA's decision on fixed call termination rates in 2010 in not taking into account the access line deficit (the difference in the fixed line cost and retail prices for providing fixed lines) and universal service costs that Telkom says exists when determining wholesale call termination rates (ICASA, 2010a). Rather, the costs of the access line deficit (to the extent that it exists) and universal service obligations should be recovered through retail tariffs.

ICASA explains that it arrived at the reduced R0.10 for mobile call termination due to increased call volumes on the mobile networks. Nonetheless, the proposed regulations require that MTN, Vodacom and Telkom provide information to ICASA that is sufficient for them to build a bottom-up long run incremental cost model, which suggests that they have not implemented this yet. ICASA indicated that it could revise these rates if the results of a bottom up LRIC model justified this. In respect of asymmetry, ICASA reduced the market share percentage to 20% from 25%. ICASA allows for this asymmetry to be in place for a period of 3 years, after which if a licensee has a market share of less than 10%, it is entitled to the higher, asymmetric rate (R0.10). This is to protect the interests of small businesses.

MTN and Vodacom have both opposed the proposed call termination rates (though the latter less forcefully than the former), partly due to the particularly steep declining in 2014 (which requires a 50% rate reduction), and partly due to the very large subsidy afforded to Cell C and Telkom Mobile. The latter two companies are able to charge almost double (R0.39) what MTN and Vodacom will be allowed to charge (R0.20) for call termination in 2014, and will be allowed to charge more than double what MTN and Vodacom will be allowed to charge in 2015 and 2016.

ICASA has brought its call termination rate regulations in line with the EC's determination, both in respect of reducing the market share that affords a new entrant with asymmetrically high call termination rates (from 25% to 20%) and in respect of the adoption of a bottom-up LRIC model to set call termination rates. However, in allowing new entrants to charge higher call termination rates for more than 7 years (2011 to 2017, at least) instead of the 4 years recommended by the EC, and allowing for significantly higher call termination rates even after the 3 year period has elapsed, ICASA runs the risk of protecting competitors rather than competition.

While ICASA acknowledges the importance of protecting investments into mobile networks, an unacknowledged but very important feature of the calling party pays regime is that it allows for the extension of access to mobile voice services, since it is free to receive calls. Consumers, no matter how little income they earn, have an incentive to remain connected to mobile networks if they don't have to pay to receive calls. Imposing a call termination rate as low as R0.10 per minute suggests that ICASA does not consider low access prices and extension of services to economically marginal areas as an important feature of call termination rates. They may well be justified in this assumption given the significant expansion in access to mobile services that has taken place in many African countries, including South Africa (discussed below), as call termination rates were reduced.⁴⁸ If extension of access to mobile services were not an important reason for the existence of mobile call termination rates, ICASA should rather consider moving towards a bill and keep regime (as recommended by Dewenter and Kruse, 2011) instead of going to the considerable effort and expense of building a bottom-up LRIC model, which operators will also incur significant expenses to provide inputs for. If ICASA does persist in imposing the R0.10 rate, this will provide an interesting case study

⁴⁸ It is important to note that considerable expansion in access also took place when high call termination rates were in place (See Figure 26).

to test whether the mobile operators will continue to maintain or even grow access levels (subscriber numbers) and if so, whether South Africa should move to the simpler bill and keep regime.

6.4. The SA call termination rate interventions in the context of experience in other countries

6.4.1. Experience with call termination rate interventions in developed countries

Overview of economic regulation framework of call termination rates in the EU

The telecommunications sector in the European Union is regulated in terms of an overall regulation, the “Framework directive”, as well as a series of four specific directives. These directives were amended in 2009 (see Box 8 below). The set of directives governing the sector gave rise to a series of markets that the European Commission (EC) recommended as being susceptible to ex-ante regulation. The EC initially identified the following markets that are relevant for call termination (EC, 2003):

- *Market 9: Call termination on individual public telephone networks provided at a fixed location. For the purposes of this Recommendation, call termination is taken to include local call conveyance and delineated in such a way as to be consistent with the delineated boundaries for the markets for call origination and for call transit on the public telephone network provided at a fixed location. The market corresponds to the one referred to in Annex I(2) of the Framework Directive in respect of Directive 97/33/EC (call termination in the fixed public telephone network).*
- *Market 16: Voice call termination on individual mobile networks. This market corresponds to the one referred to in Annex I(2) of the Framework Directive in respect of Directive 97/33/EC (call termination on public mobile telephone networks).*

These markets were subsequently confirmed in the 2007 recommendation on electronic communications markets as markets 3 and 7 (EC, 2007), despite the overall rationalisation from 18 markets (as set out in EC, 2003) to 7 markets. A further report commissioned by the EC on future markets that ought to be susceptible to ex-ante regulation concludes that wholesale call termination markets should continue to be susceptible to ex-ante regulation in the EC’s forthcoming review in 2014 (Ecorys, 2013). Ecorys (2013) did recommend merging markets for fixed and mobile call termination (markets 3 and 7, as set out in EC, 2007) for convenience, since the two sets of markets are analysed in the same way.

Box 8: Regulatory framework for the telecommunications sector in the European Union

The telecommunications sector in the European Union (EU) is regulated in terms of a number of directives, including:

1. The Framework Directive (European Parliament and Council, 2002a), which sets out the principles for regulation of the telecommunications sector;

Box 8: Regulatory framework for the telecommunications sector in the European Union

2. Directive on the authorisation of electronic communications networks and services (the Authorisation Directive);
3. Directive on access to, and interconnection of, electronic communications networks and associated facilities (the Access Directive) (European Parliament and Council, 2002a);
4. Directive on universal service (the Universal Service Directive); and
5. Directive on the processing of personal data (the Privacy and Electronic Communications Directive).

These directives were updated in 2009 (European Parliament and Council, 2009), in a series of amendments relating to a regulatory framework for networks and services, and on radio frequency spectrum. Among other things, the 2009 reforms reduced the number of markets subject to ex-ante regulation from 18 markets to 7. The regulatory framework for electronic communications is due for review again in 2014, and to this end the European Commission has already issued a set of proposals for a single market for electronic communications in Europe (EC, 2013b).

Source: Europa, 2013

Call termination rates for fixed and mobile networks are set by National Regulatory Authorities (NRAs) in the EU in terms of a recommendation on the regulatory treatment of fixed and mobile termination rates published by the European Commission (hereafter referred to as the recommendation, EC, 2009). The recommendation is based on cost recovery, using the costs of an efficient operator, and employs the long run incremental cost (LRIC) methodology. The LRIC of call termination services should be calculated by assessing the total long run incremental costs for all services provided by an operator less the total long run incremental costs of an operator that does not provide call termination services to third parties. The recommendation notes that the two sided nature of the voice services market means that both the caller and the called party benefits from the call; therefore, not all of the benefits of a call should be paid for by the caller.

The model employed by NRAs should be technologically neutral and should employ current cost accounting. Furthermore, the model should be bottom up, although it should be reviewed against a model using audited top down data from operators. For mobile networks, the model should use the mixture of 2G and 3G technologies anticipated in access networks, and the core network model should be based on a next generation network architecture. All costs not related to voice traffic should be ignored, and should be attributed to the costs of other services. The depreciation method used should allow for the economic depreciation of the useful life of the asset. Where this is not possible to assess, straight line depreciation, annuities, or tilted annuities may be used. Further details on the specific nature of the cost model recommended by the EC are shown on Box 9 below.

Box 9: Specific costing methodologies set out in the EC Recommendation (2009) for bottom-up LRIC models for mobile call termination rates

The EC (2009) Recommendation requires that only traffic-related costs be taken into account when assessing the costs of call termination, and that costs first be allocated to services other than call termination services provided to third parties, and the remainder should be added to the costing model for call termination services provided to third parties.

The EC distinguishes between costs relating to *coverage* and costs relating to *capacity*. Coverage enables calls to be made and received to and from any part of the network at a given time. The costs of capacity relate to increments in network capabilities to serve additional demand. The EC recommends using the costs of capacity rather than coverage in the determination of call termination rates, since coverage costs are likely to include a number of fixed, sunk costs that will not vary with changes in traffic, while capacity costs do vary with changes in traffic. The costs of SIM cards and handsets are not traffic related and therefore should not be included in the cost model. The costs incurred initially by an operator to acquire spectrum are driven by the need to provide services to subscribers and therefore should be excluded from the cost model. Additional spectrum purchased for the purpose of increasing capacity is driven by traffic requirements and therefore should be included in the cost model. These costs should be based on forward looking opportunity costs where possible. Costs that should be included in the LRIC model include network related costs that vary with traffic, including backbone network costs and main switching centre (MSC) capacity. Where additional base transceiver stations (BTS) or other cell sites are needed to increase network capacity, the costs of these sites should be included in the model. Additional wholesale costs relating to the provision of call termination services to third parties also need to be taken into account. Coverage costs, unavoidable business overhead costs and retail commercial costs should be excluded from the model. The Minimum Efficient Scale (MES) is set at a market share of 20%. NRAs are able to vary the MES market share depending on market conditions.

Source: EC, 2009

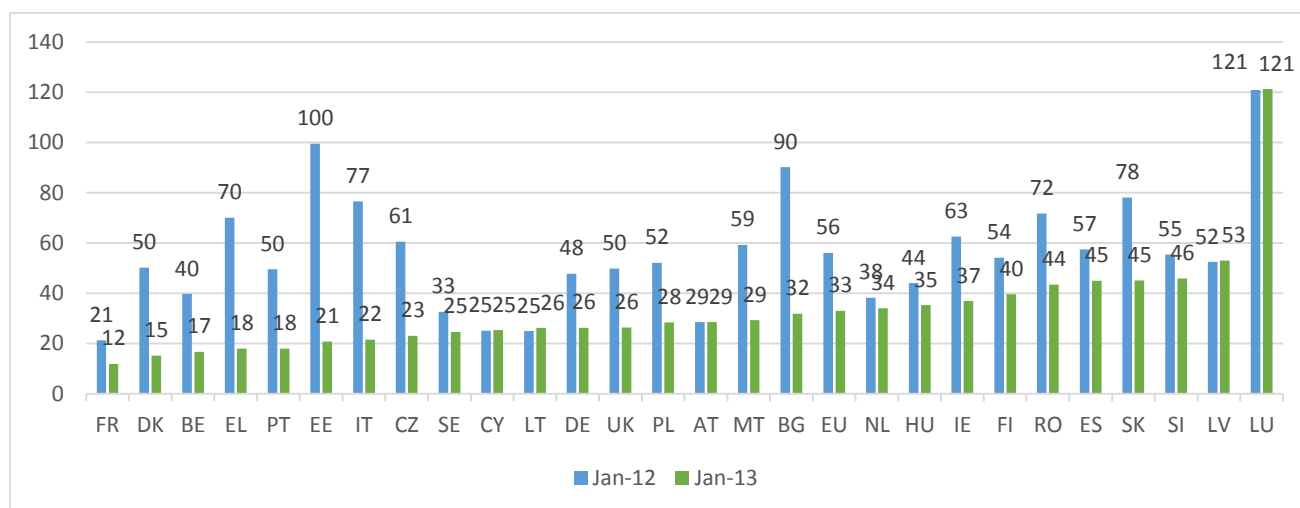
The recommendation allows for differences between countries and provides scope for different methodologies that are appropriate to circumstances to be implemented in individual member countries. The EC allowed for a glide path of approximately 3.5 years (from May 2009 until December 2012) for the new costing methodology to be implemented. Alternative methodologies may be used by NRAs, particularly where NRAs do not have adequate resources to develop bottom up LRIC models. Nonetheless, alternatives to the LRIC method may not yield call termination rates greater than the average of call termination rates arrived at by NRAs using the bottom up LRIC methodology.

Furthermore, the call termination rates arrived at should be symmetrical between operators. There should be no differences in costs between different fixed line operators. The only difference in costs between mobile operators should be due to uneven spectrum assignments and higher costs for new entrants before they reach minimum efficient scale (MES). Differences due to uneven spectrum assignments should decrease where spectrum trading is allowed and as the new entrant's volumes increase. The recommendation permits a transitional period for asymmetry of four years after entry. New entrants may recoup higher costs due to not reaching MES, which is assumed to be at a market share of between 15% and 20%. Fixed entrants do not have this problem because they can lease network elements and/or focus on high density routes, and therefore are not allowed to charge higher call termination rates than incumbents.

Impact of call termination rate interventions in developed countries

Despite the introduction of a harmonised system for the regulation of call termination rates across the EU in 2009, mobile call termination rates currently vary dramatically across Europe, from approximately R1.22 per minute in Luxembourg to R0.12 in France (EC, 2013a). Nonetheless, many EU countries have decreased their interconnection rates significantly over time (see Figure 34 below).

Figure 34: Mobile termination rates in the EU (Cents, at ZAR14.12 / EUR)



Source: EC, 2013a

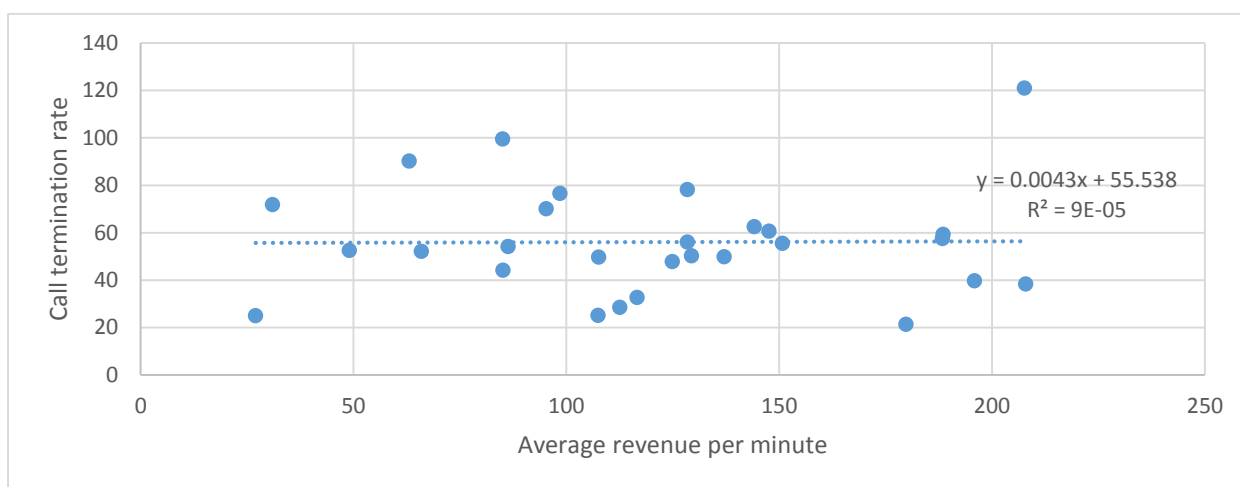
Note: Exchange rate used was provided by Google on 20/12/2013

South Africa's current mobile call termination rate (for MTN and Vodacom, discussed in more detail below) of R0.40 is high by comparison, in that it falls within the top quartile of call termination rates in the EU. The mobile call termination rate published in ICASA's 2014 regulations of R0.10 would be lower than the mobile call termination rate in any country in the EU but of course is higher than the bill and keep regime (which has a R0 call termination rate) that is in place in the US, Canada, Hong Kong and Singapore.

ICASA's proposed approach to use an LRIC model for call termination is in line with the EU recommendation. Nonetheless, it would be useful for ICASA to publish the details of its proposed methodology in its decision in the same way that the EC published the details of its recommended methodology. ICASA's decision to allow for a significant level of asymmetry, in allowing Cell C and Telkom Mobile to charge R0.40 in 2016, a 400% mark-up on the R0.10 rate imposed on MTN and Vodacom, from 1 March 2016 until 28 February 2017, 16 years after Cell C was licenced in 2001 and more than four years after Telkom Mobile commenced its operations in 2010, is not in line with the EC recommendation. This may lead to significantly higher prices for consumers, who usually pay a single rate for calls to all mobile networks (though this may change after this decision is implemented).

A superficial analysis of call termination rates in the EU indicates that average retail prices are not related to call termination rates (see the horizontal trend line in Figure 35 below).⁴⁹ There are many other factors that explain average prices in different countries including costs other than call termination rates, demand, differentiation between network operators, and the extent of competition. All of these factors vary across markets. Therefore, a lot of the variability in the retail pricing data is unexplained in Figure 35. Put another way, while lower call termination rates are a necessary condition for lower retail prices, they are by no means a sufficient condition.

Figure 35: Call termination rates and average revenue per minute, EU 27 (ZAR cents per minute, Jan-12)



Source: Own analysis of EC, 2013a

Note: Each dot represents the data for an individual EU country.

Nonetheless, overall for the EU, lower call termination rates over time have coincided with significantly greater market shares for smaller operators (see Figure 36 and Figure 37 below). Between 2005 and 2013, average call termination rates fell from R1.82 to R0.33 per minute.⁵⁰ Over a similar period, the incumbents' share of the market fell from 41% on average in 2004 to 36% in 2012, while that of smaller competitors grew from 28% to 34%. Reducing call termination rates, therefore, appears to be a key means of reducing barriers to entry for new entrants, consistent with Laffont, Rey & Tirole's (1998b) model of network competition with asymmetrically sized networks and on-net / off-net price discrimination (discussed above).

Figure 36: Mobile subscribers: operator market shares at EU level, October 2004 – October 2012

⁴⁹ This graph is also shown in Frontier Economics, 2012.

⁵⁰ Note that average EU prices in Euros were converted to Rands at an exchange rate of ZAR14.18 / EUR, as per Google on 20 December 2013.

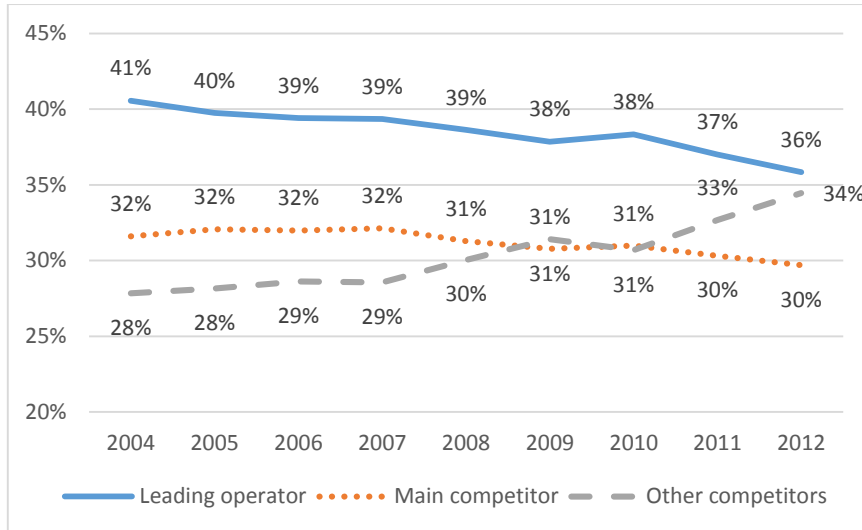
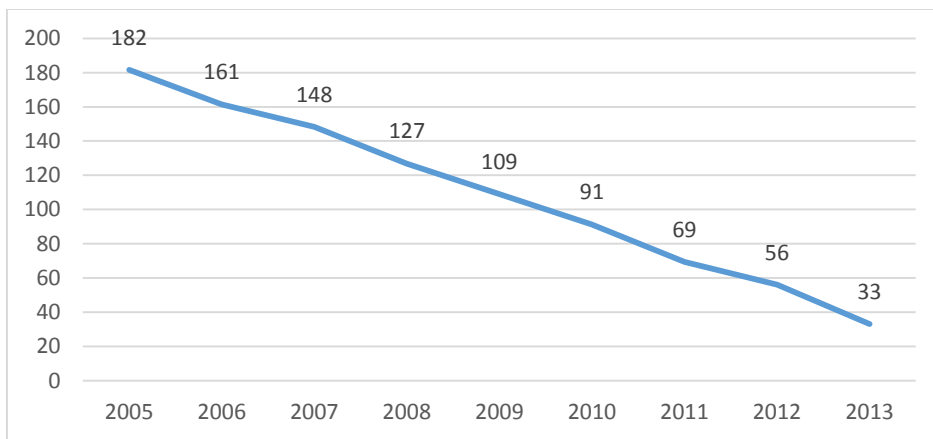


Figure 37: Call termination rates EU average, 2005-2013 (ZAR cents per minute, ZAR14.18/EUR)



Source: EC, 2013a

Bohlin & Kongaut (2012) provide a useful summary of research into the impact of mobile call termination rates on retail prices and access to services in largely developed countries (see Table 18 below). The results of the various studies are contradictory in many cases. For example, Genakos & Valletti (2011) found that call termination rate reductions increased retail prices as a result of a ‘waterbed effect’. The same authors’ more recent (2014) paper found that this ‘waterbed effect’ had disappeared over time. Kongaut & Bohlin (2012) themselves find that call termination rate reductions have led to decreases in retail prices. Pensendorfer and Veronese (2009) found no relationship between MTR reductions and retail prices.

Table 18: Summary of studies on impact of mobile call termination rate reductions (Bohlin & Kongaut (2012))

Authors	Outcomes of research
Genakos and Valletti (2011 and 2014)	The authors estimated the impact of MTRs on retail prices and operator profits, initially (in their 2011 paper) over a shorter time period than their more recent (2014) paper. Their initial results showed that reducing MTRs by approximately 10% results in increases of approximately 5% in retail prices. They found that the “waterbed effect” was strongest in markets with high levels of competition and mobile penetration. More recently in their 2014 paper, with more data over a longer period, the authors found that the “waterbed effect” had disappeared, due to the greater role that mobile to mobile calls play in the market in more recent years compared to fixed to mobile calls. The authors found that regulation did not reduce the mobile operators’ profits and investments.
Andersson and Hansen (2009)	The authors used the multi-firm competition model to estimate the impact of MTRs on operator profits. Their results showed that call termination rates do not necessarily have an impact on firm profitability, and concluded that MTRs therefore do not necessarily benefit consumers in mature markets.
Pensendorfer and Veronese (2009)	The authors found that lower MTRs result in lower uptake of mobile services (measured by SIM penetration) and found some evidence of greater usage for higher MTRs but did not find strong evidence of a relationship between lower call termination rates and retail prices. The authors highlighted several data limitations in the available data, and were also concerned about endogeneity between usage and the MTR, since the latter might be set according to usage patterns.
Alexander, Cunningham, and Candeub (2010)	The authors found that higher MTRs lead to greater subscriptions per person.
Growitsch, Marcus and Wernick (2010)	The authors find a strong relationship between reductions in MTRs and lower retail prices for services, and they also find a strong relationship between reductions in MTRs and greater usage (in terms of minutes of use).
Dewenter and Kruse (2011)	The authors find no relationship between either receiving party pays (i.e. MTRs are set at R0 per minute) or calling party pays regimes (where MTRs are > R0 per minute) and mobile diffusion rates, and recommend the use of RPP due to the lower regulatory costs involved.

Source: Summarised and adapted from Kongaut & Bohlin (2012) and the applicable papers as sourced.

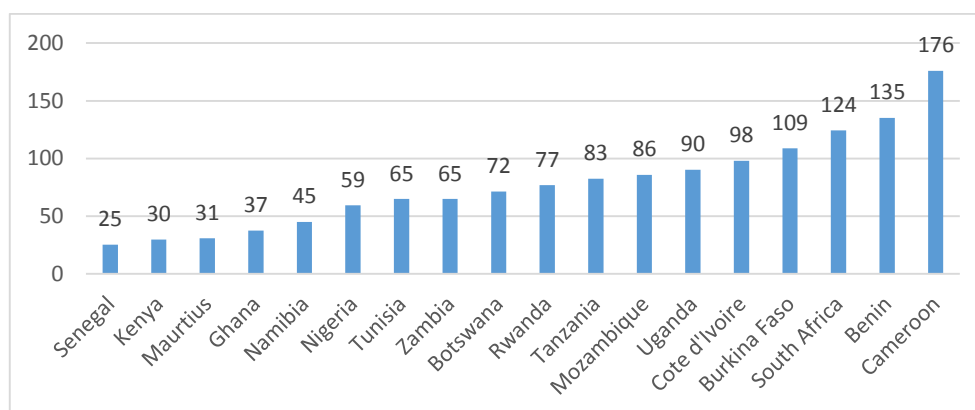
Many of these studies tend to focus on retail prices for mobile voice services. Mobile call termination rates also impact on retail pricing for fixed line voice services, however. It stands to reason that, whatever the waterbed effect in markets for mobile services, whereby prices for other retail mobile services increase after an MTR reduction (at least according to some evidence), prices for fixed line voice usage services in all likelihood declined as a consequence of the MTR reductions, since the fixed operators’ input costs declined, and fixed operators did not experience the same magnitude of call termination rate reductions for their own networks that mobile operators experienced.

6.4.2. Experience with call termination rates in other African countries

Stork (2012) developed a review of the impact of Mobile Termination Rate (MTR) regulatory interventions in Botswana, Kenya, Namibia, and South Africa. Stork (2012) relies on individual case studies, rather than cross-country econometric techniques, to assess the impact of lower call termination rates. As is the case in EU countries, call termination rates diverge significantly across countries in Africa, from as low as R0.25 in Senegal to R1.76 in Cameroon (Stork, 2012). Note that South Africa’s call termination rate has been significantly reduced since 2010,

from R0.89 (peak) to R0.40, for MTN and Vodacom, and to R0.44 for other mobile operators (ICASA, 2010a). Nonetheless, South Africa’s current call termination rate is still high when compared to that of Senegal, Mauritius, Ghana and Kenya.

Table 19: Mobile call termination rates in selected African countries (Cents, at ZAR11 / USD, 2010) (Stork, 2012)



Source: Adapted from Stork (2012)

Where mobile call termination rates have been reduced through regulatory interventions in Botswana, Kenya, Namibia and Nigeria, Stork (2012) finds that retail prices declined, and in many instances the subscriber base and incumbent profitability increased (see Table 20 below).

In Botswana, the regulator reduced call termination rates by 15% between 2010 and 2011, and Mascom reduced its prices (OECD high usage basket) by 5% (Stork, 2012). Kenya had the largest regulated decrease in call termination rates and saw the largest decrease in retail prices as a result of the Kenya Communications Commission’s (KCC) intervention: call termination rates dropped by 84% between 2007 and 2013 and by 65% between 2007 and 2010 alone (KCC, 2007 & KCC, 2010). Between January 2010 and January 2011 alone, Safaricom’s (the largest mobile services provider in Kenya) retail prices dropped by 68% and its subscriber base grew by 59% (Stork, 2012). Safaricom’s earnings before interest, tax, depreciation and amortisation (EBITDA) margin, a measure of profitability, did decline from 51.7% to 43.6% (Stork, 2012) but the latter is still significantly above the EBITDA margins earned by mobile operators in South Africa, for example (discussed below).

The Namibian Communications Commission (RIA, 2009 and Stork, 2012) reduced mobile termination rates from N\$1.02 to N\$0.60 in 2009, and then following a glide path, to N\$0.30 in January 2011. The final rate applied to both fixed and mobile networks, as was the case in Nigeria (Stork, 2012). MTRs declined by 51% from June 2009 to January 2010 (RIA, 2009). Between 2008 and 2010, the largest mobile operator, MTC, increased its subscriber base from 1m to 1.5m subscribers, and its EBITDA margin increased from 50.9% to 55.8% (Stork, 2012). Between 2008 and 2011, MTC’s retail prices declined by between 37% and 58%, using the OECD low usage and medium usage baskets respectively (Stork, 2012).

The MTR in Nigeria was regulated by the Nigerian Communications Commission in 2009 (NCC, 2009) and was reduced by 28% (Stork, 2012). MTN is the largest operator in Nigeria, and reduced its prices between 2008 and 2011 by 37%, using the OECD high usage basket, while the total number of CDMA and GSM subscribers in Nigeria increased by 16% between 2009 and 2010 (Stork, 2012). MTN in South Africa did not immediately reduce its retail prices in terms of the OECD high usage basket though using average prices, MTN's prices did come down (discussed below). MTN's subscriber base increased by 14% over the period (Stork, 2012). Average retail mobile prices, including Vodacom's prices, in South Africa did decline significantly after the mobile call termination rate intervention. This is discussed in more detail below.

Table 20: Mobile call termination rate reductions, price changes, subscriber base changes and incumbent profitability in Botswana, Kenya, Namibia, Nigeria and South Africa, Stork (2012)

Country (name of incumbent)	MTR reduction	Retail prices	Subscribers	Profitability
Botswana (Mascom)	2010-2014: -60% 2010 – 2011: -15%	Feb '10 – Mar '11 (Mascom, OECD high usage basket): -5%	No information in Stork (2012)	No information in Stork (2012)
Kenya (Safaricom)	2007 – 2013: -84% 2007-2010: -65%	Jan '10–Jan '11: Airtel: -81% Safaricom: -68% Orange: -54%	2007 – 2010: Safaricom: +59%	2007 – 2010: Safaricom's EBITDA margin declined from 51.7% to 43.6%
Namibia (MTC)	2009 – 2011: -72% 2009 – 2010: -51%	2008 – 2011 (MTC cheapest product): -37% (OECD low usage) -58% (OECD medium usage) -46% (OECD high usage)	2008 – 2010: MTC increased its subscriber base from 1m to 1.5m	2008 – 2010: MTC's EBITDA margin increased from 50.9% to 55.8%
Nigeria (MTN)	-28% for incumbents (NCC, 2009)	2010 – 2011: (MTN, OECD high usage basket): -40%	2009 – 2010: +16%	No information in Stork (2012)
South Africa (MTN)	2011 – 2013: -52%* 2009 – Oct 2010: -22%*	2010-2011 (MTN, OECD high usage basket): No impact. Note that this is discussed in more detail below.	Dec '09 – Dec '10: +14%	No information in Stork (2012)

Source: Adapted from Stork (2012)

* Note: Calculated using a simple average of peak and off-peak call termination rates

Stork (2012) concludes that the “waterbed effect”, whereby retail prices for mobile services rise after call termination rate reductions, is not visible in African countries where the regulator has intervened in call termination markets: rather, retail prices have fallen, subscriptions increased, and the incumbent's profitability was not harmed significantly (and in one case profitability in fact increased after the intervention). This is contrary to the findings of Genakos and Valletti (2011), who found that retail prices increase with lower call termination rates but is consistent with the latter authors' findings in 2014, where they found that the waterbed effect

was eliminated over time and that there is no evidence that regulation had an impact on operator profits and investment. Stork's (2012) finding is also contrary to the findings of Alexander *et al* (2010) and Pensendorfer and Veronese (2009), who found that higher MTRs lead to higher mobile penetration. Stork's (2012) findings are consistent with those of Growitsch *et al* (2010) and Bohlin and Kongaut (2012), who find that lower MTRs lead to lower retail prices.

6.5. Impact of call termination rate interventions in South Africa

6.5.1. Operator competition in South Africa and the call termination rate regime in the context of the Laffont, Rey and Tirole (1998a, 1998b) model of network competition

The Laffont, Rey and Tirole (1998a, 1998b) model examines the socially optimal call termination rate (the Ramsey outcome) and the rate that colluding operators would set to maximise profits. Key insights from the model (discussed more in detail above) suggest that operators would choose different call termination rates depending on the competitive setting and regulatory context, which has implications for regulatory interventions. The key factors modelled by Laffont, Rey and Tirole (1998a, 1998b) all suggest that ICASA should intervene aggressively in the setting of call termination rates, and should consider setting call termination rates below the costs of call termination (see Table 21 below).

Table 21: Matrix of Laffont, Rey & Tirole model factors mapped to South African context

Laffont, Rey & Tirole factor	South African context	Implication for collusive outcome	Implication for socially optimal call termination rate
Linear pricing or non-linear pricing?	Both: (Quasi) linear pricing for prepaid, non-linear pricing for post-paid.	The presence of linear pricing, at least for prepaid services, suggests that operators would choose a high call termination rate to limit the incentives of rivals to drop retail prices and create an access deficit.	The regulator should intervene to set prices as close to costs, or even below costs (where fixed costs are minimal, discussed below), to mitigate the effects of a likely collusive outcome. This should be balanced against promoting access to networks.
Is asymmetry in call termination rates between operators allowed?	Yes, particularly historically, the fixed termination rate was significantly lower than the mobile rate.	The high off-net rate for calls from fixed networks means that fixed networks lose retail market share and advantages mobile operators. Mobile operators would there set a higher fixed to mobile rate.	In order to promote convergence, while the regulator should ensure that both fixed and mobile rates are set in relation to (or below) costs, the mobile rate should not significantly exceed the fixed between ON (national) call termination rate.
High fixed costs of servicing customers	Historically, yes and currently, less so. Consumers in South Africa required subsidised handsets. As the prices of	Lower fixed costs raises the profitability of acquiring customers, which raises the incentive for operators to lower retail rates, and which	As the fixed costs of serving customers decline with greater subscriber numbers and as handset prices decline, the profitability of acquiring

Laffont, Rey & Tirole factor	South African context	Implication for collusive outcome	Implication for socially optimal call termination rate
(acquisition, billing)	handsets, particularly basic voice handsets, have declined, fixed costs are significantly lower.	suggests that operators would choose a higher call termination rate to limit the incentive to lower retail rates.	customers increases and so the regulator should intervene more aggressively in setting lower call termination rates, potentially below the costs of call termination.
Are all operators symmetrical in size and is on-net / off-net discrimination allowed?	MTN and Vodacom are overwhelmingly dominant in the mobile market and Telkom is overwhelmingly dominant in the fixed market. On-net / Off-net price discrimination is not explicitly prohibited and is used extensively by operators.	Incumbents would choose a significantly higher call termination rate to use on-net / off-net price discrimination to generate tariff mediated network effects.	The regulator should intervene to reduce the call termination rate, potentially below cost. The regulator should be careful when considering prohibiting on-net/off-net discrimination since discrimination can eliminate double-marginalisation and result in lower prices for consumers.
Are networks highly substitutable or heterogenous?	All mobile networks in South Africa are GSM based and handsets are unlocked by regulation and number portability is in place. This suggests a reasonable degree of substitutability. While the operators spend a lot of money on marketing which suggests some level of differentiation, marketing has shifted significantly towards advertising prices, which suggests that networks are more substitutable now.	The high degree of substitutability between networks suggests that lowering retail prices causes significant increases in market share, which suggests that operators would choose a higher call termination rate in order to dis-incentivise retail price reductions as these would cause an access deficit.	Regulators should impose a call termination rate that is close to or even below costs, although they should take into account that the high degree of substitutability means that retail prices are lower in general and so the double marginalisation (arising from retail mark-ups on top of call termination rates that are set above costs) problem is less of a concern.

The presence of multi-homing in South Africa presents a significant departure from the Laffont, Rey & Tirole (1998a, 1998b) model, which uses a discrete choice model of competition between networks, in which customers choose one network and operators compete for all of a customer's business. In 2012, there were approximately 66m mobile subscriptions across the mobile network operators (discussed in more detail below) in South Africa, while South Africa's population is 53m people (Statssa, 2013b), of which 37,5m people are 15 years or older. Furthermore, only 80% - 90% of adults have access to a cell-phone. This suggests that many (if not most) of the population in South Africa has more than one SIM card (mobile operator), and therefore multi-homes. This may reduce the effect that call termination rates have on final average retail prices, since consumers that have more than one SIM are able to take advantage of low on-net prices, particularly if a large percentage of the population has more than one SIM. Mobile operators therefore might compete with one another less through retail off-net prices and more through on-net prices, which might reduce their incentive to set a high call termination rate in the first place.

6.5.2. Operator claims about impact of intervention

The mobile operators, including Cell C (a smaller rival to incumbents MTN and Vodacom) all issued warnings about the negative impact that reduced call termination rates would have on their businesses (Stork, 2012).⁵¹ These operators warned that call termination rates would not lead to lower prices. Rather, they would result in reduced operator profitability, lower investment, less coverage, less access to mobile networks and reduced employment at operators.

For example, Vodacom (2009) submitted to the Parliamentary Portfolio Committee on Communications (PCC) that:

“A dramatic reduction of charges is likely to have a negative impact on the government policy objective of universal access and would be disruptive to the economy and communications industry.”

While the Cell C CEO at the time, Lars Reichelt, proposed a rate of R0.75 per minute during the course of the PCC hearings in 2009 which was significantly lower than the R0.89 per minute peak tariff ultimately agreed to, he claimed that (McCleod, 2009b): *“This proposal is very painful for us, very painful”*.

This is because while smaller new entrants benefit from lower call termination rates to some extent because larger networks are less able to use on-net discounts (such as for Vodacom to Vodacom calls) relative to high call termination rates to exclude smaller operators (see Laffont *et al*, 1998b), all mobile network operators earn (after call termination payments) significant revenues from fixed line networks for fixed to mobile calls. This outcome arises from the fact that the call termination rate regime usually allows for significantly higher call termination rates for calls terminated on mobile networks relative to calls terminated on fixed line networks, though this asymmetry between fixed and mobile has been eliminated in ICASA’s latest (2014) regulations, as discussed above.

MTN and Vodacom have more recently issued similarly dire warnings about ICASA’s proposed call termination rate intervention leading to job losses and lower investment (see, for example, Mcleod, 2014).

6.5.3. Impact on prices and usage

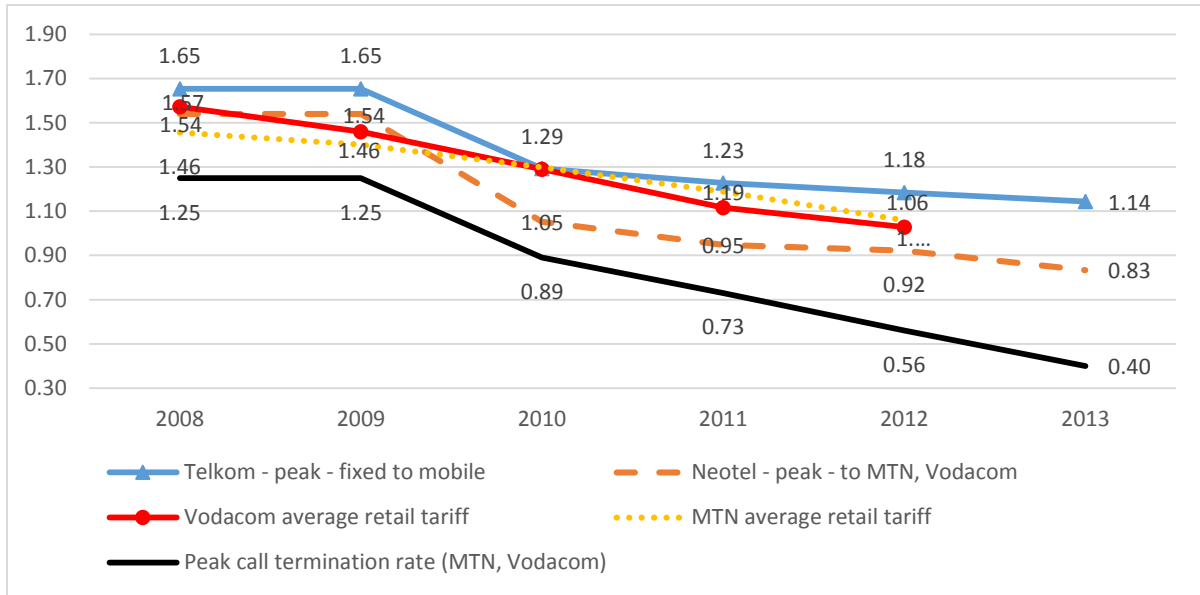
Contrary to the predictions of the mobile operators, retail prices for voice services on average fell significantly between 2008 and 2013, although they did not fall by as much as call termination rates fell. While the peak call termination rate for MTN and Vodacom fell by 68%,

⁵¹ More recently, Cell C and Telkom have shown support for the ICASA intervention, particularly due to the significant asymmetry that ICASA has allowed for smaller operators who may charge more than double what MTN and Vodacom may charge under the 2014 regulations. While Vodacom indicated that they welcomed ICASA’s intervention into the call termination rate regime in 2013 (Vodacom, 2013), they have decided to join MTN in taking ICASA’s latest (2014) decision on review (see, for example, Mcleod, 2014).

Vodacom's retail prices fell by 34% between 2008 and 2012, and MTN's prices fell by 27% between 2008 and 2012 (see Figure 38). The effect on fixed to mobile prices was similar: Telkom's retail fixed to mobile prices fell by 31% between 2008 and 2013 and Neotel's prices fell by 46% over the same period. Telkom's initial fixed to mobile rate cut was particularly pronounced due to the terms of its interconnection agreement with Vodacom at the time, which required that Telkom had to reduce its retail prices if interconnection prices fell (Vodacom, 2009). While retail prices may not have declined by as much as the call termination rates did, they have declined significantly over the period of the call termination rate intervention.

In addition to this, the usage of mobile networks has grown significantly in response to lower prices (see Figure 39). Telkom's total minutes of use declined significantly between 2004 and 2012, though this is largely due to the fact that it has lost ground to other fixed line voice service providers (see Figure 39). Increases in usage have to some extent compensated the mobile operators for lower retail prices and lower call termination rates. Telecommunications operators pay both interconnection costs and receive interconnection revenue. It is therefore important to assess not only how much interconnection revenue declines for an individual operator but also how much interconnection costs decline, in order to arrive at the impact of the call termination rate intervention on operator financial revenues and costs on-net (Stork, 2012). Telkom earns a lot less from net interconnection revenue than MTN and Vodacom do due to the asymmetry between fixed and mobile call termination rates: fixed call termination rates are significantly lower than mobile call termination rates, though this is changing in terms of ICASA's new 2014 regulations (as discussed above).

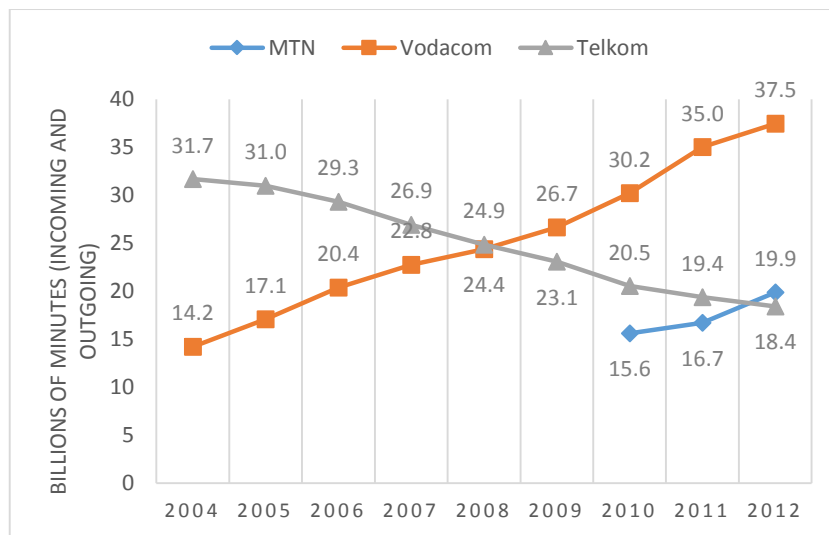
Figure 38: Mobile call termination rates (peak), average mobile retail prices and peak fixed to mobile prices (ZAR / minute)



Source: Analysis of MTN (2005-2013) and Vodacom (2005-2013), and Telkom (2005-2013) and Voice price comparisons (2009-2013) used for Neotel

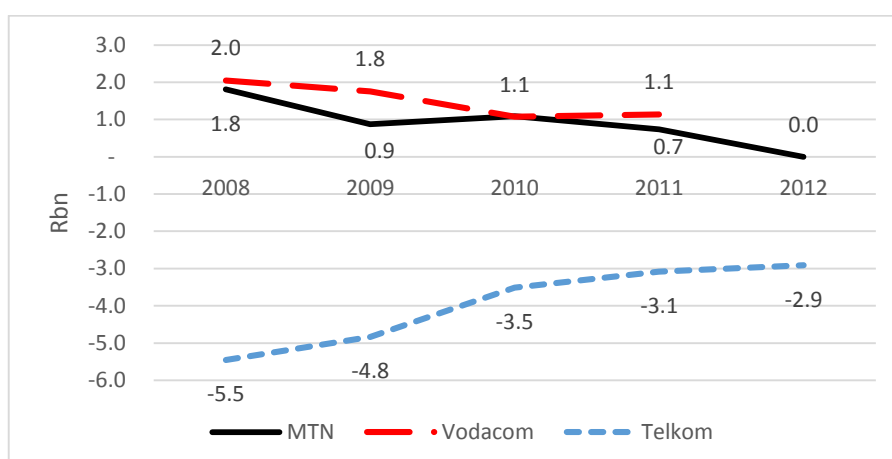
Notes: MTN and Vodacom prices are average rates calculated by dividing outgoing voice revenue by outgoing minutes of use. Vodacom and Telkom financial data corresponds to the calendar year prior to the year in which the financial results were reported, due to Vodacom and Telkom's financial year ending in March (their data therefore reflects the previous calendar year more than it does the calendar year in which results are reported). Neotel and Telkom retail prices are as reported in the media and on their websites.

Figure 39: MTN and Vodacom minutes of use (Billions, 2004-2012)



See figure below for notes and sources.

Figure 40: Net interconnection revenue for MTN, Vodacom and Telkom, 2008-2012 (Rbn)



Source: Analysis of MTN (2005-2013) and Vodacom (2005-2013) and Telkom (2005-2013) annual reports

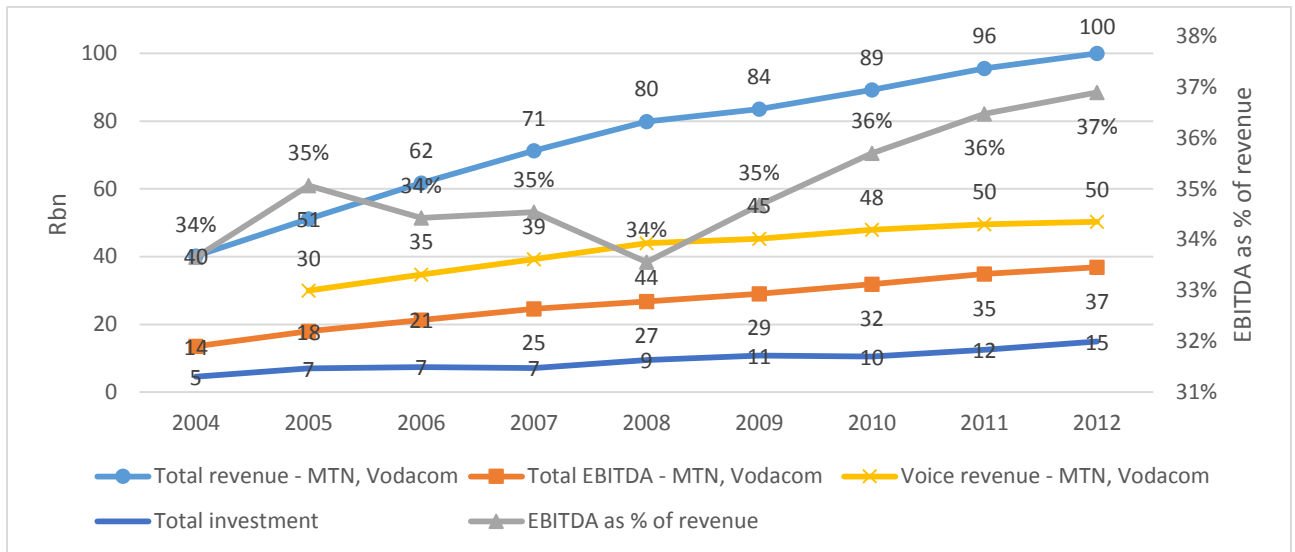
Note: Vodacom and Telkom financial data corresponds to the calendar year prior to the year in which the financial results were reported, due to Vodacom and Telkom's financial year ending in March (their data therefore reflects the previous calendar year more than it does the calendar year in which results are reported). MTN's data corresponds to the relevant calendar year.

While the initial call termination rate cut (brokered by the Minister of Communications and the PCC) which took effect from March 2010 caused a significant decline in Vodacom's net interconnection revenues, MTN's net interconnection revenues increased (see Figure 40 above). The subsequent rate cut effective from March 2011 had the opposite effect: Vodacom's net interconnection revenue increased (see Stork, 2012), while MTN's net interconnection revenue decreased. Vodacom did not report on interconnection expenses in 2012 (financial year ending in March 2013), and MTN's net interconnection revenue declined to zero. Over the same period, Telkom's net interconnection expense declined significantly.

6.5.4. Impact on operator revenue, profitability, investment and competition in adjacent markets

Again, contrary to the views expressed by the mobile operators prior to the call termination rate intervention, there were no, or at worst there were limited, negative effects arising from the intervention. Total revenues for MTN and Vodacom grew significantly between 2009 and 2012, from R84bn to R100bn (see Figure 41 below). Earnings before interest, tax, depreciation and amortisation (EBITDA) for MTN and Vodacom combined increased from 34% of revenues in 2004 to 37% of revenues in 2012. A significant proportion of this growth is from device revenue (smartphones, tablets, etc.) and data revenue rather than voice revenue, however: voice revenues have essentially been flat between 2010 and 2012 (growing from R48bn in 2010 to R50bn in 2012), and have declined in real terms (after taking into account the effects of inflation). Investment has increased since 2009, from R11bn to R15bn, although again the bulk of this investment relates to data services rather than voice coverage (discussed next).

Figure 41: MTN, Vodacom total revenue, EBITDA, voice revenue, investment in their South African operations (2004 - 2012)



Source: Analysis of MTN (2005-2013), Vodacom (2005-2013)

Note: Vodacom's financial year ends in March. Their data is shown as reflecting for the year prior to the year in which results are reported. MTN's year end is in December.

Growth in mobile network coverage by the mobile operators suggests that they continued to invest in the sector. Mobile voice (1G and 2G) coverage in South Africa is close to ubiquitous: Vodacom reported 99.8% population coverage in 2012 while MTN reported 98.6% population coverage in the same year (MTN, Vodacom, 2005-2013). Cell C reported 63% population coverage in 2010 (Cell C, 2005-2013). These high coverage levels have arisen from significant growth in the total number of mobile network Base Transceiver Station (BTS) sites: MTN's network grew from 4,245 BTS sites in 2004 to 11,172 sites in 2012, while Vodacom's network grew from 5,713 sites to 9,348 sites over the same period.⁵² Telkom began its mobile network rollout in 2010, and grew from 970 BTS sites in 2011 to 2,299 sites in 2013.

3G population coverage, while not as extensive, has grown significantly (see Figure 13). MTN's 3G coverage grew from 27% in 2007 to 65% in 2012. Vodacom's 3G coverage grew from 25% in 2008 to 85% in 2013. This is despite the reduced revenues and increased intensity of competition arising from the call termination rate intervention. The growth in network coverage is also reflected in the growth in the overall number of BTS sites in the Vodacom (see Figure 14 above) and MTN networks over time, as well as the growth in the number of 3G BTS sites. The number of 3G base stations has been growing as a proportion of the overall Vodacom network (see Figure 14 above).

⁵² This relates to 2G sites. Most 3G sites, reported separately, would have been installed as a network overlay to the 2G network, though there may be some 3G sites that are deployed in addition to the 2G network, which means that this figure may understate the total size of the Vodacom network.

6.5.5. Impact on employment

While there has been a marginal decline in employment at Vodacom from a peak of 5,327 employees in 2010 to 5,153 employees in 2012 (Vodacom, 2005-2013) and MTN has also reduced employment (Interview with MTN), this has been relatively small. The reduction in employment at MTN and Vodacom also coincided with the expansion of Cell C's network and subscriber base as well as with Telkom Mobile's entry into the market. The Telkom Mobile staff complement alone at 480 employees (Telkom, 2005-2013) outweighs the employment losses at least at Vodacom (MTN does not report on employment for MTN South Africa). With new entry and more vigorous competition, employment losses at incumbent network operators may well have taken place whether call termination rates were reduced or not.

6.5.6. Impact on access to mobile services

Access to voice services and coverage also increased over the period of the call termination rate reductions contrary to Vodacom's (2009) prediction. All of the mobile networks increased their subscriber bases over this period: between 2009 and 2012, the number of MTN subscribers grew from 18.8m to 25.4m, while the number of Vodacom subscribers grew from 19.7m to 28.9m between 2010 and 2012 (MTN, 2005-2013 & Vodacom, 2005-2013).⁵³ Cell C grew its subscriber base from 6.9m to 10m subscribers between 2009 and 2012, while Telkom Mobile grew its subscriber base from 0.5m in 2010 (when it entered the market) to 1.5m in 2012 (Cell C, 2005-2013 & Telkom, 2005-2013). While some of this growth is due to subscriptions for machine to machine communications (such as vehicle tracking), overall subscriber growth has been significant.

Growth in access to mobile services is confirmed by survey evidence. Statistics South Africa (2012a) reports that household access to cellphones was 88.9% in 2011, compared to 72.9% in 2007 and 32.3% in 2001 (Statistics South Africa, 2007). There is very little variability in access to a cell-phone between provinces: the lowest availability is 81.1% in the Northern Cape and the highest is 93.8% in Gauteng. Note however that the Statistics South Africa questionnaire was structured such that if any one person in a household owned a cellphone, the household was deemed to own a cellphone.⁵⁴ This means that while household access to cell-phones was almost 90%, access to cellphones by the population could be significantly lower than this if many household members on average are unable to access the device.

Gillwald *et al* (2013) arrived at similar results from a survey of households for access to cellphones (84.2%). World Wide Worx (2012) estimates that there are approximately 40m unique users of cellphones in South Africa, and cellphone penetration is therefore approximately 80%. This is less than what Statistics South Africa (2012a) and Gillwald (2013) estimate. This is because, for example, Statistics South Africa (2012) suggests that 88.9% of

⁵³ Vodacom changed its definition of subscribers over this period, and provides data going back to 2010 only. Note that Vodacom and Telkom have financial years ending in March. Their data is shown as reflecting for the year prior to the year in which results are reported. MTN's year end is in December.

⁵⁴ Households were asked the following (Question H-13): "Does this household own any of the following in working order?". Respondents could answer Yes or No to various household goods, including landline, cellphone and computer.

households own a cellphone but not that each person within those households have a cellphone. The AMPS surveys (2007-2013) confirm the relatively high rate of cellphone penetration shown in the census (Statistics South Africa, 2012a) and in Gillwald *et al* (2013): cellphone penetration has grown from 67% of the adult population in 2007 to 86% in 2013. This does suggest though that cellphone penetration is not 100%, and that more than five million adult South Africans still do not have access to a cellphone.⁵⁵

The significant growth in cellphone penetration in South Africa during a period in which call termination rates declined is in contrast to the findings of Pensendorfer and Veronese (2009) and Alexander *et al* (2010) who found that higher call termination rates result in a greater number of subscriptions, and is also in contrast to Dewenter and Kruse (2011) who found no relationship between mobile diffusion and call termination rates.

It is possible that greater uptake of mobile services in South Africa may not have been driven by lower call termination rates (leading to low retail prices and greater demand). The introduction of number portability in 2006 (ICASA, 2005) and banning network locked handsets no doubt also contributed to greater competition and therefore lower prices and increased demand. Nonetheless, lower call termination rates in all likelihood played an important role in developing greater competitive intensity, in allowing for significant subscriber growth among new entrant networks (Cell C and Telkom Mobile). Furthermore, the call termination rate reductions also allowed for greater incentives for retail price reductions, since the costs of doing so, in the form of lower net interconnection revenues, declined with the call termination rate (see Laffont *et al*, 1998a).

6.5.7. Impact on competition

The mobile services sector has seen increased entry and expansion of smaller new entrants during the call termination rate intervention and lower retail prices (discussed above).⁵⁶ Nonetheless, market shares in the mobile sector appear to have remained relatively stable over time (see Figure 42 and Figure 43 below). While the absolute number of active SIM cards in the market exceeds the number of customers counted by the AMPS survey (South African Audience Research Foundation, "SAARF", 2007-2013) by a significant margin, the AMPS survey does provide an indication of which providers customers see as their main provider.⁵⁷ Vodacom's market share has declined slightly over time, from 49% in 2007 / 2008 to 46% in 2012 / 2013, MTN has increased its market share by two percentage points over the same period and Cell C has gained one percentage point. The AMPS results therefore do not

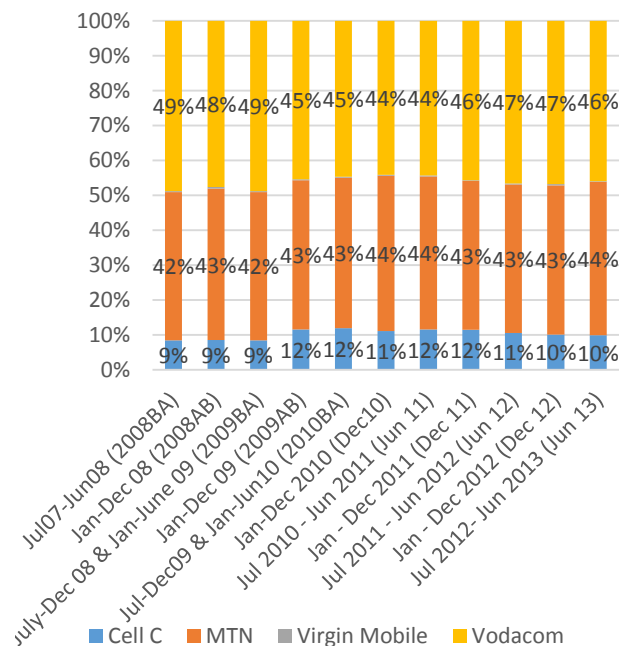
⁵⁵ The 2013 AMPS survey uses an adult population of 37,214,000 people.

⁵⁶ A further measure of competition is the Telecommunications Regulatory Environment (TRE) assessment, which is a survey of stakeholder perceptions. Stakeholder perceptions of the regulation of anti-competitive practices improved between 2006 and 2011, from less than -1 but greater than -2, to greater than -1 but less than 0, on a scale of between -2 and +2 (RIA, 2013a). While this is a perception survey with a limited number of respondents, the perception of the regulation of anti-competitive activities in telecommunications markets in South Africa has improved.

⁵⁷ Question E3 of the AMPS survey asks the question: "Please think about the cellphone that you personally use most often... What make is it?" and then the following question E4 asks: "And to which network is this cellphone linked? Is it linked to...". All of the mobile operators are on the list, which is read out and for which only one answer may be recorded (SAARF, 2013).

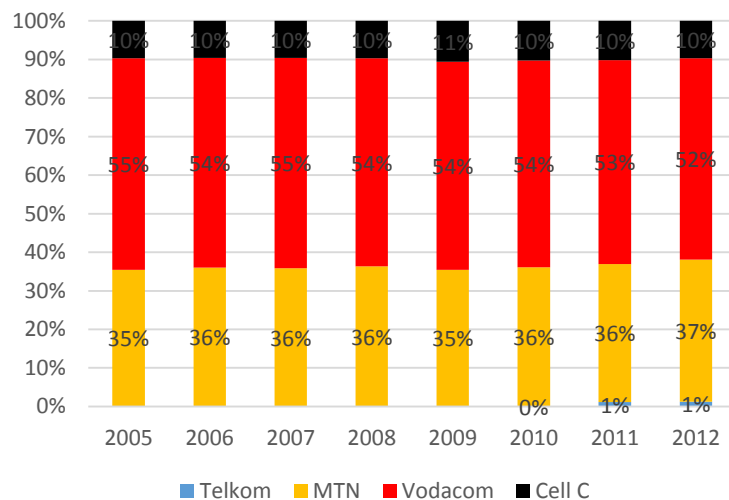
suggest that the market for cell-phones is a dynamic, competitive one. Revenue data for the mobile operators shows a slightly more dynamic picture: while Vodacom's market share declined from 55% to 52% in terms of revenues between 2005 and 2012, MTN's share increased from 35% to 37% (see Figure 43 below) and Telkom Mobile entered the market. Publicly available information for Cell C suggests that their market share, in terms of revenues, has remained low and relatively stable over time.

Figure 42: Market shares using all media products survey results for cell-phone providers (2007 - 2013)



Source: Analysis of AMPS data, SAARF (2007-2013)

Figure 43: Market shares based on revenues (2007 - 2013)



Source: Operator annual reports.

Note: Cell C data for 2011, 2012 are estimates and are based on growth in previous years of approximately 3% per annum

Data from operator annual reports on subscriber numbers also depicts a more dynamic picture than the AMPS data (see Figure 26 and Figure 27 above). However, changes in subscriber numbers and market shares emanating from operator annual reports are more likely to do with changes in definitions of active subscribers and the implementation of RICA in 2010 rather than intensity of competition. For example, Vodacom's subscriber base in 2009 included inactive subscribers; excluding inactive subscribers, Vodacom's subscriber base declined significantly in 2010.

Another indication of the intensity of competitive rivalry is rates of churn, measured as the number of customers that exit the network as a percentage of the average subscriber base in a given period. While prepaid churn increased between 2004 and 2013 (see Figure 28 above) Vodacom changed its definition of active subscriber base in 2010 (decreasing the denominator in the churn calculation, and thus "inflating" churn) and so it is difficult to ascribe the increase in churn after 2010 to increased competition for customers. Nonetheless, over the period, competitive intensity did increase, at least for prepaid customers. Prepaid churn at Telkom Mobile is also very high, at 58.9% in 2012 and 56.8% in 2013. The lack of change in churn for postpaid subscribers is remarkable and is despite mobile number portability being introduced in November 2006. This is consistent with Laffont *et al's* (1998a) analysis that where operators compete in two part-tariffs, as they do for contract customers (there is a fixed monthly charge and a variable usage charge), then the mobile termination rate has less of an impact on competitive intensity. This is because operators are able to compete by reducing fixed fees, which does not have the effect of reducing net interconnection revenues that lowering retail voices prices has. Conversely, the high call termination does appear to have resulted in reduced competitive intensity for prepaid customers, where competition takes place by lowering retail tariffs: a high call termination rate reduces each operator's incentive to lower retail prices in this instance because this would cause a greater proportion of outgoing calls and therefore lower net interconnection revenues.

The call termination rate intervention therefore had significant distributional consequences: while it may not have increased competitive intensity for postpaid subscribers (and in fact reduced benefits to postpaid subscribers in that connection incentive bonuses declined) it did lead to greater competition for prepaid subscribers. Competition in markets for postpaid customers appears to have allowed for mobile operators to provide significant incentives for service providers, often passed on in the form of better quality cellphone handsets or other devices. These were reduced significantly after the call termination rate intervention (source: interviews with stakeholders) and competition and lower prices for postpaid subscribers therefore appears to have been replaced with competition and lower prices for prepaid customers to some degree.

A further indication of greater competition in the mobile sector after the introduction of lower call termination rates is an increase in the number of mobile numbers ported (see Table 12). The number portability regulations were promulgated in 2005 (ICASA, 2005), and governed fixed and mobile number portability. Mobile number portability was introduced in 2006 and has risen significantly since then, from less than 177,000 numbers ported in 2007 to more than 475,000 numbers ported in 2013 (see Table 12 below).

Table 22: Mobile numbers ported (2006-2013)

	Mobile numbers ported
November 2006 - December 2007	177,469
January - December 2008	160,501
January - December 2009	164,913
January - December 2010	215,456
January - December 2011	235,975
January - December 2012	367,555
January - November 2013	475,616

Source: Number Portability Company, 2006-2013

Furthermore, as a result of the all but elimination of the least cost routing (LCR) business model as a result of reductions in connection incentive bonuses (CIBs) and reduced commission income, many of the LCR providers have converted their customer bases to voice over internet protocol (VOIP) services, along the lines of a traditional fixed line services model (Source: Interviews with stakeholders). This has intensified competition in the fixed line voice services market, as former LCR operators compete to provide the full suite of fixed line voice services (see, for example, Patel (2010)). Thus the call termination rate intervention also supported greater competition in markets for fixed line services.

The mobile operators are also entering new markets at least partly as a result of greater competition and lower revenues from voice services, including mobile money and markets for fixed line services, particularly for business voice and data services. The call termination rate intervention, while reducing revenues (in real terms) for voice services, has therefore stimulated competition in adjacent markets.

6.5.8. Assessment of call termination rate intervention outcomes against the Laffont, Rey and Tirole (1998a, 1998b) model

The key insight from Laffont, Rey and Tirole (1998a, 1998b) is that the higher the call termination rate, the less the incentive that each operator has to reduce retail prices, since this would cause greater outbound calling which would generate an access deficit. Average retail prices have been remarkably similar for MTN and Vodacom (see Figure 38 above), which suggests a reluctance for each of these operators to lower their retail prices relative to one another in order to avoid an access deficit. Both MTN and Vodacom use aggressive on-net discounts to attract and retain customers. Nonetheless, this was not enough to cause average prices to be competitive, since average retail prices declined significantly after the call termination rate intervention.

Nonetheless, the call termination may not have been the only factor that drove lower prices over this period (as discussed above). It appears as though retail prices were declining prior to the call termination rate intervention (see Figure 38 above), perhaps due to greater homogeneity between the two networks as network locked handsets were prohibited and as

mobile number portability was introduced in 2006. Number portability has certainly increased significantly since the number portability regulations were introduced (see section 5.5.2 above).

Reductions in connection incentive bonuses (CIBs) and commissions to resellers after the call termination rate was reduced (Source: Interviews with operators) also suggest that operators were using fixed fees (non-linear prices) to compete for subscribers prior to the call termination rate intervention. This is consistent with Laffont, Rey and Tirole's (1998a, 1998b) model extension for non-linear pricing, where there is a fixed subscription fee and a separate usage per-minute charge. Any additional margins earned through high call termination rates are competed away through lower fixed subscription charges. Where operators compete in non-linear prices (fixed subscription fees), they have a reduced incentive to set high call termination rates.⁵⁸ However, operators did not choose a lower, cost-based call termination rate. Rather, it appears as though the operators still chose a high call termination rate to preserve high retail rates for prepaid services, where fixed fees play less of a role, and of course to limit competition from fixed line networks (since they would have to charge high off-net prices for mobile calls) while generating significant access (call termination) surpluses from the fixed line networks.

Lower CIBs arising from lower call termination rates indicate less competitive intensity among mobile operators for postpaid customers, which should have been reflected in lower rates of postpaid subscriber churn. The lack of a decrease in churn among Vodacom's postpaid subscribers after the interconnection rate reduction (see section 4.6 above) indicates that while CIBs and commissions were reduced, operators continued to compete for postpaid subscribers, but through retail pricing (average prices per minute) and other factors, such as data prices, rather than through discounts on fixed subscription fees.

The fact that Vodacom's net interconnection revenues (interconnection revenues less interconnection costs) increased over the period of the call termination rate intervention (see Figure 40 above) suggests that the incumbent operators selected a price that was above the optimal collusive levels (as was the case in Botswana and Namibia), since the elasticity of demand was greater than one (a given percentage decrease in price creates a greater percentage increase in volume) at the price at which call termination rates were set. MTN's net interconnection revenue declined more significantly, however, which suggests that callers to the MTN network were less sensitive to price and so MTN benefited from more call termination revenues than Vodacom did. This divergence in interests is also visible in MTN and Vodacom's latest submissions to ICASA on call termination rates: MTN outright opposes ICASA's intervention while Vodacom cautiously supports, albeit with caveats, the intervention.

⁵⁸ Recall that where operators compete in linear prices (retail per minute voice usage prices), they choose a high call termination rate to dis-incentivise retail price competition since if one operator reduced their retail prices this would generate outbound calls and generate an access deficit for that operator. Where operators compete in non-linear prices (fixed monthly subscription charges) then choosing a high call termination rate does not limit competition. In this case, operators would not choose a high call termination rate, since this would not limit competition.

The increase in Cell C's reported subscribers and Telkom Mobile's entry into the market in recent years supports the notion that lower call termination rates reduces the potential for tariff mediated network effects generated by on-net / off-net price discrimination in the context of high call termination rates. The increase in prepaid services churn (customers leaving a network in a given period divided by average customers in that period), from 55% in 2010 (and 43% in 2011) to 57% in 2012 for Vodacom (see section 4.6) suggests that competition between mobile operators improved somewhat during the period in which call termination rates were reduced, even if the impact on competition for postpaid services was more muted (for the reasons discussed above). Increased competitive intensity is also reflected in substantial growth in overall mobile numbers ported, which grew from 165,000 numbers ported in 2009 (number portability was introduced in South Africa in late 2006) to more than 475,000 numbers ported in 2013. While a number of other factors also affected competitive intensity over this period, including allowing number portability and prohibiting network locked cell-phones, ICASA's call termination rate intervention appears to have been very successful in increasing competition.

The extensive multi-homing by South African consumers (usage of more than one SIM card) is a significant departure from Laffont, Rey and Tirole's (1998a, 1998b) discrete choice model and suggests that mobile operators may have less of an incentive to select a high call termination rate (discussed above). Nonetheless, because operators in South Africa are not allowed to discriminate between rates for minutes terminated from fixed line and mobile networks, the call termination rate that they selected was high compared to regimes where call termination rates were set by regulators according to costs (discussed above), which significantly disadvantaged the fixed line networks which had to charge very high rates for calls to mobile networks, and which therefore lost significant market share to mobile networks. The effect of this asymmetric mobile / fixed rate was also that it earned significant revenues for mobile operators. The mobile operators therefore still had a significant incentive to set high call termination rates due to the presence of significantly lower call termination rates set by fixed line operators for historical reasons (discussed above).

Furthermore, even if consumers have more than one SIM card in South Africa, the total subscriptions (66m) relative to the adult population (between 30m and 34m) suggest that they are unlikely to have more than two SIM cards on average. In this context, consumers should rationally choose the two largest mobile networks, MTN and Vodacom, to benefit the most from on-net discounts, particularly where call termination rates are high and so off-net prices and therefore average prices of smaller new entrant networks are high. The incumbent mobile operators would therefore continue to choose a high call termination rate even with multi-homing in order to limit competition to as few networks as possible. Therefore, even with multi-homing, ICASA should intervene to set lower call termination rates.

6.6. Summary

Laffont, Rey & Tirole's (1998a and 1998b) model on competition between networks suggests that the call termination rate that operators would choose collusively, and indeed the optimal rate set by regulators, depends on the competitive setting and regulatory context. In certain circumstances, where operators compete using two-part tariffs, where networks are symmetric

in size, and where fixed costs are high and where substitutability between networks is low, operators will likely choose a relatively benign, low call termination rate. Where there are new entrants, pricing is more linear, where fixed costs are low and where substitutability is high, which more closely characterises the South African market, operators collusively select a high call termination rate.

An important departure from the Laffont, Rey and Tirole (1998a and 1998b) model is that many (if not most) of South Africa's population owns more than one SIM card, which means that operators compete for call volumes rather than for customers, which means the call termination rate should have less of an impact on competition. Nonetheless, asymmetry between fixed and mobile call termination rates mean that operators were able to disadvantage the fixed line networks significantly through setting high mobile call termination rates and earned substantial call termination revenues on net. Furthermore, consumers on average do not have more than two SIM cards, and so MTN and Vodacom still had a significant incentive to set high call termination rates in order to limit competition to between their two networks. This suggests that there is significant scope for ICASA to intervene in markets for call termination rates, which it has successfully done.

The regulation of call termination rates in South Africa evolved from almost no regulation since the mobile operators were licenced in 1993 until March 2011, when the new call termination rate regulations developed by ICASA came into effect. Major operators ostensibly were required to set call termination (interconnection) rates at long run incremental cost (LRIC) since the interconnection guidelines were brought into being by ICASA's predecessor, SATRA, in 1999. Since MTN and Vodacom were not declared major operators, these regulations had little impact on the level of call termination rates, other than to prohibit discrimination which caused the mobile to mobile call termination rate (initially set at R0.20) to increase to the level of the fixed to mobile call termination rate (which eventually rose to R1.25), all of which occurred prior to Cell C's entry in 2001.

Between March 2010 and March 2013, the peak mobile call termination rate for MTN and Vodacom was reduced by 68% through political pressure initially, followed by regulatory intervention by ICASA. This resulted in mobile retail prices declining by between 30% and 35%, and fixed to mobile retail prices declining by between approximately 30% and 45%. While this resulted in mobile voice revenues declining in real terms, aggressive investment by the mobile operators into mobile data services and significant increases in demand for data services resulted in higher overall revenues and EBITDA margins over the period. While employment among MTN and Vodacom declined, this effect was relatively small, and took place over a period in which Telkom Mobile and Cell C expanded their services and, at least in the case of Telkom Mobile, increased employment. Furthermore, competitive pressure in the voice services market created an incentive for MTN and Vodacom to enter new, adjacent markets including mobile money and offering fixed line services to businesses, which increased competitive intensity in those markets. While the least cost routing (LCR) business model was all but eliminated, many LCR operators were able to convert their customers to voice over internet protocol (VOIP) services which increased competitive intensity in the fixed line voice market. The call termination rate intervention therefore facilitated significantly greater competition, not only in voice markets but in a range of adjacent markets.

The successful outcome of the call termination rate intervention in South Africa was not guaranteed: the results from empirical studies in other jurisdictions are inconclusive on the impact of high call termination rates on consumers. Cross-country empirical studies have shown everything from a decrease, to no impact, to an increase in retail prices arising from lower call termination rates.

The call termination rate intervention also had important distributional consequences: while high call termination rates preserved high prepaid voice prices to some extent and more limited switching from incumbent networks to new entrants, these effects were reduced as call termination rates declined. At the same time, connection incentives for postpaid customers were decreased when call termination rates were reduced, as lower call termination revenues meant lower incentives for signing up new customers.

ICASA has since proposed further reductions in mobile call termination rates, to R0.10 per minute for MTN and Vodacom from 1 March 2016. This is very near to a bill and keep regime, and will test whether the significant access growth in South Africa can be maintained and whether the last 5m unconnected consumers in South Africa will be connected. To the extent that access continues to increase, ICASA should consider moving towards a bill & keep regime in order to save its own costs as well as those incurred by the operators for developing and maintaining a bottom-up LRIC model. A bill and keep regime for voice services also becomes more attractive as the operators continue to shift their focus to investment into data services over the short to medium term. The expansion of Cell C and Telkom Mobile has partly been as a consequence of asymmetrically high call termination rates, which ICASA has decided to maintain going forwards. The extent of asymmetry is dramatic: Cell C and Telkom Mobile may charge more than double what MTN and Vodacom may charge, and asymmetry will have been in place more than 15 years after Cell C at least was licensed. This is considerably longer than in the EU for example where asymmetry is allowed for a maximum of 4 years. The extent of asymmetry will also likely mean that consumers will pay higher prices for longer. While Cell C faced an adverse call termination rate environment for a decade prior to the first call termination rate intervention in 2011, ICASA does risk favouring competitors at the expense of competition by allowing Cell C these high levels of asymmetry.

7. Opening up the fixed line network

7.1. Introduction

Telecommunications markets globally were liberalised during the course of the 1990s and regulators sought to create a level playing field for new entrants by providing access to incumbent networks. The enormous and unexpected success of wireless mobile operators globally has called into question the validity of open access fixed line policies, since fixed and mobile operators both offer voice and data services.

Nonetheless, one of the key requirements for the competitiveness of South African businesses is low costs to communicate. While consumers are switching to mobile as an alternative to fixed voice services, businesses are less able to do so for a number of reasons including

reliability, specific requirements for telephone number ranges and high data throughput requirements. In this context, the regulator's role is to regulate for competitive outcomes to ensure that services are priced competitively and that services are reliable in the fixed line sector. One of the key potential interventions to achieve competitive outcomes is local loop unbundling (LLU) and open access fixed line policies more generally. Unbundling of the local loop is a regulatory process which allows multiple telecom providers to use connections between the fixed line operator's network and the customer's premises. Unbundling of the local loop is intended to facilitate services-based competition, stimulate innovation, lower the price of telecommunications and offer consumers and businesses a variety of access options for ICT services.

Despite it being government policy since 2007 (DOC, 2007b), LLU has not yet been implemented and is one of the prime examples of regulatory capture of the sector regulator in South Africa, with the outcome that the competition regulator has had to intervene instead. Local loop unbundling and opening up the fixed line network in general is therefore a useful case study for the analysis of the performance of the regulators.

LLU has been introduced in most developed countries and as of January 2001, when the European Commission's Regulation on Local Loop Unbundling (EC/2887/2000) came into force, is a requirement of European Union policy on competition in the telecommunications sector. It has been introduced in all member states at various stages of development.

Countries that have successfully introduced LLU include the United States, United Kingdom, New Zealand and Hong Kong. As a signatory of the General Agreement of Trade in Services (GATS), South Africa made a commitment to open its markets to competition. Subsequently, the country lifted many of the restrictions and limitations that were initially applicable to its commitment and had by 2003, largely fulfilled its undertaking of opening up the market.

This section addresses the following questions:

1. What are the learnings from international experience with open access fixed line policies?
2. How has ICASA assessed LLU and opening up the fixed line network, from an economics and legal perspective, and how has ICASA intervened in markets for fixed line services?
3. How have the competition authorities intervened in markets for fixed line services, including in respect of the Telkom / BCX and MTN / Verizon mergers as well as the abuse of dominance complaints against Telkom?

First, economic theory and evidence on providing access to upstream monopoly upstream facilities will be discussed, followed by an overview of international experience with unbundling. ICASA's proposed LLU intervention is then described and assessed, followed by a review of the competition authorities' interventions in the fixed line market.

7.2. Economic theory and evidence on providing access to monopoly facilities upstream

7.2.1. Theoretical approaches to refusal to deal

There is a considerable debate about monopolisation practices in general, and whether firms have the incentive to monopolise adjacent or downstream markets. The debate starts with the 'Chicago School', which is a set of theories that aim to show that monopolists seldom have an incentive to engage in vertical foreclosure and where they do have an incentive, this is efficiency enhancing and good for consumers (see, for example, Carlton (2008)). This is most clear in the Chicago School objection to intervening in the case of margin squeeze cases in respect of double-marginalisation: even if a downstream rival were to be excluded from a market by a vertically integrated incumbent, this would be good for consumers because instead of there being two mark-ups in the value chain, there is only one. Furthermore, the upstream monopolist does not have an incentive to limit downstream competition because it is able to extract its full monopoly profit upstream.

This Chicago School "one monopoly profit theory" can be seen by comparing Figure 44 and Figure 45. Figure 44 shows the monopoly price and quantity with a vertically integrated incumbent, with consumer surplus being the area B and producer surplus the area A. Were there a downstream monopoly in addition to the upstream one, the upstream monopoly price would become the downstream marginal cost (Figure 45). This reduces the upstream producer surplus to the area C and the downstream producer surplus to the area D, and consumer surplus is reduced to the area E. It is clear from the figures that $A + B > C + D + E$, which means that consumers and the economy are better off under one monopoly, and regulators should therefore not be concerned about downstream exclusion.

Figure 44: One monopoly profit

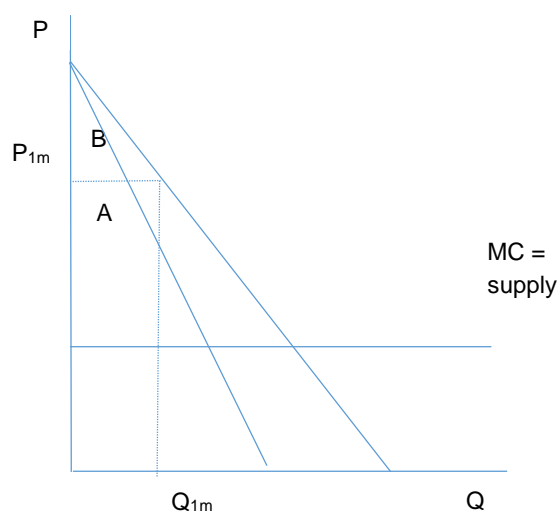
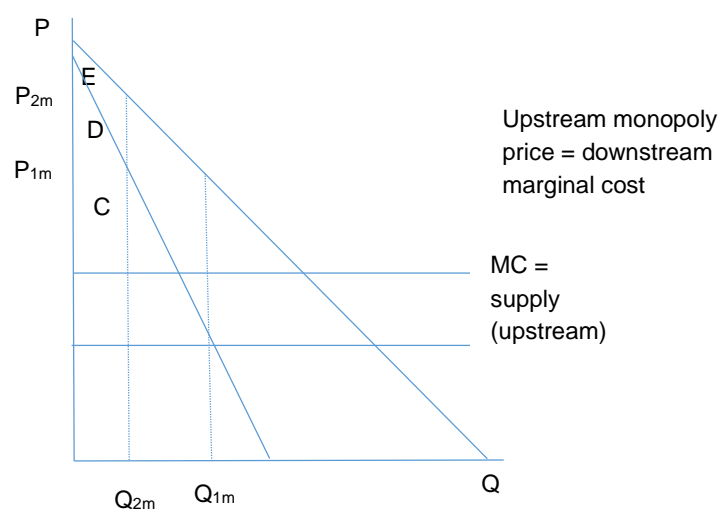


Figure 45: Double marginalisation



Objections to the one monopoly profit theory include that it does not hold if the upstream monopolist's prices are regulated upstream and that it relies on downstream usage of the upstream monopoly input to be used in fixed proportions. Furthermore, if the upstream monopolist faces a credibility problem with resellers, it is not able to charge the full monopoly price. The credibility problem arises where the monopolist negotiates in succession with resellers and has an incentive to lower its price in each successive deal, such that the first reseller refuses the monopoly price (Rey & Tirole, 2006). A further objection is that the one monopoly profit theory is a static model of competition and does not take into account the dynamic incentives for firms to eliminate competition in a downstream market. For example, an upstream monopolist may have an incentive to foreclose downstream competition in order to deny downstream customers to a new entrant upstream or in order to prevent a downstream firm from gaining information on demand and building economies of scale needed to enter upstream (see, for example, Segal & Whinston, 2000).

One of the key features of the liberalisation of the telecommunications sector has been the facilitation of 'facilities based competition', or new entry upstream, and ultimately removing sector specific regulation as competition upstream intensifies. This is facilitated through the 'ladder of investment', discussed above in section 2.2.2. The ladder of investment allows for new entrants to invest in downstream markets where barriers to entry are low while providing temporary access to the incumbent's upstream facilities (Cave, 2004).

In order to prevent refusal to supply upstream facilities while new entrants build out networks, functional separation was implemented in the UK. This entailed British Telecom agreeing to separate its upstream activities from its downstream activities, including in respect of its management, operations and governance structures (Cave, 2006). This is discussed in more detail in Box 10 below.

Box 10: Six degrees of separation (Cave, 2006)

Structural separation began in the USA in the 1984 with the break-up of AT&T into local and long distance services. In the EU, regulatory interventions in the 1990s took the form of accounting separation of different levels in the vertical value chain in telecommunications operators. In the United Kingdom, pressure from competitors resulted in the operational separation of British Telecom (BT). This was intended to address discrimination by BT in providing upstream inputs to its own downstream operations and those of third parties. Discrimination can take place by price and non-price means. Accounting separation is intended to deal with price discrimination. Operational separation is designed to deal with non-price discrimination. There are six different separation options, other than accounting separation and divestiture, described in the list below.

Separation options (Cave, 2006)

- Ownership separation (in whole or in part)
- 6 – Legal separation
- 5 – Business separation with separate governance arrangements
- 4 – Business separation with localised incentives
- 3 – Business separation (BS)
- 2 – Virtual separation
- 1 – Creation of a wholesale division
- Accounting separation

The first option more intrusive than accounting separation is the creation of a wholesale division. This does not guarantee non-discrimination but allows for greater separation between the upstream input provider and downstream retail services. Virtual separation means that while physically the upstream and downstream providers are not separated, processes and procedures to provide wholesale inputs do not discriminate between the vertically integrated entity's downstream division and that of third parties. Business separation involves assigning assets to different upstream and downstream divisions, in addition to providing equivalent processes for transactions for the vertically integrated downstream unit and that of third parties (see list below).

Separation of assets

Premises	Staff can be employed at different offices.
Operational Support Systems	OSS can be separated though this is costly.
Labour force	Labour forces could be separate or combined.
Brand	The organisations can have the same brand, different ones or have a hybrid ('e.g. division of...')
Management information systems	Separations of MIS will increase trust in that information that relates to an outside third party will not be shared with the downstream division of the vertically integrated entity.
Strategy	Strategy is not separated between upstream and downstream divisions, particularly when significant decisions like investments in new fibre networks are taken.

Business separation with localised incentives provides for separate incentivisation of the management of the unbundled upstream division, to maximise the profits of that division without taking into account the impact on the downstream retail entity. A further separation would be the creation of a separate governance structure for the upstream division, including a separate board. The final, most extensive measure for separation is legal separation, whereby the upstream division is housed in a separate legal entity.

Such separation methodologies can be accompanied by both internal enforcement measures by the vertically integrated entity as well as by external enforcement imposed by the regulator. For example, BT's undertakings under the UK Enterprise Act included an equality of access board (EAB) as a means of internal enforcement. BT's annual report included a provision for £70m for the implementation of Openreach, the separated upstream division of BT.

Source: Cave, 2006

7.2.2. Empirical evidence on unbundling

As discussed above, the ladder of investment theory has caused regulators in many countries around the world to provide regulated access to incumbent infrastructure. The impact of these interventions have been assessed by a range of academics and institutions, including Hausman & Sidak (2005), the Berkman Centre (2010), and Nardoto, Valletti, Verboven (2013).

Hausman & Sidak (2005) on local loop unbundling in 5 developed countries

Hausman & Sidak evaluate LLU in five developed countries: the United States, the United Kingdom, New Zealand, Canada and Germany. The authors assess four justifications and linked hypotheses for unbundling to test whether mandated unbundling achieved its purpose (see Table 23 below).

Table 23: Justifications and testable hypotheses for LLU (Hausman & Sidak, 2005)

Justification	Testable Hypothesis
Retail competition in the form of innovation and lower prices is desirable	Lower retail margins, greater investment by incumbent
Unbundling is necessary to generate facilities based competition	Entry by co-axial cable providers and mobile operators
Unbundling results in future facilities based entry	Conversion from LLU based entry to facilities based entry
Competition in wholesale markets is desirable	Competing last mile networks, lower prices for last mile facilities

Source: Hausman and Sidak, 2005

Hausman & Sidak (2005) considered both the impact of LLU on voice services and broadband in the US. The Federal Communications Commission (FCC) implemented mandatory unbundling using the Total Element Long Run Incremental Cost (TELRIC) methodology. LLU was partly rolled back after a US court decision in 2002 removed line sharing as a means of unbundling (which was offered at very low rates), citing a failure by the FCC to consider competing alternatives, including cable (Hausman & Sidak, 2005).⁵⁹ The FCC subsequently considerably reduced the scope of open access policies in the US (Berkman Centre, 2010).

During the course of the period in which open access policies were in place, Hausman & Sidak (2005) found that prices for telephony services in the US increased more rapidly. They reviewed several articles and reports which found that lower unbundled facility pricing caused the incumbents to invest more (such as Willig *et al*, 2002), while others found that investment by incumbents declined (such as Hazlett *et al*, 2003). The entry of the cable networks into voice telephony and broadband services in the US also meant that unbundling was not necessary to generate facilities based competition in the US. The authors also found that the 'stepping stone hypothesis', or ladder of investment theory, was not applicable in the US. Hausman & Sidak (2005) found that, in fact, new entrants used unbundled network elements as a greater proportion of their networks over time. Some studies showed that US states that

⁵⁹ This was later confirmed in a 2003 FCC ruling and a 2004 US court decision (Hausman & Sidak, 2005).

had lower prices resulted in a greater proportion of unbundled lines used by new entrants in their networks (such as Crandall *et al*, 2004). Hausman & Sidak (2005) also found that only limited wholesale competition had developed in the US, largely for high capacity dedicated links offered to enterprise customers and other new entrants (Competitive Local Exchange Carriers).

Similar to the US, Hausman & Sidak (2005) found that prices for retail telephony services in the UK increased after the introduction of unbundling. While prices for broadband services fell significantly, this was attributed by the OECD (2001) to competition from cable providers. Furthermore, investment into telecommunications services in the UK fell after 2001, although this could be attributable to the bursting of the telecommunications bubble. Hausman & Sidak (2005) comment that facilities based entrants, such as COLT, entered the market in 1993, long before unbundling was put in place, and have expanded their market considerably, particularly for business customers. There has been very little conversion of unbundling based entry to facilities based entry, largely because of the already successful facilities based entrants. The authors further conclude that there is significant wholesale competition in the UK market, largely due to the presence of facilities based entrants, including electricity utilities. Finally, Hausman & Sidak (2005) conclude that the reason that there has been limited further expansion of cable networks in the UK has been the regulated supply of copper local loops below cost, which has had the perverse effect of entrenching BT's dominance there.

New Zealand presented an example of a country that did not mandate local loop unbundling (other than one, light form of LLU, Bitstream access) before 2005 (when the Hausman & Sidak, 2005 paper was published). Since then, New Zealand has implemented LLU (see, for example, Comcom (2013)). In 2003, however, the Commerce Commission decided not to implement LLU, for four reasons:

1. *Fixed-wireless networks would provide an alternative to copper over time;*
 2. *The gains from LLU in other countries have been limited;*
 3. *There is limited demand for LLU as a competitive means of entry; and*
 4. *LLU is a resource intensive activity, particularly in determining the terms of access.*
- (Hausman & Sidak, 2013).

Despite the lack of LLU (in the period leading up to 2005), prices for telephony services in New Zealand did not increase significantly. Investment into telecommunications nonetheless declined in New Zealand, partly due to global declines in investment in telecommunications and partly due to significant investments by Telecom in the 1990s (Hausman & Sidak, 2005). Facilities-based entry developed despite the lack of LLU: TelstraClear invested in a significant network in competition to Telecom, although it decided to scale back investment in this network in 2003. A number of other facilities based entrants, including fixed-wireless providers, entered the market. At the time of the Hausman & Sidak (2005) article, there was no mandatory unbundling and so the 'ladder of investment' or 'stepping stone' hypothesis could not be tested. A wholesale market for access services had not developed at the time either.

In Canada, the Canadian Radio-Television and Telecommunications Commission (CRTC) mandated unbundling but instead of using Total Element Long Run Incremental Cost

(TELRIC) used in the US or Total Service Long Run Incremental Cost (TSLRIC) used a measure of forward looking cost (excluding joint and common costs) plus a 25% mark-up. The CRTC initially limited LLU to a period of 5 years but subsequently extended this indefinitely. Hausman & Sidak (2005) found that prices for retail telephony services increased by more than the rate of inflation and conclude that unbundling has not resulted in lower prices. While investment in Canadian telecommunications increased by new entrants (often incumbents in other parts of Canada) and incumbents following the introduction of LLU, Hausman & Sidak (2005) found that a more sophisticated econometric analysis is required to understand whether this was caused by other factors, such as an increase in overall demand or the effects of the entry of facilities based competitors that was independent of the LLU decision. The authors also found that facilities based competition from cable providers and even satellite was significant enough to eliminate the need for greater competition among DSL providers using LLU. The stepping stone hypothesis was partly confirmed in Canada, in that investment in wholly owned access lines by new entrants increased significantly after LLU. Nonetheless, because the share of LLU lines increased as a percentage of total lines in new entrant networks, the authors found that the stepping stone hypothesis was not confirmed, in that the proportion of wholly owned lines should increase over time according to the stepping stone hypothesis. Hausman & Sidak (2005) found that Canada had only a small wholesale market, and so LLU did not achieve its desired impact in this regard.

Germany's Regulator of Telecommunications and Post (RegTP) did not use marginal cost pricing when introducing LLU (Hausman & Sidak, 2005). Nonetheless, prices for telephony services declined significantly after 1999 after the introduction of LLU, although Hausman & Sidak (2005) explain that this may have been due to other factors, such as competition from mobile telephony. Investment by the incumbent in Germany, Deutsche Telekom, declined after the introduction of LLU. Hausman & Sidak (2005) explain that, while inter-modal competition between copper and cable operators is less extensive in Germany, this is due to the fact that Deutsche Telekom (the copper-based fixed line incumbent) owned the cable networks until 2000, and competition from cable operators was developing at the time of writing their report in 2004. The authors found that there is also little evidence in support of the stepping-stone hypothesis, even though new entrants invested heavily in their own facilities after LLU was introduced. Wholesale competition had not developed by the time that Hausman & Sidak wrote their report in 2005.

In summary, Hausman & Sidak (2005) found that, as at the time of their publication, LLU did not result in lower retail prices but did result in lower investment in the sector in many cases (see Table 24). They found that facilities based entry in the form of cable providers took place regardless of LLU and that therefore LLU was not necessary to stimulate facilities based investment. They found no evidence in support of the ladder of investment (stepping stone) theory, and they concluded that wholesale competition did not arise as a result of LLU. LLU therefore did not achieve its objectives, according to the authors.

Table 24: Summary of Hausman & Sidak findings on the impact of LLU (2005)

	Lower prices and more innovation	No facilities based competition without LLU	Ladder of investment	Wholesale competition
US	ILEC capex decreased; Prices increased	Cable share of broadband: 66%	No evidence in support	Competition for enterprise cust.
UK	Telecoms prices flat, broadband prices fall; CLEC reach 50% share; ILEC capex decreased	Cable share of broadband: 41%		51% of wholesale revenues controlled by entrants
New Zealand	Call prices flat; rental prices increased; ILEC capex decreased	Facilities based BB: 28%		No evidence
Canada	Prices increased, CLEC capex decreased, ILEC capex increased then decreased	Cable share of BB: 64%		CLEC 20% of wholesale lines
Germany	Prices decreased, Capex decreased	Very low cable share		No wholesale market

Source: Adapted from Hausman & Sidak (2005)

The authors' research also suggests, however, that LLU implemented using incremental costs (such as TELRIC or TSLRIC) was less successful than where joint and common costs were taken into account. For example in Canada and Germany, where joint and common costs were taken into account when setting prices for unbundled network elements, there was greater investment by new entrants into their own networks (see also Cave, 2006).

Berkman Centre (2010) report on open access policies in the telecommunications sector

The Berkman Centre (2010) report, published 5 years after the Hausman & Sidak (2005) report, came to different conclusions regarding open access policies in analysing outcomes in the US against outcomes in other countries. The Berkman Centre report found that the US had fallen behind many other developed countries in respect of broadband penetration and speeds. Furthermore, the report concluded that:

Our most surprising and significant finding is that “open access” policies - unbundling, bitstream access, collocation requirements, wholesaling and/or functional separation – are almost universally understood as having played a core role in the first generation transition to broadband in most of the high performing countries; that they now play a core role in planning for the next generation transition; and that the positive impact of such policies is strongly supported by the evidence of the first generation broadband transition. (Berkman Centre, 2010).

The Berkman Centre (2010) report further found that countries with the slowest broadband speeds and highest prices, such as the US and Canada, relied on inter-modal competition between cable and DSL to deliver broadband. Countries that had the fastest speeds and lowest prices had DSL and cable broadband providers and additionally had new entrants that relied on the use of facilities owned by incumbents through open access policies. Countries

between these positions usually had ineffectively enforced open access regimes or had only recently implemented open access policies.

The key lessons learned in respect of open access policies assessed in the Berkman Centre (2010) report are reproduced on Table 25 below.

Table 25: Policy lessons from international experience with the development of broadband

Core lesson	Case study or section
Open access policies, unbundling in particular, played an important role in facilitating competitive entry; where facilities based entrants were present, access based entrants played an important role in catalysing competition; In some cases, access based competition resulted in increased competition, technological progress, lower prices and service innovation	Japan, Denmark, the Netherlands, Norway, Sweden, France, UK, New Zealand
Having an actively engaged regulator enforcing open access policies is more important than formally adopting open access policies; incumbents resist open access policies whether they are formerly government owned or not.	Japan, South Korea, France, UK, Canada
Broadband providers are regulated as carriers, and their carrier function is regulated separately to their services function	All surveyed countries
Open access rules are being applied to next generation access networks, particularly to fibre based broadband networks.	Japan, South Korea, Sweden, Netherlands, France, UK, European Regulators Group/EU, New Zealand
Vertical integration between fixed and mobile is increasingly allowed, with open access principles being applied to mobile networks	Japan, South Korea apply access; France and Germany experience integration but do not apply access
In the two earliest instances in which functional separation was implemented, it had rapid effects on competitive entry, penetration, prices and / or speeds	UK, New Zealand
Where functional separation was introduced, it had a significant impact on competitive entry, prices and / or speeds	UK, New Zealand, Sweden, Netherlands, Italy, Australia
Functional separation is increasingly being adopted to support open access, particularly for next generation access networks	Japan, South Korea, Denmark, Norway, Sweden, the Netherlands, UK, France, Germany, Italy, New Zealand
Entrepreneurial competitors have tended to enter through bitstream or unbundled access	Japan, South Korea, Denmark, Norway, Sweden, the Netherlands, France, UK
Unbundled access is often used by incumbents from neighbouring regions or countries; entry often takes place by acquiring entrepreneurial new entrants	Denmark, Norway, Sweden, Finland, Germany
Where open access policies are weakly implemented countries rely on facilities based competition with weaker results	Germany, Canada
The high costs of next generation access are causing countries to work out ways to share costs, risks and facilities rather than the duplication of facilities for facilities based competition; they aim to mitigate the loss of facilities-based competition with new models of open access and shared facilities, tailored to fibre	European Regulators Group, the Netherlands, France, Germany, Switzerland, UK

Source: Reproduced from Berkman Centre (2010)

The Berkman Centre report (2010) thus found that open access policies, particularly LLU, led to more competition, lower prices, higher broadband speeds and more innovation in a number of countries. Open access policies are being extended to next generation optical fibre networks.

Nardoto, Valletti, Verboven (2013) review of the impact of LLU in the UK

More recently, Nardoto, Valletti & Verboven (2013) analysed broadband penetration and broadband quality across more than 4,265 UK local exchanges, assessing the effect of where new entrants use LLU lines at those exchanges and where the incumbent, BT, provides services directly to customers or provides services indirectly to customers via third parties using a service called Bitstream access. The data was evaluated over 17 periods. The authors further examined the impact of inter-modal competition from cable broadband providers. Their main findings were that LLU does not have an impact on broadband penetration but it does have an impact on broadband quality, as new entrants try to differentiate themselves from their incumbent through broadband speed offerings. Inter-modal competition has a positive impact on both broadband penetration and on innovation.

Initially in 2005, LEs that were served by an LLU new entrant had higher broadband penetration. However, LLU new entrants were likely to target high income consumers and businesses that were more likely to take up broadband in the first place, which reflects an endogeneity problem (i.e. rather than LLU resulting in higher broadband uptake, greater broadband uptake was encouraging the growth of LLU). The authors solve this by assessing dynamic panel data over time. They conclude that LLU has either no or a very small positive impact on broadband penetration, while inter-modal competition (between cable and DSL) has a significant impact on penetration. Nardoto *et al* (2013) do not compare LLU with no open access policy at all in their dataset, however: rather, they compare LLU with bitstream access, a service based form of open access policy. Bitstream access does not require that new entrants invest in network build to exchanges and equipment installation and monitoring. It might be the case, therefore, that Bitstream access allows for sufficient competition to develop in order for broadband penetration to be maximised.

The authors then go on to assess whether LLU has had an impact on broadband quality. It turns out that consumers that use a new entrant that uses LLU experience broadband speeds that are 20.1% higher than users that use BT. This is because LLU operators are able to control the customer experience while operators using Bitstream cannot: LLU operators offered speeds that were on average 47.3% greater than operators that used Bitstream.

Summary

There is a debate on the impact of open access fixed line policies on a range of policy outcomes, including competition, broadband penetration, pricing and speeds. While some research, such as that developed by Hausman & Sidak (2005), suggests that LLU has not had the desired impact on developing facilities based entry upstream and has not resulted in lower prices to consumers, other research, such as that developed by the Berkman Centre (2010) find that open access policies, implemented by an engaged regulator, have had a significant impact on expanding broadband penetration and resulting in lower prices and faster speeds. More recent research on the impact of LLU in the UK shows that while LLU did not have a significant impact on broadband penetration, it had a significant impact on the quality provided by new entrants, who offer speeds that are on average 20% faster than those provided by the incumbent, BT (Nardoto *et al*, 2013). While there is considerable scope for further research in

this area, the most recent literature suggests therefore that open access fixed line policies can have a significant positive impact on market outcomes for consumers.

7.3. International best practice for unbundling interventions

7.3.1. Unbundling in the European Union

National regulatory authorities in the EU may impose obligations, including LLU, on operators that have Significant Market Power (SMP) (see, for example, ECP, 2000). The European Commission publishes recommendations on relevant markets. In 2003, in relation to wholesale fixed line services, the EC defined the following markets (EC, 2003):

- Wholesale unbundled access to metallic loops and sub-loops for the purpose of providing broadband voice services (Market 11);
- Wholesale broadband access, including Bitstream access, which allows for the transmission of data in both directions and other wholesale access provided over other infrastructures, if and when the offer facilities equivalent to Bitstream access (Market 12);
- Wholesale terminating segments of leased lines (Market 13); and
- Wholesale trunk segments of leased lines (Market 14).

In 2007, the EC revised the total number of markets susceptible to *ex-ante* regulation down to 7 from 18 (EC, 2007). The markets described above in the 2003 recommendation were also found to be susceptible to *ex ante* regulation in the 2007 recommendation, except for the market for wholesale trunk segments of leased lines, which was eliminated. The wholesale fixed line markets were renumbered 4,5 and 6 in the 2007 recommendation. The markets relating to LLU have therefore remained reasonably consistent over time.

Local loop unbundling was mandated in the EU in December 2000, for operators found to have significant market power in the fixed public telephone network supply market (ECP, 2000; see Box 11). LLU as it was initially conceived in 2000 in the EU was aimed largely at the metallic path facilities owned by fixed line incumbents (ECP, 2000). The 2000 LLU regulation required that incumbents were able to recover their “costs plus a reasonable return, in order to ensure the long term development and upgrade of local loop infrastructure.” The regulation further imposed a non-discrimination obligation, which required that the incumbent provide local loops to third party operators in the same manner in which it provides local loops for its own downstream services. Incumbents were required to provide access to the following facilities (ECP, 2000):

- A loop or local sub-loop, authorising use of the full frequency spectrum of the twisted metallic pair (‘full unbundled access’) or the use of the non-voice band frequencies of the loop or sub-loop (‘shared access’);
- Collocation, including the physical space and technical facilities needed to accommodate a third party operator; and
- Related facilities, including cable connections and relevant information technology systems.

These requirements were consolidated and re-iterated in the 2002 interconnection and access directive (EPC, 2002b).

Box 11: Reference offer for unbundled access requirements under EU LLU Regulation (ECP, 2000)

Fixed line incumbents were required to publish a reference offer for unbundled access, which were required to include the following terms and conditions:

- Information on the locations of LLU sites and availability of loops at specific parts of the access network;
- Technical conditions related to access and use of local loops;
- Collocation options (including distance and virtual collocation), equipment characteristics, security issues, access conditions, safety standards, rules for the allocation of space, and conditions for beneficiaries to inspect the space at which collocation is available, including where collocation space has been refused.
- Conditions for access to operational support systems, information systems or databases for pre-ordering, provisioning, ordering, maintenance and repair requests and billing.
- Supply conditions, including lead times for responding to requests for supply of services and facilities, service level agreements, fault resolution procedures and quality of service parameters.
- Compensation for failure to meet lead times.
- Pricing for each feature and functionality listed above.

These conditions were largely repeated in the 2002 Directive on Access and Interconnection (EPC, 2002b).

Source: ECP, 2000

A key problem in the implementation of LLU is that upstream fixed line incumbents are able to use a number of price and non-price means of excluding their downstream rivals (as discussed above in section 7.2.1). In order to resolve this, the EU undertook further reforms in 2009 to allow for functional separation after its successful implementation in the UK (EPC, 2009). In terms of the new regulation, a national regulatory authority imposing functional separation must set out what legal status the separated entity will have and what assets and staff are to be separated. The regulator may also set rules for the incentivisation of staff and for the governance of the separated wholesale entity. Regulated entities are also able to effect voluntary separation, similar to that undertaken by BT (as discussed above). These reforms extended the EU's open access framework to include duct access, and information on space availability within ducts.

The European Commission's current plans are to maintain and extend LLU to facilitate the introduction of a European virtual broadband access product (EC, 2013). This will enable the fixed line incumbent's downstream rivals to use next generation access (largely optical fibre based) networks owned by incumbents (EC, 2013). The EC proposes not only to allow for passive access to loops and sub-loops but virtual access that provides equivalent functionalities to passive access. The EC proposes three offers for the European Virtual unbundled access product:

1. *Offer 1: Access to layer 2 (the data layer) of the network (in terms of the International Standards Organisation (ISO) seven layer model for communications protocols), which*

allows for equivalent functionalities to physical access and where the network is handed over closer to the customer than the national or regional level;

2. *Offer 2: Access to layer 3 (the network layer of the ISO seven layer model for communications protocols) of the network, the Internet Protocol (IP) layer, such as Bitstream access, at either regional or national level.*
3. *Offer 3: Access to wholesale terminating segments of leased lines for exclusive use of the access seeker, offering permanent symmetric capacity, unlimited usage, and with service grade agreements, by means of a point to point connection and with layer 2 (the data layer of the ISO model for communications protocols) network interfaces. (EC, 2013)*

The EU's maintenance and extension of LLU is in line with recent research funded by the EC which found that markets 4 and 5 relating to wholesale fixed line access (discussed above, emanating from EC(2007)) will continue be susceptible to ex-ante regulation (Ecorys, 2013). Specifically, the research found that⁶⁰:

High and non-transitory barriers to entry exist and are expected to remain for the relevant timeframe; the relevant market structure is not expected to tend to effective competition within the relevant timeframe and application of competition law alone is not expected to be able to sufficiently resolve the market failures concerned. (Ecorys, 2013)

This suggests that LLU will be in place in the EU in the short to medium term.

7.3.2. Local loop unbundling in other developing countries

Open access policies, including LLU, have largely been implemented in developed countries due to their large, well developed fixed-line networks. While there is less experience with open access policies in developing countries, LLU has been implemented in countries such as Brazil (Scaramuzzi, 2012), Jordan (ITU, 2011), Turkey (OECD, 2013), Nigeria (discussed below) and Tanzania (Robinson, 2014), for example. Some developing countries, like South Africa (discussed below), and Mexico (Schiavoni, 2013a), are in the process of implementing LLU.

In practice, the implementation of LLU has not been effective in some instances. For example, while LLU has been implemented in Nigeria by the Nigerian Communications Commission, the fixed line incumbent there, Nitel, is effectively not operational which makes LLU ineffective (Southwood, 2012 and Koboldt, 2013).

Many developing countries have not implemented LLU. For example, the Telecommunications Regulatory Authority of India's ("TRAI") view is that "the sharing of copper loop through unbundling or bit stream sharing which was at one time considered important for increasing broadband penetration has lost relevance especially for rural areas" (TRAI, 2011). More recently, it appears as though TRAI has adopted measures for the "sharing of active and passive infrastructure" (Kaur, 2013). In Chile, the regulator appears to have found, in line with court rulings in the US, that sufficient inter-modal competition exists between cable and copper

⁶⁰ The researchers found the same outcome for Market 6 (leased line access) but only in areas where there is not high replication of services.

fixed line networks such that regulation of fixed line networks is not justified there (Schiavoni, 2013b).

There is not enough literature on the scope of LLU implementation or its impact in developing countries. While LLU may not be suited to all developing countries, such as Chile where inter-modal competition with cable networks exists, or Nigeria where the fixed line incumbent essentially isn't operating, many developing countries have already implemented it or are considering doing so.

7.4. ICASA's local loop unbundling interventions

7.4.1. Legal framework

The Electronic Communications Act (ECA), no. 36 of 2005, provides an open access framework for the sector. Sections 37(1) and 43(1) of the ECA respectively provide that licensees must interconnect or lease facilities to another licensee upon request and within determined timeframes, subject to the request being economically and technically feasible. Interconnection and facilities leasing regulations have been put in place to give effect to these open access provisions of the ECA (discussed above in section 2.2).

ICASA may exempt licensees from the obligation to interconnect and ECNS licensees from the obligation to provide facilities, but only if such licensees are found not to have 'significant market power' (SMP) in the relevant market. ICASA may exempt ECNS licensees even if they have significant market power from the obligation to lease fibre loops and sub-loops serving residential premises if constructed after the coming into force of the ECA. ICASA has not to date exempted any licensee from their obligations to interconnect and lease facilities.

Section 43(8) of the ECA provides that ICASA must prescribe a list of essential facilities that must be provided in terms of section 43(1), and ICASA must review that list at least every 36 months.⁶¹ This has not been done notwithstanding a policy direction directing ICASA to consider prioritising and urgently prescribing a list of essential facilities to include facilities connected to the SAT-3/WASC/SAFE marine cable (ECA, 2007c).⁶²

Sections 43(10) and (11) of the ECA provide that an ECNS licensee may not enter into agreements for access to or use of international facilities, which agreements contain exclusivity provisions, provisions that create undue barriers for accessing or using such facilities, or otherwise restricts any party from leasing, selling, or otherwise providing such facilities to other services providers.

Section 21 of the ECA provides for regulations for rapid deployment of electronic communications facilities, often envisaged as a "one-stop shop" for ECNS licensees to obtain planning and other permissions from local authorities and government departments. The onus is on the Minister of Communications to consult with the Ministers of Co-operative Governance

⁶¹ Section 43(8) of the ECA also provides that leasing of essential facilities should be facilitated.

⁶² ICASA started the process to issue a list of essential facilities (ICASA, 2007d) but did not complete it.

and Traditional Affairs, Rural Development and Land Reform, Water and Environmental Affairs and with ICASA and other relevant institutions, in order to develop policies and policy directions for the rapid deployment and provisioning of electronic communications facilities. ICASA must prescribe regulations governing how ECNS licensees may exercise their infrastructure rights (having regard to the policy and/or policy directions). In accordance with section 21(2), the regulations must provide procedures and processes for:

- Obtaining any necessary permit, authorisation, approval or other governmental authority, including the criteria necessary to qualify for such permit, etc.; and
- Resolving disputes that may arise between an ECNS licensee and any landowner, in order to satisfy the public interest in the rapid rollout of ECNs and ECFs.

These provisions were clarified recently in the Electronic Communications Amendment Act, no. 1 of 2014, which made changes to sections 21 so as to remove uncertainty around the legal status of the guidelines by clarifying that the Minister will issue policy and/or policy directions. The policy and/or policy directions must be issued by the Minister within 12 months of the coming into force of the Electronic Communications Amendment Act, no. 1 of 2014. ICASA will then have a further 6 months in which to finalise the regulations.

7.4.2. Role of legislature and government

LLU report

The Department of Communications (DOC) appointed a committee to examine Local Loop Unbundling (LLU) which delivered its report in 2007 (DOC, 2007a). The LLU Committee recommended three forms of unbundling for South Africa, all relating to the fixed copper access network, and all of which were to be implemented simultaneously (DOC, 2007a):

1. Full unbundling;
2. Line sharing; and
3. Bitstream (wholesale) access.

The first two forms of unbundling relate to the physical copper between customer premises and the main distribution frame at local exchanges (i.e. layer 1 of the Open Systems Interconnection (OSI) model). Full unbundling provides access to both the low frequency (voice) and high frequency (data) portions of the copper local loop while line sharing provides access only to the high frequency (data) portion. Bitstream provides virtual access to copper local loops at the Internet Protocol (IP) layer of the network (i.e. layer 3 of the OSI model). The Committee also recommended carrier pre-selection to allow customers to choose between providers of voice services regardless of who supplies that underlying fixed line infrastructure.

While the Committee did not deal with the ownership structure of Telkom, it did recommend a separate facilities and services entity to be formed within Telkom. Furthermore, collocation should be regulated taking into account the cost of renting space, electricity and security. Where space is not available in an exchange, virtual collocation (where connectivity is provided

between the local exchange and a nearby outside site to give effect to LLU) should be made available. ICASA needed to be resourced in order to implement LLU, including for the inspection of LLU sites. The Committee also did not specifically address LLU pricing, though it did recommend that ICASA regulate prices for LLU network elements. The Committee recommended that rather than ICASA implementing LLU in isolation, stakeholders should be included in the process and the timetable for implementation should be carefully managed. Subsequent to the publication of the LLU Committee report, the Minister of Communications at the time (Dr. Ivy Matsepe-Casaburri) issued a policy decision in 2007 that the LLU process should be implemented by the end of 2011. On 17 September 2007 the then Minister of Communications issued an omnibus policy direction in terms of section 3 of the ECA, which included specific reference to LLU in the following terms (DOC, 2007b):

8. Local loop unbundling (LLU) process

I HAVE ALSO TAKEN THE POLICY DECISION that, given the complexity of local loop unbundling process on the one hand and the urgency for South Africa to enable all operators appropriately licensed to have access to the local loop on the other hand, the unbundling process in South Africa should be urgently implemented and completed by 2011. In addition, the Authority should urgently and as appropriate, take advantage of the report of the Local loop unbundling committee and its recommendations on the proposed unbundling models and ensure that we achieve the 2011 deadline.

Nonetheless, LLU was not implemented by 2011, discussed next.

Parliamentary Portfolio Committee on Communications and Department of Communications

Subsequent to the Ministerial policy decision to implement LLU in 2007, the regulator (ICASA), the Parliamentary Portfolio Committee on Communications (PCC), and the Department of Communications (DOC) appear to have been focused on voice services and call termination rates in particular (discussed in section 6 above). In early 2011, the new Minister of Communications, Roy Padayachie, announced that LLU was to be implemented by November that year (see, for example, McLeod (2010)). ICASA did indeed publish a draft framework document for LLU, followed by a findings note after hearings, late in 2011 (discussed below).

The PCC, however, opposed the rapid implementation of LLU in a budget review of the Department of Communications and while finding that the regulator should implement LLU, the Minister should review its policy direction⁶³ and ICASA should complete a regulatory impact assessment (RIA) before implementing LLU (PCC, 2011).

Minister Padayachie's successor, Minister Dina Pule, seems to have left the matter there. Her adviser, Roy Kruger, believed that LLU would harm Telkom and would not benefit South Africans (see Wilson, 2013a). Minister Pule's successor, Minister Yunus Carrim, also appears to be in favour of delaying LLU, and appears to have intervened with ICASA to delay the publication of LLU regulations (Draft LLU, 2013). Minister Carrim's spokesperson, Siya Qoza,

⁶³ Although it was in fact a policy decision, and not a policy direction.

explained that a RIA should be undertaken before LLU is implemented (Wilson, 2013b). ICASA has since published draft regulations, discussed below.

The Parliamentary Portfolio Committee on Communications (PCC) has not debated LLU in at least the last 18 months (Source: Interviews with PCC MPs), and is therefore not a priority for the PCC.

Without political pressure from the DOC and PCC, which results at least in part by government's significant (more than 50%) shareholding in Telkom (including the Public Investment Commissioner's stake, see Telkom annual reports), there is very little incentive for ICASA to drive the LLU process forwards. Political demand for regulatory action played a significant role in lowering call termination rates (as discussed in relation to the call termination rate intervention). The delays in the LLU process, which are at least in part due to political interference with ICASA, are substantial: the initial deadline for the completion of LLU was the end of 2011. The implementation of LLU in practice had not at the time of the publication of this report yet begun in South Africa.

7.4.3. Overview of LLU regulation making process

Prior to the publication of the LLU Committee's report (discussed above), ICASA in May 2007 had released notice of its intention to define relevant end to end leased lines and other wholesale markets in terms of section 67(4) of the ECA (ICASA, 2007a). This draft market definition exercise noted that wholesale access to the fixed line local loop was one of the markets which it sought to define and that it did not believe that such intention was in conflict with the process under way at the Department to address policy considerations around the unbundling of the local loop.

1.3 ICASA is mindful of the process underway within the Department of Communications to address policy to enable Local Loop Unbundling ("LLU"). The market definitions contemplated in this review are not in conflict with LLU since this is a regulatory remedy and not a market definition. Appropriate market definitions are in fact necessary and a pre-requisite for LLU policy to be effective.

This notice of intention recommended that:

"Telkom must grant access, upon reasonable request, to the local loop at varying points and with the appropriate method of interconnection. This will include any co-location facilities which may be required in order to reduce the distance cost of making connection at various points, including co-location in the local exchange".

As regards pricing the notice of intention stated that:

That explicit cost-based pricing be imposed on all types of access at the local loop referred to above. The appropriate price control to be applied is likely to be long run incremental cost ("LRIC"), calculated on the basis of relevant forward looking economic costs of an efficient operator, including a reasonable cost of capital.

The original deadline for the completion of the unbundling process was set as end 2011 (as discussed above). In essence what followed has been a series of false starts which have

resulted in limited progress in implementing LLU. On 28 February 2008 ICASA issued a media notice to invite public participation in the LLU process. This notice noted that the LLUC report was handed to it in January 2008. On 23 September 2008 ICASA convened a workshop entitled “ICASA Exploratory Workshop on Local Loop Unbundling”.

ICASA published a draft framework for LLU in mid-2011, which included unbundling fixed line operators only in line with the LLU Committee’s report (ICASA, 2011a). The draft framework included Bitstream, full line and shared line unbundling, as well as sub-loop unbundling (ICASA, 2011a). The latter had not been including in the 2007 LLU Committee report (discussed above). Specifically, the Discussion Document proposed the following forms of unbundling:

- *Bitstream Access:*
 - *Supplier retains control of equipment in exchange; and*
 - *Supplier then hands control of ADSL line after backhaul.*
- *Line Sharing:*
 - *Supplier retains control of PSTN (phone) frequencies; and*
 - *LLU Operator has a DSLAM in exchange to provide ADSL.*
- *Full Loop Unbundling:*
 - *LLU Operator has full control of the connection point; and*
 - *LLU Operator would provide PSTN services as well as ADSL.*
- *Sub Loop Unbundling:*
 - *Similar to Full Loop Unbundling but with the ability to add hardware into the cabinet; and*
 - *Necessary for providing services such as VDSL.*

(ICASA, 2011a).

After holding hearings, ICASA published its findings in respect of LLU in late 2011 (ICASA, 2011b). The findings document was significantly less ambitious than the framework document and was substantively in line with the DOC and PCC’s calls for a regulatory impact assessment (RIA) prior to the implementation of LLU. ICASA promised to complete the RIA before conducting market reviews and implementing LLU regulations. Instead of implementing Bitstream, ICASA promised a reduction in prices for IPConnect, a precursor to Bitstream that Telkom offers Internet Service Providers on a commercial basis. It appears that this reduction had been agreed on between ICASA and Telkom prior to the publication of the Findings Note and which formed part of a broader framework for the investigation and quantification of the Access Line Deficit (ALD) claimed by Telkom. The ALD is the loss that Telkom claims it incurs for the supply of fixed lines to retail subscribers.⁶⁴ ICASA targeted the implementation of Bitstream access by the end of 2012 after developing an ALD recovery scheme for Telkom. ICASA further undertook to implement an inquiry into unbundling wireless local loops. While Bitstream access was not implemented by the end of 2012 (and indeed still has not been implemented at the time of the publication of this report), ICASA did negotiate price reductions

⁶⁴ The ALD claimed by Telkom is the difference between the monthly rental charge for a Telkom line to a retail customer and the cost of the maintenance and support of that line.

for IPConnect (see, for example, Mochiko, 2012). However, ICASA did not undertake market enquiries, complete a RIA nor implement LLU regulations.

On 17 June 2013 ICASA announced the commencement of its Cost to Communicate Programme, which includes a specific focus on LLU:

7 LOCAL LOOP UNBUNDLING

....

7.2.2 The Authority's Position on the Local Loop

7.2.2.1 The Authority is currently awaiting the conclusion of the review of the CCC ruling of 24 August 2012.

7.2.2.2 In the interim, the Authority will publish draft regulations governing the manner in which copper local loops shall be unbundled in South Africa and these draft regulations are designed to obtain an industry view. However, the regulations shall not take effect until after the completion of the CCC ruling review process.

7.2.2.3 Further, the regulations will require licensees to provide information to the Authority in order to establish the efficacy of bitstream and shared/full loop unbundling over time

As part of this announcement ICASA indicated that it had set a new deadline for the publication of Local Loop Unbundling (LLU) regulations, being 4 March 2014 (Local loop, 2013). ICASA stated further it was of the view that all necessary processes had now been followed and that all that was required was the implementation of the relevant provisions of the ECA.

By now there had been a substantial waning of political will behind LLU (as discussed above). Reservations about the viability of LLU and the level of priority it should be accorded have been expressed by, *inter alia*, the technical adviser to the previous Minister of Communications, who argued that unbundling the local loop would lead to a damaging outcome for Telkom and would cause job losses without radically improving connectivity for most South Africans (Wilson, 2013a).

Towards the end of 2013, ICASA published yet another set of draft LLU regulations, this time including wireless local loop unbundling (ICASA, 2013a and ICASA, 2013b). This set of draft regulations did not contain any provisions of substance relating to the particular requirements of LLU as an application of facilities leasing. Rather it largely mirrored the provisions of the Facilities Leasing Regulations (ICASA, 2010c). This is particularly clear when the regulations are compared to the recommendations of the 2007 LLU committee report for example. For example, while licensees must provide collocation space in terms of the draft regulations, there is no requirement for virtual collocation (where there is no physical space available new entrants at a local exchange), as recommended by the LLU Committee. Where the LLU Committee recommended rules regarding physically separated space at local exchanges for the collocation of equipment, the ICASA regulations do not refer to this. There are many other rules recommended by the LLU Committee that ICASA has not included.⁶⁵ This limited scope

⁶⁵ These include rules regarding: notification before closure of Main Distribution Frame (MDF) sites, information on technologies used by Telkom, rolling forecasts on use of metallic paths, Telkom's network related information, a detailed cutover process, customer-authority forms, target service restoration periods, and a comprehensive process for maintenance and fault reporting.

of the regulations may partly be due to the fact that ICASA wished to capture wireless unbundling within a general framework.

Furthermore, ICASA requires non-discrimination between the access provider's own downstream operations and those of third parties but does not set out any rules that would facilitate functional separation of these activities, including in respect of operating support systems, management information systems, people, processes and the like. Recall that functional separation, discussed above in Box 10, has been allowed for in EU rules (EPC, 2009) to ensure that incumbents do not discriminate between their own downstream operations and those of their downstream rivals. While functional separation is dealt with in part through the Competition Commission's settlement with Telkom (discussed below), this will by no means ensure full functional separation and non-discrimination by Telkom. LLU can be implemented without functional separation, and indeed the EU rules allow for functional separation but do not require that national regulatory authorities (NRAs) implement it. Given Telkom's track record of excluding downstream rivals (discussed below), however, LLU is unlikely to succeed without functional separation being implemented.

ICASA on 6 December 2013 published an Explanatory Note on the draft regulations originally published in September (ICASA, 2013b). Of particular interest is the Annexure to the Explanatory Note dealing with what ICASA refers to as Telkom's "purported" Access Line Deficit:

"The Authority has engaged Telkom on numerous occasions during 2012 to identify whether there is alignment on the existence of the ALD and potential methods to address the concern.

However, although Telkom has provided significant amounts of information in justifying why the ALD exists, the Authority does not agree with Telkom on the scope and scale of the ALD. The principle cost make-up of the ALD is related to the cost of employees and labour-related costs. It is imperative that Telkom manage its labour costs in line with an efficient provision of services. A key measure of this is the number of employees per active fixed line. Telkom reported a figure of 125 active fixed lines per employee in 2002 increasing to 191 active fixed lines per employee in 2012. While this has improved, it remains far below its competitors in this metric.

It is evident that Telkom's business model and approach to service provision needs to be adapted considering that the market dynamics have changed considerably since 2000. The Authority acknowledges the recent impairment of assets in this regard. The Authority notes the difficulties faced by the shareholder in terms of employment sustainability within the ICT sector as well as at Telkom specifically. However, this social challenge faced by the entire ICT sector is not a justification for preventing the provision of access to any form of local loop.

Despite Telkom having provided copious information about the purported Access Line Deficit, the information provided was not convincing. The Authority therefore determines that the purported ALD is of no relevance in determining access to the Local Loop."

(ICASA, 2013b)

On 14 February 2014 ICASA cancelled the public hearings into the Draft LLU Regulations scheduled for 18-20 February, 2014, and stated that it would instead hold a public workshop on the 18th February 2014 to consider “*Wholesale Access under Chapter 8 of the ECA*” (ICASA, 2014). ICASA set out the reasons for this decision and provides a set of questions to be considered at the workshop:

1. *The Electronic Communications Act defines radio apparatus as a facility. However, radio apparatus is only useful in combination with Spectrum, which means that the wireless local loop is a facility. What would be your view?*
2. *Is there a difference in the way Chapter 8 applies to active facilities versus passive facilities?*
3. *From a conceptual point of view, is there a difference between copper, fibre and wireless last mile access? What are the implications of the practical differences?*
4. *What measures and methods would make the leasing of last mile access simpler and cheaper for all parties?*
5. *What additional issues need to be considered?*

(ICASA, 2014)

The following are the outcomes of the workshop held at ICASA on the 18th February 2014:⁶⁶

- There is scope for a trial of LLU to take place at a currently underutilised rural Telkom exchange. This will be arranged and a working group is to be established (comprising TSA, IS and the MNOs).
- Interested parties were requested to submit further comments on the draft LLU Regulations with particular reference to providing a detailed alternative set of regulations.
- There was a majority view from participants that wireless local loop unbundling should be explored as part of a separate process.
- Telkom indicated that they had been hoping for the LLU hearings to proceed as they had information relating to the socio-economic impact of LLU which they wanted to present. There will instead be a private meeting between ICASA and Telkom to discuss this.

There have been substantial delays, prompted by political interference (discussed above) and private negotiations between Telkom and ICASA, in the implementation of LLU in South Africa. ICASA’s decision to include wireless local loops in its process, which is not in line with international best practice, has diluted the proposed LLU regulations. This will delay the successful implementation of LLU even further in South Africa.

⁶⁶ Notes provided by Dominic Cull, Ellipsis Regulatory Solutions.

7.4.4. ICASA CCC decision in Neotel LLU dispute

In the absence of any progress in LLU Neotel, which would be a primary beneficiary of LLU, sought to force the issue by lodging a facilities leasing request with Telkom in respect of certain copper loops under Chapter 8 of the ECA and the Facilities Leasing Regulations (ICASA, 2010c).

After Telkom formally rejected the request Neotel lodged a dispute with ICASA on 23 March 2011, arguing that Telkom was obliged under the ECA to accede to the request and it had not disputed the reasonableness of doing so.

On 18 May 2012 the Complaints and Compliance Committee⁶⁷ issued an interim order in respect of a complaint lodged with it by Neotel against Telkom in March 2011 in respect of access to Telkom's copper loop (*Neotel vs. Telkom [2011]*). The relevant portion of the interim order reads as follows :

1. *Neotel's request to Telkom and the later referral of the dispute that ensued between the parties was legally valid.*
 2. *Telkom's response to Neotel's request was not adequate and was therefore not in accordance with the prescribed legal provisions.*
 3. *The CCC concluded that Telkom had contravened Regulation 3(2) of the Electronic Communications Facilities Leasing Regulations of 2010.*
- Neotel vs. Telkom [2011]*

To reach a practical solution, however, the CCC decided that it would be necessary for the Local loop Unbundling Regulations to be in place as envisaged by section 44(3)(m) of the ECA. It was noted that in terms of the Ministerial Policy Directive of 2007, ICASA was given until November 2011 to publish Local loop Unbundling Regulations. These Regulations have not been finalised as at March 2014.

In light of the above, and ICASA's silence on the progress on the finalisation of the Regulations and the steps undertaken to resolve the dispute when it was initially referred to it by Neotel, the CCC decided that ICASA should develop terms and conditions that are consistent with the provisions of Chapter 8 of the ECA within a period of three months from the date of the CCC's decision, i.e. 18 May 2012.

On 24 August 2012 the CCC issued its final judgement in respect of the Neotel complaint. This order is currently subject to review proceedings initiated by Telkom. It is not clear when this will be finalised.

The approach taken by the CCC is unhelpful. Faced with a respondent that was clearly unwilling to negotiate, it failed to take the opportunity to require that ICASA impose specific terms and conditions consistent with Chapter 8 of the ECA on the proposed lease of facilities. The finding was unequivocal but the remedy inadequate.

⁶⁷ The CCC was established in terms of section 17A of the ICASA Act.

It perhaps also points to the fact that LLU is unlikely to take place in South Africa until such time as it is embraced by Telkom as the incumbent fixed operator. In the context of an ineffectual regulator and apparent lack of political will, it is difficult to see Telkom being forced to co-operate to the degree required to implement LLU at a technical and service offering level.

7.5. Competition authority interventions in markets for fixed line services

7.5.1. Telkom / BCX and MTN / Verizon merger decisions

Several mergers have been proposed in the telecommunications sector in South Africa, at least one of which was prohibited on the grounds that it would cause a substantial lessening of competition. The mergers yielded useful insights about the way in which the competition authorities view markets for telecommunications services and the Telkom / BCX decision played an important role in keeping markets for fixed line services more open.⁶⁸

During the course of the merger between MTN and Verizon (which was ultimately approved by the competition authorities), competitors complained that the merger would be anti-competitive on the grounds that MTN would discriminate in favour of its own fixed line Internet Service Provider (ISP) operation (which would be considerably bolstered by the acquisition of Verizon Business in South Africa) in the supply of access to wholesale data services on the MTN mobile network (CT, 2010). Theories of harm put forward by competitors included bundling, input foreclosure and customer foreclosure. Competitors also complained that MTN would be in a better position post-merger to block Voice over Internet Protocol (VOIP) services, such as Skype, on its mobile network. The Tribunal ultimately found that MTN was able to block VOIP with or without the merger and that MTN's attempts to bundle managed network services (management of fixed line networks on behalf of corporates) with mobile services had not been successful prior to the merger. Even if bundling were to increase post-merger, MTN and Verizon would have relatively low market shares in markets for managed network services, which would mean that bundling would be unlikely to lead to a lessening of competition.

A further theory of harm advanced was that MTN would foreclose access to its mobile network to downstream managed network service providers. Again, the Tribunal found that there were alternative mobile providers and that MTN and Verizon's combined downstream market share was simply too small to warrant concern. Finally, competitors also raised concerns that the merged entity would deny a customer to upstream fixed line rivals. Given MTN's small market share in markets fixed line services, this was also dismissed as a concern, and the merger was ultimately approved.

The Tribunal came to the opposite conclusion in the Telkom / BCX merger, in the context of Telkom's overwhelming dominance in markets for upstream fixed line services (CT, 2006).

⁶⁸ For example, in the Mweb / Tiscali merger the Competition Tribunal (CT) examined markets for dial-up internet access for home based consumers (see CT, 2005). While this market was reviewed some time ago in 2004, the Tribunal did not at the time consider mobile services as viable alternatives due to the fact that the development of mobile services at that stage was "nascent".

Competitors also complained in that merger that Telkom would foreclose downstream competitors in markets for (fixed line) managed network services. The Tribunal did not make a finding regarding these input foreclosure concerns. Nonetheless, the Tribunal found that the merger was anti-competitive on the grounds of the horizontal overlap in markets for managed network services, in which BCX was poised to become a significant competitor. This was particularly harmful to competition given the opening up of markets for fixed line services (deregulation) and the economies of scale and scope that pertain to managed network services. The Tribunal found that Telkom's aim was to use the merger to thwart competition arising from deregulation. Entry from Neotel was unlikely to be sufficient or timely enough to negate the anti-competitive effects of the merger.

The Tribunal has therefore taken a relatively hands-off stance where markets for fixed line services and managed network services are concerned where the market shares of the relevant entities in those markets, such as those of MTN and Verizon, are relatively low. This was despite very large market shares, at least in the case of MTN, in adjacent markets for mobile services. The Tribunal was much more vigilant in ensuring that the transition from Telkom's monopoly over the provision of fixed line services to a more competitive market was not undermined by Telkom monopolising adjacent markets, being managed network services in the Telkom / BCX merger.

In preventing the Telkom / BCX merger, the Tribunal has therefore played a significant role in creating scope for greater competition in markets for managed network services and the adjacent fixed line market.

7.5.2. Abuse of dominance complaints against Telkom and functional separation settlement agreement

In 2002 and the period 2005-2007 a number of complaints were laid against Telkom under the Competition Act by downstream competitors.

During 2002 the South African VANS Association (SAVA) and other ISPs lodged a complaint alleging Telkom had abused its dominance, leveraging its upstream monopoly to create an unfair advantage for its downstream retail division in the competitive value added network services market. The Commission determined that the Competition Act had been breached and referred the matter to the Tribunal on 24 February 2004, alleging that Telkom had unlawfully sought to extend its monopoly rights by refusing to supply essential access facilities to independent value added network service (VANS) providers, inducing their customers not to deal with them, charging their customers excessive prices for access services and discriminating in favour of its own customers by giving them a discount on distance related charges which it did not advance to customers of the independent VANS providers

Telkom challenged this referral on a number of grounds, including one relating to the lack of jurisdiction of the competition authorities in the matter, effectively delaying the hearing of the matter in the Tribunal until October 2011. On 7 August 2012 the Tribunal imposed a penalty of R449 million on Telkom, with 50% to be paid within six months of the ruling and the balance within 12 months thereafter.

Between June 2005 and July 2007 five separate complaints against Telkom were submitted by the Internet Service Providers' Association (ISPA), Verizon, Internet Solutions and MWEB. The Commission determined that Telkom had engaged in margin-squeeze against first-tier ISPs by charging pricing which was excessive or which precluded cost-effective competition against Telkom's retail division in respect of specified products. The Commission further found that "Telkom had engaged in anti-competitive conditional selling of IP VPN (a type of managed network service) and Internet access services through bundling these products with Diginet and ADSL access services that were priced far lower than the equivalent access services which end customers would purchase when considering the purchase of IP VPN and Internet access from Other Licensed Operators (OLOs) relative to Telkom Retail"⁶⁹.

Having determined that Telkom had contravened sections 8(a), 8(b), 8(c) and 8(d)(iii) of the Act the Commission on 26 October 2009 referred the matter to the Tribunal for adjudication. A settlement was reached in terms of which Telkom formally admitted that its conduct had breached sections 8(c) and 8(d)(iii) of the Act.

In terms of the settlement Telkom warranted that the conduct referred to in the settlement had ceased or that it would cease within six months of 18 June 2013 (the date on which the settlement was confirmed by the Tribunal). To give effect to this it agreed to adopt and commence implementation of a transfer pricing programme set out in Annexure A to the Settlement Agreement in respect of specified services by 18 November 2013. This involves pricing network services it provides to OLOs and Telkom Retail on a non-discriminatory basis in respect of network components which both OLOs and Telkom Retail require in order to provide a comparable retail service. Network components which are not common to OLOs and Telkom Retail in respect of a service are to be priced at cost plus a reasonable return to both OLOs and Telkom. There can be no restriction on self-provisioning by OLOs of such non-common components where this is technically feasible.

Under the transfer pricing programme Telkom was required to operationalise a system in terms of which a set of "fixed network products" are traded internally between Wholesale and Retail according to a corresponding set of transfer prices. These prices are to be based on cost as calculated by Telkom's regulatory cost reporting systems or by reference, where applicable, to the pricing structure applied to OLOs.

It was further agreed that Telkom Retail would implement the retail pricing policy set out in Annexure B to the settlement, which requires Telkom Retail to set retail pricing for IP VPN and Internet access products in a manner that ensures it covers its costs, including the cost of services obtained from Telkom Wholesale at non-discriminatory transfer prices and the costs incurred by Telkom Retail in selling the services. The policy required accounting separation in respect of these products, with records to be kept in such a manner as to enable monitoring by the Commission.

⁶⁹ Para 2.3 Settlement Agreement in terms of Section 27(1)(d) as read with Section 58(1)(a)(iii) of the Competition Act, 1998 in respect of alleged contraventions of section 8 of the Competition Act 1998, Tribunal Case No. 016865.

The settlement agreement required Telkom to prepare and internally circulate a summary of the provisions of the settlement within 30 days of 18 June 2013. By 18 December 2013 Telkom was required to have implemented a functional wholesale/retail separation which would be based on and subject to the code of conduct set out in Annexure C to the settlement. The code of conduct and transfer pricing programme are to remain in place until 18 November 2018.

An administrative penalty of R200 million was imposed, with allowance for this to be paid off in three instalments. Pricing relief in the form of price reductions for the wholesale products forming the subject of the complaint and related retail products were mandated for Telkom's 2014, 2015 and 2016 financial years by the minimum percentage set out in Annexure D (this Annexure is confidential and has not been made public). This pricing relief is required to have an indicative value of at least R875 million within a minimum of 70% of the relief relating to wholesale prices. Telkom agreed not to raise these prices from 2016 levels in its 2017 and 2018 financial years. Finally, Telkom agreed to roll-out strategic points of presence in the public sector at its own cost.

The settlement agreement contemplates a monitoring scheme commencing with an audit to be conducted by an independent expert accountant or economist by 18 November 2013 to determine whether Telkom was in substantial compliance with its obligations under the settlement. Provision was made for dispute resolution and rectification of non-compliance. The outcomes of the audit are to be published in Telkom's annual report for the 2014 financial year.

For the five financial years after 18 June 2013, Telkom is required to undertake an audit, which may be internal, in order to determine whether it complies at least substantially with the transfer pricing programme and the retail pricing policy and will publish confirmation of compliance in its annual report. The settlement obliges Telkom to grant the Commission access, upon reasonable request and notice, to its transfer pricing and retail product accounts and underlying documents for a period of five years from 18 June 2013.

While the Competition Commission settlement went some way to preventing Telkom discriminating in the supply of upstream fixed line inputs between its own downstream operations and those of third parties, the monitoring of this sort of functional separation is usually best left to the telecommunications regulator, in this case ICASA. Competition Authorities have strong investigative powers after conduct has occurred but are not well placed to monitor firms on an on-going basis. ICASA on the other hand is better suited for this, though it has been unwilling or unable to provide access to Telkom's upstream inputs through LLU (as discussed above). The Commission's settlement agreement does not engage with Cave's (2006) framework for functional separation (discussed above). The settlement agreement requires that Telkom separate its wholesale and retail divisions and that it will implement a transfer pricing programme between its wholesale and retail arms, and will separate accounts for IP VPNs and internet access. The agreement also provided for dispute resolution and a compliance programme.

However, important aspects of functional separation are essentially left for Telkom to decide during the implementation of the agreement. For example, there is no explicit description of which products and services are wholesale and which are retail. It is not clear whether Telkom must set up access to its operational support systems, for example, for the ordering of metallic path facilities (copper local loops) for third parties in the same way that its downstream division orders metallic path facilities. There is no discussion about separating business support systems (including billing and customer relationship management). The settlement agreement also does not explicitly require Telkom to rebrand its wholesale business, nor separate and house its wholesale division staff in a separate building. There is no requirement for the management of the wholesale business to have localised incentives (to be incentivised to provide as many metallic path facilities, for example, to as many customers, including Telkom retail and ISPs, as possible). There is no requirement for the wholesale business to have a separate governance structure. There is also no explicit requirement for even accounting separation for the wholesale business (this is only imposed for two retail product areas). While many of these requirements might be read into the settlement agreement, it would have been useful for the Commission and Telkom to set these out explicitly, as has been done in other jurisdictions such as in the EU (discussed above).

While competition authorities have intervened in markets for fixed line telecommunications services, they have done so with respect to past conduct for certain services. The remedy imposed through the Competition Commission and Telkom settlement agreement in 2013 goes some way towards preventing exclusionary conduct in the future. However, a comprehensive solution from the sector specific regulator, ICASA, is more desirable. Given the lack of independence of ICASA and the DOC from Telkom, it is hard to see how this could be brought about in the future, absent the state divesting its interests in Telkom.

7.6. Summary

Economic theories associated with the Chicago School suggest that input foreclosure of an upstream input in order to favour the downstream operations of a vertically integrated upstream monopoly is unlikely: Why could a monopolist not simply extract its monopoly profit upstream and leave downstream firms to compete as fiercely as possible in the resale of the upstream monopoly input? Even where input foreclosure does occur it would be good for consumers, due to the elimination of double-marginalisation. There are a number of reasons why the Chicago School theories about input foreclosure might not hold, however. The first is that the vertically integrated upstream monopolist might avoid regulation upstream, where the price of the monopoly input is regulated and the monopoly profit therefore cannot be extracted. A further anti-competitive incentive for input foreclosure is the credibility problem faced by a monopolist facing multiple downstream buyers who the monopolist interacts with sequentially and who refuse to accept the monopoly price given the monopolist's incentive to discount to the following reseller. A further theory of harm to competition is that downstream firms may in the medium to long term enter the monopoly upstream market, or will provide custom for new upstream entrants. Monopolists therefore do have incentives under these circumstances to foreclose downstream rivals.

In order to alleviate the effects of this conduct regulators have developed means of separating the upstream and downstream divisions of vertically integrated upstream incumbents and have developed open access frameworks for third parties to make use of monopoly inputs, being Local Loop Unbundling (LLU). While Hausman & Sidak (2005) find that LLU did not significantly improve competition and broadband in a number of developed countries, this was largely due to the presence of inter-modal competition there between cable and copper networks. South Africa does not have any cable networks: there is only one fixed line network that has significant coverage, Telkom's. Other studies, including the Berkman Centre (2010) report and Nardoto *et al* (2013) found that LLU and open access policies generally (in the case of the Berkman Centre report) lead to better outcomes for consumers, including through lower prices and better quality, even where inter-modal competition exists.

In South Africa, the DOC set a deadline for ICASA to implement LLU by the end of 2011. Due to political interference or at the very least a lack of political will, ICASA did not achieve this target and has not to date implemented LLU. This is despite a dispute successfully brought by Neotel against Telkom and numerous false starts in the implementation of LLU regulations. At the same time, the competition authorities have limited Telkom's ability to extend its market power in markets for managed network services by prohibiting the Telkom / BCX merger. The competition authorities have also implemented a limited form of functional separation through a settlement agreement with Telkom but have left a significant amount of discretion to Telkom in the implementation of the agreement. Without energetic co-ordination between ICASA and the competition authorities on the settlement agreement through the exercise of concurrent jurisdiction over Telkom, the functional separation and LLU process may not be effective.

8. Conclusion

There are important links between regulation of the telecommunications sector and economic growth. For example, there is a strong and positive relationship between broadband penetration and economic growth, and the regulation of broadband inputs (discussed below) has a significant impact on broadband penetration and quality. In developing countries, a 10% increase in broadband penetration leads to a 1.38% increase in economic growth (Zhen-Wei Qiang *et al*, 2009). In South Africa, the ICT sector accounts for 4.3% of Gross Domestic Product (GDP), while the telecommunications sector accounts for 3.4% of GDP (Statistics South Africa, 2013a). The internet economy, including spend on internet access, investment in infrastructure, spend on internet retail and spend by government, accounts for approximately 2% of GDP, and this share will rise to approximately 2.5% by 2016 (World Wide Worx, 2012). The current share of GDP accounted for by the internet in South Africa is very low by developing country standards, particularly when compared to China (5.5%), India (4.1%), Mexico (2.5%) and Brazil (2.2%) (BCG, 2010).

The lack of the development of the internet has a significant impact on South Africa's growth potential: small and medium enterprises account for the bulk of South Africa's output and employment and need internet access in order to be globally competitive, including in relation to market access and information and improvements in productivity. 30% of SMEs say that their businesses could not exist without their website, according to a survey by World Wide Worx (2012). Furthermore, the business process outsourcing sector in South Africa is shifting

towards higher value outsourcing arrangements, including the outsourcing of legal processes and shared financial and accounting services, which require high speed broadband.

In order to address the lack of internet availability, a range of interventions are required including in respect of training on information and communication technologies (for SMEs particularly), incentives for the uptake of broadband (including significantly lower import duties), the assignment of as much spectrum as possible for broadband purposes, and economic regulation of the fixed line network as part of the Local Loop Unbundling process. The Department of Communications is taking steps towards these goals with the publication of the draft National Broadband Plan. However, the plan does not go far enough in terms of providing details on spectrum to be re-allocated for broadband nor does it mention Local Loop Unbundling or the Universal Service and Access Fund, which could otherwise be used to roll out broadband in rural areas. There are therefore significant gaps in South Africa's policy and economic regulation framework that need to be addressed in order for the electronic communications sector to be a catalyst for economic growth.

While broadband has important links to growth, ICASA has largely focused its interventions in markets for voice services. The telecommunications sector in South Africa has seen significant decreases in mobile voice prices over the last 8 years, from more than R1.50 per minute on average in 2005 to just over R1 per minute in 2012. Call success rates and dropped call rates on mobile networks were mostly within the bounds set by ICASA in 2013, having improved to some degree from an initial, indicative quality of service report prepared by ICASA in 2011. The prices and quality of broadband in South Africa are less encouraging: while mobile broadband prices in South Africa are cheaper than they are in Brazil and China for most products, they are more expensive than in India and Russia. Fixed broadband prices in South Africa are significantly more expensive than in all other BRICS countries. At the same time, South Africa's broadband speeds are significantly slower than speeds in Brazil, Russia and China. South Africans are paying more for broadband than consumers in other countries, and experiencing slower speeds. Investment, revenues and profits for the mobile sector have increased significantly over time for MTN and Vodacom, despite the call termination rate interventions which introduced lower call termination revenues and introduced more intense price competition. Churn has increased to more than 50% for mobile prepaid customers. Churn for postpaid customers, however, is a more sedate 10%, and the latter rate did not change significantly after the introduction of mobile number portability. This suggests that competition for prepaid mobile customers is more intense than it is for postpaid customers.

While Telkom's fixed line voice minutes are declining, a significant proportion of this decline is accounted for by other fixed line and VOIP operators growing their voice volumes. Telkom's fixed line revenues have declined marginally over time as has their profitability (measured by EBITDA margins) due to an overall decline in fixed line connections. Telkom's broadband, business voice and data services grew significantly over the last decade, however. Telkom's rates of investment into its fixed line network have fallen as it focused on capital expenditure on its mobile network. This has changed somewhat recently, however, with Telkom announcing that it plans to "de-risk" its mobile investments and has increased investment in its fixed line network. While internet service providers and alternative fixed line operators have connected enterprise customers and the mobile operators, DFA having connected over 4,000

mobile sites for example and Neotel having connected approximately 2,500 business customers, alternative fixed line services have been rolled out in relatively small geographic areas and their reach is limited.

As a consequence of the limited competition among operators, particularly in the fixed line sector, South Africa has a poor ranking in terms of information and communications technology (ICT) sector development, in terms of both the World Economic Forum's Network Readiness Index (NRI) as well as the International Telecommunication Union ICT Development Index (IDI). South Africa ranks at number 70 out of 144 countries in the NRI and number 84 out of 154 countries in the IDI. And South Africa's ranking has slipped over time, from ranking at number 72 in 2002 in the IDI, though South Africa's rankings have improved marginally over the last year. This suggests that policymakers and regulators have an important role to play in improving economic regulation of the telecommunications sector in South Africa in order to ensure more competitive outcomes and the development of the sector, in order to bring South Africa in line with its BRICS rivals.

These sector outcomes are at least in part due to poor regulation. There are important flaws in the regulatory framework for the telecommunications sector in South Africa. Key among these flaws is the ownership of regulated entities by the state and the policymaker (the DOC) having shareholding responsibility for these regulated entities. This undermines the independence of the regulator. ICASA's independence is also undermined in other ways, including through performance monitoring of councillors by the Minister of Communications and the inability for ICASA to appoint experts without ministerial approval where experts are not in ICASA's approved budget. Finally, and linked to the lack of independence of the regulator from regulated entities, ICASA engages in private negotiations with regulated entities (discussed in more detail in section 7 below). While the competition authorities, which are not directly linked to regulated entities, have intervened in the sector they have done so partially and in relation to specific products and markets where ex-post evaluation of conduct has been possible. A better approach would be for the sector specific regulator, ICASA, to regulate the sector holistically.

There are also significant problems with the independence of the competition authorities and ICASA in respect of funding and appointments by line ministers. Best practice is for economic regulators to be funded through industry levies and to have regulated entities pay for consultants required to provide expertise on regulatory decisions. There is no common appeal authority for economic regulators in South Africa: while the competition authorities have dedicated appellate bodies, ICASA's decisions are appealed to the High Court, which means fewer appeals as outcomes are uncertain, and therefore less accountability for ICASA. There are other gaps in the regulatory framework, or regulatory "governance" regime, including a lack of regulation of the quality of broadband services, ICASA's lack of information gathering powers, and the unwieldy size of the ICASA council which makes decision-making difficult. The open access regime and other aspects of regulation employed in the ECA are disproportionate, and create onerous regulatory obligations for small new entrants.

In terms of regulatory "substance", while ICASA has issued thousands of spectrum licences, and deals with thousands of complaints and hundreds of number applications every year, in

respect of key actions to bring about competitive broadband services, ICASA and the competition authorities have not had the desired impact. Some of the delays, including in respect of licensing of spectrum, are caused by government interference. Telkom has used various legal means of delaying decisions by the competition authorities in the various abuse of dominance complaints against it. Furthermore, the delays in the implementation of local loop unbundling is at least partly due to the fact that ICASA is under-resourced due to the state's ownership of a significant stake in Telkom, which reduces the state's incentive to properly resource the regulator. Finally, the licensing framework creates artificial barriers to new entry, and the management of numbers, particularly non-geographic numbers, as well as the rules regarding rights of way, inhibit new entry.

The implications of this are that ICASA and the competition authorities need to be further insulated from political interference and be properly resourced through industry levies and fees. Furthermore, a single appellate body for economic regulators ought to be established in order to improve accountability of the regulators and improve outcomes in the sector.

A useful case study to assess regulatory effectiveness is in respect of interventions in markets for call termination services. Laffont, Rey & Tirole's (1998a and 1998b) model on competition between networks suggests that the call termination rate that operators would choose collusively, and indeed the optimal rate set by regulators, depends on the competitive setting and regulatory context. In certain circumstances, where operators compete using two-part tariffs, where networks are symmetric in size, and where fixed costs are high and where substitutability between networks is low, operators will likely choose a relatively benign, low call termination rate. Where there are new entrants, pricing is more linear, where fixed costs are low and where substitutability is high, which more closely characterises the South African market, operators collusively select a high call termination rate.

An important departure from the Laffont, Rey and Tirole (1998a and 1998b) model is that many (if not most) of South Africa's population owns more than one SIM card, which means that operators compete for call volumes rather than for customers, which means the call termination rate should have less of an impact on competition. Nonetheless, asymmetry between fixed and mobile call termination rates mean that operators were able to disadvantage the fixed line networks significantly through setting high mobile call termination rates and earned substantial call termination revenues on net. Furthermore, consumers on average do not have more than two SIM cards, and so MTN and Vodacom still had a significant incentive to set high call termination rates in order to limit competition to between their two networks. This suggests that there is significant scope for ICASA to intervene in markets for call termination rates, which it has successfully done.

The regulation of call termination rates in South Africa evolved from almost no regulation since the mobile operators were licenced in 1993 until March 2011, when the new call termination rate regulations developed by ICASA came into effect. Major operators ostensibly were required to set call termination (interconnection) rates at long run incremental cost (LRIC) since the interconnection guidelines were brought into being by ICASA's predecessor, SATRA, in 1999. Since MTN and Vodacom were not declared major operators, these regulations had little impact on the level of call termination rates, other than to prohibit

discrimination which caused the mobile to mobile call termination rate (initially set at R0.20) to increase to the level of the fixed to mobile call termination rate (which eventually rose to R1.25), all of which occurred prior to Cell C's entry in 2001.

Between March 2010 and March 2013, the peak mobile call termination rate for MTN and Vodacom was reduced by 68% through political pressure initially, followed by regulatory intervention by ICASA. This resulted in mobile retail prices declining by between 30% and 35%, and fixed to mobile retail prices declining by between approximately 30% and 45%. While this resulted in mobile voice revenues declining in real terms, aggressive investment by the mobile operators into mobile data services and significant increases in demand for data services resulted in higher overall revenues and EBITDA margins over the period. While employment among MTN and Vodacom declined, this effect was relatively small, and took place over a period in which Telkom Mobile and Cell C expanded their services and, at least in the case of Telkom Mobile, increased employment. Furthermore, competitive pressure in the voice services market created an incentive for MTN and Vodacom to enter new, adjacent markets including mobile money and offering fixed line services to businesses, which increased competitive intensity in those markets. While the least cost routing (LCR) business model was all but eliminated, many LCR operators were able to convert their customers to voice over internet protocol (VOIP) services which increased competitive intensity in the fixed line voice market. The call termination rate intervention therefore facilitated significantly greater competition, not only in voice markets but in a range of adjacent markets.

The successful outcome of the call termination rate intervention in South Africa was not guaranteed: the results from empirical studies in other jurisdictions are inconclusive on the impact of high call termination rates on consumers. Cross-country empirical studies have shown everything from a decrease, to no impact, to an increase in retail prices arising from lower call termination rates.

The call termination rate intervention also had important distributional consequences: while high call termination rates preserved high prepaid voice prices to some extent and more limited switching from incumbent networks to new entrants, these effects were reduced as call termination rates declined. At the same time, connection incentives for postpaid customers were decreased when call termination rates were reduced, as lower call termination revenues meant lower incentives for signing up new customers.

ICASA has since proposed further reductions in mobile call termination rates, to R0.10 per minute for MTN and Vodacom from 1 March 2016. This is very near to a bill and keep regime, and will test whether the significant access growth in South Africa can be maintained and whether the last 5m unconnected consumers in South Africa will be connected. To the extent that access continues to increase, ICASA should consider moving towards a bill & keep regime in order to save its own costs as well as those incurred by the operators for developing and maintaining a bottom-up LRIC model. A bill and keep regime for voice services also becomes more attractive as the operators continue to shift their focus to investment into data services over the short to medium term. The expansion of Cell C and Telkom Mobile has partly been as a consequence of asymmetrically high call termination rates, which ICASA has decided to maintain going forwards. The extent of asymmetry is dramatic: Cell C and Telkom Mobile may

charge more than double what MTN and Vodacom may charge, and asymmetry will have been in place more than 15 years after Cell C at least was licensed. This is considerably longer than in the EU for example where asymmetry is allowed for a maximum of 4 years. The extent of asymmetry will also likely mean that consumers will pay higher prices for longer. While Cell C faced an adverse call termination rate environment for a decade prior to the first call termination rate intervention in 2011, ICASA does risk favouring competitors at the expense of competition by allowing Cell C these high levels of asymmetry.

A further useful case study on the regulation of the sector is in respect of regulatory decisions to open (or keep open) the fixed line market. Economic theories associated with the Chicago School suggest that input foreclosure of an upstream input in order to favour the downstream operations of a vertically integrated upstream monopoly is unlikely: Why could a monopolist not simply extract its monopoly profit upstream and leave downstream firms to compete as fiercely as possible in the resale of the upstream monopoly input? Even where input foreclosure does occur it would be good for consumers, due to the elimination of double-marginalisation. There are a number of reasons why the Chicago School theories about input foreclosure might not hold, however. The first is that the vertically integrated upstream monopolist might avoid regulation upstream, where the price of the monopoly input is regulated and the monopoly profit therefore cannot be extracted. A further anti-competitive incentive for input foreclosure is the credibility problem faced by a monopolist facing multiple downstream buyers who the monopolist interacts with sequentially and who refuse to accept the monopoly price given the monopolist's incentive to discount to the following reseller. A further theory of harm to competition is that downstream firms may in the medium to long term enter the monopoly upstream market, or will provide custom for new upstream entrants. Monopolists therefore do have incentives under these circumstances to foreclose downstream rivals.

In order to alleviate the effects of this conduct regulators have developed means of separating the upstream and downstream divisions of vertically integrated upstream incumbents and have developed open access frameworks for third parties to make use of monopoly inputs, being Local Loop Unbundling (LLU). While Hausman & Sidak (2005) find that LLU did not significantly improve competition and broadband in a number of developed countries, this was largely due to the presence of inter-modal competition there between cable and copper networks. South Africa does not have any cable networks: there is only one fixed line network that has significant coverage, Telkom's. Other studies, including the Berkman Centre (2010) report and Nardoto *et al* (2013) found that LLU and open access policies generally (in the case of the Berkman Centre report) lead to better outcomes for consumers, including through lower prices and better quality, even where inter-modal competition exists.

In South Africa, the DOC set a deadline for ICASA to implement LLU by the end of 2011. Due to political interference or at the very least a lack of political will, ICASA did not achieve this target and has not to date implemented LLU. This is despite a dispute successfully brought by Neotel against Telkom and numerous false starts in the implementation of LLU regulations. At the same time, the competition authorities have limited Telkom's ability to extend its market power in markets for managed network services by prohibiting the Telkom / BCX merger. The competition authorities have also implemented a limited form of functional separation through

a settlement agreement with Telkom but have left a significant amount of discretion to Telkom in the implementation of the agreement. Without energetic co-ordination between ICASA and the competition authorities on the settlement agreement through the exercise of concurrent jurisdiction over Telkom, the functional separation and LLU process may not be effective.

9. Recommendations

The following recommendations flow from this report:

- l) In relation to market access and lowering barriers to entry:
 - i. Telecommunications licensing should be simplified. A basic notification process for both services and infrastructure licensing should be put in place. ICASA should be allowed to issue i-ECNS licences without a Ministerial policy direction.
 - ii. There should be greater access to spectrum for smaller operators on a local or community basis, particularly in respect of television white spaces.
 - iii. The ECA's "open access" principles for interconnection and facilities leasing are too wide and catch all licensees, which is disproportionate for small licensees. At the very least, facilities leasing and interconnection agreement obligations should be limited to providers with market power in terms of chapter 10 in order to reduce compliance costs.

- m) In relation to providing greater clarity to the sector:
 - i. The MOU between ICASA and the competition authorities should be updated. It has not been updated since the ECA was put in place.
 - ii. The ECA is not clear as to whether ICASA must conduct a market enquiry before setting tariffs for interconnection and facilities leasing matters. This should be clarified in the ECA.

- n) In relation to ICASA's independence:
 - i. ICASA should be allowed to employ experts outside of its approved budget without ministerial approval.
 - ii. State ownership of Telkom limits ICASA and the DOC's independence. The state's interest in Telkom and other regulated entities should be divested in order to remove this conflict of interest.
 - iii. The requirement for ICASA to consider ministerial policies and policy directions should be removed as this undermines ICASA's independence and results in considerable delays.

- o) In relation to consumer protection:
 - i. ICASA's consumer protection rules do not set out what consumers are responsible for, and while quality for voice services is dealt with, quality of broadband services is not. This needs to be remedied.
 - ii. ICASA should establish the consumer advisory panel, as required in terms of the ECA.

- p) In relation to ICASA's legal powers:
- i. ICASA needs to be provided with sufficient legal powers to obtain information.
 - ii. ICASA's fines should be linked to the magnitude of the contravention rather than have fixed maxima.
- q) In relation to the decision makers at ICASA and the competition authorities:
- i. The ECA and Competition Act should be amended to ensure that an independent investigation is required prior to removal of decision makers.
 - ii. ICASA's 9 council members should be reduced to the number recommended Brown et al : 3 or 5 commissioners.
 - iii. ICASA council members and the Competition Commissioner and Deputy Commissioners should be appointed by the President, and their terms of service should be capable of being changed while they are in office.
 - iv. ICASA councillors should not be accountable to the Minister of Communications and should rather be accountable to Parliament for their performance.
- r) In relation to ICASA and the competition authorities' funding:
- i. ICASA and the competition authorities' funding should generally be raised through special levies from regulated entities rather than through appropriations from Parliament.
 - ii. A rule should be put in place that prohibits government cuts in spending unless they apply consistently to all agencies.
 - iii. ICASA and the competition authorities should be given the authority to have regulated entity fund the costs of consultants.
 - iv. State ownership of Telkom reduces government's incentives to fund ICASA. This means that independent funding for ICASA is particularly important and this underlines the importance of the state divesting its interests in the telecommunications sector.
- s) In relation to transparency and accountability of ICASA and the competition authorities:
- i. ICASA and the competition authorities should seek outside expert advice on their performance.
 - ii. There should be a dedicated appellate body for ICASA's decisions to enable regulated entities to regularly appeal ICASA's decisions.
 - iii. ICASA in some instances enters into private negotiations with regulated entities instead of conducting transparent proceedings. This should be prohibited.
- t) In relation to ICASA's staff, training and internal procedures:
- i. ICASA should put in place a case management system to preserve confidential information and to facilitate provision of access to documents that are public in terms of the ECA.
 - ii. Training on the procedures and practices adopted by ICASA when implementing the ECA needs to be implemented.

- iii. A track for specialists to progress outside of management structures should be implemented in order to attract and retain highly skilled staff.
 - iv. A key area for training that should be developed is technical training (Interviews with DOC staff members). This is particularly important for areas such as Local Loop Unbundling and Spectrum assignment.
 - v. There should be prohibitions on a variety of ethical problems set down in legislation, and there should be requirements for all regulatory personnel to disclose their financial interests.
- u) Consideration should be given to moving towards a bill and keep regime for call termination in South Africa. The mobile operators are focusing their investments on the rollout of data networks, which are to some degree at least independent of markets for voice services. The introduction of bill and keep will facilitate competition and will result in lower costs of compliance for regulated entities and reduced complexity for the regulator.
- v) The call termination rate intervention highlights the importance of politicians and policymakers in the regulatory environment. The change in the interests of the DOC after Telkom divested its share of Vodacom shows how bringing about change in the sector requires alignment of interests between the state, regulated entities and consumers. In order to bring about LLU, consideration should be given to housing Telkom's copper local loop assets as well as its collocation facilities and related infrastructure in a separate legal entity falling under the Department of Public Enterprises rather than the Department of Communications. This should more closely align the interests of consumers, politicians, the DOC and ICASA which should facilitate LLU and ultimately the development of broadband and small businesses in South Africa.

10. References

10.1. Articles

Alexander, P., Candeub, A., and Cunningham, B. (2010). 'Network growth: Theory and evidence from the mobile telephone industry', *Information economics and policy*, vol. 22(1), available:

http://businessinnovation.berkeley.edu/Mobile_Impact/Alexander_Candeub_Cunningham.pdf

Analysys Mason. (2010). *Assessment of economic impact of wireless broadband in South Africa*. Available from: <http://www.analysysmason.com/PageFiles/16954/AML-GSMA-spectrum-benefits-in-South-Africa-10-11-03.pdf>

Andersson, K., & Hansen, B. (2009). 'Network competition: Empirical evidence on mobile termination rates and profitability', Institute for research in economics and business administration, working paper 09/09, available: http://brage.bibsys.no/nhh/bitstream/URN:NBN:no-bibsys_brage_23554/1/A09_09.pdf

Aproskie, J., Hodge, J., Lipschitz, R., Sheik, F. (2008). 'South African 15-year Telecommunications Policy Review', available:

http://www.thepresidency.gov.za/docs/reports/15year_review/economic/telecommunications.pdf

Atkinson, R., Castro, D., & Ezell, S. (2009). 'The Digital Road to Recovery: A stimulus plan to create jobs, boost productivity, and revitalise America'. *The Information Technology and Innovation Foundation*. Available from: <http://www.itif.org/files/roadtorecovery.pdf>

Atrostic, B. & Nguyen, S. (2006). 'How businesses use information technology: Insights for measuring technology and productivity'. *CES 06-15*. Available from: <ftp://tigerline.census.gov/ces/wp/2006/CES-WP-06-15.pdf>

Australia Bureau of Statistics. (2006). *ICT satellite account: ASNA experimental estimates*. Available from: <http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/5259.0Main+Features12002-03?OpenDocument>

Basu, S. & Fernald, J. (2006). 'Information and communications technology as a general-purpose technology: Evidence from U.S. industry data'. *Federal Reserve Bank of San Francisco*. 2006-29.

Berkman Centre. (2010). 'Next generation connectivity: A review of broadband internet transitions and policy around the world', available: http://cyber.law.harvard.edu/sites/cyber.law.harvard.edu/files/Berkman_Center_Broadband_Final_Report_15Feb2010.pdf

BMI-T. (2012). *Outlook for terrestrial fibre projects in South and Southern Africa*.

BMI-T. (2013). *Review of policy and formulation of recommendations for the Department of Communications by BMI-Techknowledge*. Available from: <http://www.doc.gov.za/documents-publications/ict-policy-review.html#>

Bohlin, E., & Kongaut, C. (2012). 'Impacts of mobile termination rates (MTRs) on retail prices: The implication for regulators', available: <http://www.econstor.eu/bitstream/10419/60348/1/720230160.pdf>

Boston Consulting Group. (2012). 'The internet economy in the G-20', <http://www.bcg.com/documents/file100409.pdf>

Brown, A., Stern, J., Tenenbaum, B., and Gencer, D. (2006). 'Evaluating infrastructure regulatory systems'. Available from: <http://siteresources.worldbank.org/EXTENERGY/Resources/336805-1156971270190/HandbookForEvaluatingInfrastructureRegulation062706.pdf>

Business Process Enablement South Africa – Western Cape. (2013). Available from: <http://www.bpesawesterncape.co.za/key-indicator-industry-report/>

Business Trust. (2009). *Ready to compete: South Africa's Business Process Outsourcing Capabilities in the Financial Services Sector*, available: <http://www.offshoringsouthafrica.com/>

Carlson, J., Geerdts, C., Hart, A., King, J., Mgwili-Sibanda, F., & Ntlatlapa, N. (2013). *Studies on the Use of Television White Spaces in South Africa: Recommendations and Learnings from the Cape Town Television White Spaces Trial*. Available from: <http://www.tenet.ac.za/tvws/recommendations-and-learnings-from-the-cape-town-tv-white-spaces-trial>

Carlton, D. (2008). 'Should "price squeeze" be a recognized form of anti-competitive conduct?' *Journal of Competition Law and Economics*, 4(2): 271

Carrim, Y. (2013). *Speech on priorities for the Department of Communications*. Available from: <http://www.techcentral.co.za/heres-my-plan-carrim/42897/>

Cave, M. (2004). 'Remedies for broadband services', *Journal of Network Industries: vol. 5, no. 1*

Cave, M. (2006). 'Encouraging infrastructure competition through the ladder of investment', *Telecommunications Policy*, vol. 30

Crandall, R., Ingraham, A., and Singer, H. (2004). 'Do unbundling policies discourage CLEC Facilities-based investment', *Topics in economic analysis and policy*, vol. 4, no. 1, art. 14.

Crandall, R., Jackson, C., & Singer, H. (2003). *The effects of ubiquitous broadband adoption on investment, jobs and the U.S. Economy*. Available from: http://newmillenniumresearch.org/archive/bbstudyreport_091703.pdf

Crandall, R., Lehr, W., & Litan, R. (2007). 'The effects of broadband deployment on output and employment: a cross-sectional analysis of U.S. data'. *Issues in Economic Policy: The Brookings Institution*, http://www.brookings.edu/~media/research/files/papers/2007/6/labor%20crandall/06labor_crandall.pdf

Cull, D. (2009). 'It takes two to termination tango'. *TechCentral*. Available from: <http://www.techcentral.co.za/it-takes-two-to-termination-tango/10327/>

De Lille, P. (2009, August 31). 'The great mobile rip-off'. *TechCentral*. Available from: <http://www.techcentral.co.za/the-great-mobile-rip-off/669/>

Dewenter, R. & Kruse, J. (2010). 'Calling party pays or receiving party pays? The diffusion of mobile telephony with endogenous regulation'. *DICE discussion paper*, No. 10. Available from: <http://www.econstor.eu/bitstream/10419/41421/1/638178916.pdf>

Dippon, C., & Ware, H. (2010). 'Wholesale Unbundling and Intermodal Competition'. *Telecommunications Policy*. Available from: http://www.nera.com/extImage/PUB_Wholesale_Competition_01.10.pdf

Draft LLU regulations delay: the real reason. (2013). *Mybroadband*. Available from: <http://mybroadband.co.za/news/telecoms/83417-draft-llu-regulations-delay-the-real-reason.html>

Easley, D. and Kleinberg, J. (2010). *Networks, Crowds and Markets: Reasoning About a Highly Connected World*, New York: Cambridge University Press

Economides, N. (2004). 'Telecommunications regulation: An introduction'. *NYU Working Paper*, No. 2451/26175, available from: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2284619

Ecorys, (2013). 'Future electronic communications markets subject to ex-ante regulation', available: http://ec.europa.eu/information_society/newsroom/cf/dae/document.cfm?doc_id=3148

Ellipsis Regulatory Solutions. (2012). *Draft spectrum assignment plans for the 800MHz and 2.6GHz bands*. Available from: <http://www.ellipsis.co.za/draft-spectrum-assignment-plans-for-the-800mhz-and-2-6ghz-bands/>

Esselaar, S., Deen-Swarray, M., Ndiwalana, A. & Stork, C. (2007). 'ICT usage and its impact on profitability of SMEs in 13 African countries'. *Information Technologies and International Development*, vol. 4(a). Available from: <http://www.itidjournal.org/index.php/itid>

European Competitive Telecommunications Association. (2010). *Regulatory scorecard 2009*. Available from: <http://www.ectaportal.com/en/REPORTS/Regulatory-Scorecards/Regulatory-Scorecard-2009/>

Evans, D., & Padilla, J. (2005). 'Excessive prices: Using economics to define administrable legal rules', *Journal of Competition Law & Economics*, Vol. 1 (1).

Fornefeld, M., Delaunay, G., Elixmann, D. (2008). 'The impact of broadband on growth and productivity'. *EU DG Information society and media*. Available from: http://breitbandinitiative.de/wp/wp-content/uploads/2009/04/2008_micus-studie-broadbandeu_long.pdf

Frost & Sullivan. (2012). *Demand Analysis of the BPO and Contact Centre Market within the South African Financial and Retail Sectors*, Frost and Sullivan, US

European Commission. (2013a). *Electronic communications market indicators*. Available from: <http://ec.europa.eu/digital-agenda/en/news/electronic-communications-market-indicators>

Frontier Economics. (2012). *The impact of recent cuts in call termination rates across Europe: A report prepared for the Vodafone group*. Available from: http://www.vodafone.com/content/dam/vodafone/about/public_policy/articles/mtr_impact_of_ec_recommendation.pdf

Galpaya, H. & Samarajiv, R. (2009). *Measuring effectiveness of telecom regulation using perception surveys*. Available from: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1553051

Genakos and Valetti, T. (2011). 'Testing the waterbed effect in mobile telephony', *Journal of the European Economic Association*, vol. 9(6). Available from: <http://www.sel.cam.ac.uk/Genakos/Genakos%20Valetti-Testing%20Waterbed%20Effect.pdf>

Gillwald, A. (2009). *Suggested amendments to the South African Electronic Communications Act: Competition Matters*. Available from: <http://thornton.co.za/resources/lti-bna%20article-competition%20amendments-july%202009.pdf>

Gillwald, A., Moyo, & M., Stork, C. (2013). *Understanding what is happening in ICT in South Africa: a supply- and demand-side analysis of the ICT sector*. Available from: <http://www.researchictafrica.net/docs/Policy%20Paper%207%20-%20Understanding%20what%20is%20happening%20in%20ICT%20in%20South%20Africa.pdf>

Greenstein, S., McDevitt, R. (2010). *The Broadband Bonus: Estimating broadband internet's economic value*. Available from: <http://www.kellogg.northwestern.edu/faculty/greenstein/images/htm/Research/WP/Broadband%20Bonus%20-%20GreensteinMcDevitt-4.pdf>

Growitsch, C. & Wernick, C. (2010). The Effects of Lower Mobile Termination Rates (MTRs) on Retail Price and Demand. *Communications and strategies*, 80, available from: http://www.wik.org/fileadmin/Aufsaeetze/MARCUS_et_al_Growitsch_MTR.pdf,

Hausman, J. & Sidak, G. (2005). Did mandatory unbundling achieve its purpose: Evidence from five countries. *Journal of Competition Law and Economics* 1(1), available from: http://criterioneconomics.com/wp/wp-content/uploads/2012/06/Did_Mandatory_Unbundling_Achieve_its_Purpose1.pdf

Hazlett, T., Havenner, A., & Bazelon, C. (2003). *Declaration on behalf of Verizon, in the matter of petition for forbearance from the current pricing rules for unbundled network elements*. WC Dkt. No. 03-157 (Sept. 2003)

Industry Canada. (2012). *ICT sector gross domestic product*. Available from: [http://www.ic.gc.ca/eic/site/ict-tic.nsf/vwapj/0105864e.pdf/\\$FILE/0105864e.pdf](http://www.ic.gc.ca/eic/site/ict-tic.nsf/vwapj/0105864e.pdf/$FILE/0105864e.pdf)

International Telecommunication Union. (2009-2013). *Information and Communication Technology Development Indicators*. Available from: <http://www.itu.int/ITU-D/ict/publications/idi/>

International Telecommunication Union. (2009). *Regulatory Accounting Guide*. Available from: http://www.itu.int/ITU-D/finance/Studies/Regulatory_accounting_guide-final1.1.pdf

International Telecommunication Union. (2011). *Chairman's report on the 11th Global Symposium for Regulators*. Available from: http://www.itu.int/ITU-D/treg/Events/Seminars/GSR/GSR11/pdf/GSR11_Chairmanreport_en.pdf

International Telecommunication Union. (2013). *ICT Eye*. Available from: <http://www.itu.int/net4/itu-d/icteye/>

Katz, M. & Shapiro, C. (1985). 'Network externalities, competition and compatibility'. *The American Economic Review*, Vol. 75, No. 3

Katz, R. (2012). 'Impact of Broadband on the Economy'. *International Telecommunication Union*. Available from: http://www.itu.int/ITU-D/treg/broadband/ITU-BB-Reports_Impact-of-Broadband-on-the-Economy.pdf

Kaur, I. (2013). 'India (Country regulation overview)'. *Ovum Knowledge Base*. Available from: <http://ovum.com/research/india-country-regulation-overview-2/>

Khan, M. (2010). *Political Settlements and the Governance of Growth-Enhancing Institutions*. Available from: http://eprints.soas.ac.uk/9968/1/Political_Settlements_internet.pdf

Klemperer, P. (1999). 'Auction theory: A guide to the literature'. *Journal of Economic Surveys*, vol. 13 (3)

Klemperer, P. (2000). *Auctions vs. Beauty Contests*. Available from: <http://www.nuff.ox.ac.uk/users/klemperer/biggestpais.pdf>

Knott-Craig, A. (2009, August 11). 'Interconnect: the real story'. *TechCentral*. Available from: <http://www.techcentral.co.za/interconnect-the-real-story-2/555/>

Koboldt, C. (2013). 'Competition and regulation in a converged broadband world'. *International Telecommunication Union Broadband Series*. Available from: <http://www.itu.int/ITU-D/treg/publications/Competitionregulation.pdf>

Kongolo, M. (2010). 'Job creation versus job shedding and the role of SMEs in economic development'. *African Journal of Business Management*, vol. 4(11).

Koutroumpis. (2009). 'The Economic impact of broadband on growth: A simultaneous approach'. *Telecommunications Policy*, vol. 33 (9). Available from: http://www.itu.int/wsis/stocktaking/docs/activities/1287061655/Pantelis_Koutroumpis.pdf

Laffont, J., Rey, P., and Tirole, J. (1998a). 'Network competition I: Overview and non-discriminatory pricing'. *Rand Journal of Economics*, vol. 29, no. 1.

Laffont, J., Rey, P., and Tirole, J. (1998b). 'Network competition II: Price discrimination'. *Rand Journal of Economics*, vol. 29, no. 1

Lawrence, J. (2006). 'Interconnection and facilities leasing', In Thornton, L., Carrim, Y., Mtshaulana, P. & Reburn, P., editors. *Telecommunications Law in South Africa*. Johannesburg: Real African Publishers. Available from: <http://thornton.co.za/resources/telelaw8.pdf>

LirneAsia. (2008). *Manual of instructions for conducting the Telecom Regulatory Environment ("TRE") Assessment*. Available from: http://www.lirneasia.net/wp-content/uploads/2008/04/lirneasia_tremanual_v21.pdf

Local loop unbundling gets new deadline. (2013). *Mybroadband*. Available from: <http://mybroadband.co.za/news/telecoms/79729-local-loop-unbundling-gets-new-deadline.html>

Macher, J., Mayo, J., Ukhaneva, O., & Woroch, G. (2012). 'Demand in a portfolio-choice environment: The evolution of telecommunications'. *Georgetown University Working Paper*, 1-32. Available from: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2133424

- Mawson, N. (2011, July 4). 'Cellular companies drop consumers'. *ITWeb*. Available from: http://www.itweb.co.za/index.php?option=com_content&view=article&id=45072
- McLeod, D. (2009a, November 12). 'Cellular operators agree to cut interconnection rates'. *TechCentral*. Available from: <http://www.techcentral.co.za/cellular-operators-agree-to-cut-interconnection-rates/11233/>
- McLeod, D. (2009b, October 14). 'Cell C tables all-day 75c interconnection plan'. *TechCentral*. Available from: <http://www.techcentral.co.za/cell-c-tables-all-day-75c-interconnection-plan/10641/>
- McLeod, D. (2010, November 11). 'Padayachie wants local loop unbundled'. *TechCentral*. Available from: <http://www.techcentral.co.za/padayachie-wants-local-loop-unbundled/18971/>
- McLeod, D. (2012a, March 22). 'Fibre council threatens court action against Ekurhuleni'. *TechCentral*. Available from: <http://www.techcentral.co.za/fibre-council-threatens-court-action-against-ekurhuleni/30495/>
- McLeod, D. (2012b, October 31). 'Bad line at Telkom'. *TechCentral*. Available from: <http://www.techcentral.co.za/bad-line-at-telkom/35931/>
- Mochiko, T. (2012, August 8). 'Telkom to cut IPConnect cost'. *Business Day BDLive*. Available from: <http://www.bdlive.co.za/articles/2012/04/04/telkom-to-cut-ip-connect-cost;jsessionid=2A4ECF50AB97B5377B70693246AD2237.present2.bdfm>
- Mokgosi, L. (2006). 'The Telecommunications Regulator'. In Thornton, L., Carrim, Y., Mtshaulana, P. & Reburn, P., editors. *Telecommunications Law in South Africa*. Johannesburg: Real African Publishers.
- Motta, M. (2004). *Competition Policy: Theory and Practice*. New York: Cambridge University Press
- Nardoto, M., Valletti, T., & Verboven, F. (2013). 'Unbundling the incumbent: Evidence from UK broadband'. Available from: <http://www.iae.csic.es/investigadoresMaterial/a1310512284127484.pdf>
- Nelson Hall. (2011). *Analysis of South Africa as a BPO delivery location*. Available from: http://www.btrust.org.za/downloads/18_bpo_nelsonhall_final_report_sept2011.pdf
- NERA. (2004). *Framework for evaluating the effectiveness of telecommunications regulators in Sub-Saharan Africa: A final report for the GICT department of the World Bank*. Available from: http://siteresources.worldbank.org/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/Resources/282822-1208273252769/Analytical_Framework_Report_190404.pdf
- New 5Mbps – 100Mbps business fibre broadband product launched. (2013). *MyBroadband*. Available from: <http://mybroadband.co.za/news/broadband/88917-new-5mbps-100mbps-business-fibre-broadband-product-launched.html>

Ngwenya, D. (2011). *Availability of spectrum for broadband. Presented at the Spectrum Management Workshop held at the Birchwood Hotel, South Africa, March 2011.* Conducted by the Communications Regulators Association of Southern Africa.

Number portability company. (2006-2013). 'Number porting statistics'. *Email correspondence and website.* Website data available from: <http://www.number-portability.co.za/>

OECD. (1998). *Policy Round Tables: Relationship between Regulators and Competition Authorities.* Available from: <http://www.oecd.org/dataoecd/35/37/1920556.pdf>

OECD. (2001). *The development of broadband access in OECD countries.*

OECD. (2013). *OECD Communications Outlook 2013.* Available from: http://www.keepeek.com/Digital-Asset-Management/oecd/science-and-technology/oecd-communications-outlook-2013_comms_outlook-2013-en#page1

Ookla. (2013a). *Source data.* Available from: <http://www.netindex.com/source-data/>

Ookla. (2013b). *Household download index.* Available from: <http://www.netindex.com/download/>

Presidential Infrastructure Co-ordination Commission. (2012). *A summary of the South African national infrastructure plan.* Available from: <http://www.economic.gov.za/communications/presidential-infrastructure-coordinating-commission/202-picc-summary-of-sa-national-infrastructure-plan>

Research ICT Africa. (2013a). *Understanding what is happening in ICT in South Africa: a supply and demand side analysis of the ICT sector.* Available from: <http://www.researchictafrica.net/docs/Policy%20Paper%207%20-%20Understanding%20what%20is%20happening%20in%20ICT%20in%20South%20Africa.pdf>

Research ICT Africa. (2013b). *Cheapest prepaid product for OECD basket in a country in US Dollars (USD).* Available from: http://www.researchictafrica.net/prices/Fair_Mobile_PrePaid.php

Rey, P., & Tirole, J. (2006). *A primer on foreclosure.* Available from: <http://neeo.univ-tlse1.fr/198/1/primer.pdf>

Roberts, S. (2009). 'Assessing excessive pricing: the case of flat steel in South Africa'. *Journal of Competition Law and Economics*, vol. 4(3)

Robinson, J. (2014). 'Thailand (Country regulation overview)'. *Ovum Knowledge Centre.* Available from: <http://ovum.com/research/thailand-country-regulation-overview/>

Sandbach, J., & Hooft, L. (2009). *Using on-net / off-net price differentials to measure call externalities and implications for setting MTRs.* Available from: http://stakeholders.ofcom.org.uk/binaries/consultations/mobilecallterm/responses/Vodafone_annex_E_Sandbachva1.pdf

Scaramuzzi, E. (2012). *Brazilian regulator approves asymmetric rules to foster competition and announces 'regulatory holiday' on fibre networks*. Available from: <http://www.cullen-international.com/asset/?location=/content/assets/training--conferences/conferences/2012/11/3rd-latam-symposium-ict-regulation-briefing-report-07112012.pdf/3rd-latam-symposium-ict-regulation-briefing-report-07112012.pdf>

Schiavoni, L. (2013a). 'Mexico's plan for telecoms reform will require careful implementation'. *Ovum Knowledge Base*. Available from: <http://ovum.com/2013/03/15/mexicos-plan-for-telecoms-reform-will-require-careful-implementation/>

Schiavoni, L. (2013b). 'Chile (Country regulation overview)'. *Ovum Knowledge Base*. Available from: <http://ovum.com/research/chile-country-regulation-overview-2/>

Shideler, D., Badasyan, N., Taylor, L. (2007). 'The Economic impact of broadband deployment in Kentucky'. *Federal Reserve Bank of St. Louis, Regional Economic Development*, 3(2). Available from: <http://research.stlouisfed.org/publications/red/2007/02/Shideler.pdf>

Segal, I. and Whinston, M. (2000). 'Naked exclusion: Comment'. *American Economic Review*, 90: 296-309

South African Audience Research Foundation. (2005-2013). *All media products survey*. Available from: <http://saarf.co.za/AMPS/presentations-amps.asp>

South African Audience Research Foundation. (2013). *DS CAPI Questionnaire*. Available from: <http://saarf.co.za/amps-dscapiquestionnaires/2013/Full%20Client%20Copy%20AMPS%20M0132%20-%202013A.pdf>

Southwood, R. (2012). 'Strategies for the promotion of broadband services and infrastructure: a case study on Nigeria'. *Broadband Commission for Digital Development*. Available from: http://www.itu.int/ITU-D/treg/publications/BB_MDG_Nigeria_Final.pdf

Statistics South Africa. (2007). 'Community Survey 2007'. *Statistical release P0301*. Available from: <http://www.statssa.gov.za/publications/P0301/P0301.pdf>

Statistics South Africa. (2011). 'The status of the Information and Communication Technology satellite account for South Africa'. *Discussion document D0407*. Available from: <http://www.statssa.gov.za/publications/D0407/D04072011.pdf>

Statistics South Africa. (2012a). 'Census 2011'. *Statistical Release P0301.4*. Available from: <http://www.statssa.gov.za/Publications/P03014/P030142011.pdf>

Statistics South Africa. (2012b). 'Census 2011: Provinces at a glance. Report No. 03-01-43'. Available from: <http://www.statssa.gov.za/Publications/P03014/P030142011.pdf>

Statistics South Africa. (2012c). 'The status of the Information and Communication Technology satellite account for South Africa'. *Discussion document D0407*. Available from: <http://www.statssa.gov.za/Publications/D0407/D0407March2012.pdf>

Statistics South Africa. (2013a). 'Draft information and communication technology satellite account for South Africa, 2005'. Available from: <http://www.statssa.gov.za/publications/D0407/D04072011.pdf>

Statistics South Africa. (2013b). 'Mid-year population estimates: 2013'. *Statistical release P0302*. Available from: <http://beta2.statssa.gov.za/publications/P0302/P03022013.pdf>

Stork, C. (2012). 'The mobile termination rate debate in Africa'. *Info*, vol. 14, iss. 4. Available from: http://www.acorn-redecom.org/papers/2011Stork_English.pdf

Van der Merwe, C. (2009, May 15). 'Vodacom – Vodafone merger will now require regulatory approval'. *Engineering news*. Available from: <http://www.engineeringnews.co.za/article/vodacom-vodafone-merger-will-now-require-regulatory-approval-icasa-2009-05-15>

Veronese, B. & Pensendorfer, M. (2009). *Wholesale termination regime, termination charge levels and mobile industry performance: a study undertaken for Ofcom*. Available from: <http://stakeholders.ofcom.org.uk/binaries/consultations/mobilecallterm/annexes/annex7.pdf>

Voice price comparisons. (2009 – 2013). *MyBroadband*. Available from: <http://www.mybroadband.co.za/>

Waverman, L., Dasgupta, K., & Brooks, N. (2009). *Connectivity scorecard 2009*. Available from: <https://www.wbginvestmentclimate.org/toolkits/investment-generation-toolkit/upload/TheConnectivityReport2009.pdf>

Waverman, L., & Koutropis, P. (2011). 'Benchmarking telecommunications regulation', *Telecommunications Policy*, 35.

Weeks, M. & Williamson, B. (2006). *A sound basis for evidence based policy? A critique of the ECTA regulatory scorecard and SPC Network papers on investment and broadband*. Available from: http://www.indepen.uk.com/docs/ecta_scorecard_june-2006.pdf

Wikipedia. (2013). *Remote concentrator*. Available from: http://en.wikipedia.org/wiki/Remote_concentrator

Willcocks, L., Craig, A., & Lacity, M. (2012a). 'Becoming strategic: South Africa's BPO service advantage – Part 1: Main Report'. *LSE Outsourcing Unit Working Paper Research Series*. Available from: http://www.outsourcingunit.org/WorkingPapers/WP12_3.pdf

Willcocks, L., Craig, A., & Lacity, M. (2012b). 'Becoming strategic: South Africa's BPO service advantage – Part 2: Case studies of success'. *LSE Outsourcing Unit Working Paper Research Series*. Available from: http://www.outsourcingunit.org/WorkingPapers/WP12_4.pdf

Willig, R., Lehr, W., Bigelow, J., & Levinson, S. (2002), 'Stimulating investment and the Telecommunications Act of 1996', *Report filed by AT&T in FCC Docket 01-338, Oct. 11, 2002*

Wilson, C. (2013a). 'LLU will 'damage' Telkom – Pule adviser'. *TechCentral*. Available from: <http://www.techcentral.co.za/llu-will-damage-telkom-pule-adviser/41086/>

Wilson, C. (2013b). 'LLU set for yet more delays'. *TechCentral*. Available from: <http://www.techcentral.co.za/llu-set-for-more-delays/42503/>

World Bank. (2013). *Worldwide governance indicators*. Available from: <http://databank.worldbank.org/data/views/reports/tableview.aspx>

World Bank. (2014). *World DataBank*. Available from: <http://databank.worldbank.org/data/home.aspx>

World Economic Forum. (2013). *Network readiness index*. Available from: <http://www.weforum.org/issues/global-information-technology/the-great-transformation/network-readiness-index>

World Wide Worx. (2012). *Internet Matters: the Quiet Engine of the South African economy*. Available from: http://www.internetmatters.co.za/report/ZA_Internet_Matters.pdf

Zhen-Wei Qiang, C., Rossotto, C., & Kimura, K. (2009). 'Chapter 3: Economic Impacts of Broadband'. *Information and Communications for Development: Extending reach and increasing impact*. Washington, D.C.: The International Bank for Reconstruction and Development / World Bank. Available from: <http://issuu.com/world.bank.publications/docs/9780821376058?mode=embed&layout=http://skin.issuu.com/v/light/layout.xml&showFlipBtn=true>

10.2. Cases, legislation and policy

Altech Autopage Cellular (Pty) Ltd v the Chairperson of the Independent Communications Authority of South Africa *et al*, case No. 20002/08.

Botswana Telecommunications Authority. (2011). *BTA directs public telecommunications operators to reduce their prices*. Available from: http://www.researchictafrica.net/countries/botswana/BTA_DIRECTS_PUBLIC_TELECOMMUNICATIONS_TO_REDUCE_PRICES.pdf

Commerce Commission New Zealand. (2013). *Unbundled copper local loop final pricing principle*. Available from: <http://www.comcom.govt.nz/regulated-industries/telecommunications/standard-terms-determinations/unbundled-copper-local-loop-service/ucll-final-pricing-principle/>

Communications Commission of Kenya. (2007). *Interconnection determination no. 1 of 2007*. Available from: http://www.cck.go.ke/regulations/downloads/Retail_Interconnection_Rates_Fixed_Mobile_Telecoms.pdf

Communications Commission of Kenya. (2010). *Interconnection determination no. 2 of 2010*. Available from: http://www.cck.go.ke/regulations/downloads/interconnection_determination_no2_2010.pdf

Competition Appeal Court. (2009). *In the matter between Mittal Steel South Africa Limited, Macsteel International BV, Macsteel Holdings (Pty.) Ltd. and Harmony Gold Mining Company Limited and Durban Roodepoort Deep Limited*. Case no. 70/CAC/Apr07

Competition Bureau. (2005). *Comparative Study on Interaction between Competition Law Authorities and Telecommunications Regulators in Australia, the United Kingdom Germany and the United States of America*

Competition Tribunal. (2004). *Merger between Mweb and Tiscali*. Case no. 72LMSep04.

Competition Tribunal. (2006). *Prohibited merger between Telkom and Business Connexion*. Case no. 51LMJun06.

Competition Tribunal. (2007). *Harmony Gold Mining Limited, Durban Roodepoort Deep Limited vs. Mittal Steel South Africa Limited, Macsteel International Holdings BV*. Case no. 13/CR/Feb04.

Competition Tribunal. (2008). *Proposed merger between MTN and Verizon*. Case no. 81LMJul08.

Competition Tribunal, 55/CR/Jul09, 73/CR/Oct09, 78/CR/Nov09

Department of Communications. (2007a). *Local loop unbundling: A way forward for South Africa*. Available from: http://www.ellipsis.co.za/wp-content/uploads/2014/03/local_loop_unbundling.pdf

Department of Communications. (2007b). 'Local loop unbundling (LLU) process.' *Policies and Policy Directions drafted in terms of Section 3(1) and (2) of the Electronic Communications Act 36 of 2005*. Government Gazette number 30308.

Department of Communications. (2009). 'Ministerial Policy Direction regarding the Licensing Framework of Broadband Infraco Proprietary Limited (Broadband Infraco)'. *Government Gazette number 31869*.

Department of Communications. (2010). 'Broadband policy for South Africa'. *Government Gazette no. 33377*. Available from: http://www.doc.gov.za/index.php?option=com_docman&task=cat_view&qid=55&Itemid=104

Department of Communications. (2011a). 'Draft policy directions for electronic communications services in high demand spectrum' and 'Policy directions on exploiting the digital dividend'. *Government Gazette Number 34848*.

Department of Communications. (2013a). 'Consultation on the proposed national broadband policy for South Africa'. *Government gazette no. 36332*. Available from: <http://www.ellipsis.co.za/wp-content/uploads/2013/03/Consultation-on-National-Broadband-Policy-April-2013.pdf>

Department of Communication. (2013b). 'South Africa Connect: Creating opportunities, ensuring inclusion, South Africa's broadband policy'. *Government Gazette number 37119*.

Department of Trade and Industry. (2013). *Industrial Policy Action Plan 2013/14 – 2015/16*. Available from: <http://www.dti.gov.za/DownloadFileAction?id=768>

Europa. (2013). *Summaries of EU legislation*. Available from: http://europa.eu/legislation_summaries/information_society/legislative_framework/l24216a_en.htm

European Commission. (2003). 'Relevant product and service markets within the electronic communications sector susceptible to *ex ante* regulation in accordance with Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communications networks and services'. 2003/311/EC, *Official Journal of the European Union*, L 114/5. Available from: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:114:0045:0045:EN:PDF>

European Commission. (2007). 'On relevant product and service markets within the electronic communications sector susceptible to *ex ante* regulation in accordance with Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communications networks and services', *Official Journal of the European Union*, L 344/65. Available from: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2007:344:0065:0069:en:PDF>

European Commission. (2009). 'On the regulatory treatment of fixed and mobile termination rates in the EU'. 2009/396/EC. Available from: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:124:0067:0074:EN:PDF>

European Commission. (2013). *Proposal for a regulation of the European Parliament and of the Council laying down measures concerning the European single market for electronic communications and to achieve a Connected Continent, and amending Directives 2002/20/EC, 2002/21/EC and 2002/22/EC and Regulations (EC) No 1211/2009 and (EU) No 531/2012*. Available from: <https://ec.europa.eu/digital-agenda/en/news/regulation-european-parliament-and-council-laying-down-measures-concerning-european-single>

European Parliament and Council. (2000). 'On unbundled access to the local loop', *Regulation (EC) No. 2887/2000*. Available from: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32000R2887:en:NOT>

European Parliament and Council. (2002a). 'On a common regulatory framework for electronic communications networks and services'. *Directive 2002/21/EC, Official Journal of the European Communities*, L 108/33. Available from: http://europa.eu/legislation_summaries/information_society/legislative_framework/l24216a_en.htm

European Parliament and Council. (2002b). 'On access to, and interconnection of, electronic communications networks and associated facilities'. *Directive 2002/19/EC, Official Journal of the European Communities*, L 108/7. Available from: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2002:108:0007:0020:EN:PDF>

European Parliament and Council. (2009). *Amending the Directives 2002/21/EC on a common regulatory framework for electronic communications networks and services, 2002/19/EC on access to, and interconnection of, electronic communications network and associated facilities, and 2002/20/EC on the authorisation of electronic communications networks and services*. Available from: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:337:0037:0069:EN:PDF>

Independent Communications Authority of South Africa and Competition Commission of South Africa. (2002). 'Memorandum of Agreement'. *Government Gazette number 23857*. Available from: <http://www.compcom.co.za/assets/Uploads/home/ICASA.pdf>

Independent Communications Authority of South Africa. (2006 – 2012). *Annual reports*. Available from: <http://www.icasa.org.za/AboutUs/AnnualReports/tabid/290/Default.aspx>

Independent Communications Authority of South Africa. (2002a). 'Supplementary interconnection guidelines'. *Government Gazette number 24203*.

Independent Communications Authority of South Africa. (2002b). 'Supplementary facilities leasing guidelines'. *Government Gazette number 23613*.

Independent Communications Authority of South Africa. (2005). 'Number portability regulations'. *Government Gazette number 28091*.

Independent Communications Authority of South Africa. (2007a). 'Intention to define relevant end to end leased lines and other wholesale markets in terms of section 67(4) GeN 529'. *Government Gazette number 29863*.

Independent Communications Authority of South Africa. (2007b). 'Standard terms and conditions of licensees for class electronic communications network services licensees'. *Government Gazette no. 30512*.

Independent Communications Authority of South Africa. (2007c). 'Standard terms and conditions of licensees for individual electronic communications network services licensees'. *Government Gazette no. 30530*.

Independent Communications Authority of South Africa. (2007d). 'Regulations providing a list of essential facilities and matters related thereto'. *Government Gazette no. 30612*.

Independent Communications Authority of South Africa. (2009). 'Regulations setting out the minimum standards for end-user and subscriber service charters'. *Government Gazette no. 31556*.

Independent Communications Authority of South Africa. (2010a). 'Call termination regulations'. *Government Gazette no. 33698*. Available from: <http://www.icasa.org.za/LegislationRegulations/FinalRegulations/TelecommunicationsRegulations/CallTermination/tabid/462/Default.aspx>

Independent Communications Authority of South Africa. (2010b). 'Interconnection regulations'. *Government Gazette no. 33101*. Available from: <http://www.icasa.org.za/Portals/0/Regulations/Regulations/Interconnection/Final%20Regulations/Interconnection%20Regulations.pdf>

Independent Communications Authority of South Africa. (2010c). 'Facilities Leasing Regulations, *Government Gazette no. 33252*.

Independent Communications Authority of South Africa. (2010d). 'Regulations on Radio Frequency Spectrum Fees'. *Government Gazette no. 33495*.

Independent Communications Authority of South Africa. (2010e). *Spectrum usage spreadsheet*. Available from: <http://www.ellipsis.co.za/licensing/frequency-licensing/spectrum-audits/>

Independent Communications Authority of South Africa. (2010f). 'High Demand Radio Frequency Spectrum Licensing Regulations'. *Government Gazette number 33429*.

Independent Communications Authority of South Africa. (2010g). 'Invitation to apply for a radio frequency spectrum licence for the purposes of providing a mobile broadband wireless access service in the 2.6GHz band'. *Government Gazette number 33429*.

Independent Communications Authority of South Africa. (2010h). 'Invitation to apply for a radius [sic] frequency spectrum licence for the purposes of providing broadband wireless access service in the 3.5GHz band'. *Government Gazette number 33247*.

Independent Communications Authority of South Africa. (2010i). 'Withdrawal of the invitation to apply for radio frequency spectrum in the 2.6GHz and 3.5GHz bands'. *Government Gazette number 33420*.

Independent Communications Authority of South Africa. (2010j). 'Notice of the implementation date for geographic number portability'. *Government Gazette number: 33144*

Independent Communications Authority of South Africa. (2011a). 'ICASA framework for introducing Local Loop Unbundling: Discussion paper for public comments', *Government Gazette number 34382*

Independent Communications Authority of South Africa. (2011b). 'Findings note on the ICASA framework for introducing Local Loop Unbundling'. *Government Gazette number 34823*.

Independent Communications Authority of South Africa. (2011c). 'Draft Under-serviced area definition regulations and the explanatory memorandum'. *Government Gazette no. 34662*.

Independent Communications Authority of South Africa. (2011d). 'Radio Frequency Spectrum Regulations'. *Government Gazette no. 34172*.

Independent Communications Authority of South Africa. (2011e). 'The 800MHz and 2.6GHz draft spectrum assignment plan in terms of section 31(3) of the ECA and regulations 3 and 7 of the radio frequency spectrum regulations of March 2011'. Available from: <http://www.ellipsis.co.za/wp-content/uploads/2012/01/ICASA-Draft-High-Demand-Frequency-Licensing.pdf>

Independent Communications Authority of South Africa. (2011f). 'Implementation of the asymmetry provisions of the call termination regulations'. *Government Gazette no. 33976*.

Independent Communications Authority of South Africa. (2011g). 'Quality of service report: Gauteng'. Available from: <http://www.icasa.org.za/LegislationRegulations/EngineeringTechnology/QualityofServiceReports/tabid/546/Default.aspx>

Independent Communications Authority of South Africa. (2012a). 'Under-serviced Areas Definition Regulations'. *Government Gazette no. 35675*.

Independent Communications Authority of South Africa. (2012b). 'Numbering plan regulations'. Available from:

<http://www.icasa.org.za/LegislationRegulations/FinalRegulations/TelecommunicationsRegulations/NumberingPlan/tabid/160/Default.aspx>

Independent Communications Authority of South Africa. (2012c). 'Radio Frequency Spectrum Regulations', Government Gazette number 34172. Available from:

<http://www.icasa.org.za/LegislationRegulations/FinalRegulations/MiscellaneousRegulations/RadioFrequencySpectrum/tabid/721/ctl/ItemDetails/mid/2622/ItemID/1479/Default.aspx>

Independent Communications Authority of South Africa. (2013a). 'Notice of re-issue of the draft "Bitstream and shared/full loop" regulations'. *Government Gazette number 36840*.

Independent Communications Authority of South Africa. (2013b). 'Explanatory note to accompany the draft "Bitstream and shared / full loop access regulations'. *Government Gazette number 37121*.

Independent Communications Authority of South Africa. (2013c). 'Draft call termination regulations'. Available from: <http://www.ellipsis.co.za/draft-call-termination-regulations-2013/>

Independent Communications Authority of South Africa. (2013d). 'Requests for proposals towards the development a supporting implementation framework for toll – free services (080 numbering range)'. *Government Gazette number 36722*. Available from: <http://www.icasa.org.za/LegislationRegulations/FinalRegulations/TelecommunicationsRegulations/NumberingPlan/tabid/160/ctl/ItemDetails/mid/2562/ItemID/1690/Default.aspx>

Independent Communications Authority of South Africa. (2013e). *Broadband value chain analysis*. Available from:

<http://www.icasa.org.za/LegislationRegulations/MarketsCompetition/MarketsCompetitionAnalysis/CosttoCommunicateProgramme/BroadbandValueChainAnalysis/tabid/744/Default.aspx>

Independent Communications Authority of South Africa. (2013f). 'Quality of service report: Johannesburg and Pretoria Region, 2013/2013 Quarter 1'. Available from: <http://www.icasa.org.za/LegislationRegulations/EngineeringTechnology/QualityofServiceReports/tabid/546/Default.aspx>

Independent Communications Authority of South Africa. (2014). *Media release on LLU workshop*, available:

<https://www.icasa.org.za/Portals/0/Newsfeeds/News%202014/MRLLUPublicHear.pdf>

National Planning Commission. (2010). *National development plan 2030: Our future - make it work*. Available from:

<http://www.npconline.co.za/MediaLib/Downloads/Downloads/NDP%202030%20-%20Our%20future%20-%20make%20it%20work.pdf>

Neotel vs. Telkom [2011] ICASA Complaints and Compliance Committee, case number 59/2011

Nigerian Communications Commission. (2009). *Determination of voice and SMS interconnection rate*. Available from:

https://www.google.co.za/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&ved=0CEkQFjAA&url=http%3A%2F%2Fwww.ncc.gov.ng%2Findex.php%3Foption%3Dcom_docman%26task%3Ddoc_download%26gid%3D282%26Itemid%3D&ei=Sli4UvGaM6qM7AbMvYAY&usq=AFQjCNGq-R4mmR1oheda71hBDMHMHpqXqQ&sig2=C7kIgaab70F7bBZfpKK2Rq

Parliamentary Communication Services. (2009). *Committee Proposes Significant Reduction in Interconnection Rates*. Available from:

http://www.parliament.gov.za/live/content.php?Item_ID=1082

Parliamentary Portfolio Committee on Communications. (2011). *Budgetary review and recommendation report (BRRR) of the Portfolio Committee on Communications on the Department of Communications, dated 20 October 2011*. Available from:

<http://www.pmg.org.za/docs/2011/brrr/111024pccombrrr.htm>

Republic of South Africa. (1996, no. 103). *Telecommunications Act*. Available from:

http://www.internet.org.za/telecoms_act.html

Republic of South Africa. (1996, no. 108). *Constitution of the Republic of South Africa*.

Available from: <http://www.gov.za/documents/constitution/1996/a108-96.pdf>

Republic of South Africa. (2000, no. 3). *Promotion of Administrative Justice Act*. Available

from: <http://www.justice.gov.za/legislation/acts/2000-003.pdf>

Research ICT Africa. (2009). *Namibian Interconnection Benchmarking Study*. Available from:

<http://www.researchictafrica.net/countries/namibia/Namibia%20Interconnection%20Study%20Public.pdf>

South African Telecommunications Regulatory Authority. (1999). *Interconnection guidelines*.

Available from: http://www.itu.int/ITU-D/treg/Legislation/South_Africa/Intercon_guidelines99.pdf

South African Telecommunications Regulatory Authority. (2000). 'Interconnection and facilities leasing guidelines'. *Government Gazette number 20993*.

Standard Bank Investment Corporation and the Competition Commission and others. [2000] Supreme Court of Appeal case no. 44/2000

Telecommunications Regulatory Authority of India. (2011). *Consultation paper on issues related to telecommunications infrastructure policy*. Available from:

<http://www.trai.gov.in/WriteReaddata/ConsultationPaper/Document/5-main.pdf>

Telkom SA Limited v The Competition Commission of South Africa and The Competition Tribunal of South Africa. [2008]. Pretoria High Court case no.11239/04.

Telkom SA Limited v The Competition Commission of South Africa and The Competition Tribunal of South Africa, (623/2008) [2009] ZASCA 155 (27 November 2009, following the decision of Claasen J in the High Court in Telkom SA Limited v The Competition Commission of South Africa and The Competition Tribunal of South Africa (case:11239/04)

Telkom SA Ltd. vs. Cell C (Pty.) Ltd. [2010] Complaints and Compliance Committee, case number 41/2010

Telkom SA Limited vs. MTN (Pty.) Ltd. [2010] Complaints and Compliance Committee, case number 40/2010

Telkom SA Ltd. vs. Vodacom (Pty.) Ltd. [2010] ICASA Complaints and Compliance Committee, case number 39/2010

The Competition Commission vs. Telkom SA SOC Limited [2013] Competition Tribunal case number 016865, Settlement agreement

Thinta Thinta Telecommunications (Pty.) Ltd. vs. Telkom SA Limited [2010] ICASA Complaints and Compliance Committee Case number 32 / 2010

Tshwane. (2013). *Wayleave management system*. Available from: <https://wayleave.tshwane.gov.za/>

10.3. ICT companies

Broadband Infraco. (2008 – 2013). *Annual results, interim results, press releases and presentations*.

Cell C. (2005-2013). *Media briefings and press releases*

Google. (2013). *Google Fiber Kansas City Prices and Plans*. Available from: <https://fiber.google.com/cities/kansascity/plans/>

MTN. (2005-2013). *Annual results, interim results, press releases and presentations*

Neotel. (2013). *NeoBroadband Fibre*. Available from: <http://downloads.neotel.co.za/pdf/NeoBroadBand%20Fibre%20Service%20Schedule.pdf>

Remgro. (2010 – 2013). *Annual results, interim results, press releases and presentations*

Sentech. (2013). *Annual report*.

Tata Communications. (2011-2013). *Press releases, annual results, and SEC filings*

Telkom. (2005 – 2013). *Annual results, interim results, press releases and presentations*. Available from: <http://www.telkom.co.za/>

Vodacom. (2009). *Vodacom (Pty) Ltd submission in response to the Portfolio Committee on Communications' invite to comment on the measures to reduce interconnection rates and the high cost of telecommunications in South Africa*. Available from: <http://www.pmg.org.za/files/docs/091013vodacom2.pdf>

Vodacom. (2005 – 2013). *Annual results, interim results, press releases and presentations*. Available from: <http://www.vodacom.com/>

Vodacom. (2013). 'Vodacom's written submission in response to the Authority's invitation for comments on the Draft Call Termination Rate Regulations', available: <http://www.icasa.org.za/LegislationRegulations/FinalRegulations/TelecommunicationsRegulations/CallTermination/Submissions/tabid/463/Default.aspx>

Appendix A: Interviews

Centre for Competition, Regulation, and Economic Development Seminar on the telecommunications sector review, 29 November 2013

Collin Mashile, Chief Director: Broadcasting and e-Content Policy, Department of Communications of South Africa

Danny Kekana, MP and Marian Shinn, MP, Parliamentary Portfolio Committee on Communications

Francois Truter, Chief Director: Service Incentives, Incentive Development Administration Division, and Reshni Singh, Director: BPS – Business Process Services, Services investment cluster incentive, Department of Trade and industry

Graham de Vries, Rosanna Achterberg, MTN

Mameetse Mphahlele, Chief Director, Department of Communications of South Africa

Marc Furman, Gregory Locke, Wayne Speechly, Internet Solutions

Mothibi Ramusi, Cell C

Murray Steyn, Vox Telecom

Open Society Institute, Seminar on review of the performance of ICASA presented by Libby Lloyd, 4 December 2013

Patricia Miller, Vodacom

Selelo Ramohlola, Manager, Market analysis, Markets and Competition Division, Independent Communications Authority of South Africa

Wilmari Hannie, Mweb