THE STATE OF ICT IN SOUTH AFRICA

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EXECUTIVE SUMMARY

There is extensive evidence now that, as technology evolves from basic voice services to that of broadband, the value of networks increases exponentially with significant multiplier effects impacting positively on economic growth and individual well-being under the right conditions. It is the evolution of such technology that has produced innovation such as the Internet of Things, Blockchain and Artificial Intelligence. These have the potential to reduce labour and transactional costs, increase productivity and information flows in the economy and, in the resource-constrained environments of developing countries, overcome logistical bottlenecks and corruption in supply-chain management and administrative processes.

For countries to harness these technologies for the development of their economies and societies, they will need to address the new array of new policy issues affecting the creation of a 'trust' environment for the use of these Internet-based services and applications and new competition issues in the platform or 'gig' economy while attending to the many unresolved, legacy policy issues. These include:

- creating environments for investing in constantly-evolving technologies that are needed to provide high-speed and good quality infrastructure and services on which these innovations and global competitiveness depend;
- ensuring that markets are effectively regulated to provide services competitively, but flexibly, to enable innovations in services and products that might reduce costs, enable access or improve intensity of use;
- ensuring that deployment of services and applications are inclusively developmental;
- implementing strategies identified in SA Connect to incentivise investment in under-serviced areas through the aggregation of public-sector demand;
- enabling complementary access strategies, such as free public Wi-Fi, extension of licence exempt spectrum, enabling community access and small-cell networks;
- stimulating demand through the provision of affordable access, but requiring further development of relevant local content, applications, education and e-skills that would enable the inclusion of people not only as consumers, but as producers; and
- creating an enabling environment for platforms, e-services and applications to proliferate by creating a safe, secure and trusted environment for digital participation through the development of an integrated cyberpolicy and legal framework that safeguards citizens' rights.

This will require shifting digital policy from the silos in which it currently resides into a national integrated policy, requiring high levels of co-ordination between the state, private sector and civil society.

HIGH OPPORTUNITY COSTS OF POLICY AND REGULATORY DELAYS

On paper, South Africa has long recognised communications networks as the backbone of the modern economy and society. The National Development Plan (2011: 2) provides a framework in which to realise South Africa's vision that by 2030 "…a widespread broadband communication system will underpin a dynamic and connected vibrant information society and a knowledge economy that is more inclusive, equitable and prosperous." Yet, national commitments to ICTs that followed the NDP in the Presidential Infrastructure Coordinating Commission via the national broadband policy and plan, SA Connect, have failed to meet their set targets or make significant progress to meet specified objectives.

This is attributable to multiple factors, not least of all to the discontinuity in policy formulation and sectoral leadership with the appointment of no fewer than six ministers to oversee the then Department of Communications between 2009 and 2014, along with four directors-general. This resulted in the failure to conclude enabling strategies such as the digital

migration process and meeting the International Telecommunication Union's (ITU) 2015 cut-off — despite being the continental leader when it started the process in 2000 — that should have unleashed the digital dividend spectrum for 4G and delivered digital broadcasting to the country. This protracted process has now been overtaken by developments including the growth of the Internet; the reduced cost of satellite that could affordably offer direct-to-home, free-to-air services; and the rise of multiple low-cost online content carriers. Arguably, this has rendered the expensive pilots and networks for national digital transmission redundant, and the costly legal suits by broadcasters exploiting, or perhaps inducing, several policy flip-flops pointless.

The opportunity costs to the country of not addressing the raft of critical unattended policy issues, including the rapid deployment guidelines, identified as key to the extension of broadband and the release of high-demand spectrum necessary for 4G deployment, which the Independent Communications Authority of South Africa (ICASA) sought to auction but was thwarted by operators and the Ministry of Communications more than six years ago, have been high. Subsequent to the establishment of a Policy Review Panel to conduct the complex policy review exercise, the rapid succession of six ministers and four directors-general from 2009 to 2014 warped the exercise. The intermittent arrest of the process was compounded by the splitting of the Communications Ministry and Department in 2014, which had both it and the new Department of Telecommunications and Postal Services (DTPS) inwardly-focussed instead of externally, at a critical time in the development of the sector. As a result, the arising green paper was only turned into the official and controversial government White Paper in 2016, which now provides the basis for a raft of legal amendments including the Electronic Communications Amendment Bill that was the subject of public consultation earlier in 2018.

Likewise, the failure to develop the integrated e-strategy required by the 2005 Electronic Communications Act, in anticipation of the emerging broadband ecosystem for over the past decade, left the country without a co-ordinated plan of action to deal with fast-changing global developments, or to harness them for developmental outcomes. Longstanding conflicts of interest within the institutional arrangements have been compounded by political appointments, sometimes without the technical or governance expertise required for ICASA and the Universal Service and Access Agency of South Africa (USAASA) to fulfil their vital roles in the implementation of policy.

The promulgation of the long-outstanding issue of enabling the rapid deployment of broadband infrastructure, such as spectrum trading and the 'use-it-or-lose-it' principle that would enable more efficient use of spectrum, were welcomed in submissions made to the DTPS. The proposal of an, at one point exclusive, wireless open access network as the recipient of all high-demand spectrum in the 2.6GHz and digital dividend bands, has received far more of a mixed response. This is largely due to the lack of clarity about how this might feasibly operate, and the negative impacts this could have on the massive investments being made by operators to grow South Africa's mobile broadband market. Intentions in the Bill to abolish all the existing statutory bodies, and replace them with a new 'Economic Regulator' have also been challenged largely on the ground of its accountability to DTPS, which would exacerbate existing conflicts of interest in the current institutional arrangements. The clawing back some of the spectrum regulatory aspects of spectrum assignment has also being challenged in this context.

MARKET DEVELOPMENTS

Relatively well-integrated into the global economy, and powerfully driven by rapidly-changing technological and economic developments, the private sector has not waited for the protracted policy processes being formulated to deal with this dynamic sector, which increasingly cuts across all other sectors. Network operators have found innovative ways of overcoming policy and regulatory bottlenecks and exploited opportunities to deploy technologies to meet South Africa diverse needs. Competition in the international transmission market has proliferated with the landing of multiple undersea cables driving down

the formerly-monopolistic pricing of Telkom to 80 percent of what it was in 2006.

The pricing challenge has now become national transmission. Although there is competition on the major intercity routes and in the metros, and there has been considerable complementary investment, which has extended broadband reach without duplicating infrastructure along some of the secondary and tertiary routes, Telkom still has more fibre (150 000 km) than all the other players combined and remains the only provider in some geographic markets. Fibre-to-the-home/office/building (FTTX), although currently only in high-end urban areas, is being rolled out rapidly, and complements the competitive offerings to mobile broadband services that have been constrained by the lack of access to LTE spectrum. Operators have nevertheless re-farmed existing spectrum and, although the rollout was initially delayed, there is now extensive 4G coverage to complement the 90 percent 3G broadband coverage of the country.

LACK OF EFFECTIVE COMPETITION REGULATION

Despite the number of players in the mobile market, the South African market is concentrated with an Herfindahl–Hirschman Index of 3 495. Without the long-awaited ECA Chapter 10 review of markets, also commissioned several times but not released, and a determination of dominance in markets susceptible to ex ante regulation, the use of competitive markets to deliver on national objectives, including consumer welfare, is thwarted. This holds true for the mobile market as well.

Mobile phones are critical drivers of social and economic development. Smartphones, in particular, have revolutionised the telecommunications industry by becoming the principal means of Internet connectivity. These technologies have become the primary platforms for innovation in developing countries and are contributing directly and indirectly to economic growth and job creation. From a technology perspective, the move towards IP-based platforms has been revolutionising both the cost of access and the scale and scope of services for over a decade, contributing to the construction of a digital knowledge economy despite the policy lags. The convergence of technologies has fundamentally revised the ICT value-chain, and demands that policy and regulation rapidly adapt to the far more complex, but potentially greater value, global communications system.

Although the recent End-User and Subscriber Service Charter Amendment regulations mandating mobile operators to: rollover unused data; enable transfer data to other users on the same network; and prohibit customers being charged out-of-bundle rates without their consent, demonstrates a commitment to consumer protection, but it does not deal with the underlying causes of high data prices. Failure by ICASA to put in place this mandatory and foundational regulation more than a decade after the Act was passed means that the wholesale facilities market, which is highly imperfect by nature, does not allocate resources efficiently and therefore does not produce the intended competitive results. Even in the absence of anti-competitive practices, without cost-based access to dominant operators' networks, smaller operators cannot compete. Market leaders have the liquidity to reinvest in their networks, thereby extending their network coverage and improving the quality it offers. This enables dominant players to attract more customers, thereby increasing their market share and revenues, placing them in a better position to further enhance the quality of their networks or pay for spectrum when it does become available. Wholesale price regulation is therefore critical to creating a fair and competitive environment. This is not an easy task in a developing market, and has to be done in a way that does not remove incentives for network investment.

DIGITAL INEQUALITY PARADOX

South Africa's progress towards realising this vision of the NDP for the sector has been highly uneven for all the reasons discussed above. The findings of the "After Access" Survey undertaken by RIA in 2017 indicate that large numbers of people in South Africa remain marginalised from the digital vision of the NDP.

More than any other country perhaps, South Africa highlights this policy paradox: as more people are connected and can access more information and

services, at higher speeds than ever before, digital inequality is being amplified, not reduced. This is not only the case between those online and those left offline as suggested in the 'digital divide' policy discourse and the mantra of 'connecting the last billion' in global fora and multilateral agencies. As we move from basic voice services to broadband services with over-the-top (OTT) applications offering low-cost voice and text substitution as well as micro-work platforms offering labour mobility and digital platforms enabling financial inclusion, the gap is growing not only between the connected and unconnected, but between those who have the skills and financial resources to use the Internet optimally and those barely online.

DEMAND STIMULATION

Although the unaffordability of devices is the primary barrier to South Africans coming online, the unaffordability of data is also one of the major factors limiting the intensity of use. Modelling of the data shows that one of the other main factors in determining the degree of digital inclusion are education and income. Traditional supply-side focused policy interventions, which fail to address demand-side challenges, will simply perpetuate existing inequalities. Analysis of the 2017 After Access survey data shows that education, income and locational inequalities are simply being mirrored online — arguably amplified — as the economic and social value of being digitally networked exponentially increases. This is confirmed by various indices including the IDI, in which South Africa performs relatively well on the infrastructure index, and ranks adequately on the regulatory assessment, but on the skills and education measure (which use the Human Development Index, on which South Africa scores only 0.67, 119th out of 188 countries) South Africa scores very poorly.

INTERNET PENETRATION AND GNI

The inequalities between those with access to broadband and the resources to use it optimally, and those without, are also reflected between countries and regions. Africa lags the furthest behind on global indices such as the ITU ICT Development Index (IDI). This is not surprising as mobile phone and Internet penetration is broadly aligned with gross national income (GNI) per capita, and some of the lowest GNIs per capita are found on the continent. As South Africa's GNI per capita is much higher than most other African countries, and the economy is more developed, it is not surprising that mobile phone and internet penetration outstrips other African and the Asian countries in the 2017 After Access Survey. Even though the cost of communication is high in South Africa — with it being ranked 35th out of 49 African countries on RIA's Africa Mobile Pricing (RAMP) Index — the majority of South Africans have access to communication services and 53 percent have access to the Internet.

Although there is a 23 percent gap between South Africa and the next-best performing country surveyed in Africa, Kenya, South Africa performs poorly in relation to Internet penetration when compared with countries in Latin America (on similar income levels). With only half of the population connected in South Africa, it is well below the Latin American countries surveyed where Internet penetration rates are over 65 percent. Argentina, having a similar population size as a one-time comparator country, now stands at 85 percent Internet penetration.

GENDER GAP

The general alignment of mobile phone ownership and Internet penetration with GNI or GDP per capita is broadly true of the gender gap too. Overall, the five Latin American countries surveyed, together with South Africa, are the richest among the countries surveyed and they show the lowest gender gap. South Africa performs particularly well in relation to mobile phone ownership with near parity, though the Internet access gap is 12 percent larger. This is in stark contrast with the poorer African countries surveyed that reveal high gender disparities in mobile phone ownership, but particularly regarding Internet use.

Other than Rwanda, in which the gender gap is by far the greatest of the African countries, the gender gap amongst the African countries surveyed is nevertheless lower than some of the higher income per capita countries of Asia, such as India and Bangladesh, in which we see some of the greatest

gender disparities. What these descriptive statistics mask if the real factors determining connectivity. As the modelling of the survey data for all countries shows, education and the correlated factor of income are the major determinants of mobile and Internet connectivity and use. Although there is a seven percent gap between men and women in South Africa broadly speaking, men and women of a similar income and education are connected, though there is a slight disparity in use.

This also true of youth who show only a slight gap (1%) between young men and women. Although a large number of youth access the Internet at a place of education, they now have significantly more smartphones (71%) and greater Internet penetration (70%) than the national averages (55% and 53% respectively).

POVERTY GAP

The real gap is a poverty gap. The socially and economically marginalised – particularly those at the intersections of class, gender, race or ethnicity – are unable to harness the Internet to enhance their social and economic well-being. Results from RIA's 2017 After Access Survey reveal that despite mobile broadband, the digital divide between the poor and the rich is significant in South Africa. Half of the population (respondents were above 15 years of age) remain unconnected, and most of these people earn less than ZAR 7 000 a month. Those earning more than ZAR 7 000 are largely connected.

Amongst the poorest (those with income less than ZAR 1 583 a month), those people living in urban areas are more likely to use the Internet. Interestingly, the Survey finds that those earning between ZAR 1 584 and ZAR 7 167 (the next-lowest income group) who live in rural areas are more likely to use the Internet than those who live in urban areas.

AFFORDABILITY

South Africa outstrips all other African countries in access and usage indicators against which it is benchmarked. Yet, communications services are not affordable to the majority of South Africans with 36 percent claiming the cost of smart device is the primary reason for not being online, 15 percent stating that the Internet is too expensive and 47 percent giving the cost of data as the reason they limit their use. A key component to achieving universal access and sufficient intensity of use for network effects to snowball is affordability. Affordability of telecommunications depends primarily on the price (determined by the input costs and profit margin of the operator) as well as the user's disposable income. South Africa does not perform well against any of the benchmarked Latin American countries, including Colombia, Guatemala and Paraguay, despite these countries having a lower GNI per capita. The benchmarking exercise, shows that markets that are more competitive such as Argentina and Peru offer more affordable prices and are more likely to be digitally inclusive.

Internet-based services provide cheaper communication alternatives, and operators are currently investing in infrastructure to improve their network quality, coverage and access, leading to nearly 100 percent of the country being covered by 3G networks. However, data services and products are still unaffordable to almost half of the South African population. While mobile phones are the most popular device used to access the Internet in South Africa, the cost of the device is the main barrier to those not connected to or accessing the Internet.

The main factor limiting increased use is the price of data. Price-sensitive feature and smartphone users are increasingly supplementing their purchases of their high-value, low-denomination bundles with public Wi-Fi. Thirty-two percent of Internet users indicated they used public Wi-Fi at least once a month, with women demonstrating greater use at 32 percent compared to men (30%).

QUALITY OF SERVICE

The increase in Internet use is driven mainly by a swelling appetite for OTT services, such as social media and online platforms that allow consumers to make voice calls over WhatsApp, Skype, FaceTime and Facebook Messenger at a much lower cost. A significant portion of Internet users (73%) stated that they use the Internet for social networking.

With diminishing ARPUs as more people in South Africa come online, supply-side data shows that

the demand for data is coming from those already connected who require increased amounts of data for video and other bandwidth-hungry applications, such as gaming.

Both supply- and demand-side data shows increasing substitution of relatively high-cost traditional voice and text services with Internet-based services, which provide cheaper communication alternatives. As operators make the inevitable transition from voice to data revenues, quality of service remains a key area of competition, and the market has seen massive investments by mobile operators alone amounting to ZAR 23.8 billion (capital expenditure of Cell C, MTN and Vodacom) leading to nearly 100 percent of the country being covered by 3G networks. Furthermore, there is 80 percent 4G coverage despite the optimal high-demand spectrum not being assigned in the political wrangle between the Ministry and ICASA over control of its assignment.

While these mobile broadband improvements, together with the roll-out of FTTX in high-end residential and business areas, have produced some of the best quality of service measurements on the continent, Internet and data services and products are still unaffordable to many South Africans.

POLICY AND REGULATORY

The longer-term, welfare-enhancing policies that are necessary to address inequality more broadly can nevertheless be supported by shorter-term policy and regulatory interventions to address digital inequality. Interventions that would reduce prices, enhance quality, improved e-literacy and develop local content would all bring online those who are currently marginalised from services, women being in the majority. These are discussed in the final part of this report following the diagnostic of the performance of the sector against national policy objectives. South Africa's performance is assessed by benchmarking it against a set of indicators drawn from the policy objectives, and through the institutional, supply- and demand—side analysis in the four other parts of the report, which diagnose the reasons for the results and recommend remedies on that basis.

AGILE REGULATION

What is clear is that we need even greater regulatory agility and insight to manage tensions between the policy objectives of competitive efficiency, innovation and consumer welfare. While operators' deploy technology to overcome supply-side challenges and circumvent some regulatory obstacles, release of spectrum is essential for the optimal evolution of next-generation technologies.

Although supply-valuation of spectrum — with spectrum trading to deal with any errors in pricing or use — may be the most efficient way of releasing commercial spectrum, greater consideration needs to be given to safeguarding the public and social value of the Internet through the extension of the spectrum commons by setting aside unlicensed and social-use spectrum. This has the potential to provide complementary public services and reduce the cost of services operating on unlicensed spectrum.

Lastly, in developed and developing countries alike, most spectrum is largely unused outside the main metropolitan areas. In the sharing-economy of the Internet era, we are already seeing voluntary infrastructure sharing by operators. These types of approaches need to be embraced by Government from a critical resources management perspective. Enabling secondary spectrum use would enable new dynamic spectrum sharing, which operates at a fraction of the cost of GSM networks in the largely-unused spectrum in rural areas. Such an approach could instantly provide low-cost, high-quality bandwidth. With the long-term evolution of 5G underway, policymakers need to ensure that 5G technology, which operates within a spectrum-sharing environment with data off-loads to proprietorial and open public Wi-Fi, is harnessed for public purposes and not just niche commercial applications.

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LIST OF ABBREVIATIONS

ADI	Affordability Drivers Index
ADSL	asymmetric digital subscriber line
ARPU	average revenue per user
BTS	base transceiver station
DWDM	dense wavelength division multiplexing
DoC	Department of Communications
DTPS	Department of Telecommunications and Postal Services
DTT	digital terrestrial television
EBIDTA	earnings before interest, depreciation, taxation and amortisation
ECA	Communications Act
ECNS	electronic communications network service
ECS	electronic communications service
ECTA	Electronic Communications and Transactions Act (2002)
EIU	Economic Intelligence Unit
FTTX	fibre-to-the-home/office
GDP	gross domestic product
HHI	Herfindahl-Hirschman Index
IBA	Independent Broadcasting Authority
ICASA	Independent Communications Authority of South Africa
ICT	information and communication technology
IDI	ICT Development Index (of ITU)
IoT	Internet of Things
IP	Internet protocol
ISP	Internet service provider
ISPA	Internet Service Providers Association of South Africa
ITA	Invitation to Apply
ITU	International Telecommunication Union
LTE	long-term evolution
MDDA	media development and diversity agency
MNO	mobile network operator
MOU	minutes of use
MTR	mobile termination rate
MVNO	mobile virtual network operator
NDP	National Development Plan
NPC	National Planning Commission
NRI	Network Readiness Index
OECD	Organisation for Economic Co-operation and Development
OOB	out of bundle
OTT	over-the-top
PoP	point of presence
POPI	Protection of Personal Information Act
RIA	Research ICT Africa
SADC	Southern African Development Community
SATRA	South African Telecommunications Authority
SMP	significant market power
Stats SA	Statistics South Africa
STB	set-top box
ToP	top of the pyramid
USAASA	Universal Service and Access Agency of South Africa
USAF	Universal Service and Access Fund
USOs	universal service obligations
VANS	value-added network service providers
VDSL	very-high-bit-rate digital subscriber line
WACS	West Africa Cable System
WOAN	wireless open access network

Part A

The global challenge of measuring sector performance

1 INTRODUCTION

The Global South is undergoing rapid social and economic change as a result of the confluence of mobile and Internet technologies. Across the globe there is mounting evidence that broadband directly contributes to job creation and stimulates economic growth[1]. Though broadband impact studies vary on the exact contribution that increases in broadband penetration make to economic growth, there is considerable evidence to support claims that broadband uptake correlates with increases in GDP, job creation, the broadening of educational opportunities, enhanced public service delivery, rural development and more[2].

Empirical findings suggest that investment in telecommunications infrastructure is causally related to the nation's total factor productivity and that contributions to aggregate and sectoral productivity growth rates due to advancements in telecommunications are substantial[3, 4]. These network externalities compound as there are more network connections. However, for countries to enjoy the network externalities associated with broadband infrastructure investments, a critical mass has to be reached[5]. Although for voice this was understood to be around 40 percent, because of the heightened effects associated with broadband the threshold is only 20 percent. The research on network effects, however, has largely been undertaken in the Global North, where broadband is generally 'always-on' and, on average, intensity of use is high. Further research is needed on the impact of intensity of use, not just connectivity, on network effects, especially in developing country contexts where many people are minimally connected.

This may go some way to explaining why with 50 percent Internet penetration South Africa has far exceeded the 20t percent critical mass threshold but does not seem to be enjoying the network effects that are associated with increased information flows

1. Broadband Commission (2017). "The State of Broadband: Broadband catalyzing sustainable development". Available at: https://www.itu.int/dms_pub/itu-s/opb/pol/S-POL-BROADBAND.18-2017-PDF-E.pdf
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4. Kenny, R. and Kenny, C., 2010; "Superfast: Is it really Worth a Subsidiary?". Communications Chambers, Accessed at: https://bit.ly/2MVZROs
5. Roller, L.H. & Waverman, L. (2001). "Telecommunications infrastructure and economic development: A simultaneous approach". *American Economic Review,* 91 (4): 909-923.

and productivity gains, and which are reflected in economic growth[6]. Yet, it appears not to enjoy these effects to same degree as countries with similar Internet penetration levels and GDPs per capita. This may be because these indicators mask the extreme inequalities that exist between different Internet users. As discussed below, these are not only as a result of supply-side constraints of availability, price and quality of communication that limit use. As the global information and communication technology (ICT) indices and the national ICT survey results in Part D show, demand-side constraints on digital equality are more challenging to redress from a policy perspective.

There is evidence of an increasing divide, not only between those with access to such services and those without, but also between those who are connected and have the means and skills to utilise the Internet optimally and those who are not.

In fact, as technology evolves from voice to data services and over-the-top (OTT) platforms, the Internet of Things (IoT) and Artificial Intelligence – the central policy challenge is that, unless we rapidly address these human deficits as we increase ICT access and use, digital inequality becomes amplified. Without connectivity, people, be they consumers, workers or entrepreneurs, are excluded from participating in the economic and social networks that permeate modern societies.

1.1. SUSTAINABLE DEVELOPMENT GOALS (SDGS)

ICTs are a prerequisite, then, to human development in contemporary society, and human development is a necessary condition of equitable participation by the citizenry in contemporary society. This is highlighted in the United Nations (UN)s' SDGs that include goals to 'enhance the use of enabling technologies, in particular ICT, to promote women's empowerment' and 'significantly increase access to ICT and strive to provide universal and affordable access to Internet in LDCs by 2020'[7]. ICT targets also underpin several of the other goals, such as poverty alleviation, improved health, quality education, clean energy, climate action and industry innovation[8].

Yet, by and large, we do not currently have the data in the Global South to assess where we are or what progress we are making towards proposed targets. What we do know, from the limited data that is available from least developed and most other African economies, is that, with only two years to go to 2020, even using inflated indicators measuring active SIM cards and not unique subscribers we are billions of people away from achieving universal access to the Internet[9, 10]. For many developing countries, simply getting to the 20 percent penetration rate[11] would be a significant milestone[12].

In most developing countries, policymakers and regulators are dependent on supply-side data from operators, which, in turn, is based on the

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11. Argued by Roller and Waverman (2001) to be the critical mass necessary for the positive network effects necessary for economic growth to kick in.
12. See 2017 After Access Survey, of the seven African countries surveyed, four have penetration rates well below 20 percent.

Table 1: South Africa's performance on ICT indicators in relation to the SDGs

SDG GOALS AND TARGETS	INDICATOR PERFORMANCE	SOURCES
1.4) and 9.1) Households with broadband Internet access	11%	After Access Survey, 2017
4.4) Individuals with ICT skills	Unknown	
5.b) Individual mobile phone ownership	84%	After Access Survey, 2017
9.c) Broadband Internet prices (1GB of prepaid mobile data)	USD 8.28	RAMP Index, Q2 2018
9.c) Mobile network population coverage	3G: 99% 4G: 80%	Annual reports: Vodacom, 2018
	3G: 98% 4G: 80%	Annual reports: MTN, 2018
16.10) and 17.8) Individuals using the Internet	52%	After Access Survey, 2017
17.6) Fixed Internet broadband subscriptions	2%	ITU, 2017
17.8) International Internet bandwidth (bps per inhabitant)	263 029.93 bps	ITU, 2017

administrative data collected by operators. This is also the basis of the data usually provided to the International Telecommunication Union (ITU), the body responsible for the harmonisation of standards and indicators for the sector. Without nationally representative demand-side data, it is impossible, for example, to provide an accurate measure of user access to the Internet, or to analyse the issues and challenges facing users.

An example of supply-side and demand-side mismatch can be seen in relation to mobile subscribers, where supply-side data measures the number of active SIM cards on operator networks, rather than unique users. Duplicate SIMs account for at least some of the over-count of subscribers, who are measured by operators and reported to the ITU data of countries on the basis of active SIMs[13]. On the basis of such supply-side data alone, one is also unable to provide a more granular analysis (such as a breakdown by gender, location or income) of the kind required for policy planning and effective interventions. The ITU acknowledges this and urges national regulatory authorities and national statistical offices to undertake detailed surveys. It also supports the training of officials, and in the case of some least developed countries, the undertaking of surveys where government shows a commitment to gathering this data[14].

13. The issue is further complicated by the rise of the Internet of Things (IoT) and the growing prevalence of M2M SIMs. Effort to adjust active SIMs numbers to reflect unique subscribers are also problematic. GSMA adjusted figure of 38 million unique subscribers in SA in 2017 (68% of the population) instead of the 90 million active SIMs at the time, appears to undercount the number of subscribers.
14. The ITU worked with the Expert Group on an indicator framework, based on the first meeting of the Inter-agency and Expert Group on Sustainable Development Goal Indicators (IAEG-SDGs). The ITU has proposed eight ICT indicators covering eight targets within goals 1, 4, 5, 9, 16, 17 (See Annex 1).
ECOSOC (2017). "Report of the Inter-agency and Expert Group on Sustainable Development Goal Indicators". Available at: https://unstats.un.org/unsd/statcom/48th-session/documents/2017-2-IAEG-SDGs-E.pdf

1.2. GLOBAL ICT INDICES

Global ICT indices have become the reference point for assessing national performance. Several indices now compete with or complement the International Telecommunications Union's (ITU) ICT Development Index (IDI). The World Economic Forum's Network Readiness Index (NRI), the Affordability Drivers Index (ADI) from the Alliance for Affordable Internet, the GSMA's Mobile Connectivity Index, and most recently, the Economist Intelligence Unit's new Inclusive Internet Index (3i), all seek to measure digital developments in respect of ICTs between countries over time[15].

South Africa has steadily slid down global indices and is now ranked 92nd out of 176 countries in the ITU's 2017 IDI. In the NRI, South Africa is ranked 65th out of 139 countries, while it is ranked 22nd out of 58 countries on the ADI from the Alliance for Affordable Internet. The GSMA's 2017 Mobile Connectivity Index ranks South Africa 90th out of 163 countries and the EIU's 3i has South Africa ranked 27th out of 75 countries.

1.2.1 ICT Development Index (IDI)

In line with global trends acknowledging that connectivity alone will not be sufficient for countries to overcome the digital divide, the ITU's IDI seeks to look beyond simple connectivity indicators to the level of evolution of ICT development over time and within countries relative to others. It uses a number of sub-indices to assess the development potential of ICTs and the extent to which countries can make use of them to enhance growth and development in the context of available capabilities and skills in particular. The ITU's IDI, for example, ranks all 11 indicators in each of its three sub-indices equally[16]. It then weights its three sub-indices.

In 2017, on the Access Sub-Index South Africa scored 5.48. The score was generated using the following ITU indicators: fixed-line subscriptions (6.62), mobile cellular telephone subscriptions (142.38), international Internet bandwidth per Internet user (bits/s) (263 029.93), percentage of household with a computer (24.39%) and percentage of household with Internet access (52.96%). On the Use Sub-Index South Africa scored 3.91, based on percentage of individual using the Internet (54%), fixed (wired) broadband subscriptions per 100 inhabitants (2.84) and active mobile broadband per 100 inhabitants (58.62). Lastly, the IDI score for SA's 'Skills' sub-index was 6.00. The calculation for the IDI skills sub-index is based on the mean years of schooling (10.30), secondary gross enrolment ratio (91.96) and tertiary gross enrolment ratio, standing at 19.38 in South Africa. Other measures considered are population (53 835 382), population density (45.44) and GNI per capita (5 480) (ITU, 2017).

Table 2: South Africa's performance on the IDI's sub-indicators

ACCESS - 5.48					USE (INDIVIDUAL) - 3.91			SKILLS - 6		
Fixed line	Mobile cellular	International Internet bandwidth per user	Households with a computer	Households with Internet access	Internet	Fixed broadband	Mobile broadband	Mean years of schooling	Secondary gross enrolment	Tertiary gross enrolment
6.62	142.38	263 029.93 bps	24.39	52.96	54%	2.84	58.82	10.3	91.96	19.38

Source: ITU IDI Report, 2017

15. There are important differences: the IDI addresses the digital divide; the NRI's focus is international competitiveness; the ADI looks more at affordability; the MCI looks at mobile Internet uptake; and 3i focuses on Internet inclusivity.
16. The ICT Access sub-index comprises five indicators; ICT Use and ICT Skills each comprise three.

Table 3: South Africa's performance on the NRI's sub-indicators

ENVIRONMENTAL - 65TH		READINESS - 89TH			USAGE - 75TH			IMPACT - 93RD	
Political and regulatory	Business and innovation	Infrastructure and digital content development	Affordability	Skills	Individual	Business	Government	Economic	Social
26th	65th	44th	74th	95th	77th	32nd	105th	57th	112th

Source: WEF Global IT Report, 2016

1.2.2 Network Readiness Index (World Economic Forum)

The Network Readiness Index is in some ways a more comprehensive measure comprising of four sub-indices built up from 53 individual indicators, though some argue that fewer indicators make an index more reliable. It is also underpinned by some of the same ITU indicators as the IDI and so some of the underlying data problems are transferred to this index. Another critique of the WEF index is that 50 percent of the scoring comes from subjective small sample opinion surveys, primarily from business.

The obvious question this raises is that if the policy and regulatory environment score so much better than the implementation categories, is the policy and regulatory framework appropriate for the country or is it just performing well against a best practice checklist that does not align with the institutional endowments or resources of the country? Or do the institutional arrangements inhibit the autonomous implementation of the policy and regulatory framework? Or does the challenge lie at the operational level, where the level of co-ordination required across agencies and government departments is not happening? Or are the market structure and policy objectives misaligned and not producing the intended outcomes? Some of these questions are address in the analysis below.

South Africa's performance on the NRI has marginally improved since 2014, but it is second to the best-performing African country, Mauritius.

South Africa is, nonetheless, quite significantly ahead of fellow African states, such as Rwanda (80th), Tunisia (81st), Cape Verde (85th) and Kenya (86th).

While these rankings provide some insights into the challenges facing the country, and changes in country scores may demonstrate progress or deterioration, changes in a country's rankings have less to do with the ICT sector than with GDP per capita, which is not something ICT regulators on their own can do anything about.

Esselaar, Gillwald and Stork (2017) demonstrate that, when plotting indices against GDP per capita, the result is that, typically, above 80 percent of the variation in index scores is explained by GDP or GNI per capita[17]. Affordability indicators, likewise, may change, not because of price changes, but because of changes in GDP per capita, something over which ICT policymakers and regulators have no direct control. The effect of well-designed regulatory interventions may be masked by other economic events, including currency exchange rate fluctuations and the consequent impact on GDP per capita. This means that, although policymakers may use indices to see general overall progress or regression of their particular country in comparison to others, to identify the sector-specific determinants of the problems or successes requires looking at individual indicators, rather than composite indices.

Generally, actual prices expressed in USD do not contribute to explaining an index score for any of the five indices reviewed. Only when expressed as a share of per capita income – in other words, affordability – are prices able to explain index scores. Here, it is not the numerator (price) but the denominator (GDP per

17. Esselaar, S., Gillwald, A. and and Stork, C. (2017). "Analysis instead of summation: Why indices are not enough for ICT policy and regulation". Available at: https://bit.ly/2MCweTh

Table 4: South Africa's performance on ICT indicators related to other indices' rankings

COUNTRY	RANKINGS					ICT INDICATORS		
	IDI (ex 176)	NRI (ex 139)	ADI (ex 58)	MCI (ex 163)	3i (ex 139)	1 GB prepaid data USD	Active SIM cards per 100	Internet subscribers per 100
South Africa	92	65	22	90	39	8.28	147	54
Nigeria	143	119	13	125	45	5.00	83	26
Kenya	138	86	30	116	51	2.94	82	26
Ghana	116	102	26	113	49	2.24	128	35
Namibia	118	99	31	128	N/A	5.9	99	31
Rwanda	153	80	21	134	63	2.39	75	20
Tanzania	165	126	39	136	57	2.25	72	13
Uganda	152	121	32	145	64	2.77	55	22
Sources	**ITU, 2017**	**WEF, 2016**	**A4AI, 2017**	**GSMA, 2017**	**EIU, 2017**	**RAMP Index (Q4 2017)**	**ITU, 2016**	**ITU, 2016**

Source: Adapted from Esselaar, Gillwald and Stork, 2017

capita) that explains the index score. ICT policies and regulations can only directly influence the numerator, not the denominator, of these affordability indicators.

1.2.3. Other issues and index comparisons

Another problem is that very few indices have up-to-date pricing data, especially for developing countries. Prices and other data published by the ITU, which forms the basis of many of the other indices, can be two years out of date by the time they are applied to an index – a significant error factor in dynamic, prepaid mobile markets. In addition, using global standard measures (e.g. 1 GB of data) to assess and compare the cheapest plans across countries seldom reflects the way data is purchased or used in a developing country, with largely prepaid mobile markets, where high-unit-cost, low-denomination bundles reflect far higher aggregate prices[18]. Table 4 shows country rankings on a number of the main indices, along with the price of 1GB of data, the active SIM card penetration, and Internet penetration in order to illustrate how arbitrary the rankings are.

Three results of this summary highlight the arbitrariness of the indices:

- South Africa scores best in SIM penetration, but has the highest mobile broadband prices;
- Nigeria scores better than Ghana in the ADI, but Ghana is cheaper and has a higher penetration rate of SIM cards; and
- Uganda scores reasonably well on the A4AI Index, but is outranked by Rwanda, despite Uganda having much higher Internet penetration rates and very similar prices.

In fact, Rwanda, a best-practice infrastructure case for many multilateral organisations and development banks, especially the World Bank, and outranks all other African countries listed here in other indices, despite them all having considerably lower prices and higher Internet penetration rates. The most basic measures of ICT access (penetration and prices) are not reflected in the ranking of countries in this example.

The diagnostic analysis at the end of this report seeks to present outcomes in a context-specific way that not only benchmarks indicators, where possible,

18. Ibid.

against other similar countries and some best performers, but identifies the reasons for the position or ranking, and thereby points to the remedy or intervention required to address it. This exercise draws on the supply-side and administrative data available, which is triangulated with the pricing and quality of service databases gathered by RIA as well as the demand-side data for South Africa in Part D[19].

The section below examines the linkages between the size of the economy (GNI) and per capita incomes, against the nationally representative demand-side indicators collected as part of the After Access Survey, providing some comparison with other large and populous countries, such as Nigeria, Bangladesh and Colombia, that appear to face similar challenges – for example, limited political or leadership capacity and socio-economic inequality.

1.3. COMPARATIVE ASSESSMENT OF GLOBAL SOUTH COUNTRIES IN THE 2017 AFTER ACCESS SURVEY

As noted at the outset, ICTs, and particularly mobile technologies, have been identified as critical drivers of social and economic development. Smartphones, in particular, have revolutionised the telecommunications industry by becoming the principal means of Internet connectivity. These technologies have become the primary platforms for innovation in developing countries and are contributing directly and indirectly to economic growth and job creation. As Figure 1 shows, mobile phone penetration and Internet use is broadly aligned with Gross National Income (GNI) per capita[20].

Figure 2 shows that the gap correlation with the GNI per capita is also broadly true of the gender gap. Though GNI per capita masks extreme inequalities in

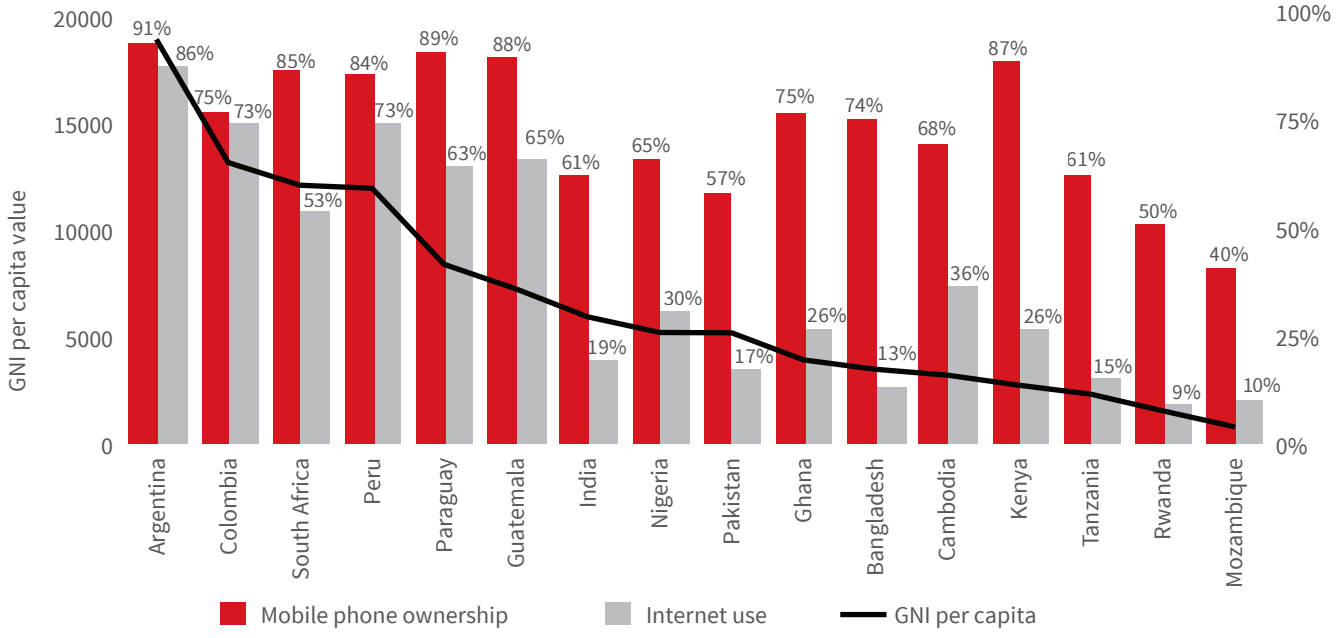

Figure 1: Mobile phone ownership, Internet use and GNI per capita
Sources: RIA After Access Survey, 2017; World Bank, 2018

19. This data forms part of a global ICT access and use survey conducted across 16 countries in 2017, ten of which were in Africa.
20. Pew Research Centre reports Internet use statistics that are slightly higher than the After Access Survey estimates. The difference between the two estimates is that while the Pew Research centre surveys individuals who are 18 years and older, the After Access is a nationally representative survey based on a census of adults who are 15 years and older.

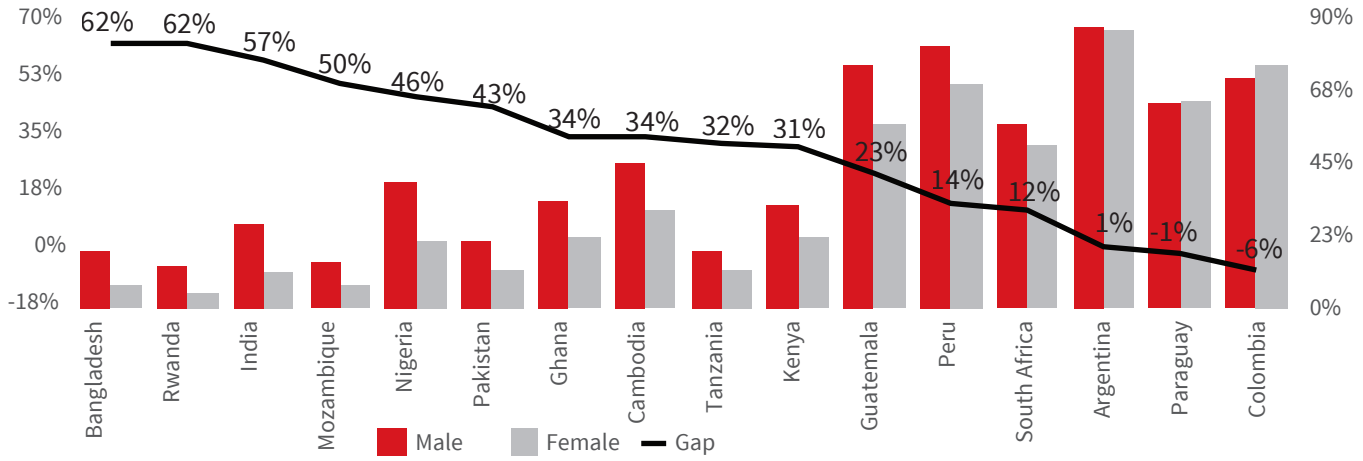

Figure 2: Gender gap in Internet use
Source: RIA After Access Survey, 2017

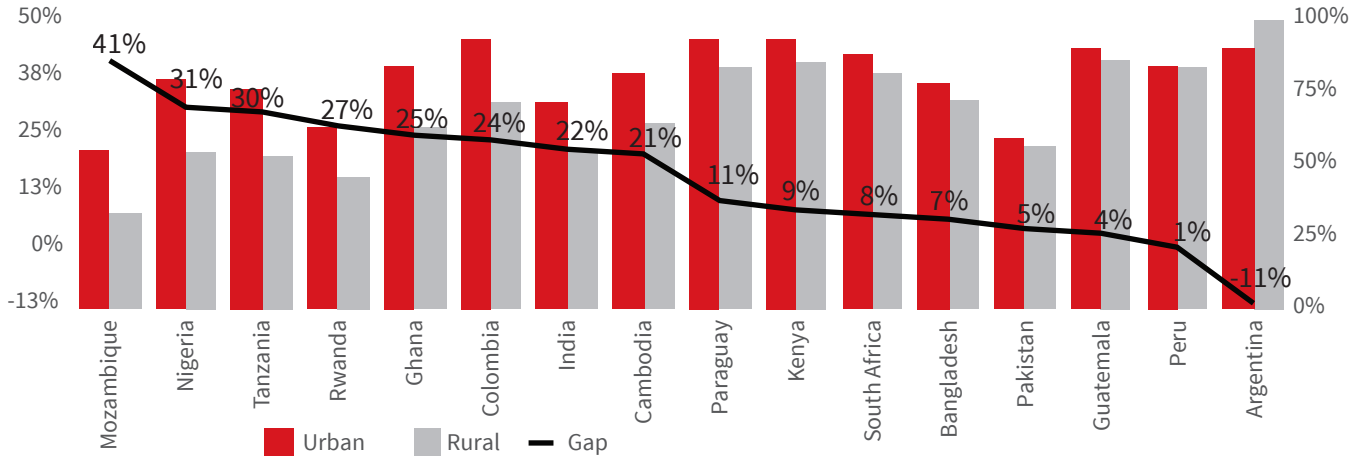

Figure 3: Urban–rural divide in Internet use
Source: After Access Survey, 2017

South Africa, the country performs well in relation to gender equity.

Although South Africa's Internet penetration levels compare well with other African and Asian developing countries, it does not perform as well when compared with countries in Latin America with similar incomes. With only half the population online, the potential of the Internet in a developing economy to drive social and economic integration is not optimally tapped.

While an increased number of Internet connections suggests there is a bridging of the digital divide, paradoxically, Part D shows that, as more people are connected, digital inequality increases. This is not only the case between those online and those offline, but between those who have the skills and financial resources to use the Internet optimally and those barely online. Without policy interventions to reduce these disparities, offline inequalities will simply be mirrored online — or potentially amplified. Therefore, as the information society matures, not everyone is equally well served by ICTs. Many individuals and households do not use the Internet, or do not have the devices they need to access the Internet. The After Access Survey finds that South Africa has the highest mobile phone (84%) and Internet penetration rates (53%) among surveyed countries.

Digital inequality is even higher among urban and rural area dwellers, with less than half of South Africa's rural population connected to the Internet.

The portion of urban-based South Africans using the Internet is as high as that cited in the 2017 Stats SA Household Survey (see Figure 3).

2 COUNTRY CONTEXT

South Africa's economic struggles over the last five years have seen it lose its 'Africa's largest market' status to Nigeria. South Africa now competes with Egypt for second place, with a weak rand also reducing its purchasing power in the global market[21]. As a result, the country's ICT sector has struggled to grow as impressively as in other countries, and contributed only 3 percent to GDP, according to the 2014 ICT Satellite Account[22].

Access to ICT goods and services in South Africa nevertheless continues to grow. Household access to mobile telephony has reached a plateau, closing in on universal service, with over 96 percent of households reporting one or more members having cellphones.

Fixed-line telephony access continues to shrink, with only eight percent of households using them to supplement communications. Only four percent of households have no access to any form of communications[23]. The level of household Internet access is far lower, with some 62 percent of households reporting one or more members having access to or using the Internet. However, most of this access (57%) takes place 'using mobile devices', with just over ten percent of households reporting Internet access 'at home'[24].

The efforts of government to support a market-oriented business environment and enable it to improve the state of the country's economy have been hampered by a lack of continuity in ministerial leadership and state co-ordination required for the development of this increasingly cross-cutting sector. Lack of progress in key areas of implementation, specifically SA Connect, the South African broadband policy and plan, has constrained sector development.

Since 2014, the ICT sector has enjoyed a single Minister of Telecommunications and Postal Services, but much of the last four years has been spent trying to unravel the legislation resulting from a decade and a half of convergence, and with the separating out of the Department of Telecommunications and Postal Services (DTPS) from the Department of Communications (DoC). The latter, more controversial department, responsible for broadcasting and government information, has not enjoyed the same continuity. In the rearrangement of the institutions, responsibility for the regulator was assigned to the DoC, leaving the DTPS with no direct line to the regulator (the implementer of its policy). With greater integration of Government's vision and activities, this might not be the failure that it is.

Besides SA Connect, the other main policy initiative, which carried issues through from the fourth administration under the (short-lived) leadership of Minister Yunus Carrim, was the protracted National Integrated ICT Policy Paper process, started in 2012 .The resultant National Integrated ICT Policy White Paper (hence referred to as White Paper), which covers everything from revised institutional arrangements for the sector to universal access and service and cybersecurity, has been both hailed and criticised from different corners of the sector.

21. The South African (2018). "South Africa regains second place in Africa's biggest economies". Available at: https://www.thesouthafrican.com/south-africa-2nd-in-africa-biggest-economies/
22. Stats SA (2017). "Economic Analysis, Information and Communication Technology satellite account for South Africa, 2013 and 2014". Available at: http://www.statssa.gov.za/publications/Report-04-07-01/Report-04-07-012014.pdf
23. Ibid.
24. Ibid.

Certainly, the proposed rapid deployment guidelines to fast-track broadband rollout have been welcomed, as have some aspects relating to spectrum management, such as the provision for spectrum trading and the 'use it or lose it' principle. The proposed licensing of a single national wireless open access network (WOAN) has been far more controversial. While several smaller players in the market have welcomed its potential to increase both competition and equitable access to spectrum[25, 26], larger operators and various industry interests have condemned the heavy-handed approach and cautioned against unintended outcomes, especially the negative impact on significant investment currently being made in mobile networks[27, 28]. A consensus seems to be emerging around the prospect of a hybrid system that accommodates government's WOAN plan by assigning portions of available and future spectrum to it as well as existing operators[29].

Despite protracted policy processes and regulatory delays in critical areas of competition regulation, which have caused uncertainty, the sector has performed relatively well, with significant investments in broadband infrastructure as operators transition for voice to data. With considerable demand-side challenges to getting the half of the population that is currently unconnected online and the challenge to upskill Internet users to productive, not simply consumptive use, the wider positive impacts on the digital economy and society are not apparent. Concerns pertain to signs of stagnancy in the innovation and business environments, for example, regarding the delays in market entry and business operations, and the struggle to maintain consistent government procurement plans and practices, as well as the lack of venture capital and cyber-skills[30].

Four telecommunications legislation amendments are currently underway as processes triggered by the adoption of the White Paper by Cabinet: the Electronic Communications Amendment Bill, the Digital Development Fund Bill, the ICT Sector Commission and Tribunal Bill, and the Electronic Communications and Transactions Amendment Bill. Only the first has been released for public comment and it has yet to be presented to Parliament.

Acknowledgement of the skills crisis facing the creation of the digital economy envisaged in the National Development Plan (NDP) resulted in the publication of the iKamva National e-Skills Institute Bill in 2018. It seeks to establish iKamva National e-Skills Institute (iNeSI); its objects, board and functions, as well as the knowledge production and co-ordination CoLabs. The Bill aims to integrate the department's three e-skills development-related components: namely the National Electronic Media Institute of South Africa (Nemisa), the e-Skills

25. TechCentral (2018). "Give all unassigned spectrum to the WOAN: Telkom". Available at: https://techcentral.co.za/give-unassigned-spectrum-woan-telkom/79499/
26. ITWeb (2017). "Cell C backs WOAN". Available at: https://www.itweb.co.za/content/z5yONP7EZEGMXWrb
27. ITWeb (2018). "WOAN monopoly a 'terrible idea' - MTN". Available at: https://www.itweb.co.za/content/Pero37Zg8zwMQb6m
28. MyBroadband (2018). "Vodacom's position on Government's WOAN plan". Available at: https://mybroadband.co.za/news/government/246975-vodacoms-position-on-governments-woan-plan.html
29. Operators met with the Minister behind closed doors to strike a deal, which appears not to have been reflected in the Electronic Communications Act Amendment Bill, however several submissions at the public hearings endorsed an unspecified sort of hybrid wireless open access model.
30. Gillwald, A., Esselaar, S. and Rademan, B. (2016). "An evaluation of open access broadband networks in Africa: The cases of Nigeria and South Africa". Available at: https://researchictafrica.net/publications/Other_publications/2016_Integrated_Policy_Paper_-_Open_Access_Broadband_Networks_in_Africa.pdf
Dessus, S. and Arendse, N. (2017). "SA must develop ICT sector, reduce broadband costs - World Bank". Available at: https://www.moneyweb.co.za/moneyweb-radio/sa-must-develop-ict-sector-world-bank/
Gool, K. (2018). "Subdued growth to dominate SA ICT market". Available at: https://www.itweb.co.za/content/xnklOvzbkd8v4Ymz

Institute (e-Si) and the Institute for Space and Software Applications (SSP). It is envisioned that the institute will collaborate with relevant post-school education and training institutions that offer digital skills and multimedia programmes to maximise the use of existing infrastructure and resources[31]. Submissions to the Bill were being processed at the time of writing.

The National Assembly is currently busy deliberating an amendment bill to the Competition Act of 1998. What is significant for the ICT sector is its proposed amendment to Section 82 by 'requir[ing] regulatory authorities to negotiate co-operation agreements with the Competition Commission. The amendment extends the issues that must be the subject of this agreement to matters associated with market inquiries'. This would directly affect Independent Communications Authority of South Africa (ICASA)'s market review of the sector as it aims to study the possible existence and abuse of dominance in the market, as well as anti-competitive behaviour[32].

The National Council of Provinces also has before it the Film and Publications Board Bill for deliberation before being signed into law by the president. Like the Cybercrimes and Cybersecurity Bill, this Bill has been circulated multiple times and discussed at length due to the controversial provisions it contains.

With the national economy having slowed to the point of contraction, and other industries struggling to inject value, opportunities and jobs into the market, the ICT sector, under the right policy and regulatory conditions can serve as an enabler of growth.

As a key input for other sectors in an increasingly digital economy and through the creation of new services and formal and informal employment it has the potential to perform far better than it does on global rankings, and more in line with the size and sophistication of the economy. For this to happen, far greater effort will need to go into addressing the demand-side limitations on the sector, specifically the human development constraints, both from consumption and production perspectives and the lack of alignment between skills and market needs.

2.1. ICT ECOSYSTEM

In line with the trend in global policy research and practice, the approach adopted for this report understands ICT as being more than a supply-side, infrastructure issue, one that is simply resolved by relying on economic growth to overcome the digital divide and provide greater connectivity.

Rather the digital environment is envisaged as an ecosystem of high capacity, high speed and high quality electronic networks, services, applications and content that enhances the variety, uses and value of information and communication for different types of users through complementary private and public access. The different elements are integrally related; a blockage in one part of the ecosystem impacting on the functionality of other parts of the ecosystem. The overall health of the system is determined by the policies, strategies and processes that enable the functionality of the overall system and the organic evolution and innovation of solutions to weaknesses or blockages in the system.[33]

This approach provides a conceptual framework through which to analyse the relationships between different elements and the outcomes resulting

31. DTPS (2018). "iKamva National e-Skills Institute Bill". Available at: https://www.parliament.gov.za/storage/app/media/Docs/bill/8046ac26-9b62-4e4a-a63a-366dc9dd77d3.pdf
32. Ministry of Economic Development (2018). "Competition Amendment Bill". Available at: https://www.parliament.gov.za/storage/app/media/Docs/bill/123743eb-a1bf-40b7-9492-e4ddcf4d5a0c.pdf
33. Gillwald, A., Moyo, M. and Stork, C. (2012). "Understanding what is happening in ICT in South Africa". Available at: https://www.researchictafrica.net/publications/Evidence_for_ICT_Policy_Action/Policy_Paper_7_-_Understanding_what_is_happening_in_ICT_in_South_Africa.pdf

from their interactions. It places users – citizens and consumers – at the centre of the system. Their access to, and the affordability of, networks, services, applications, and content determines the degree of their inclusion in the ecosystem or their exclusion from it. The factors that link these elements and impact on access and affordability are those of pricing and – importantly, in the increasingly bandwidth-hungry broadband environment – quality. These, in turn, are an outcome of the market structure and the effectiveness of the regulation, which are themselves determined by the policy and legal framework.

This framework is the product of the state at the national level, but is increasingly impacted by multi-lateral international governance institutions, such as the ITU and the World Trade Organisation, as well as by ICANN and the UN's Commission on International Trade and Law, and by entities such as the African Telecommunications Union (ATU) and the Communications Regulators Association of Southern Africa (CRASA). National markets and networks are also overlaid with new innovative global platforms, including cloud services, Big Data applications, OTT services and the Internet of Things (IoT), are creating new cross-border and local policy and regulatory challenges around issues of cybersecurity, privacy and other digital rights necessary to create a secure and trusted environment for users.

The environment created by the interplay of these elements and the nature of the relationships and processes between and within them, determine the conduciveness to the essential technology investment that is required to drive the growth of the sector and economy. These conditions are shaped by the market structure, by how competitive the services that arise from it are, or how effectively regulated they are.

The capacity of the regulator to be effective is determined, at least to some degree by the institutional arrangements and the autonomy of the regulator to implement policy. The levels of efficiency and innovation that enable the evolution of the ecosystem depend on the availability of the skills and competencies of the people and institutions at each node within the ecosystem to harness the benefits associated with integrated networks for economic development, and social and political engagement.[34]

34. Gillwald, A., Moyo, M. and Stork, C. (2012). "Understanding what is happening in ICT in South Africa". Available at: https://www.researchictafrica.net/publications/Evidence_for_ICT_Policy_Action/Policy_Paper_7_-_Understanding_what_is_happening_in_ICT_in_South_Africa.pdf

3 METHODOLOGY

It is for this reason that the diagnostic approach described below, which deploys benchmarking where comparative data makes this possible, is used for this assessment of the state of the ICT sector in South Africa.

This entails an analysis in the symptomatic areas of pricing, penetration and quality of service. The method not only enables the identification of dysfunctional parts of the ICT ecosystem, but also determines the related causes and linkages throughout the system, in order to propose remedies. In the presence of supply-side data, the diagnostic methodology enables benchmarking of indicators on the basis of carefully constructed components to provide greater analytical power than may be available in generalised international rankings or indices. While the indices do identify weaknesses in sector performance, they are unable to explain the reasons for these. As a result, nor is it possible, therefore, to identify specific remedies to address these weaknesses – other than generalised statements of 'best practice'.

Many so-called 'best practices' promoted by multilateral organisations or emulated from North American and European Union regulation, are underpinned by assumptions of mature markets, capacitated institutions and empowered citizens – assumptions that simply do not apply to many developing countries.

Many of what are identified as the success stories in developing countries in Africa by multilateral agencies are those of island states, such as Mauritius, and hence are poorly applicable to mainland sub-Saharan Africa. Benchmarking against core policy objectives with other African countries held up on various indices as best performers can also shake untested assumptions. Rwanda, for example, which is held up as an African model to the world, has less than ten percent Internet penetration and, at over 60 percent, the largest gender gap of the countries surveyed in 2017[35].

The diagnostic approach adopted here employs both supply-side and demand-side data specifically generated for this report to provide reliable indicators in key areas of sector performance. It further benchmarks these against indicators derived from databases generated for other appropriate comparator countries, where available. This benchmarking methodology is dynamic in nature, based on a careful selection of appropriate comparator countries. It facilitates comparison across a specific set of relevant benchmark countries, on the basis of a defined set of indicators that are selected according to the policy issue being analysed. As a guideline, the relevant criteria for choosing comparator countries are: level of economic development, regional factors, geographic or locational factors, and population size, where possible.

The diagnostic approach also includes best performers, in order to provide aspirational goals and understand what makes those countries more effective in meeting national policy objectives. Depending upon the selection of countries and criteria, the performance of the country being assessed may shift from positive to negative. It is from this supply-side analysis, together with demand-side insights where available, that the evidence base for specific interventions by policymakers and regulators is derived.

The different types of data enable the triangulation of the supply-side and demand-side data with both document analysis and stakeholder insights derived from interviews, in order to compare outcomes with policy goals and regulatory objectives.

35. RIA After Access Survey, 2017.

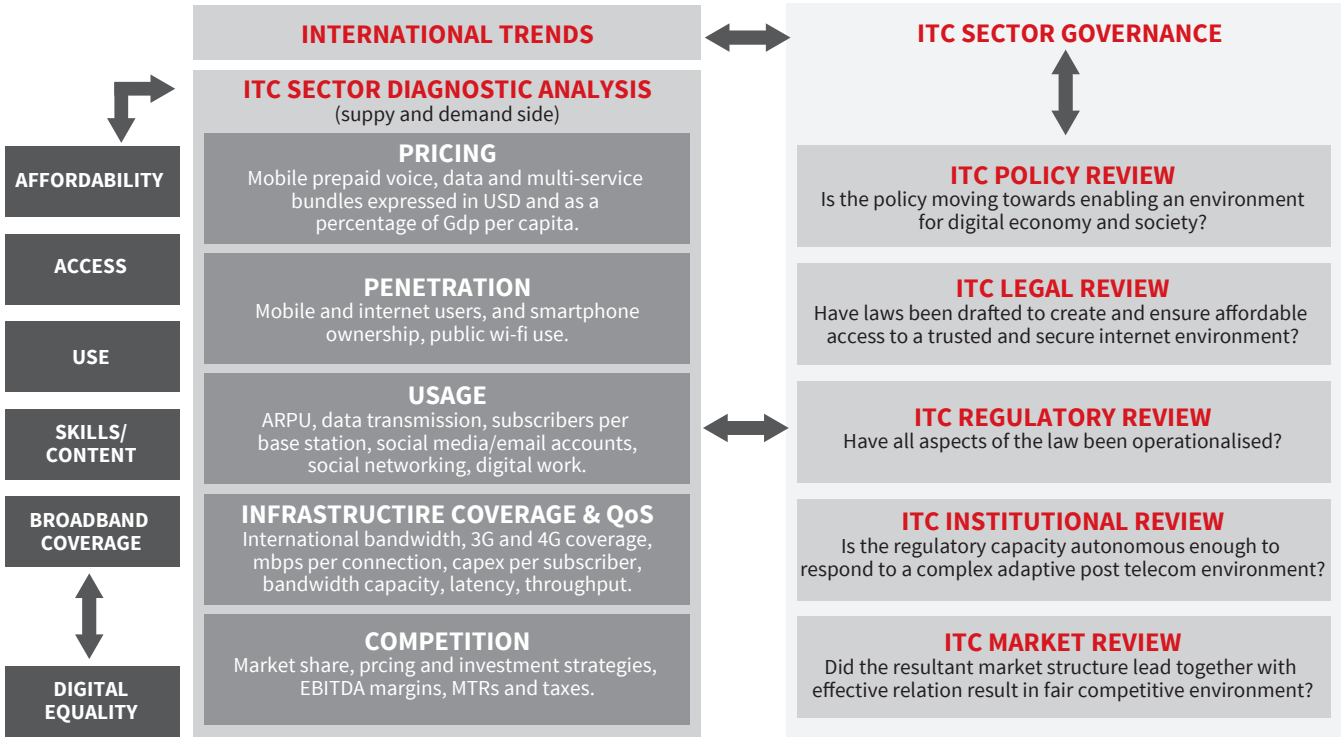

Figure 4: Diagnostic framework[36]

This report is divided into five parts. Part B starts with an examination of development affecting the policy and regulatory framework, the arising institutional arrangements and market structure. After this international benchmarking section, Part B reviews developments in the policy and legal framework that sets up the institutional arrangements and market structure for the sector. It also assesses the regulatory framework and progress made towards the implementation of policy.

In Part C the supply-side analysis of the performance of the sector is undertaken by examining the strategies and results of operators, particularly in the mobile market. It then reviews the market, as might have been done had the critical Chapter 10 identification of markets and those susceptible to *ex ante* regulation been undertaken by ICASA.

Part D provides demand-side insights from RIA's 2017 After Access Survey, which not only provides accurate descriptive statistics for prepaid mobile markets, but also explains the causes of particular outcomes for policy concern (mainly relating to inequality), identified through statistical modelling.

Finally, Section E evaluates the South African ICT sector policy and regulatory outcomes in relation to coverage and reach, access, affordability, quality of service and competition. Although competition is not a policy goal, but rather a resource allocation strategy to achieve policy objectives, it provides a composite measure of these other market outcomes, and, as such, is used in the diagnostic analysis. On this basis, it makes recommendations on points of policy and regulatory intervention to improve sectoral outcomes.

Policy framework and institutional arrangements: The policy and legal framework from which the associated institutional arrangements and market structure arise is analysed in terms of the linkages between policy (aspiration), legislation and regulation (implementation) and operation (sector performance). Arising from this, the policy and regulatory outcomes are then assessed, and

36. Developed by Research ICT Africa for ICT sector performance reviews.

benchmarked where possible, in terms of coverage and reach, access and use, affordability and quality of service, together with the composite indicator (HHI) of competition.

Coverage and reach: Fair competition provides an incentive for mobile operators to invest in infrastructure, in order to make their networks as widely available as possible, and to guarantee an appropriate quality of service. The analysis measures both the extent and quality of infrastructure available in a country, along with network coverage: how much of the population has access to a mobile signal of at least 3G. Network coverage is measured by the number of subscribers per base transceiver station (BTS) where this data is available. The level of investment is further expressed as investment per subscriber.

Access and use: Usage measures the consumption of mobile services, such as voice and Internet. Content is a difficult indicator to assess: due to the global nature of the Internet, content is consumed from around the world. Traffic measures the average minutes per MB used per subscriber.

The category of access is defined by a set of indicators capturing the prevalence of mobile connection devices, as well as Internet use. Although supply-side data can provide total numbers of active SIMs, it is only through nationally representative surveys, such as the one undertaken for this report, that the number of unique users can be measured with any real degree of accuracy in prepaid mobile environments. Access is linked to affordability, because lower prices lead to greater access and use.

Pricing and affordability: Price can be a key supply-side indicator of the level of competition in the sector. The pricing of mobile voice and data services remains a key factor in any assessment of the sector's performance. If mobile voice and data prices (analysed in accordance with GNI or GDP per capita) are high in comparison to the benchmarked countries, then the causes of high prices need to be assessed. In most countries where the mobile voice market is reaching maturity, prices have been in steady decline. In comparison, mobile data is a rapidly growing market, and prices are far more volatile. In countries where both voice and data prices are high, there are usually significant obstacles to competition, with the associated barriers to affordable access and usage.

However, low prices on their own do not make services affordable, although lower prices are likely to be more affordable. Affordability is measured by the United Nation's Broadband Commission as the price of a product relative to the GNI per capita (expressed as a percentage). The Broadband Commission has recently tightened its affordability yardstick from five percent of GNI per capita to two percent[37]. Of course, such nationally aggregated figures mask domestic inequalities that exist in incomes, and, therefore, what is affordable to whom. As most people in developing countries live below national average incomes, prices that may be affordable at the national level are likely not to be affordable for them. From the demand-side data, it is possible to disaggregate the bottom quintile of users, for example, to see what portion of their income would purchase 1 GB of data, for instance (or what products they could consume within the two percent income parameter).

Quality of service: While network congestion and the dropping of calls has always been an issue with voice services, in the broadband environment, with data-substituted voice and text services, such as WhatsApp driving Internet uptake, the quality of service (data speed and latency) have become critical determinants of consumer preference. In order to measure this in South Africa, mobile broadband performance test results were collected between 2013 and 2017 using NetRadar, an application that provides neutral information about the quality of mobile Internet connections and mobile devices. Data was, thus, collected anonymously from users and sent to a central server. The tests varied and

37. Broadband Commission (2017). "Broadband Commission for Sustainable Development Targets". Available at: https://www.broadbandcommission.org/Documents/publications/wef2018.pdf

were affected by different factors, including the location of the test, the speed of movement of the users when the test was carried out, the time of day, and the degree of congestion of the network at a particular moment. Such demand-side data is also able to provide insights into consumers' preferences, and the significance of service quality to different users for various activities.

Competition: The competition component is, in fact, a policy instrument or means of achieving policy objectives, rather than a policy outcome in and of itself. It is included as an indicator because it has been identified as such, cutting across the other components for analytical purposes. Fair competition in the sector leads to reasonable returns on investment for operators and affordable prices for end users. Competition is measured using a standard concentration measure (the Herfindahl-Hirschman Index), but the degree to which competition is present in a market determines the degree to which other indicators are progressing towards the attainment of national objectives.

The assessment of the current situation in South Africa has been derived through the triangulation of findings from the document analysis (draft policies, policies, legislation, regulations, guidelines, articles in the trade press) and the benchmarking of key indicators. This provides a situational analysis of the ICT sector and enables the analysis of the gap between where it currently stands and where it needs to be in order to provide the underpinnings of the digitally empowered society and knowledge economy envisaged for South Africa. These, however, are only the necessary conditions, and are insufficient for the transformation that the NDP envisages for the country.

A key requirement for digital transformation lies in the area of human development, as the global indices show (South Africa scores 0.66, ranked 119th out of 188 countries)[38].

Although the current readiness assessment does not have the data (or resources) to undertake such an analysis in this key area, such an analysis remains a critical success factor for ensuring the country has the necessary human resources with the requisite skills to participate in the digital economy, whether as consumers, users, producers or innovators.

38. UNDP (2017). *Human Development Report*. New York CIty, New York.

Part B

Policy, legal and regulatory framework

4 POLICY AND GOVERNANCE FRAMEWORK

This section provides an overview of the policy, legal and regulatory frameworks in South Africa, focusing on some of the existing features that characterise the latest pertinent developments contributing or constraining the creation of an enabling environment for the achievement of national policy objectives.

4.1. INFORMATION COMMUNICATION TECHNOLOGY IN NATIONAL POLICY

In line with the precepts of global telecommunications reform in the mid-1990s, the country's ICT sector was reformed through the liberalisation of the market, the partial privatisation of the incumbent, and the establishment of an independent regulator[1]. Roles for the sector were divided between government (the Ministry), which is responsible for policy formulation, and the national regulatory agency (initially the South African Telecommunications Authority, SATRA), which was responsible for the regulation of telecommunications until SATRA was merged with the Independent Broadcasting Authority (IBA), to become the Independent Communications Authority of South Africa (ICASA).

Initially South Africa led telecommunications reform initiatives on the continent, with the competitive licensing of two GSM operators in 1993, followed by highly participatory, albeit contested, Green and White Paper processes leading to landmark reform legislation in 1996. Further liberalisation followed in the early 2000s, with converged legislation and the licensing of new fixed and mobile entrants. But these early reform efforts were marred by political interference in licensing processes associated with the third mobile operator and the second fixed-line operator, and later a long period of policy paralysis, punctuated by a steady succession of often-controversial ministers.[2]

The result, today, is a sector that performs well against comparators on the African continent (despite the policy lags and regulatory failures) but fares poorly in comparison to countries in Latin America, for example, with similar GDP and GNI per capita.

The national level commitment to ICTs in the NDP, through the Presidential Infrastructure Coordinating Commission (PICC) and via the National Broadband plan SA Connect, has failed to meet set targets or specified objectives. This is attributable to multiple factors, not least to the discontinuity in sector leadership, with the sequential appointments of no fewer than six ministers along with four directors-general to oversee the (then) Department of Communications (DoC) between 2009 and 2014. This was exacerbated by a period in which ICASA was weakened by delays in the appointment of new councillors when terms of incumbents came to an end, by the failure to reappoint some of the experienced councillors who made themselves available, and by the appointment of councillors who lacked experience or standing in the sector. As a result, the parliamentary appointment system, rather than safeguarding the independence of ICASA, has resulted in appointees being accountable to their political principals, rather than to parliament and to the public interest.

Inherently challenged by asymmetries of information that exist between regulators and operators, the weakened institutional arrangements for the sector enabled the incumbent operators to subdue

1. Horwitz, Robert and Curry, Willie, Another Instance Where Privatization Trumped Liberalization: The Politics of Telecommunications Reform in South Africa – A Ten Year Retrospective (August 15, 2007). TPRC 2007. Available at SSRN: https://ssrn.com/abstract=2118147
2. Gillwald, A. (2005). Good intentions, poor outcomes: Telecommunications reform in South Africa. Telecommunications Policy(29), 469–491.

the regulator through litigation and threat of litigation on several critical regulatory processes. These included the again recently revived market review required for the assessment of market power and the identification of remedies to address any possible abuse of dominance; the quality of service audits; and an abortive first attempt to auction high-demand spectrum, which was thwarted by operators who supported the decision by then Department of Communications that ICASA did not have the authority to auction spectrum because spectrum 'policy' was a ministerial function, thinking that they would get a better deal through political lobbying.

4.1.1 Vision 2020

Following the death of long-standing Minister Ivy Matsepe-Casaburri, and with the arrival of a new administration following the 2009 elections, the ICT sector welcomed the appointment of new leadership in the Department of Communications that had been in a policy interregnum for nearly a decade. In his first Budget Vote, the new minister, General Siphiwe Nyanda, launched a policy review process dubbed 'ICT Vision 2020', announcing his intention to develop an Integrated National ICT Policy Framework[3].

Under the direction of the Minister of Communications, the ICT Vision 2020 was to:

- provide a roadmap for the ICT industry's long-term development and growth and for South Africa to become a leading country in the information era;
- entail the development, by industry in partnership with government, of an aspirational and unified vision and strategy towards clearly defined industry goals, to be achieved by 2020; and
- include research on various components of the sector, local and international factors to affect it in future, and best options to be followed for future development[4].

Following an ongoing internal dispute between Minister Nyanda and his director-general, Nyanda was fired in (then) President Zuma's first major cabinet reshuffle in late 2010 and replaced by his deputy, Roy Padayachie. Padayachie, in turn, was replaced a year later by Dina Pule, under whom the integrated national policy review was formally launched in 2012, with the appointment of an independent high-level ICT Policy Review Panel to drive the process.

4.1.2 National Development Plan (NDP)

The National Planning Commission (NPC's) National Development Plan (NDP), which followed the release of the NPC's Diagnostic Report in 2011, which conceives of ICT only within the context of economic infrastructure, was presented and accepted by Parliament in 2012. The NDP's vision for the ICT sector is stated as follows: 'by 2030 ICT is expected to underpin the development of an inclusive dynamic information society and knowledge economy' through the development of a 'comprehensive and integrated e-strategy that reflects the cross-cutting nature of ICTs'[5]. However, the NDP itself fails to thread ICTs throughout the strategy, in accordance with this 'cross-cutting nature'.

For its goals to be achieved, the NDP refers to new means of assigning the spectrum that will become available following the migration of terrestrial television broadcasting from analogue to digital transmission, and sets out a strategy for universal access, including targets, monitoring, and evaluation indicators. Also, the NDP identifies the need for demand-side stimulation strategies, such as e-literacy, skills development and institutional development, and other strategies to promote ICT diffusion that provide inter-governmental as well as private and public co-ordination – things that

3. Polity (2010). "SA: Statement by Siphiwe Nyanda, Minister of Communications, on Information and Communication Technologies". Available at: http://www.polity.org.za/article/sa-statement-by-siphiwe-nyanda-minister-of-communications-on-information-and-communication-technologies-26042010-2010-04-26
4. ITWeb (2009). "ICT Vision 2020: The dialogue begins". Available at: https://www.itweb.co.za/content/KjlyrvwL3OY7k6am
5. NPC (2011). *National Development Plan*, Pretoria, South Africa. Pg. 170

had been missing from the DoC's first iteration of its broadband policy[6] gazetted three years earlier but not implemented. Another key focal point, according to the NDP, is building affordable access to a number of services through effective regulation of competitive markets[7].

For the medium term, the period from 2015 to 2020, the NDP endorses the target, proposed by the DoC, of achieving 100 percent broadband penetration by 2020, and expands the definition of broadband from 256 kbps to at least 2 mbps[8]. For the long term, in the period from 2020 to 2030, it envisages the state as making extensive use of ICTs in the delivery of services to citizens, including entertainment, information and education. And it suggests greater collaboration between the state, industry, and academia as being critical to the success of any e-strategy[9].

A revised National Broadband Plan and Policy, SA Connect – promulgated during Yunus Carrim's short tenure as minister, following the firing of Dina Pule for misconduct in 2013[10] – sought to take forward the spirit of the NDP, but there has not been significant progress on its implementation since then. With the previous Department of Communications split into two following the 2014 general election, the 2015 recommendation of the ICT Policy Review Panel was only formalised in late 2016, with the translation of many of its recommendations into a formal and controversial government White Paper[11].

As yet, however, the White Paper remains unimplemented, other than via the publication of a single draft Bill and the consequent round of public hearings. Long-delayed and critical issues relating to rapid deployment guidelines for the rollout of broadband infrastructure are still awaited, as are spectrum management guidelines encouraging spectrum trading and imposing the 'use it or lose it' principle.

4.2 SECTOR POLICY OVERVIEW

From the mid-1990s South Africa forged the way for telecommunications reform on the continent with the partial privatisation of its incumbent operator, Telkom and the opening up of markets and autonomous regulation as strategies towards achieving universal access. The emergence of the mobile market radically transformed communication in the country, providing a real alternative to the very limited fixed lines in South Africa by rapidly creating highly profitable companies with the resources to invest in the consistent next-generation upgrades in the country. However, delayed competition to both the fixed monopoly incumbent, Telkom, and the mobile duopoly, MTN and Vodacom, did not produce optimal market conditions in the first decade of reform.

This was exacerbated by ineffectual regulation, as the autonomy of the regulator was eroded and the critical implementation of policy, independent of either state or commercial interests impeded. Compromised through an increasingly politicised council appointment process, the institution was often left without the leadership or technocratic capacity to fulfil vital actions required to create the conditions for fair competition and investment in the sector necessary to achieve national objectives.

6. Department of Communications (DoC) (2010). "Draft Broadband Policy". Available at; https://www.ellipsis.co.za/wp-content/uploads/2013/03/National-Broadband-Plan-2010.pdf
7. NPC (2011). *National Development Plan*, Pretoria, South Africa.
8. Ibid.
9. Ibid.
10. Dina Pule had failed to disclose the business interests of her romantic partner Phosane Mngqibisa, who benefitted financially from the sponsorship of the 2012 information and communications technology event, the ICT Indaba, which her department hosted in Cape Town.
11. A number of its key positions on issues such as the awarding of a privileged Wireless Open Access Network (WOAN) licence, spectrum management, the establishment of a new economic regulator, and the role of the Minister, are widely seen as departures from the recommendations of the Panel.

This was compounded by the next technology wave that brought the challenges of delivering universal broadband, declared by the UN to be critical to the realisation of human rights in the digital era, to a country that had made little progress on the extension of the fixed network despite (or, arguably, because of) the partial privatisation of Telkom and the delays to introducing fixed-line competition. After a period of policy flip-flops and lack of state co-ordination, and without any reference to the extensively consultative policy process that (flawed as it may have been) provided a vision for the sector, the state-owned broadband company "Broadband Infraco" was introduced. At this time, mobile broadband was taking off and the (then-) dark fibre companies, which were able to self-provide and build their own backhaul networks, had extensively rolled out fibre across many of the main metros and national routes.

The approach employed in the telecommunications sector between 1994 and 2005 constrained the liberalisation of the sector as envisaged in the Telecommunications White Paper of 1996, which had engineered an initial consensus around the reform framework and had anticipated a far more rapid opening up of the sector, implying less state involvement. However, since the beginning of the second round of reform in South Africa, ushered in by the 2001 Telecommunications Amendment Act, the State pursued a path of 'managed liberalisation', moving far more slowly on the liberalisation timetable, with market restructuring bringing in a greater role for the state[12].

4.2.1 The Telecommunications Amendment Act (2001) and the ICASA Act (2000)

After South Africa's major telecommunications policy reform in the mid-90s and the consequent Telecommunications Act of 1996, a national colloquium was held in 2001 to prepare for the end of Telkom's monopoly and the opening up of the telecommunications market to competition. However, expectations for more than one fixed-line operator were not met, as contestations between the Department of Communications and the Department of Trade and Industry resulted in a preference for only one licensee. Thus, the 2001 Amendment Act allowed for the licensing of a single fixed-line operator and, despite the liberal value-added network services (VANS) and Internet service providers (ISPs), there was no further liberalisation of the market.

The imperatives of the converging environment and institutional crises wracking, first, the IBA, and subsequently, SATRA, resulted in a process to merge the two authorities. This was done through the Independent Communications Authority of South Africa (ICASA) Act of 2000, which preceded any policy or law on convergence and resulted, therefore, in a single institution informed by two different statutes on broadcasting and telecommunications. The ICASA Act was amended in 2006 to accommodate changes to the appointment process of ICASA's decision-making Council, in line with the intentions of the Electronic Communications Act of 2005.

4.2.2 The Electronic Communications Act (2005)

Attempts to respond to unintended sectoral outcomes, and the challenges of regulating this dynamic, globalised sector, resulted in the third round of legislative reform in a decade. Without a revised policy framework, and after several unsuccessful attempts to get earlier iterations of the legislation through Parliament, the Electronic Communications Act (ECA) was finally ratified by (then) President Thabo Mbeki in July 2006. The Act replaced the 1996 Telecommunications Act (and its 2001 Amendment Act), and sought to create a regulatory framework and licensing regime better suited to the convergence of broadcasting and

12. Esselaar, S., Gillwald, A. and Stork, C. (2006). "South African Telecommunications Sector Performance Review 2006". Available at: https://researchictafrica.net/publications/Telecommunications_Sector_Performance_Reviews_2007/South%20Africa%20Telecommunications%20Sector%20Performance%20Review%202006.pdf

telecommunication infrastructure, services and content, and to the move towards next-generation networks and services.

The Act broadly initiated a new regulatory approach in line with the technological and economic developments of the time, and is still relevant for the current bottlenecks in the market, if implementation is done seriously and innovatively. However, implementation is highly dependent on the capacity of the regulator, ICASA, to prescribe and oversee the hundreds of regulations required to make the legislative and regulatory framework relevant, agile and sustainable.

The ECA also successfully replaced the old licensing framework with a new horizontal, technologically neutral one that ICASA has to manage in its regulation of sectoral licensing and fees. The ECA's comprehensive approach to the delivery of broadband necessitated a separate chapter for electronic communications networks, for the laying of fixed-line network infrastructure (Chapter 4), as well as a radio frequency spectrum chapter that lays out the assignment and management responsibilities to ICASA (referred to here as the 'Authority' (Chapter 5)). Both chapters delineate the respective licence conditions for operators, but Chapter 4 is more concerned with the handling of physical infrastructure obstacles, whereas Chapter 5 focuses on the more politically controversial and complex task of designing roles for the Ministry and the Authority regarding spectrum assignment plans. The Authority is granted powers of setting spectrum bands in its radio spectrum plan, but is required to gain approval from the Ministry.

While the ECA has the potential to address some of the policy and regulatory barriers that have hampered the growth of the sector over the last decade, the ICASA Amendment Act of 2006 – which deals with the institutional arrangements between the Ministry and the regulator and its operational framework – has been less forward-looking. A structural conflict of interest was created when the power of appointment to ICASA's decision-making council (on the basis of parliamentary shortlisting) was moved from the President and given to the Minister, who is also responsible for Telkom, one of the key entities over which ICASA is expected to exercise independent regulatory authority. This relationship continues to be politically strained and ICASA's line of accountability has been dubiously split between the current two Ministries[13]: ICASA reports to the Minister of Communications, but the Minister of the DTPS is responsible for the key sectors over which ICASA is expected to preside (telecommunications, post and the Internet). The draft ECA Amendment Bill already envisages moving authority over many functions, particularly those pertaining to spectrum management[14], back to the Minister of Communications and the DTPS. This change fails to take cognisance of the perception of potential political interference that can be created by a ministerial role in spectrum management, licensing and other functions normally under the purview of an independent regulator, and the resulting implications for investor risk assessment.

4.2.3 National Broadband Policy: 'SA Connect'

As with many other policies, South Africa was quick off the mark in adopting a broadband policy in 2010. However, the draft policy was hurried through the necessary public processes without much adjustment, resulting in a state-centric and an infrastructure supply-side approach. In 2013, a new broadband policy called SA Connect, which attempted to address some of the shortfalls of the earlier policy, was adopted after stakeholder consultation. This policy was responsive to South Africa's NDP, laying the ground for an integrated supply-side and demand-side strategy to meet the NDP's goals of a:

> *…dynamic and connected information society and a vibrant knowledge economy that is more inclusive and prosperous. A seamless information infrastructure will be universally available and accessible and will meet the needs of individuals,*

13. Forthcoming legislation (the ICT Sector Commission and Tribunal Bill) is expected to remove its non-broadcasting powers.
14. ICASA will retain assignment powers under the draft Bill, but be subject to greater ministerial power powers.

business and the public sector, providing access to the creation and consumption of a wide range of converted services required for effective economic and social participation – at a cost and quality at least equal to South Africa's main economic peers and competitors.[15] *The policy identifies 'structural constraints' in the sector as something to be overcome, along with the need to satisfy pent-up demand for affordable broadband. The sharing of resources and infrastructure, including spectrum, is further seen as a responsibility of the regulator to encourage service-based competition in the market. However, the implementation of the plan has stalled. Five years later, the first round target for 2016 of 5 mbps average download speed for 50 percent of the population has not been met, by a wide margin.*

The lack of progress in implementing SA Connect can be laid primarily at the door of the current government, which, in 2014, separated the former Department of Communications into two: an old-style Department of Telecommunications and Postal Services and a new Department of Communications. This undermined a decade of convergence legislation and regulations, leaving critical policy and regulatory actions in limbo. With no overarching, integrated infrastructure plan for communications, public and private networks have developed unevenly and on the basis of very different models.

4.2.4 National Integrated ICT Policy White Paper

The ICT Policy Review Panel of independent experts, as appointed by Minister Pule in 2012, issued:

- a 'Framing Paper' setting out principles to govern its work in 2013;
- a 'Green Paper' in 2014[16];
- a 'Discussion Paper', which more closely resembles a Green Paper by canvassing options, in 2014; and
- a set of recommendations in 2015.

The White Paper followed some 18 months later, and departs from the 2015 recommendations in several key respects. In 2014, Siyabonga Cwele (previously Minister of State Security, and before that the Minister of Intelligence Services) became the first minister of the newly-created DTPS. Minister Cwele continued the policy review process to integrate and co-ordinate sectoral policy and deliver on the ICT Vision 2020 goals set out in 2009, as well as those of the NDP. Two years later, following a green paper process, the National Integrated ICT Policy White Paper was accepted by Cabinet and Parliament. It focuses on improving access to infrastructure, competition (particularly in the services market), and inclusion of all citizens in the digital economy.

Most notably, the White Paper plans to abolish all the existing statutory bodies and replace them with a new economic regulator, tasked to take over regulatory functions from ICASA, the domain name authority (ZADNA) and the Universal Service and Access Agency of South Africa (USAASA). The new regulator will be answerable to the DTPS, while retaining independent regulation of broadcasting and content, presumably under the rump of ICASA. In effect, this will mean a return to the pre-2000 dispensation under the IBA and SATRA. In addition to this, the DTPS will also gain centralised policymaking powers and oversight of the ICT sector, with the creation of additional committees to serve and carry out some of these functions.

The White Paper claims to provide the 'overarching policy framework for the transformation of South Africa into an inclusive and innovative digital and knowledge society'[17]. It outlines:

15. NPC (2011). *National Development Plan*, Pretoria, South Africa. Pg: 190
16. The process name turned out to be a misnomer as it was mainly a review of progress made.
17. DTPS (2016). "National Integrated ICT Policy White Paper". Available at: https://www.dtps.gov.za/images/phocagallery/Popular_Topic_Pictures/National_Integrated_ICT_Policy_White.pdf Pg. 117

government's approach to providing cross-government leadership and facilitating multi-stakeholder participation; interventions to reinforce fair competition and facilitate innovation in the converged environment; policies to protect the open Internet; policies to address the digital divide and new approaches to addressing supply-side issues and infrastructure rollout including managing scarce resources.[18]

While there are controversial elements of the White Paper that are presented in the Electronic Communications Amendment Bill (see below for more detail on the open access principle, amendments to spectrum management policy, and their overlapping in the creation of a single national wireless open access network), it does contain a number of potential benefits for the ICT sector. While the long-awaited rapid deployment guidelines could have been issued under the current ECA instead of being caught up in the new one, which should only come into force in 2019, they are specified far more fully than hitherto, and, rather than identifying a single state-sponsored operator to deliver on national broadband objectives, look to increase competition in the service layer, in order to offer better value to end users. Open access principles are specified far more strongly than under the existing ECA, enforcing non-discrimination and fair competition in the accessing of high sites for the installation of broadband equipment by licensees. Such sites will also be made available at all levels of government on a cost-recovery basis, although it can be argued that existing facilities-leasing legislation in the current ECA carries these implications already.

The explicit introduction of spectrum trading, as well as the 'use it or lose it' principle, displays recognition of the market's power to allocate this valuable resource more efficiently. Additionally, the creation of a centralised geographic information system (GIS) database will contain South Africa's infrastructure details for better information gathering and policy planning, as well as improved site identification and permit application systems. The regulator is then directed to include single trench provisions and allow for licensees to participate in the accessing of trenches or capacity.

The White Paper's assumed bifurcation of responsibilities between DoC and DTPS goes against market developments and international best practice. For example, in relation to spectrum, the digital dividend emerging from digital migration (DoC's jurisdiction) needs to be allocated to the deployment of mobile broadband services (DTPS's jurisdiction). Regulatory authorities around the world have implemented a converged ICT regulatory framework with a mandate to regulate the broad, converged ICT sector, which increasingly functions as a complex, integrated ecosystem.

The White Paper will give rise to a slew of legislation to improve the functioning of the sector and achieve its political goals[19]:

- the Ikamva National e-Skills Institute Bill;
- the Postal Services Amendment Bill;
- the South African Post Office Amendment Bill;
- the Electronic Communications Amendment Bill;
- the Digital Development Fund Bill;
- the ICT Sector Commission and Tribunal Bill; and
- the Electronic Communications and Transaction Amendment Bill.

Of these, only the first had been tabled in Parliament at the time of writing. Drafts of two others (the Postal Services and Electronic Communications Amendment Bills) have been issued, and the public afforded an opportunity to make submissions. There has been no progress to date on the remainder.

18. Ibid. Pg. 3
19. DTPS (2017) 'Briefing on proposed legislation emanating from the National Integrated ICT Policy White paper', Robert Nkuna: Director-General, Department of Telecommunications and Postal Services, Pretoria, 10 October 2017, available online at http://pmg.org.za/files/171010whitepaper.pptx.

5 LEGAL FRAMEWORK

5.1 DRAFT ELECTRONIC COMMUNICATIONS ACT AMENDMENT BILL

Following an invitation to provide written comments on the draft Electronic Communications Amendment (ECA) Bill in November 2017, a public workshop was held in March 2018, with invitations to organisations that made submissions to provide oral presentations. The draft Amendment Bill is part of an omnibus cluster of legislative amendments arising from the White Paper.

Table 5: National Integrated ICT Policy White Paper proposed changes in the ECA Bill

	PROPOSED CHANGE	PROBABLE EFFECTS	RIA'S COMMENTS
DTPS responsibilities	The USAF, managed by USAASA, will be transferred to the Digital Development Fund and will be a distinct fund established by and accountable to the Minister of Telecommunications and Postal Services.	Government participation in the sector, through the DTPS, will substantially increase if this Bill is passed.	The Bill contains multiple provisions that undermine the independence of ICASA while increasing the Ministry's power in the sector,
	In addition to transferring functions from statutory bodies to the DTPS, Government's role will be significantly expanded through the establishment of committees.	The Bill expands the powers of the Minister in an alarming way.	The challenge of the DTPS' limited capacity to fulfil its mandate will affect the sector's growth rate.
	Formulation of communications policy, including the setting of universal service and access objectives.		Thus, all policy-related responsibilities currently resting with USAASA and the regulator will be transferred to the Minister.
Spectrum regulation	To reassign spectrum bands currently assigned to ECNS licence holders.	Despite the potential to open up spectrum bands for new entrants, this policy will have significant negative implications for incumbent licencees.	Given the depth of responsibilities assigned to the DTPS regarding the spectrum policy, its lack of capacity to individually fulfil policy objectives, and its proximity to political interests, makes it susceptible to narrow-interest and non-market forces capable of derailing the sector and its potential pro-poor growth.
	For Government, through the Minister, to guard the national frequency spectrum as a custodian.		
	For the DTPS to be responsible for spectrum administration and coordination with all role players that utilise it (e.g. policy-making, planning and allocation functions).	By controlling spectrum policy, the DTPS will be able to alter the future allocation and use of spectrum for telecommunications.	The various and manifold provisions of the Bill that undercut ICASA's independence in all matters of spectrum are unconstitutional
	DoC would be responsible for providing policy directives on broadcasting spectrum matters.		

	PROPOSED CHANGE	PROBABLE EFFECTS	RIA'S COMMENTS
Open Access	Publishing 'Reference Offers' aim to help implement OA principles: - Transparency: market players should be clear to all players. - Non-discrimination: access seekers must be granted access to networks in a non- discriminatory manner. - Effective access: competitors should be able to obtain access in reasonable locations using standardised interfaces.	Applying these principles are expected to fundamentally restructure the telecommunications wholesale market, and introduce new products and services.	The proposed cost-based pricing will negatively affect large operators.
		There is a wide-range of potential intended as well as unintended effects this could have on the incumbent fixed and mobile network operators.	Standardising the application of these principles across mobile and fixed sectors would necessitate enforcement against Telkom's fixed network, across layers 0 to 3.
		The Regulator is expected to enforce these principles with licence conditions, unbundling, and service level agreements.	This type of enforcement is unnecessary given the sector's success with voluntarily adopting open access principles in fibre network deployment, yet a prioritisation of mobile networks without the necessary market review would appear to punish successful mobile network operators.
WOAN	The Bill envisages the establishment of an ECNS licensee with special privileges known as the Wireless Open Access Network (WOAN). It would be granted an individual ECNS licence and radio frequency spectrum licence to provide wholesale electronic communications network services on an open access basis.	This can strongly affect the levels of mobile network investment currently supporting services in the country, and unintentionally reduce infrastructure-level competition.	While high-demand spectrum is currently defined, new DTPS powers would enable the Minister to redefine other bands as "high demand", allowing for policy directives to reassign said bands to the WOAN. This introduces a level of uncertainty that severely threatens network investment.
	The WOAN is envisaged as a creator of broadband access using all available high-demand spectrum in a leasing competition allow new service-layer operators to enter the market and increase competition.	The greatest risk involved with the WOAN is an environment suffering from limited competition and innovation.	
	The Wireless OAN will be a public-private sector-owned and managed consortium, and will consist of entities that are interested in participating.	This approach would also reduce the cost of creating such a network immensely.	As it stands, the Government will not be funding this operation at all and has rather played the position of a market bully by strong-arming operators into committing some 30% of their capacity to come from the WOAN

	PROPOSED CHANGE	PROBABLE EFFECTS	RIA'S COMMENTS
Rapid deployment	This provision applies open access to all infrastructure (although a cost-recovery mechanism is not detailed) and hopes to increase competitive service expansion.	This policy, when implemented, should improve infrastructure access. Attempting to reduce the duplication of infrastructure can nevertheless reduce the incentive to invest.	Focussing on retail and service competition will also adversely affect the infrastructure market as fewer players will be interested in the minimal returns available, given that the retail competitors will be able to access the same infrastructure as the itself. (under these conditions)
	Property owners will be required to respond to requests for property or land access within a reasonable time. The treatment of all service providers must also be equal and standardised.		A competitive telecommunications infrastructure environment would see infrastructure providers invest therein with greater scale and footprints emerging as result. What typically follows in such a growth trajectory is the consolidation of providers through M&A activity.
Statutory bodies	ICASA, USAASA, and ZADNA will be absorbed into the new 'Economic Regulator' and their responsibilities will be split between it and the two Ministries.	While the new regulator would resemble ICASA, it would assume many of the functions of other bodies.	The ICT sector desperately needs clarity on the roles and responsibilities of its sectoral bodies, especially those proposed in the current round of legislation.
	The new Regulator will be tasked with providing market definitions and conducting periodic reviews.		
	The Universal Service and Access Fund will be replaced by a new Digital Development Fund, which will be accountable to the Minister of Telecommunications and Postal Services.	The widened scope of the DDF enables it to act as a medium for private funds to flow to under-served areas.	Its function might be limited to a co-ordinating role which could make investment more effective.
			However, the DDF may be vulnerable to political pressure coercing the redirection of funds towards network builds favoured by associates.

It is clear from the White Paper that the remaining Bills will have substantial implications for the ECA and for the structure and regulation of the sector. It is likely they will affect the powers, competencies and independence of ICASA, as well as the future existence and scope of USAASA and the domain name authority, ZADNA. The draft Bill[20] sets out several fundamental departures from the recommendations of the ICT Policy Review Panel[21]. There is an undercurrent throughout the Bill that asserts the role of the DTPS and its minister over that of ICASA, and downgrades the independence of the latter. The

20. Department of Telecommunications and Postal Services (DTPS) (2017). "Electronic Communications Amendment Bill - Draft". Available at: http://pmg-assets.s3-website-eu-west-1.amazonaws.com/ECABill.pdf
21. Department of Telecommunications and Postal Services (DTPS) (2015). *ICT Policy Review Report*. Pretoria, South Africa.

Bill grants extensive powers to the Minister, not only in overseeing the sector, developing policies and representing the country at international fora, but also in the management of scarce resources, such as spectrum[22]. This erodes the powers of independent entities that are tasked to exert their technical expertise and grasp of the dynamics and trends within the broad ICT sector to implement national policy independently of government and industry.

5.1.1 Spectrum

The proposed pre-emptive insertion of Section 29A into the chapter on spectrum asserts *ex ante* a primary role for the Minister in respect of spectrum, and serves to limit the autonomy of the regulator. It is also at odds with Section 192 of the Constitution, which requires broadcasting to be subject to 'independent' regulation. This is so, because broadcasters depend on spectrum, which will no longer be under the overall control of an independent regulator. Although overall high-level spectrum policy and international country interaction with the ITU are clearly under the Ministry's domain, regulatory practice in many jurisdictions with independent sector regulators (or spectrum agencies) leaves spectrum management and band planning within the ambit of such a specialised agency, along with regulation, assignment, licensing, charging, monitoring and enforcement in relation to spectrum.

Further, with the Ministry still a significant shareholder in key industry players such as Telkom and Broadband Infraco, the proposed involvement of the Minister in respect of 'high-demand' spectrum creates a potential conflict of interest. In addition, ICASA, as the body receiving spectrum assignment requests, is far better placed than the Minister to determine where there is high demand. In any respect, global standardisation of next-generation spectrum is likely to indicate what is going to be high-demand spectrum. High-demand spectrum could, of course, also be in the unlicensed bands, for example, public Wi-Fi bands. This notwithstanding, ICAASA also needs to consider a mechanism for determining demand for such spectrum.

5.1.2 Wireless Open Access Network (WOAN)

The draft Bill also proposes to license a Wireless Open Access Network (WOAN) operator. Although not canvassed in much depth in either the ICT Policy Review process or in SA Connect, the draft Amendment Bill sets out procedures to establish the proposed WOAN as a special licence category, with close involvement of the Minister.

The establishment of the WOAN as an ECNS licensee with radio frequency spectrum and subject to special conditions is intended to provide wholesale electronic communications network services on an open access basis to other operators licensed in terms of the ECA. Incentives for the WOAN include:

- reduced or waived fees;
- access to rights of way and public infrastructure, as well public electronic communications facilities through government facilitation; and
- allocation of funds to construct or extend an electronic communication network in under-serviced areas.

The Bill specifies further that it is the Minister who must determine which unassigned high-demand spectrum must be assigned to the WOAN. This provision may undermine the existing rights of current spectrum licensees and the high levels of investment in the sector. Not only that, its asymmetrical application will serve to disadvantage other applicants for spectrum, making it anti-competitive.

Any new assignment of additional high-demand spectrum would become conditional on the WOAN being 'functional'[23]. Making access to 'high-demand' spectrum conditional on the successful deployment and operation of the WOAN, which already faces a number of risks, might further delay the urgent release of 4G spectrum, in respect of the assignment of which South Africa is now lagging behind many

22. Ibid.
23. Department of Telecommunications and Postal Services (DTPS) (2017). "Electronic Communications Amendment Bill - Draft". Available at: http://pmg-assets.s3-website-eu-west-1.amazonaws.com/ECABill.pdf

other African countries. This consequently forces operators to continue the sub-optimal practice of re-farming spectrum from other bands, contributing in turn to the high data prices witnessed in South Africa. The sector also requires competitive mechanisms for spectrum assignment, and the assignment of unused spectrum to alternative network deployment mechanisms, such as community networks and secondary use in rural areas. The recently published regulations on TV White Spaces – albeit they were not yet in effect at the time of writing – are a welcome accommodation of dynamic spectrum technologies that have the potential to reduce the cost of communications dramatically.

The Bill identifies the deployment of open access networks as a means of bringing about affordable and ubiquitous broadband access through increased service-based competition, as depicted in the National Integrated ICT Policy White Paper. It should be noted that the WOAN as a licence category was introduced in the White Paper, without sufficient prior public or industry consultation[24]. Both the White Paper and the draft Bill appear to assume that 'open access' inevitably and always produces positive outcomes. Open access can be a mechanism to achieve certain outcomes, but it is not necessarily the only or always the best way to do so. There is considerable evidence that open access can reduce investment and perpetuate dominance, and requires enforcement once it is found to be effective in meeting its objectives[25].A 2014 study by Analysis Mason, commissioned by DTPS and Treasury, on the viability of the open access network, indicated that there was no case to be made for the introduction of such an open access wireless network, and that evidence from those that were being trialled at the time suggested caution was advisable. DTPS has indicated it does have other studies that have demonstrated the viability of the WOAN (personal interview, former director-general Joe Mjwara, 2016), but these have not made public. The CSIR was commissioned in 2017 to undertake an implementation analysis, but this, too, has not been made public as yet.

There has been no successful implementation of various open access wireless initiatives undertaken in Nigeria, Kenya, South Africa, and Rwanda. In the Mexican case, the delays and opportunity costs associated with the delays have raised many red flags. The project was only possible, and could only override existing rights and legal barriers, because of the constitutional mandate that underpinned it. It was also this constitutional imperative that compelled it to proceed even when there were significant concerns about its viability and benefits.[26]

In the case of Mexico, complex institutional arrangements have had to be instituted to mitigate the risk associated with the project, included the establishment of Red Compartida, the common carrier company holding the spectrum, as a special purpose vehicle for which only bidders not associated with any existing operators were eligible. Unlike what is being proposed in South Africa, only 90 MHz of spectrum in the 700 MHz (digital dividend) band has been set aside for the exclusive use of the open access wireless network (interview with Red Compartida, 2016).

Further, the potential success of Red Compartida appears to depend on special powers given to the

24. Industry players have publicly complained about the lack of good faith displayed by the Minister in leaving out the agreed policies and clauses from the few consultations that did take place. For more information, see: http://www.freemarketfoundation.com/article-view/telecoms-industry-under-threat-what-the-media-and-public-need-to-know.
Also note that the idea's beginnings germinated from the Broadband Plan's 'open access' principles and attention to a lack of service-level competition – an idea later sustained in the ICT Policy Review Panel's findings without recommending any adoption of a WOAN.
25. Mariscale *et al*, Mexico case.
26. Gillwald, A., Odufuwa, F. and Rademan, B. (2016). "An evaluation of open access broadband networks in Africa: the cases of Nigeria and South Africa". Available at: https://researchictafrica.net/publications/Other_publications/2016_Integrated_Policy_Paper_-_Open_Access_Broadband_Networks_in_Africa.pdf

regulator by constitutional reform, which permit the asymmetrical regulation of the operator that has enjoyed extreme dominance of the market (as much as 80 percent market share). This differs from South Africa, where dominance of the duopoly is yet to be established by a market review, and the abuse thereof is far less certain. Despite this, only one bidder, ALTAN Redes, came through to the final round, and was awarded the contract. In March 2018, the company went operational with the initial 30 percent coverage as required, and which it is required to extend to 90 percent by 2024.

5.1.3 Other issues

In order to have adequate evidence for making decisions to improve competition in mobile telecommunications, the long-overdue market review needs to be published by ICASA, and the necessary market restructuring or wholesale access and pricing remedies put in place.

The draft Bill further proposes a requirement for spectrum fees to 'be in accordance' with ministerial policies and requires ICASA to 'comply with ministerial policies and policy directions' in respect of spectrum. This increase in the price-setting powers of the Minister increases the potential for conflicts of interest between the DTPS and ICASA, which is expected to set prices independently.

Aligning price targets with ideological goals opens the door to less restrained political interference in the market, and undermines the public interest objectives of regulation and its obligation to serve users and to benefit the greater South African economy.

The draft Bill's introduction of the 'use it or lose it' principle governing spectrum management – over and above ICASA's current Administrative Incentive Pricing (AIP) scheme – is likely to result in more optimal use of the available spectrum. It is also useful to have SMMEs and new entrants exempted from this provision – on good cause – in order to encourage market development. However, for reasons of regulatory independence, this should be at the discretion of the regulator, with due consideration of the relevant market factors at the time, rather than requiring ministerial approval. The proposed provisions covering spectrum trading, sharing and re-farming, together with the 'use it or lose it' principle, will encourage effective use of the available spectrum, enable the correction of assignment or pricing errors, and stimulate service innovation by assigning spectrum to those who value it most.

Universal access and service funds have largely been unsuccessful in enhancing universal access[27]. The levy is normally added to the cost of the service, which is already unaffordable in many jurisdictions. No expenditure of funds or even partial disbursements have been made, leading to the accrual of massive amounts in unspent funds[28]. The double negative impact of such funds is that, on the one hand, they may constrain investment in a jurisdiction if they are not spent, but on the other hand, they simply push up the cost of communications, making access less unaffordable for the poor[29].

The universal access and service policy in South Africa requires a major overhaul. Yet, besides ignoring the ICT Policy Review Panel's recommendations, the

27. Research ICT Africa (2016). "The state of ICT in Lesotho". Available at: https://researchictafrica.net/wp/wp-content/uploads/2018/01/2017_The-State-of-ICT-in-Lesotho_RIA_LCA.pdf
28. ITU (2013). "Universal service Fund and ". Available at: https://www.itu.int/en/ITU-D/Conferences/GSR/Documents/ITU%20USF%20Final%20Report.pdf
29. More information on the repeated instances of corruption at USAASA, its failure to ensure sustainability in its initiatives, and the absence of any subsidies benefitting the needy prior to the STB debacle can be found in the 'Institutional arrangements' section below.

Bill suggests no fundamental review of the effectiveness of universal service obligations (USOs) or the Universal Service and Access Fund (USAF) in achieving universal access. On the contrary, the requirement that there is ministerial 'approval on the nature and form of all universal access and universal service obligations before they are imposed on licensees'[30] appears to consolidate the existing policy. The extension of ministerial directive powers, which already exist in general, to universal access and service specifically, in what would effectively constitute a veto power on decisions taken by the regulator, does not address the problem, as the regulator has had little to do with the formulation or even implementation of universal access and service. Rather, ICASA is responsible for imposing the USOs (even though it has little success in monitoring them); levy percentages, which it passes on to Treasury; and defining under-serviced areas.

5.2 CYBERCRIMES AND CYBERSECURITY BILL

The Cybercrimes and Cybersecurity Bill is in the process of being enacted, although, at the time of writing, it is still under consideration by the Parliamentary Portfolio Committee. It was first published as a draft Bill in August 2015, revised and tabled in Parliament in February 2017, and is in the process of being amended following due notice and comment procedures.

The Draft Bill has been highly contested, as it is seen to threaten constitutional rights in significant ways, specifically those relating to freedoms of expression and of information[31], the right to privacy, and the right of access to public-sector information. It lacked important checks and balances and unnecessarily heightens state power over the Internet in many ways. Government's bid to secure the Internet supposedly in the name of protecting South African citizens from potential cyber-threats would enable state control of the Internet and the surveillance of its citizens. Taking into account the long list of cyber-crimes provided for in the Draft Bill, law enforcement agencies would be overwhelmed with cybercrime cases and understaffed for tackling the cyber-threats envisaged by it. Public institutions may lack the necessary capacity and competencies to assess whether an action is legitimately a cyber-crime on a case-by-case basis, and subsequently to respond to such a case.

In addition to the potential inability of the public sector to tackle hypothetical attacks in the most effective ways, other concerns are related to the risk arising from the potential abuse of power (endorsed under Section 31 of the Draft Bill) by law enforcement agencies or investigators who are granted the authority for search and seizure of evidence without search warrants where cyber-crimes are suspected. This may place legitimate online activities at risk of criminalisation at the discretion of public officials.

The Draft Bill focussed on securing the Internet by heightening arbitrary state powers to act unaccountably rather than safeguarding citizens' right. It seems to characterise cyber-risks as an existential threat in an attempt to justify extraordinary measures such as the suspension of civil and political liberties. A broad range of sections were deleted during the review process, including problematic issues such as computer-related terrorist activity and related offences; computer-related espionage and unlawful access to restricted data; infringement of copyright; harbouring or concealing persons who commit offences; and provisions establishing the Cyber Security Centre, the National Cybercrime Centre, and the Cyber Command. On a positive note, an amendment extended protection to whistleblowers who disclose information in the public interest[32].

In March 2017, a second draft of the Bill was published for comment and then public hearings were held after the Bill was tabled in Parliament. Although

30. Department of Telecommunications and Postal Services (DTPS) (2017). "Electronic Communications Amendment Bill - Draft". Available at: http://pmg-assets.s3-website-eu-west-1.amazonaws.com/ECABill.pdf
31. See Bill submissions from the Centre for Constitutional Rights, the South African Human Rights Commission and the Right 2 Know campaign.
32. Tilley, A. (2018). "Cybercrimes legislation in South Africa". Available at: http://www.odac.org.za/images/docs/publications/LessonsLearned.pdf

a vast number of experts provided input on how to remedy the defects in the Bill, the Department of Justice did not take into account the majority of the submissions[33]. A group of experts and organisations led by Alison Tilley from the Open Democracy Advisory Centre (ODAC), in a letter to the Portfolio Committee on Justice and Correctional Services pointed out that the Bill was deeply flawed and remained very problematic in many aspects. Major concerns were raised on the lack of clarity of drafting in a number of clauses. The recommendation was to withdraw the Bill entirely as it does not meet constitutional muster, as outlined in many of the submissions.

5.3 PROTECTION OF PERSONAL DATA OF INTERNET USERS

The Protection of Personal Information (POPI) Act (2013) aims to promote the protection of personal information processed by public and private bodies. Thus, Internet service and content providers have to inform users that they gather information about their browsing behaviour, and seek the express consent of users before tracking their browsing behaviour (users choose to opt in). Users must have the possibility to opt out of the data collection process.

The rights of a data subject include the right to:

- be notified that personal information is being collected;
- be notified if their personal information has been accessed or acquired by an unauthorised person;
- request access to their personal information;
- request the correction, destruction and deletion of their personal information;
- object on reasonable grounds to the processing of their personal information; and
- object at any time to the processing of personal information for direct marketing unless consent has been granted (opt-in).

There is a general requirement under POPI that data is collected only for specific, explicitly defined and lawful purposes, and that that purpose must relate to the function and purpose of the data controller (Section 13(1)). The law also requires that all further processing is compatible with the purpose of collection (Section 15(1)). POPI, however, prohibits the processing of special personal information (Section 26). This is information relating to the religious and philosophical beliefs, race or ethnic origin, trade union membership, health, sex life or biometric information of the data subject. Section 26 also extends the prohibition to the alleged criminal conduct of a data subject or the proceedings and disposal thereof appertaining to the alleged criminal conduct. This prohibition, however, does not apply if the processing is carried out (amongst other reasons) with the consent of the user (Section 27(1)a). ISPs may process such data with the express contractual consent of the data subject, and they may negotiate the periods of time for their use as well as the specific terms with clients.

Section 18 of POPI requires data controllers to inform the data subject when they are collecting personal information. They must also inform the data subject what information is being collected about them, even indirectly, what the purpose of the data collection is, and if they intend to transfer the data to a third country or international organisation. This includes information about the level of protection in the third country.

Section 19 of POPI requires that data controllers secure the integrity and confidentiality of personal information by taking appropriate, reasonable technical and organisational measures to prevent loss, damage to, unauthorised destruction of, and unlawful access to and processing of personal information. Additionally, a data subject must be notified immediately by the data controller if there are reasonable grounds to believe that there has been a data breach (Sections 21(2) and 22).

Section 23 gives users access to personal information collected and processed by data controllers. They may request this information, upon proof of identity, and the request is to be fulfilled free of charge. Section 24(1) gives the data subject the right to request a data controller to correct or delete personal information relating to themselves and Section 24(1)b gives the data subject the right to demand that a data controller destroys or deletes a record of personal information that the data controller is no

33. Ibid.

longer authorised to retain in terms of Section 14.

This Act places much power in the hands of Internet users, and its contribution to protecting them is immense. In a global digital environment, where users are easily exploited through being unaware of privacy law and the implications of web-surfing on their rights (particularly protection from surveillance), South Africa could again resume its lost leadership role by adopting a norm-setting policy. The opportunity to resume this role by adopting the full legislation should not be missed because of a delay in its signed ratification.

5.4 PROTECTION OF ONLINE PURCHASES OF GOODS AND SERVICES

The 2011 Consumer Protection Act (CPA), the 2002 Electronic Communications and Transactions Act (ECTA) and the 2013 Protection of Personal Information Act (POPI) all contain provisions to protect users' online experiences so that online shoppers have a similar level of protection as shoppers in a brick-and-mortar store.

Online sellers must provide shoppers with essential information on their website, including full names, physical address, adequate description of the goods or services being sold, the price payable and the terms of the agreement of sale. Should the online retailer not do so, the purchaser has the right to cancel the online purchase agreement within 14 days. Further, an online shopper has the right to cancel a purchase within seven days of receiving the goods or services without reason or penalty[34]. If an online shopper cancels the online purchase, the online retailer must refund all payments, provided the shopper pays the costs of returning the goods and that the goods returned are still in the original packaging and in good condition (ECTA, Sections 55 and 56).

Section 61 of the CPA provides that the online retailer, distributor or even the manufacturer could be held liable in the event that the online shopper suffers harm as a result of the goods being unsafe, or having a product failure or being defective or hazardous. Finally, POPI requires responsible parties (data controllers) to be open about their processing and allow the data subject to participate in how their personal information gets processed.

Local consumer protection enforcement agencies generally do not have the authority to take action against domestic businesses engaged in fraudulent and deceptive commercial practices with respect to online transactions. However, the matter turns on where the transaction is adjudicated to have taken place. The wording of the CPA is that 'every transaction occurring within the Republic' comes within the ambit of the CPA. Section 4 of the CPA then stipulates that any of the following persons may, in the manner provided for by the Act, approach a court, the Tribunal or the Commission alleging that their consumer's rights in terms of the CPA have been infringed, impaired or threatened, or that prohibited conduct has occurred or is occurring.

This once more serves to bolster the framework of law protecting users of online services, but cannot make up entirely for a lack of awareness amongst the population. The Bill seeking to amend the 2002 ECTA will need to integrate well with this piece of legislation, to cover any gaps in the rights framework protecting online users. However, there is potential for overlap and unnecessary duplication of provisions.

5.5 INSTITUTIONAL EFFECTIVENESS

The problems created by the 2014 dismemberment of the original Department of Communications into the Department of Telecommunications and Postal Services (DTPS) and the new Department of Communications (DoC), incorporating the Government Communication and Information System (GCIS), have been critiqued extensively above, which analysis will not be repeated here.sf6.

However, it is important to point out how the resultant blurred lines of accountability and authority

34. These rights to cancel online purchases do not apply to transactions that were for financial services, online auctions, food and consumables made to order or personalised goods, the provision of accommodation, transport or leisure, or services that are entered into for a specific period of time (Section 42(2)j).

have exacerbated the leadership challenges and lack of institutional capacity in both departments, and how this has undermined state intentions to develop a vision and appropriate policy for the ICT sector and to provide strategic direction on key issues. The unnecessarily protracted broadcast digital migration process, and the failure to develop a converged ICT ministry, are two of the more striking examples of this lack of vision and capacity. Weak political appointments and lack of leadership have consistently plagued the new DoC, DTPS, ICASA, and the Universal Service and Access Agency of South Africa (USAASA).

While some of the problems are related to ICASA's lack of independence from DoC and from certain elements of industry, structural conflicts of interest persist as a result of continued state ownership and influence in the sector.

The Minister's dual responsibilities for the safeguarding of significant state assets in the sector, and for policy that determines the well-being of state entities, contribute to these conflicts.

5.5.1 ICASA

With ICASA already burdened with the mandate from the previous 1996 Telecommunications Act, the ECA imposed additional burdens on the regulator, *inter alia*, to re-license the entire sector on horizontal lines to reflect convergence in the sector; to unbundle the local loop; to deal with essential facilities; and to conduct spectrum valuation – all on the basis of market definitions and determinations of dominance in the market[35]. Devoid of any supporting policy document, the incomplete 2005 ECA, together with ICASA's lack of capacity and expertise to implement, has produced a series of bottlenecks in the path towards a fair and competitive ICT environment.

In July 2014, after ordering the creation of the DTPS, (then) President Jacob Zuma ordered that ICASA remain answerable to the DoC, while the administration, powers and functions of all other broadcasting, postal, film, publications and telecommunications (among many) sectors were transferred to the DTPS.[36] Zuma nevertheless clarified the relationship between ICASA and the DTPS in December of the same year[37] by transferring the administration, powers and functions of various sections of existing legislation to the Minister of the DTPS, allowing them to hold the regulator accountable on key performance indicators and measurements.

The authority and autonomy of the regulator ICASA to implement national policy have been undermined at various levels: through structural conflicts of interest in the institutional arrangements, political constraints, lack of competencies and the politicisation of the organisation. The outcome is highly ineffectual regulation of the sector, with a consequent absence of competitive outcomes or proper protection of consumer welfare. For example, in an effort to auction spectrum in 2016, ICASA hastily issued an Invitation to Apply (ITA) for spectrum licences expected to cost ZAR 3 billion each. A collection of about ZAR 12 billion from the various MNOs offered an opportunity for the Finance Minister to relieve fiscal congestion, but a court interdict by DTPS Minister Cwele halted the ITA process. The High Court judge found the process to be disorderly and not inclusive of government[38].

35. Such determinations would form the basis for pro-competitive interventions, in addition to lone MTR regulation.
36. Clarified in the President's Proclamation No. 47 of 2014, found at: https://www.gov.za/sites/default/files/37839_pro47.pdf
37. By issuing the Presidential Proclamation No. 79 of 2014, found at: https://www.gov.za/sites/default/files/38280_proc79.pdf
38. EyeWitness News (2016). "High Court blocks ICASA's R12bn mobile internet spectrum auction". Available at: https://ewn.co.za/2016/09/30/High-Court-sets-aside-Icasas-planned-spectrum-auction

While part of the problem relates to the lack of ICASA autonomy from the Department – and, indeed, lack of autonomy from certain elements of industry[39] – also contributing to the problem are ICASA's low levels of experience and competence, an absence of leadership, and council appointments on the basis of political or personal allegiance rather than technical competence (leaving individuals accountable to their political principals, rather than to the principles of the law and Parliament)[40].

Without sufficient accountability accompanying the autonomy that legally pertains to ICASA, decision-making processes and systems are compromised. Structural conflicts are able to arise, given the imbalances of power that may exist between state entities in the sector and strong commercial players, with an eye to exerting influence over the regulator in the middle by imposing their interests, taking advantage of personal relationships and exploiting the lack the of accountability. Such an environment embeds regulatory uncertainty and damages the attractiveness of South Africa as an investment destination[41].

Weak state co-ordination and poor administrative processes have also impacted negatively on the sector. After a delay in the initiation of the appointment process by the (then) Minister of Communications, the existing councillors were compelled to stay on, creating an interregnum in the leadership of the regulator, with the associated impact on decision-making and uncertainty for the sector[42]. However, the public appointment process finally got underway and a new council was appointed in November of 2017[43].

The leadership challenges facing the entity were not alleviated by the delay in the appointment of the chairperson, Rubben Mohlaloga, and the Minister's subsequent insistence on reappointing him despite his being found guilty of corruption, on the grounds he was taking it on appeal. Mohlaloga has since been

39. BusinessDay (2018). "State-capture inquiry must probe broadcast deals". Available at: https://www.businesslive.co.za/bd/opinion/2018-03-20-state-capture-inquiry-must-probe-broadcast-deals/
TechCentral (2012). "Captured by the incumbents". Available at: https://www.businesslive.co.za/bd/opinion/2018-03-20-state-capture-inquiry-must-probe-broadcast-deals/
40. Brainstorm (2013). "Undoing ICASA's independence". Available at: http://www.brainstormmag.co.za/cover-story/36-cover-story/9314-undoing-icasas-independence
ITWeb (2014). "ICASA's independence remains moot". Available at: https://www.itweb.co.za/content/APero3qZ88B7Qb6m
Fin24 (2016). "ICASA a weak ref in a tough fight". Available at: https://www.fin24.com/Finweek/Business-and-economy/icasa-a-weak-ref-in-tough-fight-20161115
41. BusinessDay (2013). "ICASA independence 'must be guaranteed' ". Available at: https://techcentral.co.za/icasa-ordered-to-stop-spectrum-auction/68886/
News24 (2017). "#GuptaLeaks: How MultiChoice paid the Guptas millions". Available at: https://www.news24.com/SouthAfrica/News/guptaleaks-how-multichoice-paid-the-guptas-millions-20171124
ITWeb (2015). "Controversial names make ICASA short list". Available at: https://www.itweb.co.za/content/YKzQenMj5P47Zd2r
42. DispatchLive (2015). "DA welcomes Parliament's decision to withdraw ICASA nominations". Available at: https://www.dispatchlive.co.za/news/2015-06-23--da-welcomes-parliaments-decision-to-withdraw-icasa-nominations/
43. Parliament of the republic of South Africa (2017). "National Assembly adopts the list of five recommended candidates to serve at the ICASA Council". Available at: https://www.parliament.gov.za/press-releases/national-assembly-adopts-list-five-recommended-candidates-serve-icasa-council

found guilty of fraud while a Member of Parliament on the Committee for Agriculture [44].

The turf war over spectrum assignment between the Ministry and ICASA, following the regulator's Invitation to Apply (ITA) for high-demand spectrum in June 2016, is an example of the institutional disjuncture that has resulted in the use of public funds by state institutions to challenge each other over matters that should be clear from the policy and law. The Ministry sought and secured a court injunction halting the auction, which they saw as pre-empting their intention to assign the spectrum in question to the WOAN, as per the White Paper. Another example of institutional incapability is the delay in completing a comprehensive market review for reducing the cost to communicate in South Africa, in accordance with the ECA's Chapter 10, as a prelude to imposing pro-competitive conditions, inter alia, with the objective of reducing consumer pricing.

In an effort to promote effective competition in broadband markets, Minister Cwele requested ICASA undertake an inquiry and prescribe regulations to this effect in 2016. ICASA's spokesperson, Paseka Maleka references the ECA's section 67(4) when describing the regulatory purpose of the study[45]. Only in 2017 did the arduous process begin after (then) Finance Minister, Malusi Gigaba, directed the Competition Commission to review the high cost of data in the country in consultation with the National Consumer Commission and ICASA, among others. ICASA is currently conducting its priority markets study before figuring out the most expedient means for regulating data prices[46]. There seems to be considerable political pressure on both ICASA and the Competition Commission, along with confusion over lines of accountability among public leaders, and a level of joint co-operation between the regulator and the Commission in this convoluted process[47].

The public has been asked to wait until the end of 2018 before it can accurately understand, for example, how much data costs, and how data pricing can be reduced through regulation. ICASA has started the second phase of this process, in which it will identify priority markets for review with a view to the possible imposition of pro-competitive regulation. The third phase will be specific market reviews on what informs prices for communications services in South Africa[48].

ICASA's failure impose *ex ante* regulation on competition issues and create an enabling environment for the sector to grow fairly has resulted in the Competition Commission being identified as the agency best suited to deal with such issues. The Commission has acted effectively in cases where ICASA had not, such as the anti-competitive practice case brought by the (then) SA VANs Association (SAVA) and the Internet Service Providers Association of SA (ISPA) against Telkom, that saw the Competition Tribunal levying the largest penalties awarded at that time, in addition to behavioural

44. News24 (2018). "Parliament wants convicted fraudster and Icasa chair to be suspended". Available at: https://www.news24.com/SouthAfrica/News/parliament-wants-convicted-fraudster-and-icasa-chair-to-be-suspended-20180529
TechCentral (2012). "Battles rage over bid to fix ICASA". Available at: http://www.techcentral.co.za/battles-rage-over-bid-to-fix-icasa/37165/
TechCentral (2015). "ICASA down to just three councillors". Available at: http://www.techcentral.co.za/icasa-down-to-just-three-councillors/58301/
ITWeb (2018). "Rubben Mohlaloga's suspension up in the air". Available at: https://www.itweb.co.za/content/VgZeyqJAOA9MdjX9/RYKzQenvjdMZd2rO
45. Masweneng, K. (2017). "ICASA to tackle high cost of data". In Businesslive. Available at: https://www.businesslive.co.za/bd/companies/telecoms-and-technology/2017-07-17-icasa-to-tackle-high-cost-of-data/
46. MyBroadband (2018). "ICASA's big plans for data prices in South Africa". Available at: https://mybroadband.co.za/news/telecoms/258837-icasas-big-plans-for-data-prices-in-south-africa.html
47. See: https://www.ellipsis.co.za/competition-commission-inquiry-into-data-services-market/ and https://www.ellipsis.co.za/icasas-cost-to-communicate-programme/
48. MyBroadband (2018). "ICASA's big plans for data prices in South Africa". Available at: https://mybroadband.co.za/news/telecoms/258837-icasas-big-plans-for-data-prices-in-south-africa.html

remedies that resulted in the functional separation of Telkom[49]. The Commission is currently dealing with anti-competitive practice complaints against mobile operators relating to the price of data in response to a request from the Minister of Economic Development, Ebrahim Patel[50]. The main objectives of the inquiry are to:

- obtain a clear understanding of the data services value chain, including the interaction and commercial relationship between different levels of the value chain and the relationship with other parts of the ICT sector and the broader economy;
- assess the state of competition in the market at every stage of the value chain for provision of data services in order to identify areas of market power where consumers may be exploited or excluded by firms and to identify any other structural, behavioural or regulatory factors that may influence competition or pricing;
- benchmark South African data services pricing against those of other countries; and
- establish whether data supply quality and coverage is adequate by international standards and the country's developmental needs[51].

High out-of-bundle data charges, along with aggressive data expiry periods used by mobile operators in South Africa to extract revenue from users, have, *inter alia*, led to mounting pressure on the operators.

ICASA has since drafted 'consumer protection' regulation to address data expiry and out-of-bundle (OOB) charges[52], which are currently mired in litigation over implementation timeframes.

While the record of the Competition Commission and Tribunal is good, it does not have the sector-specific expertise to undertake such studies, and the cases have taken years to be concluded, by which time market conditions can have changed fundamentally and smaller companies forced to exit the market. The Competition Commission continues to set guidelines and deal with *ex post* complaints. The sector regulator has the authority to create conditions for competition through *ex ante* regulation. Undertaking the decade overdue market review is the lynchpin of the *ex ante* competition framework. It is imperative that ICASA concludes the review so that other aspects of a forward-looking and future-proof competition framework can be put in place.

5.5.2 The Universal Service and Access Agency of South Africa (USAASA) and the Universal Service and Access Fund (USAF)

The mandate of the USAASA includes its role to 'manage Universal Service and Access Fund in the promotion of universal service and universal access to electronic communications services, electronic communications networks, and broadcasting services'[53].

USAASA's management of the USAF has been bedevilled by repeated instances of corruption[54].

49. Note that referring a case to the Competition Tribunal is the second step after it goes through the Competition Commission, and this particular case began back in 1999. For more information, see BusinessTech (2012). "Telkom fined R449m for market abuse". Available at: https://businesstech.co.za/news/general/19539/telkom-fined-r449m-for-market-abuse/
50. Mcleod, D. (2017). "CompCom to probe mobile operators over data pricing". In TechCentral. Available at: https://techcentral.co.za/commission-probe-operators-data-pricing/76406/
51. Competition Commission (2017). "Data Service Market Inquiry". Available at: http://www.compcom.co.za/wp-content/uploads/2017/09/Data-Inquiry-Market-Conduct.pdf
52. As opposed to strict pricing regulation.
53. A limited amount of information about USAASA can be found here: https://www.dtps.gov.za/index.php?option=com_content&view=article&id=39&Itemid=197. However, a more descriptive list of USAASA's mandate can be found on its own website: http://www.usaasa.org.za/.
54. See, for example, inter alia: Malefane, M & Ncana, N (2011, September 25) 'Digital TV officials suspended over R29m', Sunday Times, available online at http://www.timeslive.co.za/scitech/2011/09/25/Digital-TV-officials-suspended-over-R29m1; Holomisa, B (2013, June 7) 'Corruption and Maladministration at USAASA', open letter; Mzekandaba, S (2017, August 7) 'Cloud of corruption hangs over STB tender', ITWeb, available online at http://www.itweb.co.za/index.php?option=com_content&view=article&id=163914:Cloud-of-corruption-hangs-over-STB-tender&catid=260.

Over the lifespan of the USAF, over ZAR 2 billion in universal service levies was collected, almost exclusively from the telecommunications licensees. Most of those contributions have disappeared into the fiscus. Allocations to the USAF by Treasury, excluding funds earmarked for the digital migration, total a mere ZAR 625 million[55]. There is very little to show for this expenditure, however. Some ZAR 400 million was spent on telecentres, few of which remain in operation today. A further ZAR 150 million went to finance Internet connectivity for public schools and FET colleges, and just over ZAR 60 million was squandered on the failed Under-serviced Area Licensee experiment. No money ever reached 'needy persons', the key objective of the USAF.

Based on government's decision to subsidise the set-top boxes (STBs) required for the migration to digital terrestrial television, National Treasury set aside ZAR 1.39 billion in the USAF's budget for the benefit of South Africa's five million indigent households[56]. There has since been a high level of corruption in this process and the CEO has been suspended as a result[57].

The contracts were then halted by USAASA, leaving two of the 26 winning bidders with hung investments, and prompting them to seek relief in the courts against the Agency[58]. Nevertheless, up to and including these events, there is a dearth of evidence showing how South Africa's poor have directly benefitted from the operations of the USAF, an institution mandated to effectively systematise the trickle-down effect for those at the bottom of the country's economic pyramid.

Although the original Universal Service Agency was established with a sunset clause, the now renamed USAASA has been kept alive in each new round of legislation over the last two decades, despite its inability to deliver on its mandate. To an extent, the Agency's problems can be explained by the historical evolution of the sector's institutional arrangements over the past 25 years. The ECA requires all licensees to contribute to the USAF in accordance with regulations issued by ICASA, which remains the body responsible for prescribing the basis and manner of contributions, albeit by law they may not exceed 1 percent of a licensee's annual turnover. As part of the convergence rationale of the ECA, the mandatory contribution to the Fund extends to broadcasting licensees, who prefer to contribute to the Media Development and Diversity Agency (MDDA). The ECA allows the Minister to issue policy directions to the USAASA Board in carrying out its oversight functions.

Meanwhile, the Act requires USAASA to make recommendations to the Minister as to what constitutes universal service and access, but it is the Minister who is required to make determinations in this regard and publish them in the Government Gazette. The requirements of the Act in relation to USAASA require it to co-ordinate efforts towards universal service and access. To do so, USAASA may undertake investigations, conduct research, and survey and evaluate the extent to which universal service and access have been achieved. The Agency is also required, when requested, to advise ICASA on universal service.

55. Funding in the USAF, earmarked for the digital migration totals some ZAR 2,25 billion to date (Lewis, C (2015) 'Establishing a Local Content Fund: The Experience of Funding Universal Access and Service' Available at SSRN: https://ssrn.com/abstract=2663055 or http://dx.doi.org/10.2139/ssrn.2663055).
56. MyBroadband (2014). "They're after our billions! - USAASA". Available at: https://mybroadband.co.za/news/government/99798-theyre-after-our-billions-usaasa.html
57. ITWeb (2018). "Set-top box manufacturing war looms". Available at: https://www.itweb.co.za/content/O2rQGqAp8NWMd1ea TechCentral (2018). "USAASA CEO suspended after breakdown with board". Available at: https://techcentral.co.za/usaasa-ceo-suspended-after-breakdown-with-board/81030/
58. TechCentral (2017). "Set-top box dispute goes to arbitration". Available at: https://techcentral.co.za/set-top-box-dispute-goes-to-arbitration/71587/

The proposed dissolution of USAASA, as appears to be contemplated in the undeveloped Digital Development Fund (DDF) Bill, may remove some of these problems (mostly by replacing the USAF with the DDF, although the mandatory contribution should simultaneously hike from 0.2% to a minimum of 1%).

The administrative and governance costs of a dedicated agency have placed on the sector a considerable and unnecessary financial burden that can be reduced with incorporation. Dissolving the Fund as a body of resources raises important questions about the distribution of existing assets and funds, as well as the transfer of responsibility for these decisions and resources. The opportunity is ripe for mismanagement and a lack of capacity in designing and carrying out a tight handover will make the process vulnerable to opportunism.

5.5.3 South African Domain Name Authority (ZADNA)

South Africa's not-for-profit domain name authority (for the .za namespace) is a statutory regulator and manager of said country code top-level domain. Although it is accountable to the DTPS it does not receive government funding [59]; however, its board is nominated by a panel that is confusingly appointed by the Minister of Communications, and the nominations are appointed by this same minister.

According to the Electronic Communications and Transactions Act (2002)[60], ZADNA is mandated to:

- administer, regulate and issue licenses in terms of the Electronic Communications and Transactions Act;
- comply with international best practice in administration and management of the .za namespace;
- license and regulate registries; and
- license and regulate registrars for respective registries.

59. It is therefore exempt from complying with the Public Finance Management Act.
60. Department of Communications (2002). *Electronic Communications and Transaction Act*. Pretoria, South Africa.

6 REGULATION

To have effective competition in a market with entrenched incumbents requires effective regulation, and this returns us to the centrality of effective regulation for the efficient and equitable delivery of communication services.

6.1 ELECTRONIC COMMUNICATIONS LICENSING AND FEES

The Electronic Communications Act (No. 35 of 2005) and the Independent Communications Authority of South Africa Act (No. 13 of 2000) (ICASA Act) have established the mandate for ICASA to:

- grant licences to electronic communications operators and service providers;
- monitor licensee compliance with licence terms and conditions;
- develop regulations;
- plan and manage the radio frequency spectrum; and
- protect consumers.[61]

ICASA issues Electronic Communications NetworkService (ECNS) and Electronic Communications Services (ECS) licences on both Class and Individual bases. A Class ECNS (C-ECNS) licence is offered to operators working within a limited geographic area, the size of which corresponds to a district or municipality. The Individual (I-ECNS) licence is offered to commercial entities operating at provincial or national levels. The latter may only be applied for after ICASA has received a policy direction from the Minister of Communications, and only then may ICASA issue an ITA for all interested parties. The party to successfully apply for the licence must pay a once-off application fee. The successful party must pay both once-off and ongoing licence fees stipulated in the ITA. A Class ECNS application, on the other hand, requires a completed application form as well as a non-refundable fee[62]. Tables 6 and 7 below contain the fee figures.

The distinctions between Class and Individual ECS licences are similar to those between ECNS

Table 6: ICASA's ECNS licence fees (ZAR)

	CLASS ECNS LICENCE	INDIVIDUAL ECNS LICENCE
Initial application for licence	12 187	As specified in the ITA
Amendment of licence	6 094	60 940
Renewal of licence	6 094	6 094
Transfer of licence	6 094	60 940

Table 7: Spectrum licence fees (ZAR)

Unit price per MHz paired	2 226
Minimum fee	141
Minimum fee for a satellite hub station	58 596

61. Seen at: https://www.icasa.org.za/pages/telecommunications
62. The unit price per MHz paired is ZAR 2 226 plus 5.3% CPI at ZAR 2 344. For more information, see ICASA's Radio Frequency Spectrum Licence Fees for 2018

types, although an operator needs an Individual ECS (I-ECS) licence if they intend to use numbers from the national numbering plan. However, there is no policy directive required from the Minister in order for ICASA to issue an ITA for an I-ECS licence. The renewal of a Class ECS (C-ECS) costs the same as transferring or amending it (similar to a C-ECNS licence).[63]

6.2 BROADCASTING AND POSTAL SERVICES

As successor to the Independent Broadcasting Authority (IBA), established in 1993, ICASA enjoys the mandate from the South African Constitution to act as the 'independent authority to regulate broadcasting in the public interest, and to ensure fairness and a diversity of views broadly representing South African society'[64]. While the Broadcasting Act (No. 4 of 1999) provides for the regulation of broadcasting activities in the public interest, clarifying the powers of the Minister and ICASA in the process, the ECA promotes convergence in the broadcasting, broadcasting signal distribution and telecommunications sectors, simultaneously providing the legal framework for convergence of these sectors. As such, ICASA:

- develops regulations for the broadcasting industry;
- issues licences to service providers;
- plans and manages the radio frequency spectrum; and
- protects consumers against poor-quality services.[65]

In order to award and administer broadcasting licences, ICASA works within the framework of the following laws and regulations, as well as their amendments:

- Electronic Communications Act, No. 36 of 2005;
- Broadcasting Act, No. 4 of 1999;
- Processes and Procedures Regulations for Class Licences, 2010; and
- Standard Terms and Conditions Regulations for Class Licences, 2010.[66] In terms of the Postal Services Act (No. 124 of 1998), ICASA has to license and monitor the South African Post Office, including the rollout of street addresses and the provision of retail postal services in under-serviced areas.

Currently, the South African Post Office is the only reserved postal service licensee and it would require a policy direction from the Minister of Communications to get ICASA to issue an ITA for a competitor. Nonetheless, by completing the appropriate form, any applicant may request an unreserved postal service certificate.

Presidential Proclamation No. 79 of 2014 placed the South African Broadcasting Corporation (SABC) under the mandate of the DoC, in addition to being subject to regulation at the hand of ICASA. The country's ICT sector is linked to its broadcasting and postal components, but capturing their respective statuses is an exercise beyond the scope of this report[67].

6.3 SPECTRUM ASSIGNMENT AND FEES

The ECA provides that no signal may be transmitted or received by radio without the requisite spectrum licence issued by ICASA, with the exception of those frequency bands designated as license-exempt. Such a licence is required in addition to any service licence that ought to be obtained for providing a service via radio frequency spectrum.

The administration of spectrum licences is not what is holding up the assignment of additional spectrum to MNOs, and limiting the range of options for reducing mobile data costs to the benefit of consumers. MNOs and other licensees, along with

63. ICASA (2018). *Administrative fees* related to the Electronic Communications Act of 2005. Government Gazette, Pretoria. Available at: https://www.icasa.org.za/uploads/files/Admin-Fees-for-Service-Licences-2018.pdf
64. Taken from ICASA's published mandate on their website: https://www.icasa.org.za/pages/our-mandate
65. Seen at: https://www.icasa.org.za/pages/about-us
66. Ibid.
67. Note that broadcasting licences fall under a separate category of licensing, with specific and different criteria for individual vs class licences. Additionally, ICASA requires no ministerial direction to issue an I-BS ITA.

Table 8: Assignment of frequency spectrum bands (MHz) to mobile operators in South Africa

880 – 890	890 – 902	903 – 904	904 – 906	906 – 915	915 – 925	925 – 935	935 – 947	947 – 948	949 – 951	952 – 960
Cell C	Vodacom	MTN	Cell C	MTN	GUARDED	Cell C	Vodacom	MTN	Cell C	MTN
1920 – 1935	1935 – 1950	1950 – 1965	1965 – 1980	1980 – 2110			2110 – 2125	2125 – 2140	2140 – 2155	2155 – 2170
Vodacom	Cell C	MTN	Telkom	GUARDED			Vodacom	Cell C	MTN	Telkom

Source: OpenTelecomData, 2018
Note: For precise spectrum assignments, visit: https://opentelecomdata.org/spectrum-chart/

the public, have called for the 'high-demand' spectrum bands (700 MHz, 800 MHz and 2 600 MHz) to be released. Initially, in 2010, and again later, in 2016, ICASA publicly announced a spectrum auction but was stymied in both cases due to the failure of government, regulator, and industry to come to a common agreement on the terms of the auction.

Besides the market review being completed, the regulator urgently needs to be permitted to assign high-demand spectrum required for 4G LTE rollout. Operators are currently obliged to reform their existing spectrum in order to roll out LTE services, resulting in inefficiencies that contribute to the current high cost of services. However, the assignment of such spectrum should be done in such a way that it ensures any 3G coverage gaps are closed before operators can deploy any spectrum newly assigned to them. As consumer preferences shift from voice and SMS services to data, operators are no longer focusing primarily on price as their main point of attraction, but prioritising network quality and coverage instead.

With public Wi-Fi now carrying more traffic globally than GSM networks, who far from regarding them as unlicensed competitors as they once did, she them as critical to managing their network congestions unlicensed spectrum should be a far more central aspect of spectrum planning. In some countries – such as Rwanda and South Africa – metropolitan governments are offering 'free' public Wi-Fi (FPW) as part of their strategy to provide citizens with connectivity to access government services and the internet more widely. Given widespread use of internet-enabled phones with sufficient computer power and adequate screen sizes for meaningful use (even among lower income groups), free public Wi-Fi is a promising solution to universal access problems but perhaps more importantly by offering complementary free access to overcome challenges of inherently unaffordable GSM service. Regulators should leverage this success by expanding access to license-exempt spectrum and further reducing costs associated with its use.

There is also a need to extend and safeguard spectrum commons and enable un-utilised or under-utilised spectrum (even if this is already licensed) to be used. This needs to be implemented in a coordinated way that prioritises the efficient use of spectrum in order to enhance consumer welfare. As noted previously, the institutional arrangements proposed in the draft EC Amendment Bill for spectrum management, introduces unnecessary and unwarranted levels of co-jurisdiction over spectrum.

6.3.1 Migration to digital terrestrial television (DTT)

While the debate on "high-demand" spectrum has continued, the provision of publicly-subsidised set-top boxes, and their contested encryption status (which has been the subject of repeated court challenges), has led to a substantial delay in transferring terrestrial television broadcast signals from analogue to digital transmission. Nearly ten years after the DTT process began, South Africa has missed its own internally set initial deadline of switching off analogue signals in 2011, as well as the later 2015 ITU deadline, all while government suffers policy switches, a lack of policy clarity and

implementation delays. As June 2018, only eight countries in Sub-Saharan Africa have completed the switchover but South Africa might be expected to be among the leaders.The DoC, under the previous minister Mmamaloko Kubayi-Ngubane, confirmed the policy decision to not encrypt set-top boxes in February, and its new minister, Nomvula Mokonyane, has since appointed a 12-member Broadcasting Digital Migration Advisory Council to advise her on the progression of the DTT plan. This appointment took place after she established a DTT Programme Management Office (PMO), dubbed the 'War room', which is headed by Aldred Meyer. At the time of writing, the Council and PMO had not committed to a deadline for migration, as they were consulting various technical advisors on the necessary steps still to be taken.

Without these delays, South Africans would be enjoying the benefits of the higher quality and greater channel variety afforded by digital terrestrial television. In addition they would benefit from the freeing up of the much-needed spectrum discussed above, which would have been released for MNOs to reduce the cost of mobile data services[68]. Countries that have completed the switchover, such as Kenya and Tanzania, have already successfully assigned 700MHz spectrum to operators.

6.4 MOBILE TERMINATION RATES (MTRS)

Mobile termination rates (MTRs) or interconnection rates are prices or fees that carriers charge for terminating or completing calls on each other's network. These charges form part of an operator's cost of providing calls to its customers. These rates may be commercially negotiated or may be regulated[69]. In some countries, the regulator only facilitates termination negotiations but cannot set termination charges, unless operators fail to reach an agreement.

ICASA has completed the implementation of the MTR glide path established in 2014, which ran until September 2017. The rate dropped from ZAR 0.31 to ZAR 0.19 over three years, where it currently sits. An asymmetrical rate was effected against MTN and Vodacom as the two largest MNOs, who benefitted from a net-inflow of MTR revenue compared to Telkom Mobile and Cell C, with the termination rate in their case initially pegged at ZAR 0.20, dropping to ZAR 0.13 by September 2017. The justification for creating this glide path was to minimise the incentives that existed for operators to seek additional revenue from MTRs since they act as an input cost which affects the end user. A similar glide path imposed on Telkom saw fixed termination rates cut to ZAR 0.10 over the same period.

More recent review of the regulation and its impact led to ICASA extending the period of applicability to September 2018, and issuing a statement (later to be revised) to the effect that asymmetry remains 'necessary to minimise the impact of the disadvantages faced by late (small) entrants and new entrants for a defined period to enable them to compete effectively with the incumbents'[70].

6.5 END USER AND SUBSCRIBER SERVICE CHARTER

While ICASA has been compelled to focus its resources onto termination rates, it has also faced pressure from Parliament and the Ministry to focus

68. MyBroadband (2018). "South Africa must finish digital TV migration by June 2019". Available at: https://mybroadband.co.za/news/broadcasting/245788-south-africa-must-finish-digital-tv-migration-by-june-2019.html
69. The approach for regulating MTRs adopted by most regulatory authorities allows for total cost recovery based on an entirely allocated cost model. Two schemes are usually used when setting termination rates: pure-long-run incremental cost (pure-LRIC) and long-run incremental charges plus (LRIC+). The LRIC+ has been adopted by Ofcom in the UK, while Kenya uses pure-LRIC to set termination rates. In both schemes, the regulators set costs by comparing calculated costs to a hypothetical efficient new entrant. The difference between these two approaches is in the calculation of costs, with the pure-LRIC considering the marginal costs, while under the LRIC+, the regulator sets termination rates based on detailed costs, which include common costs.
70. ICASA (2018). "Briefing note on asymmetry in mobile and fixed wholesale voice call termination". Available at: https://www.icasa.org.za/uploads/files/Briefing-note-on-asymmetry-22-june-2018.pdf

Table 9: Out-of-bundle data rates for operators in South Africa (ZAR) (Oct 2017)

Cell C	0.15
MTN	0.89
Telkom	0.29
Vodacom	0.89

Sources: ICASA, 2017; ITWeb, 2017
Note: Cell C has various OOB data rates; the cheapest was used.

on reducing the cost of data. The resultant regulation of out-of-bundle (OOB) data costs and data expiry periods requires operators to inform users better of the impending changes to their cost structures for both prepaid and post-paid customers. Although the determination was welcomed, there was some consternation at ICASA's decision to back down on extending the validity periods of data bundles up to three years, and to opt for a simple data rollover instead[71]. MNOs are now required to notify users when their data bundles are 50, 80 and 100 percent depleted, to seek the explicit opt-in of subscribers for out-of-bundle charging, and to offer the options of continuing without data, purchasing a data bundle from the unstructured supplementary service data menu (to be made available by notification) or opting in to OOB rates[72].

What is more, the Charter also includes the mandatory option for users to roll over unused data should there be a remainder at the time of expiry. While these regulations have generally been welcomed by all but the operators, there is the possibility of unintended outcomes, particularly to product and service innovation. While South Africa scores poorly in the RAMP Index (the measure used by RIA globally to compare prices) for 1 GB of data, several high-value, low-cost products are provided by operators and widely – indeed predominantly – used by price-sensitive users. The innovation of these products arises from the maximising of network capacity at specific times, which takes the form of validity periods. It is nevertheless worth considering, as an area for consumer protection, the profits made from sliding users onto higher OOB rates without their awareness.

One shortfall of this tactic is that, while users may unintentionally be saving a substantial amount from such a regulation, the users (and Parliament and #DataMustFall campaigners) may remain unsatisfied as advertised retail prices remain unchanged. It is conceivable that operators may seek to compensate for revenue shortfalls by increasing advertised retail prices, but there is no evidence of this as yet in the RAMP Index.

Lastly, the Charter updates the mandate of licensees to run a minimum of four educational campaigns for end users to better understand smartphones, how to use data and the range of products available to them. This again targets the lack of users' awareness, which could cost them unnecessarily when it comes to the data usage habits of modern life.

71. TechCentral (2018). "ICASA backs down on data expiry rules". Available at: https://techcentral.co.za/icasa-backs-down-on-data-expiry-rules/80915/
72. MyBroadband (2018). "Mobile networks heading to court over out-of-bundle regulations fights". Available at: https://mybroadband.co.za/news/telecoms/267265-mobile-networks-heading-to-court-over-out-of-bundle-regulations-fight.html

Part C

Market and competition analysis (supply-side)

7 MARKET STRUCTURE

Although South Africa now has a horizontal licensing regime, with separate network and services licences, the legacy of the monopoly market in fixed services and the duopoly in the mobile market remain. The protectionism afforded state-owned entities, the advantages of incumbency together with delays and ineffectual *ex ante* regulation required to create an enabling environment for new entrants has affected developments of some telecommunication markets, especially the fixed technology market. The South Africa telecommunication market remains structured around vertically integrated incumbents who compete downstream in the services markets. Although the functional separation of Telkom required by the Competition Commission following findings of anti-competitive practice had arguably limited effect on Telkom's behaviour, their voluntary structural separation in response to the Commission they faced from wholesale open access carriers does appear to have brought some transparency to their practices and pricing, as witnessed in their recent positive results. The entry of multiple open access fibre operators, in both the international transmission and national transmission markets does appear to have had positive competitive effects on prices and investments. Fibre to the home or office in the access network is also driving up quality and driving down prices where services are being rolled out, but this remains primarily a high-end residential and corporate offering.

The main rival of fixed services, as was the case in the voice market, is now data in the mobile market. While the mobile market might appear competitive, with four players in the market and a number of virtual networks and services, as a result of a series of regulatory failures on which dominant operators in the mobile market have been able to capitalise, it is concentrated around two players who own more than 80 percent market share of active SIMs: MTN and Vodacom. Due to the existence of club effects and first-mover advantage, the late entrants Cell C and Telkom Mobile have not been able to place pressure on the incumbents and have struggled to keep more than a 10–15 percent market share.

With data becoming the central requirement for most smartphone users, it appeared that the shift from voice to data might level the playing field as club effects and high off-net voice prices diminished. While the incumbents sought to lobby decision-makers against OTTs, Cell C embraced them, growing their market significantly for a period with zero-rated products. Though MTN clung to its voice market revenues, Vodacom responded to the inevitable shift to a voice and text substitutable, data-only environment investment heavily in its broadband network to attract and retain high-end customers. Vodacom and MTN's dominance in the market enables them to have the liquidity to reinvest in its network, extending its network coverage and improving the quality it offers. This in turn enables them to attract more customers and thereby increase their surpluses and be in a better position to buy more spectrum and enhance the quality of their network. Even without engaging in any anti-competitive practices, this creates a virtuous business cycle against which smaller operators cannot compete, without cost-based access to dominant operators' networks. Wholesale price regulation of this kind is critical to creating a fair and competitive environment, but it has to be done in a way that does not remove incentives for investments by operators to build out and upgrade their networks.

The rest of this section examines the impact of the market structure on the competitiveness of the market with reference to a number of key indicators. Drawing on theoretical and empirical studies, it examines the degree of concentration in the markets, as this has been found to have a positive impact on mobile prices and a quadratic

relationship with capital expenditure per subscriber[1, 2]. Although the number of operators is used as an alternative measure of market structure, it has been found to have no significant effect on both prices and investment[3].

The Herfindahl-Hirschman Index (HHI) is used to measure concentration in the market and hence competition. The South African mobile market is highly concentrated, with an HHI of 3 495, higher than the 2 500 score for highly concentrated market as indicated by the Federal Trade Commission and the US Department of Justice. Suggesting minimal competition in the South African mobile telecommunication sector. Empirical results from the literature indicate that increase in market concentration increases market prices. Results also indicate an inverted-U relationship between market concentration and investment. The indicate that there is a trade-off between static and dynamic efficiency. Competition in mobile telecommunications reduces prices but also results in lower investments as compared to more concentrated markets[4]. Competition in mobile telecommunications reduces prices but also results in lower investments as compared to more concentrated markets. Market concentration is also found to have positive relationship with Earnings before interest, taxes, depreciation and amortisation (EBITDA) per subscriber and average revenue per user (ARPU). Pricing provides the best indicator of the competitiveness of a market, and is itself an indicator of the effectiveness of the market structure and regulation of the sector. Although data limitations make an assessment of the impact of market structure at operator level on mobile prices and investment difficult to assess comprehensively the relationships between these are examined.

This section starts with a description of the main operators in the markets and then undertakes an assessment of the competitiveness as described above. It follows with an identification o f markets, as would be the case had the critical Chapter 10 review of markets required by the Electronic Communications Act had undertaken and a high level assessment where the bottlenecks in the markets are and which markets would be susceptible to ex ante regulation. A key aspect of infrastructure regulation which is inherently imperfect is ex ante regulation which is designed to protect consumers in the retail market by safeguarding fair competition in wholesale markets. Telecommunications regulators around the world define markets and determine dominance for these markets in order to design the appropriate ex ante regulation that promotes competition and thus affordable user prices and efficient investments[5]. Despite the regulator having completed market reviews in 2008 and 2014, a decade on, no determination has been made on market definitions, preventing it from intervening on other competitive issues constraining the development of the sector[6]. In 2017, ICASA again announced its intention to conduct a public enquiry into

1. Eggers, J. P., Grajek, M., and Kretschmer, T. (2011). First Mover Advantages in the Mobile Telecommunications Industry: A Consumer-Centric Perspective. ESMT Working Paper 03.
2. Frontier (2015), Assessing the case for in-country mobile consolidation. Report prepared for the GSMA, February 2015.
3. Hawthorne, R (2016). How competitive are markets for telecommunications services in South Africa? ACER 2016
4. Mutinda, S (2016) Evaluation the Impact of Market Structure in Mobile Telecommunications markets: Panel data analysis for Emerging Economies, Masters thesis, UCT.
5. EU (1997). Definition of relevant market. Available at: http://europa.eu/legislation_summaries/competition/firms/l26073_en.htm
   BEREC (2013). Response to the European Commission's questionnaire for the public consultation on the revision of the Recommendation on Relevant Markets, March 2013.
   Cave, M, Stumpf, U, and Valletti, T. (2006). A Review of certain markets included in the Commission's Recommendation on Relevant Markets subject to ex-ante Regulation.
6. National Gazettes, No. 40945 of 30 June, 2017

priority markets and it was anticipated to have been concluded by mid-2018 but the time of writing this report the determination was still pending.[7].

7.1 UNDERSEA CABLE OPERATORS

For the period up to April 2009, Telkom had a full monopoly on submarine cables into South Africa and was able to charge excessively high rates on international bandwidth out of South Africa. However, at that time, Telkom only sold the half circuit between South Africa and Europe, and one of the other international consortium members would have to sell the other half circuit into Europe. Since the end of the exclusivity period, other owners such as BT and Neotel have now been able to sell full end-to-end circuits on SAT-3 and SAFE.

Since 2009, a number of new cables have been laid around Africa on both the East and West coasts, and today there are six submarine cables that connect SA to the rest of the world. This has resulted in a massive reduction in prices for bandwidth, and has boosted the demand very significantly for international connectivity.

The price of international transmission, the major cost of inputs for ISPs only 10 years ago, has continued to fall since the advent of competition in the market. With the entry of Seacom in 2009, followed shortly thereafter by EASSy (both of which run up the East Coast of Africa), with an advent of the West Africa Cable System (WACS) and Africa Coast to Europe (ACE) consortia (consisting of a number of South African incumbents and larger operators) on the West African coast, the stranglehold that the SAT-3 consortium had on the continent was broken. The consortium arrangements and open access models of the new undersea cable operators changed the structure and ownership of the international transmission market entirely.

Seacom is owned by the company's founder, Brian Herlihy (10%), while 60 percent is held by South African groups: Remgro (30%), Sanlam (15%) and Convergence Partners (15%). The remaining 30 percent is held by the Aga Khan Development Network in Kenya (MyBroadband, 2016). EASSy is a public–private consortium consisting of 16 Africa (92%) and International (8%) shareholders, including the West Indian Ocean Cable Company (itself comprising a further 13 shareholders), MTN International Group and Neotel South Africa. The 17 200 km WACS spans the West Coast of Africa, starting at Yzerfontein near Cape Town and terminating in the United Kingdom. It was launched in 2012 with a design capacity of 5.12 tbps. The ownership of WACS consists of 14 telecommunications operators, Neotel, Telkom, Broadband Infraco and Vodacom[8].

With the arrival of competing undersea cables, prices fell to a fraction of what they had been under the SAT-3-SAFE monopoly. While international bandwidth previously made up 80 percent of ISPA costs, it now made up roughly 20 percent. The real cost challenges shifted to national transmission, which now made up the bulk of costs. For many ISPs international bandwidth is now cheaper than national bandwidth (personal interview, Anthony Brooks, ISPA, 2016).

7.2 FIXED NETWORK/SERVICES OPERATORS

Considerable backbone and backhaul investments have been made over the decades by the likes of Telkom, Liquid Telecom South Africa (previously Neotel) and Broadband Infraco, giving South Africa the most extensive infrastructure on the continent. This has been supplemented in recent years by the expansion of fibre networks in the larger metropolitan areas. The overlays of fibre and bandwidth available is a key measure of competitiveness of cities as global investment destinations. The cost of the fibre is, of course, a further consideration. With negligible wholesale access regulation in South Africa, despite the duplication and the existence of a clear facilities-leasing framework, the cost still remains relatively high.

Competition in fibre network rollouts in South Africa was initiated by the 2005 High Court ruling that ended Telkom's infrastructure monopoly and

7. In August 2017, ICASA released a briefing note on Phase 1 of (Market Study) of the Priority Markets Inquiry in Terms of Section 4B of the Independent Communications Authority of South Africa Act of 2000.
8. BusinessTech (2012). WACS ownership breakdown. Avaialble at https://businesstech.co.za/news/telecommunications/12582/wacs-ownership-breakdown/

allowed mobile operators and value-added service providers to build their own networks. Competition in the fibre-to-the-home (FTTH) market intensified in 2014, following the appointment of Vumatel to lay fibre in Parkhurst, which subsequently led to a stampede to lay fibre in all the other metros. Since Vumatel's success, the number of competitors in the infrastructure market has risen to 35. Other than Vumatel, main players in the FTTH market include mobile operators, MTN and Vodacom and Openserve, which together owns 80 percent of the market[9].

7.2.1 Telkom

The Telkom group comprises of Openserve, Telkom Consumer, BCX and others. The group, which is partially owned by government, reported a 19.2 percent decrease in profit after tax to ZAR 3.1 billion for the period ending March 2018 (March 2017: ZAR 3.8 billion). The group attributes profit decline to an increase in the taxation expense and a 3.6 percent decrease on earnings before interest, taxation, depreciation and amortisation (EBITDA) of ZAR 10.5 billion.

Open Serve, Telkom's wholesale subsidiary, is the giant fibre operator in South Africa. In 2017, the company announced that it had deployed 150 000 km of fibre nationally. Its fibre network had passed over 300 000 homes, of which almost 74 000 were connected. In its provisional annual results for the year ending March 2018, Telkom reports fibre capital expenditure of ZAR 2,1 billion. Telkom faces stiff competition from Vumatel, Vox and Cybersmart, who are investing aggressively in rolling out their networks.

Fixed-line voice service demand continues to decline as telecommunication subscribers substitute them with mobile technology services. While the group is performing well in the mobile service market, increasing its market share by 30 percent, the fixed-line subscriber base is shrinking. As of March 2018, the fixed-line subscriber base of Telkom stood at 2,7 million, representing a 9.3 percent decline in subscription (2.9 million subscriptions in March 2017).

Revenue per fixed access line also declined from ZAR 4 718 in March 2017 to ZAR 4 703, representing a 0.3 percent decrease. Also declining is the average revenue per user, which declined by 1.8 percent to ZAR 360.82.

Fixed-line data service demand is negatively affected by the swelling of demand for mobile broadband services (981 176 fixed broadband subscribers). As of 2018, Telkom had less than 1 million subscribers on their fixed broadband technologies. The number of broadband subscribers decreased by 2.2 percent but compensated by an increase in Telkom mobile broadband use of 37.5 percent.

7.2.2 Liquid Telecom

In its intention to creating the largest pan-African broadband network, Liquid Telecom acquired 70 percent of Neotel, South Africa's second national operator. Liquid Telkom has access to 40 000 km of cross-border, metro and access fibre networks, spanning 12 countries across Africa. The remaining 30 percent of Neotel was acquired by Royal Bafokeng Holdings. The company has deployed a ZAR 7 billion nation-wide backbone fibre network, connecting 40 cities and towns across South Africa[10].

7.2.3 Broadband Infraco

Broadband Infraco is a state-owned telecommunications company, providing a portfolio of products with high capacity managed bandwidth from point of presence (PoP) to PoP through a national long distance fibre optic network. The company has invested in fibre networks, comprising of 14 923 km of fibre utilising dense wavelength division multiplexing (DWDM) equipment. The Broadband Infraco fibre networks provide its 30 customers – across various segments, such as mobile network providers, content providers, high data SOCs and international players – with a combination of base capacities, ranging from 2.5 Gbps to 100 Gbps.

9. Nkosi, W (2017). Competition for a byte of the fiber market? Econex, Available at: https://econex.co.za/competing-for-a-byte-of-the-fibre-market/
10. https://www.liquidtelecom.co.za/wps/portal/neotel/AboutUs/EverythingNeotel/!ut/p/a0/04_Sj9CPykssy0xPLMnMz0vMAfGjzOJN_J1NPJyCDbz9Q3zdDByDzTydwixdDI2czPQLsh0VASwUE7w!/

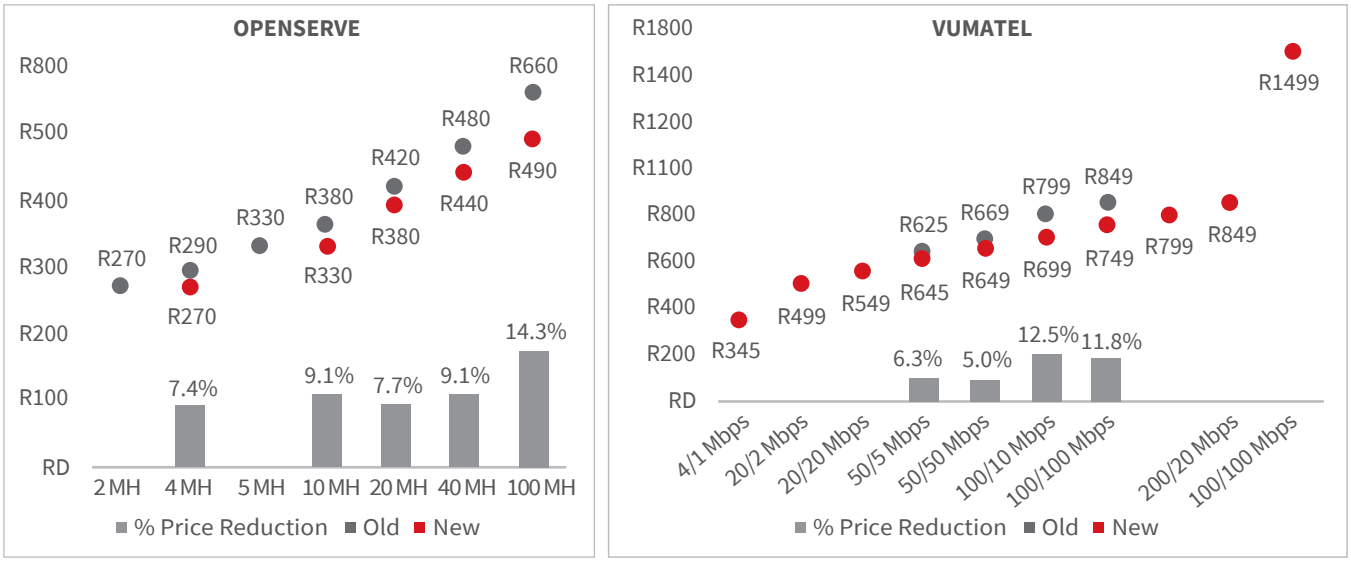

Figure 5: Price reductions on bandwidth at wholesale level (OpenServe and Vumatel)
Source: Econex Calculation, 2017[11]

Despite the increase in its customer base in 2017, Broadband revenue declined by 12 percent to ZAR 397 million, an outcome that the company attributes to a consolidation process. However, the company remained cash positive with a positive EBITDA. To improve its networks, the company invested ZAR 70 million in 2017. Half of the six major routes that were optimised were completed at 100 percent.

7.2.4 Fibre national transmission and metros

Dark Fibre Africa (DFA)

To increase its presence in the market, Community Investment Venture Holdings (CIVH) acquired 3.9 percent of Vumatel, with an intention to increase its stake. The addition of Vumatel's 8 000 km fibre to the 10 000 km DFA fibre, a subsidiary of CIVH will significantly strengthen CIVH's position in the fibre market, creating a strong competitor to OpenServe and Neotel\Liquid[12].

Together with the backhaul investments made by the mobile operators, MTN, Vodacom, Cell C and Telkom, South Africa is estimated to have over 60 000 km of unduplicated fibre and over 80 000 km of duplicated fibre.

Although the copper fixed-line market is dwindling, the FTTH market is expanding rapidly, with many of the more affluent areas of the major cities covered by companies such Vumatel, Fibrehoods, Frogfoot and Octotel. The remaining retail broadband market is driven by the mobile operators who continue to reap the benefits of massive investments in the next-generation networks in response to growing demand for data. Total subscriber numbers have flattened off with 53 percent Internet penetration, suggesting some level of saturation.

The fixed-line services continue to see a decline in usage and revenue. The fixed-line penetration has declined from 11 percent in 2004 to eight percent in 2016, with only two percent of the population using fixed broadband services[13].

7.3 MOBILE MARKET NETWORK SERVICE

Mobile market makes up the lion's share of the end user market for voice and increasingly for data, with voice declining in revenues as data burgeons. This

11. Nkosi, W (2017). Competition for a byte of the fiber market? Econex, Available at: https://econex.co.za/competing-for-a-byte-of-the-fibre-market/
12. Broadband (2018). The quiet giant shaking up South Africa's telecoms market. Available at: https://mybroadband.co.za/news/telecoms/263801-the-quiet-giant-shaking-up-south-africas-telecoms-market.html
13. International Telecommunication Union (ITU), (2016). Fixed-telephony subscription. ITU Statistics. Available at: https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx

section will therefore provide a far more in-depth assessment of this market.

South Africa has a vibrant mobile market that has seen rapid uptake and unexpected innovations which have far surpassed market expectations, when the first two licences were granted in 1993. The dominant operators are Vodacom and MTN (in terms of SIMs and voice minutes), with Cell C and Telkom Mobile trailing behind. All are increasingly forced to find innovative ways of distinguishing themselves from competitors to gain and retain customers, as they deal with the presence of disruptive OTT services and the migration of their core business from voice to data.

While for some the voice revenues of dominant mobile operators were under threat from OTTs like WhatsApp, others like Cell C embraced OTTs, offering zero-rated free basic access to OTTs in order to attract customers, and have been successful in clawing some market share away from the dominant operators. In the face of Cell C's success, Vodacom responded by providing innovative products such as the 'Just 4 You' package that is individually tailored for the specific user. MTN also responded by offering cheaper low-data bundles, specifically to attract low-intensity Internet users. In addition, MTN and Vodacom also zero-rated Facebook, Twitter and other educational content.

As pointed out earlier, however, it is important to note that supply-side figures do not measure unique subscribers, but rather active SIM cards, which explains the inflated penetration levels. The After Access survey undertaken by RIA in 2017 shows that the actual per capita mobile phone penetration in South Africa stands at 84 percent.

7.4 OWNERSHIP AND MARKET SHARE

7.4.1 Vodacom

Vodacom is the largest operator in South Africa, with a subscriber base of 45 263 001, corresponding to 46.8 percent of the market[14]. Vodacom was licensed to provide GSM cellular service in 1993, and became operational in 1994. In 2002, it started its General Packet Radio Service (GPRS) and later pioneered 3G services in 2004. Vodacom was the first operator in South Africa to launch 4G LTE technology in 2012. As of 2018, the company claims to have extended its 4G network coverage to some 80 percent of the population, with 3G now reaching 99.97 percent, and only 0.03 percent with no coverage. Despite the investment made in 4G networks, only a small proportion of Vodacom subscribers (16 percent) are connected via LTE. The majority of Vodacom subscribers in South Africa are connected either through W-CDMA (44 percent) and GSM (40 percent)[15].

Vodacom was initially a joint venture between Telkom and Vodafone UK, and subsequently part of the Thintana strategic partnership in the privatisation of Telkom, indeed arguably its cash cow. Part of the Vodafone agreement blocked Vodacom from competing against Vodafone; as mobile markets were opening up in Africa, Vodacom was only allowed in markets south of the Equator. In a bid to develop its mobile phone services and to extend its mobile services to other African markets, Telkom sold its 15 percent stake in Vodacom to Vodafone for ZAR 22.5 billion (USD 2.22 billion) in a controversial transaction in 2008. The remaining Telkom stake was listed on the stock exchange and sold to former shareholders.

7.4.2 MTN

Similarly, MTN, the second largest mobile operator (measuring by active SIM cards), was granted a licence to provide mobile services in 1993 and launched in 1994[16]. MTN started its transition from 3G to 4G in 2012, with a capacity to offer speeds of 70 mbps, though at that time it could only provide average download speeds of between 7 and 20 mbps[17]). The MTN subscriber base of active SIM cards

14. GSMA Intelligence, (2018). Available on subscription
15. GSMA Intelligence, (2018). Available on subscription
16. MTN Group Limited, Book 1-MTN Group Overview, (2009). "Integrated Business Report for the year ended 31 December 2009". Available at: https://www.mtn.com/MTN%20Service%20Detail%20Annual%20Reports/ar_2009_group_overview.pdf
17. TechCentral, (2012). MTN launches commercial 4G network. Available at: https://techcentral.co.za/mtn-launches-commercial-4g-network/36673/

stands at 29 806 000, representing a market share of 31 percent, some way behind that of Vodacom. The majority of its subscribers (72%) use 3G W-CDMA network with 18 percent on GSM and only ten percent connect via LTE[18], despite the fact that MTN claims 80 percent 4G population coverage in 2018 (9 212 4G sites across the country). MTN's 3G population coverage is reportedly 98 percent, marginally less than that of Vodacom's.

MTN is a publicly listed company, with 70.6 percent listed on the stock exchange. Major institutional shareholders include the government employee pension fund (14.8%), Lombard Odier Darier (9.8%), and MTN Zakhele Futhi (4.1%).

7.4.3 Cell C

Cell C entered the South African market in 2001, seven years after Vodacom and MTN. The company launched its 2.5 G EDGE-based services in 2005. EDGE allowed it to offer value-added services such as multimedia messaging service (MMS), Internet access and content download. The entry of Cell C increased competition in the South African mobile market, previously a duopoly of Vodacom and MTN. As of 2018, 17 years later, the company has managed to gain 17 percent of total market share of active SIMs, claiming some 16.3 million subscribers, and a doubling of the company's market share since 2011. Cell C business is highly dependent on the provision of Mobile Virtual Network Operators (MVNOs) on its network, which contributed ZAR 370 million to its revenue[19]. The majority of Cell C subscribers (72%) connect via 3G W-CDMA technology, while 21 percent are on 2G GSM technology and a mere 7 percent use 4G LTE technology[20].

At launch, Cell C was 100 percent privately owned by 3C Telecommunications. Following its successful recapitalisation in August 2017, Blue Label Telecoms successfully acquired 45 percent share while Ne1 UEPS Technologies bought 15 percent. 3C Telecommunications now holds 30 percent, with the remaining 10 percent held by Cell C management and staff.

7.4.4 Telkom

Telkom's mobile arm entered the market as '8ta' in 2010, and is the smallest operator, with barely five percent of the active SIM market in 2018, despite being able to leverage the fixed-line market presence and backhaul facilities of Telkom. After a very slow start in the market, Telkom's cheap data prices have built some market share, with it gaining the largest number of subscribers in 2016/17[21].

7.4.5 Virgin Mobile

Virgin Mobile has operated as an MVNO since it came into the market with some fanfare in 2006[22] However, the service has not been able to attract large audience on the brand alone, with offerings that are not very competitively priced or products that are not very innovative. It has less than one percent market share, a penetration that has shifted little in the 12 years since it come on the market. It appears to be able to tap into the United Kingdom and European tourist market, where it is well-established as a brand.

rain, a data-only mobile network, launched its service is 2018, with flat-rate offerings (ZAR 0.05 per MB) intended to incite competition in the data market, where high pricing for OOB data has been the subject of consumer ire.

18. GSMA Intelligence (2018), Available by subscription
19. Cell C Annual Report Presentation for year ended 31 December 2017. Available at: https://www.cellc.co.za/cellc/static-content/PDF/ANNUAL_RESULTS_2017.pdf
20. GSMA Intelligence (2018), Available by subscription
21. Mothobi, O. (2017). South Africa data prices static for two years but consumers not flocking to cheapest product offering. Research ICT Africa Policy Brief no.3. Available at: https://www.researchictafrica.net/polbrf/Research_ICT_Africa_Policy_Briefs/2017_Policy%20Brief%203_South%20Africa.pdf
22. Theron, N. (2006). The competitiveness of the SA Mobile Market- Will the entry of Virgin Mobile increase competition? Research Note 4. Econex. Available at: https://econex.co.za/wp-content/uploads/2015/04/econex_researchnote_4.pdf

7.5 PERFORMANCE OF MOBILE OPERATORS

Innovations and technological changes in the telecommunications industry continue to change the business environment of the sector. The entry of data communication applications, more specifically the voice and text OTTs, is expected to have a negative impact on voice service revenue. To keep a grip on revenues from voice and SMS, the two dominant operators, Vodacom and MTN, unsuccessfully lobbied ICASA to regulate OTTs (such as WhatsApp and Skype, which have proven to be significant substitutes for voice calling)[2324] . Despite the relatively high cost of data, the amount of data used by such applications means they are far cheaper than traditional voice and text services, though over time the widespread adoption of such substitutes has compelled the operators to reduce the margins on traditional end-to-end voice services to close to zero.

The competitive effect has been to undermine the first-mover advantage of incumbents in the telecommunications market and allow smaller operators that embrace OTTs to be competitive and gain market shares. While initially MTN and Vodacom rejected OTTs, Cell-C was the first to adopt them, offering some as zero rated services to attract customers to its network, a strategy that increased the company's market share in the South African market. When Vodacom realised the impact of Cell C's decision on retention of their customers and on attracting new first-time Internet users, it also started offering social network bundles and zero-rated products, which put a brake on Cell C's distinctive offer and rapid subscriber growth. While the telecommunications industry is oligopolistic in nature, the evolution of data communication services is likely to move the market towards competition, with many operators likely to enter the market. For instance, the entry of Rain, a provider of fixed and mobile data products, without legacy voice service to protect its revenue, is expected to increase competition in the market.

7.6 MARKET SHARE AND REVENUES

The telecommunications sector is one of the largest industries in South Africa. For the year ending March 2017, the industry generated about ZAR 135.9 billion in revenue. Vodacom has the largest share of this revenue, amounting to ZAR 70 billion (8.1% increase from the previous year), followed by MTN (ZAR 42.5 billion – 3% increase). For the same period, Vodacom's service revenue increased by 5.6 percent to reach ZAR 52 billion, while that of MTN's increased by 3.9 percent. The increases in service revenue for

Table 10: Revenue by operator (ZAR)

	TOTAL REVENUE	SERVICE REVENUE	DATA REVENUE SHARE
Vodacom	70 billion (+8.1%)	54,6 billion (+4.9%)	40%
MTN	42.5 billion (+4.7%)	(increased by 3.9%)	34%
Telkom	7.8 billion (+28%)	5.1 billion (+47.2%)	
Cell C	15.7 billion (+7%)	13.1 billion (+12%)	30%

Sources: Cell C Annual Report, 2017
MTN Group, Annual Report, 2017
Telkom Group Annual Report, 2018
Vodacom Group Annual Report, 2018
Notes: Service revenues for MTN Group, as well as Telkom's data revenue share were not reported.

23. Mothobi, O. (2017). South Africa data prices static for two years but consumers not flocking to cheapest product offering. Policy Brief no.3. Research ICT Africa. Available at: https://www.researchictafrica.net/polbrf/Research_ICT_Africa_Policy_Briefs/2017_Policy%20Brief%203_South%20Africa.pdf
24. Mothobi, O., Alison, G. and Rademan, B. (2018). Dominant operators' data prices remain static while SA struggle to get and stay online. Research ICT Africa Policy Brief 1. Available at: https://researchictafrica.net/wp/wp-content/uploads/2018/06/2018_Policy-brief-1_Data-prices-remain-static_South-Africa-.pdf

these two operators were mainly due to growth in the numbers of active SIMs, and increased demand for data products. In the same period, Vodacom's data revenue grew by 2.1 percent to ZAR 23.3 billion (making up 40% of service revenue), while that of MTN increased by 25 percent to reach 11.3 billion and contributed 34 percent to total revenue. Both MTN and Vodacom attribute their revenue growth to improved 3G and LTE network quality, alongside an aggressive smartphone sales campaign[25][26].

For the period ending March 2017, Cell C revenue recorded the highest percentage revenue increased by seven percent, to reach ZAR 15.7 billion, while Telkom's mobile revenue grew by 28 percent, reaching ZAR 7.8 billion in March 2018. Telkom recorded the highest percentage increase in service revenue (47.2% to reach ZAR 5.1 billion), while Cell C's service revenue increased by only 12 percent, taking it to ZAR 13.1 billion. Cell C attributed the strong revenue growth to its 'strategy of innovation, exceptional value in product offerings and customer-centric approach', while its lesser service revenue increase was attributed to the growth in data volumes (an increase of 67 percent to reach ZAR 4.4 billion)[27][28].

While much is made of pricing, a closer look at how the market evolves according to adjustments in operators' competition strategies shows that their intense focus on improving their network quality, speed and coverage is the most significant factor in earning market leadership. The subscriber bases of the two smaller mobile operators increased by higher percentages than those of the larger players in 2016/2017. Telkom and Cell C registered subscriber growth rates of 47.7 percent (from 2.7 million active SIMs in 2016 to 4 million in 2017) and 20 percent (up to 15.5 million active SIMs) respectively. It is important to note that these operators are growing from a much lower base than the two major operators, which makes their higher percentage growth rates unsurprising.

Vodacom's subscriber base grew by 12.1 percent to reach 41.6 million in 2018, double the subscriber base of Cell C. The company registered more than four million new subscribers, a quarter of Cell C's total subscribers, and its prepaid subscriber base reached 36 million (up by 13.4%) in 2018. Vodacom attributes the growth in its subscriber base to its new bespoke offering 'Just 4 You'. Having increased its subscriber base by 0.6 percent to reach 30.8 million in 2016, MTN's number of active SIMs declined to 29.5 million in 2017. The effects of its turnaround strategy (more competitive pricing and improved service quality) may only be seen in its 2018 figures.

7.6.1 Investment

After several years of slower growth in operator revenues, and clinging to their traditional voice and SMS services in the face of the growing adoption of OTT voice services (WhatsApp, Skype and their ilk), operators in South Africa appear to have turned their attention to data revenues. Mobile operators have made significant network infrastructure investment to be able carry the vast volumes of data transmitted by bandwidth-intensive applications and platforms (see Figure 6).

For example, as part of its strategy to grow its network capacity, reduce its reliance on third-party transmission providers and improve network redundancy, and in an effort to catch up with the rate of investment by dominant operators, Cell C commenced replacement of its Core Transmission Legacy SDH

25. MTN Annual Results, (2017). Financial results for the year ended 31 December 2017. MTN Group. Available at: https://www.mtn.com/MTN%20Service%20Detail%20Annual%20Reports1/Booklet2017.pdf
26. Vodacom (2018). Integrated report for the year ended 31 March 2018. Vodacom Group. Available at: http://www.vodacom-reports.co.za/integrated-reports/ir-2018/pdf/full-iar-lores.pdf
27. Cell C, (2017). Annual results presentation for the year ended 31 December 2017. Available at: https://www.cellc.co.za/cellc/static-content/PDF/ANNUAL_RESULTS_2017.pdf
28. Telkom SA SOC Limited, (2018). Group Provisional Annual Results for the year ended 31 March 2018. Available at: http://www.inceconnect.co.za/sens-view/12589

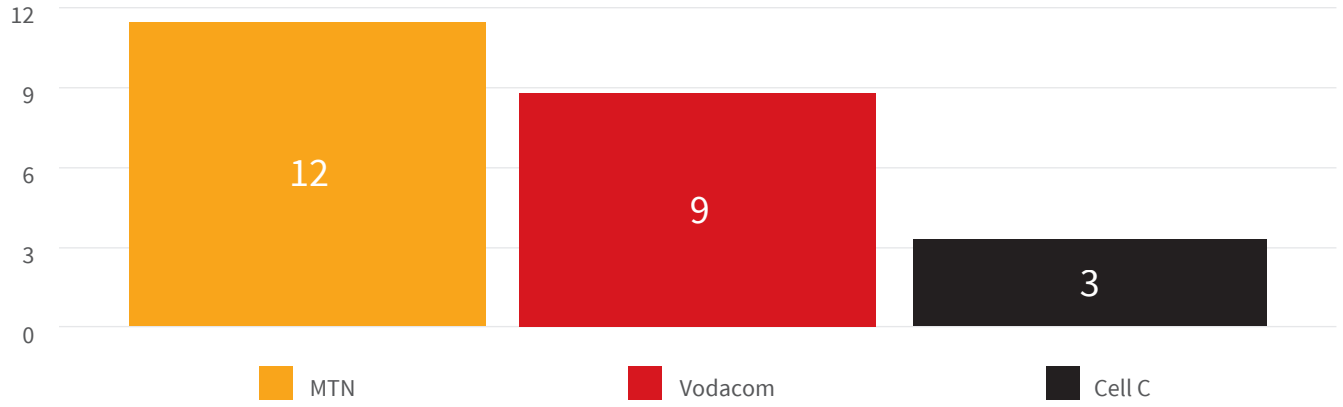

Figure 6: Operators' capital expenditures (ZAR billions) in 2017/18
Sources: Operators' annual reports, 2017/18

technology with a new IP-MPLS and Dense Wavelength Division Multiplexing (DWDM) Core in 2016. Cell C attributes its good performance in the year ending March 2017 to significant investment in infrastructure and the rollout of additional sites, amounting to a capital expenditure of about ZAR 1.2 billion. A decline in capital expenditure (from ZAR 3.4 billion as reported by Cell C in December 2016) does, however, suggest that the smallest operator was not able to hold to its strategy of improving network capacity[29][30].

After holding out on competitive data prices, and trying unsuccessfully to drive voice revenues, MTN has been forced to strengthen its data strategy. Vodacom, which, together with Cell C, had been a first-mover in embracing data strategies – and in Cell C's case embracing OTTs – gained substantial market share from MTN. Vodacom, however, emerged from the short-lived price war as the premium quality provider and quickly adjusted its price upwards. However, its current promotion, offering 2 GB of data for the price of 1 GB is likely to maintain its market share for a large portion of 2018.

For the year ending March 2017, MTN's strategy focused on investing in infrastructure to improve its network coverage and quality and to compete more effectively with Vodacom, which had become perceived as the quality provider with the widest coverage following six years of intensive investment in 4G network developments. This included the re-farming of its 900MHz spectrum in order to use its old 2G spectrum for providing 3G services[31]. MTN has since allocated ZAR 11.5 billion to capital expenditure, and its Q3 2017 financial results demonstrated that the second-largest operator is playing catch-up, investing more than its competitors in 2017.

Although it invested less than MTN in the last year, Vodacom has continued its strong investment strategy, with a ZAR 8.9 billion injection made in the 2018 financial year. Vodacom's strategy has also included widening its 3G and LTE data coverage, improving voice quality, and increasing data speeds[32]. It has succeeded in covering 80 percent of the population with its 4G network (up from 58.2% in March 2016) and in reaching over 7 900 sites.

29. Cell C, (2017). Cell C Reports strong 2016 financial performance. Available at: https:// www.cellc.co.za/cellc/newsroom-detail/2016-financial-report
30. Cell C, (2017). Annual results presentation for the year ended 31 December 2017. Available at: https://www.cellc.co.za/cellc/static-content/PDF/ANNUAL_RESULTS_2017.pdf
31. Vodacom (2017). Integrated report for the year ended 31 March 2018. Vodacom Group. Available at http://www.vodacom-reports.co.za/integrated-reports/ir-2017/pdf/full-integrated.pdf
32. Vodacom (2018). Integrated report for the year ended 31 March 2018. Vodacom Group. Available at: http://www.vodacom-reports.co.za/integrated-reports/ir-2018/pdf/full-iar-lores.pdf

Competition in the data market today, where digital products are more in demand than ever, is no longer about pricing alone. Quality of service is more critical for time sensitive voice substitutes and video, which are driving demand.

Large operators, such as Vodacom and MTN, are more likely to win this battle, because their significant market share and larger profits are able to accelerate their investments relative to smaller operators, and respond to the demand for high-quality and high-speed services for which users are willing to pay a premium. Small operators are unable to attract and retain the customers who favour quality over price (and who generally increase service revenue), and as a result small operators have smaller surpluses to reinvest, forcing an over-reliance on loans. Small operators know, however, that this is the only way they can survive, hence the significant capital injections in both Cell C (3.4 billion) and Telkom (8.6 billion) for the extension of their high-speed networks. Both of these operators have had to significantly cut their costs of operating as part of their ongoing business strategy.

7.7 EARNINGS BEFORE INTEREST, TAXES, DEPRECIATION AND AMORTISATION (EBITDAS)

The South African mobile operators are financially healthy and profitable. Under its strong leadership with a turnaround strategy of innovation-driven revenue growth and recapitalisation process in 2017, Cell C has had a successful year, achieving a 151 percent year-on-year increase in EBITDA to ZAR 7.8 billion. Despite being the smaller operator, Cell C has operated more efficiently, with an EBITDA margin of 50 percent, higher than all operators in the market. The second most efficient operator in the market is Vodacom. However, Vodacom's strategy of offering high quality and user-tailored services has been able to secure its place as the largest operator in terms of subscribers, revenue and market share. MTN is barely profitable with an EBITDA margin of 32 percent. The low margins of MTN are attributed to its strategy of protecting its traditional revenue streams. An EBITDA trend analysis of the two dominant operators Vodacom and MTN shows that Vodacom's profitability has been increasing, rising from 36 percent in 2010 to 40 percent in 2018, while MTN's EBITDA continues to dip, falling from 44 percent in 2010 to 32 percent in 2018.

7.8 AVERAGE REVENUE PER USER (ARPU)

Average revenue per user (ARPU) is an important metric to measure the health of the mobile telecommunication sector and how well a company can monetise its user base. It provides a way to track operator revenue growth.

Figure 7 shows that Vodacom is the largest operator not only by its share of subscriptions in the market but also its share of revenues. Its dominance, however, is declining. In 2014, Vodacom's average revenue per user at USD 10.34 was almost twice as

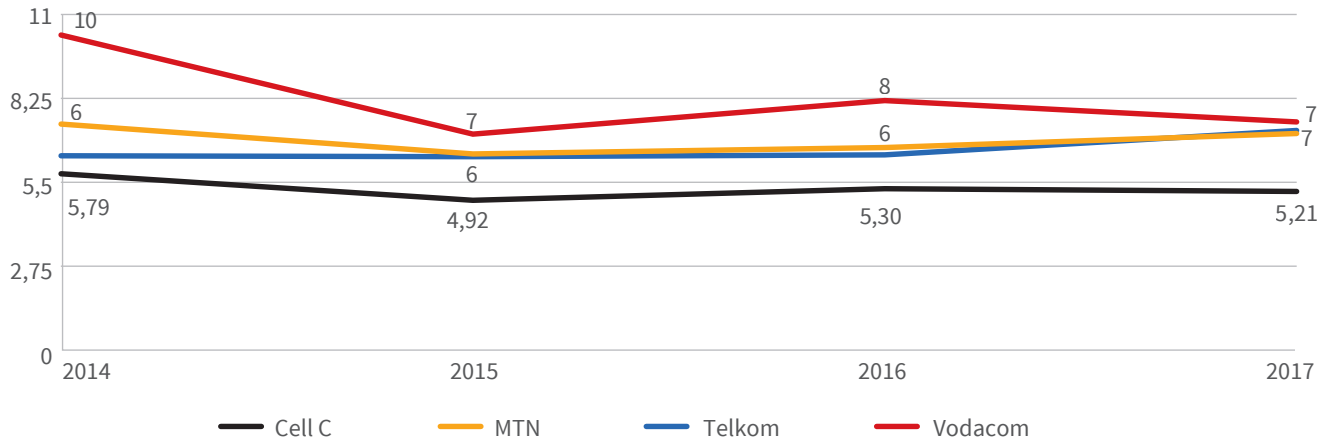

Figure 7: SA's mobile operator average revenue per users (ARPUs)
Source: GSMA, 2017

that of Cell C and almost USD 4.00 higher than that of MTN, the second largest operator. While Vodacom's ARPU is declining, MTN and Telkom's ARPU is on the rise, catching up with Vodacom in 2017. This is probably a reflection of Vodacom's bullish decision to embrace the data market and to invest heavily in its 4G network (it is even trialling a 5G network), in order to build a strong customer base with innovative data offerings.

7.9 PREPAID MOBILE PRICING

Following the innovations and development of new products in the market, in 2018 RIA extended its pricing database to capture prices of 100 MB, 500 MB and 1 GB data with a daily, weekly or monthly validity. While the voice/SMS and 1 GB basket are calculated based on the cheapest offering, the new tariffs are captured as they appear in the market. Capturing prices as they appear in the market is critical as it helps regulators and policymakers to make evidence-based competition policies.

The methodology used to evaluate mobile pricing is based on the OECD's telecommunications price baskets as, follows:

Voice/SMS basket: the cost of 30 prepaid mobile voice calls for a total of 50 minutes, distributed between destinations and 'peak' periods, added to that of 100 SMSs, and divided by the subscription value for the period of one month.
Data basket: the cost of 1 GB, 500 MB and 100 MB prepaid mobile data bundles, valid for monthly, weekly and daily periods (exact values are offered unless otherwise stated).
Conversion: The cheapest baskets are converted to USD for comparison across African markets.

RIA measures the cost of communication by mapping African mobile prepaid pricing trends with a voice/SMS basket, 1 GB prepaid data basket and the Bundled Value for Money Index (VMI). All of these are calculated and represented in RIA's African Mobile Pricing (RAMP) Index. Both the voice/SMS basket and the 1 GB basket methodologies calculate the minimal price for consumers.

South Africa performed poorly in prepaid mobile 1 GB data prices, coming 35th out of 49 African countries in Q1 2018, five spots lower than its ranking in Q3 2017. The cost of the cheapest 1 GB of data in South Africa is USD 8.28 (ZAR 99) as of Q1 2018, seven times the cost of the cheapest 1 GB basket in Egypt (USD 1.13), and nearly three times the cost of the same basket in Ghana, Kenya and Nigeria.

Using the 1 GB pricing information from the RAMP, there is evidence of minimal pricing competition among operators. The 1 GB prices in South Africa have remained constant for more than nine quarters, since Q3 2015. This suggests that lack of competition in the market has impacted negatively on low-income users who cannot afford access to the Internet due to high costs.

Data from the RAMP Index shows how MTN offers a range of products for price-sensitive users, while Vodacom's 'Just 4 You' package is tailored for customers. Telkom offers a 150 MB daily bundle for ZAR 10.00, cheaper than the ZAR 15.00 charged by MTN for its 120 MB bundle. Vodacom's price for a 100 MB daily bundle also costs ZAR 15.

MTN offers the cheapest 500 MB data bundles for daily (ZAR 50) and weekly (ZAR 55) periods, but Telkom again offers the cheapest 500 MB monthly bundle at ZAR 69. Similarly, MTN offers the cheapest 1 GB weekly bundle (ZAR 70) but does not compare well in the 1 GB monthly comparison. Vodacom's ZAR 149 promotional package (2 GB) offers the most value with an effective rate of ZAR 74.50 per GB, but Telkom's 1 GB is still the cheapest at a nominal price of ZAR 99.

The new, flat-rate offering of ZAR 0.05 per MB by a new mobile data network entrant, rain is likely to bring about changes to the data market. Although the extent of these changes is difficult to predict, Rain's strategy of using a flat rate means that customers do not have to worry about restrictive validity periods and OOB charges. With this strategy, Rain now offers the cheapest tariffs across the board: a 100 MB bundle will cost a customer ZAR 5, significantly less expensive than the previously lowest ZAR 29 100 MB offering of Cell C, MTN and Telkom. Rain's 500 MB costs less than half that of Telkom's 500 MB bundle and also out-competes its 1 GB bundle price

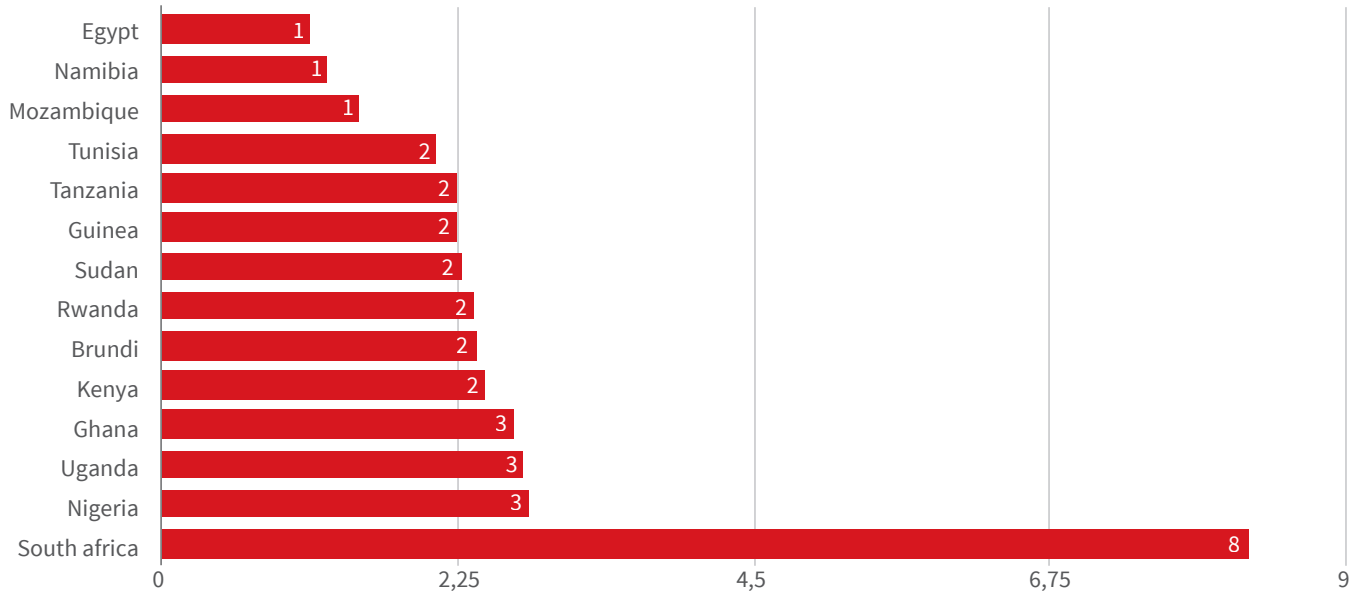

Figure 8: SA's cheapest prepaid mobile 1GB baskets compared to Africa's top performers (USD)
Source: RAMP Index, 2018

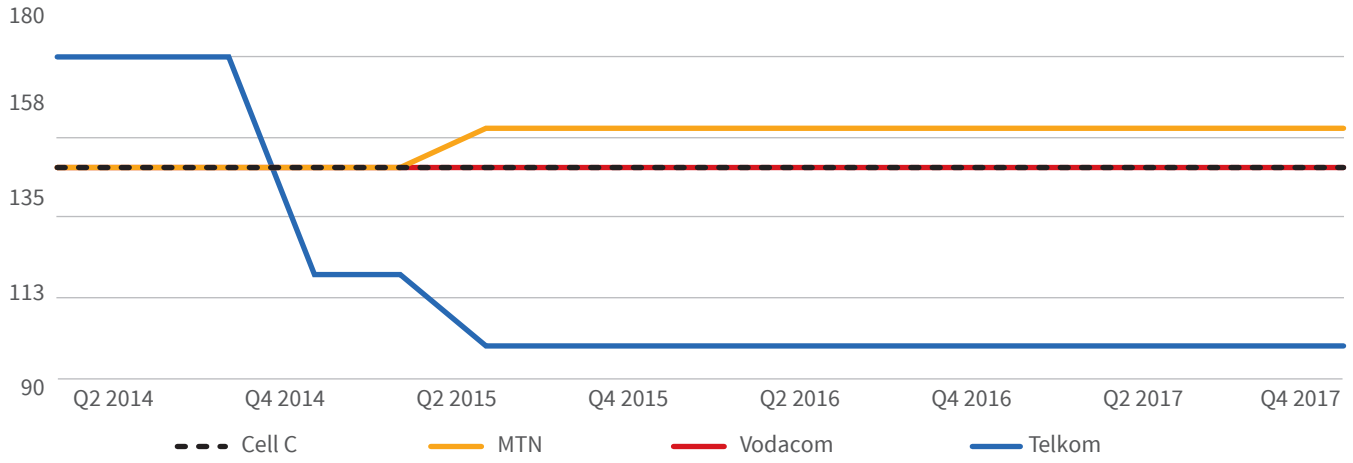

Figure 9: 1GB prepaid mobile data prices for South African operators
Source: RAMP Index, 2017

by being just about half the cost (ZAR 50).

Although the competitive pricing strategy adopted by rain is expected to pressurise the other operators to reduce their data price for fear of losing market share, rain's data-only network can only be accessed by LTE-enabled devices and its coverage is limited to only some of South Africa's metros. With just 50 percent of the population owning an Internet-enabled device, and the lack of Internet-enabled devices (as identified in demand-side section below) identified as a major barrier to Internet uptake, these services are likely to be enjoyed by those who are already better placed to pay for data, and may not alter the sector's landscape very dramatically any time soon.

The proportionate price of data for low-income users should be a serious concern for policymakers and regulators in South Africa. The After Access Survey shows that those who do not have access to the Internet fall overwhelmingly into the bottom two income categories. Of those who are connected, the majority depend on small data packages with shorter validity periods.

7.9.1 Quality of service

With increasing demand on the continent for video content, streaming media, and for services such as cloud computing, broadband performance, and specifically how users experience performance, becomes increasingly important.

In order to meet the demand for high-usage bandwidth applications, South African operators have extensively invested in increasing capacity through both terrestrial fibre networks and mobile LTE networks.

Despite this increase in network capacity, according to Cable's study of the global broadband speed league[33] the speed gap between various countries remains very wide, as the five fastest countries have download speeds which are around 40 times faster than the five slowest. According to this study, of the 39 African countries ranked, none achieved average broadband speeds above 10 Mbps, with South Africa ranking 80th out of 189, having a mean download speed of 4.36 Mbps. The research, however, focuses on fixed-line broadband tests, which tends to put African countries at an added disadvantage due to fixed infrastructure challenges, and hence slower speeds, since in South Africa (and most probably across many other sub-Saharan African countries), fixed-line connections are slower than mobile broadband connections.

South Africa performs well in comparison to other African countries. In addition, download speeds in South Africa have been improving due to innovations and technological developments. Figure 10 shows that there has been an ongoing improvement in download speed in South Africa from Q2 2014 to date, a development which can be associated with investments by telecommunication providers as they try to out-compete each other regarding coverage, speed and quality.

Figure 11 shows download speeds for the 46 African countries for which measurement information was obtained from SpeedChecker. All regions recorded similar speeds between Q1 2014 and Q1 2018, except for the Northern region, which performed better. Within SADC, the recorded download speeds in South Africa are higher than speeds in any of the other Southern African countries.

Figure 12 below represents the ratio between the 1GB data basket and the average download and upload speeds, shows that the two dominant operators Vodacom and MTN offer higher quality, respectively. In the same period Telkom's quality was the lowest. However, since Q1 2016, it seems that

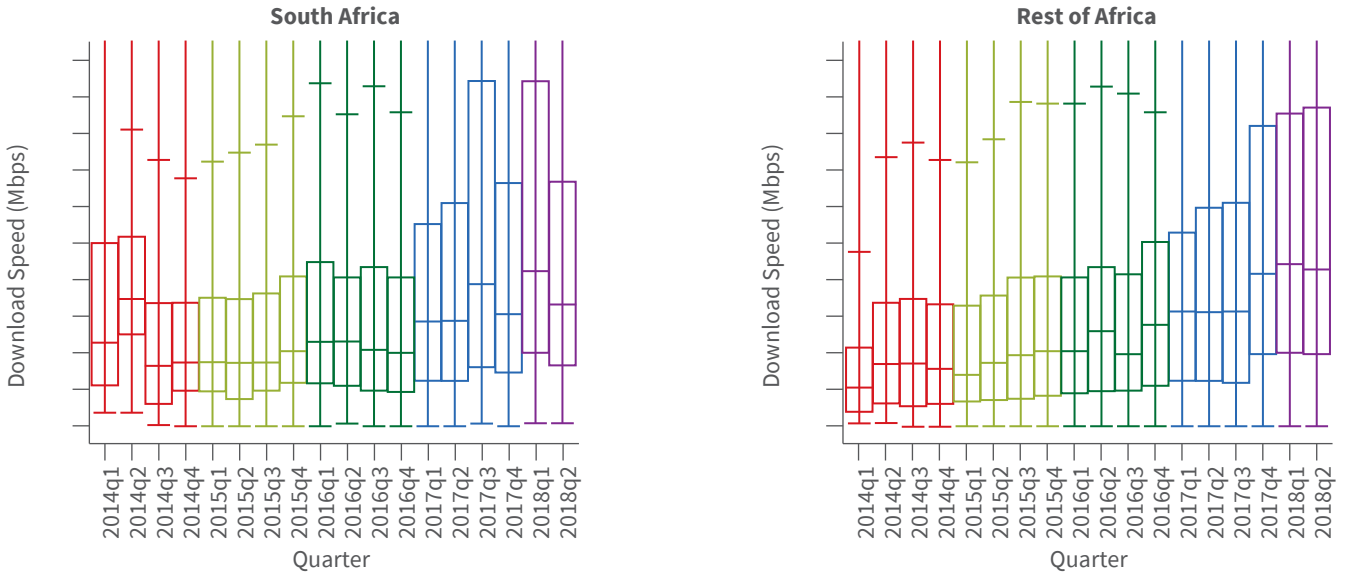

Figure 10: Download speed in South Africa verses the rest of Africa (Q1 2014 - Q2 2018)
Source: SpeedChecker, 2018

33. See more at: www.cable.co.uk/media-centre/release/New-Worldwide-Broadband-Speed-League-Unveiled-UK-Ranks-31

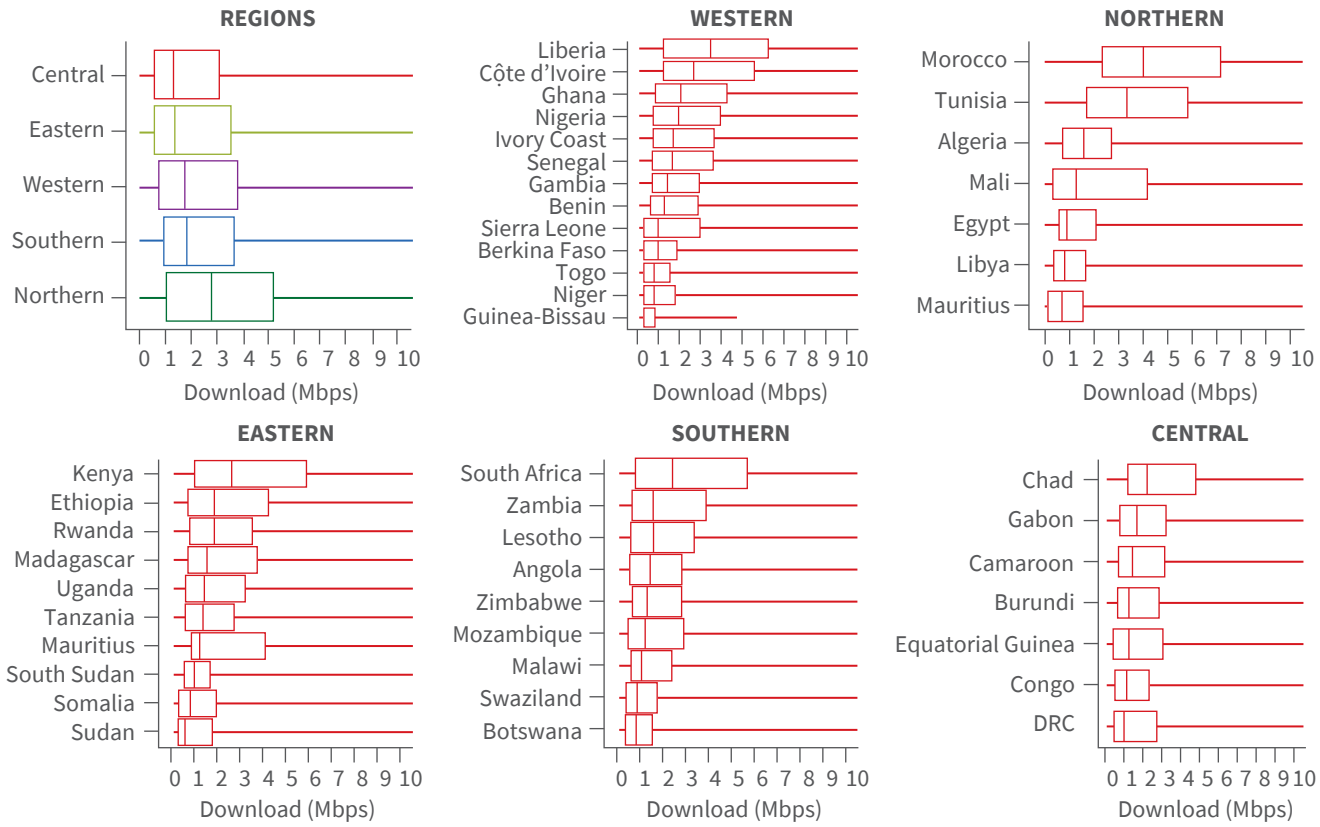

Figure 11: Download speeds for selected countries/region (mbps)
Source: SpeedChecker, 2018

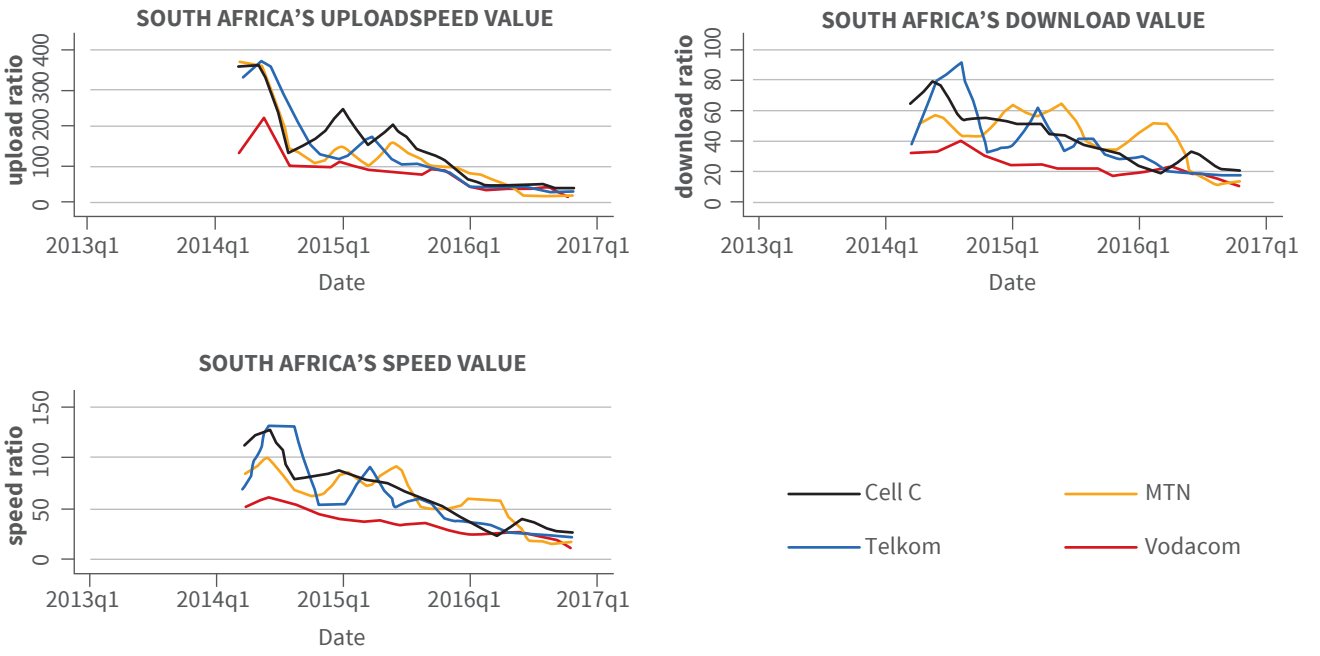

Figure 12: Quarterly quality-adjusted prices for 1GB prepaid mobile data in South Africa
Sources: RIA RAMP, 2017; SpeedCheckers, 2018

Figure 13: Fibre network coverage in South Africa
Source: Song, 2017
Data visualisation: Research ICT Africa, 2018

smaller operators improved their quality, catching up with dominant operators in Q2 2016. Vodacom SA's high prices are accompanied by higher Internet speeds, compared to MTN SA and Cell C, which are performing worse on the measure based on average download/upload speed (in Mbps) divided by 1GB basket costs.

The map shows that backbone infrastructure is highly developed and compares well with developed countries. Coverage in South Africa is very high with 100 percent of the population covered by 3G and 80 percent covered by 4G LTE networks. Some regions have more than one provider, while major cities have more than three providers. The map below shows five major operators: Broadband Infraco SOC Limited, FibreCO Telecommunications, Dark Fibre Africa, Liquid South Africa and Telkom South Africa. From the map, Telkom South Africa has the most comprehensive fibre coverage, reaching most parts of the country, while other operators like Dark Fibre Africa only provide services in major towns/cities.

8 MARKET REVIEW[34]

The South African telecommunication market is one of the most developed and advanced in the African continent. Yet an analysis of the market structure and arising markets indicates that the market is concentrated with dominant players in a number of markets. As a result, the intended competitive outcomes articulated in the policy have not materialised. This is partially as a result of the market still being structured around a number of vertically integrated incumbents who have been ineffectually regulated, though competitive entry by players in different areas have compelled them to respond either by reducing prices, adjusting their own structure to compete more effectively or making investments in next-generation technologies to enhance the quality of their service, which has become a key issue as the market shifts from voice to data.

8.1 COMPETITION FRAMEWORK PROVIDED BY ECA 2005

The competition cornerstone of the Electronic Communication Act of 2005 discussed above is Chapter 10. It mandates the regulator to undertake market reviews in order to define markets and market segments, to determine which are susceptible to *ex ante* regulation via the imposition of pro-competitive conditions. Thus, it requires ICASA to prescribe regulations 'defining the relevant markets and market segments, as applicable, so that pro-competitive conditions may be imposed upon licensees having significant market power where the Authority determines such markets or market segments have ineffective competition'.[35] This section reviews the centrality and implications of the market review, which is detailed in the ECA. The Act sets out how to determine whether a licensee holds significant market power (SMP). For this assessment for each market identified, answers will be provided to the following questions:

- Is the licensee dominant?
- Does the licensee have control of an essential facility?
- Does the licensee have a vertical relationship that ICASA determines could harm competition?

8.1.1 Dominance

The ECA states that: 'dominant has the same meaning given to that term in section 7 of the Competition Act', which in turn defines a dominant firm as one having:

34. After this report had gone to press ICASA published the findings of the inquiry into priority markets that may be prone to regulations in future.
    • Wholesale fixed access, which includes wholesale supply of asymmetric broadband origination, fixed access services and relevant facilities. This refers to the provision of last mile connectivity in fixed networks.
    • Upstream infrastructure markets incorporating national transmission services (national leased line services providing high-bandwidth connectivity between distant locations within South Africa) and metropolitan connectivity (connectivity between local sites within high-density urban and sub-urban areas and metropolitan points of presence) and relevant facilities.
    • Mobile services, which includes the retail market for mobile services and the wholesale supply of mobile network services, including relevant facilities.
    The short notice of its intentions can be found on the ICASA website https://www.icasa.org.za/news/2018/priority-markets-inquiry-findings
35. ICASA (2010). "A Guideline for Conducting Market Reviews". Available at: http://thornton.co.za/resources/Guideline_for_Conducting_Market_Reviews.pdf

- at least 45 percent of that market;
- at least 35 percent, but less than 45 percent, of that market, unless it can show that it does not have market power; or
- less than 35 percent of that market, but has market power.

The ECA also uses the definition of market power from the Competition Act 1998 as amended, where it is defined as 'the power of a firm to control prices, to exclude competition or to behave to an appreciable extent independently of its competitors, customers or suppliers'[36]

Therefore, not unlike when determining effectiveness of competition in a market, in determining dominance ICASA must consider market share as well as criteria of market power. If the licensee has 45 percent market share, it will be declared to have SMP. If it has less than that, then the issue of market power will come into play.

8.1.2 Essential facilities

The ECA defines an essential facility as 'an electronic communications facility or combination of electronic communications or other facilities that is exclusively or predominantly provided by a single or limited number of licensees and cannot feasibly (whether economically, environmentally or technically) be substituted or duplicated in order to provide a service in terms of this Act'[37]

If, in a market, a licensee controls an essential facility, then it will be declared to have SMP in the market.

8.1.3 Vertical relationship that could harm competition

Vertical integration refers to where one licensee providing services in one market is also present in a market at a higher or lower level of the value chain.[38]

Vertical integration is important in determining whether a market is competitive and it is also important in determining whether a participant has SMP. If a licensee is vertically integrated and ICASA determines that such integration could harm competition, ICASA will declare such licensee to have SMP in the relevant market.

According to ICASA's *A Guideline for Conducting Market Reviews*:[39]

Many electronic communications markets have at least one vertically integrated operator (often one being a former statutory monopolist). Such a licensee's downstream subsidiaries may compete with other licensees, but typically has control over an essential input in the upstream market. Problems can emerge when a vertically integrated operator uses its market power in the upstream market to provide an unfair competitive advantage to its downstream subsidiary.[40]

O'Donoghue and Padilla point out that a dominant vertically integrated operator can raise its rival's costs by:

- charging a higher price than to its own downstream business;
- offering them less favourable terms; or
- degrading the quality or speed of the input supplied.

Such discriminatory behaviour is not unexpected; indeed, the pattern is quite common, even among recently liberalised utilities that are vertically integrated.[41]

Any assessment of the market needs to take into account the development of the Internet and the

36. Department of Communications (2005). Electronic Communications Act. Pretoria, South Africa. Pg. 14.
37. Ibid. Pg. 12.
38. ICASA (2010). "A Guideline for Conducting Market Reviews". Available at: http://thornton.co.za/resources/Guideline_for_Conducting_Market_Reviews.pdf
39. Ibid.
40. Ibid. Pg. 13
41. O'Donoghue and Padilla's (2006) The Law and Economics of Article 82 EC, Hart Publishing, Oxford.

services carried on the Internet as an alternative to the traditional telecommunications services. Furthermore, the range of technologies has become much richer in the past few years, providing more real choice and many different ways of achieving the same overall service to the end user. In this sense traditional consideration of retail markets as fixed, mobile, voice and data markets may not be as useful as conceptualising the markets in terms of some of the services currently available in the value chain in South Africa.

This section identifies the relevant retail market(s) and provides an analysis of competitiveness in these. Where it is assessed not to be effectively competitive, the corresponding wholesale market(s) is identified. Were this to have been carried out by the regulator *ex ante* regulatory obligations would then be imposed in wholesale markets in which there is not effective competition and on those providers who have dominance.

8.2 COST DRIVERS

As the data on wholesale markets is notoriously opaque and even difficult for regulators to come by, to undertake costing studies and to assess for competition effectiveness this section will simply identify potential bottlenecks in these markets and propose remedies on the basis of generalised principles. Some assessment of cost drivers is done by consideration of some generic prices provided by users of facilities. In this way they are only indicative, and not the result of cost information obtained from the operators, as would be done were the regulator to undertake the study.

Due to the significant increase in the number of providers of international connectivity, competition in these markets is effective and likely to continue to be so, resulting in substantial reductions in price and increase in capacity.

International IP transit is available in many cities throughout the globe. Some of the major exchange points are in London, New York, Hong Kong and Amsterdam. As this service is offered outside the borders of South Africa, it falls outside of ICASA's jurisdiction. In any event, it is a highly competitive market with many suppliers. The going rate to acquire such IP transit services at these major centres is between USD 30 (New York) and USD 3 (London). For this reason, international transit is cheaper than national IP transit, which is not as competitive.[42]

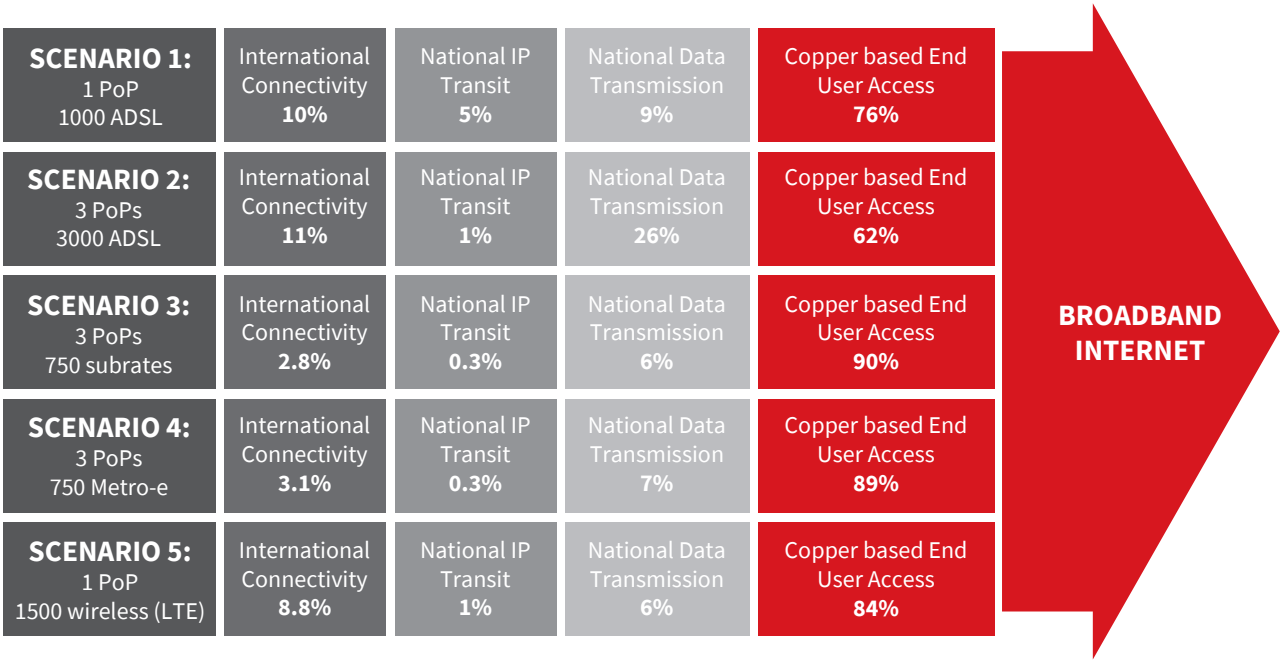

Figure 14: Cost drivers along the value chain
Source: Brierley, Gillwald, Horrocks, Stork and Weeks, 2013

42. Brierley, M., Gillwald, A., Horrocks, J., Stork, C. and Weeks, K. (2013). "Forward-looking Value Chain Analysis and Market Review for South Africa". Research ICT Africa advisory, (unpublished).

However, to gain access to these services, an ISP has to establish a point of presence (PoP) at one of these major centres (of interconnect) and, more importantly, pay for the necessary international private leased circuit (IPLC) between South Africa and, for example, London. For smaller ISPs this is not affordable; they have insufficient scale and the management of such a relationship in foreign currencies is too complex. Therefore, they must obtain this service locally from one of the major ISPs that already has such an international infrastructure and IP transit relationship. This service will then include the link between South Africa and the international PoP (in London, in this case).

There are at least five major ISPs selling these services (Axxess, Afrihost, Telkom Internet, Vodacom Fibre, Cell C's C-Fibre, Vox) including a global leader selling locally. International IP transit prices have also fallen in the last ten years or so. The market price for international IP transit is also tempered by the fact that ISPs can create this service themselves, and many have done so, some on their own, while others have teamed up together to increase their scale and reduce costs for the necessary intercontinental IPLC link.

From an analysis of the cost drivers in the broadband value chain, it is clear that the bulk of costs arise in the end user access market. However, the national data transmission may also constitute a major cost factor in some configurations, and thus should be included as priority markets for further analysis.

The analysis also confirms that from a cost driver point of view, international connectivity is no longer a bottleneck in broadband provisioning in South Africa, as discussed above.

8.3 RETAIL MARKETS ANALYSIS

An analysis of the South African retail broadband market (looking at household surveys, available price data, annual financial reports of licensees and quality of service analyses) reveals three distinct retail market segments:

- mobile broadband for the majority of broadband users in the country the first choice of access or as a complement to fixed broadband[43];
- fixed mass market broadband in the form of ADSL and VDSL; and
- which is largely being replaced by high quality fixed broadband (fibre to the home or office) for corporate and medium-sized businesses and now high-end residential use[44].

The underlying end user access platforms are wireless, fixed-copper and fibre. The high-quality fixed broadband segment primarily employs fibre-based products, though copper is included in the form of sub-rate leased-line services. With the convergence of historically-distinct platforms, price benchmarking in the fixed and mobile voice markets confirms that prices in the voice market have come down as a result of the mobile termination rate regulation[45]. Arguably, greater pressure on prices has come from the proliferation in the market of OTTs, offering cheaper data-based substitutions for voice and text services[46].

In the emerging data market, things look somewhat different. Although there are a number of players in the market, it is nonetheless highly concentrated. The fact that prices are considerably higher than in other African markets suggests that competition is not sufficient in the mobile broadband retail market. There may, therefore, be a need for regulatory interventions in the underlying wholesale markets. Further, fixed broadband in

43. For the majority of broadband users in the country this is the first choice of access, or is a complement to fixed broadband.
44. Brierley, M., Gillwald, A., Horrocks, J., Stork, C. and Weeks, K. (2013). "Forward-looking Value Chain Analysis and Market Review for South Africa". Research ICT Africa advisory, (unpublished).
45. Stork C and Gillwald, A (2014) Link between termination rates and retail prices in Namibia, Kenya and South Africa, Telecommunications Policy. Vol. 38 (8–9): 783-797.
Communications Regulatory Association of Southern Africa (CRASA) (2016) Towards a Definition of Open Access, unpublished.
46. Mothobi, O. Chair, C. and Rademan, B. (2017). "SADC not bridging digital divide". RIA policy brief No. 6, Research ICT Africa. Available at: https://www.researchictafrica.net/polbrf/Research_ICT_Africa_Policy_Briefs/2017_Policy_Brief_6_SADC.pdf

the form of ADSL can presently not compete with mobile broadband on price, quality of service, or increasingly available and more competitively priced FTTC. In a competitive environment, even ADSL would be expected to be more expensive than mobile broadband, but much faster and more reliable. In fact, mobile broadband is by far the most common way for people to access the Internet (see Part D).

Although it is difficult to get the data for transparent benchmarking, prices for national data transmission and high-quality fixed end user access, in terms of sub-rate services, appear to be internationally competitive and do not indicate excessive pricing. This is undoubtedly as a result of the competitive fibre market, which has resulted in as many as ten networks in metropolitan areas. Competition in the major intercity routes also exists, though not to the same extent, with Liquid having extended its network following the buyout of Neotel and the collective National Long Distance (NLD) builds with MTN and Vodacom[47]. In terms of assessing geographic substitution, there are still many areas in which the supply is not competitive. In most cases, it is Telkom that continues to be the only supplier in certain geographic markets, and in some remote areas it is Infraco via Transnet's legacy network. The commercial open access fibre network operators, such as Dark Fibre Africa and Fibreco, have also undertaken complementary investments. Thus, in some of the more rural areas, such as the Eastern Cape or Limpopo, they may be the only the only suppliers or alternative to Telkom's OpenServe. OpenServe is at least partially able to compete as a trusted wholesale open access provider (this is central to their turnaround strategy), and has been positively, if hesitantly accepted by industry (as confirmed in their recent results).

8.4 IDENTIFICATION OF PRIORITY WHOLESALE MARKETS

The generic analysis of retail prices and the cost-driver assessment support the identification of three separate end user access markets for wholesale broadband services. The case to include wireless in

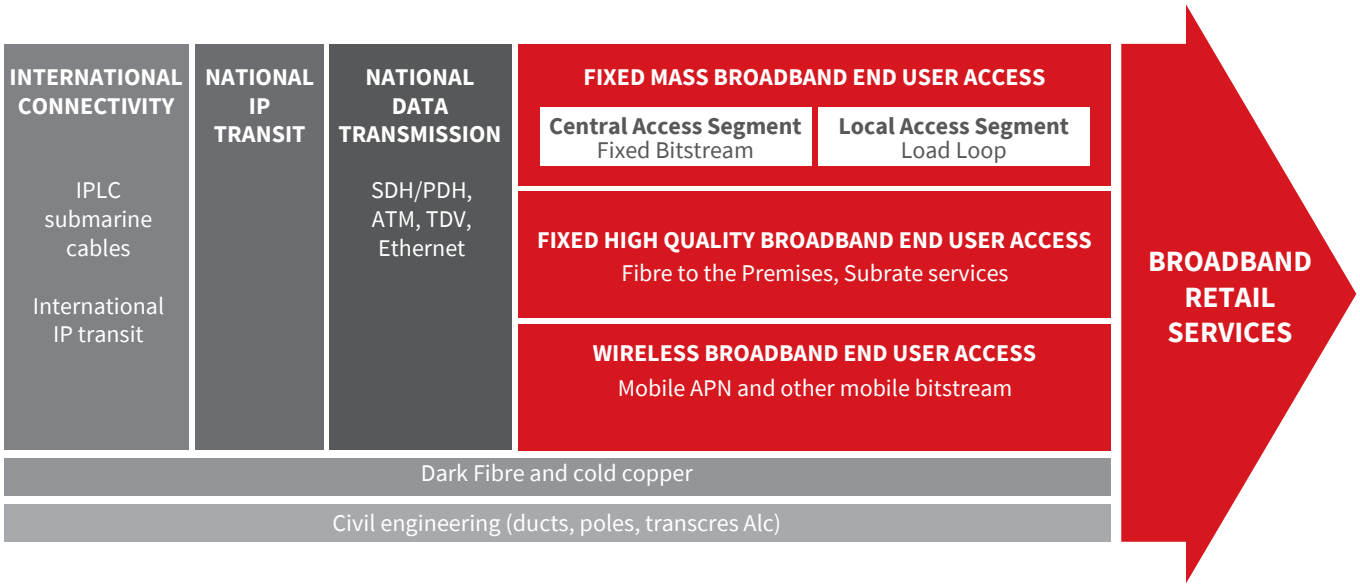

Figure 15: National IP transit and peering: The market for national IP transit and peering is questionably competitive without adequate costing data.

47. The first NLD consisted of the Mtunzini/Durban/Johannesburg route, but was followed by a triangle-shaped route between Johannesburg, Kimberley and Bloemfontein in addition to the leg connecting Bloemfontein and Cape Town. Duncan Mcleod TechCentral https://techcentral.co.za/liquid-telecom-plans-sa-fibre-builds/76816/

the priority markets despite an indication of competitiveness in the retail market (in terms of pricing) is supported by the fact that it makes up most of the end user access market.[48]

The priority markets are thus:

- Priority Market 1: National IP transit and peering;
- Priority Market 2: National data transmission;
- Priority Market 3: Fixed mass market broadband end user access;
- Priority Market 4: Fixed high quality broadband end user access; and
- Priority Market 5: Wireless broadband end user access.[49]

Market 1 - National IP transit and peering: National IP transit and peering and national data transmission are also priority markets despite being less significant contributors to the overall cost for broadband services because of their potential to hamper competition from smaller ISPs that are without core networks and that are generally unable to enter into peering agreements with larger ISPs; though a high-level assessment suggests the market for national IP transit and peering is sufficiently competitive.

Market 2 – National data transmission (SDH, PDH, ATM and Ethernet): The market for national data transmission is highly concentrated. Telkom is dominant and therefore has SMP. However, the market does appear to be dynamic, given the rapid deployment of fibre networks. There may thus be some countervailing power from various other licensees or groups of licensees building fibre networks, as they choose to build their own transmission links, rather than lease lines from Telkom. This may explain why prices in South Africa are reasonably low when compared with other countries. Given this, and the fact that further investment in infrastructure is to be encouraged, ICASA may not choose to proceed with competitive conditions on Telkom at this point in time. However, as the market is highly concentrated and some elements of the underlying infrastructure may constitute essential facilities, it will be important to assess competitive conditions in this market in future reviews.

Market 3 – Fixed mass market broadband end user access (including the central access segment and the local access segment): Competition is not effective in the market for fixed mass broadband end user access, in particular, the submarkets of wholesale local access and wholesale central access. Telkom has SMP in both of these market segments.

Market 4 – Fixed high-quality broadband end user access (including fibre and sub-rate services): Competition is not effective in the market for fixed high quality broadband end user access. Telkom has SMP. The price benchmarking points to competitive pricing. Therefore, no further specific regulatory remedies should be imposed at this point in time. However, remedies for the fixed mass broadband end user access markets will also positively impact the market for fixed high quality broadband end user access and thus are expected to stimulate competition in both markets.

Market 5 – Wireless broadband end user access (including mobile and other wireless bitstream services): The share of wholesale mobile data revenues compared to total revenues is still very small – below half a percent for all mobile operators. The wholesale wireless broadband end user access market is nascent and the evaluation of competitiveness as well as determinations of SMP cannot, and arguably should not, be determined. However, future reviews should assess this market[50]

48. Brierley, M., Gillwald, A., Horrocks, J., Stork, C. and Weeks, K. (2013). "Forward-looking Value Chain Analysis and Market Review for South Africa". Research ICT Africa advisory, (unpublished).
49. Ibid.
50. Brierley, M., Gillwald, A., Horrocks, J., Stork, C. and Weeks, K. (2013). "Forward-looking Value Chain Analysis and Market Review for South Africa". Research ICT Africa advisory, (unpublished).

8.5 POSSIBLE REMEDIES

Possible remedies used in other markets to deal with dominance are:

- information requirements (such as being required to make available to ICASA and other licensees its coverage of each number block/main distribution frame area and the number of active lines served by copper in each area;
- access requirements in respect of each of the market segments, central access and local access; and
- price controls and accounting methods (initially, prices could be set by benchmarking maximum prices and this could be adjusted if the dominant operator in the market challenged it on the basis of detailed evidence).[51]

The regulator faces the difficult task of creating an environment conducive to the significant investments required for the imperative broadband extension espoused in the National Development Plan and SA Connect, the national broadband policy. While operators should not be penalised for their success, the dominance of Vodacom and MTN does enable them to have the liquidity to reinvest in their network infrastructure, extending coverage and improving quality. This, in turn, enables them to attract more customers and thereby increase its surpluses, placing them in a better position to buy more spectrum and further enhance the quality of their networks. Even in the absence of anti-competitive practices, this creates a virtuous business cycle, against which smaller operators cannot compete, without cost-based access to dominant operators' networks. Wholesale price regulation is therefore critical to creating a fair and competitive environment, albeit that it has to be done in a way that does not remove incentives for network investment.

51. Brierley, M., Gillwald, A., Horrocks, J., Stork, C. and Weeks, K. (2013). "Forward-looking Value Chain Analysis and Market Review for South Africa". Research ICT Africa advisory, (unpublished).

Part D

South Africa demand-side analysis

9 INDICATORS AND INDICES

The 2030 Agenda for Sustainable Development has identified the spread of ICTs and global interconnectedness as critical to the achievement of the 17 Sustainable Development Goals. The mobile industry, which provides cheaper ways of achieving universal connectivity, offers a robust platform to deliver essential services like e-governance, education, health, energy and financial inclusion. For unequal societies, such as in South Africa, mobile technologies provide opportunities for inclusive growth and ensure that no one is left behind.

Despite the recognition of ICTs as critical to economic growth, ability to reduce poverty and ensure inclusive growth, there is little in-depth systematic collection of ICT indicators in South Africa to inform policy formulation or assess outcomes. As in most developing countries, policymakers and regulators depend on supply-side data from operators, which also forms the basis of the administrative data provided to the International Telecommunication Union (ITU), the body responsible for the harmonisation of standards and indicators for the sector. The ITU uses this data for the compilation of the ICT Development Index. As the United Nations body mandated to collect global indicators and the only body with a global reach, this data set is also at the core of all the major global indices and databases, such as the World Economic Forum's Network Readiness Index and the World Bank's *Little Data Book on Information Communication and Technology.* With this data underpinning all these indices, the underlying data limitations are transferred to them.

As an outcome of the World Summit on the Information Society (convened by the ITU), and the Partnership on Measuring the Information Society (convened by UNCTAD), countries have also been urged to undertake user surveys to inform and assess policy outcomes in an increasingly complex and globalised communications system. Despite making commitments to gather such information, very few governments in developing countries prioritise these resource intensive surveys, including South Africa, despite having one of the most developed national statistical offices in the Global South[1]. The After Access Survey undertaken by Research ICT Africa (RIA) in South Africa and in six other African countries (Ghana, Kenya, Mozambique, Nigeria, Rwanda, and Tanzania) as part of a wider study of 16 Global South

Table 11: Internet penetration: supply- vs demand-side data

	AFTER ACCESS SURVEY	ITU STATISTICS	DIFFERENCE (BIAS)
Ghana	26%	35%	+9%
Kenya	26%	26%	0%
Mozambique	10%	18%	+8%
Nigeria	30%	26%	-4%
Rwanda	9%	20%	+11%
South Africa	53%	54%	+1%
Tanzania	15%	13%	-2%

Source: RIA After Access Survey data, 2017; ITU Statistics, 2017

1. Brazil is a notable exception. CETIC, a multistakeholder governed body was established from a small percentage levy on domain name registrations to undertake annual household, individual and users surveys. It now undertakes the full range of survey including those on cybersecurity and kids online. It has been appointed a UN Centre of Excellence. See https://cetic.br/

countries in 2017 fills a critical information and analytical gap for these countries, at least.

Without nationally representative demand-side data, it is impossible in the prepaid mobile markets, which make up over 90 percent of the market in most developing countries, to provide an accurate measure of access to the Internet. One of the reasons supply and demand-side data do not match is that supply-side data measures active SIM cards on operator networks, rather than unique subscribers. Duplicate SIMs, which are measured by operators as active SIMs and reported to the ITU in the administrative data of countries, account for at least some of the over-count of subscribers. Table 11 shows the discrepancies or the upward bias in subscription rates when policymakers depend on supply-side information to assess penetration.

Although on the basis of the supply-side data all sorts of interesting data analysis can be done, what cannot be done is the disaggregation of data on the basis of gender, urban–rural ratios and income required for policy planning and interventions to redress digital inequality. The findings of the After Access Survey undertaken in 2017 provide the decision-makers with the identification of the demand-side challenges faced by the country, and because the data is nationally representative and can be modelled, the underlying causes of poor policy outcomes.

9.1 HOUSEHOLD INDICATORS

The only demand-side survey of its kind, the 2017 After Access Household and Individual User Survey, provides up-to-date and reliable estimates and insights into not only the levels of access to ICTs but also the nature of use, and the amounts users are spending on ICTs. Importantly, as the survey is representative of the entire population, it also provides data on those marginalised from services, such as the rural and urban poor. It also extends the database of nationally representative ICT access and use information from prior surveys conducted by RIA in 2007 and 2012. While the 2012 survey focused on adoption and use of mobile phones specifically, the 2017 survey focused on the use and access of mobile broadband services, though all the ITU standard indicators were collected. The study provides insights on the level of Internet use, reasons for non-use and affordability. As the RIA ICT Survey gathered extensive additional household information, including income and expenditure, through a method that is nationally representative, the findings can be disaggregated along gender lines into rural and urban settings and between users at the top of the pyramid (ToP) and the base of the pyramid (BoP) – information that is simply not available from national supply-side data or demand-side surveys that are not nationally representative.

Table 12: Summary of ICT access

	2008	2012	2017
Household with fixed line	18%	18%	8%
Household with a television	71%	78%	80%
Household with radio	78%	62%	68%
Household with desktop	14%	24%	9%
Household with laptop	14%	24%	17%
Household with tablet	5%	20%	15%
Household with Internet	5%	20%	11%

Source: RIA ICT Access and Use Surveys, 2008, 2012, 2017

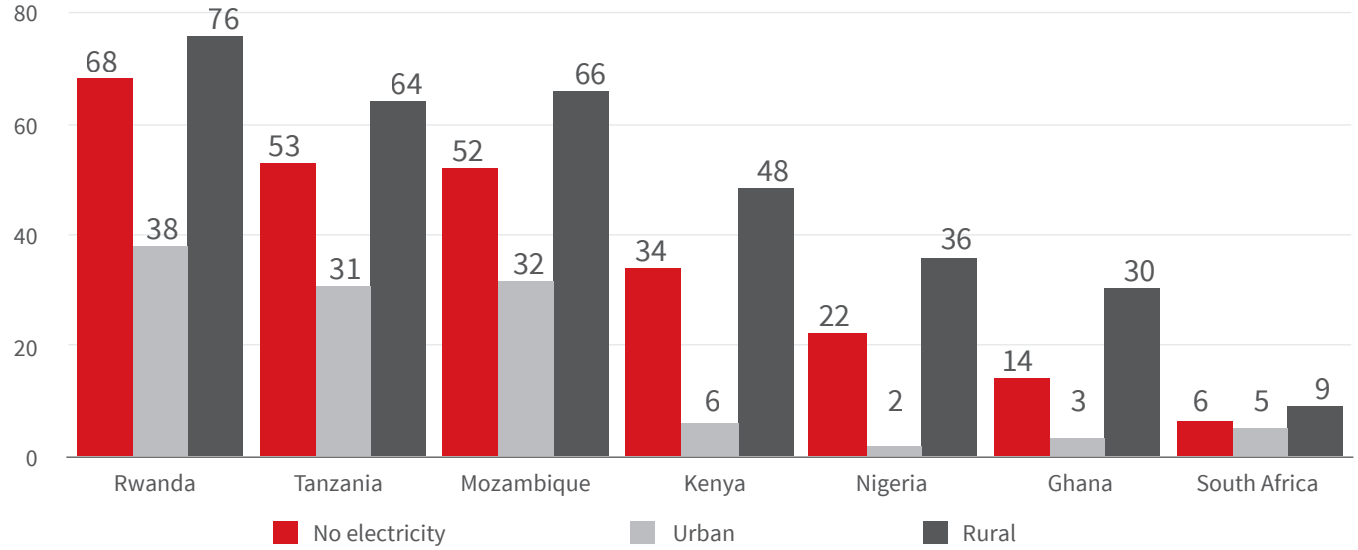

Figure 16: Households with no access to electricity in the surveyed countries
Source: RIA After Access Survey data, 2017

ICTs are one of the essential development tools. The use of ICTs, more specifically by marginalised communities, can improve the livelihoods of the poor by providing them with information and mobile platforms, such mobile agriculture, mobile finance, mobile education and e-services[2]. However, most rural areas have not yet benefitted from ICTs due to a combination of reasons, including under-development, remoteness, poverty and lack of electricity. There is a significant electrification divide in Africa, with 40 percent of households in rural areas not connected to the main electricity grid. A quarter of these households use generators and solar panels, leaving somewhat less than a third with no access to any form of electricity. South Africa is highly electrified by comparison. Among the surveyed countries, South Africa is ranked number one in terms of households with access to electricity. The overwhelming majority (89%) of households in South Africa are connected to the main grid, with two percent using generators or solar panels and only six percent of households not having electricity at all (see Figure 16). While South Africa seems to be doing well in terms of electrification, the same is not true for other surveyed countries, with more than ten percent of households in each other case not connected to the main electricity grid. In Rwanda (68%), Mozambique (52%) and Tanzania (53%) the majority do not have access to any form of electrification.

A television set and a radio are the most common ICT devices owned by households in South Africa. The vast majority of households (80%) own a television set, and some seven out of ten families own a radio. However, a small proportion of households (8%) have a fixed-line connection and only 11 percent have access to the Internet. The 2017 RIA After Access Survey household ICT penetration figures compare well with the Stats SA statistics for households with a fixed-line (8.3%), households with a television (82%) and households with Internet

2. Bhavani, A., Chiu, W. R., Janakiram, S. and Silarszky, P, (2015). "The role of mobile phone in sustainable rural poverty reduction". World Bank Group, ICT Policy Division, Global Information and Communications Department. Available at: http://siteresources.worldbank.org/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/Resources/The_Role_of_Mobile_Phones_in_Sustainable_Rural_Poverty_Reduction_June_2008.pdf

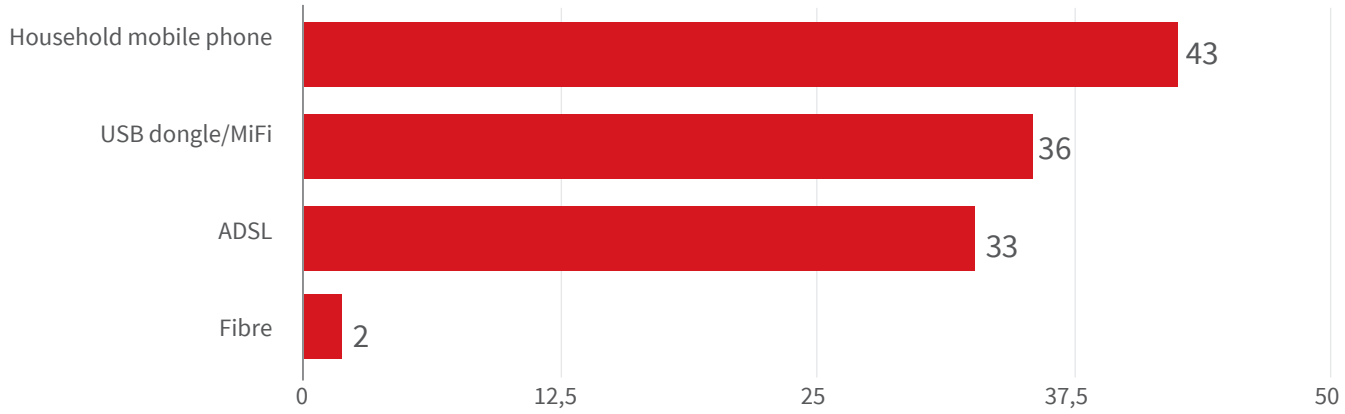

Figure 17: Internet devices used by households
Source: RIA After Access Survey data, 2017

(10.6%). The Stats SA laptop penetration, however, is five percent higher than the RIA Survey, (17%).

The RIA Access and Use Surveys show that the number of households with fixed-line connections and Internet are decreasing. Low penetration of Internet at the household level can be attributed to the low levels of access devices, such as fixed-line, computers, laptops and tablets. The lack of affordability of Internet-enabled devices and services is a significant inhibitor of Internet use, with at least half of households that do not use the Internet stating that the cost of these devices and services is too high. Other factors that lead to low levels of Internet use among households in South Africa are digital illiteracy (13%), and a negative assessment of the need for the Internet (19%). Mobile devices, such as USB dongle, portable hotspots and mobile phones are the primary tools that are used by those households that do access the Internet (See Figure 17).

South Africa faces an array of developmental challenges, with the highest degree of inequality in the world (World Bank, 2018). In recognising the role that ICTs can have in providing equal opportunities to South Africans, government adopted a National Infrastructure Plan in 2012, which envisages broadband coverage for all by 2020. While the infrastructure development in South Africa has been commendable, there are still location inequalities regarding ICT access and use. Rural households still lack the devices required to access the Internet. The gap in ownership of television and radio is minimal. The results show that the low levels of Internet

Table 13: Summary of ICT access by location

	RURAL	URBAN	GAP
Household with fixed line	0.7%	11%	93.6%
Household with a television	70%	85%	17.6%
Household with radio	61%	71%	14.1%
Household with desktop	2%	12%	83.3%
Household with laptop	7%	21%	66.7%
Household with tablet	7%	19%	63.2%
Household with Internet	4%	15%	73.3%

Source: RIA After Access Survey data, 2017

Table 14: Summary of ICT access by gender

	FEMALE	MALE	GAP
Household with fixed line	5%	11%	54.5%
Household with a television	79%	82%	3.7%
Household with radio	64%	72%	11.1%
Household with desktop	4%	13%	69.2%
Household with laptop	11%	22%	50.0%
Household with tablet	11%	18%	38.8%
Household with Internet	7%	15%	53.3%

Source: RIA After Access Survey data, 2017

penetration in rural households (4%) is due to low ownership of Internet-enabled devices, such as personal computers, laptops and tablets in these areas. While ownership of these devices by households is above ten percent in urban areas, it remains lower than seven percent in rural areas.

The digital divide is also greater between male-headed households and those headed by females. Male-headed households are more likely to own ICT devices and use the Internet more than female-headed households. This may be attributable to the fact that households headed by males are more likely to have both parents present. Two parents are more likely to contribute to the income of the household, making it easier to acquire these devices. The Survey also shows that women have considerably lower income than men on average, which would account for less discretionary income in female-headed households.

The survey results show that copper-based, fixed-line technologies are coming to an end and that mobile devices predominate. This is because mobile devices are portable, more convenient and more personalised, and mobile access is cheaper for low-volume users[3]. Individuals are more likely to use their own devices and set up their own Internet access, rather than use shared services and accessories.

9.2 INDIVIDUAL INDICATORS

The 2017 After Access Survey in South Africa covered a total of 1 815 respondents who were randomly sampled from 4 499 eligible adults living in the household and 23 visitors, 15 years and above. Of those who were interviewed 55 percent were female and 45 percent were males, 65 percent live in urban areas while 36 percent are rural area dwellers.[4]

Despite more than 20 years of democracy in South Africa, disparities in income distribution are extreme. More than a third of South African population live in poverty; with a monthly income below ZAR 380, which is less than the World Bank's stipulated USD 1.90 a day poverty line. These individuals spend more than half of their income on basic needs. On the other hand, half of the population live in state of susceptibility to poverty, with a monthly income below ZAR 1 600. A quarter of the population can be considered middle class, with income ranging between ZAR 2 000 and ZAR 4 200, while only 10 percent have a monthly income that is more than

3. Mothobi, O., and Grzybowski, L. (2017). "Infrastructure deficiencies and adoption of mobile money in Sub-Saharan Africa". Information Economics and Policy, 40©, 71-79. Available at: https://www.sciencedirect.com/science/article/pii/S0167624516301342
4. Stork, C., Calandro, E. And Gillwald, A. (2013). "Internet going mobile: internet access and use in 11 African countries". *Info*, Vol. 15 (5): 34-51, https://doi.org/10.1108/info-05-2013-0026

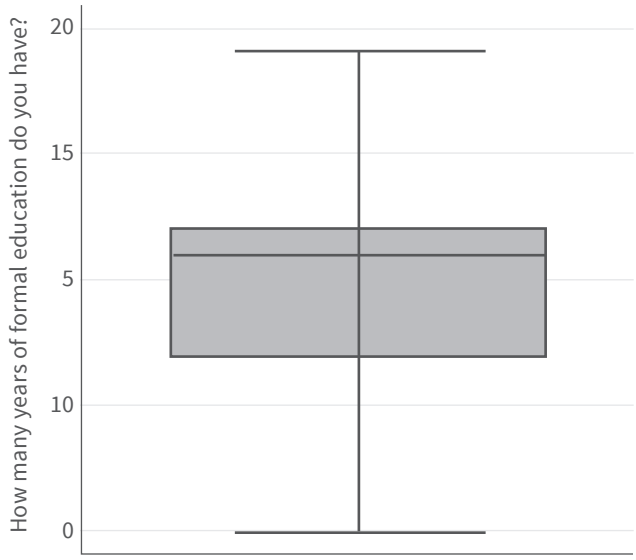

Figure 18: Years of formal education
Source: RIA After Access Survey data, 2017

ZAR 11 560 and smaller proportion of the population can be considered elite. This disparity creates a gulf of two economies in one country, where top earners earn comparably to earners in developed countries and low-income groups akin to those in impoverished countries (RIA After Access Survey, 2017). Much of this disparity is due to differences in education levels and lack of employment opportunities. The South African population (15 years and older) is mostly unemployed, with only 27 percent of the population working in formal employment and only 5 percent self-employed. A significant proportion of the population identifies themselves as students while 23 percent is unemployed. Of those who are employed and self-employed most of them are males and live in urban areas (see Table 15). Half of South Africans have matriculated while a quarter have more than 12 years of schooling (see Table 15).

In contrast to the era of expensive fixed telecommunication devices, such as desktop computers and fixed-line technologies, the majority of Africans are increasingly connected to the world of digital information via smartphones and other mobile devices. The vast majority of Africans now own a cellphone of some kind. The 2017 After Access Survey shows that 68 percent of Africans own a mobile phone, with 21 percent smartphone penetration. As indicated in Part A, Internet penetration is broadly aligned with Gross National Income (GNI) per capita (see Figure 19). This pattern is broadly true of the gender gap, too. Though GDP per capita masks extreme inequalities in South Africa, the country performs well in relation to gender equity (see Figure 21). By contrast, the 2017 RIA After Access Survey finds that South Africa has the highest mobile phone (84%) and Internet penetration rates (53%) among the surveyed African countries. This reflects a substantial increase from

Table 15: Main activity during the last 6 months

	NATIONAL	FEMALE	MALE	URBAN	RURAL
Student/pupil	18%	18%	18%	17%	19%
Unpaid housework (e.g. housewife)	7%	13%	0.7%	5%	11%
Retired	11%	11%	10%	11%	9%
Unemployed, seeking for a job	23%	24%	22%	20%	28%
Unemployed, not looking for a job	8%	9%	7%	6%	12%
Disabled and unable to work	1%	1%	1%	1%	1%
Employed	27%	21%	33%	32%	16%
Self-employed	5%	3%	8%	6%	3%

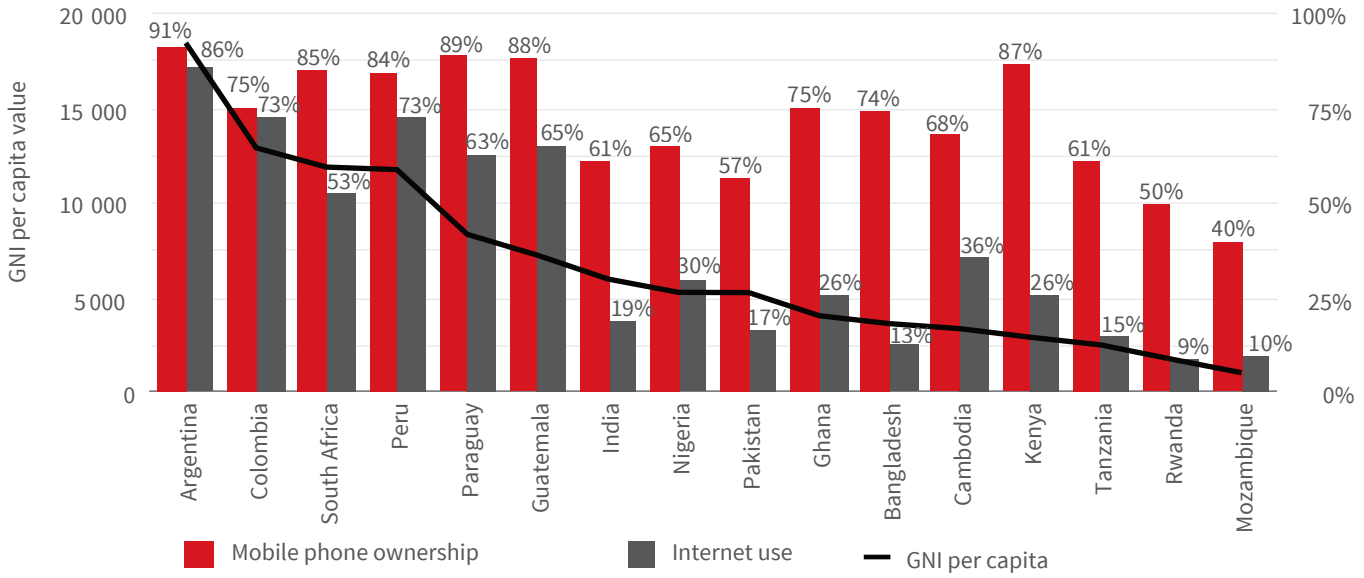

Figure 19: Mobile phone and Internet penetration overlaid on GNI per capita
Source: RIA After Access Survey data, 2017

2012, when the rates were 34 percent. The Internet penetration in South Africa is also higher than in Ghana (28%) and Nigeria (27%), which are some of the largest markets in Africa. Compared with other African countries, South Africa also has the highest social media use but does not perform well against other developed countries. While South Africa performs well against African countries, it does not do so against Latin American countries with similar income status. Internet penetration in the Latin American countries is almost reaching saturation, while only half of South Africans use the Internet[5].

The survey findings indicate that technological forms of exclusion are a reality for significant segments of the South African population, and that, for some people, digital exclusion reinforces and deepens existing disadvantages. Furthermore, the ICT gap can rightly be considered to exist alongside, and be strongly linked to more traditional twenti-eth-century social exclusion, such as low income, unemployment, poor education and social isolation. In the case of South Africa, a society with more pronounced income and educational inequalities, the Survey shows that despite the hype around smartphones connecting the poor, the digital divide between the poor and the rich is significant in South Africa. Furthermore, the data show that while the digital gap between sex groups is disappearing, it exists between urban and rural dwellers, with about two thirds (61%) of rural areas not using the Internet and only 39 percent of urban residents being unconnected and a location gap of 35 percent. The location gap is even more significant in Mozambique, Tanzania and Rwanda (see Figure 20), countries with lower levels of Internet use.

The digital divide between urban and rural in the use of the Internet is narrowing in South Africa. According to Research ICT Africa's 2012 ICT Access and Use Survey, close to half of those who used the Internet in urban areas used it in rural areas. The 2017 After Access Survey shows that there has been a significant increase in the use of the Internet. Internet use among urban residents increased from 41 percent in 2012 to 61 percent in 2017 and almost doubled in rural areas from 21 percent in 2012 to 39 percent in 2017. This jump can be attributed to

5. More detail on the methodology can be found at: www.researchictafrica.net/docs/Survey%20Methodology%202011:12.pdf

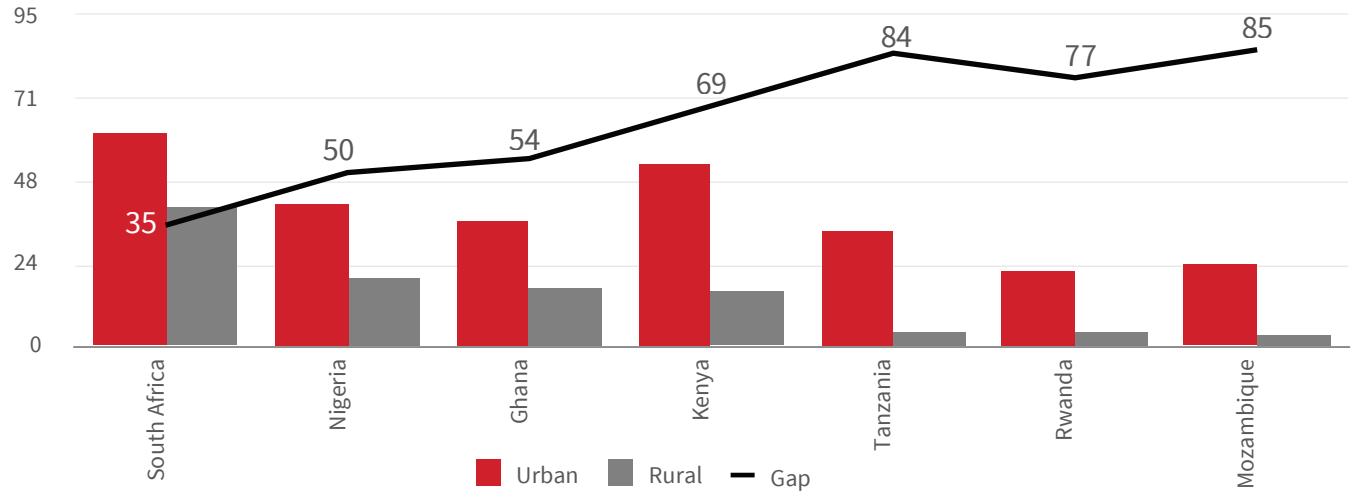

Figure 20: Location disparity in the use of Internet in South Africa and other African countries
Source: RIA After Access Survey data, 2017

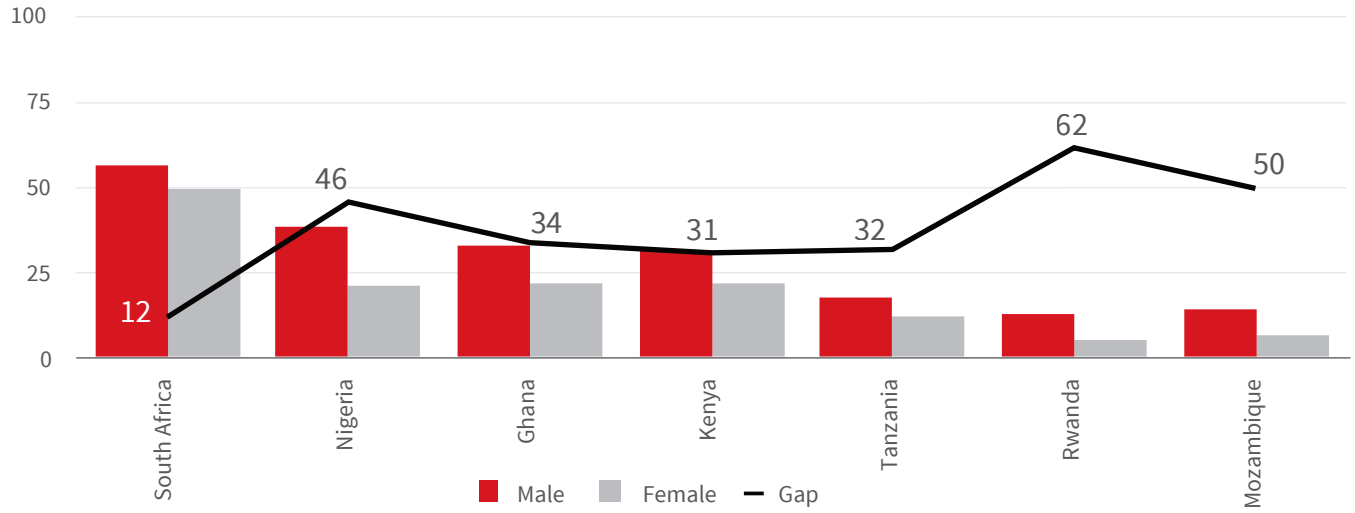

Figure 21: Gender disparity in Internet use in South Africa and other African countries
Source: RIA After Access Survey data, 2017

increased use of cheap mobile Internet-enabled devices, such as smartphones. The survey shows that mobile penetration stagnated between 2012 and 2017, with similar estimates for the rural–urban gap. The difference in ownership of smartphones is significant between urban and rural area dwellers: the 2017 After Access Survey shows that more than half of the urban population (54%) owns smartphones while only 33 percent of those in rural areas own one.

Evidence from the After Access Survey also shows a correlation between smartphones and Internet penetration. Countries that have high smartphone penetration, such as South Africa, are likely to have higher Internet penetration rates, a result which can also be explained by higher income levels. Generally, smartphones are more expensive than the basic and feature phones, and are less likely to be affordable to those on the lower income bands. Hence, countries with higher GNI per capita are more likely to have high smartphone penetration than relatively developing countries, which in turn translates into greater access to the Internet using such devices. Similarly to Latin American countries, the mobile ownership gender gap in South Africa is very small,

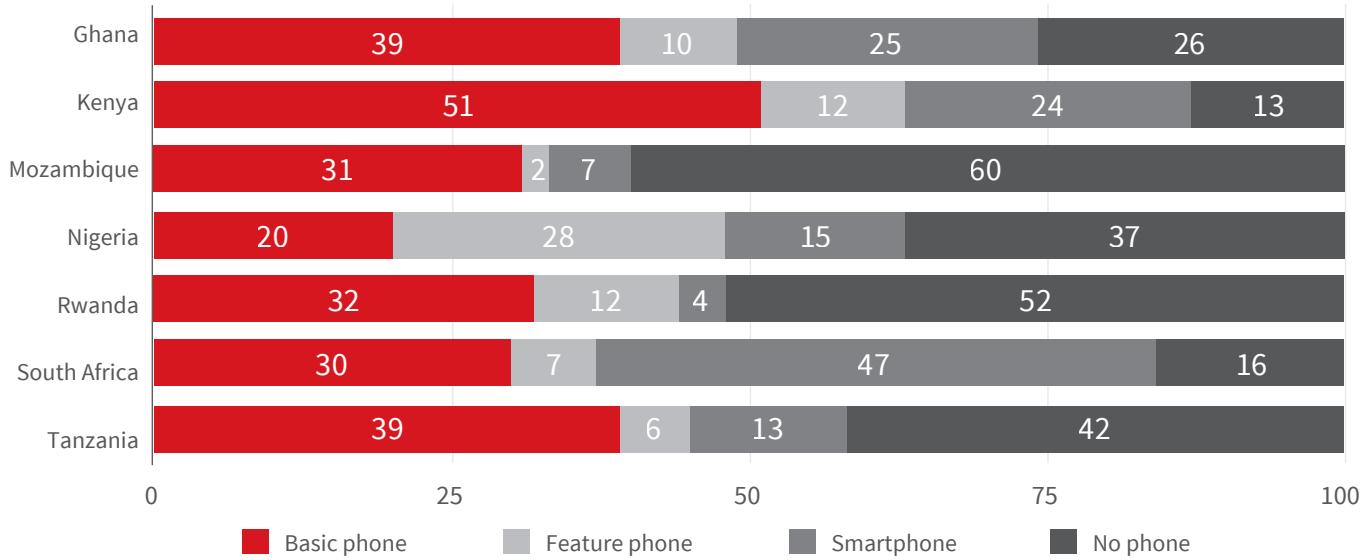

Figure 22: Penetration level by type of mobile phone
Source: RIA After Access Survey data, 2017

with disparities between urban and rural populations being more substantial. However, the mobile phone gender gap is significant in Mozambique, Tanzania and Nigeria (see Figure 21).

The 2017 After Access Survey shows South Africa's smartphone penetration standing at 47 percent, lower than 70–80 percent smartphone penetration in OECD countries as reported by Pew Research Centre[6] and 35 percent above the average smartphone penetration of the surveyed countries. Pew Research Centre estimates smartphone penetration at 51 percent, a figure that is four percent higher than the 2017 After Access survey. We attribute this difference to the different methodologies employed, with the RIA 2017 After Access survey being nationally representative. Despite Kenya having best performance regarding mobile phone penetration, only around a quarter of Kenyans own a smartphone. Rwanda and Mozambique have the lowest smartphone penetration, with only four and seven percent respectively of the whole population owning one, which translates into nine percent and 17 percent of mobile phone ownership, respectively (see Figure 22).

Unsurprisingly, the study finds that mobile phones are the most commonly used devices to access the Internet in South Africa. Amongst those using the Internet, 72 percent do so using mobile phones (i.e. smartphones), with almost the rest of the 26 percent using personal computers/laptops, and a very small number using tablets as their primary device (see Figure 23).

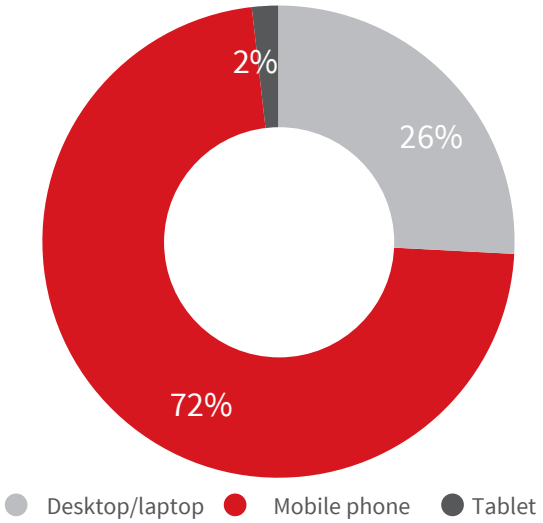

Figure 23: Population grouped by 'device used' to access the Internet
Source: RIA After Access Survey data, 2017

6. BusinessTech, (2018). More than half of South Africans now own smartphone: study. Available at: https://businesstech.co.za/news/internet/255995/more-than-half-of-south-africans-now-own-a-smartphone-study/

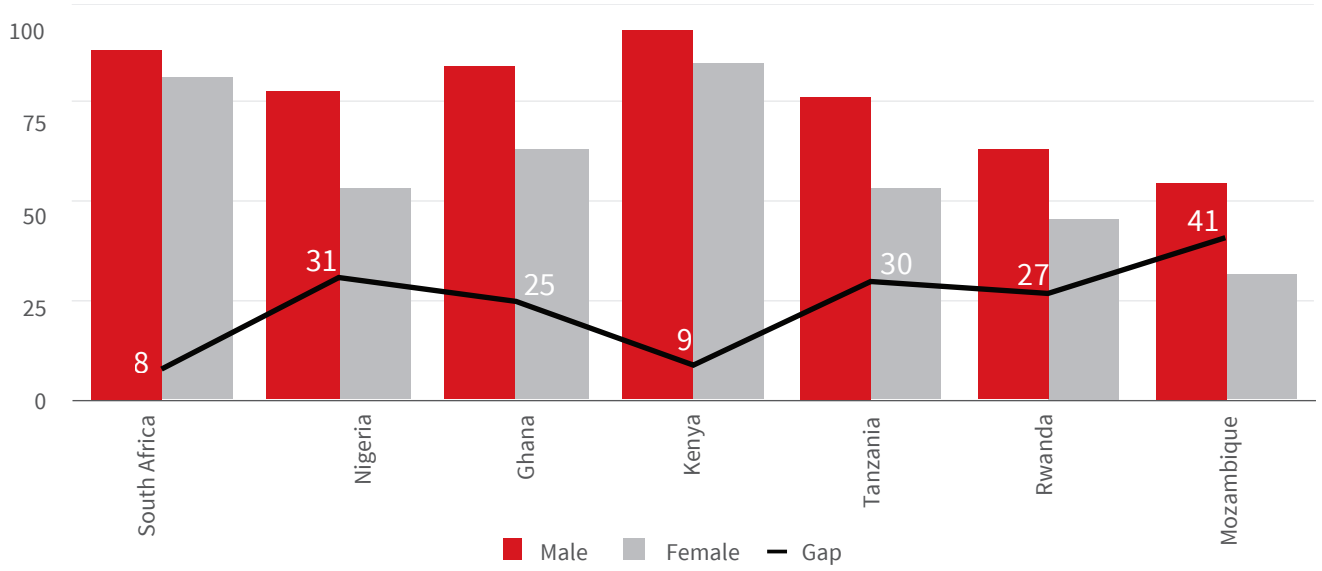

Figure 24: Gender disparity in mobile phone ownership
Source: RIA After Access Survey data, 2017

In contrast to other African countries, where all ICT indicators favour males, in South Africa females (85%) are more likely to own a mobile phone than men (83%). However, males are more likely to own a smartphone than females: smartphone penetration amongst males stands at 50 percent, which is seven percent below the 57 percent Internet penetration level amongst men; similarly, only 43 percent of females have smartphones, while 50 percent use the Internet. This suggests that men are more likely to be able to afford more expensive phones and that most women are unable to buy smartphones due to income disparities. This, in turn, would imply that females are less likely to access the Internet.

10 DIGITAL FINANCE AND FINANCIAL INCLUSION

Financial inclusion is the ability of individuals and business to access financial services to facilitate their consumption and investment activities. It allows families to meet their consumption needs and invest in their futures through improved education and health programmes. Financial inclusion is generally associated with economic and social development, and plays a significant role in reducing extreme poverty and inequalities[7]. Generally, most people in Africa do not have a bank account, except in a few countries such as South Africa[8]. The survey shows that the South African financial market is relatively-developed, with six out of ten South African residents owning a bank account. Within the proportion that has access to a bank account, three percent use someone else's account to access banking facilities. Bank account ownership in the other surveyed countries is very low, with only 13 percent of the population in Mozambique and Tanzania having access to one.

The 2017 survey shows that males and people who live in urban areas are more likely to benefit from financially inclusion than females and rural area dwellers. Of the female population, only 54 percent have a bank account, compared to 60 percent of males who are financially included, making the gender gap regarding financial inclusion ten percent. The disparity is much more significant (34%) along the rural–urban axis, with 68 percent of the urban population having a bank account, compared to 43 percent of the rural population.

Financial inclusion is not only based on access to a bank account but also access to credit to smooth out consumption[9]. Accordingly, the 2017 survey asked

Table 16: Ownership and use of ICTs by gender and location

INCOME (ZAR)	MOBILE PHONE	SMARTPHONE	INTERNET
0 – 1 583	82%	45%	51%
1 584 – 7 167	81%	38%	37%
7 168 – 7 167	95%	74%	74%
7 168 – 1 6418	100%	93%	98%
16 419 – 33 333	100%	100%	100%
33 334 – 57 333	100%	100%	100%
57 334 – 123 417	100%	100%	100%
>123417	100%	100%	100%

Source: RIA After Access Survey data, 2017

7. Cull, R. and Holle, N. (2014). "Financial inclusion and development: Recent Impact Evidence" CGAP. Available at: https://www.cgap.org/sites/default/files/FocusNote-Financial-Inclusion-and-Development-April-2014.pdf
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8. RIA After Access Survey data, 2017.
9. Kumar, A., Narain, S. and Rubbani, S. (2015). "World Bank lending for financial inclusion: Lessons from reviews of selected projects" IEG Working paper series, No. 2015/1, World Bank Group. Available at: https://openknowledge.worldbank.org/bitstream/handle/10986/21796/949720NWP00PUB0cial0Inclusion.final.pdf?sequence=1&isAllowed=y

respondents to state whether they have a credit facility. At least a third of the South African population has access to a credit card. South Africa fares relatively well, when compared to other surveyed countries, where credit card ownership is less than 20 percent, except in Nigeria, where 27 percent have a credit card.

The Survey shows that very few South Africans (4%) earn more than ZAR 16 417 per month, with 50 percent of the population earning less than ZAR 1 583. The survey shows that the majority of those who are not connected to the Internet are low-income earners: almost half those with incomes less than ZAR 1 583 do not use the Internet. The low use of the Internet in this income group correlates with lower smartphone penetration (45%). The results further suggest that smartphone penetration drives Internet uptake in South Africa, with the proportion of smartphones aligned to the percentage of Internet users.

A large body of research work and policy mostly focus on understanding challenges in rural–urban areas and of the poor[10] with less focus on the urban poor. A large number of the urban poor work in the informal sector or have jobs that pay minimum wages[11]. The urban poor do not exist in a separate world but are linked to the rural world through visits, remittances, recruitment patterns, and social, cultural and economic networks. Being neglected and often being the victims of misguided policies, the urban poor are generally left out and often end up living in slums, informal settlements or are simply homeless[12]. The survey results show that 37 percent of South Africans live on an income that is below the poverty line of USD 1.25 per day. While poverty is more prevalent in the rural areas (where 43% live below the poverty line), a significant proportion of those living in the urban areas (30%) also live below the poverty line. Interestingly, the Survey shows that men and women are affected to the same degree, with 37 percent of males and females living in extreme poverty.

However, the survey shows that the poor in the urban areas are more likely to use the Internet than those better off (six out of ten versus five out of ten). This counter-intuitive result is driven by the inclusion of students in the sample, who do not earn an income but nonetheless have access to the Internet free of charge at their respective institutions. Once students are excluded, this difference in the use of the Internet disappears, a result that suggest that, as telecommunications services move towards saturation, the Internet gap between the poor and the rich narrows. Mobile phones have managed to bridge the divide that was created by more expensive fixed-line services. While smartphone penetration in the urban areas stands at 47 percent, the proportion of the urban poor that own smartphones is higher than this average, at 56 percent. On the other hand, the percentage of rural poor using smartphones is 35 percent, well below the rate for the urban poor. These results illustrate that prepaid mobile phones provide a cheaper alternative way of providing services to the poor.

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11 ACTIVITIES ON THE INTERNET

Internet use is more common among the young generation in South Africa, with six out of ten of the population aged 15–34 using it. Indeed, there seems to be a negative correlation between age and Internet use: as age increases the rate of Internet users decreases. Almost half of the people aged 35–44 use the Internet, but the proportion of Internet users declines to 43 percent for ages 45–54, 28 percent for ages 55–64 and 21 percent for 65 years and above. This result is likely driven by exposure to the technology, peer pressure and social interaction among the young generation.

Social networking is common among Internet users in South Africa, with about 73 percent having Facebook, Twitter and WhatsApp accounts. Governments and civil societies now use social networks such as Twitter to direct policy and get rid of non-performing or corrupt leaders. For instance, the #ZumaMustFall and #DataMustFall social media campaigns were run through social media platforms, as their use of Twitter hashtags suggests. Recently, too, Mercedes-Benz and H&M were forced to apologise to the South African consumers following a social media outcry that deemed the adverts insensitive. On the other hand, less than half of Internet users use the platform to acquire educational content, while less than a third of Internet users use it to perform work-related activities.

Young Internet users remain active participants on the Web. Of those aged 15–24 years 75 percent, and 80 percent of those who are 25–34 years use social networking sites, significantly more than older generations, especially adults over 55 years. Internet users aged between 15 and 24 years are more likely to read online educational content, while young adults are more likely to use the Internet for work-related purpose.

On the other hand, the level of digital interaction between citizens and government is very low in South Africa, with fewer than 20 percent of Internet users among all age categories reporting they use e-government services. This is despite South Africa's e-government policies, which aim to use ICT to improve government efficiency and effectiveness, and in the process make it more convenient for citizens to access government services[13].

However, a significant proportion of Internet users say they use the Internet to look for employment opportunities. More interestingly, there is evidence of disproportionate use of Internet banking amongst the older generation, with more than 20 percent of Internet users aged 45 years and above having an Internet banking account. Shopping online is also found to be relatively common among older generations, with income the primary driver of online banking and shopping.

12.1 INTERNET AFFORDABILITY

Although Internet-based services provide cheaper communication alternatives, and operators are currently investing in their infrastructure to improve their network quality, coverage and access, leading to

Table 17: Internet access by location and income (ZAR)

	0 – 1 583	1 584 – 7 167
Rural	60%	92%
Urban	73%	90%

Source: RIA After Access Survey data, 2017

13. Department of Telecommunications and Postal Services, (2017). Electronic communication and transaction act, 2002 (ACT No. 25 of 2002) National e-Government Strategy and Roadmap. Available at: https://www.dtps.gov.za/images/phocagallery/Popular_Topic_Pictures/national_e-Gov_Strategy.pdf

nearly 100 percent of the country being covered by 3G networks, Internet and data services and products are still unaffordable to almost half of the South African population. When asked what are the factors that limit Internet use, more than a quarter of South Africans stated that the Internet is too expensive to use.

The survey finds that among those with incomes less than ZAR 1 583, those living in urban areas are more likely to use the Internet compared to those living in rural areas. Interestingly, the survey finds that among those earning between ZAR 1 584 and ZAR 7 167, those who live in rural areas are slightly more likely to use the Internet than those who live in urban areas.

12.2 NON-USERS OF THE INTERNET

Internet use remains strongly correlated with age, education attainment and income (negatively so in the case of age). The survey shows that 71 percent of those aged 15 and older in the African countries surveyed do not use the Internet. One of the strongest patterns in the data on Internet use is by age group, with at least 80 percent of those aged 45 and older in the country sample not using the Internet. In South Africa the picture is much better, with only half of the population aged 15 years and older (47%) not using the Internet. Worryingly, the study indicates that in Mozambique, Rwanda and Tanzania more than 90 percent of individuals aged 45 and older do not use the Internet (see Figure 25). The correlation is even stronger between income and Internet use. The survey shows that the probability of not using the Internet is higher among low-income groups (as we saw in Table 17 above). Of particular concern is that in South Africa, 100 percent of non-users of the Internet fall in the income category of less than ZAR 7 167. These results show that policies that aim at improving Internet uptake in South Africa should focus on low-income earners.

Overall, affordability of devices and services is the primary inhibitor to Internet use in South Africa. Asked why they do not use the Internet, the most frequently cited reason (by 36.2%) was the lack of Internet-enabled devices such as computers and smartphones, with a further significant number of non-Internet users (15%) indicating that it is too expensive for them.

12.3 MOBILE PHONE PLATFORMS

Mobile technologies have not only led to improved Internet access and use of the Internet in Africa and the Global South, but they have also helped a number of African communities, especially those living in rural areas, to access services that were not provided by the market due to the high installation costs in low population areas. The evolution of the mobile networks, coupled with the advancement of mobile technologies, has led to the emergence of various

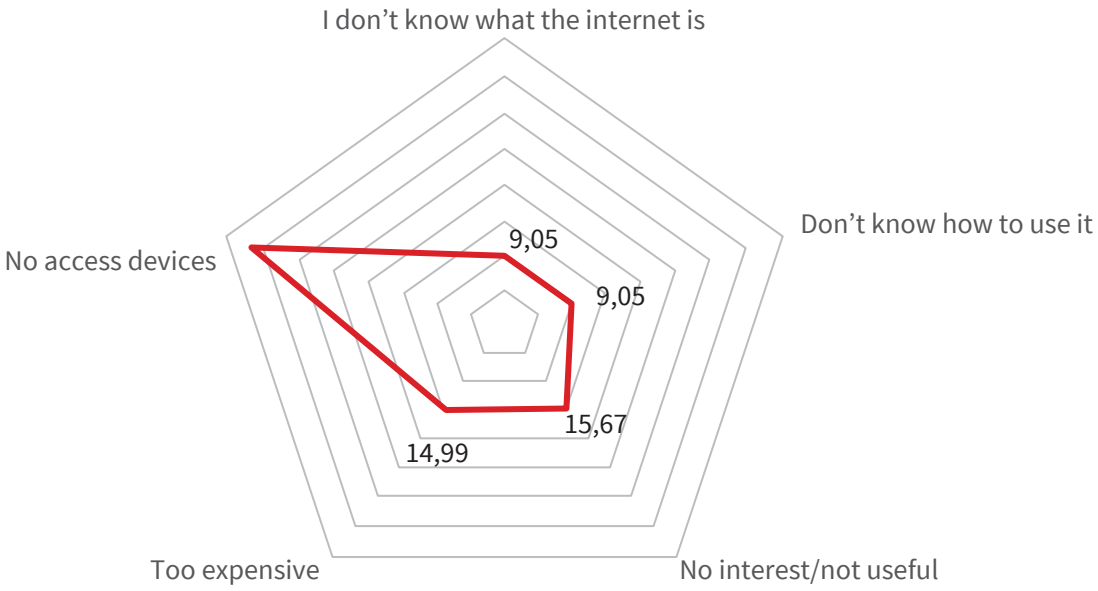

Figure 25: Reasons for not using the Internet
Source: RIA After Access Survey data, 2017

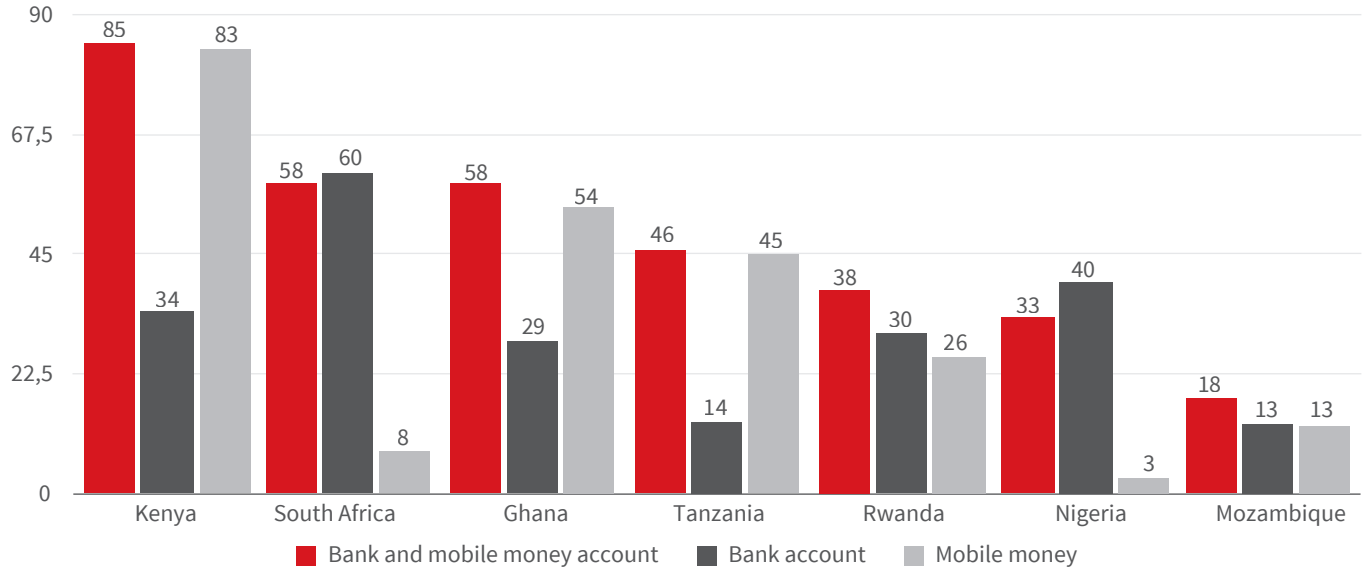

Figure 26: Account ownership in seven African countries
Source: RIA After Access Survey data, 2017

initiatives that rely on mobile phones to provide financial, healthcare, agricultural, government and other services[14].

Mobile phones today enable consumers to use them to access bank accounts, transfer money and make and receive payments, and perform other financial operations. The most common form of mobile banking in Africa is mobile money services, commonly referred to as M-Pesa in Kenya. Mobile money has improved the degree of financial inclusion in Africa by allowing people to transfer, save and pay bills using their mobile numbers as their account without the requirement to open a bank account[15].

Mobile money has become a thriving business in Africa, which has the highest levels of mobile money penetration in the world[16]. The 2017 RIA After Access Survey shows that 22 percent of people aged 15 years and above use mobile money services in the surveyed countries. The survey shows that, while most people in Africa do not have a formal bank account (67%), the use of mobile money services has contributed significantly to financial inclusion in the region, especially in Eastern African countries (Kenya, Rwanda and Tanzania). Accounting for the use of mobile, the survey shows that 45 percent of those aged 15 and above in the surveyed countries

14. Aker, J.C. and Mbiti, I. M. (2010). "Mobile phones and economic development in Africa", Journal of Economic Perspective, 24(3), 207-32. Available at: https://www.aeaweb.org/articles?id=10.1257/jep.24.3.207
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15. Fanta, A.B., Mutsonziwa, K., Goosen, R., Emanuel, R. and Kettles, N (2016). "The role of mobile money is financial inclusion in the SADC region" Finmark Trust, Policy research paper No.3/2016. Available at: https://www.finmark.org.za/wp-content/uploads/2016/12/mobile-money-and-financial-inclusion-in-sadc.pdf
Olinto, P., Beegle, K., Sobrado, C. and Uematsu, H. (2013). "The State of the Poor: Where Are The Poor, Where is Extreme Poverty Harder to End, and What is the current profile of the World's Poor?" The World Bank. Available at: http://siteresources.worldbank.org/EXTPREMNET/Resources/EP125.pdf
16. GSMA (2017). "Mobile Money Economy". Available at: https://www.gsmaintelligence.com/research/?file=7bf3592e6d750144e58d9dcfac6adfab&download

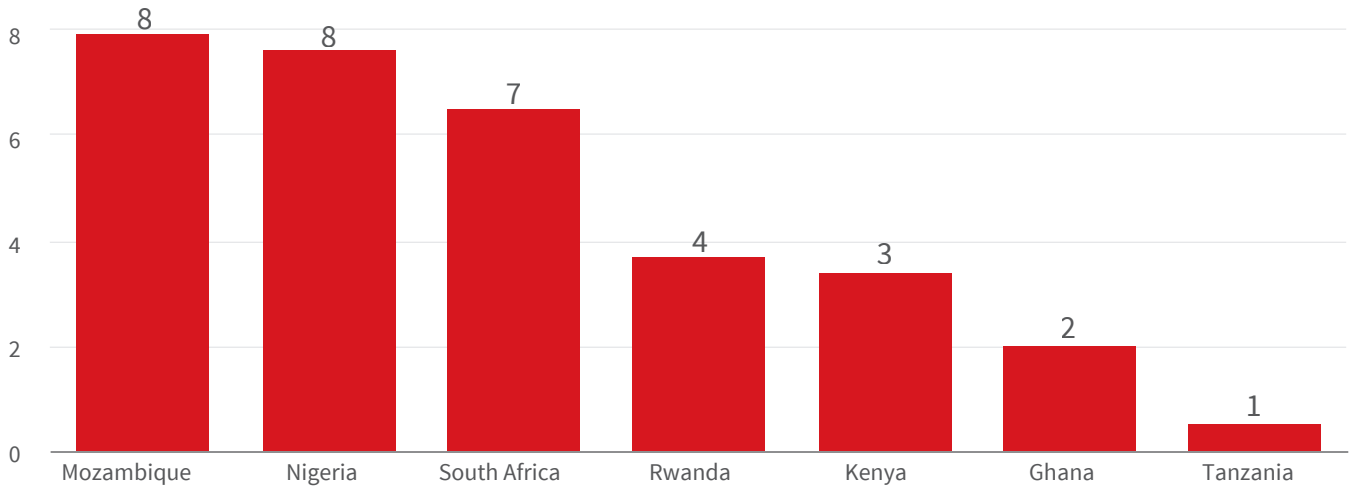

Figure 27: Proportion of Internet users engaged in microwork across countries
Source: RIA After Access Survey data, 2017

have access to financial services.

Among the surveyed countries in Africa, Kenya has the highest level of financial inclusion with 84 percent of the population having access to an account, mostly (83%) a mobile money account. South Africa is ranked second regarding financial inclusion among the surveyed countries, but this is because the majority (60%) use formal banking services, while the use of mobile banking is as low as eight percent, the biggest impediment being the regulatory framework. While it is evident that the banking services in South Africa are well-developed, a significant proportion of the population remains financially excluded. It is, therefore, essential for policymakers to promote and support the use of mobile money services, which are cheap, easy to use and can be accessed by many.

Other than providing financial services, the mobile industry has established itself as a significant enabler of employment opportunities. These employment opportunities are not only restricted to the highly-skilled labour force. Mobile phones today serve as a link between employees and employers, allowing workers to do small digital tasks, such as transcribing, hand-written text or determining whether two photographs show the same building[17]. Typically, these exercises are commonly referred to as microwork, and can be completed in a few seconds by a person without special skills or training. Workers are paid small amounts of money for completing such tasks. Such digital tasks also include online transport applications such as Uber and Taxify, and the online enablement of services such as deliveries, laundry and cleaning.

Microwork or online platform jobs can potentially contribute to socio-economic development of low-income countries by providing new job opportunities for those at the bottom of the pyramid. These platforms allow workers to choose and perform simple tasks online and report directly through the platform to receive payments in exchange[18, 19]. Even though these platforms have an enormous potential to contribute

17. Gillwald, A., Mothobi, O. and Shoentgen, A. (2017). "What is the state of microwork in Africa. View from seven African countries". Research ICT Africa, Working paper No.2/2017. Available at: https://researchictafrica.net/wp/wp-content/uploads/2017/12/Microwork_WorkingPaper_FINAL.pdf
18. Mtsweni, J. and Burge, L. (2014) "The potential benefits of mobile microwork services in developing countries: Research opportunities and challenges" Research Gate. Available at: https://www.researchgate.net/publication/271417907_The_potential_benefits_of_mobile_microwork_services_in_developing_nations_Research_opportunities_and_challenges
19. Gillwald, A., Mothobi, O. and Shoentgen, A.(2017). "What is the state of microwork in Africa. View from seven African countries". Research ICT Africa, Working paper No.2/2017. Available at: https://researchictafrica.net/wp/wp-content/uploads/2017/12/Microwork_WorkingPaper_FINAL.pdf

to the wellbeing of the unskilled labour force, the 2017 Survey shows that microwork in Africa is still at infancy; only two percent of the population aged 15 years and older work in these platforms. Considering Internet users only, the proportion of microworkers increased to five percent. These results show that, although the mobile technologies and the Internet provide an array of opportunities, African countries have not yet tapped into these digital dividends.

The low uptake of these platforms, which have the potential to reduce unemployment rates in Africa, is due to the low Internet penetration in the region (30%), more specifically the low penetration amongst low-income earners. In South Africa, microwork also remains low, despite the country having the highest Internet penetration among the surveyed countries. Of the 53 percent Internet users in South Africa, only 6 percent work via online or microwork platforms, fewer than in Mozambique (7.8%) and Nigeria (7.6%).

Online microwork does appear to have potential to break the cycle of poverty by hiring people at the bottom of the pyramid to perform digital tasks. At least half (53%) of the admittedly small number of microworkers in African stated that the income they earn from digital platforms is essential for meeting their basic needs. A further 17 percent indicated that it plays a critical role in their budget, while 30 percent do not depend on this source of income. The importance of income from these platforms is more pronounced in South Africa, with 60 percent of digital platform workers indicating that the income they earn is crucial to meeting their basic needs, with a further 20 percent suggesting that it plays a significant role in their budgets. While there is evidence that these platforms play a significant role in eradicating poverty by providing meaningful work for the people at the bottom of the pyramid[20], it is still difficult for many to benefit from such platforms as they lack the necessary skills or experience to perform the work.

The survey shows that the most common (29%) online tasks are completing online surveys and online data entry. Evidence from the survey suggests that online tasks are mostly performed by students and full-time workers, who tend to do these jobs in their spare time.

The majority of microworkers are poor and hired on location-centric platforms, such as driving for a ride-hailing application (for example, Uber, Taxify and Lyft), delivering household items ordered online, and driving for online-enabled cleaning or laundry services. The most common online-enabled services are cleaning or laundry services (30%), household deliveries (10%) and driving for ride-hailing application (6%). In South Africa, most microworkers provide online cleaning or laundry services (42%) or do online tasks (30%). A key feature of digital work platforms is that they attempt to minimise the outside regulation of the relationship between employer and employee. Workers are, for instance, generally classified as independent contractors. It is also rare that national labour laws are applied to digital workers. These issues are acute when transactions cross national borders: as it becomes unclear which jurisdictions' regulations apply to the work being transacted[21]. With the help of the Internet, much of this work can be done anywhere, and, with the lack of regulation and protections for workers, this can result in a situation in which digital workers can be disadvantaged and become mere clear-price-takers with little bargaining power. Evidence from the survey shows that a significant proportion of digital workers (30%) were not paid for at least one job that they completed. In South Africa, 26 percent of digital platform workers stated that they were not paid for a job that they had concluded.

20. Mtsweni, J. and Burge, L. (2014) "The potential benefits of mobile microwork services in developing countries: Research opportunities and challenges" Research Gate. Available at: https://www.researchgate.net/publication/271417907_The_potential_benefits_of_mobile_microwork_services_in_developing_nations_Research_opportunities_and_challenges
21. Gillwald, A., Mothobi, O. and Shoentgen, A.(2017). "What is the state of microwork in Africa. View from seven African countries". Research ICT Africa, Working paper No.2/2017. Available at: https://researchictafrica.net/wp/wp-content/uploads/2017/12/Microwork_WorkingPaper_FINAL.pdf

12

DIGITAL DIVIDE A REALITY IN SOUTH AFRICA

The survey findings indicate that technological forms of exclusion are a reality for significant segments of the South African population, and that, for many people, digital exclusion reinforces and deepens existing inequalities. Furthermore, ICT deprivation can be considered alongside, and strongly linked to more traditional twentieth-century social exclusion factors, such as low income, unemployment, poor education and social isolation. In the case of South Africa, a society with more pronounced income and educational inequalities, the survey shows that despite the hype around smartphones connecting the poor, the digital divide between the poor and the rich is significant in South Africa. Furthermore, the data shows that, while the digital gap between genders is disappearing, it exists between urban and rural dwellers, with about 40 percent of rural areas not using the Internet compared to only 25 percent of urban residents being unconnected. While the increased levels of connectivity suggest a bridging of the digital divide, paradoxically, as more people are connected digital inequality increases. This is not only the case between those online and those offline, but between those who have the skills and financial resources to use the Internet optimally and those barely online. Without policy interventions to reduce these disparities, offline inequalities will simply be mirrored online – or potentially amplified as the information society matures and not everyone is equally well served by ICTs.

Part E

Assessment of policy and regulatory outcomes

As noted above, ICT is no longer a narrow sectoral issue, but a national priority that casts policy shadows or light across the whole economy and society. To understand the state of ICT in South Africa, and to provide policymakers with the evidence available to make informed decisions, this report adopts a diagnostic approach.

Part A highlighted the many problems of using a country's ranking on global ICT indexes as a basis for policymaking or evaluation. Some of the better indexes might provide some indication of performance in relation to other countries, and even identify some of the areas of weakness or strength. What they cannot explain, however, is why this is the case, or what are the root causes of specific areas of weakness, making it impossible to identify specific remedies rather than generalised statements of 'best practice'. Indeed, most 'best practice' in telecommunications reform over the last two decades is underpinned by assumptions of existing mature competitive markets as well as capacitated institutions and workforces, with the concomitant reductions in production costs and market entry costs. Many theories of innovation and entrepreneurialism that explain the global development machinery in relation to broadband and Internet are based on assumptions of abundance, universality, and levels of human development that enable users to be producers, not just consumers,

Arguably the failure of many reforms in developing countries can be attributed to the lack of institutional endowments to implement reforms; to the absence of broadband ubiquity that characterises mature markets, and to the low levels of human development necessary to exploit the potential of the Internet successfully. Under these conditions, innovation in Africa generally arises from constraint. The uptake of mobile money services, such as M-Pesa, in countries where people are less banked (most notably, from the 2017 After Access Survey, not only in Kenya but in Mozambique and Tanzania), appears to be occurring in some of the fastest-growing mobile money markets. 'Best practices' arising from developing countries, which are often touted by development banks and multilateral agencies, often only reflect gains in a narrow area. Often micro-cases do not contribute systemically to national policy objectives or enhance the overall performance of the country on international rankings, but causes a halo effect nevertheless that spills over onto their public policies more generally. This is the case, though far from the worst case, with South Africa because South Africa's ICT market is relatively sophisticated and operators have managed to deliver extensive services despite policy vacuums, lags and unacknowledged failures. A relatively high GNI per capita results in rapid ICT adoption by high-end users but also masks the massive inequalities that keep half the population offline. Yet, while South Africa compares well with other African countries, against Latin American countries with more similar GNIs per capita, it performs less well in relation to digital inequality; which, despite its intersectional dimensions, is primarily derived from poverty.

To move beyond the indicators and understand the factors contributing to policy outcomes, this analysis adopts a diagnostic method. It builds on the approach used in the telecommunications component of the Diagnostic Report of the National Development Plan which was ultimately used as the evidence base for the economic infrastructure component of the final plan.

Drawing conceptually from medical diagnosis, it is a procedure performed to confirm or determine the presence of a condition, which has usually been preceded by a report of symptoms, or suspected on the basis of other tests. In this way, it is well-suited to the ICT ecosystem approach discussed in Part A, which recognises how the different elements are integrally related: a blockage in one part of the ecosystem impacts on the functionality of another component. The overall health of the system is determined by the policies, strategies and processes that enable the functionality of the system.

For the purposes of this study, the starting point is South Africa's relatively poor and historically declining rankings in relation to other middle-income countries on global ICT and other relevant indices,

along with the perceived high cost of communications that has preoccupied the country following the #DataMustFall campaign. Application of the diagnostic method to ICT in South Africa starts with an analysis of the policy and legal framework, the resultant institutional arrangements and their concomitant set of issues and challenges (Part B), and the market structure, its performance and problems (Part C) in order to ascertain if policy, law and institutions are fulfilling their critical mandate of creating the national conditions conducive to the high levels of public or private investment necessary for effectively regulated markets to flourish. It does so by benchmarking policy and regulatory outcomes in South Africa – in terms of penetration, prices and quality of service – against national policy objectives, primarily that of affordable access to communications in the wider context of the conditions required for the take-off of the digital economy. Although competition is not a policy outcome in and of itself, it is the policy means selected to deliver on other objectives, and is itself, rather, a composite measure of these other indicators of policy outcomes.

The diagnosis is derived through the triangulation of findings from document analysis (policies, draft policies, laws, regulations, guidelines), the consideration of news articles, research papers and expert commentary, the benchmarking of supply-side and demand-side indicators of digital readiness, and stakeholder interviews and inputs into public processes.

The benchmarking exercise requires a country to be compared to countries with similar characteristics. In this case, South Africa is benchmarked against the larger and more dynamic telecommunication markets in sub-Saharan Africa: Ghana, Kenya and Nigeria. While the normal procedure is to compare countries in the same economic block, in this comparison, we have chosen markets further afield because most countries that are in the same economic block and that have a similar GDP per capita to South Africa (such as Botswana or Mauritius) are small in terms of population size and economy and have very different geographical conditions.

As discussed in Part A, Internet penetration correlates significantly with per capita GNI, and indexes are intrinsically linked to GDP, which at least partly explains South Africa's position in relation to poorer-performing African countries. For this reason, South Africa is also compared to similar economies in Latin America, using the demand-side data from RIA's 2017 After Access study, this despite the fact that, without the supply-side data that RIA has for Africa, a fully comprehensive benchmarking exercise cannot be undertaken.

As the values for different indicators come from different quantitative and qualitative systems, and often are not reducible to a single figure or value, the concept of a traffic light has been deployed in order to indicate the relative status of the country on a particular indicator (together with a descriptor of the benchmark used to assess the status). The points requiring policy intervention are then evident at a glance. The colour 'green' is used as an indication of a performance that is better than the benchmark available – a national figure or triangulation of documents, stakeholder interviews and indicators or the benchmark average – on that particular indicator. 'Amber' is used to signify a performance that is average or not moving swiftly in a negative or positive direction, but which will alert policymakers to the need for improvement. A 'red' light is used to indicate performance that is below the average score of the benchmarked countries, or that the country is on a downward trend from a once positive position. It identifies an indicator that needs immediate attention and intervention.

13 ACCESS

Access is defined by a set of indicators reflecting the prevalence of mobile devices, as well as Internet use. Basic phones can only connect to networks that provide access to voice and SMS services, but smartphones or Internet-enabled devices can connect the user to the Internet. Smartphones are more expensive than basic phones, and are not affordable to the poor, as demonstrated in the demand-side analysis (Part D).

Although prices are high with South African coming 35th out of 49 African countries, in terms of 1 GB of data in Q4 2017, on the RIA Africa Mobile Pricing (RAMP) Index, the benchmarking exercise shows that the majority of South Africans have access to communication services. South Africa performs well in all access and use indicators against the other countries benchmarked in Africa, a result that is linked to its high per capita income levels. Internet penetration levels track GNI per capita, as can be seen in the table below. GNI per capita, however, masks inequalities, especially in a country like South Africa, where they are so extreme. Although South Africa outstrips other African countries that are benchmarked, only half South Africa's population over the age of 15 have Internet access.

Modelling undertaken on the data from the ICT access and use survey confirms that demand for telecommunications services is significantly driven by income and education level. Further, the overall GNI per capita masks the level of income inequality in the country. Even though South Africa performs well in this measure, there is evidence that communications services are not affordable to the majority of South Africans at the bottom of the pyramid.

This is further reflected in the comparison of South Africa with Latin American countries that have similar levels of GNI per capita. South Africa does not perform well against any of the benchmarked Latin American countries, including Colombia, Guatemala and Paraguay, this despite these countries having a lower GNI per capita. An analysis of the Herfindahl-Hirschman Index (HHI) shows that there is effective competition in the Latin American countries, with all the benchmarked countries having HHI values

Table 18: Benchmarking South Africa against Ghana, Kenya and Nigeria

ACCESS	COUNTRY-LEVEL INDICATOR	TRAFFIC LIGHT	COMPARISON AVERAGE	SOURCE
Mobile phone ownership	85%	●	76%	After Access, 2017
Individual using the Internet	53%	●	28%	After Access, 2017
Fixed-lines per 100 inhabitants	8%	●	1%	After Access, 2017

Table 19: Benchmarking South Africa against Argentina, Colombia, Guatemala, Paraguay and Peru

ACCESS	COUNTRY-LEVEL INDICATOR	TRAFFIC LIGHT	COMPARISON AVERAGE	SOURCE
Mobile phone ownership	85%		85%	After Access, 2017
Individual using the Internet	53%		73%	After Access, 2017
Land-lines per 100 inhabitants	8%		26%	After Access, 2017

ranging between 2 800 and 4 100. Argentina and Peru are the most competitive markets, with HHI index values of 3 309 and 2 806 respectively, and high Internet penetration levels of 86 percent and 73 percent respectively. This result suggests that markets that are more competitive offer more affordable prices and are more likely to be Internet-inclusive. In comparison, South Africa has high market concentration and unaffordable communication services.

Among the seven African countries surveyed in 2017, South Africa still performs better with an Internet penetration of 53 percent. However, the Survey shows an income divide: the 47 percent without Internet access are low-income earners. The results are evidence that, even though the telecommunication industry is well developed, traditional universal access policies focusing primarily on supply-side interventions create only some of the necessary conditions for access. Unaffordability, lack of local content and the lack of skills are all barriers that limit meaningful access and contribute to digital inequality.

14 USE

The usage indicator measures the consumption of mobile services such as mobile voice and the Internet. It also assesses the intensity of use, an important determinant of digital inequality. The average bandwidth use of the population can be determined by dividing aggregated traffic or bandwidth figures for the country by the size of the population. However, this again masks inequalities in use between high and low Internet users. The average bandwidth for those connected, however, provides some indicator of the intensity of use in the country, which is determined by the other indicators assessed here: price, quality of service, etc. Content is a difficult indicator to assess, due to the global nature of the Internet. Supply-side, big data analysis by global platforms can demonstrate what national traffic is going to which sites, but understanding the reasons why users go to specific sites can only be ascertained from demand-side data. The extent of local content, and the use made of it specifically is difficult to determine. Although there are limitations to this measure, local content is assessed by the number of Facebook users, since Facebook is largely locally generated content.

Average revenue per user (ARPU) is an important metric for the performance of the mobile tele-communications sector. A careful consideration, however, is required when using this indicator. In mobile voice markets, as they move from inception towards saturation, ARPUs start off high, as high-in-come early adopters come online, but decrease as the 'long tail of low-income users' comes online, and average usage drops accordingly.

With blended ARPU, we are seeing voice ARPU coming down, but data ARPU going up, as higher-end users' demand increasingly consumes data-intensive video products. As more users who cannot afford to use data intensively come online, ARPU tends to decline. The other problem with this indicator in prepaid mobile markets is that the measure is not

Table 20: Benchmarking South Africa against Ghana, Kenya and Nigeria

USAGE	COMPARISON AVERAGE	TRAFFIC LIGHT	COUNTRY-LEVEL INDICATOR	SOURCE
Average revenue per user in USD (blended ARPU) per month	4.10	●	6.87	GSMA, 2017
Highest minutes of use (MOU) per connection	109 (Nigeria)	●	131	GSMA, 2017
Data traffic per	39 280.08 (TB)	●	81 649.96 (TB) (smartphones)	GSMA, 2017
Social media users per 100 inhabitants	28%	●	45%	RIA After Access Survey, 2017

Table 21: Benchmarking South Africa against Argentina, Colombia, Guatemala, Paraguay, Peru

USAGE	COMPARISON AVERAGE	TRAFFIC LIGHT	COUNTRY-LEVEL INDICATOR	SOURCE
Average revenue per user in USD (blended ARPU) per month	7.85	🔴	6.87	GSMA, 2017
Highest minutes of use (MoU) per connection	221 (Colombia and Peru)	🔴	131	GSMA, 2017
Data traffic	195 345.12(TB) (Peru-Smartphone)	🔴	81 649.96 (TB) (smartphones)	GSMA, 2017
Social media users per 100 inhabitants	75%	🔴	45%	RIA After Access Survey, 2017

per unique subscriber but per active SIM card. With the phenomenon of multiple SIM-ownership in many markets, ARPU becomes very diluted.

Since the introduction of OTT, mobile operators are increasingly adopting strategies aimed at protecting their voice and SMS market, which has higher margins than data traffic, in order to increase their ARPUs. In this context, a lower ARPU would mean low-end users are coming into the market and making greater use of OTT voice and text services.

Compared with the other benchmarked countries, South Africa's SIM penetration rates are high, and, as more low-end, marginal users enter the market, ARPUs should decline. The benchmarking exercise, however, shows that ARPUs in South Africa are higher, an indication that South Africans are spending more on communication services. However, according to RIA's 2017 After Access Survey, 46 percent of those who use the Internet state that the price of Internet access limits their use, a result that shows that high ARPU in South Africa is mostly driven by high prices.

The effect of high prices on communication service use is also evidenced when South Africa is benchmarked against Latin American countries. South Africa performs poorly in all usage indicators against these countries. The use of social media and data traffic is high in Latin American countries compared to South Africa: smartphone data traffic in Peru is more than twice that in South Africa, and the average social media use in the Latin American countries is also more than twice that in South Africa, resulting in ARPUs in these countries. This is further evidence that prices and competition are critical drivers of communication services, with more competitive markets likely to have higher adoption rates and greater intensity of use of communication services.

15 PRICING AND AFFORDABILITY

Price is a key indicator of the level of competition in the sector (see Part C). Accordingly, the price of mobile voice and data services is the starting point for the assessment of the sector's performance. Price serves as a measure of the competitiveness of the market and the degree of consumer welfare. If mobile prices are high in comparison to the benchmarked countries, then the causes of high prices need to be assessed. The mobile voice and SMS market has matured, and prices are steadily declining as consumers demand more Internet services. The mobile data market, on the other hand, is far more volatile. In countries where both voice and data services are high, there are usually significant obstacles to increased access and usage.

The cost of communication in South Africa is high in comparison with other African countries. The cost of 1 GB of data in South Africa is double the average cost of the same amount of data in the comparative countries. Among factors contributing to high prices is lack of competition in the market. Although there are some MVNOs, there are essentially four MNOs, a number that is half the number of MNOs in Brazil and Nigeria (8 each) and fewer than the number of MNOs in Cambodia (5), and Ghana (7).

A key component to achieving universal access and usage service is affordability. Whether or not telecommunication services are affordable depends primarily on the price (which is determined by the input costs and profit margin of the operator) and the user's disposable income.

The 2017 RIA After Access Survey shows that low-income earners pay a significantly high proportion of their disposable income to access telecommunication services. This result is crucial for South Africa, which has significant income disparities. The affordability divide between the low-income and high-income South Africans is creating barriers

Table 22: Benchmarking South Africa against Ghana, Kenya and Nigeria

AFFORDABILITY	COMPARISON AVERAGE	TRAFFIC LIGHT	COUNTRY-LEVEL INDICATOR	SOURCE
Mobile prepaid voice basket (USD)	2.13	●	3.86	RIA, 2017
Dominant operator: mobile prepaid voice basket (USD)	2.66	●	6.46	RIA, 2017
Mobile prepaid 1 GB basket (USD)	3.04	●	7.27	RIA, 2017
Dominant operator: mobile prepaid 1 GB basket (USD)	4.06	●	10.84	RIA, 2017

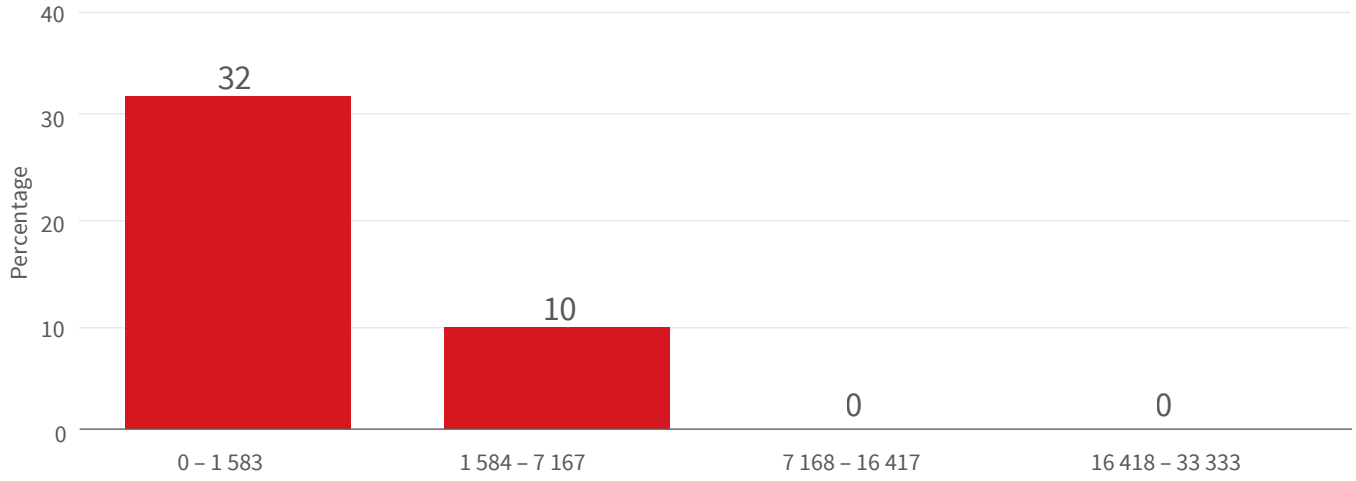

Figure 28: Percentage of individuals who do not have access to the Internet, by income group (ZAR)
Source: RIA After Access Survey data, 2017

to connecting the low-income earners. The Survey shows that almost 50 percent of South Africans do not use the Internet, and further that these 50 percent are at the bottom of the pyramid – evidence that the price of communications in South Africa is unaffordable to the poor (see Figure 1).

Other than creating a barrier to access and use, the cost of communication in South Africa discourages Internet users from accessing the Internet as much as they need or desire to, even when they own or have Internet-enabled devices. A quarter of Internet users stated that the cost of Internet access limits their Internet use.

16

INFRASTRUCTURE, COVERAGE AND INTENSITY OF USE

As demonstrated in the supply-side analysis in Part C coverage obligations are a critical part of the costs of operators but as the markets shift from voice to data market the high levels of investment in LTE and fibre become a critical aspect of competitive success. Sufficient network coverage requires extensive investment, supported by fair competition, which provides an incentive for mobile operators to invest in infrastructure. Our analysis measures both the extent and quality of infrastructure available in a country. The extent of infrastructure is measured by network coverage and the percentage of the population that has access to a mobile signal. The quality of infrastructure is measured by the number of subscribers per base transceiver station (BTS). Our analysis also seeks to assess the extent of fibre in the country and the availability of international bandwidth and cross-border connections. The level of investment is further expressed as investment per subscriber.

South Africa remains the continent's leader according to the ITU. The country is connected to multiple high-speed undersea cables: Seacom, EASSy, WACS and ACE. This has boosted broadband capacity and shifted the bandwidth bottlenecks in South Africa from the International leg to national backbone capacity.

While international transmission prices are 20 percent of what they were in 2006, when Seacom broke the SAT-3-SAFE undersea cable monopoly in South Africa, national transmission now costs more than international transmission. This highlights the urgent need for resolution of the third effort by ICASA over a decade to undertake the Chapter 10 market review and enquire into dominance in the market. While Telkom's monopoly in the national transmission was broken (first by the entry of the dark fibre companies and subsequently through self-provisioning by the mobile operators, the slow entry of the second fixed-line operator and the initial entry of Broadband Infraco into the markets) competition remains ineffectual. The overall result is that the end user price of data in South Africa is high, as indicated by the RAMP index (above). But, without the completion of a formal market review and assessment of dominance in the wholesale market, along with the necessary costing study, it is not clear how much above cost retail pricing is. Costing also needs to take into account the coverage and quality of service requirements attached to licences and the investments that have produced some of the highest quality networks in the country. This has increasingly become a critical competitive issue as the market shifts from voice to data, and particularly in the retention and attraction of high-end users.

Table 23: Benchmarking South Africa against Ghana, Kenya and Nigeria

INFRASTRUCTURE	COUNTRY-LEVEL INDICATOR	TRAFFIC LIGHT	COMPARISON AVERAGE	SOURCE
International bandwidth per user (kbps)	15 298		147 630	ITU, 2016
Percentage of population covered by 3G/4G signal	70.66		100%	3i, 2018

17 QUALITY OF SERVICE

With increasing demand for video content, streaming media, and services such as cloud computing on the continent, broadband performance – and specifically how users experience performance – becomes increasingly important to competitive outcomes in the market.

In order to meet the demand for high-usage bandwidth applications, South African operators have invested extensively, increasing capacity by investing in both terrestrial fibre networks and in the provision of mobile LTE networks.

Despite this increase in network capacity, according to the Cable's global broadband speed league[1], the speed gap between various countries remains very wide, as the five fastest countries have download speeds which are around 40 times faster than the five slowest. According to the Cable study, of the 39 African countries ranked, none achieved average broadband speeds above 10 mbps, with South Africa ranking 80th out of 189, having a mean download speed of 4.36 mbps. The research, however, focuses on fixed-line broadband tests, which tends to put African countries at a greater disadvantage due to fixed infrastructure challenges, and hence slower speeds. Although the market conditions have changed in South Africa in some of the higher-end suburbs and metropolitan municipalities, where FTTH is increasingly available in many parts of the country, where ADSL was the predominant form of fixed-line connectivity, it was found to be slower (and more expensive) than mobile broadband connections.

South Africa performs well in comparison to other African countries: download speeds have benefitted from a proliferation of FTTH services and relatively high levels of investments in fibre by MNOs. Figure 29 shows that there has been an ongoing improvement in download speed in South Africa from Q2 2014 to

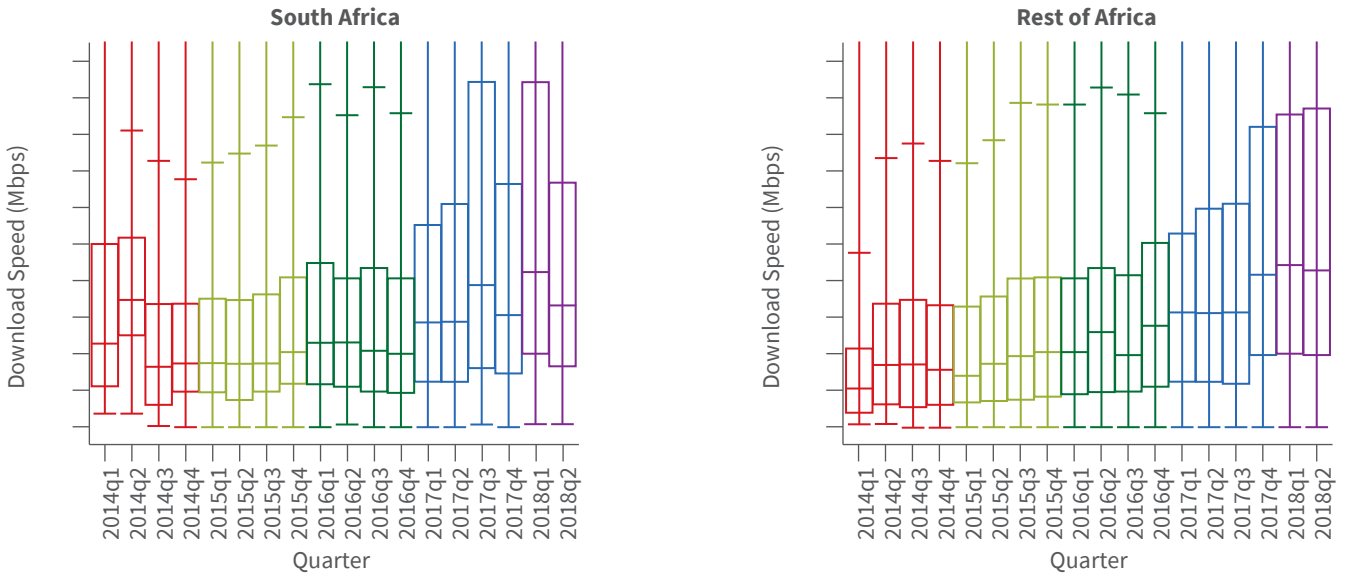

Figure 29: Download speed in South Africa verses the rest of Africa (Q1 2014 - Q2 2018)
Source: SpeedChecker, 2018

1. See the Speed League ranking — the Index is based on M-Lab data.

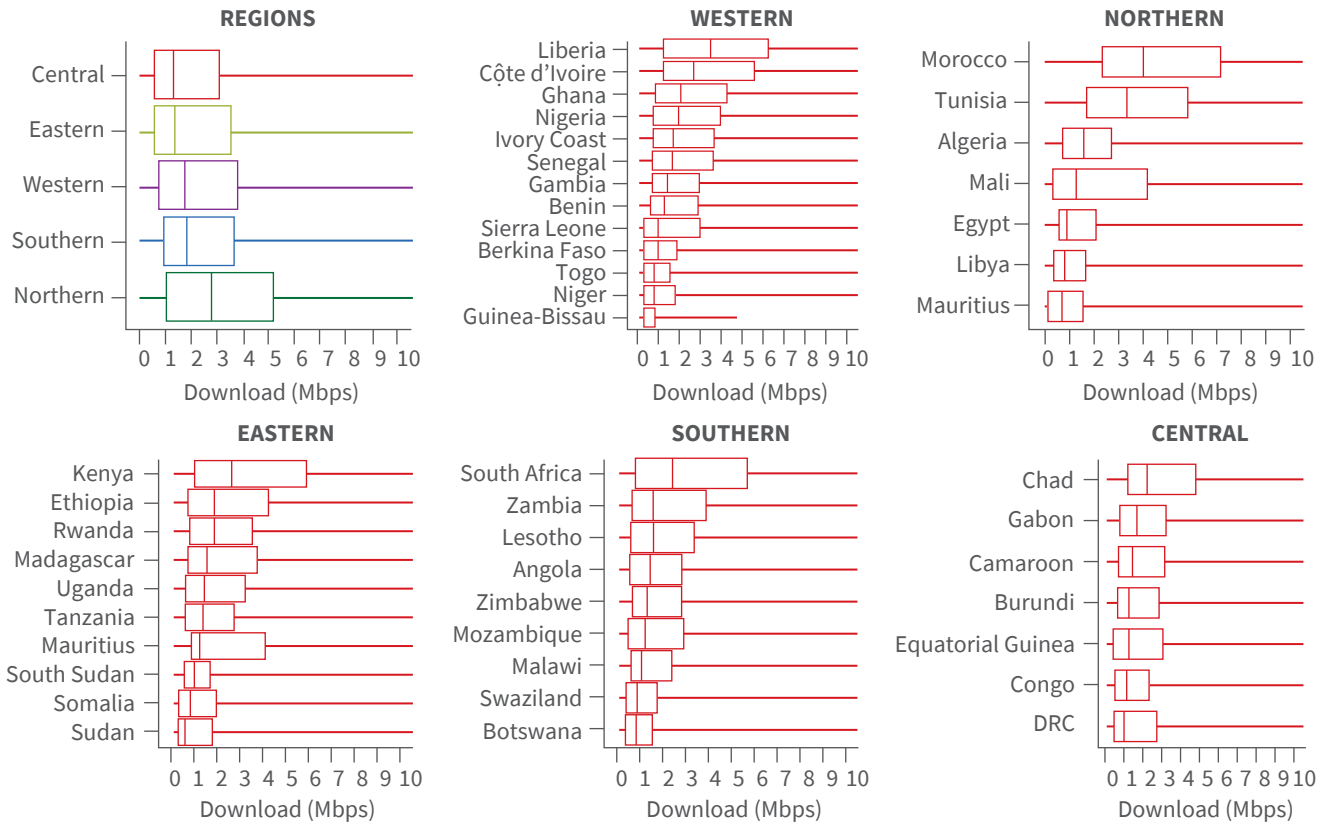

Figure 30: Download speeds for selected countries/region (mbps)
Source: SpeedChecker, 2018

date, a development which can be associated with investments by telecommunication providers as they try to out-compete each other regarding coverage, speed and quality.

Figure 30 shows download speeds for the 46 African countries for which measurement information was obtained from SpeedChecker[2]. All regions recorded similar median speeds between Q1 2014 and Q1 2018, around 1 mbps and 1.5 mbps download speed, except for the Northern region which performed better, having recorded a median speed of almost 3 mbps. Within SADC, the recorded download speeds in South Africa are higher than speeds in any of the other Southern African countries.

2. Speedchecker is a private company running large-scale software-based monitoring networks. They operate a global measurement network spanning over 170 countries. See http://www.speedchecker.xyz/.

18 COMPETITION

The competition component of sector performance impacts upon and is impacted by other components since it is at the heart of any ecosystem. Fair competition in the sector leads to reasonable returns on investment for operators and affordable prices for end users. Competition is evaluated by a concentration measure (the Herfindahl-Hirschman Index) and wholesale prices such as MTRs.

The benchmarking exercise shows that, overall, African markets are highly concentrated. An assessment of the Herfindahl-Hirschman Index (HHI) shows that South African telecommunication is highly concentrated, with an HHI index of 3 495, higher than the 2 500 rule-of-thumb yardstick for high concentration, but lower than the average HHI of the other benchmark countries. The dominant operator, Vodacom, holds close to 50 percent share of the market. The market is highly concentrated, with two operators, Vodacom and MTN, controlling more than 80 percent of the market. This indicates that, despite the entry of two other players (Cell C and Telkom), the dominant position of incumbents makes it difficult for late entrants to wrestle market share away from them.

Table 24: Benchmarking South Africa against Ghana, Kenya and Nigeria

COMPETITION	COUNTRY-LEVEL INDICATOR	TRAFFIC LIGHT	COMPARISON AVERAGE	SOURCE
Market concentration (HHI)	3 495	🟢	4 087.66	GSMA
Number of mobile operators (excluding MVNOs)	4	🟠	5	GSMA
Market share of the largest operator	47.18%	🟠	50.69%	GSMA

Table 25: Benchmarking South Africa against Argentina, Colombia, Guatemala, Paraguay and Peru

COMPETITION	COUNTRY-LEVEL INDICATOR	TRAFFIC LIGHT	COMPARISON AVERAGE	SOURCE
Market concentration (HHI)	3 495	🟢	3822	GSMA
Number of mobile operators (excluding MVNOs)	4	🟠	4	GSMA
Market share of the largest operator	47.18%	🔴	43.2%	GSMA

19 AFFORDABILITY

There is little doubt that cost drivers, such as the high rand-dollar exchange rate (which affects equipment imports required for the constant upgrading of mobile networks), together with the increasing cost of key inputs (such as electricity) have had inflationary effects on data prices. In the absence of high-demand spectrum being released to operators for 4G, high bandwidth services are also not being deployed in the most cost-effective bands, further exacerbating the high cost of communications. Despite this, it is clear the price of data is not cost based and could be brought down through regulatory measures to enable more effective competition in the market[3].

Although the recent End User and Subscriber Service Charter Amendment Regulations – which mandate operators to roll over unused data, to enable transfer data to other users on the same network, and which prohibit customers being charged out-of-bundle rates without their consent – demonstrate a commitment to consumer protection, they do not deal with the underlying causes of high data prices.

Along with many other telecommunications regulators responsible for economic regulation of the sector around the world, ICASA is mandated (by Chapter 10 of the Electronic Communications Act) to define and analyse markets and market segments, and to determine their degree of competitive functioning, in order to design the appropriate remedies. This *ex ante* pro-competitive regulation is designed to protect consumers in the retail market by safeguarding fair competition and by pre-empting anti-competitive behaviour. *Ex post* regulation, dealing with anti-competitive conduct and abuse of dominance, deals with market failures after they occur, and is the province of the Competition Commission and Tribunal.

Failure by ICASA to put in place this mandatory and foundational regulation more than a decade after the Act was passed means that the wholesale facilities and services market, which is highly imperfect by nature, does not allocate resources efficiently, and therefore does not produce the intended competitive results. Even in the absence of anti-competitive practices, without cost-based access to dominant operators' networks, smaller operators cannot compete. While successful operators should not be penalised for their success, dominance does enable Vodacom and MTN to have the liquidity to reinvest in their networks, extending network coverage and improving the quality it offers. Even in the absence of anti-competitive practices, this enables dominant players to attract more customers and thereby increase their surpluses, placing them in a better position to further enhance the quality of their networks or pay for spectrum when it does become available. Wholesale price regulation is therefore critical to creating a fair and competitive environment. This is not an easy task in a developing market and has to be done in a way that does not remove incentives for network investment.

3. Mothobi, O., Gillwald. A. and Rademan, B. (2018). Dominant operators' data prices remain static while SA struggles to get and stay online. Research ICT Africa Policy Brief 1, 2018. Available at: https://researchictafrica.net/wp/wp-content/uploads/2018/06/2018_Policy-brief-1_Data-prices-remain-static_South-Africa-.pdf

20 UNIVERSAL ACCESS

What is also clear from the supply-side and demand-side analysis is that, even if prices were effectively regulated, based on existing business models and licensing frameworks, vast numbers of South Africans would still not be able to afford to use the Internet in any sustained and meaningful way.

With 50 percent of people offline, current universal access models aimed at filling in the last 10 percent or 20 percent of the population are not going impact significantly on digital inequality. Strategies to reach schools, clinics and police stations in under-serviced areas through leveraging existing private investment have already been identified in the national broadband plan, SA Connect. The aggregation of public sector demand in those areas and the creation of incentives through anchor tenancies are already well-articulated in the plan.

However, the fact that five years later the key targets have been missed is an indictment on the institutional arrangements at various levels in the sector, particularly the failure of institutions established to spearhead policy and manage market failure. Many of the problems relate to legacy issues with the ICASA Council appointment processes, which have resulted in a leadership vacuum and the consequent failure generally to create strong, public-interest institutions with the effective capacity to implement policy without political or industry interference. The political discontinuity in the Ministry has also impacted on the policy cycle and weakened the commitment of incumbent ministers to their predecessors' agendas. The administration was also preoccupied with operationalising the misguided and ill-advised 2014 splitting of the former Department of Communications into two, with bifurcated responsibilities for broadcasting and for telecommunications and postal services.

All of this impacted on and undermined the protracted process that led to the proposed ECA Amendment Act, six years after the policy review process was started. That the Universal Access and Service Agency of South Africa (USAASA) will be rationalised and incorporated into the regulator is a sound decision, despite the latter appearing to be under tighter ministerial control. Universal access and service should be at the core of regulation in a developing country such as South Africa, and duplication of administrative functions and costs for multiple agencies in the sector has long been identified as wasteful.

Although proposed legislation appears to intend to replace the Universal Access and Service Fund with a broader focus Digital Development Fund, there appears to have been insufficient assessment of the effectiveness of the fund or questions of its continuation. A more thorough analysis of the outcomes of USAF might well have concluded that secondary levies on the sector have been counter-productive, and certainly that the ineffectual use of them should end. Unless strategically deployed, all such levies do is to add a premium to the cost of communications.

Instead of using the existing funds for long-term projects that fail to consider global market trends or are overtaken by technology developments, any remaining funds should be used in a targeted and co-ordinated way to provide not only access but equitable use of the Internet.

As proposed by SA Connect, the fund could be used far more effectively to leverage the growing availability of smart devices to enable citizens to be online by supporting the rollout of free public WiFi hotspots outside of urban centres. With SA Connect's failure to meet its targets to connect public buildings in under-serviced areas, the national public Wi-Fi initiative has also been undermined. It is true that Gauteng and the Western Cape have launched several initiatives, with varying degrees of success, but at present, these remain in the major metropolitan centre. Deploying the Universal Access and Service Fund for the development of free public Wi-Fi networks has the potential to bring more people online, improving government's online communications with citizens, and reducing digital inequalities by enabling greater use by those currently price-constrained. In this way price-sensitive users can use their small recharge bundles for voice communication.

The introduction of the 'play-or-pay' principle proposed in the White Paper certainly creates much-needed flexibility for the use of the fund. This needs to encourage operators to play according to a well-conceived plan requiring high levels of institutional and cross-sectoral co-ordination that have not previously been demonstrated.

21 SPECTRUM

Spectrum assignment is an area that can be leveraged specifically to achieve universal access and service goals. Operators gaining access to GHz 2.6 spectrum for LTE, for example, could be required first to fill gaps in 3G before being able to operationalise their services in urban areas. Or they could acquire the spectrum for urban use, at the same time being required to relinquish their spectrum in areas where they are not providing service to community network operators or WISPs wishing to provide service there.

Creating an enabling environment for the entry of multiple players with benefits for all can be done relatively quickly and will fast-track more efficient use of spectrum. Such an approach is far more likely to succeed than the highly contested exclusive wireless open access network (WOAN) being proposed in the draft ECA Amendment Bill, which is likely to result in the further delay of the already long-delayed assignment of high-demand spectrum.

Modern regulation of an increasingly converged ICT ecosystem needs even greater regulatory agility and insight to manage tensions between the certain policy objectives of competitive efficiency, innovation and consumer welfare. While assigning high-demand spectrum for the optimal evolution of next-generation technologies is a priority, greater consideration needs to be given to safeguarding the public and social value of the Internet through the extension of the spectrum commons by setting aside unlicensed and social use spectrum.

Further, in developed and developing countries alike, most spectrum is largely unused outside main metropolitan areas. In the sharing-economy of the Internet era, we are already seeing voluntary infrastructure sharing by operators. These types of approaches need to be embraced by governments from a critical resources management perspective. Enabling secondary spectrum use would enable new dynamic spectrum sharing, which operates at a fraction of the cost of GSM network, to be deployed on new business models in the largely unused spectrum in rural areas. Such an approach could instantly provide low-cost, high-quality bandwidth.

With the evolution of 5G firmly under way, policymakers also need to ensure an environment for next-generation investment into the potential of 5G technology, which operates within a spectrum-sharing environment, where data offload to proprietorial and open public Wi-Fi is harnessed for public purposes, not just niche commercial applications.

22

HUMAN DEVELOPMENT AND DIGITAL INEQUALITY

The structural basis for the growing inequality globally, in spite of improving growth rates in most of the world, is the expansion of a highly dynamic, knowledge-producing, technologically advanced sector in many countries such as South Africa that is connected to other markets in a global network, but from which a significant segment of the economy and of the society in its own country is excluded[4]. In South Africa, this is around half the population and the unevenness in the use by those who are included is determined by levels of human development.

A substantial body of academic and technical literature provides evidence of the relationship between informationalism, productivity and competitiveness for countries, regions and business firms. The quality of life and education, insofar as they influence human labour, as well as the enhancement of networking insofar as it changes social organisation both support this relationship. Without a synergistic relationship between the dynamic, informational sector of development that includes advanced services and knowledge-based economic activities, and the processes of human development that include environmental sustainability and higher participation in tertiary education, informationalism cannot be maintained as it runs out of the knowledge basis, quality workforce, social stability, and managerial efficiency that are at the source of productivity and competitiveness, the key factors in wealth creation in a globally interdependent economy.

Although lack of affordable devices is the primary barrier to South Africans coming online, and the price of data service the major factors limiting the intensity of use, modelling of the data shows that the main factors determining ICT uptake and intensity of usage are education and income. Even if South Africa's supply-side interventions were to bring full broadband coverage to the population, this would likely exacerbate digital inequality rather than reduce it. Modelling of the demand-side data shows that the major determinants of access and use of the Internet is education and the corollary indicator of income

Table 26: Specific recommendations

Digital Economy and Society Advisory Council: The White Paper proposes to establish an Inter-Ministerial Digital Transformation Committee to co-ordinate policy formulation and implementation necessary to address the challenges of the so the so-called Fourth Industrial Revolution. While overcoming sectoral silos is essential for the state co-ordination necessary to create the conditions for the digital economy, the success of the twenty-first Century national project needs to harness the resources of both private and public sectors. It is, therefore, proposed that a Digital Economy and Society Advisory Council be appointed by the Presidency from leaders in the public, private sectors and civil society, supported by the National Development Planning Office.
Review of SA Connect broadband plan: Assess the implementation of SA Connect, identify the factors contributing to the failure to meet 2016 targets and likely 2020 targets, too. Review broadband strategy, including feasibility of leveraging private investments for public delivery through incentives of smart procurement and anchor tenancies, which can shift costly capital expenditure by government to much lower-cost OpEx; employ innovative use of licensed and unlicensed spectrum; align with new universal access and service strategies, including complementary public access such as free public Wi-Fi extension to rural areas to deal with extreme digital inequality.
Rationalisation of state-owned entities: Prevent multiple state-owned entities from competing with each other, and merge public entities into a single operation. Political decisions requiring the use of state-owned entities undermine the competitive strategies adopted in policy and make the effective regulation of the sector untenable.

4. Castells and Cloete, 2011 in Cloete, C and Gillwald A (2014) "Informational development in South Africa". In Castells, M and Himanen P, (eds.) *Reconceptualizing Development in the Global Information Age*, Oxford University Press, London.

USAASA, the USAF and USOs: With the absorption of USAASA's regulatory functions under the proposed economic regulator, the rationality and effectiveness of having a universal service fund at all needs to be reviewed. Universal access and service mechanisms should be reviewed in the context of the increasing availability of Internet-enabled devices and multiple points of public access. Leveraging of these trends to provide citizens with access to public connectivity (for example, by providing free public Wi-Fi access in municipalities, schools, clinics, libraries) is suggested as a complementary service to enable digital inclusion. The concept of pay-or-play should be extended from infrastructure and device rollout to contributions by operators and the value they generate in the digital economy, or should be regulated as a public good, such as big data. This can be used not only as an evidence base for the public sector but for national planning across sectors, such as transport, for example.

Market review: ICASA must create a fair, competitive environment for the multiple players in the market by implementing the findings of its market review, and applying the necessary pro-competitive remedies, in particular in respect of entities enjoying significant market power. Incentivised infrastructure sharing and wholesale regulation of facilities and bandwidth will reduce input costs for service providers and private networks, but this requires a fair, competitive environment in which all players can compete in this relatively small market. The market review, the third commissioned and as yet unpublished findings, must be urgently completed and the necessary remedies applied to provide all licensees and market players with a certain environment in which to operate.

Enabling environment for competitive delivery of broadband services: To support the rapid deployment of broadband the regulator needs to create a mandatory rights of way regime and commercially incentivised tower zoning and infrastructure. The regulator needs to support the shift from voice services to data, by ensuring that there is sufficient spectrum available, and by reducing secondary taxes on the industry, that are driving up prices. Specifically, the implementation of the proposed rapid deployment guidelines needs to proceed in haste and not be held up by possible delays in the proposed Electronic Communications Amendment Bill.

Infrastructure sharing: Complementary investments such as in fibre national transmission should be encouraged as part of national strategic infrastructure strategy, as should commercial infrastructure sharing that is being practised where it is reducing the high costs of duplicating networks. Where it is anti-competitive, or excluding other market players, ICASA should investigate the need for mandatory infrastructure sharing at regulated cost-plus prices.

Spectrum: Review spectrum policy to ensure more optimal co-existence of licensed and unlicensed spectrum that will optimise spectrum for diverse needs in the country, but which will prioritise affordable access to communications. Licensed spectrum required for the evolution of existing services needs to be assigned at a competitively determined (efficient use) price to ensure the build-out of capital-intensive networks benefitting from economies of scale and devices. With evidence that even cost-based GSM prices are not affordable to most South Africans, spectrum should be made available for secondary use. Nationally allocated spectrum not in use in remote areas should be made available through low cost or licence-exempt spectrum for communities, non-profit providers or micro-networks. Extending unlicensed spectrum to new frequency bands can spur investment and innovation, lead to the introduction of technologies. This can complement licensed networks (e.g. via the hand-off from GSM to public Wi-Fi, which now also has backhaul application) and expand broadband access in low-cost, last-mile access and backhaul. Enabling the deployment of dynamic spectrum is a critical aspect of spectrum management seeking to optimise the use of spectrum in the context of providing exclusive use required by operators for large sunk investments as well as the expanded licence-exempt spectrum that can reduce digital inequality by enabling a ccess but also complementing high cost, private use.

Consolidated national indicators: Various portfolio organisations require information and data for evidence-based planning and implementation, and similarly by government for policy formulation. Many such entities also have appropriate research functions related to their mandate. Some have statutory or treaty obligations to collect and report data at the national level to international bodies, particularly the UN and the ITU. There is a core set of indicators that all organisations need, and all have identified the need for demand-side data (via nationally representative surveys) to supplement administrative supply-side data and the limited set ICT indicators from the census and the annual national household survey conducted by Stats SA. Historically, data has been collected on an ad hoc basis when resources could be secured. This needs to be regularised, standardised and institutionalised. An integrated and co-ordinated data-gathering procedure for the sector, and ICT across sectors, is required that clearly allocates responsibilities for the collection of data, and makes this publicly available on a national indicator data portal, with the underlying dataset available according to open data access principles.

Legal gaps: Draft, consult and finalise legislation necessary to build a trust-based environment for e-commerce, e-government, digital finance and personal use. This requires finalisation and implementation of legislation and guidelines in the areas of cybersecurity, privacy, protection of data and access to information. This needs to be framed in the context of an open data policy that safeguards these rights and which will enable the free flow of information required for more effective planning by government and service delivery entities, increase the uptake of online rather than face-to-face transactions, and create opportunities for entrepreneurialism and innovation.

Convergence in sectoral institutions: National policy would do well to reflect the streams of convergence that continue to flow strongly through the broadcasting, postal, telecommunications and Internet sectors by creating a proper, integrated Ministry of ICT. Such a public body would unify the fragmented and uncoordinated DoC and DTPS (in accordance with the ANC's own 2017 conference resolution), thereby simplifying relationships with extra-governmental organisations, such as the regulator. More importantly, this would allow government to follow through on the NDP, which sees the ubiquitous broadband and high Internet use as essential to inclusive participation in the global digital economy.

Wireless Open Access Network (WOAN): A WOAN cannot be automatically dismissed on the grounds that it has not enjoyed success yet in other countries where it has been applied (keeping in mind the unique conditions that contributed to their failures and un-redeeming successes). The current version of the WOAN, as proposed in the draft ECA Bill, is too ambitious and untested to pass into law without threatening the incentive on the private sector to invest, and without opening itself to legal challenge from MNOs that could hold up the assignment of high-demand spectrum and delay mobile sectoral development by years. There is enough unassigned spectrum available currently, in addition to that which should become available at the conclusion of the digital migration process, to entertain a hybrid model. This would assign high-demand spectrum to both existing licensees and a consortium of network operators for wholesale open access purposes. Making this decision within a wider review of spectrum needs, which includes not only the current supply-side valuation but also demand-side valuation that ensures that the public good characteristics of at least some spectrum is retained, is essential,The arising valuation of spectrum based on such needs and which is more granular in it application may enable the entry of multiple smaller players into market with more limited use of spectrum that will enable reuse at a regional or even lower level.

Cybersecurity: It is important to develop a distributed cybersecurity strategy which should facilitate cooperation among existing public, private and civil-society organisations in fighting cybercrime. The Government needs to facilitate a multistakeholder process which tackles cybercrime in a more transparent and accountable way. The Internet functions due to the absence of centralised control and the decentralised mechanisms already in place can form the basis of a coherent distributed cybersecurity strategy.