THE STATE OF ICT IN NIGERIA 2018

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EXECUTIVE SUMMARY

At a time when the ICT sector is most needed to bolster Nigeria's ailing national economy, the sector finds itself under considerable political and regulatory pressure, with the country sliding down global indices and some players even preparing to exit the market. After a decade of impressive ICT sector advancement following the liberalisation of the market in 2000, which led to its identification as a continental ICT leader, the telecommunications sector in Nigeria over the last three years has seen negligible network investment reflecting the decline of the sector. Against the backdrop of the economic recession of 2015/16, a dramatic slump in crude oil prices affected exchange rates negatively and indeed led to high government-set USD/NGN exchange rates, further increasing forex scarcity and constraining sectoral investment. This caused an escalation in the cost of equipment and a reduction in imports on which telecommunications infrastructure expansion depends.

Moreover, price wars have driven retail prices down, pleasing politicians and their constituents, but leaving scant profits for the massive investments required to rollout broadband networks as the global communications market shifts from traditional voice services to those of data.

Unpaid industry debt, which has now reached unprecedented levels with one major operator, Etisalat, exiting the market mid-2017, has also halted any major investment in the sector in the last three years. Since 2015, the only major investors have been MTN, which has bought companies with approval from the regulator but subsequently found itself unable to utilise the newly-acquired spectrum from these new deals, and Teleology Holdings, which made a non-refundable deposit to acquire 9mobile (formerly Etisalat Nigeria) from the syndicate of banks which had placed the operator under a local trustee.

The regulator was nevertheless fearless in slapping MTN and other operators with crippling fines for SIM registration failures, removing almost USD 5 billion from the sector, equivalent to one-sixth of total sector investment (USD 30 billion over the last 16 years).

The failed auction for several lots of spectrum in the 2.6 GHz band (despite two previously aborted attempts) further illustrates the struggle to raise investment levels. MTN was able to meet the steep spectrum reserve price (USD 16 million per lot) due to its the depth and spread of holdings on the continent, but nearly half the spectrum on offer remains nonetheless unsold. The spectrum trading, leasing and sharing determination finalised in May 2018 may help to optimise spectrum use in the market, though the 40-60 percent fee due to the Commission as proceeds from the spectrum, presumably to discourage speculation and hoarding, may be a disincentive to trading.

The NCC has facilitated market entry over the years through the transparent licensing of various communications services. Several regulatory mechanisms have also been implemented to create a fair and competitive environment for market players over the last decade and a half. However, the tough conditions in the

market have put all operators, even large ones, at risk of having to exit the market, and have pressurised smaller ones into adopting lifeline strategies for survival.

Presently, Nigeria compares well with other countries in prepaid mobile pricing, being ranked 5th out of 48 countries in RIA's Africa Mobile Pricing (RAMP) Index for its cheapest OECD (voice and SMS) basket.

But, although other dynamic African markets are experiencing a shift in demand towards data products, including OTT substitutes for traditional services, the voice/SMS market in Nigeria is still dominant, reflecting a lower level of market maturity. This is evidenced by Nigeria's middle ranking, but low bundle value, in RIA's Value for Money Index (VMI) that measures the value of bundled products available in prepaid mobile markets – not a healthy indicator of the country level of product innovation. Nigeria performs much better in data pricing, with dominant players being less entrenched in this emerging market, thus rendering them more susceptible to pricing pressure from the data-only service providers offering competitive products.

Even though Nigeria compares well in the affordability and price rankings, these need to be weighed against the accompanying broadband objectives of increased penetration and quality of service on which the country fares less favourably. Although it is nominally a massive market, individual Internet penetration is relatively low in Nigeria, at around 30 percent. By comparison, South Africa has the highest individual Internet penetration in sub-Saharan Africa at 53 percent, despite having considerably higher prices. In addition to the negative supply-side factors that have not created conditions conducive to investment and network extension, a number of demand-side factors, such as the lack of e-skills and the absence of local content, influence these suboptimal policy and regulatory outcomes. These are highlighted in Part B of the report, which presents the findings of the nationally-representative After Access Survey undertaken in 2017.

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 and Broadband Plans under challenging domestic conditions. Until now, broadband rollout has primarily been undertaken by dominant market players while the regulation of access to broadband networks for service-based competition has not been pursued. While successful operators should not be penalised for their success, MTN's dominance does enable it to have the liquidity to reinvest in its network, extending its network coverage and improving the quality it offers. This, in turn, enables it 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 for the dominant operator 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, yet it has to be done in a way that does not remove incentives for network investment.

In 2013, the NCC released a Competition Assessment Report in which the regulator took certain positive actions by delineating market segments and determining that MTN was dominant in retail mobile voice and, with Glo,

dominant in the wholesale leased lines and transmission capacity markets. With respect to mobile voice, the Determination effectively placed certain obligations on MTN, which led to the collapse of the differential between its on-net and off-net tariffs and appears to have gone a long way in stabilising voice pricing. However, it did not address the pricing of wholesale access in the data market or the implications for low broadband pricing in broadband extension.

Other ongoing challenges facing the industry continue to jeopardise the realisation of national policy objectives.

The long delays in processing right of way permits as well as their arbitrary costing models have resulted in the prohibitively high costs of leasing transmission infrastructure. Damage to existing fibre infrastructure as a result of cable theft; road works and other operations; the lack of reliable, clean electricity supply over the national grid; constrained investment in the industry; and the limited existing backbone infrastructure inhibit further expansion of broadband. According to recent RIA surveys in the country, data rates are still high while browsing speeds slow and unreliable – especially for retail consumers – despite the significant lowering of prices. The quality of voice and data services is also uneven and poor overall. Multiple levels of taxation by the federal, state and local governments, together with having to deal with several bodies which arbitrarily change the rules of the game and agreements with operators, as well as the lack of political will on critical sectoral issues has impacted negatively on the credibility of state commitments.

The lack of state intervention to stabilise the industry under these circumstances, or to stimulate the industry through nationally strategic interventions, such as implementing a national rights of way framework for rapid deployment of fibre that is standardised across states, has reduced confidence, investment and innovation levels in the sector. The sector is also characterised by strong voice and weak data markets, while elsewhere on the continent the leading economies are making the full transition from strong voice to strong data markets through the adoption of new technologies.

The global evolution from voice and text services to data services has disrupting traditional telco business models. High-end consumer demand and competition in the market are driving operators in Africa too to make the shift across, but without an enabling telecommunications, and financial, policy and regulatory environment for this, the move has been far slower in Nigeria than in the continent's leading markets. In Ghana Kenya and South Africa operators seem to have been better able to weather the market disruptions caused by the adoption of OTTs by consumers as substitutes for traditional services on which operators' business models have historically been reliant.

Furthermore, these poor national conditions have hampered the introduction of new services, such as mobile money, which has provided new revenue streams for operators in other jurisdictions.

The lack of a flexible regulatory model for mobile money has stunted its growth in Nigeria, with the country's population being amongst the lowest mobile money users of eight African countries surveyed in 2017.

This is despite half of the population remaining unbanked, and large numbers of people (including the banked) indicating the desirability of having mobile money as a transaction option.

Supply chains are also seriously compromised by non-payment for services rendered by everyone, from SIM suppliers to tower operators.

Without sound regulatory structures for the enforcement of inter-operator payments and the recovery of debts, or the implementation of cost-based price ceilings or floors, operators are able to unsustainably undercut one another and further heighten the risk of not fulfilling commercial obligations.

Though this situation has had the positive effect of relatively low consumer prices, the inefficiency of business payment systems has impacted on the viability of operators, and it has come at a cost to other national policy objectives such as broadband extension and sustaining the quality of service required for Nigeria's ambitions of building a digital economy and society.

These challenges have been compounded by rapid technological developments that have seen the rise of Internet-based global platforms offering OTT services on national networks. These services and their operators access local audiences and their private information in as-yet-unsecured and unsafe environments, and, while enabling low-cost access to communication services, may have inhibiting effects on the development of local content and applications.

The absence of a trusted, privacy-centred and data protecting environment with the associated cybersecurity safeguards is not conducive to the flourishing of e-commerce, and the robust development of the digital economy more generally.

DEMAND SIDE

In prepaid markets where the majority of subscribers own more than one SIM card, it is only through nationally-representative surveys that accurate and disaggregated data can be collected. Nationally-representative demand-side surveys are the only means through which reliable estimates on gender, urban-rural ratios and income groups can be drawn. In 2017, Research ICT Africa (RIA) conducted the After Access Survey as part of a 20-country Global South survey in Nigeria and six other African countries: Ghana, Kenya, Mozambique, Rwanda, South Africa and Tanzania. In 2018, the Survey is being conducted in Uganda and Senegal. The Survey in Nigeria demonstrates that a significant portion of Nigerians (71%) do not use the Internet while 36 percent do not have mobile phones.

Among the surveyed countries, Nigeria ranks second in Internet penetration, behind South Africa, though the penetration level in Nigeria is still low at 29 percent, not much more than half that of South Africa.

The Survey also demonstrates, as it did with voice services, that the mobile phone plays a significant role in enabling access to the Internet at household and individual levels. Among the individuals who reported having used the Internet, 89 percent claimed to use smartphones.

The main reasons given for not having a working Internet connection in households is that it is viewed as not necessary, the cost of equipment to connect is too high or household members do not know how to use it.

The main barrier to emobile phone ownership by individuals in Nigeria is that more than half of those not online cannot afford devices

such as smartphones. Over one quarter of them give 'no electricity' as the reason, while over one fifth say 'there is no signal' (mobile coverage). This is followed closely by having no need of it or not knowing how to use it.

The need to develop policy and regulation that increase the affordability of smart devices and develops awareness of the Internet as well as the skills to access and use it is critical to reducing digital inequality.

The Survey shows that there is significant inequality in the adoption of ICTs, which in most cases favours those at higher income and education levels, where men are disproportionately concentrated more than women, as well as those living in the major urban centres as opposed to peri-urban and rural areas.

Such digital inequality is reflected in the gender disparities of mobile phone ownership but is even more strongly reflected in relation to Internet use. Men are 17 percent more likely to use the Internet than women and are 13 percent more likely to use a mobile phone. Urban or rural location is also a key determinant of Internet access, with people in urban areas 21 percent more likely to have access than people in rural locations. Besides the affordability of devices and services amongst those who are not online or whose use is limited, a significant reason for not using the Internet is the absence of coverage of rural people. This is not surprising, considering the low rollout of 3G and as much as 70 percent of the network with the largest national footprint is still only 2G. This is, amongst other things, the result of the difficulty involved with securing right of way, a weak foreign currency exchange rate as well as a lack of incentives for network extension.

There are, nevertheless, people who reside in areas with broadband coverage but do not use the service. This indicates that people are unable to afford it or do not have the skills to use the Internet. With very low income levels amongst significant segments of the population, it is clear that, even with competitively-priced data products, significant numbers of Nigerians cannot afford the devices to come online or to use the Internet in a meaningful way and enhance their wellbeing. Without a connected citizenry, e-government strategies, especially when they target those most in need of public service assistance, are rendered futile.

Only two percent of people online are using e-government services. Social networking is driving Internet uptake, with high frequency but there is a relatively low intensity of use compared to the high-speed environments of more mature markets. Youth between the ages of 15 and 25 make up the bulk of users, with a significantly larger number of boys than girls online.

Online digital work, including microwork, is much higher in Nigeria than most of the countries surveyed, though it is constrained by the network availability and the cost of being online for long periods of time. Unlike in some of the other surveyed countries, those doing microwork are graduates, many of whom do it as their primary form of income since they cannot get formal employment.

With regards to small enterprises and the informal sector, the deployment of ICTs to enhance business operations is particularly weak. The Survey shows that mobile phone penetration among small enterprise owners is 13 percent lower than the national mobile phone penetration of 63 percent.

Of those who own mobile phones, 20 percent use their mobile phones for both private and business communication compared to the one percent that strictly use them for their business processes, procurement and/or customer

management. Internet use among small enterprises is very low (5%), with the majority of non-users not seeing the need to incorporate technology into their businesses; not even mobile phones. The most common reason for not using the Internet at the small business level was the lack of necessity (72%), other reasons given were the high cost, the lack of skills, and the lack of availability due to coverage limitations.

Modelling of the dataset undertaken by RIA in relation to these inequalities indicates that the primary determinant of Internet access and use is education, as well as the correlated factor of income. Policy interventions to address digital inequality will need to focus not only on supply side – infrastructural and pricing – issues but also on equalising education, ensuring girls remain in school, particularly in rural areas and that employment conditions support maternity benefits and childcare.

After a period in which Nigeria was regarded as the continental leader in the area of ICT, the sector is currently at a low ebb.

As confirmed by the diagnostic analysis and benchmarking, there are critical backlogs and bottlenecks in this key infrastructure of any modern economy and society.

The poor development of broadband infrastructure, resulting from low levels of investment and the disenabling economic and regulatory environment, has resulted in sub-optimal policy outcomes. Despite the relatively low retail prices of services, data nevertheless remains unaffordable for the majority of Nigerians, resulting in low levels of Internet penetration and use.

The human development backlogs reflected in the suboptimal and non-use of the Internet revealed in the demand-side findings further signal the need for significant interventions to instil confidence in the sector once again. This is essential if Nigeria is to harness the potential of the Internet for development and innovation as envisaged in Vision 2020.

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The global challenge of measuring sector performance

1 INTRODUCTION

As ICT sector stakeholders, especially policy-makers, aim to achieve national policy and regulatory goals of bringing citizens online to participate in the digital economy and society, the understanding of national ICT policy problems on both the supply and demand sides of the sector require accurate and current data that is not generally available or used in creating the most widely-used indices. In a bid to gather nationally-representative demand-side data in African countries, Research ICT Africa (RIA) conducted its 2017 After Access Surveys in ten African countries, of which Nigeria was one.

This report aims to analyse this demand-side data, ntogether with its supply-side available, to assess the state of Nigeria's ICT sector within the context of an increasingly digital global economy and society. This analysis builds on the RIA's 2018 After Access comparative report, which details the need for better data in ICT policy and regulation, particularly in Africa, as well as the methodology for collecting and analysing this data from the countries surveyed.

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 from telecommunications advancements are substantial (Kenny and Kenny, 2011; Katz and Koutroumpis, 2013). However, for countries to enjoy the network externalities associated with investment in broadband infrastructure, a critical mass has to be reached (Roller and Waverman, 2002). And the network externalities compound as there are more network connections. Without connectivity, people, be it as consumers, workers or entrepreneurs, are excluded from participating in the economic and social networks that permeate modern societies. The detailed research on network effects, however, has largely been undertaken in the Global North, where broadband is generally always on and average intensity of use is high.

Table 1: Nigeria's performance on ICT indicators based on SDGs

SDG GOALS AND TARGETS	INDICATOR FIGURES	SOURCE
1.4) and 9.1) Households with broadband Internet access	3.0% (households with working Internet connection)	After Access Survey, 2017
4.4) Individuals with ICT skills	Unknown	
5.b) Individual mobile phone ownership	63.3%	After Access Survey, 2017
9.c) Broadband Internet prices[1]	USD 2,80 (NGN 1 000)	RAMP Index, 2017 Q4
9.c) Mobile network population coverage	2G 89,79% 3G 62,05% LTE 11,04%	Company reports; African Telecoms News, 2017
16.10) and 17.8) Individuals using the Internet	28.7%	After Access Survey, 2017
17.6) Individuals using fixed Internet broadband	8.2%	After Access Survey, 2017
17.8) International Internet bandwidth (bps per inhabitant)	2 986	ITU, 2016a

Nigeria reached this threshold, believed to be around 40 percent for voice networks long ago . Although0 it has exceeded the only 20 percent threshold believe to be necessary for broadband networks as a resulted of their added value with very low intensity of use in the country, this may not be sufficient for the country to enjoy the network effects associated with increased information flows and productivity gains, which are reflected in economic growth and increased opportunities for social upliftment. But there are not only supply-side constraints of availability and quality of communication that limit use. As the global ICT indices and the national ICT survey results in Part 3 show, demand-side constraints on digital equality are more challenging to redress, from a policy perspective.

In 2017, Nigeria ranked 143rd out of 176 countries scored by the ITU's ICT Development Index. On the *Access Sub-Index* Nigeria ranked 145th.[1] On the *Use Sub-Index* Nigeria ranked 147th.[2] On the *Skills Sub-Index* Nigeria ranked 147th.[3] Together, this places Nigeria as one of

1. Based on 0.1% fixed-line tele-density, 82% mobile tele-density, 11mbps per user of international Internet bandwidth, 11% of households with a computer, and 15% of households with Internet access.

Table 2: Nigeria's performance on ICT indicators related to other indices' rankings

	RANKINGS					ICT INDICATORS		
	ADI	3i	IDI	NRI	MCI	1GB Prepaid data USD	Active SIM cards per 100	Internet subscribers per 100
Nigeria	13	45	143	119	98	2.80	83	26
Kenya	30	51	138	86	105	2.94	82	26
Ghana	26	49	116	102	96	2.24	128	35
Namibia	31	NA	118	99	NA	5.00	99	31
Brazil	10	18	66	72	56	8.48	124	60
Rwanda	21	63	153	80		2.39	75	20
Tanzania	39	57	165	126		2.25	72	13
Uganda	32	64	152	121		2.77	55	22
Sources	A4AI, 2017	EIU, 2017	ITU, 2017	WEF, 2016	GSMA, 2016	RAMP Index (Q4 2016)	ITU, 2016a	ITU, 2016a

Source: Adapted from Esselaar, Gillwald and Stork, 2017.
A4AI – Access to Affordable Internet
EIU – Economist Intelligence Unit
ITU – International Telecommunication Union,
WEF – World Economic Forum
GSMA – GSM Association
RAMP – RIA African Mobile Pricing Index

2. Based on 26% of individuals using the Internet, 0% fixed broadband tele-density, and 22% active mobile broadband tele-density.
3. Based on 56% secondary and 10% tertiary gross enrolment ratios, along with six years' mean schooling.

the lowest-ranking countries that is not a least developed country (LDC).

In 2016, Nigeria was 70 places behind the best-performing African country, Mauritius, coming 20th in Africa. Ghana and Senegal are among the countries in the Economic Community of West African States (ECOWAS) that performed better than Nigeria in the NRI. The country was on par with Ethiopia, Uganda and Zimbabwe, some of the poorest countries in the world.

A full critique of these indices and the data they use to compile their composite indicators is contained in the comparative report in this series of policy papers[4]. This report uses the diagnostic analysis below seeks to benchmark and analyse policy outcomes in a context specific way that not only benchmarks these, where possible, against other similar countries and some best performers but identifies the reasons for the position or ranking and thereby the remedy or intervention required to address it.

This draws on the supply side and administrative data available which is triangulated with pricing and quality of service databases gathered by RIA and the demand-side data for Nigeria in part D which forms part of a global ICT access and survey conducted across 16 countries in 2017, eight of which were in Africa. The section below demonstrates 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 that appear to face similar challenges.

4. Gillwald, A and Mothobi, O (2018) The State of ICT in 10 African countries: a demand side analysis with supply side insights.

2 COUNTRY CONTEXT

In 2017, the ICT sector in Nigeria accounted for 11.27 percent of national GDP and attracted 35 percent of the cumulative FDI between 2001 and 2017 (NBS, 2018). As of February 2018, Nigeria had more than 148.3 million active mobile telecommunications subscriptions, a considerable increase from 127.6 million at the end of 2013 (NCC, 2018). Although infrastructure gaps persist, Nigerian investment in infrastructure projects has been extensive and is ranked second after South Africa, with 106 projects valued at USD 100 billion. This was enabled by several initiatives by the Nigerian Government to improve the business climate in the country and make trade simpler. Since the Government has adopted a market-oriented approach, implementing reforms such as privatisation, public-private partnerships and deregulation (IiL, 2015), but this has been constrained by a lack of continuity in consecutive administrations and in the implementation of policy to create a fair competitive market that would produce positive consumer welfare outcomes.

The Nigerian telecommunications market has moved from a decade of boundless optimism, arising from seemingly endless year-on-year growth, to a period of stagnation and general uncertainty arising from the national economic crisis, a decline in the exercise of the general rule of law and deteriorating operating conditions within the regulated communications sector.

At present, there are few incentives, besides the large population, for a new entrant to invest into the Nigerian market, or for current players to expand existing operations through fresh investments. Foreign investment in the sector since 2014 has been minimal as a result. Domestic investment has not been able to compensate for this, especially with over USD 5 billion having been sucked out of the sector by what are regarded as punitive penalties that were disproportionate to the infringements for failure to register SIM cards. This, together with high USD/NGN exchange rates set by government, which have limited the importation of dollar-based equipment required for network extension, has brought the sector to a low point. There is concern that existing operations are being gradually squeezed out of market, with Etisalat already restructuring to exit it, with the rebranding as 9Mobile.

The global recession had its effects on the global telecommunications market, but, while revenues from telecommunications stabilised, they have consistently remained well above national growth levels. This is true for Nigeria too, where the contribution to GDP has risen from 8.9 percent in 2010 to 9.5 percent by Q2 2017. (NCC, 2017a) Growth in the sector has out-stripped national growth, especially with the bottom dropping out of the oil market. This period has accompanied enormous technological innovations, such as OTT services on global platforms and the Internet of Things (IoT). With many still clinging to voice to amortise their investments, operators are reluctant to make the transition from voice revenues to data revenues. Importantly, there is a need for an integrated regulatory environment that recognises the convergence of industries and sectors, including broadcasting, telecommunications and financial and other services.

New applications and proactive regulation can support the necessary shift from plain old telecommunications services to new integrated digital services, with the potential to drive new revenue streams for operators, but also to improve information flows and lower transactions costs in the economy.

Without such an environment, the negative impact on the national policy objective of universal access as a driver of economic growth and development (as set out in national development plans such as Vision 2020) should be of concern to national and sectoral decision-makers alike.

3 APPROACH AND METHODOLOGY

In line with the trend in global policy research and practice the approach adopted for this report understands ICT ecosystem as being more than a supply-side, infrastructure issue, one simply resolved by overcoming the digital divide through providing greater connectivity alone.

This approach provides a conceptual framework through which to analyse the relationships between different elements and the outcomes resulting from their interactions. It places users – citizens and consumers – at the centre of the system. Their access to, and the affordability of, the networks, services, applications and content determines the degree of their inclusion in or exclusion from the ecosystem. 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.

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, how competitive the services that arise from it are, or how effectively regulated they are.

It is for this reason that the diagnostic approach, which deploys benchmarking where possible, is used for this digital readiness assessment. Assuming the maturity of sector is assessed in terms of the progress toward these universal indicators which are reflected in national policy goals, this enables a reasonable baseline assessment with available data against which to assess the gap between Nigeria currently is and where it needs to be.

The assessment of this situational analysis deploys a diagnostic method that starts with an analysis of Nigeria's ranking on several global indices, as set out above, to identify the main bottlenecks revealed in them.

It also provides a critique of the indices in which it demonstrates that most are intrinsically linked to GDP, which is why poorer countries tend to remain more or less in a similar position at the bottom of indices, despite interventions or improvements in the ICT sector.

This report uses supply- and demand-side data that has been specifically generated to provide reliable indicators in key areas of sector performance. It benchmarks these against indicators derived from databases generated for other appropriate comparator countries. Using a diagnostic approach, it triangulates the supply-side and demand-side data with the document analysis and stakeholder insights derived from interviews, in order to compare outcomes against policy goals and regulatory objectives. It starts, therefore, with an examination of the policy and regulatory framework, arising institutional arrangements and market structure. It benchmarks penetration, prices, infrastructure and quality of service against national policy

objectives: primarily universal access to a full range of affordable services. 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.

The remainder of the report is divided into three parts. The first focuses on the supply-side factors within the ICT market, while the second examines the demand-side of the equation, on the basis of a nationally-representative survey of ICT access and use. The final section evaluates the policy and regulatory outcomes of the Nigerian ICT sector in relation to coverage and reach, access, affordability, quality of services and competition. On this basis, it makes recommendations on points of policy and regulatory intervention to improve sectoral outcomes.

The assessment of the current situation in Nigeria is derived through the triangulation of findings from document analyses (policies, draft policies, regulations, guidelines, news articles and papers), benchmarking of critical indicators and stakeholder interviews.

This provides a situational analysis of the ICT sector and enables the analysis of the gap between where it now stands and where it needs to be to provide the underpinnings of the digitally empowered society and knowledge economy envisaged for Nigeria. These, however, are only the necessary conditions; they are not sufficient for the transformation that Nigeria's Vision 2020 national development plan envisages for the country.

A key requirement for digital transformation is in the area of human development as the global indices show – Nigeria scores low on this dimension, ranked 152nd out of 188 countries in the UNDP's Human Development Index (2016: 200). Although this readiness assessment does not have the data (or resources) to undertake a further assessment of the country's human resources and of the necessary skills to participate in the digital economy, whether the individuals be consumers, users, producers or innovators, such an analysis is a critical success factor.

Part B

Policy, regulatory and competition analysis

4 POLICY, LEGAL AND REGULATORY FRAMEWORK

This section provides an overview of the policy, legal and regulatory environment in Nigeria. In line with global reforms in the 1980s and 1990s, the country's ICT sector was reformed through the liberalisation of the market, efforts to privatise the incumbent, and the establishment of an independent regulator. Roles for the sector were divided between the Government (ministry), which is responsible for policy formulation; the national regulatory agency, the Nigerian Communications Commission (NCC), which is responsible for regulation of the sector; and the licensees and service providers responsible for operations within the sector.

4.1 NATIONAL POLICY

4.1.1 Vision 2020

Nigeria's Vision 2020 is a strategic document that identifies the long-term developmental objectives with the aim of achieving accelerated and sustained economic development.

> *By 2020, Nigeria will have a large, strong, diversified, sustainable and competitive economy that effectively harnesses the talents and energies of its people and responsibly exploits its natural endowments to guarantee a high standard of living and quality of life to its citizens. (National Planning Commission, 2009)*

The intention of Vision 2020 is to achieve two broad objectives:

- optimise the potential of human and natural resources to achieve rapid and sustained economic growth; and
- translate economic growth into equitable social development, in guaranteeing a dignified and meaningful existence for all citizens.

Furthermore, Vision 2020 recognises the importance of ICT skills development and greater diffusion of ICT across sub-sectors within the economy, including education, finance, farming, trade, manufacturing, services, oil and gas and the public sector. In line with this objective, Vision 2020 will:

- promote development of local capacity to meet the needs of the ICT sector in order to develop and industrialised-based economy;
- ensure the development and availability of affordable ICT infrastructure and services;
- encourage research and development within the ICT sector;
- promote private sector-led ICT investment, entrepreneurship, innovation and local capacity development; and
- Government will facilitate and be a catalyst of ICT sector initiatives. (National Planning Commission, 2009)

The strategic initiatives envisioned to drive implementation of policy within the ICT sector include:

- providing the appropriate incentives to drive the development of ICT infrastructure and telecommunications services to rural and underserved urban areas;
- mainstreaming ICT into the education curriculum;
- encouraging local production of ICT components and sub-systems by providing incentives for manufacturers for major ICT projects;
- facilitating the development of a national multimedia super highway;
- establishing a national (spatial) ICT bone Connectivity and Bandwidth Aggregation Solution;

- implementing the Nigerian National ICT for Development (ICT 4D) strategic action plan to foster a competitive environment with ample opportunities and choices;
- establishing a national digital library with access points strategically located in both rural and urban areas;
- promoting e-learning, e-governance, e-business, e-commerce, e-banking, e-management, etc.
- providing regular and affordable access to Internet resources in all educational and research institutions, with particular focus on basic and post-basic education;
- establishing appropriate legal and regulatory frameworks to support e-business and ICT enabled activity – the legal framework will address law enforcement, electronics contracts, consumer protection, intellectual property rights, dispute resolution, privacy, cybercrime and data protection and other aspects of information security;
- providing appropriate incentives, including tax benefits and improved infrastructure, with a view to creating an enabling environment that encourages investment, innovation and exploitation of ICT enabled services; and
- mainstreaming ICT policies into the broader development of a knowledge society and ensuring coordination and consistency between ICT policy strategies and national development policies. (Government of Nigeria, 2009)

While this provides a comprehensive checklist for the requirements of a digital economy and society, without an integrated implementation strategy, starting with an identification (to which this report contributes) of current barriers to and constraints on digital inclusion (most critically the absence of an ubiquitous digital backbone in the country, and a citizenry skilled enough to utilise it optimally), on which all these activities depend, the Vision will be left a mere mirage.

4.1.2 Nigeria ICT Roadmap 2017–2020

In 2017, the federal government of Nigeria released an Economic Recovery and Growth Plan, recognising the central role ICT plays in driving economic growth and development. (Ministry of Budget and Financial Planning, 2017) In line with this, the federal government developed an ICT Roadmap. The Roadmap fills many of the gaps of the delayed draft policy, providing "an integrated framework for ICT development in Nigeria and articulates the strategic direction on four pillars namely: Governance; Policy, Legal and Regulatory framework; Industry and Infrastructure; Capacity Building" (Federal Ministry of Communications, 2017).

The Roadmap further provides guidelines for a multi-stakeholder approach to ICT sector development in order to accelerate national development through the inclusion of women, the youth and vulnerable groups. The overall vision of the federal government is to make the "ICT sector the main pillar of the Nigerian economy and to mainstream ICT into all aspects of national life" (National Planning Commission, 2009) by engaging all key stakeholders in order to implement the Roadmap effectively. Again, while the Roadmap checks all the boxes for the contribution of the sector to economic growth and recovery, without a clear implementation plan with strategies linking objectives to deliverables with timelines and budgets, we are likely to continue to see the stagnation the sector has experienced over the past five years.

4.2 ICT SECTOR POLICY

ICT in Nigeria is currently administered under the National ICT Policy issued by the Ministry of Communications in June 2012. The policy articulates the nation's ICT objective as a "knowledge-based globally competitive

society" by 2020 (Ministry of Communication Technology, 2012). To achieve this objective, the policy seeks to integrate information and communication technologies into the socio-economic development of the country for national transformation.

The document provides for 24 policy focus areas, including infrastructure development, broadband access, spectrum management, regional collaboration, universal access, research, national security, software and hardware, capacity development and local manufacturing.

Other focus areas are digital broadcasting, cybersecurity, open data, public-private partnerships, youth engagement, and outsourcing. According to the draft policy, strategic actions would be carried out through MCT as the coordinating ministry responsible for all ICT development and oversight in Nigeria. In addition, there would creation of a converged regulator to oversee the entire ICT sector through the planned merger of NCC and NBC. The new entity would also take over the regulatory and oversight functions of NIPOST (the national postal agency) and National Information Technology Development Agency (NITDA), the IT development agency.

The National ICT Policy is highly aspirational and lists over a hundred strategies for achieving objectives. However, the converged regulator is yet to be set up, six years following the release of the document, and the implementation appears to be more passive than active. It is also not clear if the National ICT Policy was costed and it was not completely clear on how the Government would implement its ICT ambitions.

4.2.1 The National Broadband Plan (2013-2018)

The National Broadband Policy for 2013–18 (Ministry of Technology and Communications, 2013) recognises the positive linkages between increased broadband penetration and GDP growth. The key objectives of the Nigerian National Broadband Plan include:

- promoting pervasive broadband deployment;
- increasing broadband adoption and usage; and
- ensuring availability of broadband services at affordable prices. (Federal Ministry of Communications, 2013)

The plan envisages a more than a fivefold increase in Internet and broadband penetration, from 6 percent in 2013 to 30 percent in 2018. In addition, metro fibre infrastructure is to be installed in all state capitals and urban cities, while other estates and business districts within major cities would have fibre to the home or premises. At a national level, the intention of government is to facilitate full rollout of wireless 3G networks by operators and transition to 4G/LTE as spectrum becomes available. (Federal Ministry of Communications, 2013) Broadband is seen as a basic utility and critical to the exercise of human rights in modern society, thus the rapid deployment of mobile broadband is a key focus for the federal government, given the pervasiveness of mobile phones.

The National Broadband Plan has not been implemented, though several of the targets appear to have been met – apparently by the policy and regulatory initiatives of MCT and NCC respectively, through commercial rollout strategies for operators, despite difficult national circumstances.

Challenges that are constraining the growth of the broadband industry include:

- the high costs of right of way, resulting in the high cost of leasing transmission infrastructure;

- long delays in the processing of right of way permits;
- multiple taxation at federal, state, and local government levels and having to deal with multiple regulatory bodies;
- state governments not making credible commitments and arbitrarily changing rules of the game and agreements with operators;
- damage to existing fibre infrastructure as a result of cable theft, road works and other operations;
- the lack of reliable, clean grid electricity supply;
- limited backbone infrastructure;
- constrained investment in the industry; and
- the lack of political will on critical issues. (Onkonji, 2016)

4.3 SECTOR LAWS AND INSTITUTIONAL ARRANGEMENTS

Until 1992, the legal basis for telecommunications and broadcasting in Nigeria was the Wireless Telegraph Act (WTA) of 1935, which was promulgated by the British colonial government of the day (Nigeria Community Radio, 2012). Amended several times by respective governments, the WTA strictly prohibited any form of non-state communication services or licences, and rights to use services and frequencies for point-to-point communication could only be granted at the discretion of the appropriate Minister. In 1992, the then military government promulgated the National Broadcasting Commission (NBC) Decree 38 of 1992 and the Nigerian Communications Commission (NCC) Decree 75 of 1992, both of which irreversibly changed the face of ICT in Nigeria. In terms of these two decrees, a significant degree of regulatory control was wrested from government ministries and given to two new regulatory bodies (the NBC and NCC), and the market was opened up to private operators. Subsequent amendments to both decrees, in 1998 and 1999, further liberalised the broadcasting and telecommunications markets.

The NCC Decree of 1992 established the NCC with semi-autonomous powers to regulate the telecommunications industry. The Nigerian Communications Act 19 of 2003 subsequently repealed and replaced the NCC Decree of 1992 and made the NCC a fully autonomous body with exclusive powers to licence and regulate both private and government-owned operators. The NBC Decree of 1992 established the NBC with comprehensive powers over all aspects of private broadcasting in Nigeria, including licensing, monitoring, policy formulation/implementation, ethics and standards.

The NBC Amendment Decree 55 of 1999 extended the NBC's oversight to include state-owned radio and TV stations and created more licensing categories, including campus and community radio stations.

However, unlike the NCC, the NBC is subject to ministerial directives, and any new licence can only be issued upon the approval by the President on the recommendation of the Minister of Information.

In 2007, with the growth of the telecommunications and broadcasting markets being driven by private companies, and in an effort spur the lagging IT sector, the National Information Technology Agency (NITDA) Act was passed, establishing NITDA as the government entity responsible for promoting IT penetration and serving as the clearing house for public sector IT projects.

The merger of NCC, National Broadcasting Commission (NBC) and National Information Technology Development Agency (NITDA) has been discussed since 2005, with the view of creating a converged regulatory authority. This

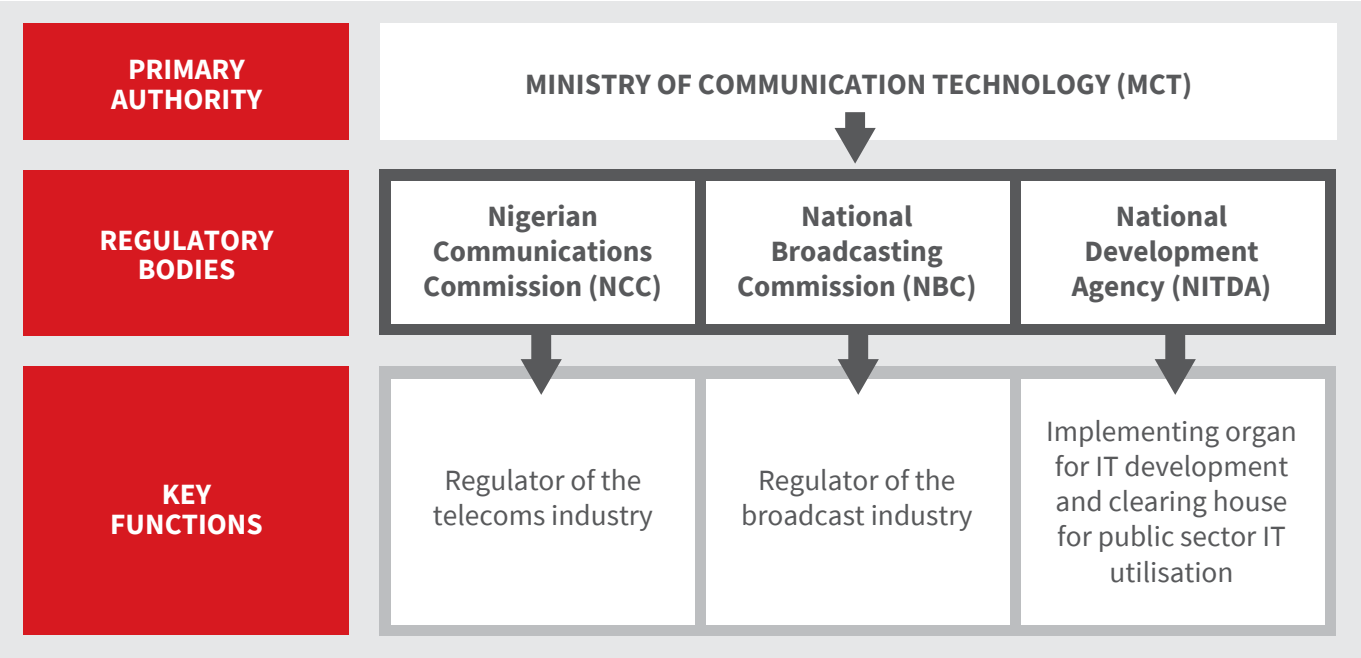


Figure 1: Current framework for ICT regulation in Nigeria

Source: Odufuwa, 2012

stems out of the increasing convergence of ICT and media issues, which has led to an overlap of regulations by the three institutions. In August 2016, the NCC and NITDA established a joint committee and a framework to collaborate on efforts to develop the telecommunications and ICT sectors.

Since the converged regulator is yet to be established, the framework for ICT regulation in Nigeria remains as it has been for the past decade. This is illustrated in Figure 5. The National ICT Policy of 2012 affirms the independence of the new regulator and creates distinctions between it and the policymaker – the Ministry. The expanded ministry would develop, coordinate and monitor the implementation of government's ICT policies and seek to promote the use and development of technology.

The Policy is noticeably silent on the roles of a number of public ICT bodies in the converged regulatory environment. These bodies are: the National Space Research and Development Agency (NASRDA), National Frequency Management Council (NFMC) and the Nigerian Internet Registration Association (NiRA).

4.3.1 The Nigerian Communications Commission

The Nigerian Communications Commission (NCC) was established as an independent National Regulatory Authority in the Nigerian telecommunications sector by Act 95 of 2003.

NCC is responsible for implementing government policy on telecommunications, issued by the Ministry of Communications. NCC's main functions include:

- licensing of telecom operators;
- assignment of frequencies to duly licensed operators;
- administration of the national numbering plan;
- facilitating private sector participation and investment in the telecom sector;
- promoting and enforcing a fair competitive environment for all operators;
- defining standards for economic regulation of dominant operators, including tariff regulation;

- establishing mechanisms for promoting universal access to telecom services;
- establishing and enforcing technical operational standards and practices for all operators, including the imposition of penalties for violations; and
- ensuring that public interest is protected. (NCC, 2013)

4.3.2 The Universal Service Provision Fund

The Universal Service Provision Fund (USPF) was established in 2006 to support the rollout of telecommunications infrastructure into rural and underserved areas. The Fund aims to "facilitate the widest possible access to affordable telecommunications services for greater social equity and inclusion for the people of Nigeria" (USPF, no date a).

The USPF consists of several projects aimed at achieving universal access. The programmes consist of two broad categories: access and connectivity. The current programmes include:

School Knowledge Centres (SKC): Under this project, 396 public secondary schools have been provided with connectivity, computers and power backup. Teachers and students are taught how to use ICT as part of the project, as well as one-year technical support, warranty and remote ICT management. The USPF is also supporting the development and deployment of local content under this programme.

E-Accessibility Project: The project provides ICT tools and Assistive Technologies (ATs) to the blind, deaf, dumb, crippled, cognitively impaired, and other categories of people living with disabilities. The project is designed to assist in improving the quality of life of people living with disability by:

- providing support to identified groups in accessing information and communication technologies;
- improving the overall learning experience of persons living with disabilities by equipping educators with the right hardware and software; and
- providing ICT and assistive solutions to cover as many areas of disability as possible, including but not limited to sight, hearing, mobility, etc. (USPF, no date b)

To date the project covers 14 institutions across the country.

4.3.3 National Information Technology Development (NITD) Fund

The law compels telecommunication companies, banks and insurance companies to pay one percent of their net profits to the NITD Fund. The obligation applies to companies with an annual turnover of more than NGN 100 million. The contributions are tax-deductible. (Ngex, no date).

4.4 REGULATION

Consistent with the liberalisation of the Nigerian telecommunications industry in the year 2000, the Nigerian Communications Commission has facilitated market entry through the transparent licensing of various communications services. Although the reform process started later than in many of the leading markets in Africa, the strides in the telecommunications industry over the subsequent decade and half are attributable to the enabling regulatory environment created by the Commission. The sector now faces the challenges of dealing with increasingly globalised and complex environments. Several new areas of policy implementation for creating a secure and trusted environment, in which the digital economy is envisaged in Vision 2020, will require the regulator to move with greater agility and adaptability from more traditional, national sector and instrumental competition regulation to new areas of regulation and enforcement, requiring engagement with global governance.

4.5 LICENSING AND REGULATION

The Nigerian Communications Act of 2003 encompasses regulatory intervention in the following areas:

- tariffs and rates regulation;
- telecoms licences regulation;
- licence fees;
- numbering regulations;
- spectrum allocation;
- universal access and service; and
- infrastructure sharing.

4.5.1 Telecommunications licences[5]

The Nigerian Communications Act of 2003 stipulates that a company is not able to operate in Nigeria unless authorised to do so under a communication licence or exempted under regulations made by the Commission under this Act.

A licence is granted upon payment of the required fee and is subject to certain terms and conditions. There are two kinds of licence under the Act, namely:

- Individual licence granted to a specified person to conduct a specified activity. The terms, conditions, scope and limitations apply to the specific service being provided.
- Class licence granted to any or all persons to conduct a specified activity. The terms and conditions/obligations are common to all licence holders.

NCC is required to respond to an application for a licence within 90 days and reserves the right to revoke or suspend a licence.

4.5.2 Spectrum allocation and fees

The telecommunications (telco) sector in Nigeria relies on spectrum for the delivery of voice and data services. Mobile is the primary method of delivering communications services in Nigeria and the scarcity of spectrum has impacted on the telco's ability to meet the growing demand for mobile voice and data services and impacted on the quality of service.

Spectrum allocation in Nigeria is handled by three regulatory bodies: the NCC, for commercial providers and users of telecommunications equipment and services; the NBC, for public and private broadcasting organisations; and the Ministry of Communications (formerly MICT), for government bodies and non-commercial users of spectrum.

The following laws and regulations govern the assignment, allocation and monitoring of spectrum:

4.5.3 National Radio Frequency Management Policy

The National Frequency Management Council (NFMC) issued the National Radio Frequency Management Policy in 2004, which outlines broad policy guidelines governing radio frequency spectrum in Nigeria. The policy includes assignment procedures, fees, eligibility, access to records and renewals, and specifies sanctions imposed for the wrong use of assigned frequencies. (Odufuwa, 2010)

4.5.4 The National Broadcasting Commission

The National Broadcasting Commission Act 38 of 1992 (as amended by Act 55 of 1999), makes the NBC responsible for all aspects of broadcasting in Nigeria, including spectrum assignments.

5. Fee schedule is in the Appendix under Annexure 2.

4.5.5 The Nigerian Communications Act

The Nigerian Communications Act of 2003 has granted NCC sole and exclusive powers to licence and manage spectrum in the Nigerian telecommunications sector. The NCC acts on behalf of the NFMC and is responsible for licensing and determining conditions related to the assignment and usage of frequencies. Other bodies recognised under the Act include the NFMC and Ministry of Communications.

4.5.6 Commercial Frequency Management Policy, Administrative Procedures and Technical Guidelines

The policy was developed by NCC and largely draws from the National Radio Frequency Management Policy. The policy outlines broad guidelines, administrative procedures and technical guidelines on national frequency spectrum management, including conditions and eligibility for frequency assignment, limitations, pricing, transfer of assigned frequencies, administrative procedures and technical guidelines, among others.

The main objectives of radio frequency management in Nigeria include:

- promotion of efficient radio communication systems and services through equitable and fair allocation and assignment of spectrum for the benefit of the maximum number of users;
- spectrum resource planning, management and monitoring in accordance with international agreements;
- adoption of advanced spectrum allocation and management techniques for the optimal use of spectrum resources;
- protection of national interests and the coordination of Nigeria's spectrum policies in bilateral and multi-lateral arrangements; and
- innovation, research and development in new radio communication techniques, spectrum-based services and applications. (NCC, No date *a*)

NCC awards licences and assigns frequencies according to a combination of elements, including commercial value, optimal usage, uniform development across geographies, and, to some extent, universal access and service. This has enabled competitive methods of licensing and frequency assignment, including open or selective auctions (either by way of lotteries or 'beauty contests'), tenders, and fixed price as determined by the Commission. (APC, 2010)

In 2015, NCC twice suspended its planned auction of spectrum in the 2.6GHz band. The auction was renewed in May 2016, with MTN Nigeria emerging as the sole bidder. The

Table 3: NCC's frequency assignments (2001–current)

FREQUENCY	450MHz	800MHz	900MHz	1800MHz	2100MHz	2.1GHz
PURPOSE	Unified Access	LTE	GSM	GSM	3G	Wireless
FREQUENCY	2.2GHz	2.3GHz	3.5GHz	5.4GHz	10.5GHz	26GHz
PURPOSE	Wireless	Wireless	Wireless	Wireless	Wireless	Wireless

Source: request for information, NCC, 2017

operator was awarded a licence for use of 2x30MHz of spectrum, amounting to six of the 14 available lots of 2×5MHz FDD paired spectrum (ranging from 2500MHz to 2570MHz and 2620MHz to 2690MHz, totalling 2×70MHz). MTN paid USD 96 million for the technology-neutral, ten-year nationwide licence and is obliged to launch commercial services within one year of the licence award. (Akinsola, 2016)

With unsuccessful auction outcomes recently in Ghana as well, the best way of valuing spectrum to ensure it is efficiently used has become a central policy and regulatory challenge.

The recent failed auction for several lots of spectrum in the 2.6GHz band (this despite two previously aborted attempts) illustrates the problem. Only dominant operator MTN was able to meet the steep reserve price (USD 16 million per lot), leaving nearly half the spectrum on offer unsold. (Song, 2017)

Presently, NCC plans to auction the 700MHz and 2.5GHz to operators to enable the offering of 4G LTE services. (Vanguard, 2017) The consequences of not being able to access market-valued spectrum is that Nigeria's technology and mobile market development significantly lags behind the bigger or more dynamics markets in Africa. Mobile network operators, with the exception of 9Mobile, deliver retail data mainly via older technologies, especially 2G, H+ and EDGE, though there are pockets of 3G, and, of late, 4G base stations in the largest cities.

4.5.7 Spectrum fees

NCC published Pricing of Spectrum Licence Fees Regulations of 2004, subsequently amended in 2009, that govern the pricing of commercial frequency spectrum for telecommunications. NCC sought to establish a transparent, impartial, and competitive pricing system for the acquisition of frequency spectrum that encompassed auctions, pageants and other globally recognised spectrum assignment methods. (NCC, 2004)

Other objectives of the Spectrum Licence Fees Regulations include:

- a simple, uniform, consistent and efficient spectrum management in Nigeria by standardising frequency spectrum fees and pricing;
- market value for frequencies proportional to spectrum size being acquired;
- efficiency and competition in the usage of frequency spectrum; and
- uniform geographical development of telecommunications infrastructure across Nigeria and the universal service goals.

The price of commercial frequency spectrum is calculated using the formula below:

Spectrum Fee = (U) × (B) × (K1) × (K2) per state, where:

- U refers to the unit price: This varies according to licensing region/tier of the state in which the applicant seeks to operate.
- B refers to the assigned bandwidth (spectrum size) in MHz.
- K1 refers to the band factor.
- K2 refers to the tenure duration factor. (NCC, No date *b*)

A detailed description is presented in the Annexure 1 below.

Besides fierce competition from GSM companies, one other reason why the ISP space is inefficient appears to be the spectrum management policies of the country.

While on the one hand, there seems to be a shortage of frequencies to deliver communications services, on the other hand, frequencies have been that underutilised or even unused, as a result of regulatory limitations or possible

hoarding by those operators to whom these frequencies have been assigned. A case in point are the 700MHz and the 800MHz bands issued to MTN by NBC and NCC, respectively.

MTN acquired the latter with its purchase of Visafone in 2015. It is also not clear if the 2.6GHz spectrum won by MTN in a 2016 bid is in play. MTN was the sole bidder and was allotted 6 out of 14 available slots in the frequency band. Inter-C is also said to have recently obtained the 2.6GHz spectrum allocation, though it is not clear how this was secured.

As in many communications markets globally there is fierce competition for frequencies. This is exemplified by the push for LTE by those operators who are yet to obtain spectrum with which to launch high-speed Internet services – Airtel and Etisalat (now 9Mobile).

The latter lost its Federal High Court case, brought against MTN and Visafone to challenge the former's use of the 800MHz spectrum, as the presiding judge agreed with NCC that the acquisition did not reduce competition in the industry and subsequently dismissed the case. (Ogunsola, 2017)

In recent times, Nigeria's telecoms industry, in line with global trends, has been undergoing some form of consolidation, with the bigger players getting bigger and the smaller ones being forced out of the market. For instance, the membership of the Association of Licensed Telecommunications Operators of Nigeria (ALTON) has shrunk from 35 to 15 operators over the past decade. Nevertheless, many market observers believe the pace and level of mergers and acquisitions has been suboptimal, and that the potential spin-offs of these for the country's ailing market has yet to materialise. This is probably best illustrated by Helios' USD 10 million acquisition of the foundering Multilinks in 2011. (Reuters, 2011) The former's network assets, especially its significant fibre infrastructure, have been redundant or drastically underutilised since the change of ownership.

The same can also be said of MTN's USD 220 million acquisition of Visafone in late 2015, intended to enable the mobile operator to launch LTE offerings using the latter's 800 MHz frequency licence it had acquired. (NCC, 2016) Though NCC had approved the deal, when Etisalat sued both MTN and Visafone, alleging potential market domination, the regulator retroactively restricted MTN from going ahead to use the newly acquired LTE spectrum, citing in its September 2016 pronouncement on the need to prevent the emergence of a monopoly in the communications sector. (Leadership Newspapers, 2016; Prinsloo, 2016) As none of the factors had changed, and as MTN had previously disclosed its intentions, this then raises the question of why the sale was originally approved.

Another case in point is Swift's series of purchases of Direct-on-PC (2013), Monarch (2015) and Chromecom (2015), among others. Presently, as can be seen in 9Mobile's current quest for new investors, which culminated in its acquisition by Teleology in March 2018, virtually all the operators besides MTN, Glo, and, possibly, IHS – the biggest tower company – appear to be actively seeking new merger and acquisition opportunities to the extent allowed by the regulator. (Matuluko, 2018)

Since any merger and acquisition activity requires significant regulatory oversight and approval, it is unclear whether NCC has prepared, or is preparing, itself to help strengthen, indeed salvage, the industry. Proactive initiatives and policies that can unlock the potential and full benefits of the anticipated consolidation of the industry must bear in mind the

possible negative effects any consolidation may have on the competitive environment: regulatory capacity has, therefore, to be strengthened in this regard. Consumers may also suffer from limited choice as the range of products and services post-consolidation may likely reduce. It is also possible that future merger and acquisition events, as suggested during the interviews by market operatives, whether helped on by the regulator or not, may never actually materialise, unless the environment is made more conducive.

4.5.8 Spectrum trading guideline

The spectrum trading, leasing and sharing determination finalised in April 2018 (as this report was being finalised) may assist with the optimal use of spectrum in the market, though the 40-60 percent fee due to the Commission on proceeds of the spectrum, presumably to discourage speculation and hoarding, may be a disincentive to selling.

This forms part of the NCC's broader objective to enhance the deployment of telecommunications services across the country and to further liberalise the spectrum management policy of the Commission. This is important for the more efficient and flexible transfer of spectrum to users who value it most, for lowering the barriers to market entry by allowing flexible access to spectrum as well as for promoting competition and innovation.

4.6 TARIFF AND RATE REGULATIONS

Tariffs are set on a competitive basis in the Nigerian telecoms industry. However, in November 2016 the NCC, in a bid to level the playing field between small operators, new entrants and larger mobile operators, announced the directive to set a data floor price at NGN 0.9 per megabit as from 1 December 2016. (Udo, 2016)

However, this was not backed by any independent costing study upon which NCC could maintain its regulatory position. The backlash that resulted from this announcement led the regulator to suspend its position pending the conclusion of its data pricing study. Presently, the industry is in limbo, as the free-for-all situation with respect to data bundles on offer to the general public remains.

It appears that this situation will continue to persist until: (a) a formal independent retail data cost study is carried out by the regulator to determine whether this generally held view is either real or merely just perceived; and (b) using the data furnished by the study, positive steps taken by the regulator to address the challenges of retail data distribution and pricing.

4.7 MOBILE TERMINATION RATES (MTRS)

Mobile termination rates (MTRs) or interconnection rates are prices/fees that carriers charge for terminating or completing calls on each other's network. These charges form part of operators' cost of providing calls to its customers. These rates may be commercially negotiated or may be regulated. In some countries, the regulator only facilitates termination negotiations but cannot set termination charges. The regulator only sets rates when operators fail to reach an agreement. For instance, apart from the first termination rate, which was based on negotiations between the incumbent operator (NITEL) and other operators, all other interconnection rates were set by the NCC. In line with global regulatory practice, the NCC decided to regulate the MTRs, as call termination on each mobile network is considered to be a monopoly market.

As of 2015, there was a debt of over N30 billion amongst telecommunication operators for interconnection. In Nigeria, there have been four interconnection cost determination

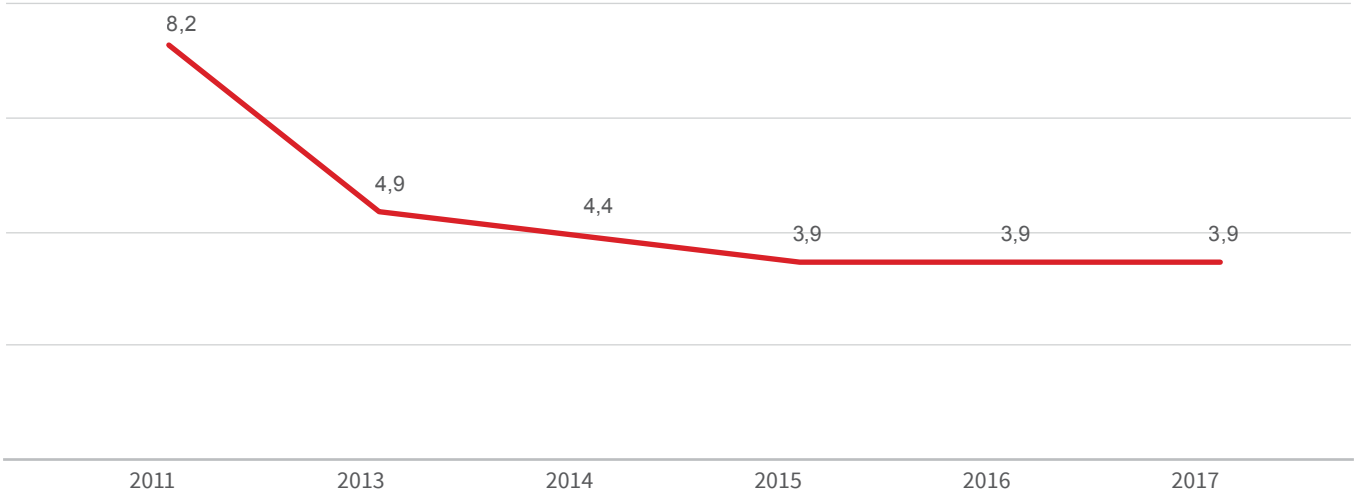


Figure 2: Glide path in mobile termination rates in Nigeria

Source: NCC, 2018

regimes in 2003, 2006, 2009 and 2013. The 2003 regime was determined via a benchmarking exercise, while the other regimes were cost-based. As a means of reducing retail prices in the mobile voice market, some African countries have set time frames, or a glide path, for operators to reduce MTRs incrementally over time to avoid the shock of full implementation to their business models. In some instances, this has been coupled with the regulator requiring the operators to reduce off-net charges – a policy that is not only expected to increase competition but also reduce retail prices and increase consumer welfare. Nigeria effected a glide path asymmetric regime in 2009 and 2013. The commission set a reduction path for termination rates in three years. In 2013, the following glide path was adopted, which reduced MTRs from NGN 8.20 to NGN 3.90 in 2015 (see Figure 6).

In 2017, the NCC commissioned Price Water Coopers (PWC) to review and update the existing termination rates model, taking into consideration the changes that have occurred over time and produce an interconnection cost model that is more in line with current realities in the Nigerian market. A discussion document was published in 2017 for comment in which the estimated increases in termination rates was attributed to Nigeria's high forecasted inflation rates compared to the USA, which was expected to have a significant impact on network equipment unit prices for 2019 and 2020. The increase in network equipment unit prices translates into an increase in network costs and ultimately an increase in MTR. Although estimated prices based on a LRIC+ model were included for discussion at the time of finalising the report, the revised termination rates have not yet been made publicly available.

This benchmarking exercise shows that interconnection costs in Nigeria are high, even though they are cost based (but may include costs of inefficient or predatory business). If the termination rates are high, smaller operators are unlikely to be able to pay them, and certainly unlikely to be able to undercut dominant operator retail prices to drive down end user prices, which is the intention of competitive markets.

If this results in a situation, as it has in Nigeria, where small operators owe dominant operators significant amount of money, the viability of the entire sector is threatened.

In 2015 operators owed each other over NGN 30 billion in termination rate charges. Where owing operators are not forced by rule of law to clear their debt, there is a danger of dominant operators cutting smaller operators in a bid to force them to do so (which, in a regulated environment, should not be permitted to happen).

So, incorrect or inadequate administrative pricing management can have an unintended negative effect on the market.

In 2013, the NCC assessed the level of competition in the Nigerian telecommunications industry (NCC, 2013b). The study revealed that the Nigerian mobile voice market is not highly competitive. The 3 063 HHI score, which suggests that the market is highly concentrated, raised antitrust concerns. At that time, the market was mainly dominated by two operators, MTN and Glo, controlling 62 percent of the market combined (NCC, 2013b).

MTN, controlling 44 percent of the market at the time, was ordered to collapse its on-net and off-net voice tariffs which had a wide differential of close to 300 percent (NCC, 2013b). The wide differentials were believed to create club/network effects and to ultimately reinforce MTN's dominance (NCC, 2013b). The RIA Africa Mobile Pricing (RAMP) Index to examine the effect of this policy, and other subsequent reductions in termination charges, displays a significant termination rate pass-through effect in the decline of mobile retail prices in 2013. Reductions in MTRs in 2014 and 2015 also led to slight price decreases.

The RAMP Index shows that the NCC's Determination resulting from the 2013 Competition Assessment Report indeed stabilised the market. Despite MTN responding to this with an increase in its retail prices, competition from other operators forced it to reduce its retail prices. While the 2015 reduction of MTRs had an insignificant effect on the retail prices of Airtel, Glo and 9mobile, MTN was forced to significantly reduce its prices in order to remain competitive.

The intensive competition in the mobile voice/SMS market in Nigeria is evidence that the

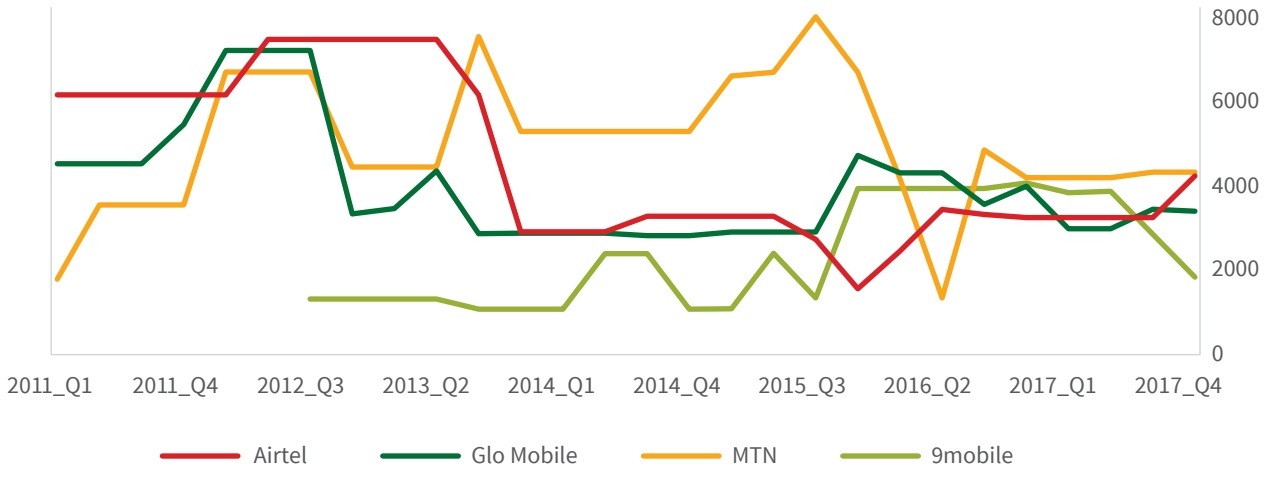


Figure 3: Operator Voice/SMS price basket Q1 2011 – Q4 2017

Source: RAMP Index, 2017

telecommunications sector appears to be trying hard to maintain revenue streams that are coming under pressure from data-driven OTT substitute services, such as WhatsApp Voice and Facebook Messenger, on mobile network and other operators.

4.8 NUMBERING REGULATIONS

NCC's Numbering Regulations of 2008 provide a framework for the control planning, administration, management and assignment of numbers. The regulations also set out the rules for the assignment, transfer, porting and use of numbers under the national numbering and electronic addressing plan.

The objectives of the Numbering Regulations are to promote investment, facilitate competition and protect customers by ensuring that:

- numbers are understood to be national resources that are not owned by customers or licensees;
- numbers can be assigned efficiently, quickly, transparently and fairly, without undue discrimination against particular customer classes, licensee types and communications technologies;
- shortages of numbers can be predicted and prevented in timely ways; and
- uses of numbers can be monitored and controlled to avoid detriment to the interests of customers. (NCC, 2008)

Numbers are assigned on a first-come, first-served basis. Number assignments are withdrawn in the case of non-use for a period of six months and in the case of violation of numbering rules.

The Numbering Regulations permit mobile number portability, whereby users can move from one service provider to another, without changing their number.

4.9 INFRASTRUCTURE SHARING AND COLLOCATION

The NCC under the telecommunications Act is responsible for:

- promoting fair competition in the communications industry;
- encouraging and promoting infrastructure sharing among its licensees; and
- developing guidelines for collocation and infrastructure sharing. (NCC, No date *c*)

In 2006, the NCC released "Guidelines on Collocation and Infrastructure Sharing "to provide a framework under which telecommunications companies can negotiate agreements on a first-come, first-served basis. Under the guidelines operators may negotiate infrastructure sharing agreements freely, as long as the agreement does not risk lessening competition. Negotiation is to be based on the principles of neutrality, transparency, non-discrimination and prices and must be cost-oriented. In addition, infrastructure sharing is required to be carried out under the terms of the licence issued by NCC.

NCC promotes the sharing of the following infrastructure: (a) Right of way, (b) Masts, (c) Poles, (d) Antenna mast and tower structures, (e) Ducts, (f) Trenches, (g) Space in buildings, (h) Electric power (public or private source). Sharing of the following infrastructure is not permitted: (a) Complete network structures, (b) Switching centres, (c) Radio network controllers, (d) Base stations.

Requests for sharing should be responded to within 30 days and refusal is allowed only in case of insufficient capacity; safety, reliability, incompatibility of facilities; and engineering considerations. The NCC intervenes (a) in the event of refusal to share; or (b) to act as mediator in the absence of an agreement. (A4AI, 2016) The NCC is presently reviewing the 2006 Guidelines to accommodate active

infrastructure sharing among operators, among other possible actions

Additionally, there is a move by industry pressure groups, particularly ATCON and ALTON to get the Government to declare communications networks as a critical national infrastructure, though this has not received traction at either parliament or the presidency. A draft bill in pursuit of this agenda has been in the senate for ten years, while every attempt to get the presidency to issue a circular in this regard has been fruitless. In July 2017, the federal cabinet passed a resolution fixing common rates for all right of way fees payable by telecoms operators in any part of the country, though it is unknown to what extent this decision is being implemented or complied with, especially since previous memos containing similar directives have been largely ignored by state officials on the field. (Ehikioya, 2017)

Instances of political interference include the events leading to the reversal of the data floor price announced by the regulator, parliamentary review of the sector, including: the alleged repatriation of GBP 13.92 billion by MTN between 2006 and 2016; nTEL's acquisition of NITEL; Etisalat Nigeria's utilisation of USD 1.2 billion loans, and its subsequent takeover by Teleology in March 2018; etc (Senate of Nigeria, 2017; Umoru, 2017). This is not to discount the oversight function of legislature, but questions abound regarding the extent that it impacts on the regulator's role, independence and statutory functions. Operators allude to Nigeria's textile sector collapse (and even that of NITEL) as providing lessons that can be applied towards ensuring the health and sustainability of communications services in the country.

The Nigeria Communications Commission (NCC, 2013) carried out an initial review of dominance in the telecommunications sector in 2010 in two markets: mobile telephony and international Internet connectivity (IIC). It found that no operator held a position of dominance in either market mainly due to the fact that there were more than three competitors in each market. In the IIC market, the NCC found that the proposed entry of four more competitors to the fixed line incumbent, Nitel, would make the market competitive in the future (NCC, 2013). In 2013, the NCC completed a second review and determined that only one market was susceptible to ex-ante regulation: wholesale leased lines and transmission capacity. The NCC followed the standard market definition process (NCC, 2013):

- identification of the products and/or services in the telecommunications market;
- definition of market structure, including relevant market segments;
- review and assessment of competition in each market, including an assessment of dominance; and
- determination of markets, subject to regulation.

The criteria used to determine dominance in these two markets were:

- market share;
- overall size of firm, specifically in relation to other firms in the market;
- control of network facilities;
- absence of buying power or negotiating position by consumers; and
- rate of technological change.

Remedies were imposed on two operators – MTN and Glo. The remedies consisted of a price cap and price floor, accounting separation and the submission of requested information to NCC, i.e. if the NCC were needed additional information not covered in, for example, accounting separation (NCC, 2014).

5 MARKET STRUCTURE

Although the licensing regime has shifted from a vertical to horizontal one, the market remains structured around a number of historically vertically integrated operators with network and services licences to operate in all levels of the market. Although traditionally the national infrastructure was largely provided by the fixed incumbent, NITEL, with value-added networks (VANs) and ISPs buying facilities from them, with the liberalisation, operators received technology neutral licences allowing them to provide both mobile and Internet services. With NITEL's national transmission network growing increasingly dysfunctional, early market entrants MTN and Airtel focused on building their own transmission capacities to carry traffic generated on their mobile networks. Once international data transmission prices fell, and fibre became necessary to carry the new data capacities required, mobile operators increased their investments, rolling out fibre across the country. New data-only operators have also rolled out networks, though their focus has been on the main urban centres. With the rise of mobile broadband and the entry of multinational organisations (MNOs) into the data services market, many of the VANs and ISPs have been unable to compete in the absence of regulated wholesale access. Some of the arising primary markets are described below.

5.1 INTERNATIONAL TRANSMISSION

Since 2010, there has been a massive 2 705 percent increase in the wholesale submarine bandwidth capacity available to Nigerian telecommunications operators, due to the launch of three new undersea cable systems with landing points into Lagos. MainOne (2010), Glo-1 (2011), WACS (2012), and ACE (2014) – with a combined overall capacity of some 9.5tbps – have the potential to change the landscape of Internet service provisioning and data connectivity in Nigeria through lowered wholesale international bandwidth prices and higher speeds. All three of these submarine systems are promoted by private corporations and are reporting strong post-launch capacity sales.

Prior to 2010, Nigerian operators had been heavily dependent on VSAT systems and nTEL's notorious SAT3 (the *de facto* monopoly submarine cable system, generally expensive and unreliable) for international bandwidth.

Since the launch of the new cables, there appears to be competition in wholesale international bandwidth pricing for Internet services and discernible improvements in bandwidth speeds. There is also increased variety in the range of available Internet products and solutions, whether delivered by traditional ISPs or mobile operators.

However, access to national fibre is still limited and relatively expensive where available. Thus, while it is true that submarine cables have expanded the capacity of overall international bandwidth, inland locations within the country are yet to experience any significant lowering of broadband prices. Based on recent RIA surveys in the country, data rates are still high while browsing speeds are slow and unreliable – especially to retail consumers – despite there being a significant lowering of prices. The quality of voice and data services is also considered quite poor indeed (Gillwald, Odufuwa and Rademan, 2016).

The biggest consumers of wholesale bandwidth are MNOs, transmission companies, major resellers, ISPs, and educational institutions. MainOne is the leading supplier of wholesale bandwidth, while WACS and ACE lag behind in the market, partly because ACE is playing catch-up and appears to be struggling to win business, and WACS has minimal presence due to issues arising from what is said to be shareholder disagreements. Glo-1 supplies all of Glo's wholesale data needs and provides redundancies to ISPs and third-party resellers. SAT-3 was recently transferred to a private entity by the national government in its privatisation of the fixed telephone company, NITEL, now rebranded nTEL and has limited patronage beyond the operator.

Only about four percent of international bandwidth of the Lagos landing station is being distributed within the country. The biggest regulatory challenge at the moment is how to get this massive amount of unused capacity delivered to users across the country through national transmission networks.

There are several reasons for the low level of capacity utilisation of wholesale bandwidth. Firstly, although retail demand is growing as mobile networks continue to push low-cost data plan offerings, the penetration of smartphones is only about 30 percent of the population of mobile owners. Besides, the low level of deployment of high-speed technologies, particularly Long-term Evolution (LTE) means that there is a mismatch in customer experience: though wholesale speeds can be very high, retail experience would be very slow. Until 2016, when the NCC undertook a study on Cost-Based Transmission Cable Pricing, there had been no regulation of international wholesale capacity. The wholesale market was developing on its own; transmission cable providers thus held supplier power and were able to indulge in arbitrary unchecked pricing (due also in part to the absence of effective competition in wholesale bandwidth provisioning). No determination resulted from the Cable Pricing study and with wholesale pricing extremely opaque it is difficult to say with precision, but it appears that wholesale pricing is high relative to similar markets and continental peers, and the rate at which wholesale prices are being brought down by competition is not presently as aggressive, when compared to retail.

Though Glo and MTN both hold shares in Glo-1 (100 percent) and WACS (11 percent) respectively, the observed trend does not suggest that either operator has been able to use their ownership of submarine cable infrastructure to exercise market power in a way that directly inhibits competition in either the upstream or downstream segments of the market. Put another way, the biggest factor holding back the openness of the upstream market appears to be pricing transparency due to inadequate regulation and weak corporate demand for wholesale bandwidth beyond the commercial centres of the country. It is also unclear whether Glo (the mobile network) gets a preferential treatment from Glo-1 (the submarine company) because it shares ownership, or whether MTN Nigeria is treated favourably when it buys capacity from WACS in which it has an 11 percent equity stake. In any case, both Glo and MTN play in the same market space as operators who buy from them, a situation that requires regulatory treatment if the market is to develop efficiently.

Though there is not a monopoly in wholesale data services, there is sufficient evidence from the stakeholder discussions that the Glo/Glo-1 relationship has a strong impact on the

downstream sector, as this operator, in particular, is able to offer almost unmatchable prices and promos on its retail data bundles. Presently, mobile consumers are able to buy data at rates that can go as low as N0.01/Kilobyte, depending on the network and bundle. While low prices are good for the market, the reduced ability of other retail networks to compete equally may be an issue that needs to be addressed by the regulator, which has the capacity to do so.

5.1.1 Communication satellites

The government deployed the geostationary NigComSat-1R in 2011 to orbit after the NigComSat-1 was lost to power failure while in orbit in 2008. The USD 250 million NigComSat-1R is managed by the aforementioned state-owned NIGCOMSAT, and offers, through its 40 transponders, voice, video and data transmissions on a wholesale commercial basis to telecoms operators and broadcast companies across its footprint. It is complete with quad band, Ku-band, Ka-band, L-band, and C-band, and less than 20 percent of its capacity has been leased out. The NigComSat-1R is located at 42.5 degrees east directly above Somalia, with a high beam into Nigeria, which utilises peripheral beams that are relatively weak.

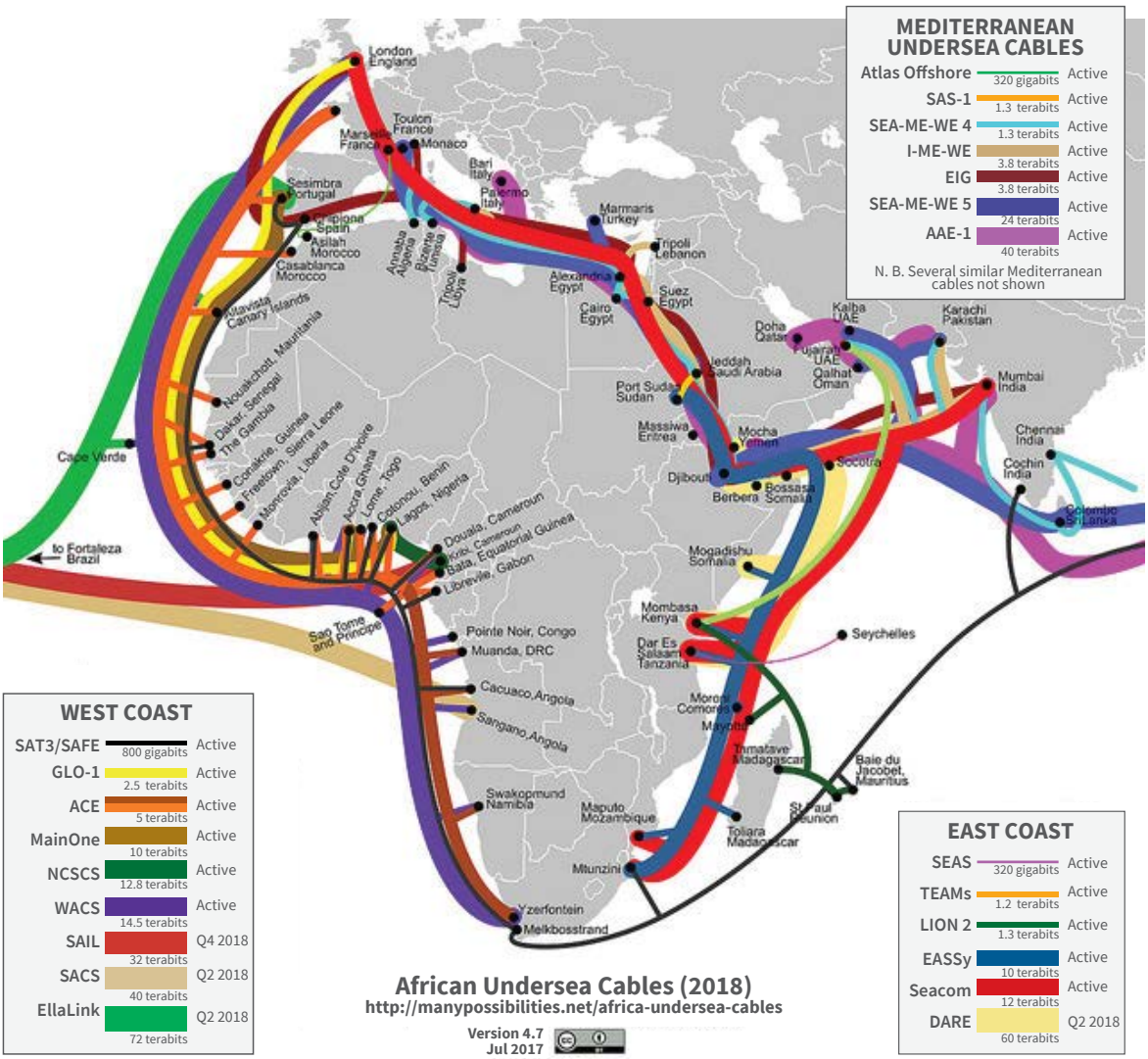


Figure 4: Fibre optic cable landings in Africa

Source: Many Possibilities website (retrieved February, 2017)

5.2 NATIONAL TRANSMISSION

The biggest challenge in delivering high-speed broadband to cities and towns will be the state of the transmission networks, particularly fibre optic connections. The vertically-integrated fibre-based network operators have focused on the most profitable geographical areas — primarily major urban areas, capital cities and intercity routes, to the disadvantage of the majority who live outside those areas. This can be attributed to investment risks caused by high capital expenditure in conjunction with demand uncertainty. The situation with inland fibre installations has, nevertheless, improved over time, as the market shifts away from VSAT to fibre or radio solutions and fibre optics, due to pricing and latency considerations. In addition, the wide penetration of mobile data has led to a sharp decline in the sales of VSAT terminals.

This is an important issue that continues to limit the effectiveness of the communications sector: the fact that there is no single national broadband network covering the entire country. Presently, all the operators together contribute about 33 000 km of fibre, and 24 000 towers – significantly fewer than far smaller countries and economies. The biggest infrastructure companies with significant network assets are, in descending order, MTN, Glo, IHS, Airtel, 9Mobile, Phase 3 and nTEL (formerly NITEL).

Attempts to expand the national broadband infrastructure through the licensing of regional Infracos by NCC in 2014, HIS (North Central) and MainOne (Lagos) have not yielded any results. Both licensees were expected to establish new carrier-grade fibre networks through which they can move operator traffic within their assigned regions on an exclusive basis. At the time of this report, neither licensee has made any significant progress on their respective mandates.

Existing operators appear not to be receptive to, or optimistic about, the open access Infraco licensing proposition. If they have the capacity to inhibit the initiative, alternative regulatory structures may have to be considered, in order to stimulate the creation of a national broadband network, possibly with some consortium arrangement that includes them, as in the successful undersea consortia that have delivered low-cost international bandwidth to the country.

There is also no need for a single-owned backbone. Building of the undersea open access model, competitive fibre rollout is happening elsewhere on the continent through commercial companies raising capital to open up new routes. The business model is inherently open access, as they require as much traffic as possible on their networks, to maximise their return on investments in a short period, allowing them to refinance the next phase of network rollout and contribute to cost network extension. Cross-continental and local commercial fibre companies believe that, with guaranteed revenues such as from government anchor tenancies created through demand aggregation in under-serviced areas, the private capitalisation of broadband rollout in otherwise uneconomic areas of the country could be induced.

Like other regulators in resources constrained environments on the continent, NCC should be focusing on creating incentives for infrastructure sharing, channelling complementary investments and moving to an industry coordinating role, by enabling voluntary models that allow the participants to carry the risks associated with high sunk cost infrastructure investments, rather than through government debt.

According to Nigeria's National Broadband Plan (2013–18), the Government is aiming for a penetration rate of 30 percent by 2018 – a five-fold increase over the 2012 level. Debate is still rife about the plausibility of reaching this milestone, with the 2017 survey indicating a penetration rate of only 29 percent. This has become even more agonising in view of both the United Nations Broadband Commission for Digital Development's targets of 50 percent for developing countries and 15 percent for Least Developed Countries by 2015; as well as UNESCO's global broadband penetration target of 60 percent by 2015. In fact, the ITU and UNESCO have also admitted to the likelihood of not meeting the same targets in each country by 2020, based on the argument that the business case for Africa does not support investment in this sector.

From a broad perspective, in order for the country to reach its goal of becoming one of the top-20 economies by 2020, governments at all levels (federal, state and the local) as well as the operators need to take up their pivotal roles and responsibilities in making ICT services widely available for the creation of employment and generation of wealth.

The main players in inland fibre installations are MTN, Glo, Phase 3, Airtel and, to a smaller degree, 9Mobile (Etisalat). These operators have built national backbone transmission networks based on fibre and radio links with availability all across the country. MTN and Glo are the only mobile operators with submarine cable investments, but they also take wholesale bandwidth from one another and from other carriers, specifically Phase 3, MainOne and nTEL.

nTEL acquired the assets of the defunct NITEL and MTel through the Government's privatisation programme and revived and upgraded SAT3 from 40GB to 400GB in 2016, from which it moves traffic across its 300 km of fibre nationwide, mostly in Lagos, Abuja and Port Harcourt. The operator launched 4G services on 800 sites following its acquisition of the incumbent NITEL and is planning to roll out into 10 more cities. Disadvantaged as a late entrant, with the current pricing of inland traffic considered prohibitive, nTEL is planning to run their own transmission network, using real estate they inherited from NITEL.

The consensus of industry is that the cost of moving traffic inland from any of the submarine cable landing points in Lagos to any location within the country is now higher than the cost of purchasing bandwidth from anywhere outside the country. It is also generally agreed that the poor quality of backhaul connections negatively impacts access networks and limits the quality of data that consumers, and, to a lesser degree, enterprises have. The twin issues of the quality and expensiveness of transmission networks are significant issues that require further understanding and urgent regulatory intervention.

NITEL used to have a national carrier and gateway licences which has now been collapsed into universal service and cable landing station licences. ISP business is a priority for nTEL because of the excess capacity on SAT3. The Internet is increasingly becoming local with the use of caching, file libraries, server mirroring, and other tools.

The national road fibre network installations continue to suffer from significant downtime arising from frequent and costly damage caused by road construction, as well as acts of terrorism and sabotage, especially by an increasing number of host communities. This sometimes results in a simultaneous loss of network availability to hundreds of base stations nationwide. Construction accidents are now quite frequent

because road development is improving in most of the state capitals and secondary towns, after decades of neglect. They occur regularly, with some reports suggesting an average of up to 70 break-ups in fibre installations per month across all networks throughout the country. Networks are unprotected from this situation at present.

Due to these problems with road fibre, Phase 3's fibre-over-power-lines infrastructure appears to be the most reliable for delivering traffic from a landing port in the south to most cities in the north of the country. Phase 3 operates a 4 000 km fibre network that is delivered through aerial deployment on pylons along the country's power transmission corridor. Phase 3 positions itself as a carrier of carriers and is in high demand by operators.

Presently, service delivery between the upstream and downstream data segments is on best-effort basis. Backbone transmission providers, such as Phase 3, Suburban and Galaxy Backbone do not have retail network presence. That may well change in the future if any of these change their corporate focus or business model. MTN continues to enjoy a strong first mover advantage and has the largest share of network assets, transmission resources, physical infrastructure and retail customers.

The availability and quality of transmission networks to backhaul traffic across the country presents a major problem. Microwave links, by default, are insufficient to deliver broadband connectivity, yet the spread of fibre connections is not sufficient, and investments to fill the gap are still outstanding.

Requiring wholesale access to already congested networks may also be problematic, unless the revenues are sufficient for the providers to extend their network and enhance the quality of their offering. Although there is some commercial passive sharing of infrastructure, a regime for active sharing was raised by a number of operators as a model that can extend the reach and use of existing infrastructure, as this model can help market players to access each other's resources, under a regulatory framework.

5.2.1 Rights of way

Fibre operators also spoke about the challenges of obtaining wayleaves and environmental clearances to extend their networks. Various states have different rules, many of them arbitrary and uncertain, and operators have experience of them being amended mid-build. They have called for national standardised right of way to be made a federal jurisdictional issue to overcome what is seen as arguably the greatest stumbling block to extension of the national backbone and backhaul networks.

5.2.2 Infrastructure sharing

The entry of tower companies appears to have introduced a new market dynamic, as most operators are now heavily dependent on these tower companies for base station logistics. At the height of the Etisalat saga in 2017, the inability of the mobile operator to service its debt obligations to its tower supplier IHS, resulted in the abrupt decommissioning of about 1 000 sites, representing about a fifth of the network. This situation may not have arisen if a regulatory arrangement was in place for commercially managing lease payments and defaults due to tower companies. While interconnect bills are subjected to a regulatory framework in which all operators are mandated to comply, there is no such arrangement for facilities leasing payments at the moment. The development of a commercial framework through regulatory intervention should do

much to stabilise the situation going forward. The NCC is presently conducting a review of the current passive infrastructure sharing guidelines towards updating the regulations for an active sharing environment and, by doing this, address the highlighted gaps in the business sector.

5.3 ACCESS NETWORK – FIXED LINE

The full liberalisation of the Nigerian telecommunication industry in 1999 has been the pivotal driver of the current expansive growth within the sector, relative to the pre-liberalisation epoch. In the Nigerian ICT ecosystem, tens of millions of dollars have been invested in the infrastructure space and comprises both passive (does not contribute to bandwidth) and active (contributes to bandwidth) infrastructure. The passive infrastructure is predominantly the transmission towers, while the active infrastructure includes optic fibre, spectrum, and radio base stations.

Though Nigeria's fixed market was the first telecoms market segment to be liberalised – when Multi-Links launched a rival service to NITEL (nTEL) in 1997 – private fixed-line companies have found mobile competition difficult to withstand, particularly the competition coming from the GSM operators, and a number of companies have been either acquired or liquidated.

The decline in fixed-service provisioning is at the same time due to several other factors:

- the collapse of the state-owned fixed-line firm NITEL (which up until 2001 had the biggest communications network in the country);
- mobile telephony's economies of scale and global adoption of mobile GSM as the technology of choice;
- the deep pockets of GSM operators, giving them strong first-mover advantage in the deployment of base stations across the country;
- reduced vendor support for rival fixed wireless/mobile platform, CDMA;
- the initial inability of fixed wireless lines to roam nationally;
- the evolution and shift of technology away from traditional fixed systems to mobile systems, driven by consumer expectations of ubiquitous access; and
- the lack of proactive anticipation on the part of the regulator NCC to deal with the unintended effects that the success of mobile has had on traditional fixed systems.

Despite the current influx of fibre optic operators into the country, which correlates with the potential of the country's communications market, last-mile infrastructure deployment to end-users remains minimal. While there has been considerable success in increasing access to basic voice communications, there has been minimal comparable improvement in broadband penetration. The positive shift in the supply of mobile telephony in Nigeria is unfortunately happening at a time when there is a large access gap in mobile broadband. This is the major factor inhibiting broadband penetration, particularly to underserved areas in the country (Gillwald *et al.,* forthcoming)

5.4 ACCESS NETWORK – MOBILE

In spite of recent growth in fibre installations, national fixed-line infrastructure is still too poor and mobile systems remain the primary means for carrying retail and enterprise data traffic in Nigeria. Mobile operators, which have the advantage of scale and coverage, are the main providers of broadband connections, with networks based on GPRS, EDGE, UMTS and LTE technologies. Internet solutions and services are also provided by fixed wireless operators, which offer EVDO and HSPA products, and ISPs, which utilise, in the main, WiMAX and fibre optic solutions.

Due to regulatory promotion of infrastructure sharing, coupled with the global trend of outsourcing, the majority of base station sites

are now under the management or outright ownership of two major tower sharing companies, IHS Towers (IHS) and American Towers. IHS manages about 15 000 towers and recently secured the Infraco licence for North Central, while American Towers owns about 5 000 towers. IHS and the MNOs are currently aggressively connecting tower locations to fibre optic cables to reduce the dependence on microwave backhauling. This should deepen the national communications infrastructure and may result in improved speeds and a greater range of services.

At the core of access networks is 2G, which covers 87 percent of the entire Nigerian population. However, 2G is an old technology that is generally inefficient in the handling and management of voice and data connections.

In contrast, 3G is presently only available to half of the population, according to the GSMA. Based on recent field research carried out for the study, 3G coverage is estimated to stand at about 15–20 percent, which is mainly in the state capitals, and up to 100 percent 2G penetration in many towns. As at September 2015, 4G accounted for only 0.15 percent of mobile data connections in the country. The reliance on older access technologies is at the heart of poor mobile data reliability, which, at the moment, is quite pronounced throughout the country (GSMA, Intelligence 2015).

Due to the growth in mobile Internet usage, the mobile handset has become the primary medium for accessing the Internet in Nigeria. The reality appears to be that the low penetration of computers, poor electricity supply, and the proprietary or limited nature of terrestrial networks have made mobile networks a convenient and portable economic necessity, in spite of its limitations in terms of screen size and applications.

Presently, Nigerian mobile networks handle much more than the voice traffic for which they were originally designed. Mobile payments, OTT, security, webhosting, and fleet control are a small sample of the kinds of transaction being carried out on these networks. Clearly, the shift from pure voice to data networks is ongoing, albeit slower than in some of the more dynamic markets on the continent,[6] yet the policies to attract new investments to achieve this still need to be generated. It is uncertain whether there is sufficient capacity being developed within the regulator to support and effectively manage this important transition.

Operators are at different stages of network or service expansion, especially as it relates to 'future-proofing' their respective networks. There is a high prevalence of feature phones, the reason why operators argue that they are retaining their 2/2.5G access networks, to maintain this set of mobile subscribers, even though there is increasing demand for newer technologies, including 3/3.5 and 4G. Operators, both MNOs and ISPs, have begun to offer unlimited plans, though these are typically capped at between 80GB and 120GB, beyond which usage speed is throttled down until the expiration of the subscription. Presently there is no Internet player that is able to guarantee bandwidth speeds, due to the quality of access networks, so products are offered in bandwidth terms MB/GB and not speed (mbps/gbps).

6. For example, according to the MTN 'Integrated Report for the year ended 31 December 2017', MTN Nigeria reports data revenue growth of 87% in 2017, yet this still makes up only 12% of total revenue In Nigeria (compared to 33% in South Africa and 25% In Ghana) (p.8).

5.5 INTERNET SERVICE PROVIDERS (ISPS)

Presently, the ISP market in Nigeria is dominated, as far as retail consumers are concerned, by MNOs who have taken advantage of the inability of ISPs to offer superior products nationwide. There are less than a dozen internet access providers left in the country and generally they focus operations on a handful of the largest state capitals. The most active are Swift, Spectranet, Smile and nTEL, all running 3G or 4G/LTE networks. Other than Smile, which has focused on some of the second-tier cities, most operate in Lagos, Abuja and Port Harcourt. These are relatively small operations, offering products in only a handful of markets; none has the penetration, visibility, or liquidity of mobile operators; and all appear to be struggling to extend their respective networks in order to retain market share. They are being challenged in all their service segments by the MNOs, especially as the MNOs roll out their fibre backhaul networks to become fully vertically integrated and start to compete downstream in the ISP market. On the enterprise side, the main players are Vodacom Business, Internet Solutions, Layer 3, and 21st Century.

Retail data appears further compounded by the absence of national or even strong regional independent ISPs. Though there are many private intermediaries between the wholesale and retail segments of the value chain, there are no more than a handful of ISPs in the largest markets. These intermediaries would include resellers (ISPs), value added service players, integrators, and retailers. The majority of these intermediaries are weak operators and do not have the sales, liquidity or expertise to match GSM networks. In nearly all the states in the country, MNOs are the dominant players in Internet services, enterprise and retail markets (Odufuwa *et al.,* 2013).

5.6 MOBILE MONEY

Further, an enabling environment needs to be created that would assist networks make the transition from voice to data and the necessary significant investments in 3G and 4G network required to offer these services cost effectively. This includes the development of complementary services, such as mobile money and other digital insurance and financial products enabling jurisdictions to reduce operators' dependence on voice services only – at the same time delivering on other universal objectives of banking the unbanked and financial inclusion more generally.

Mobile money services in Nigeria are bank-led, with supporting infrastructure provided by licensed telecom operators. Regulatory oversight for this economic segment is provided primarily by the Central Bank, with the telecoms side under NCC. Mobile money in the country will include all forms of electronic payment using the mobile phone, including USSD banking, mobile cash, and wallets. All the banks offer mobile money products and actively promote uptake through their branches and agents across the country. The regulatory framework was revised in 2017 by the CBN and favours the greater involvement and participation of MNOs, and operators are hopeful that mobile money will take off in the course of 2018, as long as the new regulatory framework is implemented. There are no success stories of bank-led mobile money initiatives. In fact, the most successful cases are where the financial regulation has been non-existent or limited, such as Kenya. Financial regulation was belatedly introduced, once the mobile money operation was a national phenomenon, and has now usefully ensured underwriting by what has become the biggest transaction bank in Kenya.

5 MARKET AND COMPETITION ANALYSIS

The establishment of the sector's independent regulator in 1999, the Nigerian Communications Commission (NCC), ended the monopoly of M-Tel, the mobile subsidiary of fixed-line incumbent, NITEL. The liberalisation process was kick-started with the awarding of three GSM spectrum licences, via an auction, to MTN, CIL (now GLO) and Econet Wireless Nigeria Ltd. Mobile GSM connections dominate the technology market, with 99.7 percent of users preferring this technology, with CDMA sputtering along at a mere 0.15 percent, followed by fixed wired/wireless (0.1 percent) and VoIP (0.03 percent). Today the market is made of primarily the five GSM companies, GLO, MTN, Airtel (formerly Zain), 9mobile (formerly Etisalat) and the newly privatised nTEL (formerly M-Tel). Etisalat, launched on the basis of a licence originally awarded to local businessman Aliko Dangote's Alheri Engineering, has had a troubled history, defaulting on a USD 1.2 billion loan obtained in 2013, losing the backing of its parent company, and becoming the troubled 9Mobile, currently up for sale. (Sutherland, forthcoming) The CDMA market, which consisted of Visafone, Starcomms, Multilinks and Zoom is now completely dead.

Since its inception, the NCC has licensed dozens of private operators to provide a wide range of services and applications across the entire telecommunications value chain. The NCC lists 30 licence categories, which together cover the range of services presently available in Nigeria: fixed telephony, mobile communications, VSAT satellite transmission, microwave and fibre optic backhaul, and Internet services.

6.1 MARKET SHARE BY SUBSCRIBERS

The Nigerian mobile sector benefitted from the arrival of a series of submarine fibre optic high bandwidth cables linking Nigeria to Europe (MainOne, Glo-1, WACS and ACE), which complemented the already existing SAT-1, data transmission. The deployment of the high bandwidth cables has increased competition in the mobile industry, with operators now focusing on rolling out 4G/LTE technologies.

As the use of OTT services became substitutes for the traditional voice/SMS, operators' competitive strategies in the data market have shifted from prices to provision of high quality services and good coverage. In 2015, the mobile subscriber market was heavily dominated by MTN, with a market share of 44 percent (NCC,

Table 4: Mobile subscriber numbers and market shares by operators in Nigeria

OPERATOR	SUBSCRIBERS	MARKET SHARE
MTN	52 275 687	36,1%
Globacom	38 169 780	26,4%
Airtel	37 233 819	25,7%
9Mobile	16 955 392	11,7%
Total market size	**144 634 788**	**99,97%**

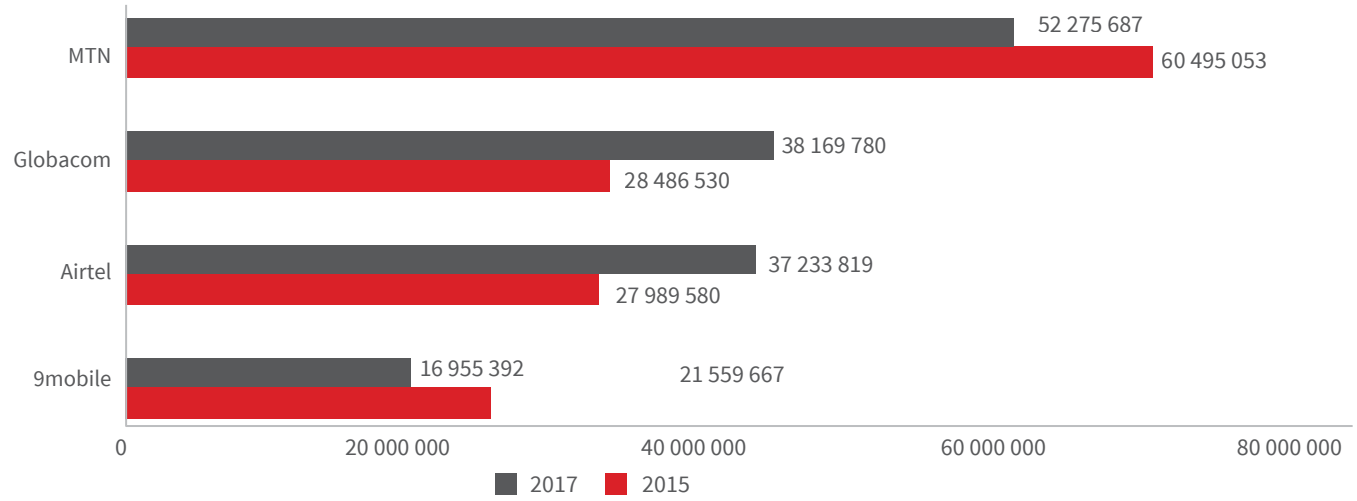


Figure 5: Operators' subscriber growth between 2015 and 2017

Source: NCC, 2018

2018). This has changed over time as competitors clawed market share from MTN. By 2017, MTN's market share had declined to 36 percent, an eight percent drop in three years. The biggest gains were made by Globacom, which increased its market share by 6 percent from 20 percent at the beginning of 2015 to 26 percent in 2017, followed by Airtel, which gained 5 percent, increasing its market share to 26 percent in the same period (see Figures 9 and 10). The financial challenges that engulfed 9Mobile led to the operator losing 4 percent market share in the same period to become the smallest operator with only 12 percent of the subscriber market.

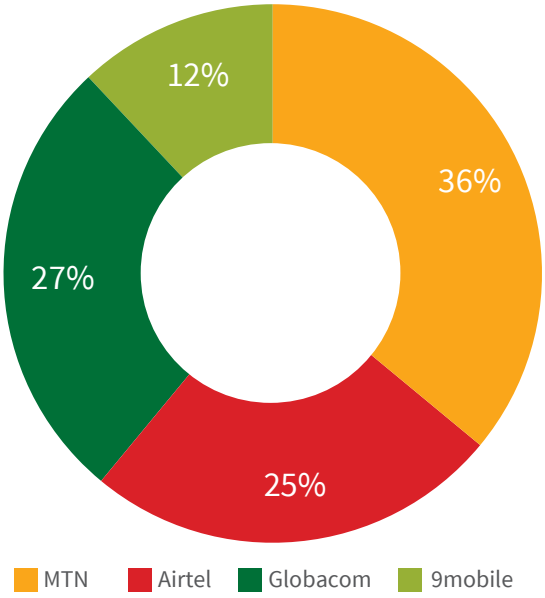


Figure 6: Operator market share by subscribers (GSM)

Source: NCC, 2017

MTN dominates the market, accruing more than 40 percent of total revenues. Both MTN and 9Mobile have lost market share over the last two years, declining from 46 percent and 14 percent respectively at the start of 2016, to 40 percent and 12 percent respectively by the end of 2017, attributed to fierce pricing competition. Both Globacom and Airtel have been beneficiaries of this decline in market share, with Globacom faring slightly better of the two. As the market continues to shift, with subscribers moving to cheaper data services, mobile voice revenues have been declining, from a little over USD 2 billion at the start of 2016 down to USD 1.6 billion towards the end of 2017.

Between early 2015 and late 2017, the Nigerian telecommunications market registered a nett decline in the number of active subscribers, from 141,6 million to 139,5 million (NCC, 2018), attributable to the impact of negative economic headwinds arising from the collapse of oil prices and the massive fine on MTN, which created significant business risks for the operator in particular, and the overall industry

Table 5: Revenue share of Nigeria's mobile operators

	AIRTEL	GLOBACOM	MTN	9MOBILE	TOTAL (MILLION USD)
Q1 2016	22%	18%	46%	14%	2 090
Q2 2016	22%	18%	46%	14%	1 992
Q3 2016	26%	20%	42%	12%	1 552
Q4 2016	26%	20%	42%	12%	1 549
Q1 2017	25%≠	21%	43%	11%	1 582
Q2 2017	25%	22%	41%	12%	1 647
Q3 2017	25%	23%	40%	12%	1 562

Source: NCC, 2018

in general. Positively speaking, the wider deployment of LTE technologies, on the other hand, has resulted in an increase in the number of mobile Internet subscriptions.[7] By late 2017, the Nigeria survey shows there were about 92 million Internet users.

6.2 AVERAGE REVENUE PER USER (ARPU)

Innovations and technological changes in the mobile sector continue to change the business environment. The evolution of data communications, more specifically the rise of OTTs, is expected to have a negative impact on voice service revenue. OTTs, such as WhatsApp and Skype, are cheaper substitutes for voice communications. An exponential growth in demand for these services has significantly reduced voice and SMS revenue, leading to a clamour from mobile licensees to have them blocked. (Eweniyi, 2017) These services have not only lead to a reduction in revenues, but they have also opened opportunities for small operators, especially those who embrace them to be competitive and to gain market shares. This has increased competition in the market,

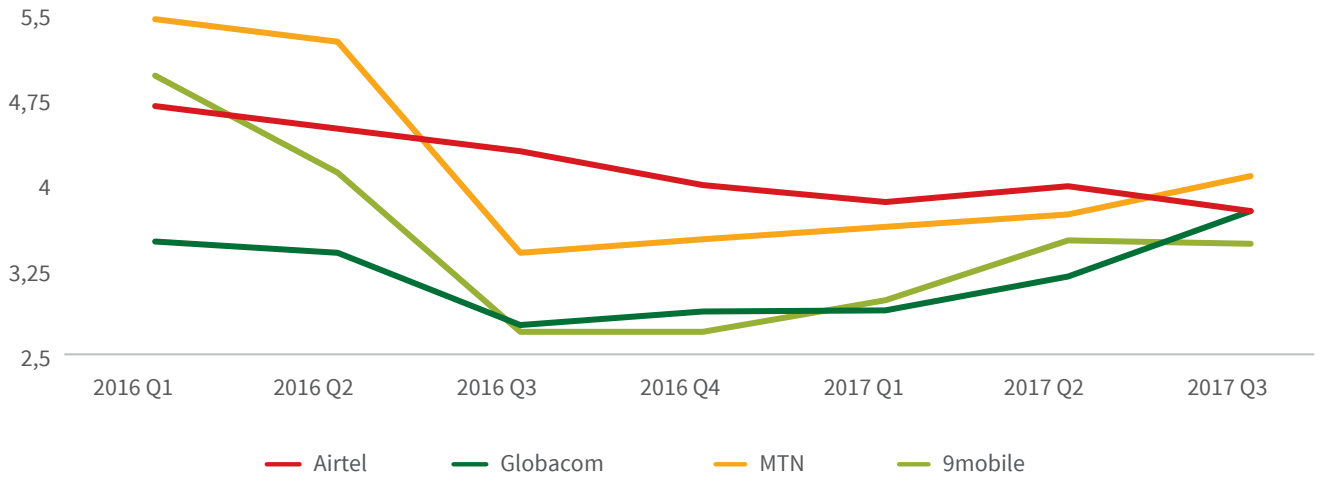


Figure 7: ARPU per operator (USD per month)

Source: GSMA Intelligence, 2018

7. Subscriptions based on data from the NCC, measuring active SIMs.

leading to episodic price wars. Even as the customer base continues to grow, average revenue per user (ARPU) drops as lower income users come online.

However, the downward trend in ARPU matches the upward trend of growth in the subscriber base for both voice and data services. Although the penetration for the voice services is very high, data service penetration is still low, though growing much faster than voice services, due to the growth of 3G phone and Internet subscriptions.

6.3 PRICING

6.3.1 Mobile retail

Compared to other countries in Africa, Nigeria is an above-average performer in mobile pricing, ranking 6th out of 49 countries in terms of the affordability of prepaid mobile products in the form of a mixed basket, according to RIA's Africa Mobile Pricing (RAMP) Index.

The cheapest OECD basket[8] in Nigeria had a price of USD 2.45, compared to the cheapest OECD basket in Egypt (the top-ranked country according to this measure), which stood at USD 1.19. Although not reflected in the figure above, Nigeria's lowest OECD basket value was among those that increased throughout this year after Glo Mobile removed its G-BAM product, placing the country on a par with Ethiopia and Mauritius. Nevertheless, the price of voice telephony in Nigeria places it amongst the cheaper countries on the continent. Barriers to entry in the mobile telecommunication market persist, with the key consideration being the licence fees to be paid and potential investment

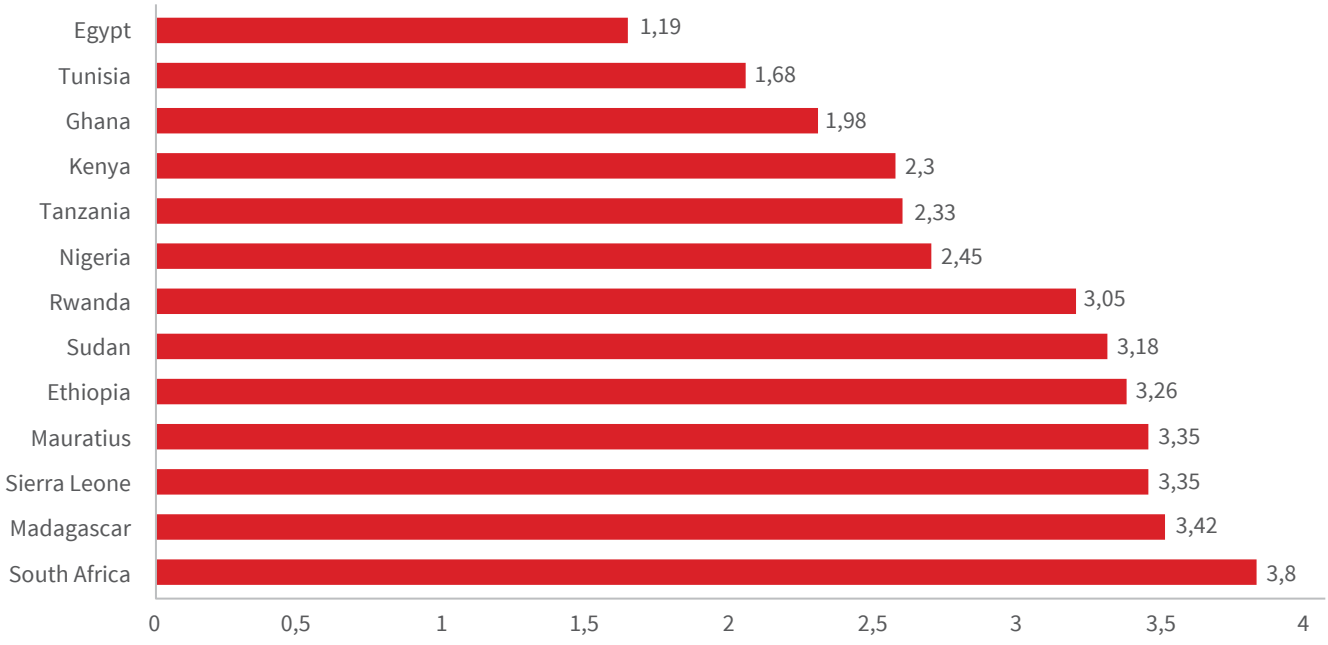


Figure 8: Top 13 cheapest OECD baskets in Africa (Q4 2017, USD)

Source: RAMP Index, 2017

8. The use of 'price baskets' is a methodology pioneered by the OECD to assist in comparing telecommunications retail prices, despite the complexity and plethora of offerings on the market. It involves designing a standard 'basket' of monthly consumption and then comparing how much it would cost to purchase this basket in each OECD country. The make-up of each 'basket' is developed with input from member countries and telecommunications operators. Each basket is intended to be a generalised representation of calling and usage patterns across countries. The baskets thus allow the price of buying a standard amount of telecommunication services to be compared across countries.

in the rollout of infrastructure. Late entrants often adopt a number of competitive strategies, such as undercutting competitors on price and providing bundled services. Undercutting competitors' prices often leads to price wars, as large operators react to the low prices offered by small operators to avoid market share loss. While small operators normally use low prices as a strategy to attract new customers, their efforts are generally squashed, due to high switching costs in the mobile telecommunication market. To reduce switching costs in the mobile market, regulatory bodies are adopting mobile number portability, a technology that allows consumers to switch operators without changing their mobile number. However, mobile number portability has not been effective in Nigeria, and this poor performance is due to long porting delays and the fact that subscribers are not allowed to port again in the subsequent three months (Mothobi, 2017).

The mobile operators continue to roll out an array of promotional offers to lure customers to their networks, a phenomenon that has benefited consumers in terms of cheap calls and data.

Using the RAMP Index, which is a database of 49 African countries, containing time series data for voice and data products, the competitiveness of the Nigerian prepaid mobile sector can be assessed. Using 1GB pricing information from this database, it is observed that price competition in the 1GB data market is minimal. For the period from Q2 2014 to Q3 2015, Smile, (one of the smaller companies, operating in only eight of the major centres in 2017), offered the cheapest product in the market. Smile offered 1GB data at NGN 1 800, while its competitors charged consumers between NGN 3 000 and NGN 4 000. Airtel reacted to Smile's low prices in Q1 2015 and charged its consumers NGN 2 000 for 1GB data, which was still higher than Smile's price. GloMobile was the first to undercut Smile in Q4 2015, reducing its price from NGN 3 000 to NGN 1 000. This has led to Glo Mobile strengthening its position as the second largest mobile operator in the Nigerian market. All other operators except for Smile reacted to this and reduced their price to match Glo Mobile in Q2 2016. Smile only matched the price offered by its competitor in Q1 2017. These price movements have been accompanied by changes in market shares. Over the years, late entrants, such as Glo Mobile, Airtel and 9Mobile have gained substantial market share from the former dominant

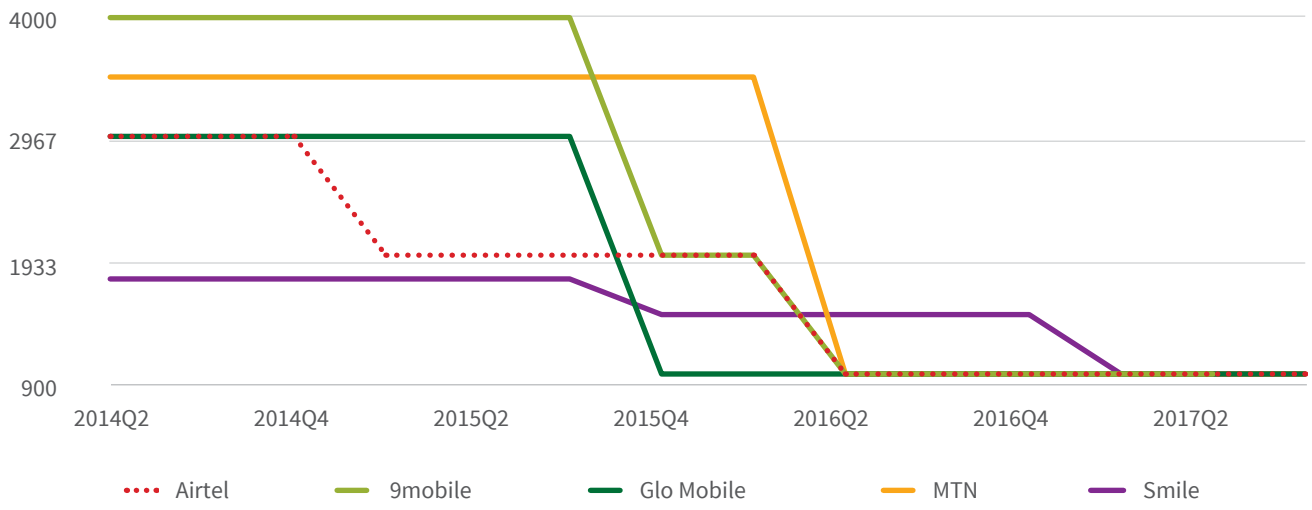


Figure 9: 1GB data prices for mobile operators in Nigeria

Source: RAMP Index, 2017

operator MTN, which used to own 65 percent (Q1 2013) of the market.

As shown in Figure 13 above, the Nigerian telecommunications market is characterised by episodic price wars, as operators undercut each other to gain market share and increase their revenue. Competition in the sector has resulted in the cheapest 1GB price in Nigeria being amongst the top ten countries in Africa. The cheapest 1GB of data in Nigeria was USD 2.80 in Q4 2017, 9 cents lower than in the previous quarter.

Industry players, with the exception of Glo, interviewed by RIA for this study are unanimous. In their view that the Nigerian telecoms market presently appears to be in a 'race to the bottom', due particularly to market distortions and competitive inefficiencies tied, in the main, to the prevalence of extremely low, possibly below cost, retail data prices. In reaction to arguments that these are the result of competitive outcomes, some observers point out that the low prices can only be forced by price leaders who are not accounting for all their costs, including payments due to their debtors, and the prompt servicing of interconnection fee obligations.

These prices are considered so low that market players say they are unable to make a return on their broadband investments the way the data market is presently structured. This is evident in the relatively low coverage of 3G and 4G networks outside of the major cities.

Clearly, this was of concern to the NCC, who up to 2015 maintained a data price floor of NGN 3.11. However, data prices dropped sharply to rock-bottom levels when this cap was lifted in December 2016, as Glo, and thereafter the larger operators, rolled out, what some of those interviewed regarded as, predatory offerings to attract subscriptions and usage. Unfortunately, this reached unsustainable levels, as it eroded margins for most players, who could not keep up with the sharp practises of a few. In response, the NCC announced its intention to impose a new price floor of N0.90 after consultation with industry. (Ogbodo, 2016) However, this was not backed by any independent costing study upon which the NCC could maintain its regulatory position. The backlash that resulted from this announcement led the regulator to suspend its position, pending the conclusion of its data pricing study.

It appears that this situation will persist until: (a) an official retail data cost study is carried out by the regulator to determine whether this generally held view is either real or merely perceived; and (b) using the data furnished by the study, positive steps are taken by the regulator to address the challenges of retail data distribution and pricing.

6.3.2 Wholesale data services

Wholesale bandwidth is relatively expensive, though actual prices are difficult to establish. Current estimates for wholesale bandwidth range from about USD 300 per mbps to USD 500 per mbps. Though carriers have generic pricing for wholesale bandwidth, large volumes on the order of several STMs or leased circuits are negotiable. At high volumes, beginning from STM-1, wholesale pricing can go as low as USD 90–120 per mbps, depending on the service provider, volume and bargaining power, and is available to external customers on a non-discriminatory basis. Quoted amounts exclude distribution costs, which would vary by distance, type of transmission technology (fibre, microwave radio or satellite) and right of way or spectrum costs. Ex-landing port prices out of Lagos are higher, as carriers factor in the cost of distribution per kilometre. The main motivation

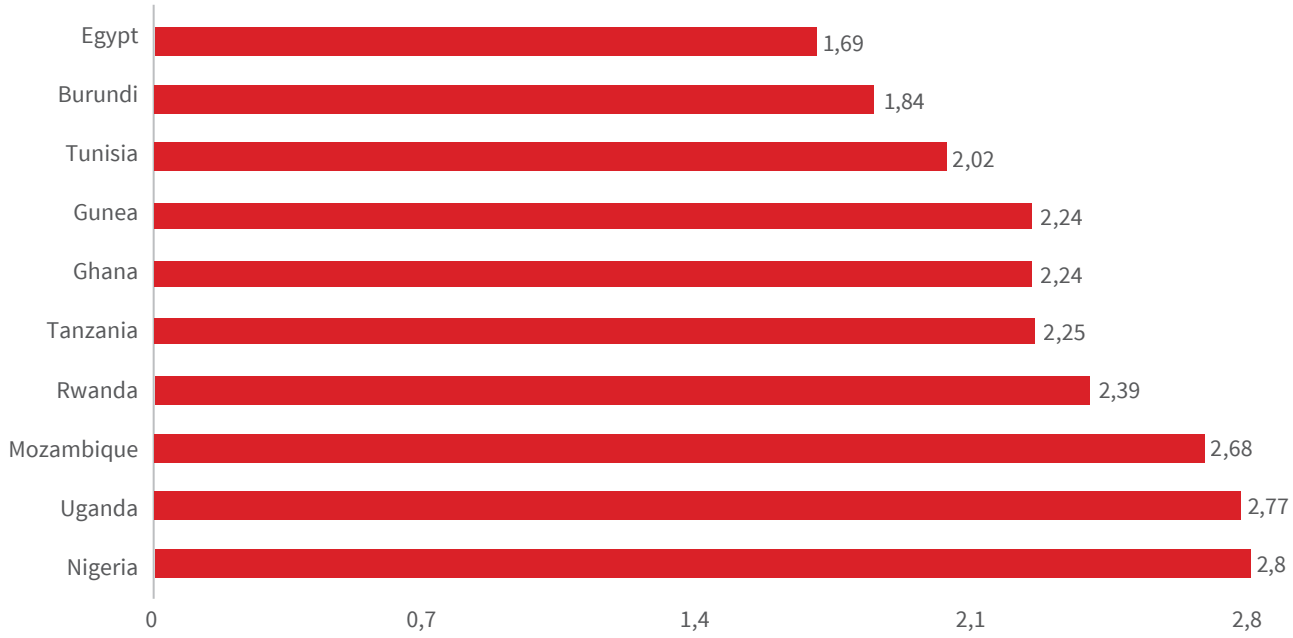


Figure 10: Ten cheapest 1GB baskets in Africa (Q4 2017, USD)

Source: RIA African Mobile Pricing (RAMP) portal, 2017

for the purchase of wholesale bandwidth operators and resellers is network traffic and demand by their own customers.

Meanwhile, for the cheapest prepaid 1GB data product, out of the 49 African countries Nigeria ranked 9th, with the cheapest 1GB offering costing USD 2.90, some way behind Egypt's USD 1.69 (again the cheapest in the respective category). Here, the price in Nigeria for 1GB of prepaid data remained steady at NGN 1 000 throughout the year for almost all operators offering mobile prepaid data, with the exception of Spectranet (which was charging a high of NGN 5 000 for what they claim is a quality premium).

The biggest expense in data provisioning is the cost of distribution. This cost will be reduced if the international cable landing points are extended inland. Via an arrangement with Cameroun Telecoms, MainOne has recently added a new landing station in Kiribi, Cameroun to its national network and the carrier has plans to extend its submarine cable into Escravos (Delta State), Qua Iboe (Akwa Ibom State), Bonny Island (Rivers State) and eventually Port Harcourt (Rivers State). One other factor that affects wholesale data costs is favourable pricing. Wholesale bandwidth is available for purchase in the biggest cities from MNOs or Phase 3. Naturally, these secondary operators would price last-mile distribution into their bandwidth offerings. MNOs buy wholesale bandwidth from submarine cable companies. Carriers that own and operate submarine cables, namely MTN and Glo, would naturally offer the cheapest prices to their own divisions and customers.

On the positive side, MNOs review voice and data pricing policies downwards, from time to time. Pricing strategy is typically designed: (a) to get existing customers to use more data, in order to grow revenues, and (b) to attract new users. Though operators publicly share their consumer packages, there is no pricing transparency for wholesale and enterprise offerings. Prices offered to corporate buyers are determined by negotiations and are influenced by how the operator perceives or values the

account. The biggest corporate buyers in the largest cities hold strong bargaining positions with service providers, arising from competitive pressure and weak demand for data services by organisations.

Etisalat has been the priciest operator in the enterprise market and only joined the competition for dedicated Internet services at the end of 2015. Monthly subscriptions range from NGN 130 000 for 2mbps (MTN) to NGN 6.2 million for an STM-1 trunk (Etisalat). Operators apply these amounts generically to both enterprises and resellers without discrimination, so third-party resellers have no special advantages, but are usually open to volume negotiations. All the operators frequently undercut their resellers and one another.

Furthermore, it is difficult for any prospective customers to obtain price quotes without being 'grilled'. Though there is no outright discrimination, price quotes can be arbitrary and widely disparate between one customer and another. Operators also tend to favour related businesses. The high incidence of arbitrary pricing and opaque billing causes some respondents to doubt whether wholesale providers are themselves clear on what their landing cost (or return on investment) is.

The main hurdles to affordability in the wholesale segment are essentially the problems operators face during network rollout, the biggest of which are: (a) right of way challenges, (b) multiple taxation, (c) vandalising of network equipment, and (d) poor public power supply. These are the drivers and contributors to the cost of rendering services and greatly limit the ability of the market to work in an efficient manner. The main effect of these hurdles can be found in high cost of services, limited dedicated connections and poor quality of service. The pervasiveness of broadband appears to be directly tied to how open the telecoms environment is to solving these problems, and requires proactive policies, regulatory movement and significant political will.

6.4 QUALITY OF SERVICE

Lack of coverage and quality of services in terms of network quality and download speed often force subscribers to own multiple SIM cards. In Nigeria, at least half of mobile subscribers own more than one SIM card. Asked about the reason for owning more than one SIM card, 30 percent stated that their main operator does not have coverage in the entire country and they switch SIM cards in the areas that are not covered by their main operator. The results show that across all operators, an equal proportion of subscribers switch SIM cards due to lack of reception, with Airtel subscribers more likely to switch.

Table 6: Percentage of subscribers who switch SIMs due to lack of coverage

MTN Nigeria	26.43%
Glo Mobile	21.59%
Airtel Nigeria	29.71%
9Mobile	22.27%

Source: RIA After Access Survey, 2017

The Survey also shows that 30 percent of mobile users have a dedicated SIM card for Internet, due to network preference. The survey results show that mobile Internet users who have more than one SIM card prefer to use Airtel network for Internet (32%), followed by MTN (29%) and 9Mobile (25%).

Mobile broadband performance test results were collected between 2013 and 2017 using NetRadar and MySpeedTest, which provide neutral information about the quality of mobile Internet connections and mobile devices. The applications are installed on users' phones

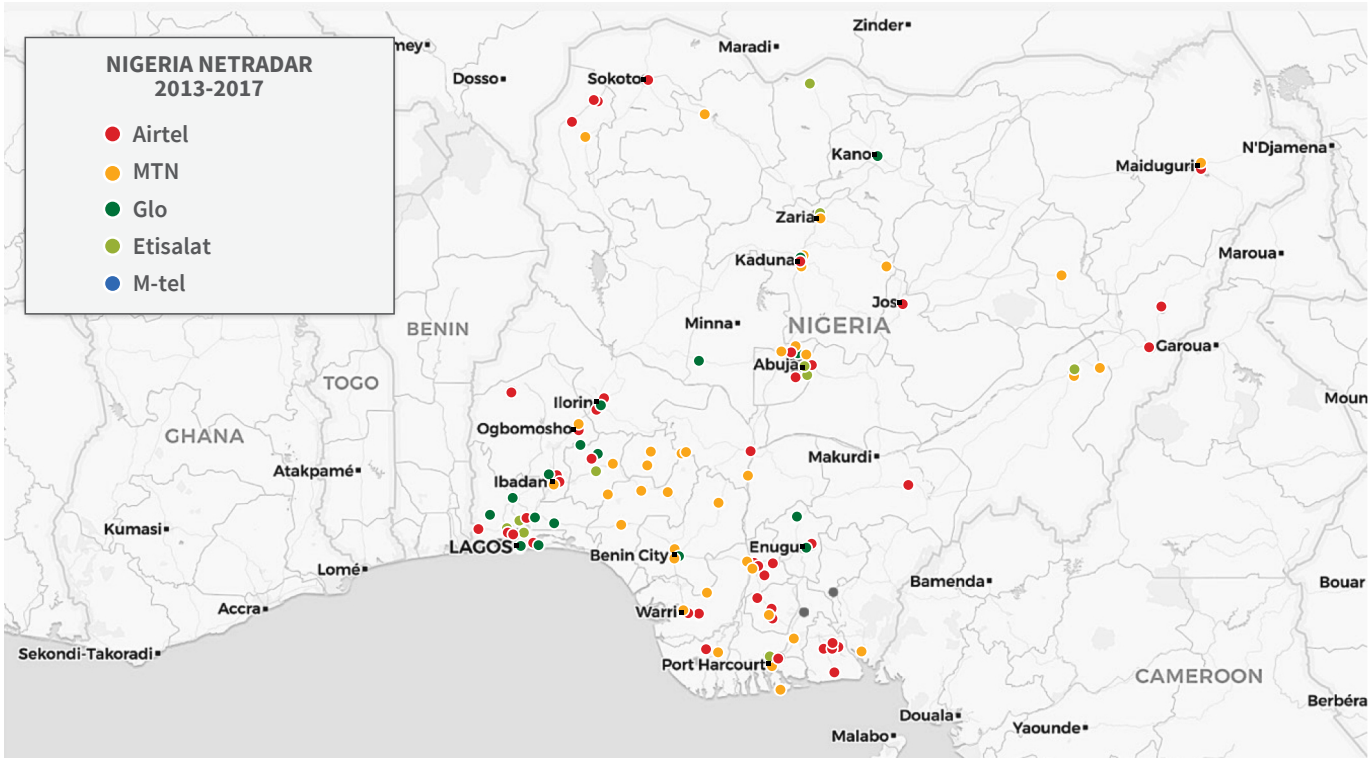


Figure 11: Sample mobile broadband performance tests

Source: NetRadar. Visualisation: Research ICT Africa, 2018

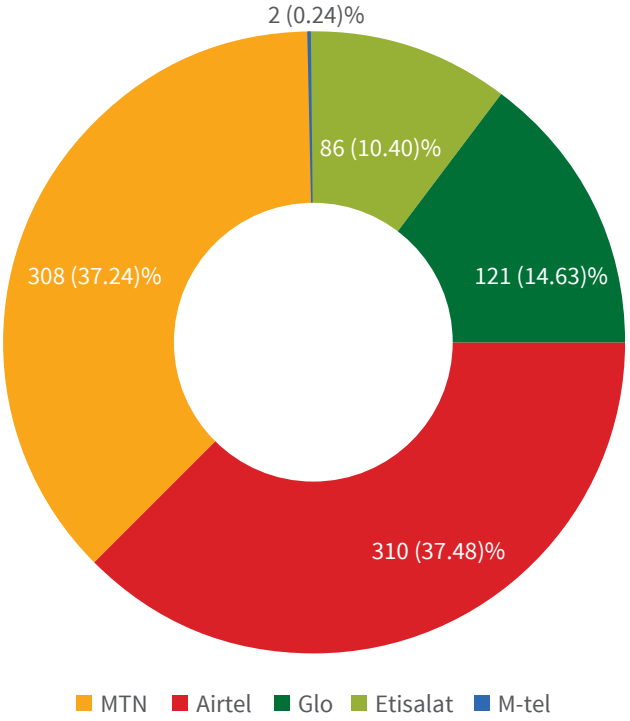


Figure 12: Sample test results

Source: NetRadar

Visualisation: Research ICT Africa, 2018

voluntarily; data is collected anonymously and sent to central server locations in several parts of the world. The tests collect a number of indicators, including dates, times, Global Positioning System (GPS) coordinates, latency, upload/download speeds, network/subscriber operator, kind of device, IP addresses, measurement servers and other information that can uniquely identify each test. The MySpeedTest app results were from Android devices, while Netradar results were for Android and iOS devices.

Figure 15 shows that Airtel and MTN subscribers, not surprisingly as the largest networks, performed a large percentage of the tests, and even though tests were carried out in various locations in the country, Lagos and Abuja had more tests than other towns. Urban areas had more test results, which corresponds to the greater number of subscribers in urban and rural areas. It is worth noting that many of

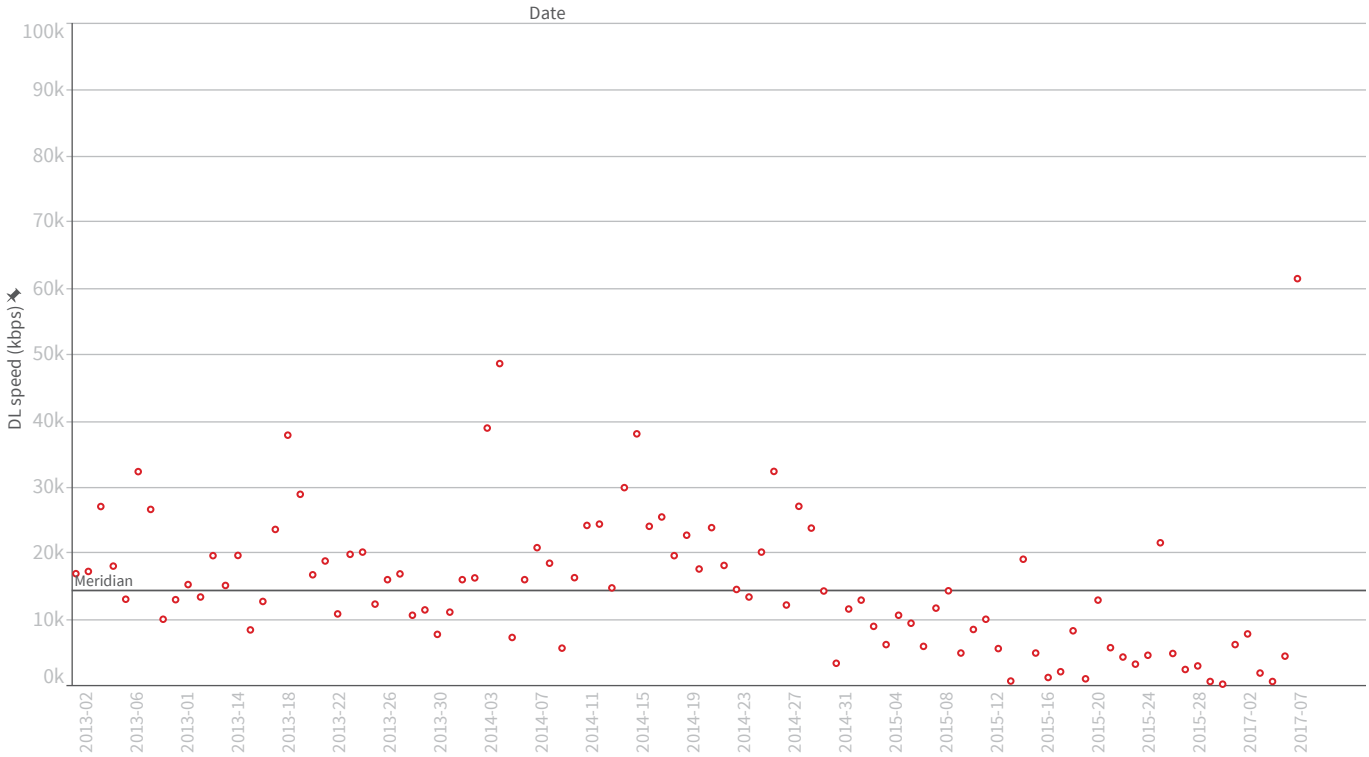


Figure 13: Download speed measurements for period 2013–17

Source: MySpeedTest, 2018

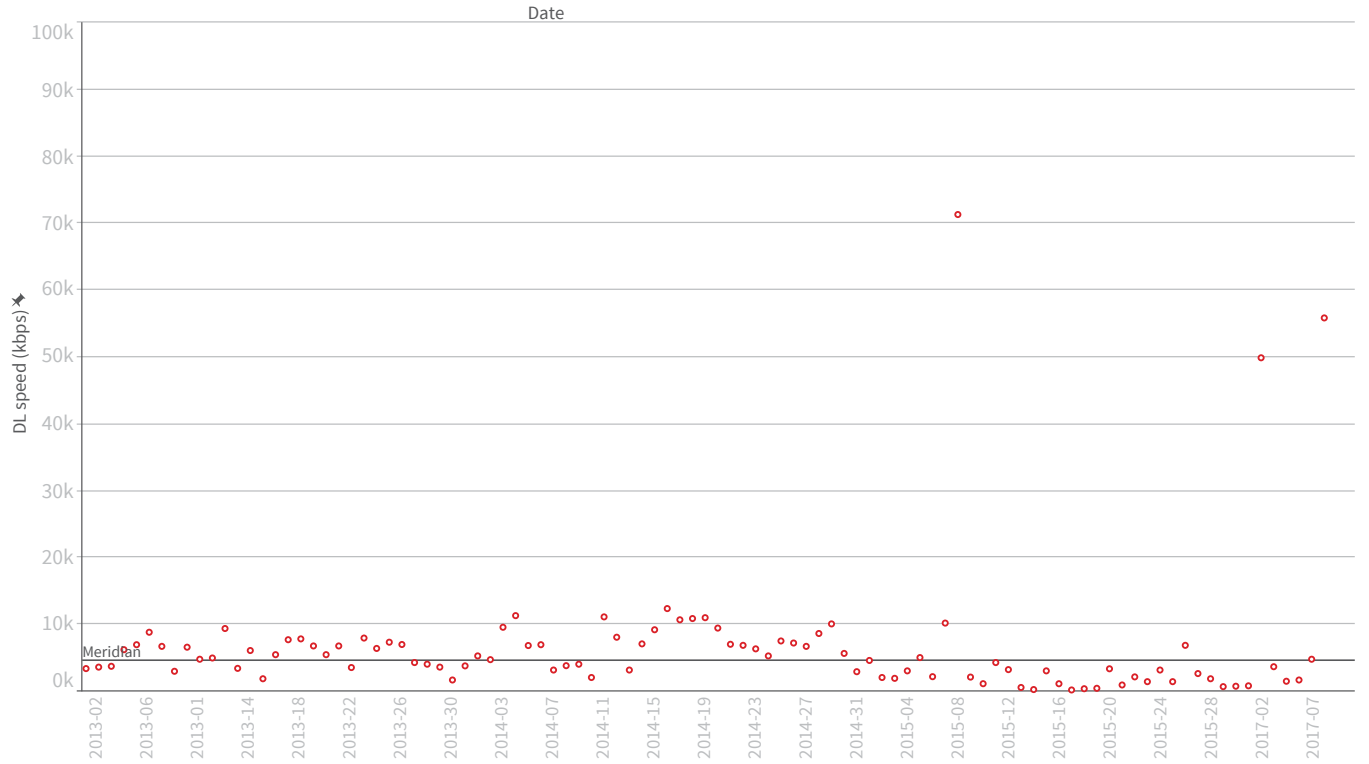


Figure 14: Upload speed measurements for period 2013–17

Source: MySpeedTest

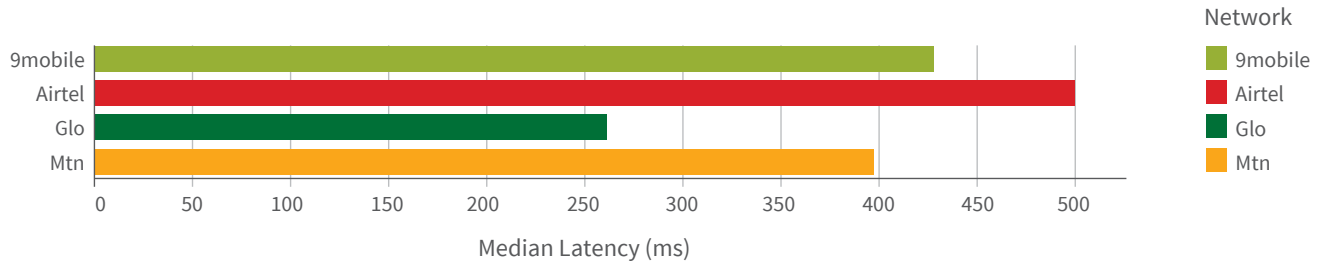


Figure 15: Latency across networks for period 2013–17
Source: MySpeedTest

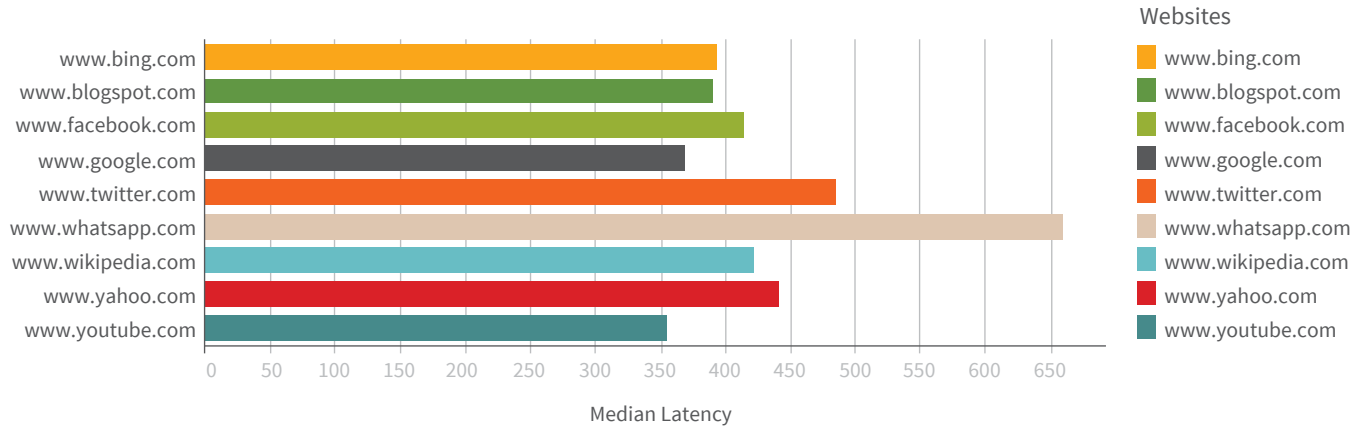


Figure 16: Median latency to popular websites and services
Source: MySpeedTest

the tests are done when a user is in motion, so results are affected by many factors, including location of the test, movement speed of the users, time of day and congestion of network at a particular moment. They are nevertheless indicative of the relative positions of operators.

Figure 16 depicts the distribution of tests across the operators, according to the NetRadar results. Out of the 832 sample tests, 310 (37.48%) were Airtel subscribers, followed by 308 (37.24%) MTN, 121 (14.63%) Globacom (also known as Glo), 86 (10.4%) Etisalat, and 2 (0.24%) M-Tel. These test results correspond to the Nigerian Communications Commission (NCC) statistics in 2017, showing that MTN continues to dominate in the GSM category, with over 36 percent of the total subscriber base. NCC statistics continue to indicate that Globacom follows MTN in terms of subscriber base, closely followed by Airtel. The test results in this case show Airtel subscribers having carried out more tests. Since the tests are voluntary, it is not easy to determine which subscribers will carry out the tests.

Despite the enormous growth and intensive competition among operators, there is still poor quality of service and network congestion. This is seen from test results of both NetRadar and MySpeedTest applications. Additionally, a broadband performance study undertaken by Kuboye (2017) indicates that average speeds in urban areas were higher than those in rural areas, with 3G networks deployed more than 4G, even when operators advertise 4G networks.

The analysis below shows graphs from the MySpeedTest app, though results from NetRadar are similar. In terms of throughput, Figures 17 and 18 below show download and upload speeds for the period February 2013 to July 2017. The median throughput in Figure 17 is 14mbps, a drop in performance between 2015 and 2017 to about 5mbps. Upload speeds over the same period show a similar trend, with an even lower median of around 4mbps and performance speeds of 1mbps. There is competition among the operators as noted in the speed results, which are similar across operators.

In terms of latency as depicted in Figure 19 above, performance ranges between 250 to 500ms, with Globacom having the least median latency of about 26ms, followed by MTN at 400ms, and Airtel has the highest median latency at 500ms. Figure 20 depicts latency to some popular websites and services, showing that users experienced latencies above 300ms. Round-trip latency to WhatsApp was the highest at 650ms, while latencies for other sites and services ranged from 350ms to about 500ms. This is a clear indication that many popular services/sites are not being hosted locally, causing the latency to increase.

Part C

Nigeria demand-side analysis

7 METHODOLOGY

As described in the RIA's After Access comparative report, this demand-side analysis of the Nigerian communications sector is based on a nationally-representative survey of ICT access and use, one of which was conducted in Nigeria.[9]Drawn from the census frame, the random selected sample of household and individuals is representative of all adults of 15 years and older. The census divides the country in Enumerator Areas (EAs), each with a household density of around 200. To select the sample, the national census sample frame was split into urban and rural EAs and each was sampled for each stratum, using probability proportional to size (PPS). For each EA, two listings were compiled, one for households and one for businesses. The listings served as a sample frame for the simple random sections of households and businesses. In Nigeria, 1 808 households were sampled, using simple random sample for each selected EA and the household head was interviewed on household indicators, including fixed lines phones, television, radio and electricity. From within each household, including any visitors staying the night, an individual of 15 years or older was then selected, based on simple random sampling for the individual (mobile) survey (1 808 individuals).

The findings of the ICT access and use survey undertaken in 2017 provides the NCC and other decisionmakers with the identification of the demand-side challenges faced by the country

Table 7: Mobile and Internet penetration in seven African countries

Countries	Mobile phone penetration – After Access 2017	Mobile phone penetration – ITU statistics 2016	Internet penetration – After Access 2017	Internet penetration – ITU statistics 2016	Average SIM card per subscriber	Maximum SIM cards per subscriber
Ghana	74%	139%	26%	35%	1.4	8
Kenya	87%	81%	26%	26%	1.2	4
Mozambique	40%	66%	10%	18%	1.3	3
Nigeria	64%	82%	30%	26%	1.6	5
Rwanda	48%	70%	8%	20%	1.5	3
South Africa	84%	142%	50%	54%	1.2	5
Tanzania	59%	74%	14%	13%	1.5	5

Source: RIA After Access Survey, 2017; ITU Statistics, 2016b

9. The Nigerian Survey is part of a wider survey of 16 countries across the Global South conducted by DIRSI in Latin America, LIRNEasia in Asia and Research ICT Africa in Africa in 2017. The high-level findings of the After Access Survey are available at www.afteraccess.net. The study was conducted in seven countries in Africa: Ghana, Kenya, Mozambique, Nigeria, Rwanda, South Africa and Tanzania.

and exact point of policy and regulatory intervention required to address them.

Table 7 shows the discrepancies or the upward bias in subscription rates when policy-makers depend on the supply-side information. This data provides some insights into the likely situation in Nigeria.

For mobile penetration these figures are derived from the number of active SIM cards on a network, not unique subscribers. On this basis, mobile penetration in many African countries, including Nigeria, exceeds 100 percent. Yet, the majority of African mobile phone users have multiple SIM cards, either to be connected in areas where their main operator may have no coverage, or to cushion themselves from high off-net calls, or to benefit from promotions. Ninety percent of mobile phone subscribers own more than one SIM card in Nigeria. In such markets, the only way to get reliable, up-to-date information about penetration levels in Africa is through nationally-representative demand-side surveys.[10]

The Nigerian Survey shows that as of 2017, 63 percent of adults of 15 years and older in Nigeria own a mobile phone, considerably less than the 83 percent reported by ITU on the basis of administrative data collected from operators and suppliers, but easily explicable with the average number of duplicate SIMs figure: 1.63. At least half of mobile subscribers own more than one SIM card; the majority own two SIMs and ten percent own more than three SIMs. Compared to other countries surveyed by Research ICT Africa, Nigeria is ranked fourth out of seven countries on mobile phone penetration. This is lower than mobile penetration in Kenya, South Africa and Ghana (whose penetration rates are also substantially lower than the reported ITU rate, due to multiple active SIMs cards being counted as unique subscribers in the administrative data that operators supply to the ITU).

10. ITU acknowledge this and actively supports national statistical offices and regulators with the training and implementation of regular surveys. Its survey manual is available at www.itu.int/dms_pub/itu-d/opb/ind/D-IND-ITCMEAS-2014-PDF-E.pdf. RIA works closely with the ITU Indicator Expert Group on refining universal indicators for pre-paid mobile markets and on providing complementary data for their reports.

8

HOUSEHOLD ICT ACCESS AND USE

Nigeria is now considered to be the largest economy in sub-Saharan Africa. The Nigerian economy has surpassed that of South Africa after rebasing its GDP in 2013. Yet, the economy remains relatively undeveloped, with low levels of industrialisation and large parts of the population dependent on subsistence agriculture.

The Survey shows that only 66 percent of Nigerians are connected to the main electricity grid compared to 89 percent in South Africa. A significant number of Nigerian households do not have an electricity connection at all (22.21%) compared to only 6.42 percent of households in South Africa. Only, 7.4 percent of households have piped water connected into their yard, and 4.9 percent connected into the house. These figures are very low compared to South Africa, where 33.08 percent of households have piped water connected into the yard and 39.94 percent connected into the house. A few households (26.9%) have no water connected into their yards.

Household access to communications services remains low in Nigeria. At only one percent, computer ownership and Internet

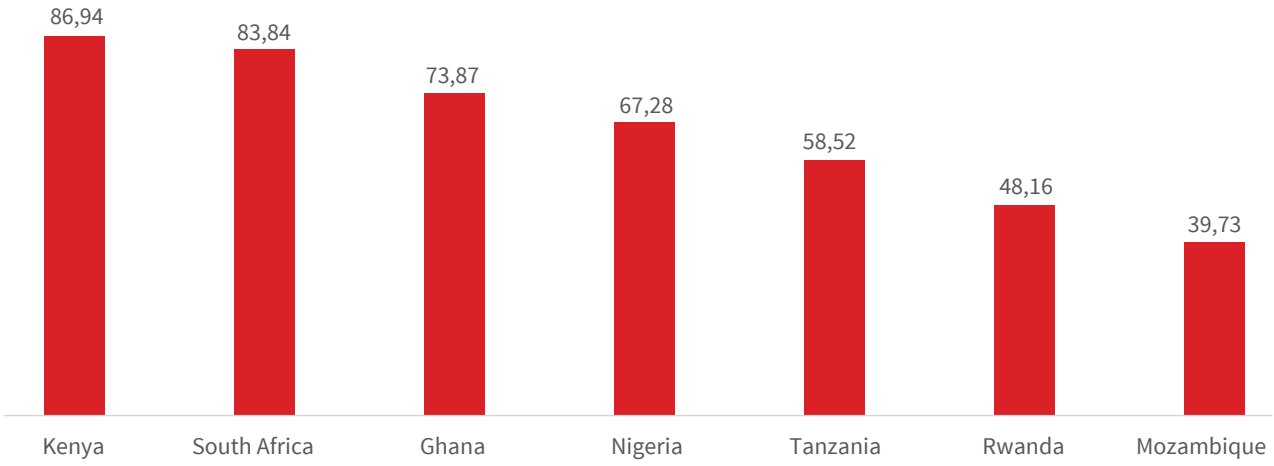


Figure 17: Mobile phone penetration in surveyed countries

Source: RIA After Access Survey, 2017

Table 8: Electricity and water connections to the households

	NIGERIA	SOUTH AFRICA
No electricity	33.31%	6.42%
Main electricity grid	65.88%	88.90%
Generator	11.37%	0.99%
Solar	0.04%	1.05%
No piped water	87.76%	26.97%
Piped water into the yard	7.37%	33.08%
Piped water into the house	4.88%	39.94%

Source: RIA After Access Survey, 2017

connectivity in households has dropped fractionally since the 2012 RIA Survey. Presently, a mere three percent of all households in the country have working Internet.

There are various factors responsible for poor penetration of household Internet. One appears to be to the collapse of CDMA companies which supplied fixed wireless communication to individuals, homes and small business. The last CDMA operator, Visafone, was acquired by MTN in 2014 and taken out of business thereafter. Operating in different parts of the country, the fixed wireless market is now being served by private ISPs – SWIFT, Smile, Spectranet, and, lately, the recently privatised nTEL – though these have coverage in only the bigger cities of Lagos, Abuja, Port Harcourt and a handful of primary towns in another weight to 10 states. They are probably responsible for raising fixed telephone connections to 215 696 from 65 914. There are no national ISPs.

The primary means by which households access the Internet is through mobile phones (75.69%) or USB modems (35.46%), as shown in Figure 22. Fixed broadband penetration is negligible and no households report ADSL or fibre-to-the-home (FTTH) connections.

The dependence on mobile devices by households (75.69%), especially for Internet connections, set against the low penetration of desktops (1.36% of households) or laptops (4.38%) over the past six years reflects the shift to mobile smart devices but is also evidence of the failure of policy that has promoted fixed broadband access. As the country shifts to competing connected devices, such as set-top boxes, Internet TV sets, smart devices, and so on, is near impossible in the absence of networks that enable high-speed Internet services.

Unlike its West African peers, such as Ghana and Senegal, Nigeria does not have a national backbone network through which high-speed Internet connectivity can be extended across the entire country.[11] Furthermore, mobile operators, which are still largely focused on traditional revenues from the voice market,

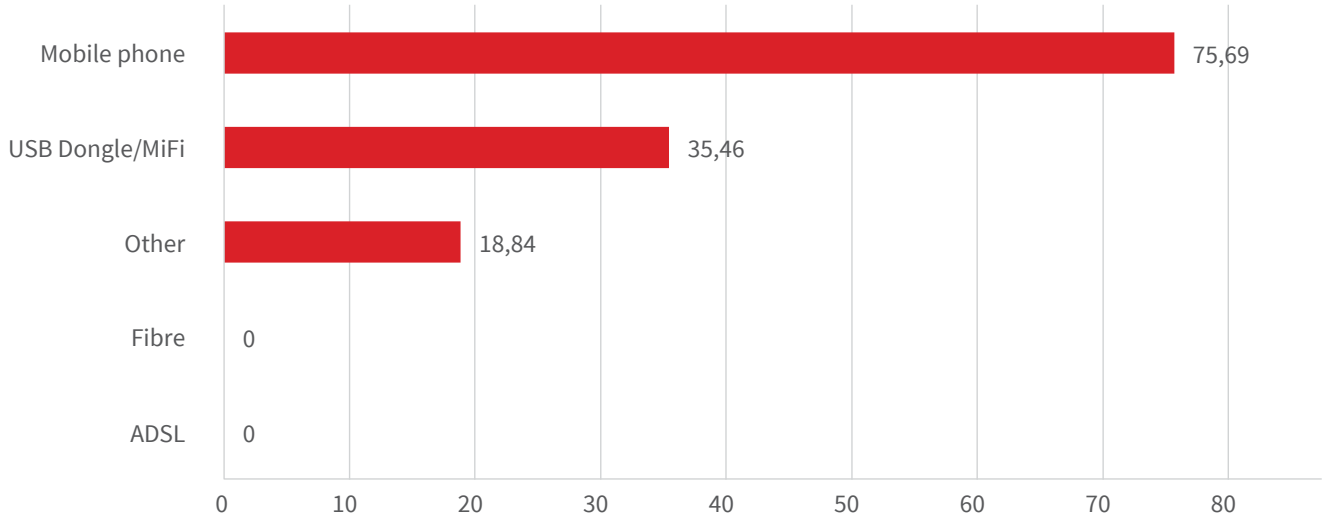


Figure 18: Household access to the Internet (in percentages)

Source: RIA After Access Survey, 2017

11. The National Government announced plans in November 2017 to develop an 18 000 km fibre network, but it is unclear how, if, or when this would be done. (Ajimotokan, 2017)

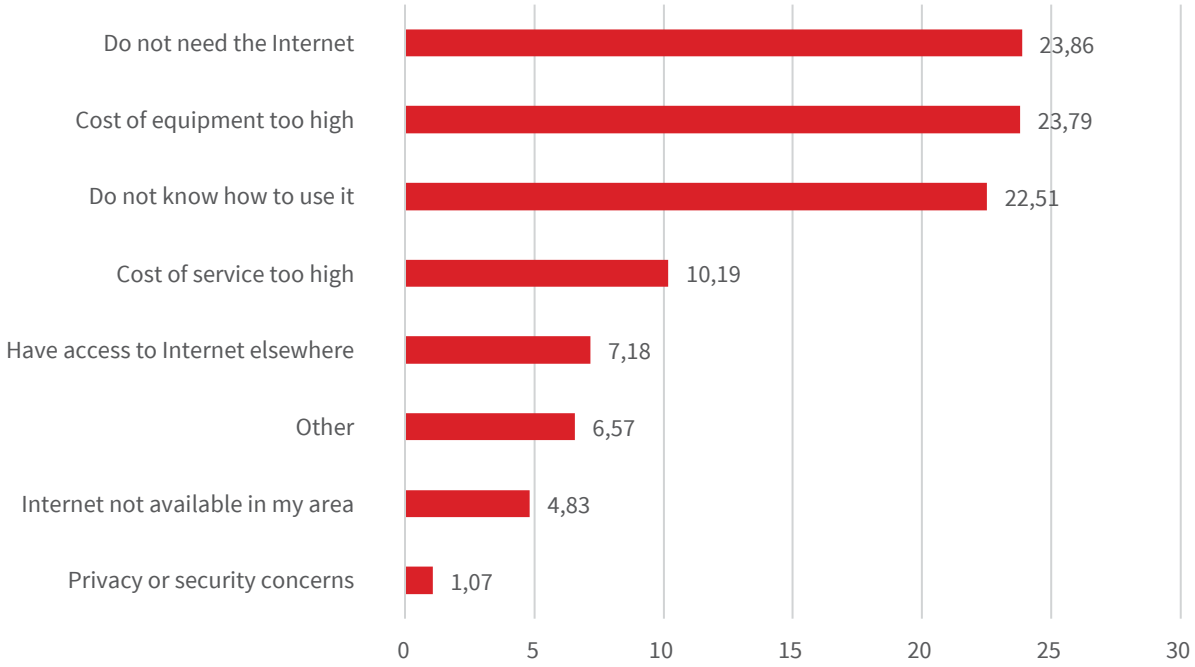


Figure 19: Why households do not have a working Internet connection (in percentages)
Source: RIA After Access Survey, 2017

have not designed products to unlock the opportunities latent in household or even small business communications, with large segments of their networks still consisting of mainly 2G sites. For now, there is limited 3G or 4G LTE coverage of the country, so mobile is being used as a fixed 'substitute' by households, pending better coverage.

One indication of the problem described here is the growth in Pay-TV subscriptions. Pay-TV now reaches over nine million homes, representing a penetration rate of 21 percent, up from 13 percent of households in 2012. Comparatively, as previously stated, the Internet reaches a mere 1.1 million homes, which highlights the unachieved potential of fixed connectivity in terms of latent, untapped demand, the capacity for competition and the development of new applications.

The reasons given by households for not having a working Internet connection relate to cost of equipment and service (34%), negative assessment of need (23.8%), lack of skill (23%) and lack of coverage (5%). In addition, some household members have access to the Internet elsewhere (7%).

9 MOBILE COMMUNICATIONS

The Survey shows that about 63 percent of Nigerians, 15 years and older, own a mobile phone, a figure which is lower than 82.98 percent mobile penetration reported by ITU in 2016. Percentage penetration has declined by three percent over the 2012 survey which reflects the downturn in the economy and the challenges within the mobile sector as the supply-side study shows. It also reflects the near saturation of the mobile voice market that mobile operators in Nigeria is still focused on and the failure to shift to data from which forward looking operators that embraced data, OTTs and new value-added Internet services in some other markets are now earing most of their revenues.

Mobile subscriptions are generally reported by organisations, such as the ITU and the GSMA, using the number of active SIMs rather than unique subscribers. Due to large proportions of dual SIM card ownership in the African prepaid market, penetration levels are reported as over 100 percent. In Nigeria, 51 percent of mobile subscribers own more than one SIM card, of which 42 percent own two SIMs and a smaller portion own more than three SIMs – 3 percent (Figure 24).

Multiple ownership of active lines is indicative of individuals' dependence on a second network as back-up, in case of signal failure (29%) or to take advantage of better on-net prices, promotions and data packages, as offered by competing networks.

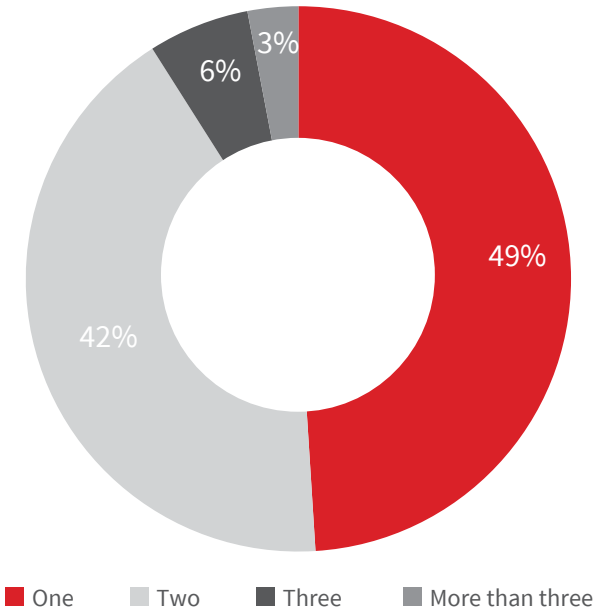


Figure 20: Distribution of SIM card ownership (in percentages)

Source: RIA After Access Survey, 2017

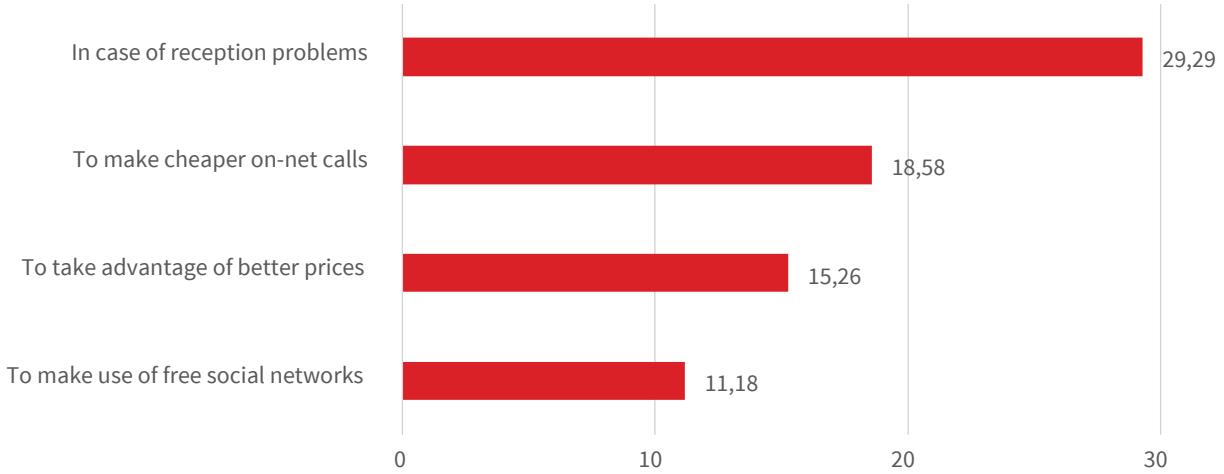


Figure 21: Reasons for ownership of multiple phone SIMs

Source: RIA After Access Survey, 2017

Table 9: ICT distribution and gender gap in Nigeria

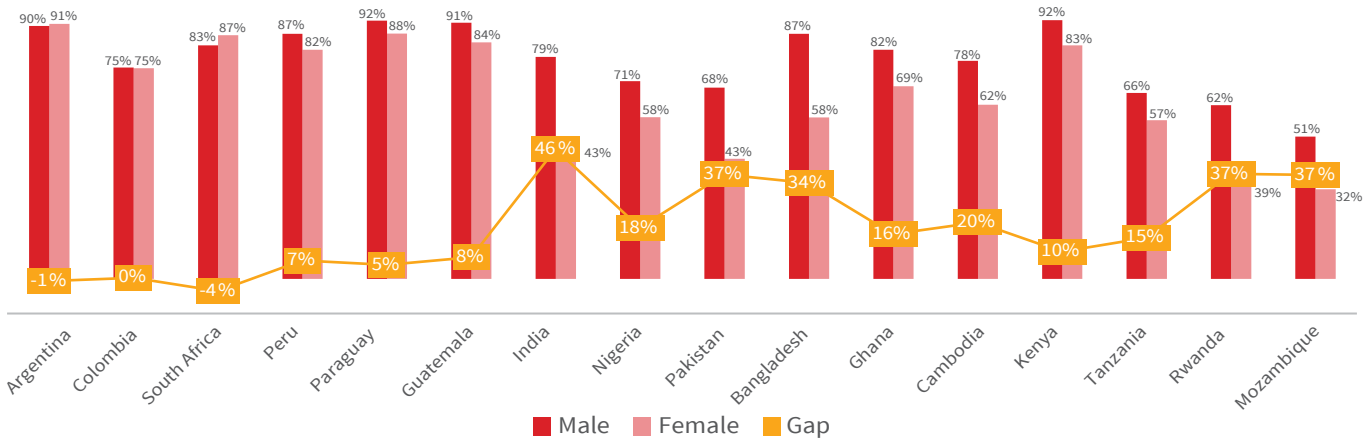
	NATIONAL	MALES	FEMALES	GENDER GAP
Mobile phone	63.26%	69.73%	56.68%	13.05%
Basic phone	32.16%	29.78%	35.15%	6.37%
Feature phone	44.84%	44.21%	45.63%	1.43%
Smartphone	23.00%	26.01%	19.22%	6.79%
Internet	28.70%	37.20%	20.05%	17.05%

The rapid growth of digital technology, often broadly referred to as information and communication technologies (ICTs), has largely reshaped lives, with the Internet becoming one of the vital infrastructures around the world. The digital divide, which refers to the gap in usage and access to digital infrastructure and services between individuals, households, business or geographical areas, remains a challenge for policymakers in developing countries. The gap in mobile phone ownership in Nigeria is significant, with probability of mobile phone ownership among males higher than that of females. The mobile phone gender gap stands at 13.05 percent, with 69.73 percent of males owning a mobile phone compared to only 56.68 percent of females having one. Asked what type of mobile phone they own the majority of Nigerians stated that they own a feature phone (44.84%), followed by basic phone (32.16%). Just over 20 percent of respondents report that they own a smartphone (Android, iOS, Blackberry). The survey reveals that males are more likely to own a smartphone than females while females are more likely to own a feature phone and basic phone.

Only 29 percent of Nigerians use the Internet. The gender gap is even more pronounced in relation to Internet access and use than to mobile phone ownership. The gender gap in Internet usage is 17.05 percent in favour of males. The survey reveals that 37.20 percent of men use the Internet, while 20.05 percent of women use the Internet. There is a significant location gap with regard to Internet use in Nigeria. The survey reveals that 41.20 percent of people residing in urban areas use the Internet while only two percent of rural areas

Mobile phone ownership (% of aged 15-65 population)

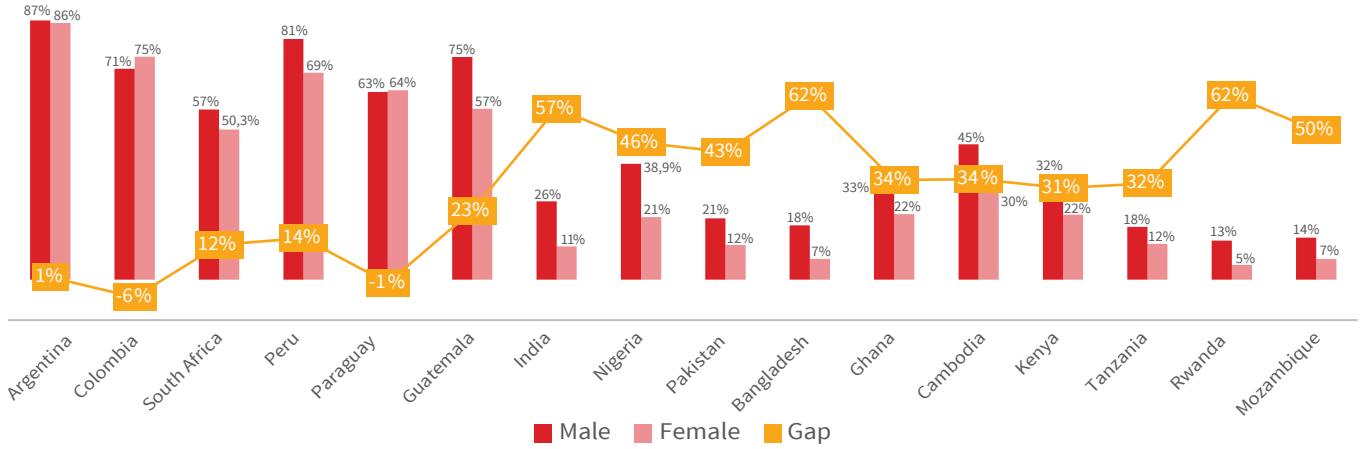
Q: Do you own a mobile phone?



Internet usage (% of aged 15-65 population)

Q: Have you ever used the Internet? (Gmail, Google, Facebook, email)

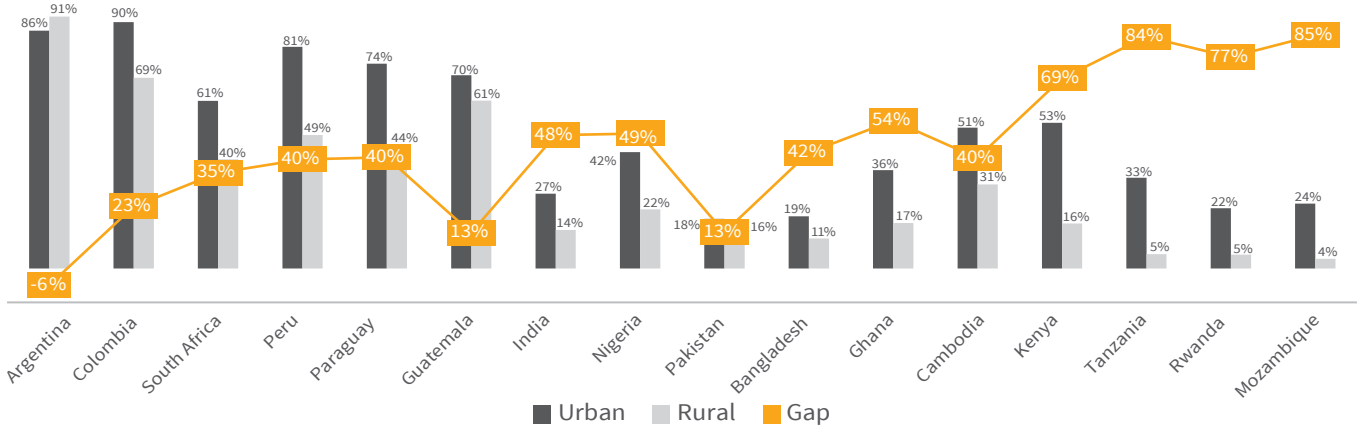
$$\text{Gender gap in Internet usage (\%)} = \frac{\text{Male internet users (\% of male population)} - \text{Female internet users (\% of male population)}}{\text{Male Internet users (\% of male population)}}$$



Internet usage (% of aged 15-65 population)

Q: Have you ever used the Internet? (Gmail, Google, Facebook, email)

$$\text{Urban rural gap in Internet usage (\%)} = \frac{\text{Urban Internet users (\% of male population)} - \text{Rural Internet users (\% of male population)}}{\text{Urban Internet users (\% of male population)}}$$



Mobile phone ownership (% of aged 15-65 population)

Q: Do you own a mobile phone?

$$\text{Urban rural gap in ownership (\%)} = \frac{\text{Urban mobile phone owners (\% of male population)} - \text{Rural mobile phone owners (\% of male population)}}{\text{Urban mobile phone owners (\% of male population)}}$$

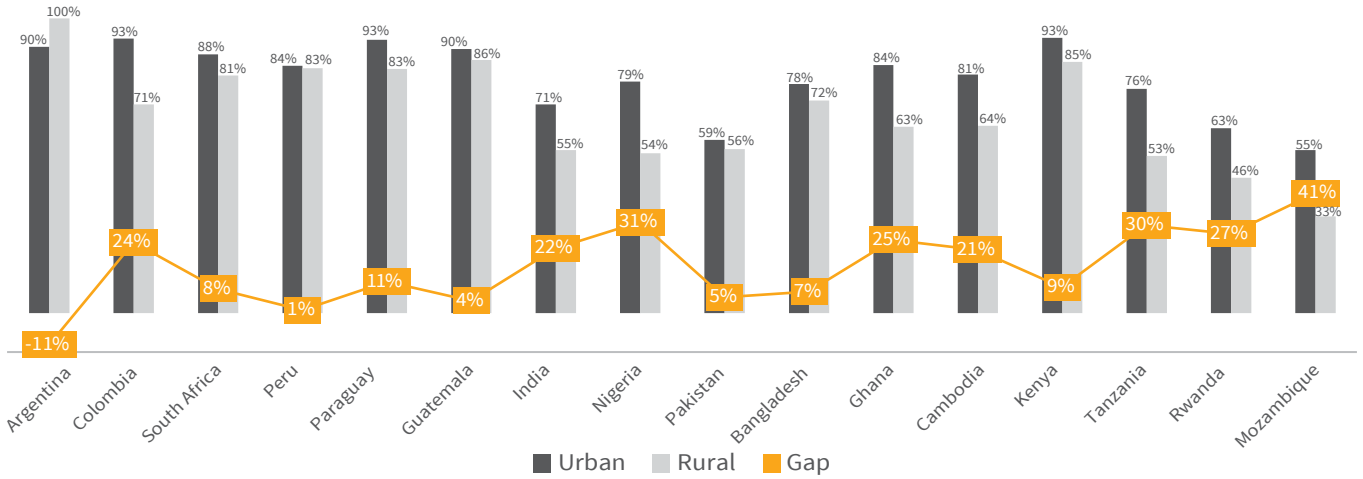


Table 10: ICT distribution and location gap in Nigeria

	NATIONAL	URBAN	RURAL	LOCATION GAP
Mobile phone	63.26%	77.78%	53.58%	31.36%
Basic phone	32.16%	26.47%	37.68%	11.21%
Feature phone	44.84%	43.39%	46.24%	2.85%
Smartphone	23.00%	30.14%	16.08%	14.06%
Internet	28.70%	41.20%	20.37%	20.83%

Source: RIA After Access Survey, 2017

use the Internet, resulting in a location gap of 21 percent in favour of urban areas. There is also a significant location gap in the ownership of mobile phones and smartphones. Internet uptake seems to be driven by smartphone in Nigeria, followed by feature phone.

Of those who access the Internet, close to 48 percent own smartphones, nearly 41 percent use feature phones and only 12 percent use a basic phone. Of those who use the Internet, 71 percent stated that they used mobile phone to access it, 29 percent used a desktop/laptop and an insignificant number of Internet users access it on tablet.

Asked why they do not own smartphones, 28 percent of mobile phone owners who do not use a smartphone stated that it is too expensive for them. Twenty-two percent believe that the basic or feature phone is sufficient for their communications need. A small percentage – under ten percent –say the smartphone is too complicated for them to use.

The digital divide is not only observed among individuals but also across countries. A number of African countries are still below the critical mass of 20 percent of the population required for the country to benefit from the network effects associated with improved information flows, productivity gains and economic growth. The survey shows that Tanzania, Mozambique and Rwanda have less than 20 percent Internet penetration. Nigeria is above

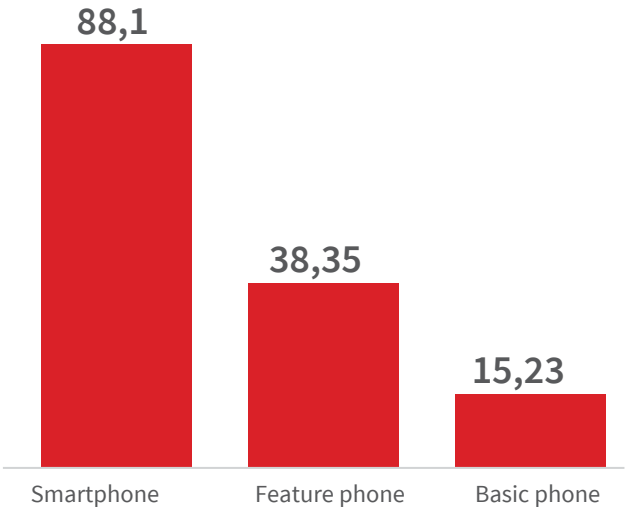


Figure 22: Type of mobile phone used by Internet users

Source: RIA After Access Survey, 2017

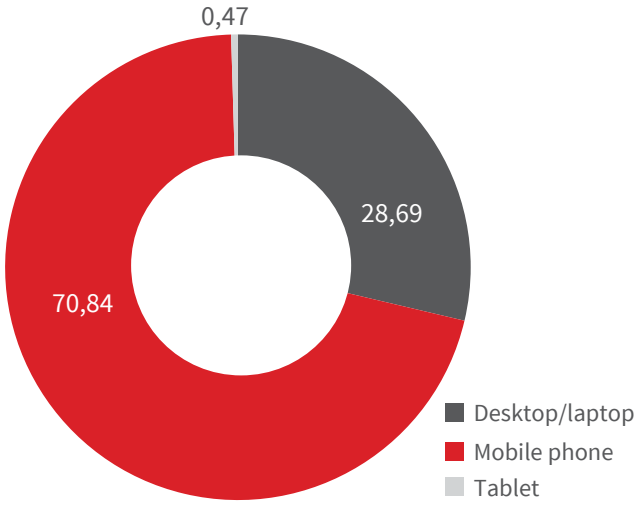


Figure 23: Devices through which individuals access the Internet

Source: RIA After Access Survey, 2017

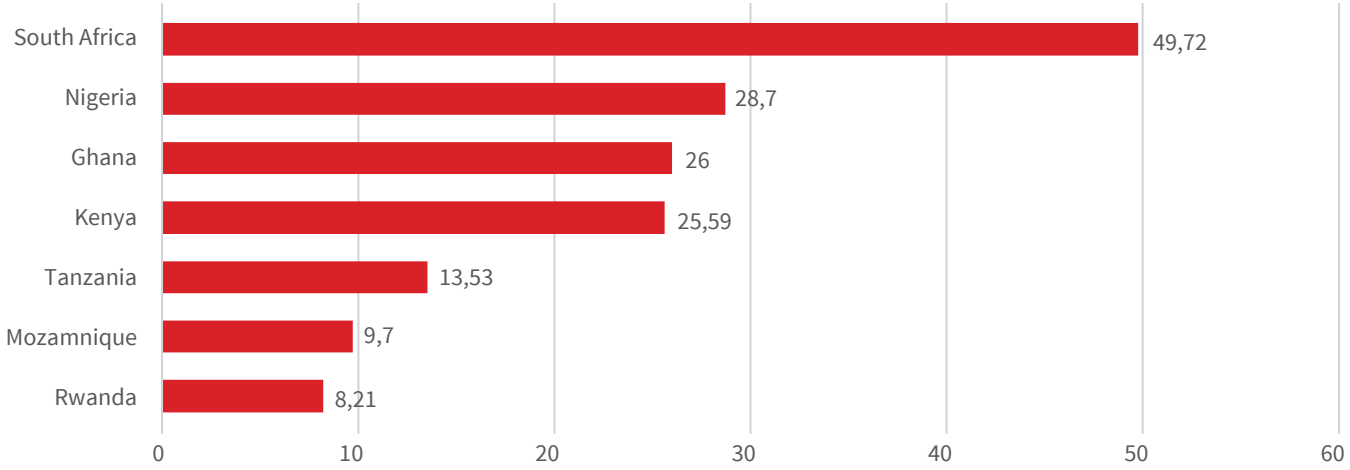


Figure 24: Internet penetration among surveyed countries

Source: RIA After Access Survey, 2017

the critical mass threshold and ranked second behind South Africa, which has Internet penetration of 53 percent.

Around 35 percent of the population are not currently being served by mobile communication services, of which 21 percent report that they do not have mobile coverage where they live. Of individuals who do not currently have a mobile phone, 56 percent say they simply cannot afford to buy one under present conditions, while 12 percent say they cannot afford to replace stolen phones and 56 percent say they simply cannot afford a first phone even though new SIM cards cost between USD 0.5 and USD 0.6.

The main barrier to mobile phone ownership by individuals in Nigeria is that more than half of those not online cannot afford devices such as smartphones. Over one quarter of them give 'no electricity' as the reason, while over one fifth say 'there is no signal' (mobile coverage). This is followed closely by having no need of it or not knowing how to use it.

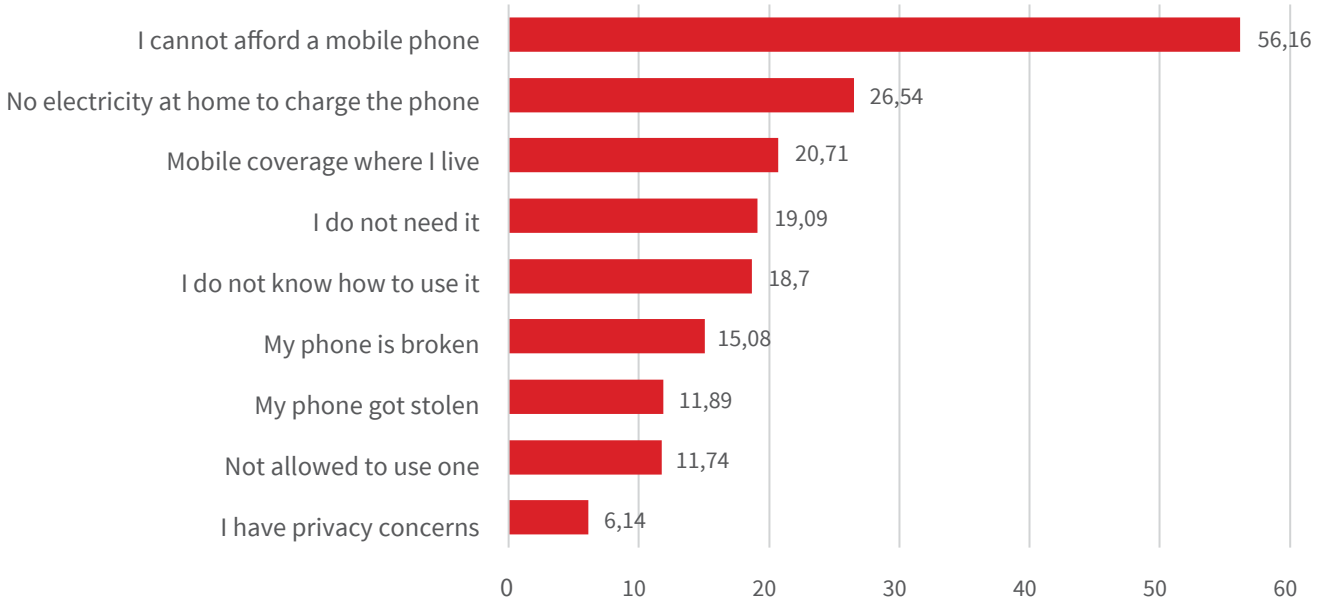


Figure 24: Reasons for non-ownership of mobile phones

Source: RIA After Access Survey, 2017

More than 80 percent of non-mobile phone owners have not used a mobile phone in the past three months while 83 percent of them do not even own a SIM card, indicating that more of them not temporarily unconnected. Asked whether they intend to buy a mobile phone, 70 percent of mobile phone non-owners stated that they will acquire a mobile phone within the next 6 to 24 months (Figure 30). Of the 30 percent who stated that they do not have plans to buy a phone, 49 percent say that mobile phone is unaffordable while 40 percent report negative assessment of need. The results are critical to policymakers and regulatory authorities. They show that there is a digital rift created by unaffordable devices and likened in recurrence to the desktop era. Furthermore, they show that policies directed towards lowering mobile operators' prices are not an end to solving digital inequality. Therefore, policymakers should, instead, focus on both demand and supply factors as a means to raising penetration rates.

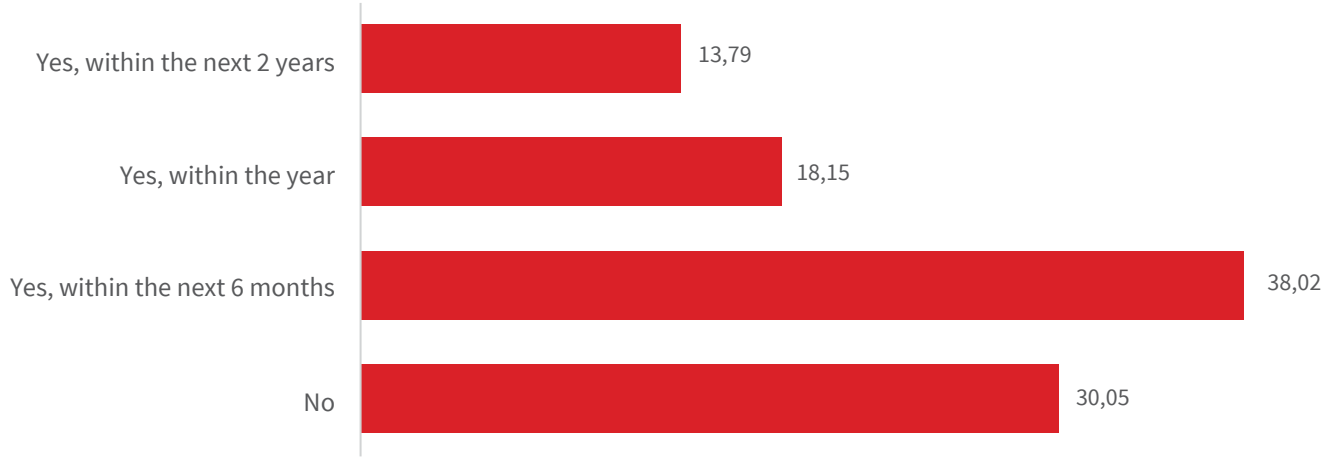


Figure 26: Plans by non-owners to purchase a mobile phone

Source: RIA After Access Survey, 2017

10 INTERNET ACTIVITIES

The Survey shows that across the countries surveyed, the frequency of use is high. As stated above, mobile phone devices are the most common of the devices used to access the Internet. Asked about the frequency of Internet use of mobile phone, close to 44 percent of Internet users state that they use the Internet once an hour or more, while 32.94 percent use the Internet at least once a day. Similarly, in Nigeria 44 percent of Internet users use it once an hour or more, while 35 percent use it daily. The frequency of use is higher among males than females: over 48 percent of males stated that they use the Internet once an hour or more, compared to 30 percent of females. Females are more likely to use the Internet once a month at most. Very few Internet users in Nigeria do not use mobile phones to access the Internet, implying that generally the frequency of Internet use among those who have access is very high, though this should not be confused with intensity. Focus groups indicate that, unlike in mature markets where services are always on, users go online to do what they need to and go offline to save costs. (Chair, 2017)

Several studies have confirmed that, once online, Internet users use social networking sites

Table 11: Frequency of Internet use in Nigeria

	NATIONAL	MALE	FEMALE
Never	1.18%	0,54%	2.39%
Once an hour or more	44.38%	49.31%	35.07%
Once a day	35.19%	37.37%	31.06%
Once a month	7.50%	4.67%	12.85%
Less than once a month	11.75%	8.11%	18.63%

Source: RIA After Access Survey, 2017

Table 12: Internet activities

	PRIMARY	SECONDARY
Educational purpose	32.67%	27.65%
Social networking	45.97%	34.48%
Work-related	14.04%	12.38%
Government services	1,92%	2.48%
Job searching	2.52%	4.93%
Online banking	0.26%	0.94%
Other	2.62%	10.65%

Source: RIA After Access Survey, 2017

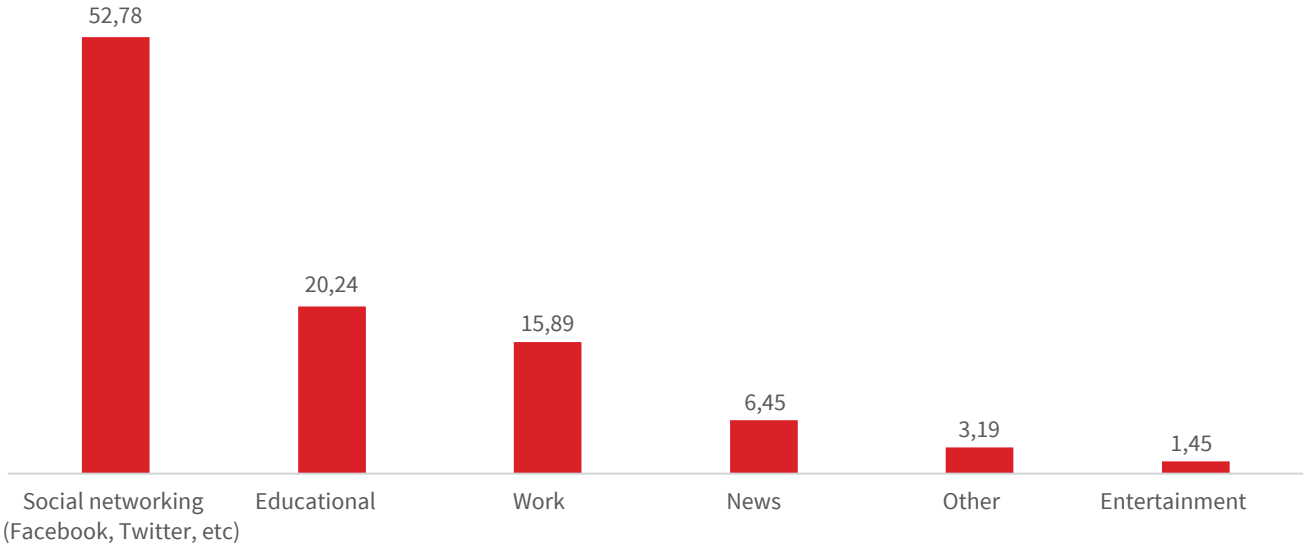


Figure 27: Activities mostly performed online

Source: RIA After Access Survey, 2017

such as Facebook and Twitter. Confirming the 2012 RIA ICT Access and Use Survey findings for Africa, a study done in 2015 by Pew Research Center shows that more than 76 percent of Internet users in Africa use social media. Similarly, the RIA After Access Survey revealed that 77 percent of those who access the Internet use social networking sites, while 45 percent use it to access educational content. When asked to rank activities performed in terms of the most important in the 2017 study, majority of Nigerian (46%) ranked social network platforms as the most important followed by educational content (33%) and online work-related material (14%)

Once online, 46 percent of people spend most of their online time on social networking sites and 33 percent stated that they mostly spend their time accessing educational content. Only 14 percent of Internet users in Nigeria perform work-related activities online and an insignificant number spends their time online on news and entertainment activities (Figure 31).

Over the years, the federal government of Nigeria has invested in ICT as a means to achieve its objective of transforming the public service into a modern-day system. The use of ICTs was identified as having the potential to improve government service delivery, ensure transparency, make government services accessible and ensure real time dissemination of information to the public. However, the survey results show that this objective was not attained, as very few people use e-government services. Only two percent of Nigerian residents ranked e-government services their most important service, while 2.48 percent ranked it second. However, when asked about what activities they mostly perform online, none identified e-government services. A number of factors, such as infrastructural gap, power failure, digital divide, low ICT literacy skills, theft and vandalising of ICT equipment, absence of privacy and lack of security contribute to the failure of e-government services (Abdulkareem, 2015).

Cost is the main reason why Internet users rationalise data consumption. Poor Internet speed is also a barrier to usage; 18 percent of users cite this as a factor. Almost no users expressed concerns about a lack of local language content, malware or virus attacks, or privacy issues.

The majority of Internet users have developed strategies for managing their data

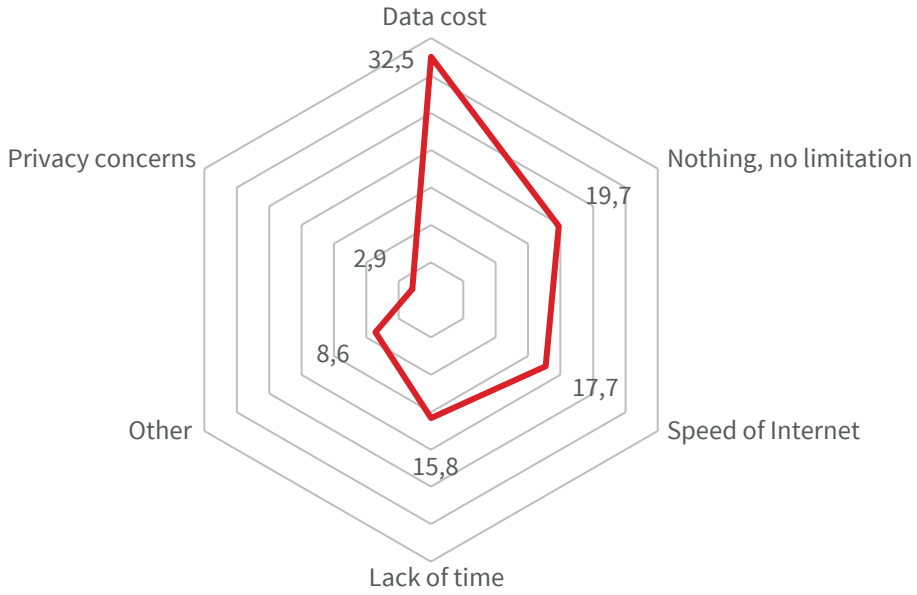


Figure 28: Limitation on use

Source: RIA After Access Survey, 2017

consumption. For more than half of all Internet users, one way they do this is through the use of regular promos offered by MNOs. These promos include free data on airtime recharge, packages that offer extra time on data expiration, and lately, unlimited data packages. Other data containment strategies include limiting usage to home or work places (29%) or public Wi-Fi areas (6%) – though the availability of the latter outside of a few of the main cities is quite minimal.

Forty percent of non-users say they do not know what the Internet is (Figure 33). This reason for not being on the Internet is astounding in modern times and goes some way towards explaining the disproportionately high percentage of people who do not use the Internet in Nigeria (as the Survey reveals, this includes 70 percent of mobile subscribers and 80 percent of the entire population). The Survey further finds that 53 percent of the entire population do not even know what the Internet

Figure 29: Data consumption strategies

Source: RIA After Access Survey, 2017

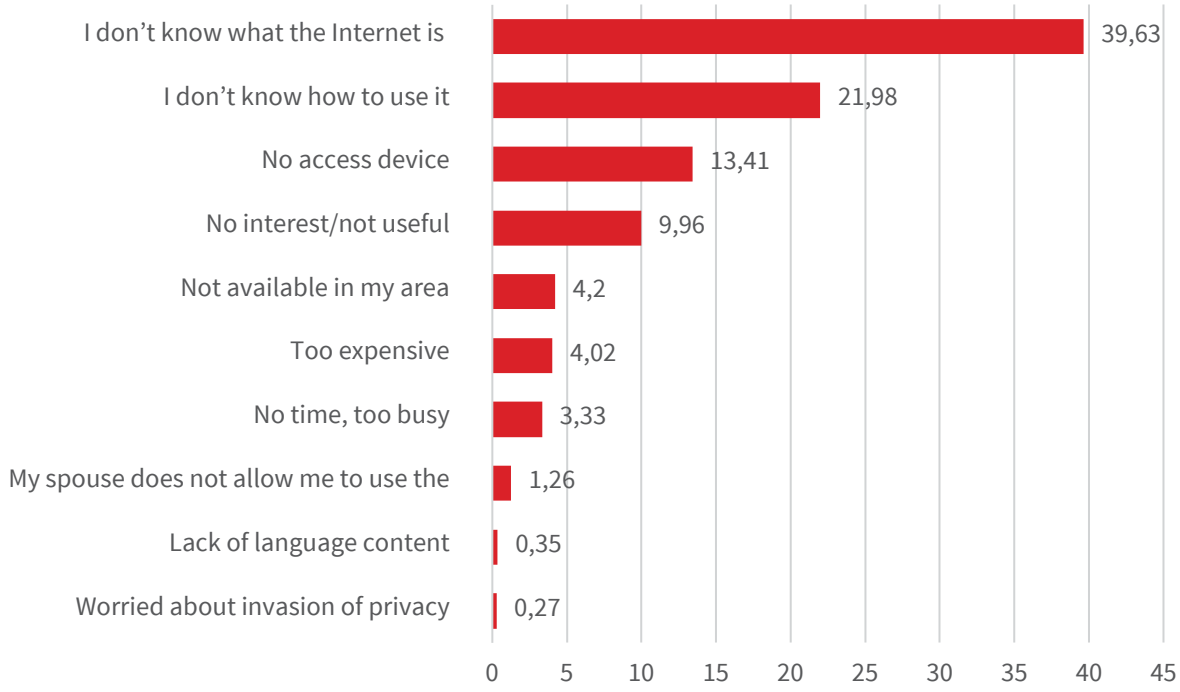


Figure 30: Reasons given by non-Internet users
Source: RIA After Access Survey, 2017

is, and 70 percent state that they have never used the Internet before; yet they clearly have, as they have indicated they use social networking services, for example. These high numbers call for awareness-raising of the potential of the Internet, if the huge digital divide is going to be bridged anytime soon.

Other reasons mentioned by individuals who do not use the Internet are lack of: skill (22%), devices (13%), interest (10%) and coverage (4%). Only 4% of people identify affordability (4%) as a reason, and very few identify the absence of local content and privacy concerns as barriers to accessing the Internet.

11

INTERNET USE AMONG THE YOUTH

Poverty is experienced through a lack of resources to improve one's self, a lack of income and limited economic opportunities such as jobs or start-up capital. RIA conducted a comparative study to assess internet use among youth aged between 15 and 24, focusing on gender and urban-rural demographics through focus group discussions in light of challenges posed by poverty in Rwanda, Tanzania and Nigeria (Chair and de Lannoy, 2018).

Internet use[12] is higher amongst young adults in their sub-categories as indicated in Table 13. The digital divide continues to play out based on location, gender and age group. Young adults in Nigeria use the Internet more compared to teens, particularly when one takes into account the sub-categories of location and gender. Urban and male young adults have higher reported internet use in comparison to their younger counterparts.

Bearing in mind the differences in internet use according the context of sex, location and age, the Internet is perceived as a useful resource by young people. To the participants it could be useful for several activities such as research, seeking employment, getting information on different topics, as well as communicating with friends and family. The majority of the focus group participants perceive the Internet as good, but there are some who acknowledged the negative issues arising from internet use.

"To me, this internet of a thing is good, it's very, very good. But youth of nowadays, they use it for so many other things, so many other things." (teen female, rural Nigeria, in Chair and de Lannoy, 2018).

According to the After Access Survey results, the primary means for internet access and use are mobile phones, followed by computers and laptops.

Ownership of devices impacts on use as participants, in particular, teens borrow devices from family members or relatives to access the internet. Forty-three percent of teens in the Survey owned mobile devices in contrast to 64 percent of the young adults.

Wi-Fi provides an alternative connectivity method. Accessing it, however, sometimes requires bypassing security measures. Youth in urban areas in particular, reported that they either hack networks to access it, or know of someone who is able to give them the password.

Table 13: Internet use among Nigerian youth

	AGGREGATE	MALE	FEMALE	URBAN	RURAL
Teens	31%	38%	21%	36%	28%
Young Adults	42%	54%	31%	57%	32%

Source: RIA After Access Survey, 2017

12. In answer to the question: "Have you ever used the Internet?".

Table 14: Percentage of Nigerian youth using social media by subgroups

	AGGREGATE	MALE	FEMALE	URBAN	RURAL
Teen	28%	34%	20%	36%	22%
Young Adults	41%	55%	30%	56%	31%

Source: RIA After Access Survey, 2017

"Actually, the last place I worked there was this company there, there was this something Wi-Fi, understand? So, there was this guy that knows the password. What I do, I just asked him!" (teen female, urban Nigeria, in Chair and de Lannoy, 2018).

The Internet is useful in gaining information for employment opportunities. Employment opportunities are either found through local platforms, social media groups or networks that share opportunities found online.

Apart from employment opportunities, using the Internet to upskill is also popular among Nigerian youth. A female participant made use of YouTube videos for makeup tutorials that she would then use in a professional capacity. A professional table tennis player stated that he is able to improve his skill by watching professional tennis players online.

"If someone is playing on the table and I'm just watching the game, there are some things that I don't know how to do, if I'm looking at the person's hand that is playing I could, I can grab what he is doing, as in the way he is doing it" (teen male, urban Nigeria, in Chair and de Lannoy, 2018).

Table 14 shows the extent of social media use within the sub-categories of the assessment. Social media use is higher within the young-adults age group specific to the 'male' and 'urban' sub-groups. Social media provides a means of communicating and learning employment and education opportunities, reaching even those without internet connection.

More entrepreneurially minded youth spoke about the productive uses of the Internet that can support their businesses.

For example, an urban teen male in Nigeria identifies himself as a DJ and uses the Internet to download music for his shows, upload his mixes and enhance his business by staying abreast with musical trends. Another participant, a tailor, stated that he is able to post the goods he has made online as a marketing strategy to gain more customers. The Internet ensures that entrepreneurs can reach clients beyond their physical vicinity (Chair and de Lannoy, 2018).

There are challenges to using the Internet optimally that are either directly related to the Internet itself, or the context in which young people make use of it. Looking at the challenges in terms of access, the Survey results highlight data cost as the most-cited limitation to Internet use by youth (48 percent of young adults and 37 percent of teenagers). The lack of an access point, poor network quality and high latency delays, as well as a device with limited mobile data all restrict access and use. Some participants do not even own a device, relying on friends and family members to access the Internet. For non-users, the lack of a device, not knowing how to use the Internet and not

knowing what the Internet is are the main reasons for the lack of internet use. Rural youth lack of awareness of the Internet: more than 40 percent of non-internet users (45 percent for teens and 40 percent for young adults) cited that the main reason they do not use the internet is because they do not know what the Internet is (Chair and De Lannoy, 2018).

Young people may be operating in contexts of restricted use due to a lack of trust from their parents, the access facility (such as a school) and discouragement from others using the Internet. One participant states that their mother refuses to buy them a phone because "she believes that if she gives me she will spoil me" (young adult female, rural Nigeria).

Parental restrictions come with either a complete ban from using the Internet or a monitored use of the Internet. Parents also take back devices: "I have phone but my mummy is always seizing my phone" (rural female teen Nigeria). It is not only parents who worry about the content their children will be exposed to, but the participants as well. Bad content is often described as pornographic, or nude pictures, which then "corrupt mind of youth" (teen male, urban Nigeria, in Chair and De Lannoy, 2018).

In the focus group discussions, the general sentiment among the youth indicated that there are some ways in which the Internet may be used to address the challenges they face. Participants who were in school, or were seeking to advance their education, made use of the Internet to research subject-related information and to find funding opportunities for their educational quests. Google and social media platforms are the most popular sites to access educational information and to discuss various topics with peers.

Overall, Internet use in Nigeria by youth is for the purposes of communicating and finding information related to the challenges they face. Use is however more prevalent among young adults compared to the teenage demographic.

Digital divides based on gender prevail even amongst youth as males have higher internet use in comparison to females. Interventions related to young people and internet use would need to focus on closing the digital division seen across location and sex. The general perception among youth is that the Internet is useful in addressing some of the challenges they face, but it is not widely regarded as the final solution. Digital literacy is a key intervention for non-Internet users, particularly for rural youth.

12 SOCIAL MEDIA

Social networking is the most common online activity among Internet users in Nigeria and respondents say that it has the most impact on their external relationships – particularly those with friends (73%), family (62%) and colleagues (52%). Social media also enables contact with the local community for nearly 38 percent of those using the Internet and social groups for 36 percent of them (Figure 35).

With the social media circle consisting mainly of family and friends, users are much more disposed to disclosing personal information, such as their gender (98%), their real name (90%), personal pictures (87%) and marital status (85%). They are also more willing to share their religion than personal details, including age (Figure 36). They are most reluctant to share their political views and sexual orientation. Only 42 percent of social media users stated that they are able to interact with friends and share information relating to their views publicly on social media. These results indicate that there are still many Nigerians concerned about monitoring and surveillance.

When asked about the use of their social media profiles, more than half of social media users (58%) stated that they use social media to make cheaper online calls, nearly half (47%) use social media to make professional business contacts.

A quarter of social media users stated that they market their products using their social media profile, while 46 percent follow government social media pages and 31 percent follow local politicians. About 60 percent of social media users in Nigeria stated that they are not

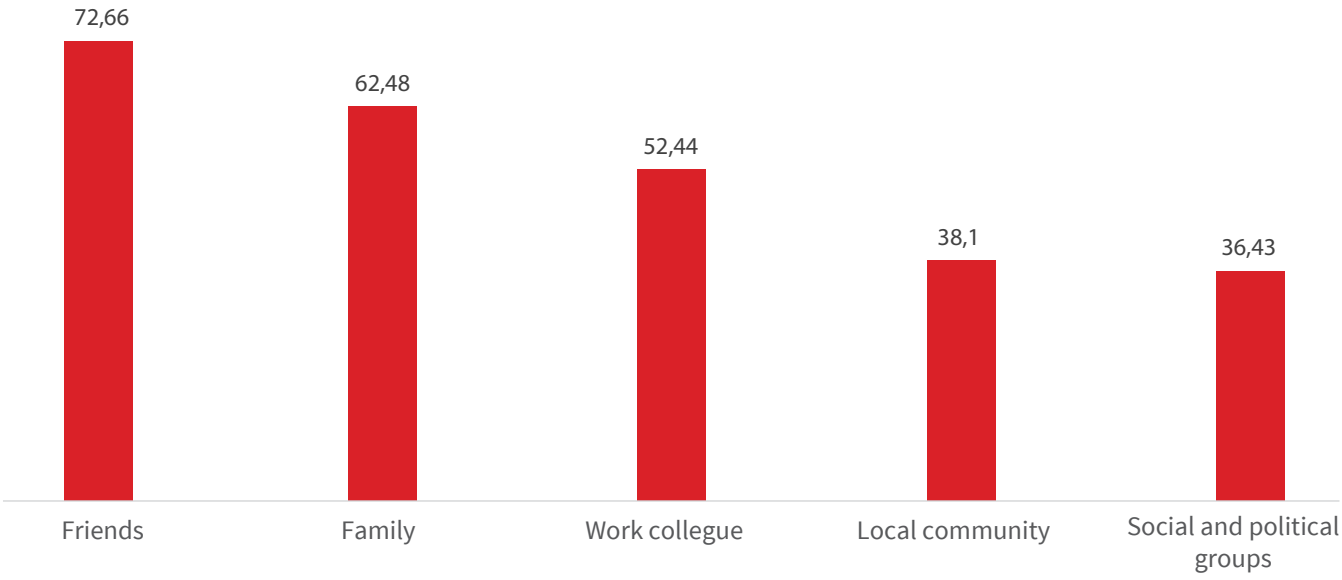


Figure 31: Impact of social media on external relationships

Source: RIA After Access Survey, 2017

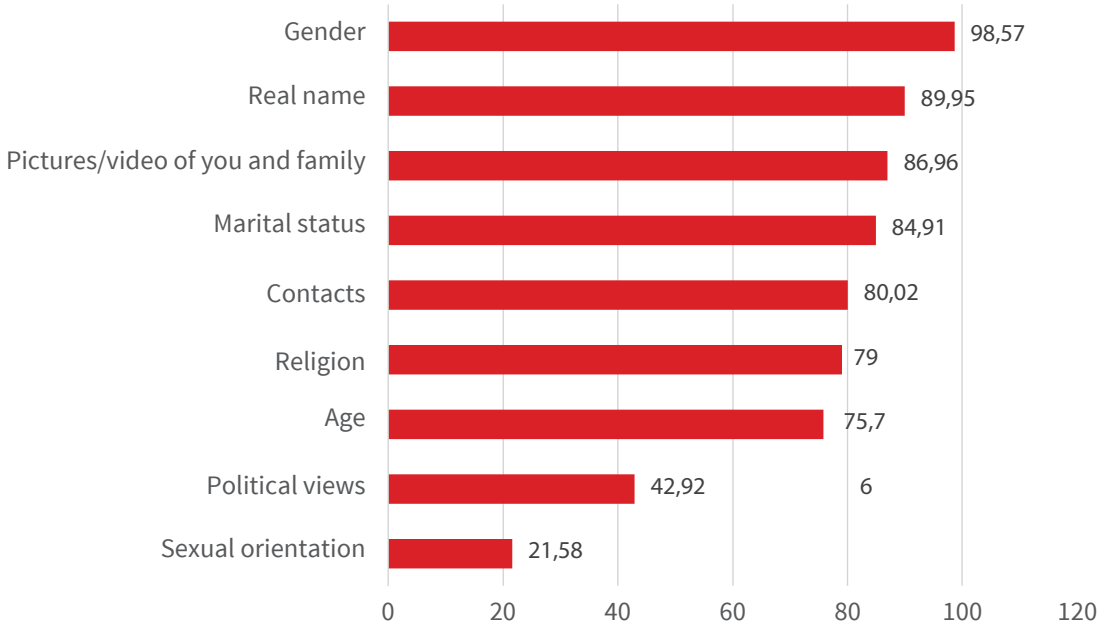


Figure 32: Information shared by individuals on social media

Source: RIA After Access Survey, 2017

comfortable about discussing political matters on social media, 14 percent stating that they are only comfortable about discussing issues relating to politics in closed groups. Data shows that religious matters are also not easy conversations in Nigeria. The majority of Nigerians (68%) using social media are not comfortable about publicly discussing religious issues on social media.

Social media usage is quite intensive in Nigeria, with 55 percent of social media users spending between one and six hours daily on their handles. Those who spend more than six hours a day represent eight percent of users, while those spend less than an hour or who do not use social media every day are still a significant number, 23 percent and 13 percent, respectively.

The 2017 Nigerian survey shows a significant proportion (64.08%) of social media users have stated that they are sometimes surprised by the time they spend on social networks.

Table 15: Duration of social media consumption

	NATIONAL	MALE	FEMALE	GENDER GAP
Not everyday	13.98%	12.47%	16.92%	4.45%
Less than an hour	23.66%	21.50%	27.84%	6.34%
1 to 6 hours daily	54.68%	58.53%	47.21%	11.32%
More than 6 hours daily	7.68%	7.50%	8.03%	0.53%

13 MOBILE MONEY

Mobile money has become a global story, allowing half a billion people in 92 countries to save and transact money in a digital form. In sub-Saharan Africa, the growth of mobile money has been exponential, reaching 277 million users in 2016, compared to 178 million bank accounts. As of 2017, there were 128 mobile money deployments in 39 countries (GSMA, 2017). RIA's survey results show that mobile money is common in Kenya, Ghana and Tanzania. Mobile money penetration among individuals 15 years and older in Kenya has reached 83 percent, followed by Ghana at 54 percent and Tanzania at 45 percent.

Yet in Nigeria, mobile money penetration is very low, only three percent of the population uses mobile money, despite more than 60% of Nigerians being un-banked. This is not as surprising as it may seem, considering the financial regulatory delays and hurdles that have plagued mobile money operations. For the moment, Nigeria uses the bank-led mobile money framework, which has proved unsuccessful so far. In response the Central Bank, is currently developing a new regulatory framework to accommodate or give sectoral leadership to mobile operators.

Mobile money is common in countries where the majority of residents are unbanked and is less used where stringent financial regulations may inhibit organic growth, such as in Nigeria and South Africa (where large number of people remain underbanked).

Our research reveals that, for the small number of people using mobile money, the most popular use of mobile money is for electronic

Table 16: Mobile money vs banking amongst mobile phone users

	KENYA	MOZAMBIQUE	GHANA	NIGERIA	SOUTH AFRICA
Mobile money	75%	47%	62%	6%	25%
Mobile banking	6%	2%	2%	9%	28%
Both*	5%		12%	1%	

Source: RIA After Access Survey, 2017

**Note: No data available for Mozambique and South Africa*

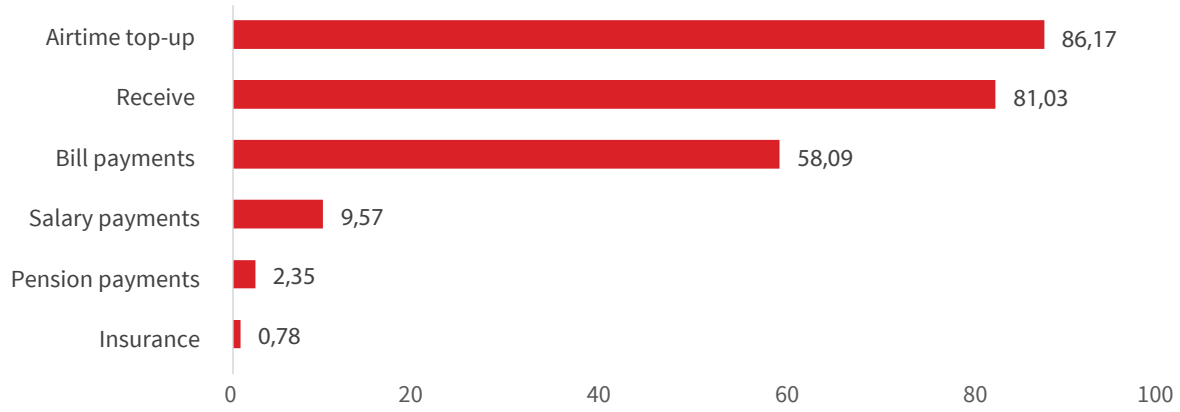


Figure 33: Uses of mobile money

Source: RIA After Access Survey, 2017

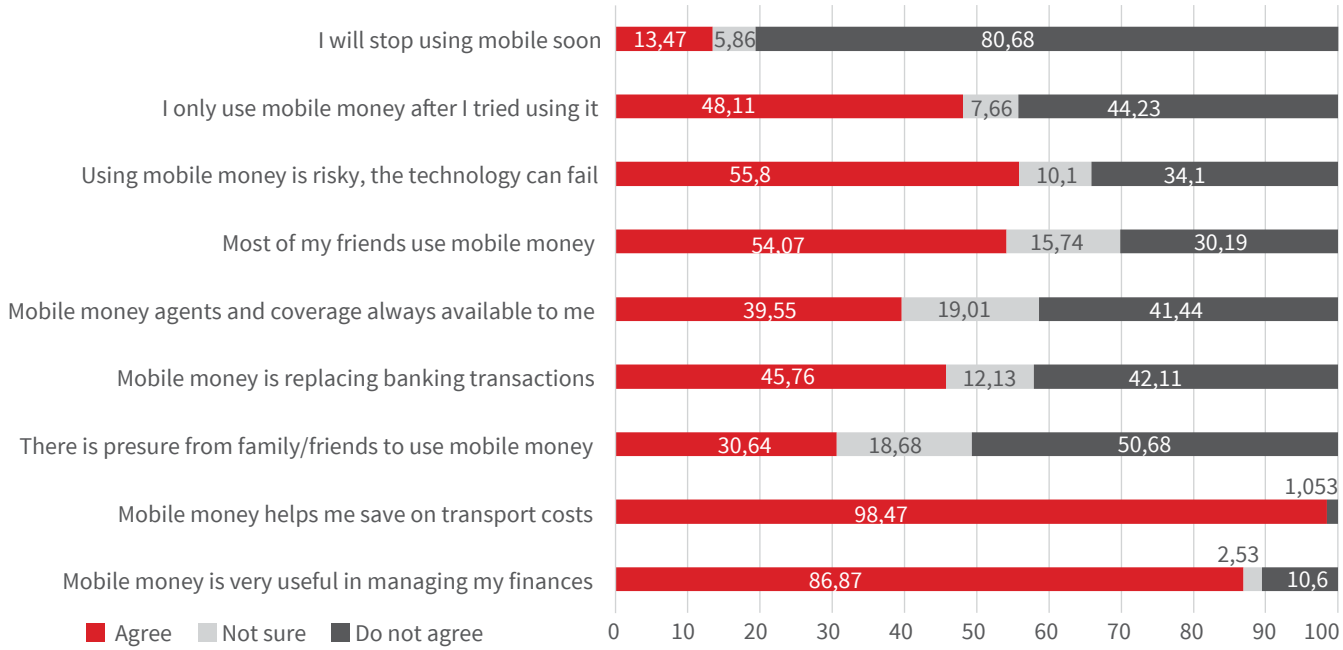


Figure 34: Motivations for mobile money adoption and use among users

Source: RIA After Access Survey, 2017

airtime top-ups (86%), money transfers (81%) and bill payments (58%), as shown in Figure 37.

Yet there appears to be a groundswell of positive views among mobile phone owners, which provides the potential basis for designing and promoting mobile money products. For example, many mobile subscribers are seeing their friends using mobile money products but will only use the platform after a successful transaction or trial. They say that mobile money helps to save on time and transport costs; yet they believe that the platform is risky, and the technology can fail. For them, mobile money is very useful in managing personal finances, yet they are under no pressure from employers, friends or family members to make use of the platform. Figure 38 highlights the motivations for mobile money adoption and use.

Among non-users, the principal reasons for not using the service are (a) they do not have anyone to whom they send or from whom they receive mobile money; (b) they do not own a mobile phone with which they can transact, or (c) they simply do not trust the platform (Figure 39). Nevertheless, 82 percent of individuals in this category say they are interested in using mobile money in the future.

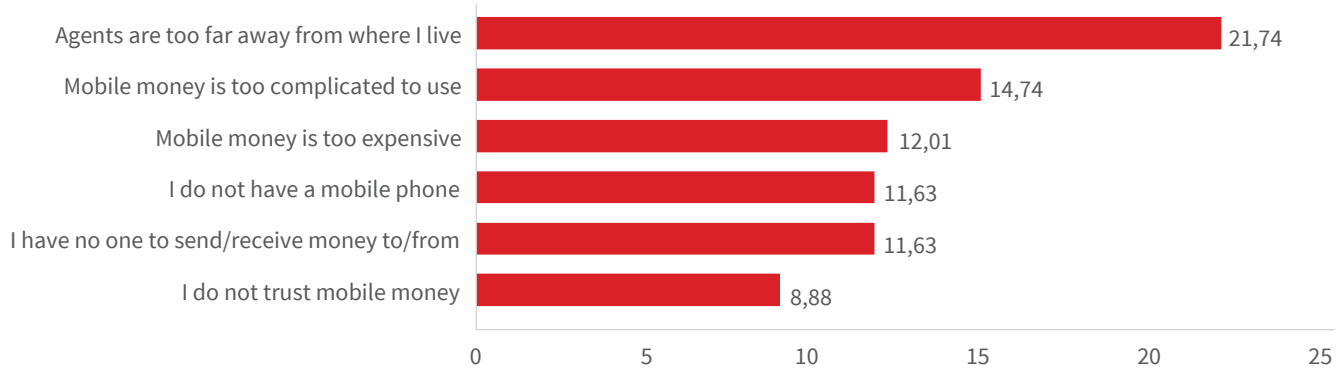


Figure 35: Reasons for non-adoption of mobile money products by non-users

Source: RIA After Access Survey, 2017

14 MICROWORK

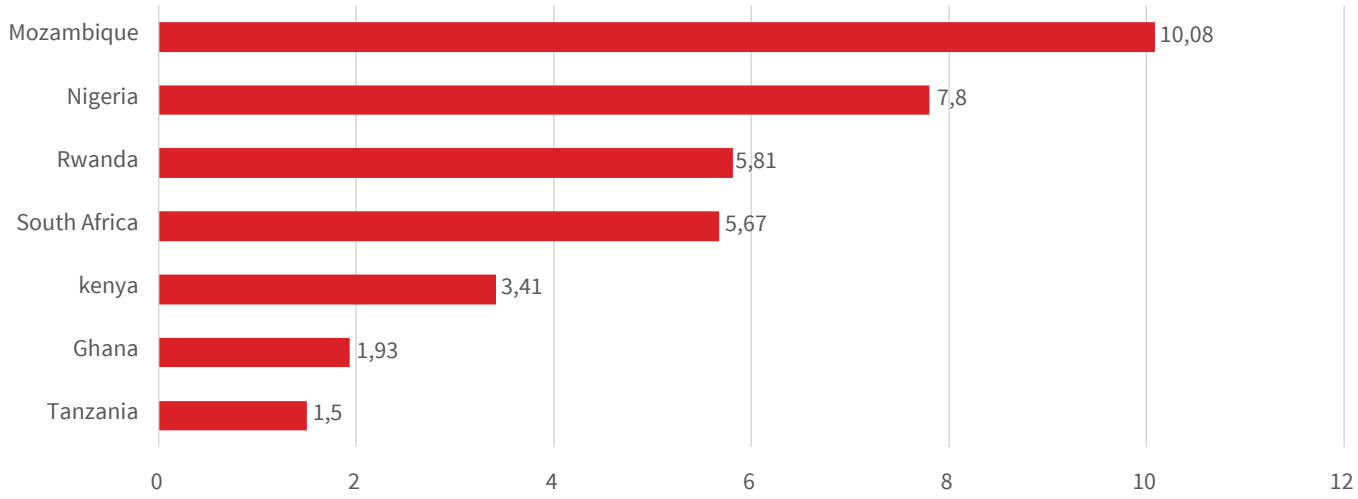


Figure 36: Percentage of Internet users contracted in microwork

Source: RIA After Access Survey, 2017

ICTs do not only provide platforms to access information, but they also provide new avenues for job creation, which could help tackle global unemployment. Microwork platforms like CloudFactory, MobileWorks or Samasource break down large business process into smaller discrete tasks, such as data entry and verification, copy-writing, or graphic design and distribute them to workers across the globe. These jobs are normally temporary or contract-based and provide the unemployed with an opportunity to generate income (Gillwald, Mothobi and Schoentgen, 2017).

The adoption of microwork services is generally low in Africa. Among the seven countries surveyed, Nigeria is ranked in second position after Mozambique in terms of adoption of microwork services. Of the 29 percent, the

Table 17: Online microwork services

	RIDE	DELIVERY	TASKS	CLEANING
Ghana	13%	36%	13%	36%
Kenya		66%	46%	9%
Mozambique	20%	13%	2%	9%
Nigeria		0.4%	22%	0.8%
Rwanda	23%	3%	10%	3%
South Africa	14%	13%	45%	30%
Tanzania		23%	29%	

Source: RIA After Access Survey, 2017

Table 18: Microwork by employment

	STUDENT	EMPLOYED	UNEMPLOYED	NOT ACTIVE
Ghana	0.6%	0.9%	4.3%	
Kenya	1.8%	4.6%	5.1%	
Mozambique	5.8%	11.8%	5.5%	9.6%
Nigeria	12.4%	3%	12.8%	
Rwanda	6.6%		4.2%	
South Africa	11.2%	4.3%	3.8%	3.3%
Tanzania	0.3%	1.1%	0.7%	

Source: RIA After Access Survey, 2017

proportion of individuals who use the Internet, only seven percent of them are contracted into microwork jobs, as compared to 10 percent of the 20 percent if Internet users in Mozambique.

While driving for ride-hailing applications such as Uber, Lyft and Taxify is a common pursuit in most African countries, the survey results show that these services are insignificant in Nigeria. The majority of those who do online jobs (22%) do tasks such as data entry and verification as well as transcribing. An insignificant number of microworkers take online cleaning jobs and delivery services (0.8% and 0.4% respectively). The Survey also shows that students and unemployed people are more likely to participate on online microwork platforms than the employed.

15 SMALL ENTERPRISE USE OF ICTS

As indicated above, the RIA small business and informal sector survey piggybacks on the sampling of the household survey. As such, it is not representative of all small businesses and the informal sector but is indicative of ICT access and use among such enterprises. The total sample for the 2017 After Access informal survey is 567: 63 percent rural and 37 percent urban. The majority of informal businesses in Nigeria sell: general goods (72%) such as cosmetics, cooked food, bakery goods and aluminium/metal products. A third of the informal services provide services, such as tailoring, motorcycle and generator repairs, and arts and printing and training services. While research has shown that economic growth that originates from the agricultural sector has a strong impact on poverty and hunger, there are very few agricultural informal businesses (8%) in Nigeria and few manufacturing business (3%) (Byerlee, de Janvry and Sadoulet, 2009; Cervantes-Godoy and Brooks, 2008). Only 34 percent of these businesses pay local or state taxes, while six percent are registered for VAT/sales tax.

The 2017 RIA After Access Survey shows the informal business sector is one sector that provides women with an opportunity to generate income and support their families.

About 55 percent of informal business enterprises are owned by females. These results are in line with the findings in the individual survey, which shows that males are more likely to be employed than females.

Generally, the informal sector plays a major role in the overall economy and more specifically in developing countries. The sector provides employment and income generating opportunities for those who are left out of the formal sector. Most respondents (41%) stated that they would not be employed if they had not stared their own small business, while 30 percent said that their business pays more than what they would get if they were employed. However, one of the biggest obstacles to the growth of this sector is limited access to finance. The majority of informal business players (84%) rely on their own savings to finance their business, while 10 percent got loan from friends and family.

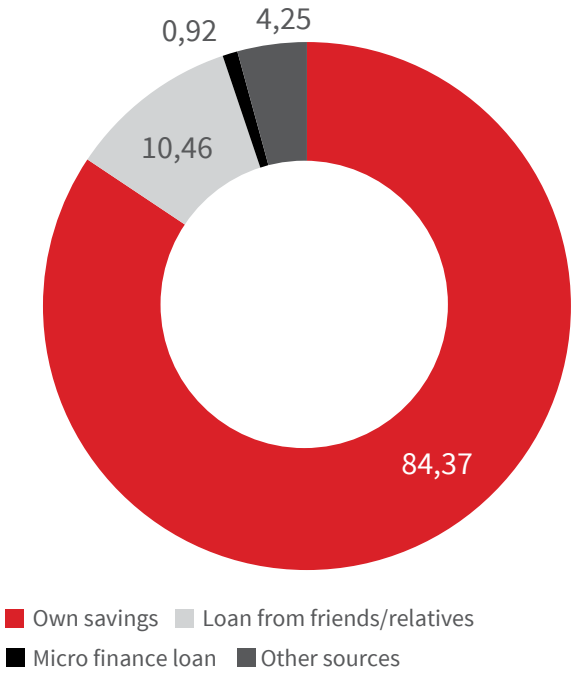


Figure 37: Start-up capital finance

Source: RIA After Access Survey, 2017

Small and medium enterprises do not only face challenges associated with lack of access to finances and financial services, but also lack of access to ICTs. ICTs can be exploited by the informal business sector to create a list of contacts and to make use of available information to start and sustain business

Table 19: Ownership of ICT devices by informal businesses

DEVICES	PERCENTAGE OF BUSINESSES OWNING DEVICES
Fixed line	2.26%
Private mobile phone	30.95%
Business mobile phone	1.14%
Private and business mobile phone	19.87%

Source: RIA After Access Survey, 2017

ventures. Moreover, ICTs have the potential to expand formal business by making economic enterprises more accessible to global and local markets; improving access to information for better prices as well as lowering transactional costs. Even though this is the case, most informal businesses in Nigeria do not have a website (97%) or lack a social media presence (96.5%). These low figures are a result of low use of ICT devices in the informal sector. Fixed line penetration remains very low (2%), while a significant number (20%) own a mobile phone and 31 percent use private mobile phones for business. Very few businesses (2%) own a computer.

Asked for reasons for the lack of these devices, the majority of respondents gave a negative assessment of their need for these devices. More than 70 percent stated that their businesses did not need computers or a fixed line to operate, while close to 50 percent stated the same for mobile phones. However, the survey also shows that literacy and skills are the critical factors that lead to low use of these devices in informal businesses. About 50 percent of those with businesses that do not have computers stated that they do not have the necessary skills to use the computer while 39 percent stating that computers are too expensive and 24 percent stating that their businesses cannot afford a mobile phone.

A small proportion of informal businesses (5%) use the Internet in Nigeria. Of the 95 percent that do not use the Internet in their businesses, 72 percent reported a negative

Table 20: Assessment of ICTs by business owners/managers

	TOO EXPENSIVE	NO NEED	NOT AVAILABLE	NO SKILLS
Computers	39,3%	73,0%		50,3%
Fixed line	9,0%	74,5%	10,9%	
Mobile phones	24,3%	47,3%	21,4%	
Internet	38,6%	71,6%	33.8%	62,3%
Mobile money	23,1%	36,0%	52,8%	61,2%

Source: RIA After Access Survey, 2017

assessment of the need for the Internet while 39 percent stated that the Internet is too expensive. As mentioned above, one of the challenges faced by the informal sector is exclusion from the formal banking services, which ultimately affects their ability to access loans. A small proportion of the informal sector (5%) has access to a bank account, while 17 percent has access to an account through the respective owner of the informal business. Only 27 percent of business owners/managers surveyed responded positively to the probability of acquiring mobile phones for business use in the future, 24 percent were undecided, while almost half said they had no plans in this regard (Figure 42).

The lack of ICT skills is heightened by the fact that, while 22 percent of enterprises have received training in business skills, they barely have sufficient skills to set up a social media page, use computers, put up a website or even use point-of-sale software (Figure 43).

Small businesses face multi-faceted challenges to adopting technologies relating to costs, infrastructure, coverage and

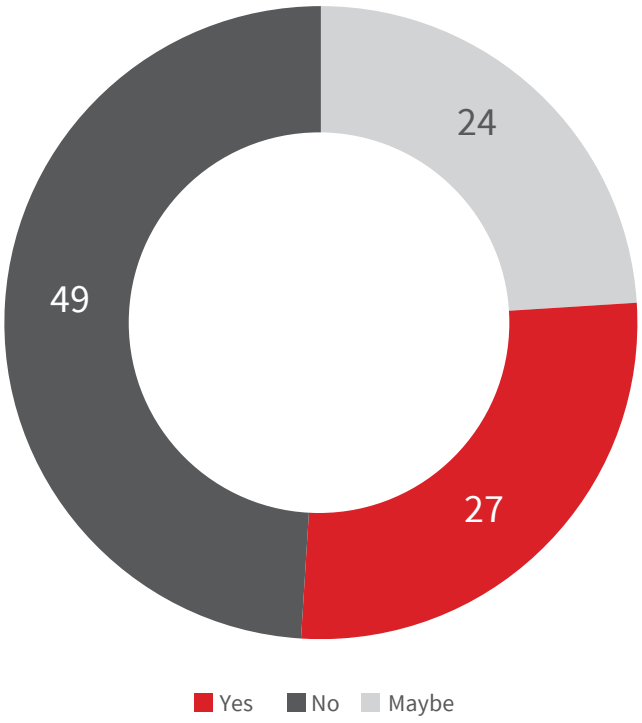


Figure 38: Future plans to acquire mobile phones for business use

Source: RIA After Access Survey, 2017

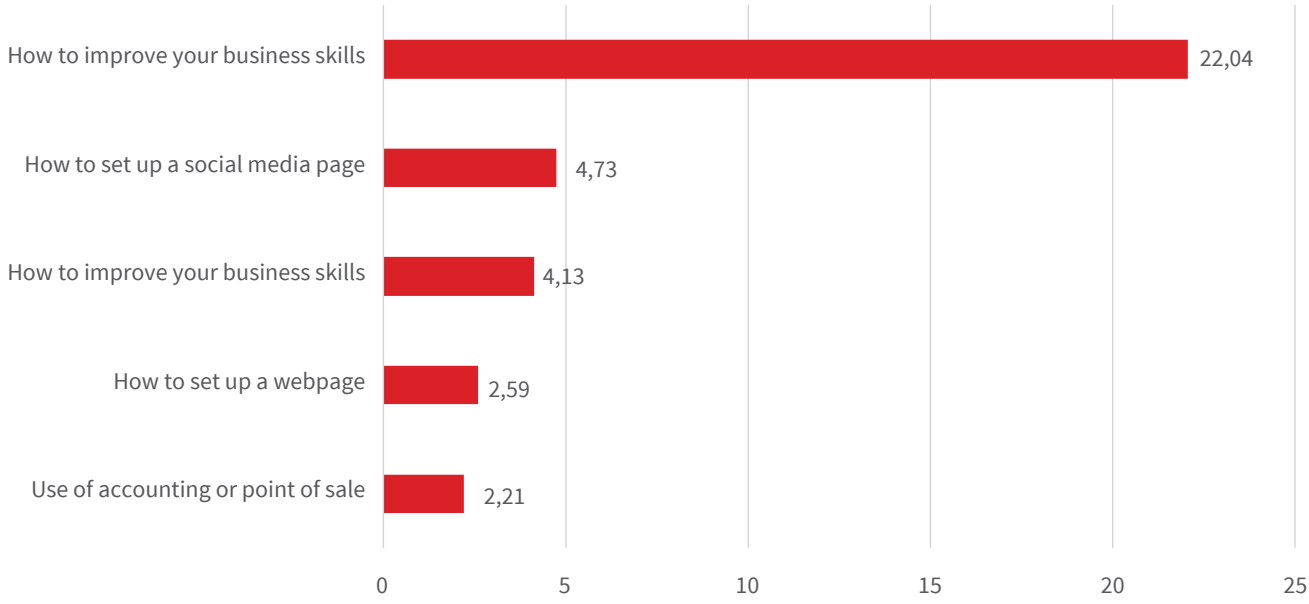


Figure 39: Capacity needs of business owners/managers

Source: RIA After Access Survey, 2017

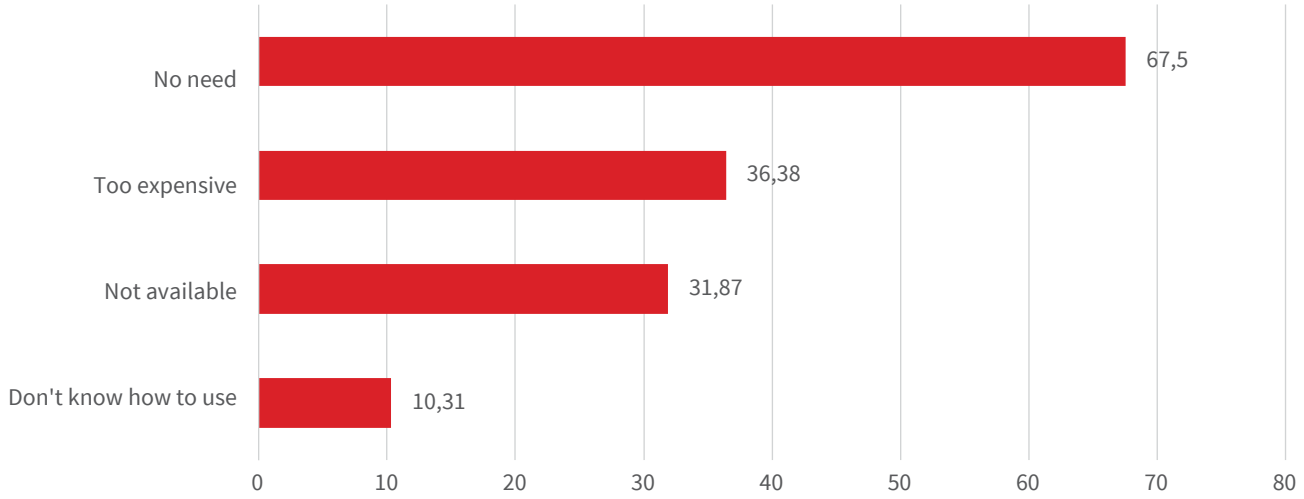


Figure 40: Barriers to Internet use

Source: RIA After Access Survey, 2017

socio-cultural barriers. As shown above, in the individual survey the majority of individuals gave a negative assessment of the need for ICTs: an outcome which can be attributed to web-illiteracy and lack of awareness. Similarly, when asked about the reason for not using technologies in their businesses, the majority gave a negative assessment of their need for ICTs. About 68 percent of small enterprises stated that they do not need the Internet to run their businesses, while 51 percent said that mobile money is not important for their business transactions. This is despite the evidence that the use of ICTs has the potential to reduce the cost of doing business and also allow small enterprises to compete efficiently in both domestic and international markets. The Survey shows that, other than illiteracy issues, the cost of using the Internet and a lack of coverage are the main inhibitors to Internet use.

Part D

Assessment of policy and regulatory outcomes (conclusions)

16 NATIONAL-SECTORAL INTERPLAY

The recent deterioration in the fortunes of the industry are intrinsically linked to policies issued over the past two years by Nigeria's Central Bank, especially those relating to foreign exchange. The negative macro-economic conditions in the country were compounded for the industry by:

- the NGN 1.04 trillion (USD 5.2 billion) fine imposed by the NCC on MTN Nigeria in October 2015 for the operator's failure to deactivate 5.2 million unregistered subscribers in contravention of section 208(1) of the Telephone Subscribers Regulation 2011 (Adepetun, 2015; NCC, 2011). The heavy fine was subsequently negotiated downwards by both parties, mid-2016, to NGN 330 billion (USD 1.7 billion) (Prinsloo and Ibukun, 2016); and
- the sudden withdrawal of Etisalat, July 2016, from the operations of its Nigerian arm, in which it held a 45 percent stake. The withdrawal was as a result of pressure from 13 local banks on due payments on unserviced loans, totalling USD 1.2 billion, as well as shareholder wrangling, actions that have resulted in a sharp decline in business of the mobile licensee now rebranded as 9Mobile, and the subject of court action blocking its sale to African consortium Teleology (Okonji, 2017).

Since 2015, the Central Bank of Nigeria (CBN) has adopted various fiscal and monetary policies to address rapid changes in the local economy that had resulted in a dramatic drop in foreign exchange earnings and reserves, and an acute scarcity of foreign currencies, especially the United States Dollar.

However, many of CBN's measures, running from late 2014 to October 2017, have had adverse effects, contributing in no small way to the observable slump in the telecoms industry. According to the National Bureau of Statistics, the full year contribution of telecoms to GDP dropped from 8.65 percent in 2015 to 7.53 percent in 2017 (NBS, 2017). Some of the fiscal regulations that have had the most negative impact include:

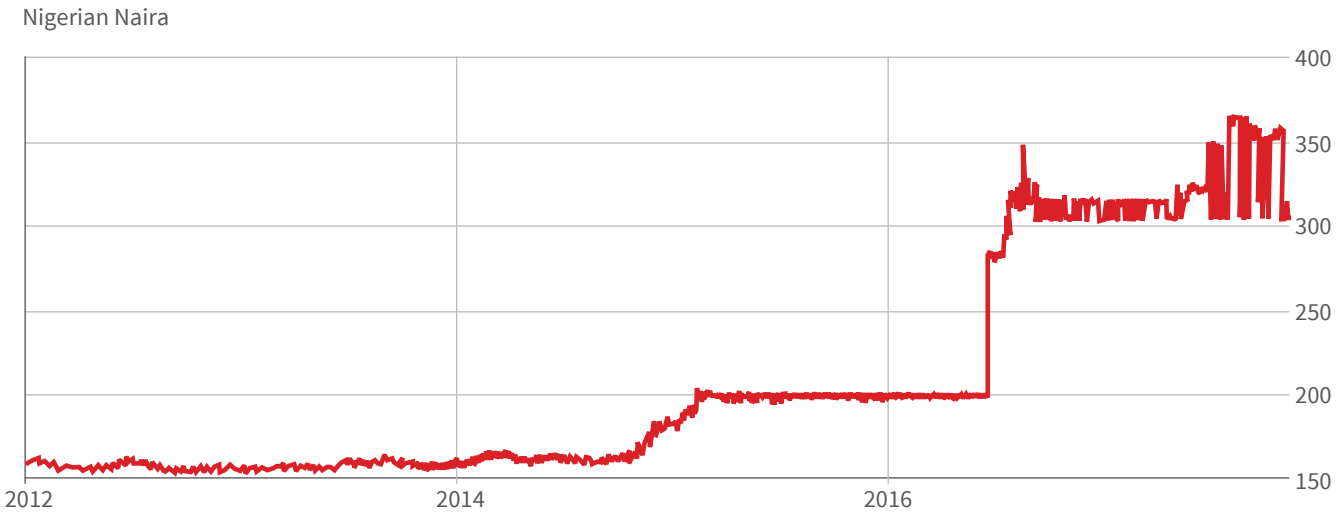


Figure 41: Performance of the Nigerian Naira against the US Dollar (2012–17)

Source: Trading Economics, 2018

- restrictions on foreign currency borrowings imposed on financial institutions;
- regulatory flip-flops and ambiguity over the prohibition of ICT equipment and services from access to official forex sales;
- the exclusion of telecoms from priority lists of items valid for forex sales, leading to high cost of funds, issuance delays by banks and rationing; and
- the inability of the operators to access the best official forex rates as they were categorised in lower tier windows.

Added to these issues is extended delays of up to twelve months, typically faced by telecoms companies clearing equipment imports at the country's ports.

During this period, telecoms companies were not only unable to secure their foreign currency needs from official sources, for the most part they also could not play to any significant degree in the secondary or parallel markets, as these were poorly regulated and not sufficiently liquid for the kind of volumes sought by operators.

The unintended outcome of these policies, coupled with other factors, such as high inflation and lending rates, is that the Nigerian telecoms industry appears not to have had any new foreign investments or any significant expansion by an operator since the end of 2015 – besides MTN's purchase of the 2.6GHz spectrum (2016) and the payment of Teleology's deposit towards its planned acquisition of 9Mobile (Etisalat).

There is also a growing debt crisis in relation to large exposures to local financial institutions, defaults on vendor payments interconnect bills and profit share payments due to non-core operators such as value-added services (VAS) players, and outstanding rentals or leases on towers by operators whose base station network is dependent on third party infrastructure providers.

Though the forex situation seems to have improved during 2017, with the reclassification of telecom equipment by the Central Bank allowing for a more favourable dollar exchange rate, there is strong evidence of an ongoing liquidity crisis in the sector, as the biggest operators appear to be holding on to large portions of industry debts. These debts are growing and are gradually becoming unmanageable. If the current situation is not urgently addressed, the risk of business failure looms for lagging operators, and indeed for the sector overall, and this situation will remain in the short and medium term, with potentially perilous effects on the national economy.

Presently, outstanding interconnect invoices are in the region of NGN 25 billion, with up to 70 percent of these invoices in dispute (NCC, 2017b). There have been repeated complaints within the industry that some operators have not settled their bills for more than three years. Though the regulator says it has helped to resolve over 60 percent of 2016 interconnect bills, there is no regulatory arrangement in place to assist operators (especially VAS players, tower companies and interconnect houses) to navigate the complexities involved in estimating, reconciling and settling what should otherwise have been regular commercial debts incurred in the ordinary course of business (NCC, 2017b).

With respect to mounting sectoral debt, and aside from the fact that there is no regulatory framework for VAS interconnects, stakeholders interviewed for this report say there are also no regulatory sanctions or penalties against corporate debtors and defaulting operators even within the existing interconnect framework, meaning that the only recourse available to any aggrieved entity is in the context of civil pursuits of debt recovery. Yet even this is fraught with judicial delays and brand risks, so the business

culture tends to allow debtors to go scot-free, leading to impunity with respect to breaches in the conditions of business contracts, even among telecoms companies.

One effect of the current investment freeze is that operators appear to have shifted into a 'maintenance' mode, with the focus of network operations centred around the principal cities of Lagos, Abuja, and Port Harcourt and its environs. Presently, mobile voice coverage of the country hovers around the 75–80 percent mark. On evidence, data coverage is much lower.

In addition, the industry and operators continue to battle with other major impact issues, such as:

- the global shift from voice to data – which can be seen in the high rate of adoption and use of OTT and data connections by mobile subscribers for voice calls, with the resultant effect of shrinking voice revenues;
- arbitrary levies sporadically charged on operators by state governments;
- multiple taxation at all levels of government;
- multiple layering of hostile 'regulations' by different state agencies in contradiction of NCC's exclusive oversight;[13]
- rampant vandalism of network infrastructure by local gangs involved in extortion and who also seem to understand they can operate with impunity; and
- corporate governance, among other issues.

These affect the smaller operators much more than the larger ones, as they do not have comparative economies of scale and scope or liquidity with which to absorb these challenges.

17.1 INSTITUTIONAL CHALLENGES

A central institution in the ICT ecosystem is the regulator, an authority with the capacity and resources to implement national policy, independent of industry or political influence. Some stakeholders believe that there is regulatory capture and that the telecoms market is over-regulated as national government attempts to deal with the impact of the economic crisis on the fiscus and to respond to constituency pressures. The primary example provided was the fine imposed by the regulator of NGN 5 million per message on any operator over whose network an unsolicited SMS is distributed. Several observers, not only operators, while acknowledging the seriousness of the flouting of the regulation, believe this extent of the penalty was out of proportion with the offence.

17.2 POLICY AND REGULATORY OUTCOMES

In this section, the assessment moves from the analysis of the policy and legal framework, the arising institutional arrangements and market structure, to the policy and regulatory outcomes in terms of penetration (infrastructure and access), prices and affordability, quality of service, and the composite assessment of competition.

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 indictors or the benchmark average – on that particular indicator. 'Amber' is used to signify a

13. See, for example: www.nigeriacommunicationsweek.com.ng/telecom-operators-threaten-to-shut-down-networks-in-7-states/

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' is used to indicate performance that is below the benchmarked countries or best performers as that what is required as a threshold for digital readiness, or that the country is on a downward trend from a once positive position; this identifies an indicator that needs immediate attention and intervention.

17.2.1 Coverage and reach

The analysis measures both the extent and quality of infrastructure available in a country and network coverage: how much of the population has access to mobile signal of at least 3G standard. Network coverage is measured by the number of subscribers per base station where the data is available. The level of investment is further expressed as investment per subscriber.

The assessment also considers the reach of the backbone and backhaul networks by assessing the extent of fibre rollout and the areas covered. It does not have data on the microwave links that are still used extensively across the country for backhaul. Fair competition provides an incentive for mobile operators to invest in infrastructure, in order to make their network as widely available as possible and to guarantee a certain quality of service.

The total number of base stations owned by mobile operators in Nigeria decreased from 33 858 in December 2015 to 31 292 in 2016. The state of Lagos had the highest number of base stations (4 369) while Yobe has the least (187).

The total fibre optic cable deployed in 2016 amounted to 57 234 km, of which 47 347 km was on-land while 9 884 km was submarine. MTN deployed the largest on-land fibre optics (22 454 km), followed by Glo, which deployed 13 277 km. Submarine fibre optic cables were deployed by three mobile operators, Glo, Airtel and NTEL for the total of 9 884 km, Glo being the leader, with 9 800 km.

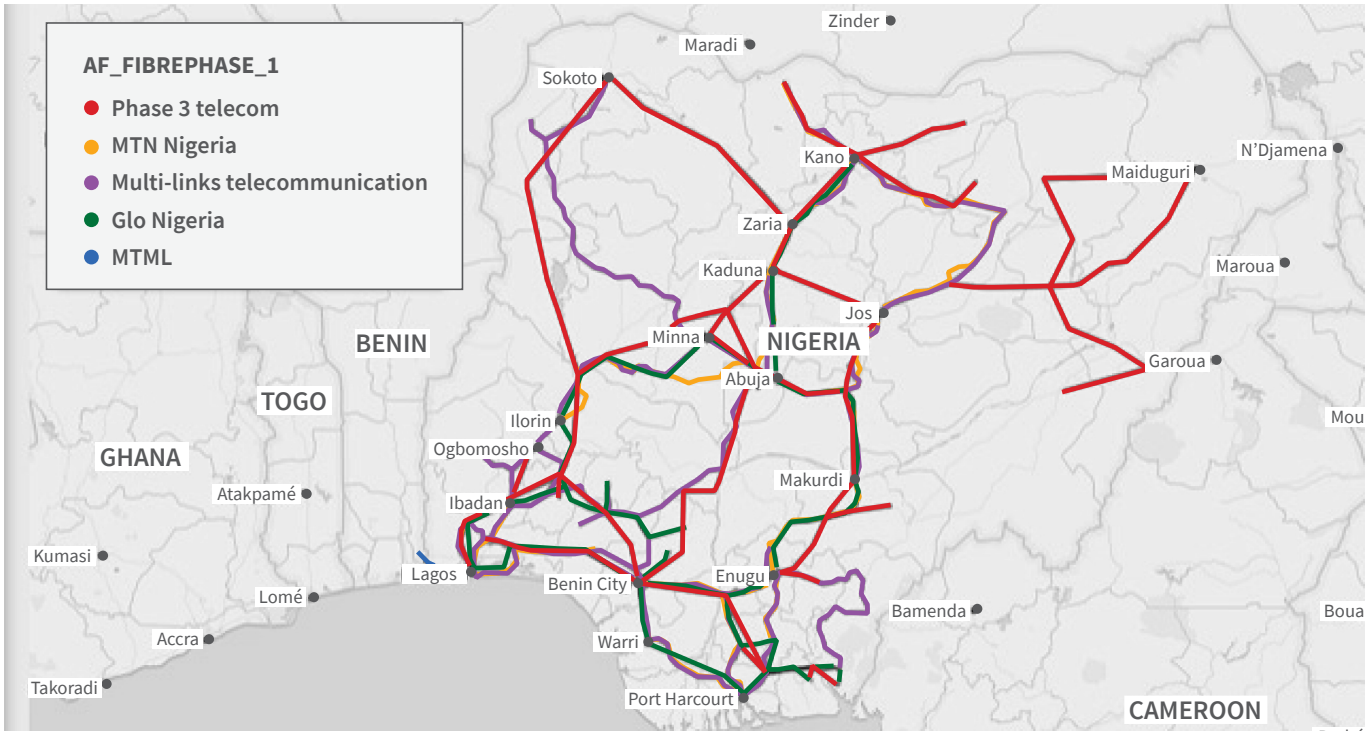


Figure 42: Fibre deployments in Nigeria

Source: Song, 2017

Table 21: Number of base stations in each state

Lagos	4 369
Ogun	1 735
Rivers	1 606
FCT	1 355
Delta	1 155
Ebonyi	304
Kebbi	295
Jigawa	290
Bayelsa	289
Yobe	187

Source: NCC, 2016

17.2.2 Access and use

A number of international organisations such as the ITU and national authorities use supply-side data to estimate penetration levels. In developing countries, where the majority of users are prepaid and own more than one SIM card, these estimates tend to over-estimate penetration levels. The ITU estimates mobile phone penetration in Nigeria to be 82 percent and Internet penetration to be 26 percent. On the contrary, the Nigerian national representative demand survey conducted by RIA in 2017 shows that only 64 percent of the Nigerian population own a mobile phone (See Part B of this report). The survey results also show that Nigeria comes last in terms of personal mobile penetration among the more developed markets in Africa: Ghana, Kenya and South Africa. Figure 47 shows from the Survey that among the comparator countries, mobile penetration among individuals in Kenya is 87 percent, followed by South Africa, with a mobile penetration level of 84 percent. Although these countries have far smaller populations, mobile penetration is more than 30 percent higher than that of Nigeria.

Following increased demand for Internet access, a number of African countries and private consortia have invested in high-bandwidth undersea cables to achieve reliable international communications, faster Internet access, and lower price. The dramatic drop in undersea cable prices was expected to stimulate increased commercial and entrepreneurial activities and ultimately economic growth, but without reductions in terrestrial backhaul prices, these outcomes have not materialised. On the user end, the growth of mobile phone technologies, which are cheaper than the historical fixed line technologies, was expected to reduce, if not eradicate, the digital divide in Africa, but, as the survey shows, unaffordability of Internet enable devices is one of the biggest barriers to bringing people online.

Unfortunately, Africa is still struggling with lower Internet penetration, with a large portion of the population not accessing the Internet. Measurable parameters, such as the

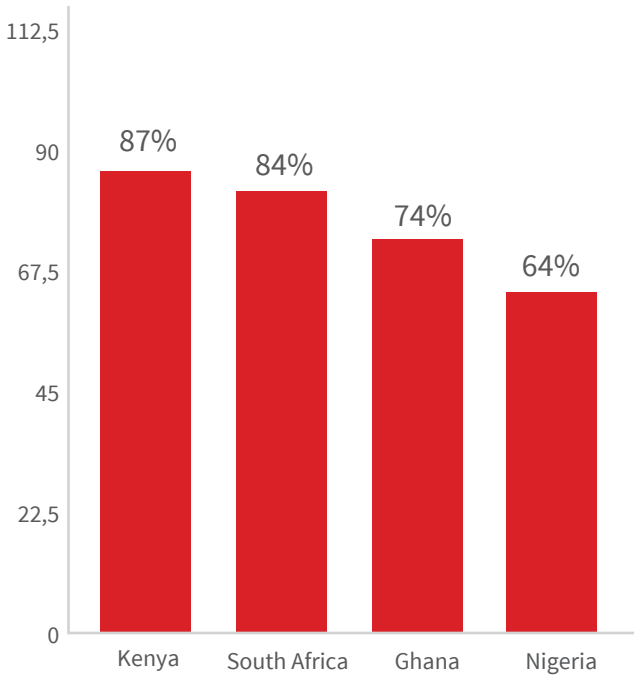


Figure 43: Individual mobile phone ownership in Africa's largest markets

Source: RIA After Access Survey, 2017

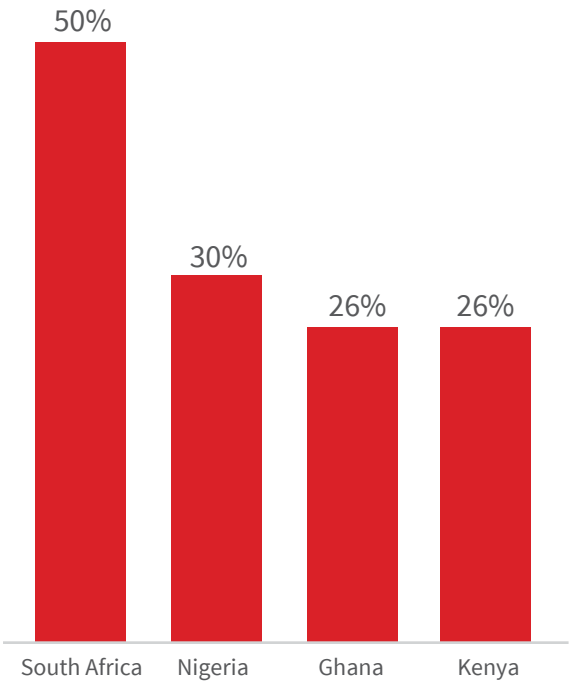


Figure 44: Individuals using the Internet in Africa's largest markets

Source: RIA After Access Survey, 2017

number of ISP subscribers, overall number of hosts, IXP-traffic, and overall available bandwidth are all an indication that Africa is way behind in the digital space.

Moreover, Africa exhibits an internal digital divide with most Internet users concentrated in its more developed markets. The results of the survey show that, in comparison to other large African markets, individual Internet usage is highest in South Africa (50%), followed by Nigeria, 20 percent behind at 30 percent, then Ghana (26%) and Kenya (26%).

On indicators of access and use Nigeria performs poorly relative to the other major telecommunication markets surveyed despite performing well in the affordability indicator.

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

ACCESS	COUNTRY-LEVEL INDICATOR	TRAFFIC LIGHT	COMPARISON AVERAGE	SOURCE
Active SIM cards per 100 inhabitants	81,82	🔴	120,93	ITU, 2016a
Individual Internet users per 100 inhabitants	25,67	🔴	38,22	ITU, 2016
Landlines per 100 inhabitants	0,08	🔴	2,66	ITU, 2016a

Table 23: Nigeria benchmarked against Ghana, Kenya, Mozambique, Tanzania and Uganda

ACCESS	COUNTRY-LEVEL INDICATOR	TRAFFIC LIGHT	COMPARISON AVERAGE	SOURCE
Active SIM cards per 100 inhabitants	81,82	🟢	63,21	ITU, 2016a
Individual Internet users per 100 inhabitants	25,67	🟢	22,61	ITU, 2016a
Landlines per 100 inhabitants	0,08	🔴	0,59	ITU, 2016a
International bandwidth per user (Bits/s)	2 986	🔴	12 912	ITU, 2016a

17.2.3 Affordability

It is known from surveys conducted across the continent over 10 years that the primary determinant of access and use is price – the price of devices and the price of services. The question that then arises is whether the price of services reflects the real costs of delivering the service.

Services can only be made affordable to the majority of people through subsidies, aggregation of demand at public access points, or lower prices.

As discussed, in the absence of a costing study, benchmarking is a useful way of assessing whether mobile (voice and data) is affordable in comparison to other countries. To do this analysis, RIA uses the quarterly-updated, comprehensive mobile pricing database of global south countries in the world. The data in the mobile pricing database is collected by RIA every quarter and covers 41 countries in Africa. RIA measures the cost of communication by mapping African mobile prepaid pricing trends with a voice and SMS basket, the RIA 1GB data basket and a Bundled Value for Money Index. Both the voice and SMS basket and the 1GB basket methodologies calculate the minimum price for consumers in the African market.

On every indicator that forms part of the affordability measure, Nigeria performs better relative to other major African telecommunication markets (Ghana, Kenya and South Africa) and the best-performing countries in sub-Saharan Africa. When asked why they do not use the Internet, 24 percent of households

Table 24: Nigeria benchmarked against best performers price to penetration Ghana, Kenya and South Africa (Note: Key applies to subsequent tables)

AFFORDABILITY	COUNTRY-LEVEL INDICATOR	TRAFFIC LIGHT	COMPARISON AVERAGE
Mobile prepaid voice basket (USD)	2,45	●	2,69
Dominant operator: Mobile prepaid voice basket (USD)	3,09	●	3,63
Mobile prepaid 1GB basket (USD)	2,89	●	4,89
Mobile prepaid 1GB basket (USD) Dominant Operator	2,89	●	6,81

Key: Green=Good, Yellow=Average and Red=Poor

Table 25: Nigeria benchmarked against Ghana, Kenya, Tanzania, Mozambique and Uganda

AFFORDABILITY	COUNTRY-LEVEL INDICATOR	TRAFFIC LIGHT	COMPARISON AVERAGE
Mobile prepaid voice basket (USD)	2,45	●	3,85
Dominant operator: Mobile prepaid voice basket (USD)	3,09	●	3,96
Mobile prepaid 1GB basket (USD)	2,89	●	2,97
Mobile prepaid 1GB basket (USD) Dominant Operator	2,89	●	3,18

stated that they cannot afford access devices such as smartphones and computers.
A significant proportion also stated that the cost of accessing services is too high. The same is observed at the individual level, with about 32 percent of those who do not use the Internet stating that the cost of data is too high for them.

17.2.4 Quality of service (data)

This indicator measures the ability of a network to achieve maximum bandwidth or provide a better network service in the areas of latency, uptime, packet loss, delays and throughput. It also looks at management of network resources by setting priorities for certain types of data (such as video and audio) on the network. In a data environment this is a critical factor in attracting and retaining customers on networks and a determinant of what people are willing to pay for a service. Overall, the Nigerian retail mobile market performs relatively well in comparison to other African countries but is not capitalising on the competitive opportunities it has with multiple players in the market to improve the pricing conditions and offerings for customers over time.

In RIA's Value for Money Index (VMI), where the value for money of multi-service bundles is calculated, Nigeria ranks 19th out of 25 countries with a score of 2.56. Competition in this area usually indicates a slightly higher level of innovation among operators in the market as they compete to offer higher value products and improve their market share. Nigeria's score of 2.56 is well behind that of top-scorer Rwanda (14.15), and points to problems with the country's level of product innovation. What is more concerning is that this low score was based on Airtel's 'Premier Connect' product, the only competition to which comes from MTN's two XtraValue bundles. The other operators either offer multi-service bundles with too little value to qualify for the VMI calculation, or simply do not offer data-based bundles at all.

Table 26: Nigeria benchmarked against Ghana, Kenya and South Africa

AFFORDABILITY	COUNTRY-LEVEL INDICATOR	TRAFFIC LIGHT	COMPARISON AVERAGE	SOURCE
Mobile prepaid voice basket (USD)	2,45	●	2,69	RIA
Dominant operator: Mobile prepaid voice basket (USD)	3,09	●	3,63	RIA
Mobile prepaid 1GB basket (USD)	2,89	●	4,89	RIA
Mobile prepaid 1GB basket (USD) Dominant Operator	2,89	●	6,81	RIA

Table 27: VMI score comparison of select African countries for Q3 2017

RANK	COUNTRY	VMI SCORE
1	Rwanda	14,15
4	Liberia	10,61
9	South Africa	6,03
19	Nigeria	2,56
25	Guinea-Bissau	1,08

Source: RAMP Index, 2017

17.2.5 Competition

Competition 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 Herfinfahl-Hirschman Index) and wholesale prices such as MTRs.

The Nigerian telecommunication market is highly concentrated with a Herfindahl-Hirschman Index (HHI) of 2 803.15 and a concentration ratio of the top three players (CR3) exceeding 80 percent.

This might suggest that industry is susceptible to collusion and price fixing. However, in reality the opposite is true, as competition is intense with periodic price wars in the data market. Among the factors that increase competition in the Nigerian telecommunication market is the existence of a mobile number portability facility, which eases consumers' flight to quality services, without the inconvenience of losing their unique number.

A major problem affecting the current state of the telecoms market in the country is the absence of regulation to allow small operators to compete effectively in the market.

Ensuring cost-based wholesale access to public networks would enable small operators and ISPs to compete more effectively on service offerings. This may even be anti-competitive, as the smaller operators suggest the dominant operator is vertically integrated, with the larger MNOs being able to push differential pricing in favour of related business to the disadvantage of competitors. Without transparent pricing, incumbent operators are able to discriminate on pricing between internal divisions and external customers.

With entrenched first-to-market advantages, and successfully-operated businesses (even though there is no extreme dominance in the market), due to its size and liquidity, MTN is able to invest in its network through company and spectrum acquisitions, thereby enhancing the quality of its business and distinguishing itself from its competitors to attract more customers.

This makes it more profitable and means it has more resources to compete more effectively. Without enforced cost-based access to larger operator networks, smaller operators are never able to penetrate the larger operators' growth cycle and gain a foothold in the market.

One of the ways some late entrants have been operating is by dropping prices to levels possibly below cost, although this is impossible to tell without costs studies. They appear unable to sustain this other than by not honouring commercial contracts on the grounds that without market dominance they do not have the cash flow.

A case in point is the debt owed to the dominant operators and tower companies by smaller companies.

In order to force payment, creditors have threatened to cut services off, which has been highly controversial as it would jeopardise their operations, but creditors seem unable to force payment through ordinary commercial activity and the rule of law. The evidence shows that large operators are reluctant to settle obligations thereby forcing smaller operators to take on unsustainable debt levels. This scenario should not be permitted by the regulator.

The ability of dominant networks or those with geographic monopolies on facilities to indulge in unfair behaviour is, however, muted by the growing role of MainOne as an independent provider of wholesale bandwidth, which is able to provide competition in some of the main centres and on some routes but not throughout the country.

Reviving NITEL as a common-carrier network would also provide competition in this area.

The quest to sell at all costs means that there is predatory pricing and wholesalers are in a position to undercut (their own) resellers by offering better prices to end-users within the same market. Currently, wholesale prices are relatively high and the rate at which they are being lowered over time does not match retail pricing. Hence, the evidence suggests that the regulator needs to be more proactive in dealing with these (and other) issues that impact on the efficiency of the market. Without a strong regulatory framework that enables a level playing field for all licensees, it is likely that smaller players would continue to lose ground and certain segments of the industry will be unattractive for new investments.

17

RECOMMENDATIONS

Clearly, on the evidence available, as presented above, the Nigerian telecoms industry is in crisis and requires significant multi-stakeholder interventions to be undertaken urgently at the highest levels of government and the NCC, to ensure that the gains of the past decade are not significantly eroded. The negative impact of failure in this critical sector on the local economy, and, indeed, on the African continent would be substantial.

Industry debt: Though the NCC has helped to resolve over 60 percent of the 2016 interconnect bills, the balance of inter-operator payments is still quite large and places the entire industry at grave risk. As a matter of national importance, urgent regulatory intervention needs to be undertaken to (a) resolve outstanding debts and (b) assist operators, on a real-time basis, (especially VAS players, tower companies and interconnect houses) to navigate the complexities involved in estimating, reconciling and settling what should otherwise have been regular commercial debts incurred in the ordinary course of business. This intervention also needs to be extended to the regulation of facilities leasing agreements, including structured provisions for the settlement of facilities leasing debts.

Intervention fund: There is a strong case for an intervention fund to help operators bridge the forex gap for the purposes of equipment importation. From all indications, telecoms in Nigeria has flipped from being cash-rich to being cash-hungry, as it were, and the ripple effect of the devaluation of the Nigerian naira in 2015 is still being felt by most operators as debt repayments have to be made at old exchange rates.

Market review of dominance: Smaller players are being choked out of business, competitive pricing is becoming hard to achieve, and there is a reluctance to pursue above-average quality of service standards for both retail and wholesale products. The regulator needs to conduct regular market reviews of dominance to identify conducts, sectors and practices that need to be remedied, either by way of moral persuasion, regulations or interventions, so as to keep the telecoms market healthy and competitive.

Cost to communicate: The NCC must create a fair, competitive environment for the multiple players in the market by implementing findings of its market review and applying the necessary pro-competitive remedies. Elimination of secondary taxes will remove a significant cost driver in the market. Even though data prices are relatively low in comparison to benchmark countries, they are still clearly unaffordable to many Nigerians. Incentivised infrastructure sharing and wholesale regulation of facilities and bandwidth will reduce input costs for services providers and private networks, but this requires a fair, competitive environment in which all players can compete.

Multiple taxation: The reality of multiple taxation persists, in spite of various efforts by NCC, ATCON and ALTON to resolve this problem. Operators continue to allege tax demands are being made of them by all levels of government, especially state and local governments, for all sorts of retrogressive levies over and above legal provisions. Some operators have sought judicial protection to prevent further harassment. The removal of unproductive secondary taxes also needs to be examined, in order to alter structurally the cost drivers in the market. (ITU, 2016b) This will make prices more affordable, which in turn, together with other complementary access strategies, will enable greater digital inclusion as a pre-condition for the success of national development strategies. Until a legally enforceable political intervention is ordered at the highest level of government (the presidency), it seems this problem will not be resolved. It is recommended that the NCC leads and promotes the initiative to bring to an end the era of multiple taxation of telecoms players in the country.

National backbone infrastructure: That Nigeria does not have a national backbone network for the transmission of high-speed data is at the heart of prevalent poor quality of voice and data services. While the Infraco model sought to address this through the licensing of new players, to provide regional backbone infrastructure, the responsiveness of industry has been lukewarm. The regulator would need to develop policies that can lead to a new open access common-carrier network, with guaranteed national rights of way by attracting new investments.

Right of way regulation: Government needs to direct the regulator requirements, to create a single, mandatory integrated right of way regime, that would support the rapid rollout of networks on the basis of unified and standardised wayleaves arrangements and environmental impact reporting.

Wholesale data regulation: Presently, Nigeria does not have regulations governing the wholesale data market, which has resulted in a lack of competition, pricing transparency, and seller power. While wholesale data can now be readily purchased by licensed operators, the terms, prices and conditions attached continue to negatively impact the rate and speeds being made available on the retail side. It is imperative that the NCC oversee the coordinated development of the wholesale data market, through active regulations and actions that promote healthy competition, improved service quality, higher data speeds and lower prices available to both retail and wholesale buyers.

Infrastructure sharing: Commercial infrastructure sharing that is being practised should be encouraged, where it is reducing the high costs of duplicating networks. However, where this is anti-competitive, or excludes other market players, the NCC should investigate the need for mandatory infrastructure sharing (both passive and active) at regulated cost-plus prices. This will lead to the rationalisation of unnecessary duplication of infrastructure.

National roaming: For the moment, consumers are not able to roam their phones from one network to another in places where they have no signal from their own operator, which defeats the goal of universal access. National roaming allows networks to extend their services to locations where they have no coverage by relying on the network infrastructure of a competitor. The regulator needs to

adopt and actively promote national roaming, especially in the light of the apparent failure of number portability which was designed in part to address the same problem.

Spectrum: The regulator needs to review spectrum policy to ensure more optimal co-existence of licensed and unlicensed spectrum, and that will optimise spectrum for diverse needs in the country, while prioritising affordable access to communications. Licensed spectrum is required for the evolution of existing services and needs to be assigned at a competitively-determined (efficient use) price to ensure the efficient build-out of capital-intensive networks. Nationally allocated spectrum not in use in remote areas should be available for free or low-cost use by community-based or not-for-profit micro-networks. Innovative use of unlicensed spectrum can also spur investment and innovation in technologies that can complement licensed networks to expand low-cost, last-mile broadband access.

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 is suggested (for example, providing free public Wi-Fi access in municipalities, schools, clinics) as a complementary service to enable digital inclusion. The NCC should consider play or pay universal service obligations that could include forgoing unused spectrum and conditional licensing of high demand spectrum (for example, requiring 3G or rural rollout before 4G can be operationalised).

Regulatory convergence: Nigeria's current national telecoms policy provides for the merger of the NCC and NBC, with the new entity also taking over the regulatory functions of NITDA and NIPOST. This proposal conforms to global and continental best practice. The delay in establishing this new body detracts from the ability of the Government to achieve its plans to create a digital society and needs to be addressed.

National ICT indicators: Various portfolio organisations require information and data to ensure evidence-based planning and implementation, as does government for policy formulation, implementation and monitoring. Many appropriately have research functions related to their mandate. Historically, the NCC is the custodian of data on the telecommunications sector, although in recent times statistics with which to build and update indicators are being collected on an ad hoc and irregular basis. Consequently, an integrated and coordinated data-gathering procedure for the sector is required, one that allocates responsibilities for the collection of data and its publication on a national indicator data portal, with the underlying dataset available within an open data framework.

Legislation for secure and trusted Internet: A legal and regulatory framework offering a secure and trusted environment for people to come and stay online requires harmonisation with global governance on issues of cybersecurity, privacy and data protection. An open data policy would also enhance information flows for transparent and accountable governance and create local content and application opportunities for local entrepreneurs

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19 ANNEXURES

ANNEXURE 1

ITU proposed indicators for ICT SDG goals and targets		
SDG Goal	**SDG Target**	**Proposed ICT indicator**
Goal 1: End poverty in all its forms everywhere	Target 1.4: By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance.	Proportion of households with broadband Internet access, by urban/rural
Goal 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all	Target 4.4: By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship.	Proportion of individuals with ICT skills, by type of skills
Goal 5: Achieve gender equality and empower all women and girls	Target 5b: Enhance the use of enabling technology, in particular information and communications technology, to promote women's empowerment.	Proportion of individuals owning a mobile phone, by sex
		Proportion of individuals with ICT skills, by type of skills
Goal 9: Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation	Target 9.1: Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all.	Proportion of households with broadband Internet access, by urban/rural
	Target 9.c: Significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet in least developed countries by 2020.	Broadband Internet prices
		Percentage of the population covered by a mobile network, broken down by technology
Goal 16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels	Target 16.10: Ensure public access to information and protect fundamental freedoms, in accordance with national legislation and international agreements.	Proportion of individuals using the Internet
Goal 17: Strengthen the means of implementation and revitalise the global partnership for sustainable development	Target 17.6: Enhance North-South, South-South and triangular regional and international cooperation on and access to science, technology and innovations, and enhance knowledge sharing on mutually agreed terms, including through improved coordination among existing mechanisms, particularly at the United Nations level, and through a global technology facilitation mechanism.	Fixed Internet broadband subscriptions broken down by speed
	Target 17.8: Fully operationalise the technology bank and science, technology and innovation capacity-building mechanism for least developed countries by 2017 and enhance the use of enabling technology, in particular information and communications technology.	Proportion of individuals using the Internet
		International Internet bandwidth per inhabitant (bits/second/inhabitant)

ANNEXURE 2

Indicator	Definition
Average revenue per user in USD (Blended ARPU)	Average Revenue per User (ARPU) is the total revenue of all operators divided by the total number of connections. It is blended ARPU because it includes all subscribers - both prepaid and contract subscribers. The ARPU shown here is the average ARPU over the last 4 quarters.
Facebook users per 100 inhabitants	Facebook users per 100 inhabitants is calculated by dividing the total number of Facebook users in the country by the total population and multiplying by 100.
Data traffic per connection (highest operator)	Highest data traffic per connection is calculated by taking the operator with the highest ratio of data traffic transferred over its mobile network divided by the number of connections.
Highest minutes of use (MOU) per connection	Minutes of Use (MoU) per connection is defined as the total number of minutes, including incoming, outgoing and roaming calls, transferred over the mobile network in the period per connection. Highest MoU per connection is calculated by taking the operator with the highest average MoU per connection over the last 4 quarters.
International bandwidth per user (kbps)	International Bandwidth refers to the amount of data transfer capacity to and from a country to the rest of the world. It is calculated by adding the capacity of all international data lines (such as undersea cables) and then dividing by the total population.
Connections per base stations	Lowest number of connections per base station among operators. Connections per base station is calculated by dividing the average number of connections for the country in the last 4 quarters by the total number of base stations in the country.
% population covered by mobile signal	Percentage of the total population that lives in an area where mobile phone calls can be made, which are covered by a mobile network signal. Less than 75 percent coverage is a red signal; between 75 percent and 95 percent is an orange signal and greater than 95 percent is a green signal.
Country level investment per subscriber in USD	Country level MNO investment per subscriber in USD is the sum of all capital investment (CAPEX) for the last 4 quarters for all operators. This is divided by the total number of active SIM cards in the country.
Market concentration (HHI)	Market concentration is measured by the Herfindahl-Hirschman Index (HHI). The HHI is calculated by squaring the market share of each firm competing in a market, and then summing the resulting numbers. The indicator used here is the average of the last 4 quarters. A score of greater than 5,000 is a red signal; between 2,500 and 5,000 is an orange signal and less than 2,500 is a green signal.
Interconnection: mobile termination rates (US ¢)	Interconnection: Mobile Termination Rates is the wholesale rate that mobile operators levy on each other for terminating calls on their networks. An MTR of greater than 4 cents is a red signal; between 2 and 4 cents is an orange signal and less than 2 US cents is a green signal.
Mobile prepaid 1GB broadband basket (USD)	The mobile prepaid 1GB broadband basket consists of a prepaid data package - for a mobile phone - of 1GB, valid for at least 30 days. If no operator provides a 1GB bundle, smaller data packages are collated to make up 1GB.
Mobile 1GB basket percent of GDP/ capita per month	To add the dimension of affordability, the mobile broadband basket is divided by GDP per capita in US Dollars to provide an indication of the cost of broadband data as a percentage of income.
Effective price (USD)	Effective price is the blended Average Revenue Per User (ARPU) divided by Minutes of Use per connection and is an estimate for the average price paid by subscribers of a network. See definition of ARPU and MoU further down. Blended ARPU contains also non-voice revenues and the effective price is thus only an approximation.

Indicator	Definition
Mobile prepaid voice basket (USD)	The mobile prepaid voice basket refers to the price of a standard basket of mobile monthly usage for 30 outgoing calls per month (on-net, off-net to a fixed line and for peak and off-peak times) in predetermined ratios, plus 100 SMS messages and converted into USD.
Mobile prepaid basket percent of GDP/capita per month	To add the dimension of affordability, the mobile prepaid voice price basket is divided by GDP per capita per month in US Dollars to provide an indication of the price basket as a percentage of income.
Value for Money Index (VMI)	RIA created the VMI as a means to capture the value of combined data, SMS and voice packages on offer. Given the complexity as well as increased number of products on the markets, only bundles offering data combined with voice and SMS or, data and voice, or data and SMS are captured. Previously RIA used the OECD price basket to capture and assess voice and SMS bundles. Blended packages which include data, however, cannot be captured on the OECD basket given the different in-bundle and out-of-bundle prices. Adding data to voice baskets does not reflect the value for data use accurately. VMI measures the value a customer gets for bundled minutes or SMSs and data per month. OECD usage baskets that RIA uses for prepaid products are based on minute, SMS and data tariff capturing the monthly basket cost. The VMI complements this as it calculates the value for the blended bundle, beyond monthly basket cost.
Smartphone basket	This indicator is a user basket from the perspective of a smart phone user using predominantly OTT for communication. It is based on 100 minutes of voice calls, 100 SMS and 1GB of data a month and thus represents an average user. An OTT user does not care whether calls are on-net or off-net and whether they are peak or off-peak. Most communication is done using OTTs anyway (OTTs are applications like Skype or WhatsApp). No assumption is made on the allocation of calls and SMS and the quantities are simply multiplied with the average minutes and SMS costs.
Individual Internet users per 100 inhabitants	Individual Internet users per 100 inhabitants refers to the proportion of individuals that used the Internet in the last 12 months. This figure is estimated by the ITU and is not based on household surveys.
Active SIM cards per 100 inhabitants	Active SIM cards per 100 inhabitants is the total number of mobile connections per 100 inhabitants. The figure includes M2M and duplicated SIM cards and is thus higher than actual subscribers.
Percentage of mobile owners with smartphones	A smartphone is defined as a mobile handset enabling advanced access to Internet-based services with computer-like functions and running an operating system such as Android, iOS, Windows Phone and BlackBerry. The percent of mobile owners with smartphones is calculated by taking the average number of smartphone users over the last 4 quarters and dividing by the total number of mobile connections.

The table below depicts the authorisation tenure and licence fees for different individual licence categories

Individual licence categories and fees			
Licence category	**Type of authorisation**	**Authorisation tenure**	**Fees (Naira)**
Sales and installation of terminal equipment (S and I)			
Including satellite Telecommunications Equipment	Individual Licence	5 years	500,000
Including switching equipment of more than 600-line capacity and major network	Individual Licence	15 years	2,000,000
Value added services			
Prepaid Calling Card (PPCC)	Individual Licence	5 years	1,000,000
Call Directory Services	Individual Licence	5 years	500,000
Special Numbering Services	Individual Licence	10 years	3,000,000
Call Centre Services	Individual Licence	5 years	500,000
Content Services using Short Code	Individual Licence	5 years	500,000
Automated Vehicle Tracking Services (AVTS)	Individual Licence	5 years	500,000
Internet Services (ISP)	Individual Licence	5 years	500,000
Paging	Individual Licence	5 years	500,000
Commercial Basic Radio Communications Network Services	Individual Licence	10 years	250,000
Trunk Radio Networks	Individual Licence	10 years	3,000,000
Collocation/Infrastructure Sharing Services	Individual Licence	10 years	2,000,000
Internet Exchange Services	Individual Licence	10 years	1,000,000
Interconnect Exchange Services	Individual Licence	10 years	1,000,000
Private Network Links (PNL) and Local Exchange Operator (cable only)			
Tier 1 (Urban)	Individual Licence	10 years	2,000,000
Tier 2 (Urban)	Individual Licence	10 years	1,200,000
Tier 3 (Urban)	Individual Licence	10 years	1,000,000
Tier 4 (Urban)	Individual Licence	10 years	857,000
Tier 5 (Urban)	Individual Licence	10 years	571,000
Tier 1 (Semi-Urban)	Individual Licence	10 years	1,000,000
Tier 2 (Semi-Urban)	Individual Licence	10 years	600,000
Tier 3 (Semi-Urban)	Individual Licence	10 years	500,000
Tier 4 (Semi-Urban)	Individual Licence	10 years	428,500
Tier 5 (Semi-Urban)	Individual Licence	10 years	285,500

Individual licence categories and fees			
Licence category	**Type of authorisation**	**Authorisation tenure**	**Fees (Naira)**
Tier 1 (Rural)	Individual Licence	10 years	300,000
Tier 2 (Rural)	Individual Licence	10 years	180,000
Tier 3 (Rural)	Individual Licence	10 years	150,000
Tier 4 (Rural)	Individual Licence	10 years	128,500
Tier 5 (Rural)	Individual Licence	10 years	85,650
PNL Regional			
National	Individual Licence	10 years	44,600,000
Tier 1	Individual Licence	10 years	2,800,000
Tier 2	Individual Licence	10 years	1,680,000
Tier 3	Individual Licence	10 years	1,400,000
Tier 4	Individual Licence	10 years	1,200,000
Tier 5	Individual Licence	10 years	800,000
Global Mobile Personal Communications by Satellite (GMPCs)			
Service Provider	Individual Licence	10 years	5,000,000
Land Earth Station Operator	Individual Licence	10 years	10,000,000
Group Licence	Individual Licence	10 years	Not yet specified
Metropolitan Fibre Cable Network	Individual Licence	20 years	1,000,000
International Data Access (IDA)	Individual Licence	10 years	25,000,000
Full Gateway Services (FGS)	Individual Licence	10 years	50,000,000
National Long-Distance Access (NLDO)	Individual Licence	20 years	20,000,000
Universal Access Service (USAL: fixed telephony national/regional, DML, RLDO, NLDO, IDA, FGS)			
National	Individual Licence	20 years	Fee depends on services within the Unified Service Licence category that the applicant is interested in
Tier 1	Individual Licence	20 years	
Tier 2	Individual Licence	20 years	
Tier 3	Individual Licence	20 years	
Tier 4	Individual Licence	20 years	
Tier 5	Individual Licence	20 years	
Non-commercial/closed user radio networks for non-telecoms companies			
2 Way Radio System	Individual Licence	1 year	125,000
3-30 Fixed and/or Mobile (HF/ VHF/UHF) Stations	Individual Licence	1 year	500,000
31-50 Fixed and/or Mobile (HF/ VHF/UHF) Stations	Individual Licence	1 year	1,250,000

Individual licence categories and fees			
Licence category	**Type of authorisation**	**Authorisation tenure**	**Fees (Naira)**
More than 50 Fixed and/or Mobile Stations including Microwave and VSAT Networks	Individual Licence	1 year	2,500,000
Fixed and/or mobile stations including microwave and VSAT networks and embassies	Individual Licence	1 year	-
International Cable Infrastructure and Landing Station Licence	Individual Licence	20 years	210,000 (Conversion based on Central Bank of Nigeria)

Source: A compilation of NCC licensing information available on the website: www.ncc.gov.ng (NCC, 2013a)

The table below depicts the authorisation tenure and licence fees for different class licence categories.

Class licence categories and fees			
Licence category	**Type of authorisation**	**Authorisation tenure**	**Fees (Naira)**
Sales and installation of terminal equipment (S and I)			
Including mobile cellular phones and HF/VHF/UHF Radio	Class Licence	Once-off	10,000
Including Fixed Telephone sets, Modem, Cordless phones, Fax machines and PABX and switches not exceeding 30-line capacity			
Repairs and maintenance of telecom facilities			
Category A: For an individual technician operating small workshop	Class Licence	Once-off	10,000
Category B: For companies operating small and medium workshop			
Category C: For companies operating comprehensive workshop			
Cabling			
Category A: For individual technician (cabling within premises only)	Class licence	Once-off	10,000
Category B: For companies (cabling within premises and/or estate)			
Category C: For companies (including underground cabling)			
Tele-centre/cyber cafe			
Commercial Telephone Call Centre only: In Urban areas In Rural areas Commercial Telephone call plus retail Internet Services Category. A for individual technician (cabling within premises only)	Class Licence	Once-off	10,000
Public Payphone	Class Licence	Once-off	10,000

Source: A compilation of NCC licensing information available on the website: www.ncc.gov.ng (NCC, 2013a)

ANNEXURE 3 – SPECTRUM FEES

The price of commercial frequency spectrum is calculated using the formula below:

Spectrum Fee = (U) × B) × (K1) × (K2) per State

- U refers to the Unit Price: This varies according to Licensing Region/Tier of the State in which the applicant seeks to operate
- B refers to the Assigned Bandwidth (Spectrum Size) in MHz
- K1 refers to the Band Factor
- K2 refers to the Tenure Duration Factor.

TIER	STATES	PRICE (MHZ/YEAR)
U = Unit Price: This varies according to Licensing Region/Tier of the State in which the applicant seeks to operate.		
Tier 1	Lagos	3,000,000
Tier 2	Delta; Federal Capital Territory, Abuja; Kaduna; Kano; and Rivers.	1,500,000
Tier 3	Abia; Anambra; Edo; Ogun; and Oyo.	1,200,000
Tier 4	Akwa Ibom; Bauchi; Bayelsa; Benue; Borno; Cross River; Enugu; Imo; Kogi; Kwara, Niger; Ondo; Osun; and Plateau.	600,000
Tier 5	Adamawa; Ebonyi; Ekiti; Gombe; Jigawa; Katsina; Kebbi; Nassarawa; Sokoto; Taraba; Yobe; and Zamfara.	300,000
B = Assigned Bandwidth (Spectrum Size) in MHz		

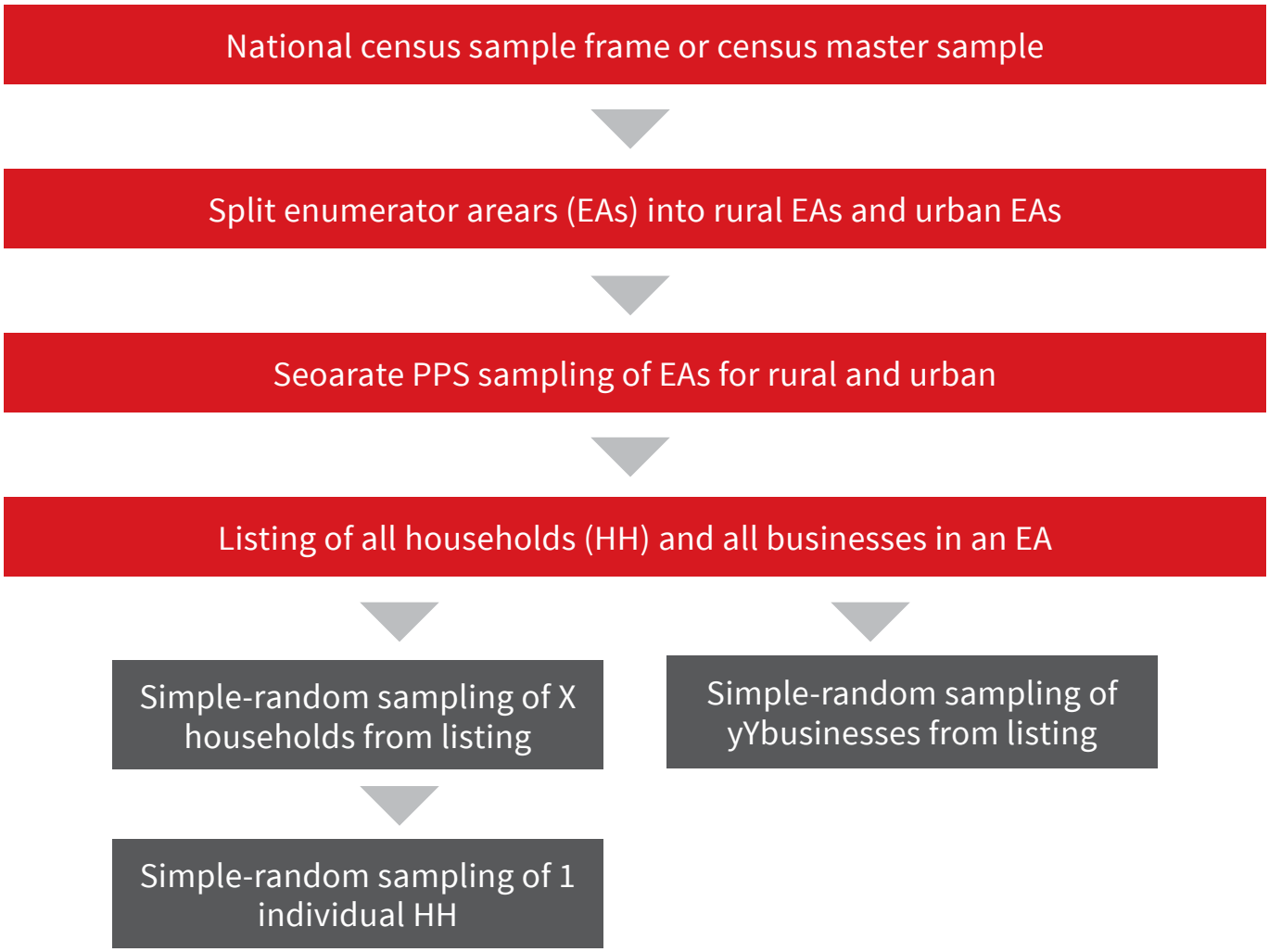
K1= Band Factor

- 1.0 for 3.5GHz Band
- 1.6 for 1.8/1.9GHz Band
- 1.4 for 800/900MHz Band
- 1.2 for 2.0-2.5GHz Band
- 0.33 for 10.5GHz Band
- 0.12 for 26GHz Band
- 2.0 for 450MHz
- 0.5 for 5.0GHz

K2= Tenure Duration Factor

- 0.3 for 3 months
- 1.0 for 1-year licence
- 4.0 for 5-year licence (Standard)
- 7.2 for 10-year licence
- 10.4 for 15-year licence

ANNEXURE 4 – SURVEY METHODOLOGY



Weighting

Three weights need to be constructed: for households, individuals and informal businesses. The weights are based on the inverse selection probabilities and gross up the data to national level when applied.

Household weight: $HH_w = DW \frac{1}{P_m * P_{EA}}$

Individual weight: $IND_w = DW \frac{1}{P_m * P_{EA} * P_1}$

Business Weight: $Bus_w = DW \frac{1}{P_m * P_{EA}}$

Household Selection Probability: $P_{HH} = \frac{n}{HH_{EA}}$

EA Selection Probability: $P_{EA} = m \frac{HH_{EA}}{HH_{STRATA}}$

Individual selection Probability: $P_1 = \frac{1}{HH_{M15+}}$

Business Selection Probability: $P_1 = \frac{q}{BUS_{EA}}$

DW = design weight compensation for over-sampling of urban EAs and under-sampling of rural EAs

HH_{EA}= number of households in selected EA based on information of last census or updated listing by field team

HH_{SRATA} =number of households in strata (urban, rural)

HH_{m15+} =number of household members or visitors 15 years or older

m = target number of EAs for each stratum, (urban, rural)

n = target number of households in EA

q = target number of businesses in EA

The target number of households in each EA varied from country to country. Usually 20 households are selected from each EA and 10 businesses.

The sample

A nationally-representative sample of 1 808 households and individuals were interviewed in Nigeria. Ideally, a sample should be representative of the larger population with respect to al variables being used in the survey.. Unfortunately, this is not always the case. A problem that often arises in surveys is non-responses. It may cause some groups to be over- or under-represented. Another problem is self-selection. If such problems occur, no reliable conclusions can be drawn from the observed surveyed data, unless something can be done to correct for lack of representativity.

To achieve representivity, weighting is applied. The weights assign an adjustment weight to each survey respondent. Persons in under-represented groups get a weight larger than 1, and those in over-represented groups get a weight smaller than 1. In the computation of means, totals and percentages, not just the values of the variables are used, but the weighted values.

A weighted adjustment technique can only be carried out if proper auxiliary variables are available. Such variables must be available in the survey and the population distribution must be available. Typically, the auxiliary variables are gender, marital status and region of a country. In this study location (urban and rural) was used as the auxiliary variable and a 40:60 split for urban/rural areas was used. Nigeria has done its last census in 2008 and there are no updated population statistics available for the BOS. While it is generally accepted that in cases like this the World Bank population statistics would provide a better estimate, this was not the case. According to the World bank, population statistics split over rural and urban areas for population over 15 years is 50:50. However, this was countered by Nigerian officials who estimate a 30:70 percent split. The 2017 survey a split of 40:60 was used as value that lies closer to all the estimated splits.

ANNEXURE 5 - INTERVIEWS CONDUCTED IN NOVEMBER 2017

The authors held face-to-face in-depth interviews in Lagos and Abuja, Nigeria, with the following senior telecommunications executives:

- Sola Teniola (President, Association of Telecommunications Companies of Nigeria)
- Gbenga Adebayo (President, Association of Telecommunications Operators of Nigeria)
- David Venn (CEO, Spectranet)
- Anthony Adegbola (CTO, nTEL)
- Tobechukwu Okigbo (Director, MTN)
- Adia Sowho (GM, 9Mobile)
- Gbolahan Shobowale (Senior Portfolio Manager, Airtel)
- Esaie Diei (Director, Glo).