Final report for GSMA

Assessment of the economic impact of wireless broadband in Nigeria

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analysys mason

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Annex A Glossary of terms

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1 Introduction

Analysys Mason has prepared this report for GSMA to assess the direct and indirect economic impact of wireless broadband in Nigeria. The content of this report is based entirely on the sources and data presented in an earlier report[1] by Analysys Mason.

Our study has found a vibrant Internet ecosystem in Nigeria. Estimates suggest that by 2009-10, between 31 and 44 million Nigerians had accessed the Internet; data from a variety of sources suggests that Nigerian consumers are already using the Internet for socialising, entertainment, reading news and job hunting. Many users whose first experience of the Internet was at cybercafés are acquiring personal mobile data subscriptions – with the result that around 30% of website hits from Nigeria originate from phones.

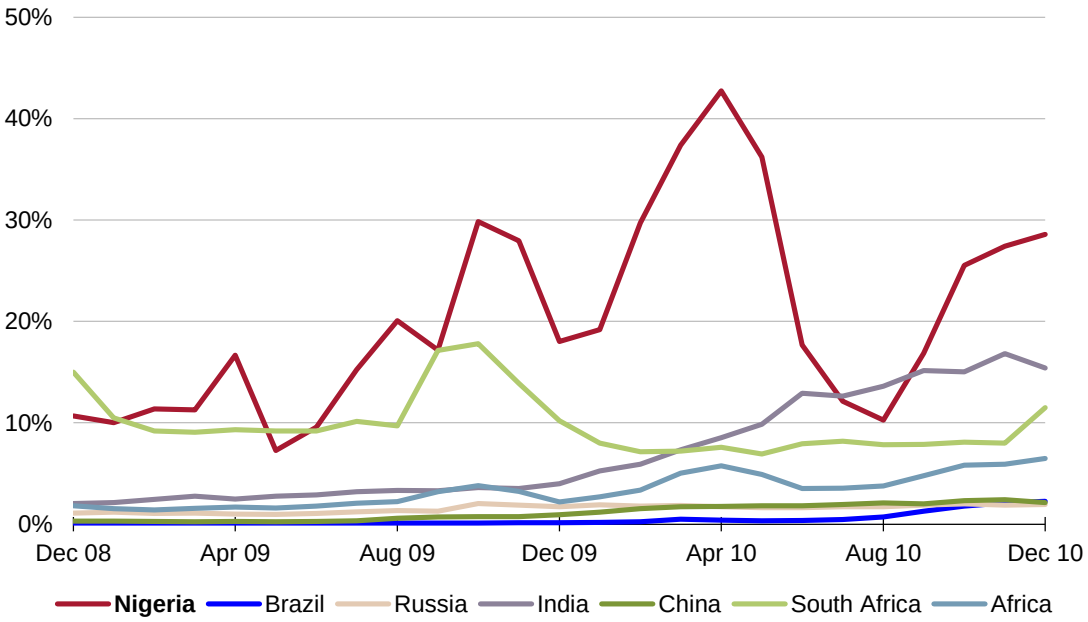


Figure 1.1: Proportion of Internet hits from mobile phones [Source: StatCounter.com]

Three major supply-side issues that threaten broadband need to be addressed:

- access to terrestrial fibre
- taxes and administrative burden
- electricity supply.

Analysys Mason estimates that wireless broadband could potentially contribute over 1% of GDP – and 1.7% of non-oil GDP – in 2015 (see Figure 1.2), supporting diversification of the economy.

[1] Analysys Mason, "Assessment of economic impact of wireless broadband in Nigeria", February 2011 (ref number 18059-64)

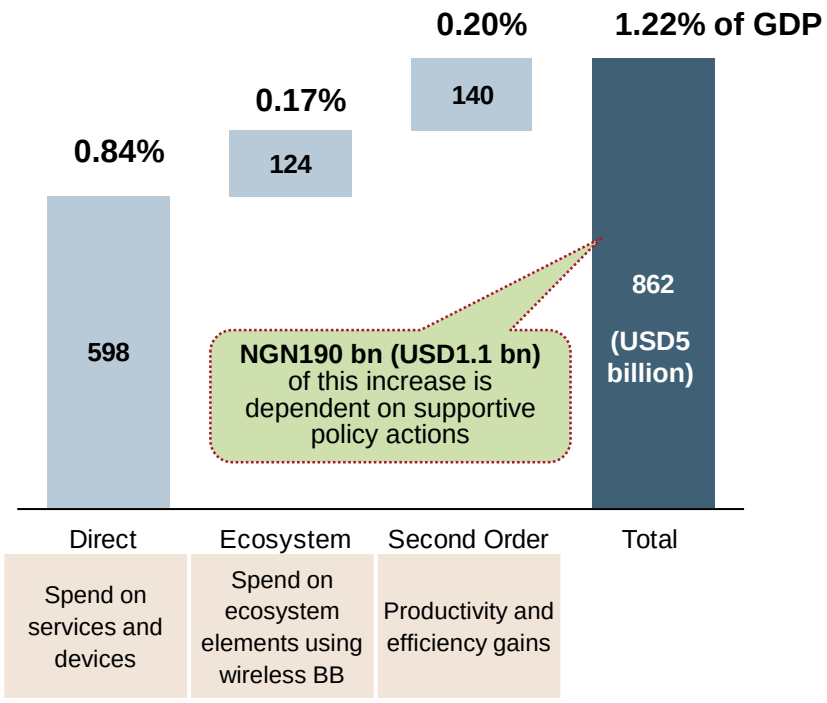


Figure 1.2: Potential impact on GDP of wireless broadband services [Source: Analysys Mason]

Such economic gains, however, depend on a positive environment created by all stakeholders that will address infrastructural challenges, spectrum management, and access to the Internet for women and rural citizens.

On the policy side, a converged media and telecommunications regulator is needed to support the industry in delivering services to Nigerians by adopting a coherent framework. In particular, care must be taken with spectrum management to ensure that:

- 2.6GHz spectrum is made available quickly, using the internationally-accepted band plan, to support demand in urban areas
- digital dividend spectrum should be released as soon as possible to extend broadband to suburban and rural areas
- a single agency, familiar with the major uses of spectrum, should manage the assignment of spectrum rather than having responsibility split between two or more agencies.

We discuss these challenges in the remainder of this report, which is laid out as follows:

- Section 2 gives an overview of broadband services in Nigeria.
- Section 3 discusses the Internet ecosystem in Nigeria
- Section 4 assesses the socioeconomic impact of wireless broadband
- Section 5 discusses policy imperatives for a successful wireless broadband market
- Annex A provides a glossary of terms used in this report.

2 Overview of broadband services in Nigeria

Broadband is still in its infancy in Nigeria and there is clearly still significant room for growth. The challenges faced by wireline networks mean that Nigeria – like much of Africa – will need to focus on wireless access technologies to bring broadband Internet access to its population.

2.1 Current status

With almost non-existent wireline services, broadband in Nigeria is driven by wireless access technologies. Fixed network infrastructure is very limited outside Lagos, a problem which has been exacerbated by the fact that state-owned incumbent Nitel has undergone turbulent privatisations, nationalisations and management changes in the last ten years. Subscribers to its fixed service, and to mobile division M-Tel's mobile service, have been in decline over this period despite substantial growth in the broader telecommunications market.

Wireless broadband connectivity is of critical importance to effectively seizing the opportunity presented by Internet and data access in Nigeria. With a wireless penetration[2] of 56% at the end of 2010 and a population approaching 160 million, Nigeria's wireless telecoms market remains among the most promising in Africa and other emerging markets (see Figure 2.1 for comparison with BRICS countries).

[2] Penetration as percentage of population. 'Wireless broadband & 3G' includes all WCDMA, HSPA, CDMA EV-DO and TD-SCDMA connections – the numbers also include voice users over these networks. Source: Telegeography.

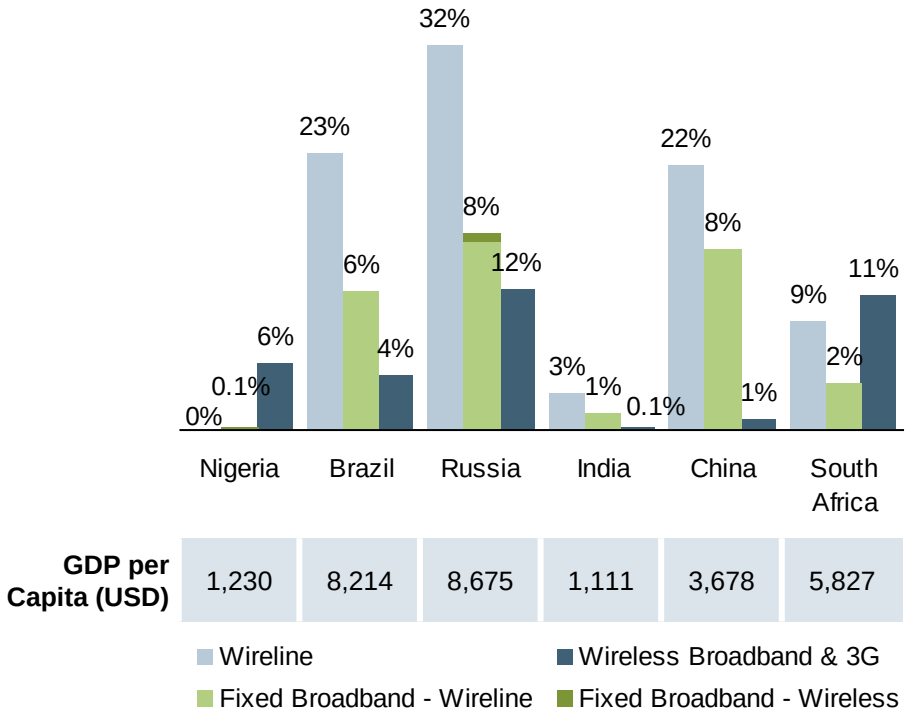


Figure 2.1: BRICS countries and Nigeria: broadband and wireline penetration by access technology (2009) [Source: Analysys Mason, TeleGeography, Wireless Intelligence, EIU]

Mobile operators

The four main GSM operators in Nigeria, MTN, Glo, Airtel and Etisalat, also hold 3G UMTS licences. Together, these operators serve about 90% of Nigeria's 90 million subscribers with the remainder of the market largely accounted for by a number CDMA operators, including Visafone, Multi-Links and Starcomms. The market shares of MTN and Glo have remained relatively constant over the last three years, while Airtel's market share has been squeezed by Etisalat. MTN, Glo and Airtel have proven their ability to tackle the infrastructure challenges with both each reaching over 85% population coverage (with Etisalat still building out its network), while CDMA and WiMAX operators remain limited to major towns and cities.

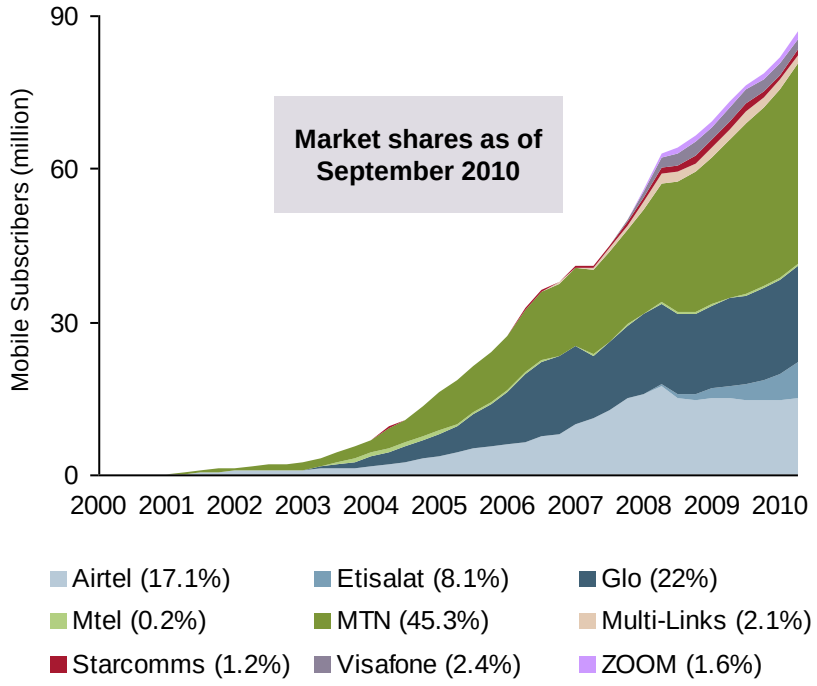


Figure 2.2: Nigerian historical quarterly data on mobile subscribers by operator [Source: Wireless Intelligence]

Fixed retail operators

Growth in fixed-line broadband has been hampered by the poor state of Nitel's PSTN.[3] The number of fixed lines – including fixed wireless connections – has grown steadily since 2001, reaching 1.2 million lines in August 2010. The growth is largely due to the efforts of alternative fixed wireless operators such as Starcomms and Reltel ('ZOOM') that offer fixed terminals to connect to their CDMA networks. Many services traditionally served by wireline access (such as cybercafés) are, in fact, connected via wireless (whether fixed or mobile).

Wholesale operators

Although Glo was awarded a second national licence (allowing it to offer wireline services) in 2002, it only launched its fixed services for commercial and wholesale customers in 2008. NITEL launched its wholesale Internet service in April 2005, enabling ISPs and carriers with an IP carriage capacity to provide services over its network. Several providers have also built out networks under National Long Distance licences.

Wireless broadband

We expect that wireless broadband services using HSPA and LTE will continue to drive increased broadband reach. Although multiple wireless technologies are used, only GSM operators have

[3] In February 2010, the sale of a 75% stake in the incumbent; NITEL was agreed with for a reported USD2.5 billion, Recent reports (as reported by TeleGeograpghy on 16 June 2011) however suggests the deal has been called off.

national scale and coverage. CDMA wireless broadband networks (using EV-DO) were first to launch, while 3G (UMTS) licences were only awarded in April 2007.

The introduction of CDMA EV-DO and HSPA networks have widened broadband access. Both Glo and MTN launched HSPA services in February 2008, with Airtel following with its own launch a year later. Glo announced in January 2011 that it had launched Africa's first LTE network.[4]

Wireless broadband subscribers now account for over half of all high-speed Internet service users. By Q4 2010, it was estimated that wireless broadband connections in Nigeria numbered just less than 600 000. By the end of 2011, the HSPA/LTE share of subscribers is expected to be higher than CDMA, which is likely to remain confined to major towns.

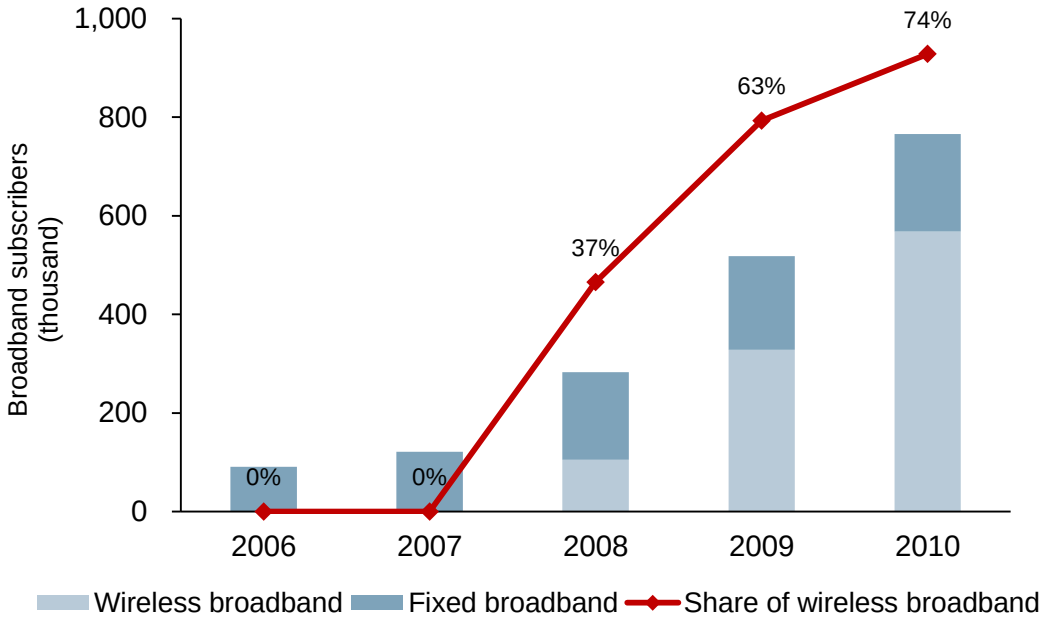


Figure 2.3: Broadband market subscribers [Source: AfricaNext]

HSPA has created momentum in the mobile broadband market despite only being launched in 2008. Wireless broadband services using HSPA and LTE are expected to continue to drive increased broadband reach.

[4] Glo January 2011 press release

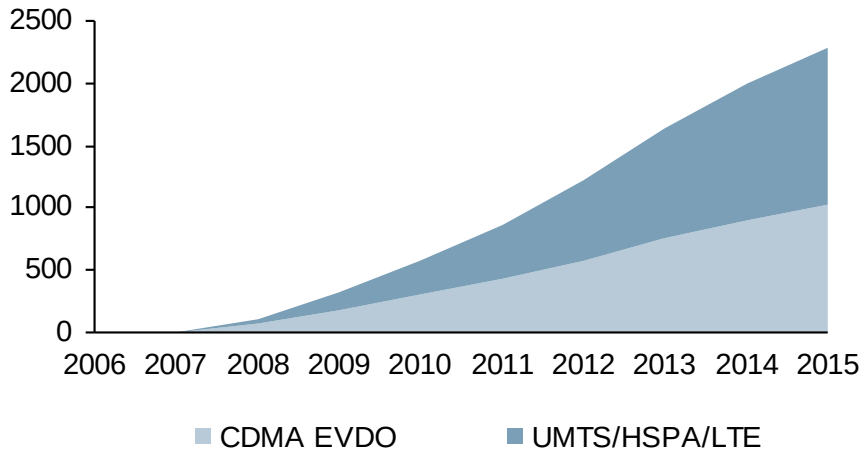


Figure 2.4: Wireless broadband subscribers in Nigeria (thousand) [Source: AfricaNext]

2.2 Demand side

With a lack of household PCs, Nigerians have been accessing the Internet through other devices. Figure 2.5 shows the contribution of mobile devices in Nigeria compared with BRICS countries.

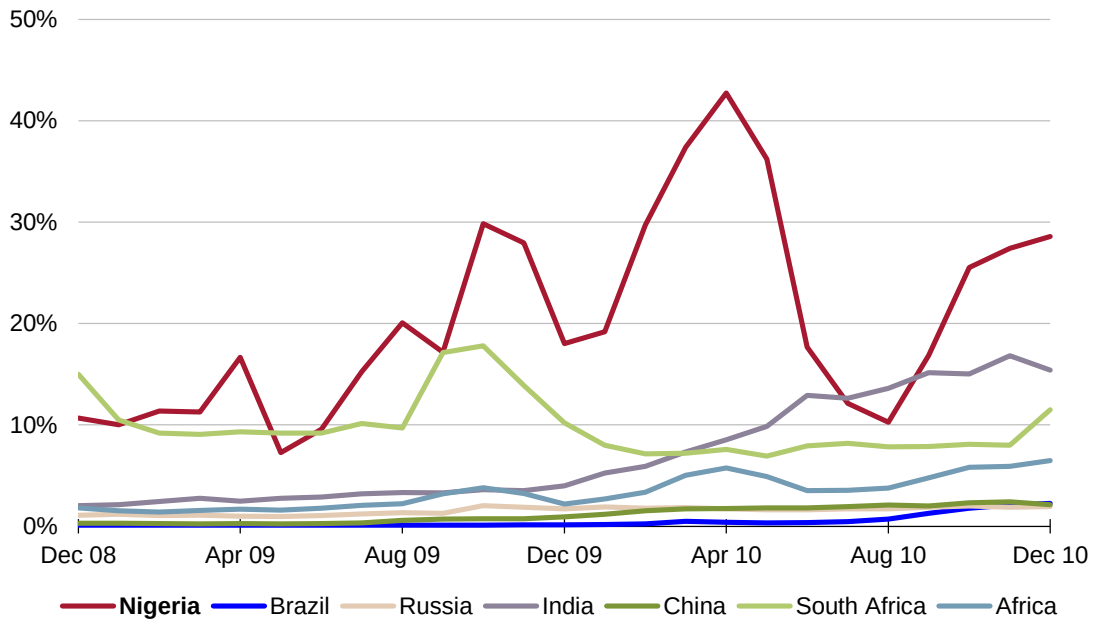


Figure 2.5: Proportion of web hits from mobile phones [Source: Statcounter]

Data from mobile Web browser developer Opera indicates that the ten most popular phones for browsing the Internet in Nigeria were manufactured by Nokia. The Opera browser, which is particularly suited to use on low-end smartphones and feature-phones, accounts for 80% of mobile Web browsing from Nigeria. Unique Opera users in Nigeria grew 315% in 2010, and data transfer grew 370%.

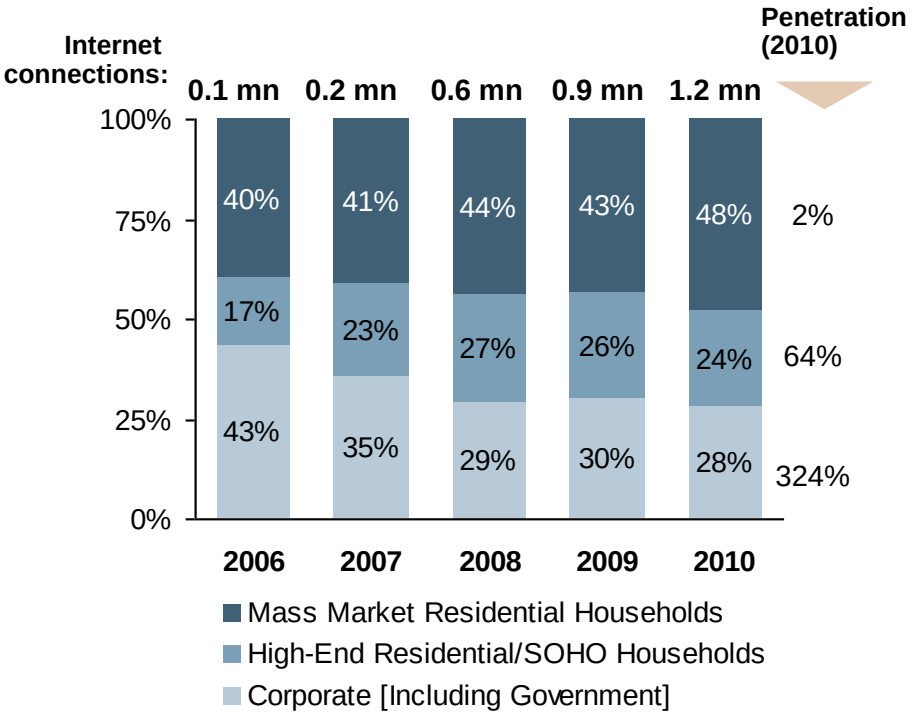


Figure 2.6: The mix of Internet connections across segments [Source: AfricaNext]

By 2009 around 31 million Nigerians are estimated from survey data[5] to have used the Internet, with some other estimates putting this figure at nearly 44 million[6] as of June 2010. They are increasingly choosing personal subscriptions over cybercafé access: 66% of Internet users visited a cybercafé during 2009, down from 82% of users in 2008 (see Figure 2.7).

5 Source: Analytix

6 Source: Internet World Stats (http://www.internetworldstats.com/)

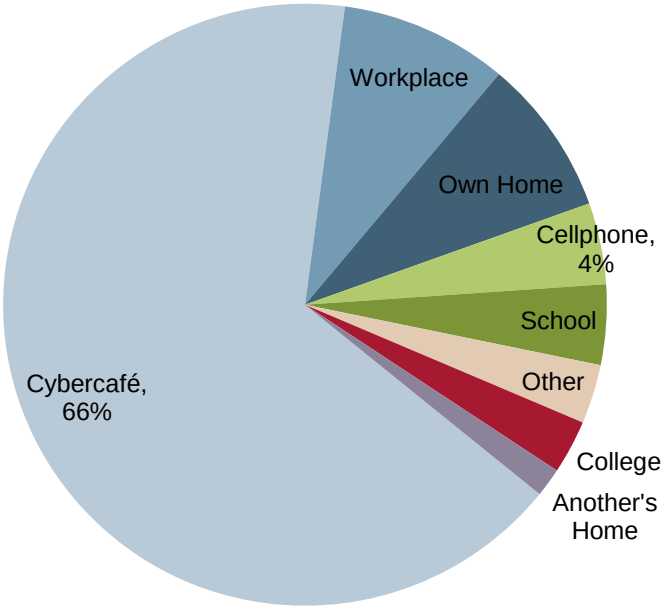


Figure 2.7: Method for accessing the Internet (2009) [Source: Analytix]

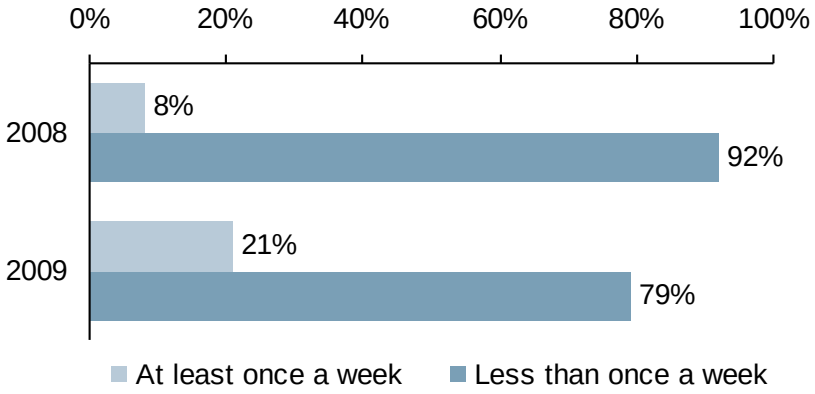


Figure 2.8: Frequency of accessing the Internet [Source: Analytix]

Reported PC ownership doubled, from 3 million to 6 million households, between 2008 and 2009, and the proportion of respondents claiming to use the Internet at least once a week increased by a factor of almost three (Figure 2.8).

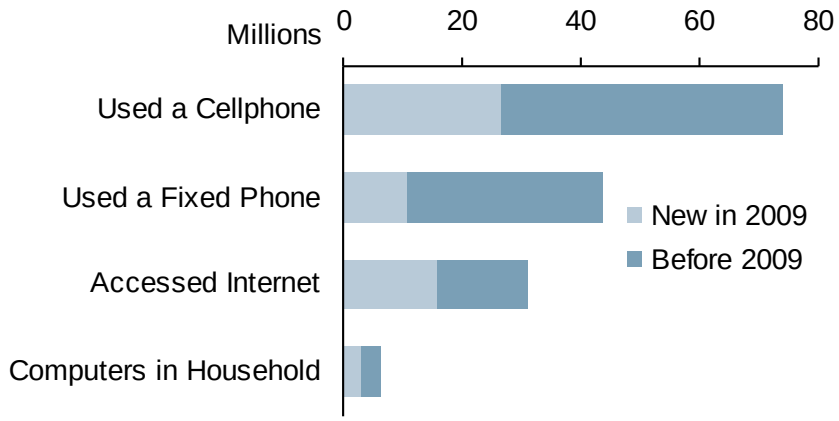


Figure 2.9: Growth in ICT usage (2009) [Source: Analytix]

Rural citizens and women are however under-represented among Nigerian Internet users.

Wireless broadband coverage (and usage) in Nigeria does not extend beyond cities and major towns. Rural inhabitants therefore have limited access to mobile networks. For instance, CDMA operators have not extended coverage beyond towns, and GSM/UMTS operators are hampered by the poor propagation of 2.1GHz spectrum (used for 3G data services). Digital dividend spectrum[7], which propagates far better, will be crucial for increasing broadband reach. (see *Mobile Internet in rural Nigeria – case study* below for the type of issues rural citizens experience as a result of this digital divide).

As mentioned above, another notable feature of Nigerian Internet use is the low proportion of women accessing the Internet. For instance data on Facebook users and Web surfers[8] indicates that men outnumber women 2:1. This gender disparity is particularly confusing given that it is not reflected in mobile service penetration, where Nigeria compares favourably with BRICS countries (see Figure 2.10). Indeed, Nigeria outperforms BRICS countries in gender equality in mobile telephony usage: only South Africa and Brazil show a smaller gender gap.

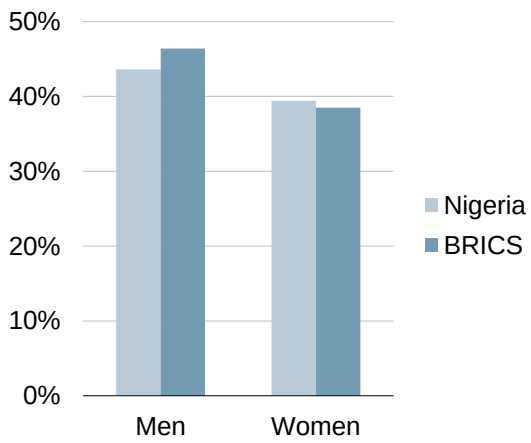


Figure 2.10: Mobile service penetration by gender (2009) [Source: GSMA]

7 The 'digital dividend' refers to spectrum bands (between 200MHz and 1GHz) that will be reorganised (and partly allocated to wireless broadband) in the switchover from analogue to digital-terrestrial TV.

8 Source: socialbakers (Facebook users) and alexa.com (Web surfers)

Mobile Internet in rural Nigeria – case study

Mobile Internet in Gitata[9]

In January 2010, the BBC brought two smartphones to the village of Gitata, about 60km from Abuja, to find out how Internet access would affect rural Nigerians.

A gathering of men from the village decided to entrust the phones to a farmer and a teacher for the two-month period of the experiment.

Gitata is a village with no electricity or running water, and the nearest Internet-connected computer was reported to be 35km away. Problems experienced included:

- users had to have the phones recharged for a small fee by the local barber – for each day's worth of use
- wireless signal was weak, and the connection slow
- the postpaid connection cost NGN500 (about USD3) per day – more than either man could afford

Comments:

"I can survive without the Internet, but I cannot live without it. Now that I know what it can do for me and for people in Gitata, I will always want to have this kind of access." Moses, Gitata

2.3 Supply side

Taxes and administrative costs

Taxation and administrative burden are negatively impacting delivery of wireless services. Taxes are significantly high with approximately 90% of mobile operator taxes going to the federal government. Regarding telecommunications as a luxury (and a source of tax revenue) may jeopardise the growth that the wireless telecommunications industry can generate.

	Taxes	*Levies*	*Duties*
Federal	7	6	6
State	2	6	0
Local	0	8	0

Figure 2.11: Number of taxes, levies and duties at different levels of Nigerian government (2007). This table shows a total of 35 distinct payment regimes to comply with. [Source: GSMA]

Ad-hoc, multi-level taxes create administrative burden and additional costs on operators even though the net financial cost to operators may be small. Fiscal federalism, which creates multiple layers of taxes (many of which are low-yielding), is burdensome for operators and affects the development of the industry. State and local government agencies should co-ordinate and simplify taxes to encourage greater investment in broadband.

9 Source: BBC (http://news.bbc.co.uk/2/hi/africa/8573346.stm)

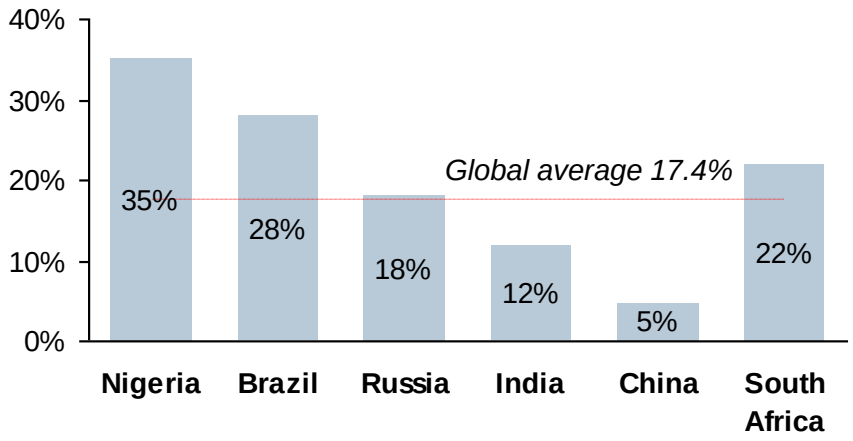


Figure 2.12: Proportion of operator revenue paid in various forms of tax (2005–7) [Source: GSMA – Taxation and the growth of mobile in sub-Saharan Africa]

Procedures for environmental assessment of new infrastructure vary between regions, and do not follow internationally-accepted standards. This adds further unnecessary administrative burden and delay to the roll-out of networks.

International and local (terrestrial) connectivity

Limited access to backbone networks has been a stumbling block to wider broadband access, but connectivity is improving.

Nigerian data networks have for years been constrained by expensive international bandwidth provided via satellite or the SAT-3 submarine cable system. The landing of two submarine cables in Lagos in 2010, and two more scheduled in 2011, has the potential to dramatically increase download speeds – but only if access networks can keep up, which requires availability of suitable spectrum.

Submarine cable	*Ready-for-service date*	*Ultimate capacity (Gbit/s)*
Glo-1 (Lagos to Europe)	2010	~2500
MainOne (Lagos to Europe)	2010	1920
WACS (South Africa to Europe)	2011	5120
ACE (South Africa to Europe)	2012	5120

Figure 2.13: International connectivity in Nigeria in the next two years: [Source: Analysys Mason, TeleGeography, Manypossibilities.net]

Although inter-city terrestrial fibre networks have been deployed by several operators, network reach remains limited and there is much duplication. Operators also appear reluctant to share network access at reasonable prices, usually for strategic reasons. As a result the benefits of these networks – and of the submarine cables landing in Nigeria – may take some time to materialise.

Operators	*Fibre backbone (km)*	*Microwave backbone (km)*
MTN	8000	10 500
Glo	10 000	>7 000
Airtel	4600	3000
Starcomms	Unknown	2800
Suburban	2500	Unknown

Figure 2.14: National backbone infrastructure in Nigeria [Source: Analysys Mason]

Connecting as many cell towers as possible to a fibre backbone (rather than using lower capacity microwave) is essential to increasing the capacity available to end users.

Electricity, fuel and utilities

A key barrier to widening broadband usage is the problematic power supply in Nigeria. A recent report suggests that Nigeria produces only 10% of its daily power requirement.[10] Only 40% of Nigerians are connected to the national grid and up to USD13 billion is spent yearly on diesel generators.[11]

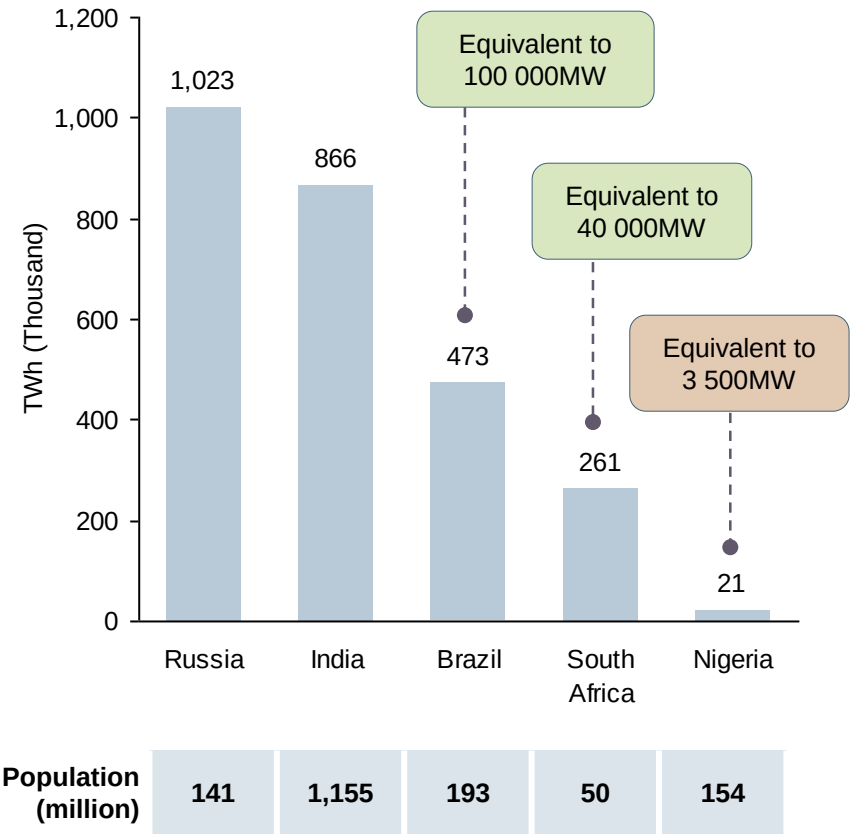


Figure 2.15: Electricity production (2009) [Source: Analysys Mason, Euromonitor]

10 Source: University World News

11 Source: Green World Water Africa

Operators are forced to explore alternative energy sources including the use of generators at every base station. In Nigeria, where generators work for up to 22 hours a day, two generators (costing in total USD40 000) are typically used per tower. Benchmarks show that opex spend on power per telecom tower in Nigeria are as high as USD2000 per month compared to USD429 per month in India.[12] In more energy reliable markets such as Ghana, Kenya and Tanzania, the cost is about half.

Current government plans to rectify power shortages include privatisation of power firm PHCN as well as initiatives that will see the country generating 35 000MW of power by 2020.

2.4 Regulation and policy initiatives

The Nigerian Communications Commission (NCC) has to date generally used effective, proportionate regulation in its management of competition in the sector.

While local loop unbundling is in place, the poor state of incumbent Nitel's infrastructure means that it is not used. NCC has recognised the importance of facilitating market provision of broadband, particularly through access to spectrum. The regulator has used auctions to award GSM licences (2001), the second national operator licence (2002), 3G licences (2007) and CDMA and fixed wireless licences (at various other times).

However, there are spectrum issues emerging that could jeopardise wireless broadband growth:

- The 2.3GHz award process has been mired in controversy for over a year.
- More than two years have passed since 2.5GHz was proposed to be offered by NCC and negotiations over its use are yet to be concluded.
- There is a lack of clarity over when the vital digital dividend spectrum will be passed to the NCC for wireless broadband use, which could dramatically increase wireless broadband coverage.

NCC should endeavour to ensure that spectrum is made available quickly and with maximum transparency, using internationally harmonised band plans.

[12] Source: Morgan Stanley

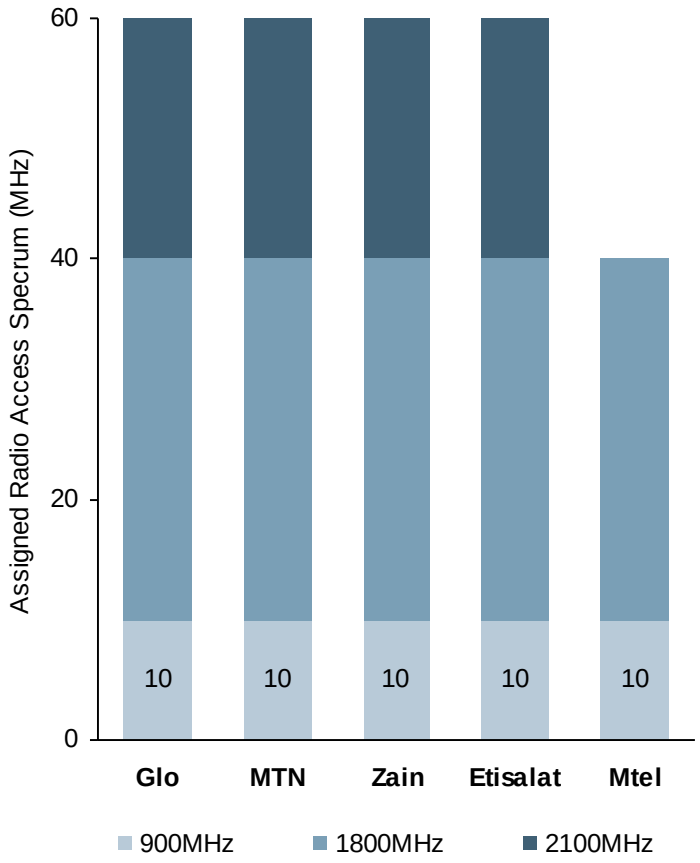


Figure 2.16: Assigned radio access spectrum [Source: Nigerian Communications Commission]

The NCC administers several ICT initiatives (indicated in Figure 2.17), but some stakeholders have found them uncoordinated. The Nigerian government should consolidate initiatives to make maximum use of private-sector input, and should aim to ensure that competition is enhanced through those initiatives.

	Wire Nigeria (WiN) Project	*State Accelerated Broadband Initiative (SABI)*	*Universal Service Provision*	*The Digital Bridge Institute (DBI)*	*Digital Awareness Programme (DAP)*
Aim	To facilitate the **build out of fibre optic** cable infrastructure	To **stimulate demand** for internet services, and drive affordable home broadband	To provide ICT **access in unserved and underserved areas**	To increase the number of **skilled Nigerians in the telecoms** sector	To encourage the **use of ICT in primary, secondary and tertiary** institutions
Mechanism	Subsidies and incentives to encourage rapid deployment of fibre transmission cables	Subsidy to build broadband infrastructure in all 36 state capitals and urban and semi-urban centres	Subsidies to the private sector	ICT training for over 2000 local and international students. Intended to become privately-run	Computer and internet facilities, basic ICT training for teachers and students

Community Communications Center (CCC)	*Schools, Universities Access Programme (SUAP)*	*Rural Broadband Internet (RUBI) Access*	*Accelerated Mobile Phone Expansion (AMPE)*	*Backbone Transmission Infrastructures*
voice, internet and ICT services to unserved communities on **shared basis**	**connectivity to 360 schools, universities** and neighbouring communities	subsidies to private sector to provide **wholesale bandwidth** to CCCs, cybercafés, rural service providers	**network roll out in unserved towns/villages** in all 774 Local Government Areas by private sector	voice and data **access points in local government area headquarters**

Figure 2.17: Regulatory ICT initiatives [Source: Analysys Mason]

State-owned Galaxy Backbone appears to have limited plans to make a difference in the wider market. This public enterprise was established in 2006 to set up and operate a unified ICT infrastructure platform for government ministries and departments.

Projects	*Services*
Broadband Internet service	Offering high-capacity bandwidth at competitive prices[13]
Remote office connectivity	Offering organisations nationwide network connectivity to their remote offices
Data centre and hosted services	Offering secure housing for mission critical systems, co-location service offerings
National Information, Communication and Education Program	NICEP is an ICT policy intervention programme focusing on the realisation of Nigeria's e-governance and Millennium Development Goals objectives

Figure 2.18: Selected Galaxy Backbone projects and services [Source: Analysys Mason, Operator website]

These activities are likely to contribute little to the development of the broadband market for a number of reasons:

- Market forces and customer requirements may be ignored, which can happen if public-sector networks are not well implemented and carefully monitored
- There does not appear to be any indication that government procurement will support lower-cost access for commercial customers through demand aggregation
- Much of Galaxy's focus to date has been on VSAT to connect rural areas, which is pragmatic but not a long-term solution.

[13] Even though the operator is a backbone owner, it still leases capacity from MTN's fibre network to provide services to its downstream customers

3 Internet ecosystem in Nigeria

Despite challenges in connecting to the Internet, Nigerians have developed a vibrant online ecosystem. A survey by On Device Research in October 2010 found that two thirds of mobile Internet users polled surfed on their phones for more than 30 minutes each session – and for 70% of users, sessions were daily or more frequent. More than half download music, games and apps with 56% likely to recommend using the mobile Internet to friends and family.

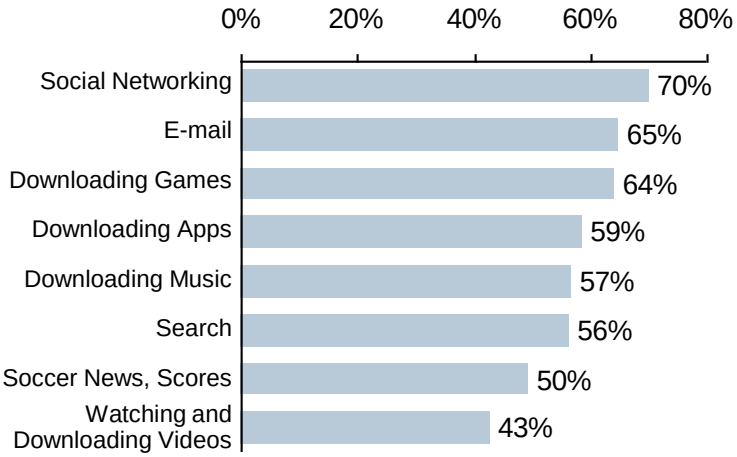


Figure 3.1: Which types of mobile Internet site do you visit on your mobile phone? [Source: Opera]

Nigerian Internet users are considered a valuable market by e-commerce operators, as indicated by online advertising prices (Figure 3.2). Internet marketing is an emerging industry in Nigeria, however at the moment much of the value in this industry is captured by foreign websites and banks due to (among other factors) the poor domestic financial services infrastructure.

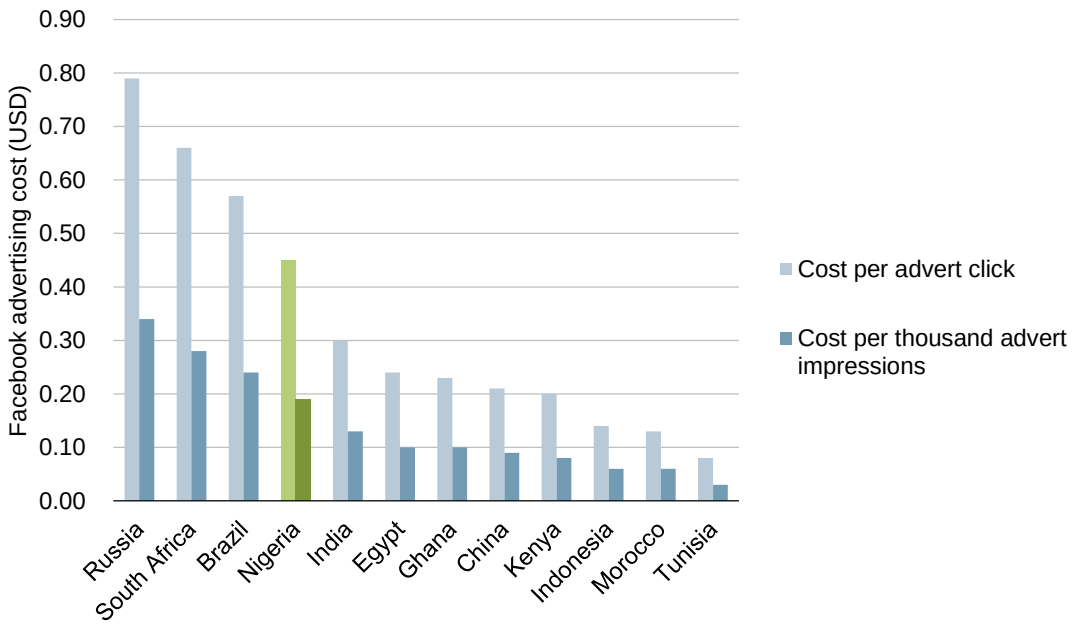


Figure 3.2: Cost of advertising to Nigerian users on Facebook [Source: WebtrendsNG]

Social networking sites and free Web-based email services dominate Internet usage in Nigeria. Globally recognised websites unsurprisingly top the list of popular sites, with Facebook reporting over 2.7 million users from Nigeria at the end of 2010. Nigerian-based websites have however started to influence Internet user habits. Nigerian entrepreneurs are seizing the opportunity of increased Web usage to deliver localised services.

	Most popular sites in Nigeria
1	facebook.com
2	yahoo.com
3	google.com
4	blogger.com
5	youtube.com
6	twitter.com
7	wikipedia.org
8	nairaland.com
9	Windows Live
10	PunchNG

Figure 3.3: Most popular sites in Nigeria. Nigerian websites are highlighted [Source: Alexa.com]

Localised content such as productivity enhancing services are featuring more in the most visited Nigerian sites. These include information portals, job adverts and banking.

	Most popular Nigerian sites	*Category*
1	nairaland.com	Forum
2	punchng.com	News
3	vanguardngr.com	News
4	gtbank.com	Banking
5	sunnewsonline.com	News
6	nigerianbestforum.com	Forum
7	234next.com	News
8	nnpcgroup.com	Government
9	naijahotjobs.com	Jobs
10	tribune.com.ng	News

Figure 3.4: Most popular Nigerian sites [Source: Web Trends Nigeria]

Learning and development

Nigeria's education system has suffered from a lack of investment. As a consequence, a quarter of the population is considered illiterate. However; given the right tools, these citizens are capable of improving their quality of life. For instance, poorly educated and illiterate users have proved to be surprisingly adept at using mobile technology. Wireless broadband will be of particular value in enhancing learning, knowledge transfer and employability of the workforce.

Ubiquitous broadband service is also vital in supporting a number of 'e'-initiatives. Nokia introduced its Ovi Life Tools in November 2010 providing information on health, agriculture and education. Ericsson has also opened up one of its three African application development hubs in Nigeria, developing solutions targeted at health, education, agriculture and small business development. The government can also play a role in enhancing service delivery for citizens by making more of its own services available online.

'e-initiatives' wireless services in Nigeria – case study

Ovi Life Tools

Ovi Life Tools (with over 6 million users worldwide) is an information service tool, covering all 36 states in Nigeria, offering:

- **Healthcare** – mother and childcare, health and fitness and disease information
- **Agriculture** – market prices for 25 crops/commodities (at launch), news and advice, weather
- **Education** – learn English, acquire general knowledge and access exam results
- **Entertainment** – football results, music, news alerts, horoscopes and jokes

Nokia's aim is for this service to address the needs of consumers and help improve their economic prosperity and quality of life. It is currently offered via two basic Nokia handsets through the Airtel and Glo networks (with plans for wider availability), at affordable monthly prices.[14]

Availability:

Services are available nationwide in three languages – English, Hausa and Pidgin English.

[14] Prices range from about NGN200 to NGN250 (USD1.30 to 1.50) per month for most subscriptions. More devices are expected to be added in the future

4 Socioeconomic impact of wireless broadband

Analysys Mason has developed a macroeconomic model to estimate the impact of improved wireless broadband on the Nigerian economy. Our modelling leads to the conclusion that by differentially growing non-oil sectors, broadband can support diversification of the Nigerian economy:

- The 1.22% GDP increase (NGN862 billion, or USD5 billion) in 2015 shown in Figure 4.1 translates into 1.7% growth for non-oil sectors
- If positive policy actions are taken to remove barriers to broadband, the benefit to GDP in 2015 will be an additional NGN190 billion (USD1.1 billion) or 0.27% of GDP.

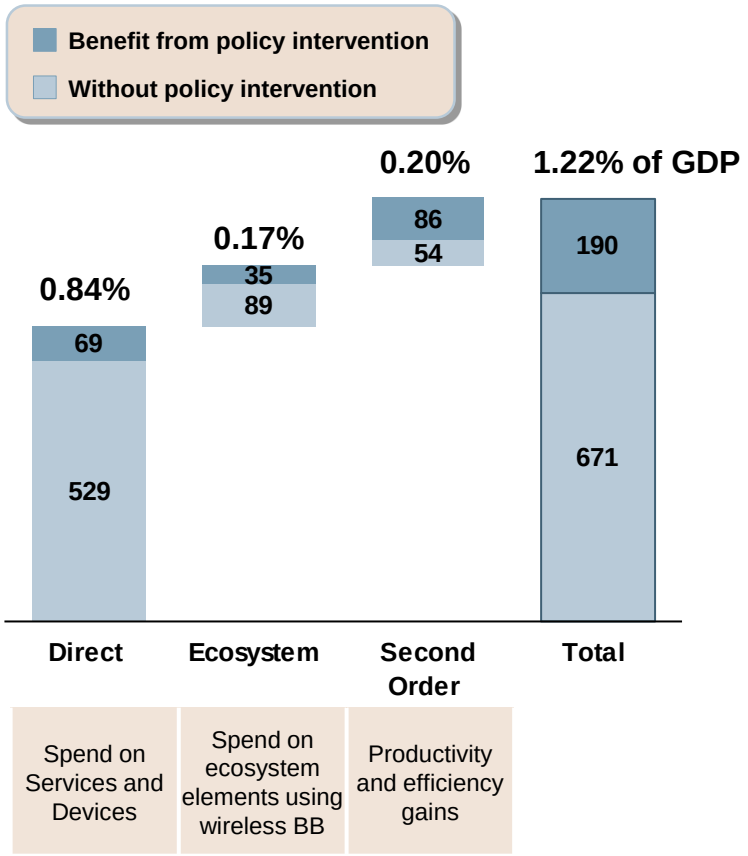


Figure 4.1: Total impact on GDP by wireless broadband services (NGN bn, 2015) [Source: Analysys Mason, UNCTAD Information Economy Report 2010]

Government support in achieving this level of growth can take the form of:

- removing barriers to wireless broadband, as outlined in Section 5 of this report
- supporting development of local Web content and applications
- implementing e-government initiatives, including online transactions for licence and levy payment
- committing to publishing state-owned datasets (e.g. population, geography, financial) so that entrepreneurs can leverage their benefits.

4.1 Direct impact

The direct impact is due to revenue from the sale of wireless broadband services and devices.

Parameter	*2010*	*2015*
Wireless broadband users (million)	1.3	13.9
Penetration of Population	1.0%	9.4%
ARPU	NGN5505 (USD36)	NGN1877 (USD11)
% households with wireless BB connection[15]	3.6%	20%
% businesses with wireless BB connection	58%	71%

Figure 4.2: Key metrics – direct impact of wireless broadband penetration [Source: Analysys Mason]

We estimate that wireless broadband will have a direct revenue impact of NGN598 billion or USD3.5 billion (0.7% of GDP) by 2015.

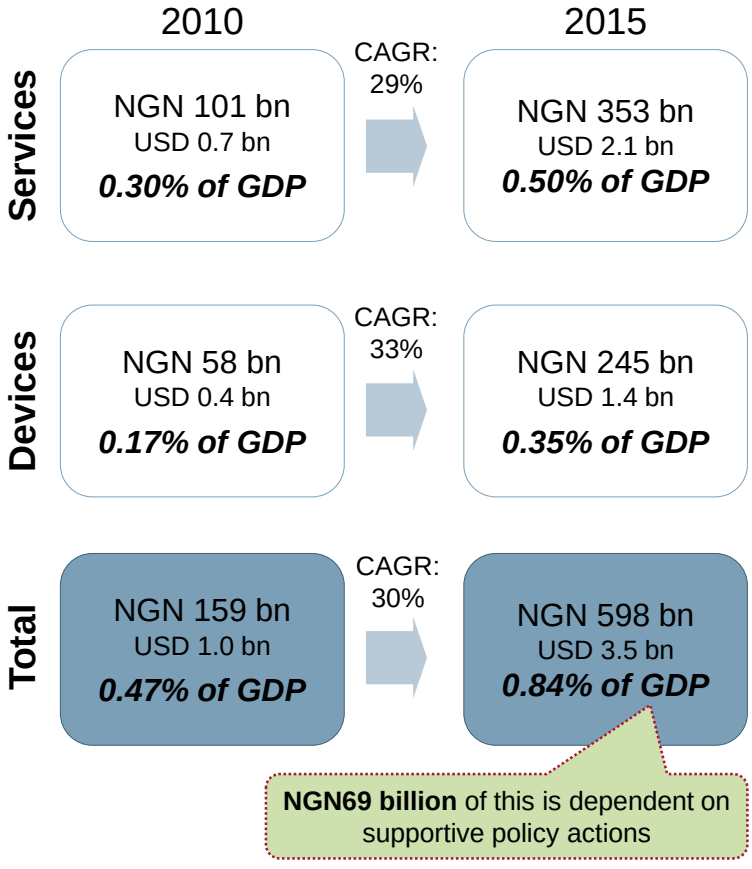


Figure 4.3: Direct revenue impact from wireless broadband [Source: Analysys Mason]

The revenue calculated here is in addition to wireless telephony revenues, which in 2009 were USD6.2 billion (or 4% of GDP).[16] By 2015, basic wireless telephony revenues are expected to reach over USD8.4 billion, but will have declined to only 2% of GDP.

15 Multiple users per household / business

16 Source: Pyramid Research

Services

Consumers will drive service uptake, as more cybercafé users opt for personal broadband access. Analysys Mason forecasts that revenue from enterprises is not expected to exceed that from consumers until 2015 due to the relatively small formal enterprise sector in Nigeria. By that same period, we expect total service revenue to be NGN353 billion (USD2.1 billion) with the enterprise segment contributing over 55% of the revenue.

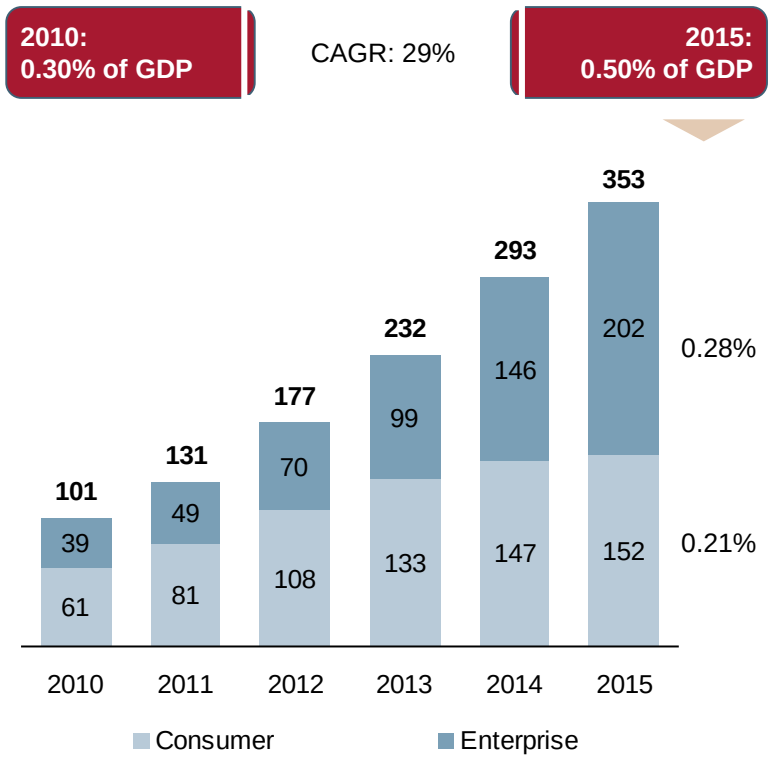


Figure 4.4: Projections for consumer and enterprise spend on wireless broadband services (NGN bn) [Source: Analysys Mason]

As discussed earlier in this report, cybercafé usage is declining in favour of individual subscriptions. Only 66% of users accessed the Internet from a cybercafé in 2009 (down from 82% the year before) as workplace, home and mobile usage increased. Enterprise service revenue will be driven by demand for high quality connectivity, while consumers are likely to accept lower-cost, reduced quality packages.

Devices

Low-end smartphones and PCs will increasingly become the preferred consumer broadband devices. Consumer wireless broadband usage will be driven by an increase in PC ownership, expected to rise[17] from 7% of households in 2009 to 13% in 2014; as well as increasingly affordable and feature-rich smartphones.

17 Source: Alcatel-Lucent Market Advantage

We expect enterprises to make less use of tablets and other dedicated mobile devices than in other markets, although they may take advantage of smartphone and USSD or SMS based applications to interact with their workforce. The total broadband device market size is expected to be NGN245 billion (USD1.4 billion) in 2015.

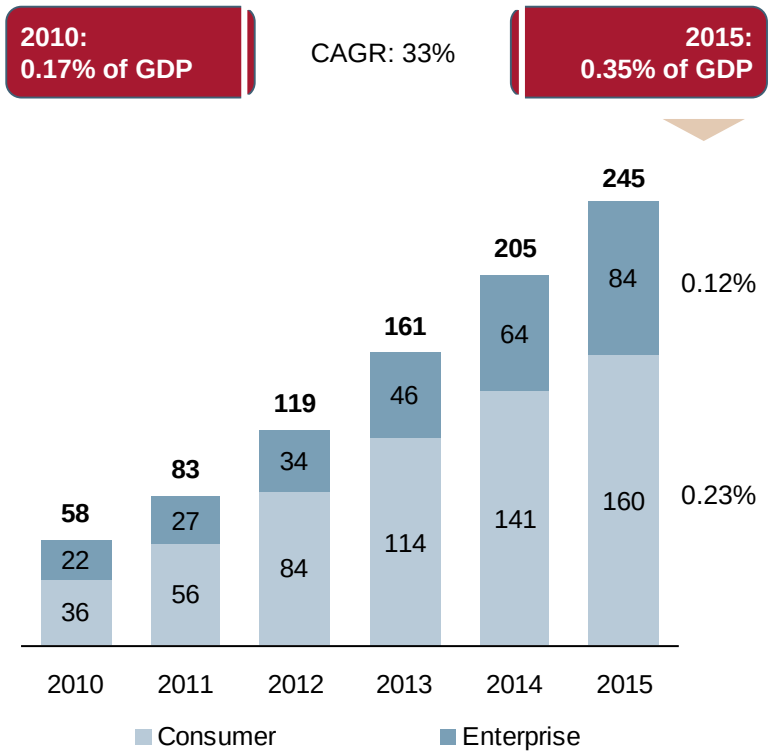


Figure 4.5: Projections for consumer and enterprise spend on wireless broadband devices (NGN billion) [Source: Analysys Mason]

4.2 Ecosystem impact

The 'ecosystem' in this case refers to goods and services that rely particularly on Internet connectivity for their delivery. Ecosystem revenue accrues to a variety of players, including entrepreneurs, existing real-world businesses developing an online presence, mobile operators, advertisers and international firms. Nigeria's digital economy is burgeoning and would benefit from government commitments to providing online services and access to data.

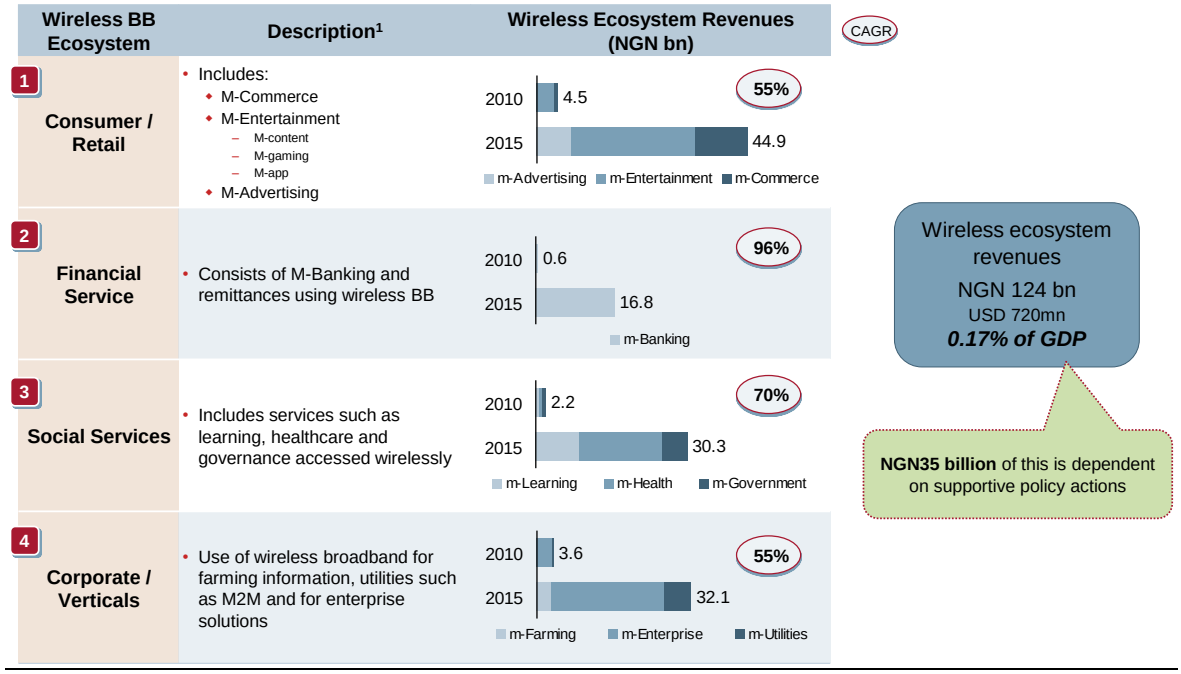


Figure 4.6: Ecosystem impact [Source: Analysys Mason]

4.3 Second order impact

Industrial productivity in the wider economy increases as workers increasingly use email and electronic file exchange, have quicker access to business critical information and can access more distant customers and suppliers. Improved broadband also increases the attractiveness of Nigeria to foreign investors. Analysys Mason expects that wireless broadband will create NGN410 billion (USD2.5 billion) of indirect value through 2015, mostly outside the oil industry.

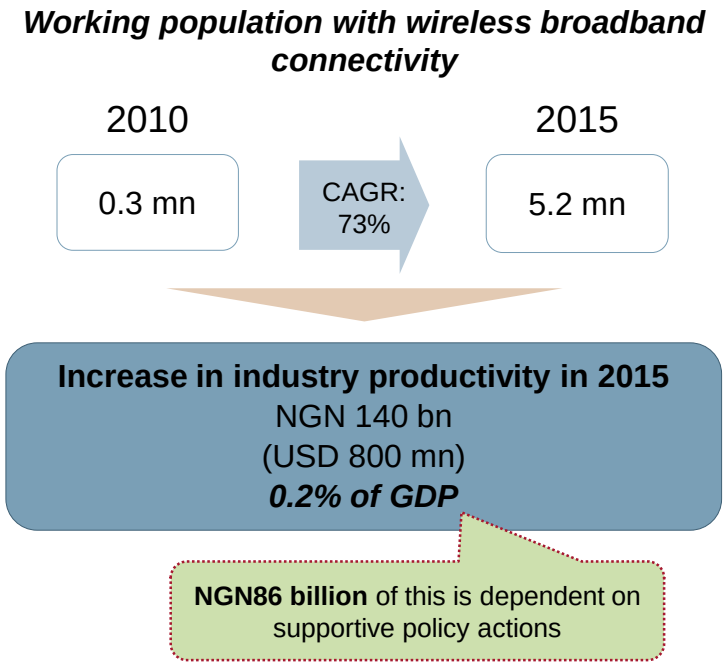


Figure 4.7: Estimation of impact on productivity due to wireless broadband [Source: Analysys Mason, EIU, Euromonitor]

Broadband connectivity referred to in Figure 4.7 includes retail wireless broadband connections used for official / business purpose and corporate connectivity.

Industry Vertical	*Industry Contribution to GDP in 2015*	*Share of Increase in Productivity in 2015*
Manufacturing, Mining & Industry	49%[18]	17%
Services	24%	67%
Agriculture	27%	15%
Total	**NGN70 908 bn**	**NGN140 bn**

Figure 4.8: Industry-wise impact on productivity due to wireless broadband (2015) [Source: Analysys Mason, EIU, Euromonitor]

Enhanced growth in the services and non-oil industrial sectors will support the diversification of the economy. We also expect that increased productivity in the agricultural sector can support rural economic development. Wireless broadband can therefore play a valuable role in these sectors by helping with diversifying the Nigerian economy away from petroleum products.

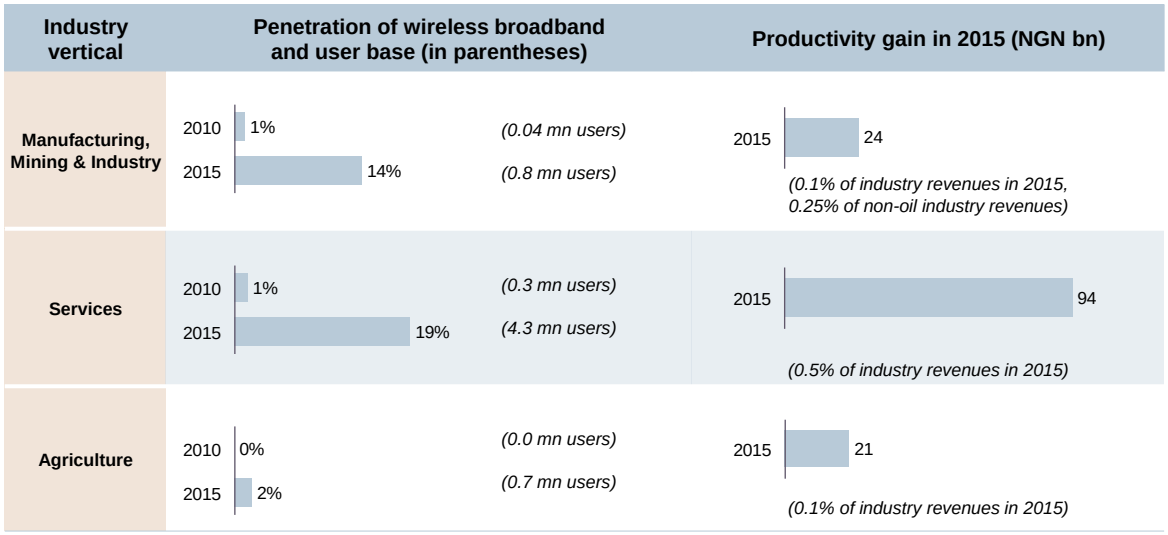


Figure 4.9: Wireless broadband penetration effect on diversification of the economy [Source: Analysys Mason, EIU, Euromonitor]

[18] Approximately 35% of GDP is expected to be derived from petroleum products, included in this category. Oil revenue is likely to be minimally affected by improved broadband access.

5 Roadmap for industry and policymakers

It is clear that there is demand for wireless broadband in Nigeria and the key question is whether the market and policymakers can keep up with this demand.

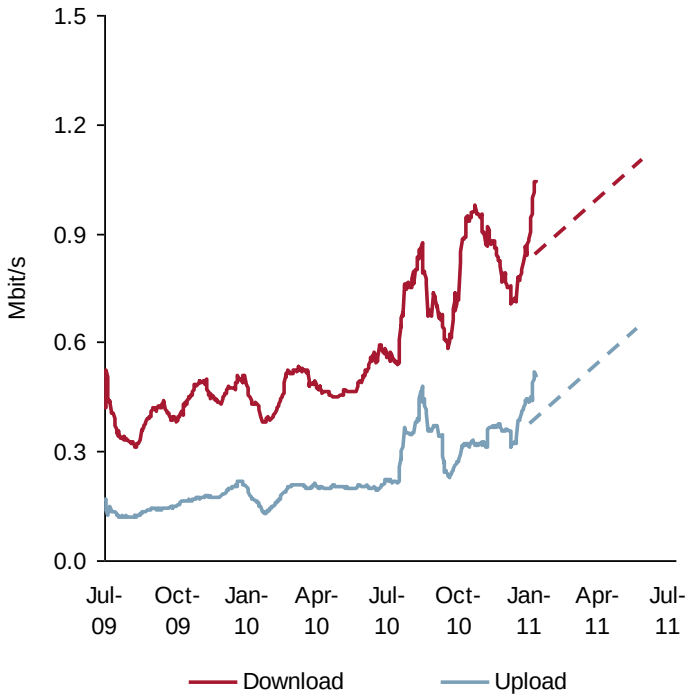


Figure 5.1: Actual and forecast connection speeds in Nigeria [Source: Analysys Mason, Speedtest.net]

The key challenges facing stakeholders in increasing access to and affordability of broadband are outlined below.

- **Addressing avoidable cost obstacles** – obstacles include federal tax rates, administrative burden of local taxes, non-standard site approval and environmental impact assessment processes, and poor electricity infrastructure. In several cases there are solutions that will not reduce government revenue but will improve broadband access.

- **Awarding spectrum for wireless broadband** – additional spectrum allows operators to support greater demand and extend their network reach quickly and with little cost to government, operators or consumers.

- **Co-ordinating deployment of nationwide fibre networks** – although there are apparently multiple fibre networks, the market for transmission is underdeveloped.

- **Supporting Internet use by rural Nigerians and women** – Internet use in rural areas has the highest cost, but has the potential to yield great value in learning, health and social services. The gap between women and men in use of broadband should not be allowed to widen further.

5.1 Policy imperatives for successful wireless broadband

Based on the key challenges identified above, Analysys Mason has developed a number of policy imperatives to be addressed by all stakeholders – government, regulators and operators – to improve delivery of broadband services to Nigerians.

Addressing avoidable cost obstacles

Any additional taxes (on services or devices) serve to discourage wider take up of personal broadband subscriptions. Ongoing discussions between mobile operators and the Joint Tax Board, aimed at harmonisation, should continue to be supported. Environmental Impact Assessment of mobile towers should be uniformly based on international best practice, and should not vary between states and local authorities in Nigeria.

► *Recommendations*

- Federal government to review the tax burden imposed on broadband operators.
- Implement harmonised levies/taxes and environmental approvals processes at state and local levels of government.
- Continue efforts to rehabilitate the mains electricity infrastructure.

Awarding spectrum for wireless broadband

Policymakers should ensure that future spectrum awards run smoothly. The 2.6GHz band in particular needs to be brought into use quickly to support wireless broadband in urban areas. There is currently confusion around when the 2.6GHz and digital dividend will be made available to the NCC for release to mobile operators. Uncertainty will add delay and cost to the deployment of broadband. Clarity is also required on whether 900MHz spectrum can be refarmed.

Award of 2.5GHz spectrum should be a priority, and planning for digital dividend spectrum awards should be underway. A spectrum band plan harmonised with that used in other countries will ensure Nigeria benefits from widely used technologies.

► *Recommendations*

- Adopt best-practice spectrum policy, with spectrum managed by a single regulatory entity.
- Quickly identify and assign spectrum suitable for wireless broadband.

Encouraging deployment of backbone fibre networks

Numerous other countries' governments have developed plans[19] to improve fibre connectivity while harnessing private-sector initiatives. Nigeria urgently needs to develop a detailed and realistic plan.

► *Recommendation*

- Support a competitive market for nationwide fibre backbone connectivity.

Supporting Internet use by rural Nigerians and women

Cybercafés have proven their value in incubating demand for Internet services. Urban areas are likely to be competitive and well-served by existing providers, and do not need co-ordinated support, so attention should be focused on rural areas. Internet access can enhance empowerment of women by providing social, educational and economic opportunities.

► *Recommendations*

- Support deployment of cybercafés and Internet kiosks in rural areas.
- Identify reasons for low Internet use among women and implement actions to address.

19 For examples of fibre broadband plans, see the Analysys Mason report *Deployment models and required investments for developing rural broadband infrastructure in India*, Accessible at: http://www.analysysmason.com/about-us/offices/New-Delhi/CII_broadband_report/

Annex A Glossary of terms

Term	*Gloss*
3G	Third Generation mobile access technology
ARPU	Average Revenue Per User
BB	Broadband
bn	Billion
BRICS	Brazil, Russia, India, China and South Africa
CDMA	Code Division Multiple Access
DSL	Digital Subscriber Line
EIU	Economist Intelligence Unit
EV-DO	Evolution Data Optimized
GDP	Gross Domestic Product
GHz	Gigahertz
GSM	Global System for Mobile Communications
HSPA	High-speed Packet Access
HSPA+	High-speed Packet Access Evolved
ICT	Information and Communication Technology
IP	Internet Protocol
ISP	Internet Service Provider
LTE	Long Term Evolution
M2M	Machine-to-Machine
MHz	Megahertz
mn	Million
MNO	Mobile network operator
MW	Mega Watt
NCC	Nigerian Communications Commission
NGN	Nigerian Naira
OPEX	Operating expenditure
PC	Personal Computer
SMS	Short Message Service
SOHO	Small Office/Home Office
TD-SCDMA	Time Division – Synchronous Code Division Multiple Access
TWh	Terawatt Hour
UMTS	Universal Mobile Telecommunications System
USD	United States Dollars
USSD	Unstructured Supplementary Service Data
VSAT	Very Small Aperture Terminal
WCDMA	Wideband Code Division Multiple Access
WiMAX	Worldwide interoperability for microwave access