



Nigeria's National Broadband Plan 2013 - 2018

A submission by the Presidential Committee on Broadband



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GLOSSARY

Acronyms	Description
2G	Second Generation Telephone Wireless Technology
3G	Third Generation Telephone Wireless Technology
ADSL	Asymmetric Digital Subscriber Line
ALTON	Association of Licensed Telecommunications Operators of Nigeria
ATCON	Association of Telecommunication Companies of Nigeria
B2G	Businesses to Government
BTS	Base Transceiver Station
C2G	Citizens to Governments
CCTV	Closed-Circuit Television
CDMA	Code Division Multiple Access
CDMA EVDO	Code Division Multiple Access Evolution Data Only Code Division Multiple Access Evolution Data Optimised
CPE	Customer Premises Equipment
CTC	Community Technology Centres
E112	The common emergency telephone number that can be dialled free of charge from any telephone or any mobile phone in order to reach emergency services
E-Agriculture	E-Agriculture describes an emerging field focused on the enhancement of agricultural and rural development through improved information and communication processes
E-Commerce	E-Commerce is a type of industry where buying and selling of product or service over electronic systems such as the Internet and other computer networks.
EDGE	Enhanced Data rates for GSM Evolution
E-Education	E-Education refers to the application of Internet technology to the delivery of learning experiences.
E-Government	E-Government is digital interactions between a government and citizens
E-Health	E-Health a term for healthcare practice supported by electronic

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	processes and communication
E-Learning	E-learning includes all forms of electronically supported learning and teaching, including educational technology.
E-Payments	E-Payments are payments that are made directly to payee from bank accounts using security features over the Internet to process the transactions.
E-Voting	E-Voting is a term encompassing several different types of voting, embracing both electronic means of casting a vote and electronic means of counting votes.
FCDA	Federal Capital Development Authority
FCT	Federal Capital Territory
FMCT	Federal Ministry of Communication Technology
FTTB	Fibre To The Base station
FTTH	Fibre To The Home
FTTx	Fibre To The x (where x could be Base station, Home, Curb, or Building)
G2B	Government to Businesses
G2C	Government to Citizens
G2G	Government to Governments
GBB	Galaxy Backbone
GCFR	Grand Commander of the Order of the Federal Republic
GDP	Gross Domestic Product
GIS	Geographic Information System
GPRS	General Packet Radio Service
GSM	Global System for Mobile communications
HRM	Human Resources Manager
HSPA	High Speed Packet Access
HSPA+	Evolved High-Speed Packet Access
HSUPA	High-Speed Uplink Packet Access
ICT	Information and Communication Technology

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IEDC	International Economic Council
ISPON	Institute of Software Practitioners
ITU	International Telecommunication Union
IXP	Internet Exchange Point
JAMB	Joint Admissions and Matriculations Board
LDO	Long Distance Operator
LGA	Local Government Authority
LTE	Long-Term Evolution
MDAs	Ministries, Departments, and Agencies
MIT	Massachusetts Institute of Technology
MMS	Multimedia Messaging Service
NAFDAC	National Agency for Food and Drug Administration and Control
NBC	National Broadcasting Commission
NCC	Nigerian Communications Commission
NFMC	National Frequency Management Council
NIGCOMSAT	Nigeria Communications Satellite Company
NIPOST	Nigeria Postal Service
NITDA	National Information Technology Development Agency
OEM	Original Equipment Manufacturer
RoW/ROW	Right of Way
S.M.A.R.T	Specific Measurable Achievable Realistic Time-bound
SME	Small and Medium Enterprise
SMS	Short Message Service
UMTS	Universal Mobile Telecommunications System
USAID	United States Agency for International Development
USPF	Universal Service Provision Fund
VSAT	Very Small Aperture Terminal

THE PRESIDENT'S MANDATE

Internet and Broadband have been globally acknowledged as the foundation for transformation to a knowledge-based economy. It is also widely acknowledged that broadband infrastructure is an enabler for economic and social growth in the digital economy. Broadband has the potential of enabling entire new industries and introducing significant efficiencies into education delivery, health care



provision, energy management, ensuring public safety, government/citizen interaction, and the overall organization and dissemination of knowledge. Mr President recently alluded to the importance of broadband and internet to national development – a statement that has received much applause from stakeholders in the ICT industry.

It has been empirically proven that every 10% increase in broadband penetration in developing countries results in a commensurate increase of 1.3% in GDP. The most credible statistics on broadband penetration estimate that Nigeria's broadband penetration is between 4% and 6%, further underscoring the need for Nigeria to give strategic importance to the development of broadband infrastructure.

The first national ICT policy recently drafted for presentation to the Federal Executive Council for approval contains the proposed broadband policy position of the country and emphasises the importance and centrality of broadband to achieving the overall objective of ICT as a tool for national development.

The policy document states as follows: *"Although there are some initiatives aimed at deploying broadband in Nigeria, many challenges remain, especially with the deployment of a national fibre optic based network to distribute approximately 10 terabytes of capacity already delivered to landing points in Nigeria. Therefore, there is an urgent need to accelerate the pace of on-going efforts, and also to introduce new initiatives to address this challenge. This is necessary for the actualization of the developmental goals of Vision 20:2020."*

The Government will therefore pursue, by the end of 2017, a fivefold increase in broadband penetration over the 2012 penetration rate.

The Federal Government recognizes that it is now imperative that a broadband strategy and roadmap be developed to properly articulate how Nigeria will achieve the targets and aspirations of the Broadband policy and for that reason Mr President decided to set up a high level Committee to develop a broadband strategy and roadmap for the country to underscore the strategic nature and importance of broadband for Nigeria.

MINISTER'S FOREWORD



On the 20th of Sept 2012, President Goodluck Ebele Jonathan, GCFR, inaugurated the Presidential Committee for a national broadband strategy and roadmap.

The committee was chaired by two esteemed men in the ICT and Telecoms sector, Dr Ernest Ndukwe, and Mr Jim Ovia supported by a cast of 15 core members representing various stakeholder groups in the sector, and an additional set of co-opted members.

My brief to the committee was to ensure that this plan would be a plan that would firstly be immediately workable and realistic, and secondly something that would greatly move the dial in terms of getting broadband to not just the under-served areas, but crucially also to the unserved areas of all of Nigeria.

In meeting with industry leaders, the message is clear that we need to assist the Private Sector in driving pervasive access to Broadband. But then, the Private Sector must also deliver not just on basic reach and penetration, but also on Quality of Service. It is only in doing this that all Nigerians will truly feel the positive impact and benefit of Broadband.

It is therefore my pleasure to present to you this National Broadband Plan which has been contributed to by all stakeholder groups in the industry and sector with the goal of enabling Broadband for All.

Mrs Omobola Johnson
Honourable Minister for Communication Technology
Federal Republic of Nigeria

ACKNOWLEDGEMENTS

The Federal Ministry of Communication Technology wishes to thank the Co-Chairmen of the Presidential Committee on Broadband and acknowledge the immense contributions by its members. We recognise also the participation of the NCC, NIGCOMSAT, USPF, NITDA, Galaxy Backbone Plc., NUC, and many others within the Ministry and departments.

The FMCT also wishes to thank the many Industry leaders and stakeholders who took time out to attend and air their views and opinions at the various stakeholder consultations on the broadband plan. The attendance at the consultation meetings was reflective of all sectors of the industry including Government agencies, Telecoms Operators, Internet Service Providers, OEM Vendors, Educational Institutions, Civil Society Groups, and Individual End Users.

The FMCT would also like to thank USAID, The World Bank and the ITU for their contributions. We look forward to providing a truly enabling environment for increased and accelerated broadband penetration in Nigeria.

EXECUTIVE SUMMARY

The policy goal of the Federal Government of Nigeria recognizes the immense socio-economic importance of broadband services to national development and therefore seeks to ensure that the infrastructure necessary to provide ubiquitous broadband services is available and accessible to all citizens at affordable rates. The transformative benefits of having broadband available to all are clear and include improved learning, increased job creation, better community and civic engagement, improved trade and commerce, and a positive impact on GDP.

In looking at what has been achieved with Broadband in the ICT sector today, the modest success recorded has been with several initiatives that ride on the back of the immense success of the Digital Mobile services boom in Nigeria, including the subsequent landing of several high capacity submarine cable systems that slashed wholesale international bandwidth prices. However, ineffective distribution and transmission of the available bandwidth inland have continued to make accelerated expansion of broadband internet access at more affordable end-user prices, a major challenge and a barrier to faster realisation of the desired broadband boom in Nigeria.

Because of the diverse nature of the country in terms of class and geography, different technologies must be deployed, including terrestrial wireless networks, optic fibre transmission networks, fibre to the home/premises, DSL systems, satellite systems and fibre/broadband over power lines. This will ensure the provision of solutions tailored to the needs of individual groups or communities.

The Broadband Vision

The broadband vision for Nigeria is one of a society of connected communities with high speed internet and broadband access that facilitate faster socioeconomic advancement of the nation and its people.

Defining Broadband

Traditionally, the term broadband referred to high-speed communications networks that connected end-users at a data transfer speed greater than 256 Kbit/s. Global organisations have chosen to define it more in terms of an ecosystem. It has however been chosen to define broadband in a manner that reflects the user experience.

As such, broadband within the Nigerian context is defined as an internet experience where the user can access the most demanding content in real time at a minimum speed of 1.5 Mbit/s.

These definitions will be reviewed and revised upwards regularly to keep in line with future developments in technology.

The Benefits of Broadband

We live in a global village where ICT has a direct impact on a Nation's ability to improve the economic wellbeing of her people and compete globally. Broadband is an essential infrastructure of the 21st Century. It enables access to business and job opportunities, improves healthcare, education and government services, and facilitates social interactions.

Broadband is to the 21st Century Information Age what Electricity was to the Industrial Age. It has a significant transformative effect on how people live and work. It empowers the individual user with previously unimaginable capabilities and global reach. The Internet is the world's biggest library and largest repository of information and knowledge; while High Speed Access is critical to fully harnessing the benefits of the Internet.

The Current State of Broadband

The broadband supply chain comprises of international connectivity, a national backbone network, metropolitan access links, and the local access network (the last mile).

In Nigeria, there is now an appreciable number of submarine cable landings on the shores of the country providing over 9 Tbit/s of combined capacity. However there is concern about the fact that all the landings are in Lagos and that access to other parts of the country is choked due to the limitations of distribution infrastructure to the rest of the country. For National Security and resilience purposes, it is considered critical that these cable companies all have demonstrable recovery and restoration agreements with each other, and that the cable systems are extended to other coastal regions or states. This will help to further accelerate the expansion and distribution of the currently underutilised bandwidth to the rest of the country.

The Federal Government shall therefore promote the rapid establishment of recovery agreements and the delivery of additional cable landing points to other coastal states such as Delta, Rivers, Bayelsa and Ondo as soon as possible.

In terms of a National Backbone fibre optic infrastructure most Long Distance Carriers have amongst themselves fibre presence in all the thirty six states and the FCT. Findings also indicate that while many routes in the country still do not have fibre coverage, there exists a proliferation of fibre along some routes. Moreover the cables on the routes that have multiple fibre installations are mostly not interconnected to offer the required redundancy to promote network resilience. While islands of fibre infrastructure may be good for some of the operators, it is definitely not good for the nation as it does not engender a truly national network.

The Government shall therefore promote a seamless interconnectivity regime and an Open Access Infrastructure sharing agreement among operators.

Wireless technology is the primary delivery medium for broadband in Nigeria. The licensing, rollout and upgrade of Mobile networks based on 2.5G (GPRS), EDGE, UMTS, HSPA, HSPA+, HSUPA, HSDPA and CDMA EV-DO technologies, as well as, the introduction of smartphones and

other smart mobile devices with seamless capability to connect the internet have been responsible for the current growth in internet access and usage recorded in Nigeria.

This trend will receive further boost with the wider rollout of 3G across the country, making it possible for many subscribers to access broadband internet using their mobile devices.

The Challenges of Broadband Operators

Challenges common to operators in the telecoms sector have been identified as; the high costs of right of way resulting in the high cost of leasing transmission infrastructure; long delays in the processing of permits; multiple taxation at Federal, State, and Local Government levels and having to deal with multiple regulatory bodies; damage to existing fibre infrastructure as a result of cable theft, road works and other operations; and the lack of reliable, clean grid electricity supply.

Strategic Goals and Objectives for Broadband

The key objectives of the Nigerian National Broadband Plan are to promote pervasive broadband deployment; increase broadband adoption and usage; and ensure availability of broadband services at affordable prices. All these are aimed at maximising the political and socioeconomic benefits of broadband.

It is intended during the period of this plan to see more than a fivefold increase in internet and broadband penetration figures. It is also intended that all state capitals and urban cities have metro fibre infrastructure installed. On a national scale, it is the intention of government to facilitate full rollout by operating companies of 3G networks as a minimum on all base stations by 2015.

This will ensure that Nigerian citizens will enjoy World Class wireless broadband as a basic access medium for the society. Broadband is an essential right and basic utility for societal transformation and development, necessary for all segments of society.

Roles for Government and Stakeholders

Governments at various levels have a critical role to play in the drive to have pervasive broadband infrastructure across the nation. Government no doubt has interest in converting the nation into a digital haven that will be fully networked and ready to be integrated into the new world order of digitally enabled citizens in an environment of e-governance, e-health, e-commerce and e-agriculture among others.

The Federal Government's primary role is focused on Policy formulation and direction as well as legal and regulatory functions. Government is therefore focused on providing overall policy, legal and regulatory platform for attracting the required investment for the sustainable development of the sector to support national development goals and plans.

As the Federal Government does its part, states and local governments must also do their part in ensuring their citizens have access to the necessary infrastructure vital for connecting to the information superhighway of the digital age. There have been reports about some areas of the country where government agencies at State and Local government levels create bottlenecks in the deployment of ICT facilities by operators, either by imposing taxes arbitrarily, or obstructing, delaying, or denying right of way applications. There are on-going efforts to ensure that these incidences are minimised.

The Local Government is a focal point for community development and it is recommended that Local Governments can facilitate broadband growth and adoption by working with communities to reduce disruption to infrastructure build and operations and creating innovative schemes to encourage adoption and usage of the internet to enhance development.

Policy and Regulation

Government shall review all ICT laws in order to ensure that they support and facilitate ICT/broadband development and give legal substance to the ICT policy and National Broadband plan. Government shall also streamline the administration of the ICT industry and complete the merger of the relevant regulatory bodies in order to ensure a single and consistent regulatory regime that will bring about better efficiency in the management of scarce resources.

All Federal agencies shall within two years make their public information and services to Nigerian citizens available on-line and the Federal Government shall offer technical assistance to all other tiers of Governments to achieve this same capability for all their MDAs.

It shall be a priority for government to classify all public ICT/broadband infrastructure deployed under a national licence as a critical national security and economic resource that must be, protected from vandalism, theft, unauthorised tampering and from enforcement action by any authority without a valid order from a high court. The enactment of an ICT Critical Infrastructure Act shall be pursued and in the interim a Federal Executive Directive shall be issued to security agencies for the administrative protection of this security sensitive and economically important infrastructure.

On the regulatory side, the regulator shall give effect to the open access principles enshrined in the Information and Communications Technology Laws wherein no infrastructure deployed on public resources shall be administered to the detriment of the general public.

The Regulator shall proactively monitor and address any anticompetitive behaviour among service providers along the broadband value chain, and shall also monitor the quality of the services delivered, the billing, billing patterns and billing structures for services to ensure that consumers get good value for money.

Spectrum is a critical resource of the wireless ecosystem and where necessary shall be refarmed, reassigned and reallocated to benefit new wireless broadband technologies capable

of delivering high-speed broadband networks and a regulatory framework developed that will promote optimal use of spectrum.

Cyber Security and Critical Infrastructure

Security issues have assumed new dimensions, with growing cases of Cybercrime, cracking, copyright infringement, identity theft, etc. Such crimes may threaten the nation's security. Indeed privacy of transaction is constantly being threatened and the same consumers that are to benefit from the new technologies and services will be demanding even more protection from the service providers and regulators. Laws would therefore be upgraded to cover new areas such as electronic transactions, e-commerce and cyber security etc.

The government realizes that every modern nation state depends on the reliable functioning of its critical infrastructure to guarantee national and economic security.

The term critical Infrastructure in this plan, refers to ICT networks and systems that are crucial to the Federal Republic of Nigeria to the extent that the damage, destruction or ineffectiveness of such networks and systems, whether physical or virtual, would have adverse impact on our national security, economic wellbeing, public safety, food security or any combination thereof.

Threats of Cyber-attacks and Physical (vandalism, sabotage and theft) attacks are two broad categories of threats that could adversely affect the nation's critical ICT infrastructure.

In many countries, legislations have not kept pace with developments in the cyber world, and legal interpretations of certain online phenomenon in a borderless global context such as the cyberspace are not entirely clear. For instance, in a situation where websites are accessible virtually to anyone anywhere in the world, it is often difficult to predict where cyber threats can come from. Businesses and national security infrastructure have been targets of cyber-attacks from overseas countries where perpetrators are beyond the reach of conventional national laws. International cooperation is therefore necessary in fighting cyber threats and attacks.

Without a cutting-edge cyber security and cybercrime law, the traditional legal concept of jurisdiction and arrest warrant may be difficult to enforce due to the cross-border and transnational character of the internet. Conventional national laws are increasingly proving inadequate to address the legal challenges emanating from the cyberspace.

Government shall focus more attention to law-and-order and socioeconomic issues that arise from cyberspace. It is the intention of government to maintain a cyber-environment that encourages economic prosperity and certainty of transaction execution while promoting efficiency, innovation, safety, security, privacy and business confidentiality. The government shall therefore enact a comprehensive cyber security Law to address the liability and criminal risks that may originate from fraudulent and inappropriate use of internet infrastructure such

as cyber-fraud, cyber-intrusion, cyber-attacks, cyber-bullying, spam, privacy violation, copyright infringement, online defamation and other forms of cybercrime.

Government shall also encourage the establishment of a team of local experts with competency in the prevention, detection and proactive interdiction of cyber threats and attacks, as well as, in forensic recovery of systems after attacks.

With respect to physical threat to infrastructure, the government shall enact a Critical Infrastructure Protection Act that has ICT infrastructure among objects to be protected, as well as, direct appropriate security agencies to elevate their surveillance and protective oversight for such infrastructure.

Local Content Imperative

It is widely acknowledged that content is key and central to what the internet represents to the average user. Therefore there is need for more people to participate in the creation of content, especially content that truly serves the need of the local internet users. This presents enormous opportunity for local content developers in Nigeria.

The content available for use over the internet has a direct role in increasing the use of the internet for the local population and for local consumption. This extends not just to the content being available online, but being accessible in local languages and script¹. The Nigerian Entertainment industry is rich and already flourishes worldwide with high demand for its music and films. An integrated plan however must include making this content richer, and more widely available. The content industry can indeed flourish with targeted campaigns that promote the creation, storage, and distribution of such content. Prime examples of such content are the Get Nigerian Businesses Online program, and improving the quality of Nigerian location information and mapping online

Local skills Development

As Nigeria focuses efforts towards closing the yawning broadband gap, a vital foundation to build on will be a deliberate action towards making ICT training facilities widely available throughout the country for the acquisition of relevant skills in Communications technology. Of all the resources required to develop and operate networks, lack of highly qualified staff can constitute a great setback to ICT development and delivery of acceptable quality of service. As the operating companies and service providers continue to expand their Communications infrastructure, they will be installing highly sophisticated equipment and systems and modernising their networks. These companies will be seeking to employ locally sourced skilled manpower to install, operate and maintain these systems.

¹ Russia saw a major boom in the uptake of the internet when it introduced the ability to deliver websites written in Cyrillic characters e.g. русский алфавит

Even regular office jobs in the new digital economy require technical skills and familiarity with new technologies. Organisations like the Digital Bridge Institute (DBI) were set up for training and development of such skills. The Federal Government shall build new skills acquisition centres and strengthen the contribution and performance of institutions like the DBI while also providing a conducive environment for private initiatives. Government shall also work with academic institutions at relevant levels to align curriculum, research (where relevant) and teaching with the demands of the ICT sector.

Adoption and Utilisation

Barriers to adoption have been identified as services not being available at a good speed, the high price of broadband services, the lack of ownership of access devices due to affordability, low level of digital literacy, and poor perception of the value of broadband. To mitigate against these barriers government shall, embark on programs that are geared towards making broadband more affordable; lower device costs by reducing or eliminating import duties and other taxes as appropriate; launch intensive nationwide awareness campaigns to educate the citizenry about the value of broadband services. Government shall also introduce digital literacy education and training programs leveraging the community access centres established across the country as well as incorporate such programs into primary and secondary education. Even this very important task requires skilled and well-trained human resources.

It is also true to state that majority of the population especially in the rural areas, do not even realise how relevant this technology is to their lives. Therefore, there is an urgent need to reach out to such groups and communities and educate them on how broadband can open new opportunities for them and their children, and why they should seek to acquire and use it.

The Broadband Roadmap

It is the intention of government to put forth a national broadband roadmap that addresses not only the broadband challenges of today, but is flexible enough to evolve over time in line with emerging realities in technologies and the market.

The implementation of a National Broadband plan requires long-term commitment and significant action by Federal, States and Local Governments, as well as, the Executive and legislative branches of government – alongside strong private sector participation.

The Minister of Communication Technology shall establish a Broadband Council to provide periodic evaluation of progress, facilitate coordination and collaboration, and highlight areas of program adjustment to permit the realization of new and emerging opportunities. Also, the Council shall be the forum for relevant agencies to discuss and fine-tune implementation strategies, assign responsibility for joint duties, share best practices and coordinate broadband funding so that government's spending on broadband has maximum economies of scale and maximum impact.

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ITEM	DESCRIPTION	TIMELINE	RESPONSIBLE
Policy & Regulation	Define the open access framework and secure ROW Waivers with states	2013	FMCT, NCC
	Enable expedited ROW permits for the rapid rollout of base stations	2013	FMCT, State Gov., FMoW
	Declare Critical National Infrastructure	2013	National Assembly, State Govs
	License new operators as required		NCC
Enabling Infrastructure	Interconnect National and Regional Long Distance Operators	2013	FMCT, NCC, FMoW, Licensees
	Incentivise rollout of fibre infrastructure	2013- 2014	FGN, NCC, State Govs
	Agree 3G Rollout Target implementation with operators	2013	NCC, Licensees
	Publish plan for freeing up more Spectrum for LTE rollout	2013	NFMC, NCC, NBC
	Conduct spectrum licensing for LTE in 2.5GHz, and 2.6GHz bands	2014 – 2015	NCC
	Release spectrum on the sub-40GHz bands for mobile backhaul	2014 – 2015	NCC, NFMC

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ITEM	DESCRIPTION	TIMELINE	RESPONSIBLE
Costing & Pricing	<p>Agree cost-based lease pricing model and implement agreed wholesale price caps</p> <p>Agree Plan for review of the cost of acquiring spectrum licences</p>	2013	<p>NCC, Licensees</p> <p>NFMC, NCC</p>
Funding & Investment	<p>Agree Financial Incentives for achieving rollout targets</p> <p>Agree Funding Options for accelerating broadband Infrastructure rollout</p>	2013	<p>FMCT, NCC, MoFI, Licensees</p> <p>FMCT, NCC, USPF, Ministry of Finance</p>
Driving Demand	<p>Set up Public Access Points and ICT Training Centres</p> <p>Educate women on the use and benefits of ICT</p> <p>Interconnect all Internet Exchange Points</p> <p>Connect all universities</p> <p>Connect schools, colleges and hospitals</p> <p>Incentivise OEM sub \$30 smart phone devices</p>	2014	<p>NITDA, USPF, DBI, State Govs</p> <p>FMCT, NCC, USPF</p> <p>NITDA, NCC</p> <p>GBB, NUC, FMCT, USPF</p> <p>State Govs, NCC USPF</p> <p>NCC, Local Manufacturers & Blackberry, Nokia, Samsung, Huawei, ZTE, etc.</p>

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ITEM	DESCRIPTION	TIMELINE	RESPONSIBLE
Building Fibre Infrastructure	Build Metro fibre networks in all the major cities and state capitals	2014	Licensees, State Govs
	Incentivise building of last mile wire line infrastructure to homes, estates, and commercial premises		NCC, Licensees
	Extend international cable landing points to other coastal states		FMCT, NCC, Licensees
Wireless Broadband Infrastructure Upgrade and Expansion Phase 1	All new cell sites to be LTE compatible	2014	Licensees
	Spread 3G to at least 50% of the population	2015	NCC, Licensees
	Complete Digital Dividend spectrum migration		Licensees, NBC, NCC
	Release more spectrum for LTE		NFMC, NCC
Wireless Broadband Infrastructure Upgrade and Expansion Phase 2	Spread 3G/LTE to at least 70% of the population	2017	Licensees, NCC
Wireless Broadband Infrastructure Upgrade and Expansion Phase 3	Spread 3G/LTE to at least 80% of the population	2018	Licensees, NCC

Conclusion

For Nigeria to become one of the world's leading economies by year 2020, high-speed broadband networks that will provide every Nigerian with fast, reliable and affordable internet access is a fundamental requirement. Broadband has been variously described as a transformative technology that levels the playing field and gives businesses access to regional, national, and international markets irrespective of geographical location. Mr President's goal in this Plan is to produce a strategy and realistic roadmap that will make affordable broadband accessible to all Nigerians within the shortest possible time frame.

The huge success of digital mobile services is a great platform upon which to build a national broadband strategy. The Federal Government is committed to resolving identified challenges to the quest for accelerated broadband penetration in Nigeria and will collaborate with the State Governments, the Private Sector and other stakeholders to achieve the goal. Government also recognises that some incentives may be required to push services to the areas deemed less commercially viable.

The Federal Government's position is that pervasive broadband services are in the best interest of the nation and no effort should be spared to reach all the currently unserved or underserved areas.

For improved access to infrastructure, the private sector is agreed that it must open up access to existing infrastructure including transmission networks and fibre ducts to enable more rapid cross country delivery of services. This must be done with transparent cost-based pricing and this can be implemented immediately and all future network deployments will operate under the same principle.

Due to paucity of wire-line last mile access infrastructure, the primary medium for nationwide delivery will be mobile broadband. Effort will however be made to encourage deployment of fibre to the home or premises where feasible.

Other critical and urgent requirements will be to: declare ICT/Telecoms infrastructure as critical national infrastructure that qualify for special protection; secure ROW fee waivers from State Governments interested in building digital havens of highly connected communities; embark on awareness creation schemes to achieve universal acceptance of the transformative impact of broadband to the society and conduct digital literacy programs at all levels. The full implementation plan details other work streams but a brief summary is provided below.

The Plan in Summary

How to go about delivering a five-fold increase in broadband penetration is crucial and this document provides within it a roadmap and timelines for achieving this. Essentially government shall

The Nigerian National Broadband Plan 2013 - 2018

- Establish policies that regard ICT networks and installations as critical national infrastructure that qualify for special government protection.
- Promote transparency of pricing and reduction of build-out costs by encouraging an increased level of infrastructure sharing and interconnections and introducing price caps where necessary or when market forces fail.
- Take necessary regulatory measures to ensure better performance levels in the delivery of broadband services.
- Facilitate rapid rollout of wireless and wire-line infrastructure and provide incentives to encourage a national 3G wireless coverage to at least 80% of population by 2018.
- Timely release of more spectrum for broadband services especially for LTE.
- Foster attractive investment climate by targeted schemes for stimulating demand and providing targeted concessions, tax incentives, grants or support where needed.
- Raise digital literacy & inclusion by using existing national assets for community access
- Advocate and demonstrate the benefits of broadband within the levels of government and also among the people

Broadband has the potential to make significant contributions and improvements to the wellbeing of the Nigerian populace. These benefits range widely from improved access to health services, agricultural best practices, online and cheaper self-driven Education, economic growth and development via improved commerce, and enhanced public safety and security measures.

Prioritising the acceleration of deploying broadband infrastructure is therefore a primary imperative that the Federal Government has identified as a key component to harnessing these benefits. The Federal Government strategy is therefore to immediately provide a means for rapid proliferation of mobile broadband across the whole country and the consolidation of all broadband impacting initiatives under a single well-coordinated plan of action.

This National Plan integrates all the major inputs of all stakeholders into a single feasible plan. This will enable faster, better coordinated deployment and promote synergies in the rollout of various programs and initiatives, bringing down costs of deployment and developing systems for longevity and sustainability.

With this implementation plan the Federal Government shall collaborate with all levels of government and private sector stakeholders to deliver 80% mobile broadband penetration by 2018 and an open access shared infrastructure environment to support future growth. The Federal Government shall push to see a rapid implementation of these identified opportunities, resolutions and quick wins.

Nigeria's broadband roadmap and strategy shares the global optimism concerning the opportunity for broadband to contribute to socioeconomic advancement and competitiveness of nations. The strategy aims at maximizing investment in broadband infrastructure through

the lowering of infrastructure deployment costs, promoting competition, unleashing new spectrum, removing impeding barriers and fostering mass market for broadband.

Broadband can be provided using a range of different types of technology, each with its own particular strengths and weaknesses. The best overall solution will usually combine several technologies, involving trade-off of costs, performance and coverage. The most suitable mix depends on the economics of the technologies being considered, in relation to geography of the terrain, as well as, population density involved.

At this juncture 3G (or HSPA) mobile broadband technology provides the fastest way for the delivery of universal mobile broadband access in Nigeria now and in the near future, while targeting LTE technology for future high capacity networks. 3G and LTE are indeed the most ideal solutions for leapfrogging Nigeria to high speed broadband delivery.

As a result, the Nigerian mobile broadband industry needs more spectra for broadband rollout. The Federal government shall encourage its relevant organs to move quickly towards allocating more spectra for mobile broadband.

The government also realizes how crucial it is for Nigeria to move forward as quickly as possible to remove all outstanding barriers and gaps in the broadband ecosystem.

IMMEDIATE TACTICAL & STRATEGIC OPTIONS

The following points summarise the actions to be taken in fulfilment of this plan

Tactical Solutions

1. Promote Instant Shared Infrastructure amongst existing operators
 - a. Introduce Transparent Cost-Based Price Caps
2. Establish a SMART CITY Anchor Project with select and qualifying States
 - a. Secure 4-Year ROW Waiver Agreements
3. Mandate the pre-installation of ducts when constructing new roads and buildings
4. Publicise the ROW Guidelines and Build Standards established with the Ministry of Works
5. Produce a GIS-based National Fibre Infrastructure Map
6. Classify the ICT Infrastructure as Critical National Infrastructure
7. Introduce Low Cost Wireless & Satellite Solutions To Hard To Reach Areas

Strategic Solutions

8. Initiate LTE-Ready Spectrum Directives including fast-tracked release of spectrum
9. Review spectrum pricing to lower the cost of spectrum for broadband rollout
10. Establish Centres for Community Access using Public Property like Post Offices, Schools Computer Labs, and Local Government Headquarters
11. Build Awareness Campaigns for Digital Advocacy and emphasising the need for Digital Literacy and Inclusion
12. Help licensees negotiate reduced right of way fees for fibre builds or securing four years ROW waiver agreements and also simplifying the right of way application process.
13. Pre-pay for public sector broadband to stimulate demand; for example pay for four years' worth of broadband supply for public sector offices upfront to enhance usage and stimulate patronage of private sector providers.
14. Promote cheaper access devices from OEMs
 - a. Challenge the sector to produce sub-\$30 smartphone access devices
 - b. Support the zero import duty taxes for mobile and computing devices to stimulate demand (e.g. for smartphones and laptops) which would help individual Nigerians access the Internet once the infrastructure is in place.
15. Explore opportunities for use of TV White Spaces / unlicensed spectrum to achieve last mile connectivity especially in rural areas
16. Encourage infrastructure sharing by
 - a. Financial incentives for infrastructure sharing especially in rural /underserved areas drawn from the Universal Service Fund.
 - b. Tax (e.g. AOL) exemptions on earnings from infrastructure sharing.
 - c. Creating a working group with operators, service providers, municipalities, local authorities to implement infrastructure sharing.
 - d. Negotiating for fibre with each licensee and asking for excess capacity for underserved communities; parties of interest would be ISP (regional or national) or a social entrepreneurship entity.

THE BROADBAND VISION

VISION20:2020

Articulating a vision for broadband with respect to Nigeria begins with the overarching context of an existing National vision, Vision20:2020.

Vision20:2020; Top Twenty World Economy by 2020.

It states “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”.

This Vision reflects the intent of the Federal Republic of Nigeria to become one of the top twenty economies in the world by the year 2020, with a principal growth target of no less than \$900 billion in GDP and a per capita income of no less than \$4000 per annum. Pervasive broadband access is a critical requirement for Nigeria to achieve this vision.

*The **broadband vision for Nigeria is one of a society of connected communities with high speed internet and broadband access that facilitates faster socioeconomic advancement of the nation and its people.***

BROADBAND VISION STATEMENT

The National ICT Policy document describes ‘A knowledge-based and globally competitive society’ in its body of work as the vision for the Nigerian society. It is clear that an integrated and effective broadband strategy is pivotal to any of these vision statements. The vision for broadband in Nigeria must therefore derive from these vision aspirations by providing for a society of connected communities with access to fast internet and broadband services. Therefore

*The **broadband vision for Nigeria is one of a society of connected communities with high speed internet and broadband access that facilitates faster socioeconomic advancement of the nation and its people.***

SECTION ONE: INTRODUCTION

1 BROADBAND AND ITS BENEFITS

Until recently, broadband was strictly defined in terms of data transfer-speeds networks could support. Traditionally, the term broadband referred to high-speed communications networks that connected end-users at a data transfer speed greater than 256Kbps.

However, defining by speed has become a moving target owing to rapidly emerging technology innovations². Whilst speed is still regarded as a critical component in the definition of

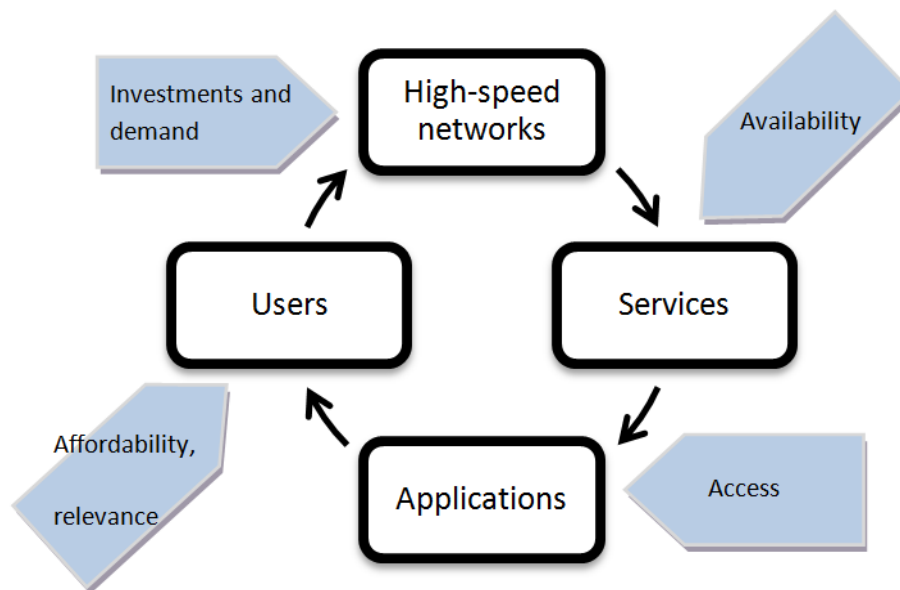


Figure 1: The Broadband Ecosystem

broadband, there has been a general moving away from defining broadband solely in terms of network connectivity speed.

Apart from quantitative indicators, a number of qualitative indicators such as Class of Service (CoS), and Quality of Service

(QoS) are now associated with broadband definitions. These cover applications and services that are uniquely made possible only by broadband technology, as well as the likely impact broadband could have on socioeconomic development. These indicators are what constitute the **'broadband ecosystem'**³.

In its "Building Broadband" document, the World Bank promotes the concept of an ecosystem⁴ of users, services, networks and applications by considering broadband in terms of demand and supply. The intention is to encourage a heightened focus on boosting access to broadband and growing adoption and usage.

² As of July 2010, the United States FCC changed its definition of broadband, updating it to refer to services that provide at least 4 Mbps downstream (to the user) and 1 Mbps upstream (to the provider). This is 20 times faster than the previous 200 Kbps definition, and indicates that many online applications need higher speed connections.

³ US Broadband Ecosystem <http://www.broadband.gov/plan/3-current-state-of-the-ecosystem/>

⁴ Building broadband: Strategies and policies for the developing world by Yongsoo Kim, Tim Kelly, and Siddhartha Raja, January 2010

1.1 DEFINING BROADBAND FOR NIGERIA

In Nigeria, wireless technology is the dominant access medium for delivering broadband to most end users compared to cable based infrastructure. This is so because unlike the more advanced countries, Nigeria did not have extensive copper cable infrastructure and therefore did not benefit from broadband over ADSL. It is also true that the optic fibre infrastructure has not been extensive enough to deliver ubiquitous broadband to homes and office premises. For the foreseeable future, wireless technology will continue to play a dominant role in broadband infrastructure for Nigeria, particularly the last mile. It has been identified that Nigeria has the opportunity to leapfrog in terms of broadband experiences that can be supported by mobile broadband technology and an adequate definition of broadband has been crafted to reflect this.

As such, broadband within the Nigerian context is defined as an internet experience where the user can access the most demanding content in real time at a minimum speed of 1.5 Mbit/s.

This definition shall be reviewed periodically in line with progressive leaps in technology⁵.

1.2 THE BROADBAND ECOSYSTEM

As mentioned above, Broadband can be considered in terms of an ecosystem that provides a holistic view to the various components required to deliver an end to end solution in the provision of broadband services. Notably, the components are: Investment which leads to the availability of networks and services, the relevance of the service to the user, and affordability.

1.2.1 INVESTMENTS

There are three broad sources of investment and funding for the build-out of broadband infrastructure: the private sector capital, government intervention funds, and Public Private Partnership funds. In general, private sector investors fund broadband networks only where they can earn good returns on investment.

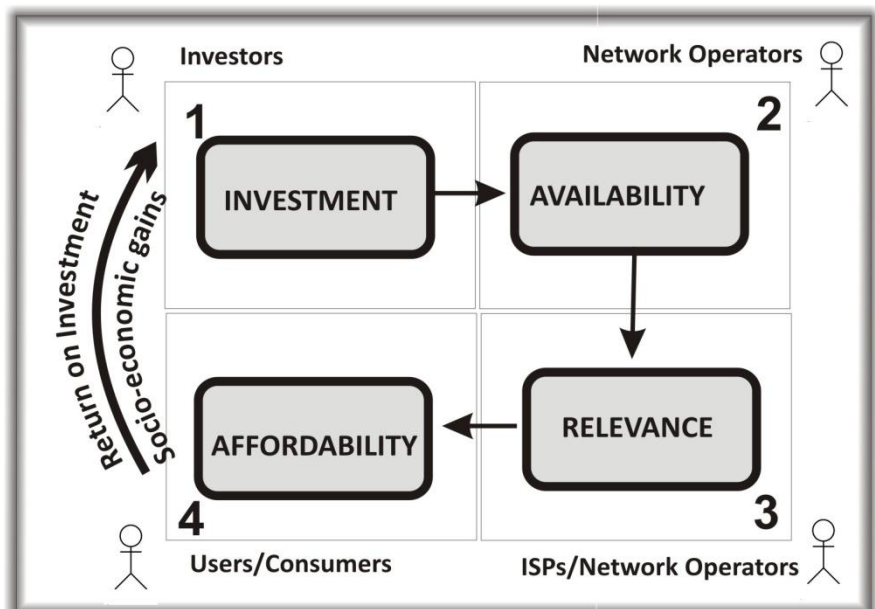


Figure 2: The Economics of the Broadband Ecosystem

⁵ Reflecting a roadmap of services versus the minimum broadband speed required to deliver a Class of Service (CoS) and Quality of Service (QoS) that is adequate for the consumer

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Nevertheless, in some cases, private companies are simply unable to cope with the level and speed of investment needed to close the broadband supply gap while still providing services at affordable price levels. In such cases direct government intervention or public-private partnership funding will be required, especially to address unserved and underserved areas.

1.2.2 NETWORK & SERVICES AVAILABILITY (THE SUPPLY SIDE)

Availability refers to the existence of network infrastructure that provides access to broadband. Such infrastructure can take multiple forms, including wired or wireless, fixed or mobile, terrestrial or satellite, and different types of networks have different capabilities, benefits and costs⁶.

Fibre backbone infrastructure is essential for delivering broadband. Because last mile access technologies can either be wire line or wireless, it is desirable that this layer of physical fibre infrastructure attains depth of capacity and pervasive coverage as even wireless technology requires fibre infrastructure (e.g. Fibre to the Base Station/Tower or Fibre to the Node) to deliver the robust mobile broadband (3G, 4G/LTE) services that support high-speed user access.

In addition, satellite solutions provide long distance wireless broadband delivery capabilities for the hard to reach and difficult areas, typically rural, low population density hinterland areas.

Over the years, technology speeds have increased and this trend is expected to continue.

Figure 3 below depicts the trend in speeds available via fibre and wireless in the past decade.

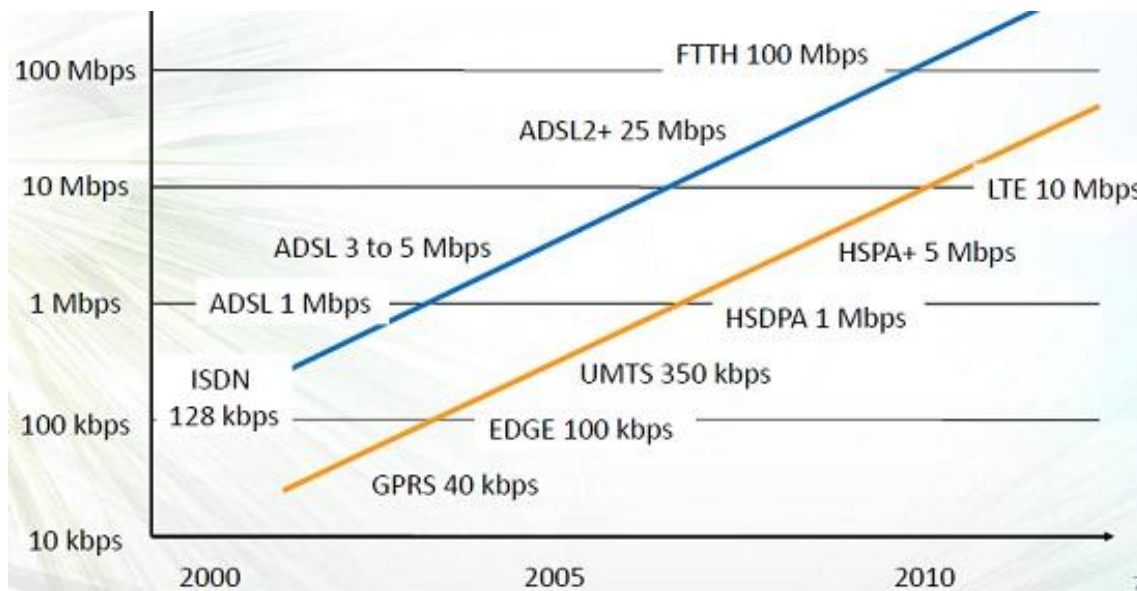


Figure 3: Speeds by Copper/Fibre and Wireless Access⁷

— Wire line — Wireless

⁶ US Broadband Ecosystem <http://www.broadband.gov/plan/3-current-state-of-the-ecosystem/>

⁷ Source Mobile Broadband Explosion, Rysavy Research, 2012 white paper

1.2.3 SERVICE RELEVANCE (THE DEMAND SIDE)

The Internet is a critical enabler of human empowerment, social development, and economic growth, and it also enhances quality of life generally. End users therefore form a critical part of the broadband ecosystem because they are the main beneficiaries.

Application and service relevance are paramount to attract users or consumers who are willing to pay for what they use on the broadband platform. In order to generate demand for broadband, consumers must not only be aware of its availability and be able to afford it, but they must also see the relevance and attractiveness of it. The value proposition of the services must be relevant to their life needs. Relevance and attractiveness of service are enhanced when the market provides sufficient choice and diversity of services, applications, and content that appeal to consumers. Content becomes even more appealing when it is locally relevant.

Relevance therefore pertains to how users are employing broadband-based services and applications ranging from online banking and shopping, social networking, instant messaging, media content and file sharing, to online gaming, video-on-demand, videoconferencing, video chatting, IPTV and VoIP. There is also evidence that broadband applications are helping businesses and government establishments to improve productivity. For example, broadband applications may allow access to new geographic markets, shorten product development cycles, and throw up more efficient resource allocation processes for business and government establishments.

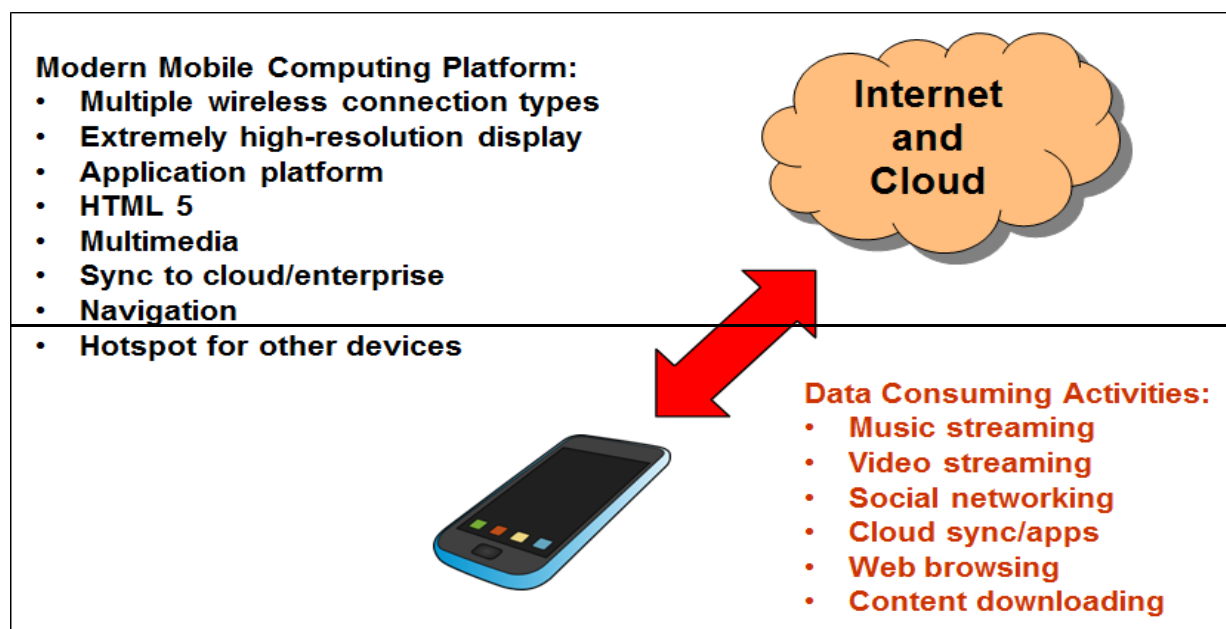


Figure 4: Smart Device and Data Applications⁸

⁸ Source Mobile Broadband Explosion, Rysavy Research, 2012 white paper

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Bandwidth demand and supply are co-dependent; more bandwidth enables the use of more applications which in turn drives the need for more bandwidth. With the necessary high speed network in place, even more innovative broadband applications follow. The following figure gives an indication of the varying experiences a user can have depending on the access technology, in this instance 3G versus 4G LTE.

Activity	3G (1.5 – 3 Mbps)	4G LTE (10 – 20 Mbps)
Download a 20 MB game	< 3 minutes	< 25 seconds
Streaming tunes	< 10 second buffer. Occasional playback buffering.	< 1 second buffer. No playback buffering.
Stream an HD video	1–5 minute buffer. Playback re-buffering and dropped frames very likely.	< 30 second buffer. No playback re-buffering or dropped frames.
Post a pic to Facebook	< 25 seconds	< 1 second
Watch a YouTube video	< 20 second buffer. Occasional re-buffering. No dropped frames during playback.	< 1 second buffer. No playback re-buffering or dropped frames.

Figure 5: User Experience Speeds

1.2.4 AFFORDABILITY AND ADOPTION

Another major component that often constitutes a barrier to the adoption and usage of broadband is affordability; when even the lowest option available is still too expensive for the average end user.

Affordability has been a major factor for broadband adoption, particularly in developing nations. In some jurisdictions, high cost of deploying broadband infrastructure has pushed the cost of providing services beyond what the ordinary consumer is willing or able to pay. This then indicates that service offers also have to be at the right price and not just the right speed. Without affordability, demand for broadband service will be weak and payback period for investors may become unacceptably long.

When it comes to user adoption of broadband some demographic trends are clear. Broadband use is more common and highly prevalent amongst youths and digitally literate adults. In rural areas broadband uptake is generally lower due to access limitations and inability to pay.

Dedicated programs for addressing the affordability barrier are essential to drive up the adoption and usage of broadband services.

1.3 THE BENEFITS OF BROADBAND

We live in a global village where ICT has a direct impact on a Nation's ability to improve the economic wellbeing of her people and compete globally.

Broadband is an essential infrastructure of the 21st Century. It enables access to business and job opportunities, improves healthcare, education and government services, and facilitates social interactions.

Broadband is to the 21st Century Information Age what Electricity was to the Industrial Age. It has a significant transformative effect on how people live and work. It empowers the individual user with previously unimaginable capabilities and global reach. The Internet is the world's largest repository of information and knowledge and High Speed Access is critical to fully harnessing the benefits of the Internet.

1.4 ECONOMIC BENEFITS

The economic benefits of investing in broadband are considerable and far reaching. It is widely accepted that an increase in broadband penetration has positive impact on GDP growth. A 2009 World Bank study suggests that a 10% increase in broadband penetration yields an additional 1.38% increase in GDP growth for low to middle income countries (see chart below).

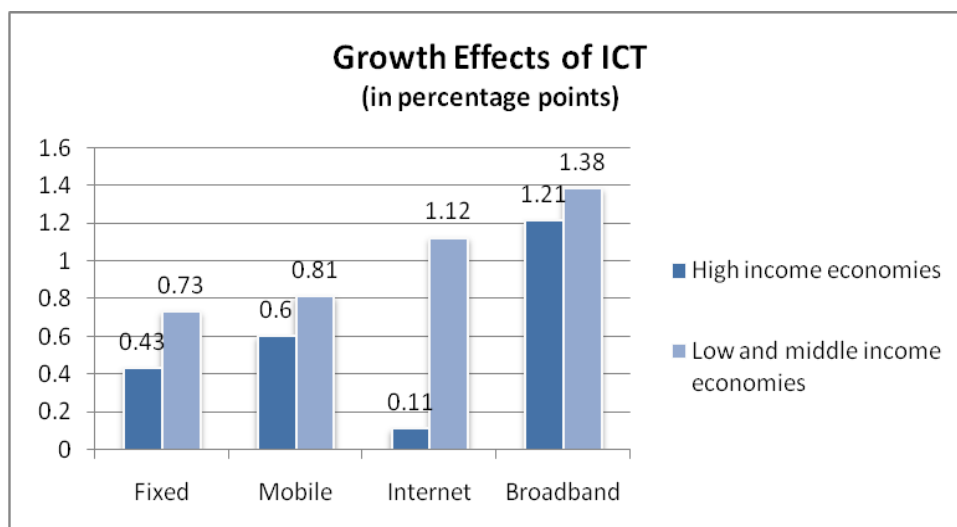


Figure 6: Effects of ICT⁹

In the first half of 2013, the FMCT ran a test pilot for a 'micro-work' program that gave 3500 otherwise unemployed youths access to freelance crowd sourcing via the internet. In just two months the pilot reported over \$121,163 USD of revenue earned by just over 2000 active registrants serving 42 clients globally. The exercise was a resounding success showing that access to broadband contributes to job creation and economic growth by **improving productivity** and **accelerating innovation**.

⁹ Qiang et al, (2009) – World Bank

1.5 BROADBAND IN ENTERTAINMENT

Nigeria's Nollywood film industry was ranked third for globally generated revenue in 2011¹⁰. It generated close to N126.4 billion (about U\$D800 million) in the three years spanning 2010-2012. The two film industries ahead of Nigeria's are the US' Hollywood and India's Bollywood. The global film and entertainment industry generated N14.5 Trillion (U\$D90.6 billion) in 2010. This was projected to increase to N16.2 trillion (U\$D102.7 billion) in 2012.

The world has witnessed the increasing popularity of online media services like YouTube¹¹, NetFlix, iTunes, and other media streaming or video-on-demand digital entertainment services but without broadband, online entertainment as we know it today would not exist.

The largest consumer demands for bandwidth are coming from Music¹², Movies, Videos, TV shows and Radio content downloads. The demand to download video content, such as a movie or TV show, within a short timeframe requires significant bandwidth. A single video download (typically 400Mb) over the internet is likely to require not less than 20Mbps in data transfer rates, to ensure fast delivery of less than twenty five seconds to the end user.

Under such circumstances, narrowband dial-up users are no better off than those without internet access; in terms of the extent that they can use (or not use) the internet for high quality, high definition entertainment purposes. With the global phenomenon of the global movie industry, the demand for video traffic is now more prevalent for mobile TV, Desktop TV, Cable TV and HDTV watchers. And as more of the world's populations go online for entertainment, pressure on internet access infrastructure builds across the world - compelling a phenomenal worldwide shift towards high-capacity broadband networks. Greater bandwidth capability has become absolutely essential in order to prevent the networks from becoming congested with this traffic.

Effective broadband infrastructure and distribution networks make this kind of growth possible, and aside from the impressive revenue that is being realized through the traditional global entertainment industry, broadband is permitting an enhanced revenue model for both the established and emerging small artists, and the media advertising agencies spreading their products and services across it.

¹⁰ Source, BUSINESSDAY, Thursday, October 25, 2012, coverpage – Nollywood ranks third, earns U\$D800 million, written by Funke Osae-Brown

¹¹ South Korean PSY's Gangnam Style hits 1 billion views, December 21, 2012, Billboard.com <http://www.billboard.com/news/psy-s-gangnam-style-hits-1-billion-views-1008059552.story>

¹² In December 2012, iROKING part of the iRoko TV group, iRoko Partners announced it hit 1 million music downloads in less than a year of being in operations

1.6 BROADBAND IN AGRICULTURE

Broadband positively impacts agriculture in several ways. It provides farmers access to timely and relevant information on weather updates, since the quality of crops and other tasks depend in large part on weather. The proper timing of planting activities in line with favourable weather conditions often promotes high yield.

Fast online access to websites¹³ that share best practices makes it possible for farmers to learn about farming management practices, online marketing options, availability of livestock and seed crops etc. Also farmers who use broadband to access pricing information online are likely to gain bargaining power and make more educated marketing or purchasing decisions.

Similarly, broadband internet enables farmers to market their products directly to consumers. Local farmers have access to new markets when they set up online shops that offer certain agricultural products to customers worldwide.

Nigerian farmers using broadband can operate and monitor their equipment remotely, eliminating the need for regular farm visits by technicians. Automatically generated messages can provide an alert when equipment develops a fault or stops functioning. They can monitor and reset greenhouse temperatures, humidity, and other settings remotely. All these amount to significant cost savings amidst improved performance.

With 70% arable land, agriculture is a key sector that creates jobs for the Nigerian economy. Agricultural communities are typically rural and rural areas are generally the last to benefit from infrastructural amenities. Non-availability of broadband in rural agricultural communities can translate to lost opportunities resulting in significant economic costs to the nation. It is therefore essential that these rural areas be provided with access to the kind of broadband services that will truly expand their addressable markets while increasing knowledge and saving costs. The Federal Government shall focus on agricultural programs that incorporate access to broadband in their business models and plans.

1.7 BROADBAND IN COMMERCE

The growing levels of internet access and the continued rollout of broadband infrastructure are driving the growth of e-commerce and m-commerce. Like railroads and highways that facilitated trade and commerce in the past, broadband is the information superhighway of the 21st century that is accelerating global commerce at a rate never imagined before.

¹³ At the Demo-Africa 2012 event in Nairobi, Kenya, Mlouma a Senegalese web and mobile business service that allows farmers and agribusinesses to buy or sell agricultural products in real time was demonstrated. It connects African vendors and suppliers via its dedicated platform to farmers in their agricultural and rural zones. Their mission is to connect and provide reliable agricultural information to farmers and agribusiness in real time. <http://www.mlouma.com/index/noservices>

An online presence increases the ability for businesses to be found, regardless of their physical location; and enables commerce to occur without having to physically visit the business premises. Several initiatives have already been developed to encourage Nigerian businesses to go online and thereby expand their market reach, for example the 'Get Nigerian Businesses Online' initiative has met with very notable success¹⁴. Access to the Internet is levelling the playing field between smaller vendors, SMEs and bigger businesses and offers smaller businesses the opportunity to achieve operational scale more quickly.

Remarkably, there has been a growing adoption of online consumer purchases throughout the world's major economies. Sectors that have grown most in online commerce include advertising, sale of software, books, entertainment, travel, event tickets, clothes, and consumer electronics. According to International Data Corporation (IDC), E-Commerce consumer's spending will grow from United States dollar (USD) 118 billion worldwide in 2001 to USD 707 billion in 2005¹⁵. Invesp Consulting, a leading provider of conversion optimization services and software for online retailers, forecasts that this figure could reach U\$D1.4 trillion by 2015¹⁶.

The explosion of the volume of e-commerce transactions riding over broadband infrastructure has meant creation of employment and wealth. Many young technology entrepreneurs are latching onto the opportunity, which is permitting businesses of all sizes to engage in commerce on anytime-anywhere basis. High speed broadband will no doubt enhance e-Commerce activities in Nigeria.

1.8 BROADBAND IN EDUCATION

The availability of high speed internet in the 21st century has pushed learning beyond the confines of physical classrooms. A student at home can participate in regular classes using interactive multimedia technology. Unlike traditional school systems which require face-to-face encounters between teachers and students, broadband makes it possible to deliver distance learning and the sharing of educational resources. Some learning platforms are structured to provide meaningful interactive, real-time learning experience. Even traditional teaching methods benefit from the access to online archival materials and resources.

E-learning and Distance learning have become commonplace as modern education is no longer restricted to sitting in a classroom and taking notes. Students are empowered to draw on the richness of the internet to research any subject matter ranging from historical events to simulations of challenging math problems.

¹⁴ As at March 2013, about 50,000 businesses had come online via the GNBO programme

¹⁵ Troy Wolverton, 2001

¹⁶ <http://www.invesp.com/blog/ecommerce/how-big-is-ecommerce-industry.html>

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The improved flow of information has made the markets for education products and services more competitive at a global scale. As a result, education authorities, institutions and individuals have more options when seeking high-quality educational products and services.

Interactive Whiteboards and Touchscreens are just few of the multimedia classroom products generally sourced through the internet. Furthermore, broadband is helping to popularize access to online education classes and digital books. For instance, Massachusetts Institute of Technology (MIT) has put all the educational materials from its undergraduate and graduate-level courses online, making them openly available to anyone anywhere, part of its Open courseware initiative. Another online initiative, the Khan Academy targeted at secondary school students, has over 3800 videos on everything from arithmetic to physics, finance and history, and it is freely available.

The National Open University of Nigeria and other similar institutions will benefit from improved and pervasive broadband connectivity.

Increasing broadband penetration will expand access to educational opportunities at all levels. Broadband connects students to teachers, parents and free educational resources. It also enables the sharing of curricula and other resources. Several studies suggest that impacts of broadband on education include:

- Improved effectiveness of instruction and learning outcomes through more engaging, interactive activities;
- Enhanced access to a wide array of professional development opportunities for educators and adult learners;
- Enhanced access to distance learning programs, online learning modules and the availability of relevant content from any location; and
- Facilitation of the collection and analysis of student data to track student performance more accurately.¹⁷

¹⁷ Howley et al, Broadband and Rural Education: An examination of the challenges, opportunities and support structures that impact broadband and rural education, 2012, ICF International
http://www.academia.edu/1778808/Broadband_and_Rural_Education_An_Examination_of_the_Challenges_Opportunities_and_Support_Structures_that_Impact_Broadband_and_Rural_Education

1.9 BROADBAND IN GOVERNMENT

Governments are increasingly leveraging broadband to provide online service portals where citizens can receive information and interact with public service administration. Broadband holds the potential to move government processes online, increasing the speed of service delivery, improve transparency, reduce arbitrariness and impropriety, and promote cooperation across departments at different levels of government.

The delivery of public services via broadband will not only drive the improvement of efficiency, it will also serve as an important catalyst for the 'universalisation' of broadband services. Financial services (e-Payments), health care, voter registration, land and company registration are all examples of public services that will be delivered effectively and quickly online.

The essence of the new approach for delivering government services leveraging broadband infrastructure is good governance. And the objectives of e-government include:

- Streamlining and standardizing of institutional processes;
- Reducing the hassle for citizens to access government services;
- Optimizing content and speed of service delivery chain by all tiers of government;
- Encouraging wholesome recording and dissemination of information and knowledge;

Governments have been leveraging broadband to experiment with new ideas and technologies to extend opportunities for engagement with citizens. Some government agencies now make their services available 24 hours a day, all year round while eliminating excessive paperwork.

The worldwide trend to shift democratic processes online is premised on the fact that transparency and accountability are usually enhanced when citizens have broadband connections and therefore have equal access to information for decision making resulting in good and accountable governance.

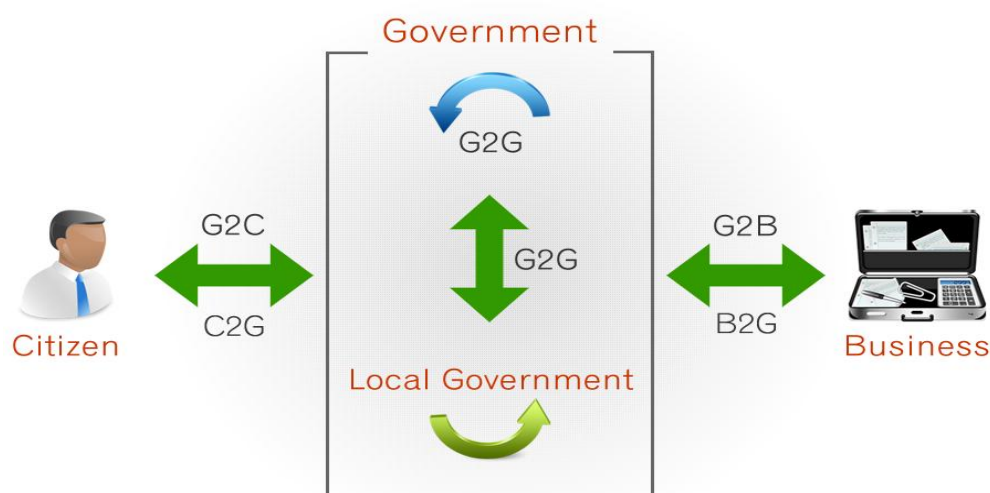
Traditionally, the delivery of government service in Nigeria has been hindered by the complexity of geography. Points-of-delivery of government services are typically located in the headquarters of Federal Agencies, Ministries, State Capitals and LGA headquarters. Under this arrangement, citizens are often compelled to travel from far flung areas to the nearest points of service. For example, Nigerians graduating from foreign universities have to travel to Abuja for National Youth Service registration at high financial costs taking unnecessary travel risk. This can be eliminated by having all the registration processes done online.

Table 1: Examples of Possible e-Government Services

<ul style="list-style-type: none"> □ Issuance of National Identity Card □ Issuance of Travelling Document (Passport, Yellow Card, etc.) □ Issuance of Driver's license □ Issuance of Tax Clearance □ Issuance of Vehicle Number Plate □ Issuance of C-of-O □ Issuance of industry licence, permit, and authorizations □ Issuance of Birth Certificate □ Issuance of Marriage Certificate □ Issuance of Death Certificate □ Payment of Tax □ Payment of import duty □ Payment of government fines and sanction 	<ul style="list-style-type: none"> □ Registration of Land Acquisition □ Registration of Vehicle Ownership □ Registration of Companies □ Registration of Cooperatives □ Registration of Associations □ Registration of Town Unions □ Registration of other legal entities □ Registration of Voters □ Delivery of Education services □ Delivery of Health Services □ Delivery of Security & Protection Services □ Delivery of Essential Amenities □ Delivery of Justice Administration □ Delivery of Law and Order □ Delivery of Fundamental Human Right
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1.10 BROADBAND ENABLING CIVIC ENGAGEMENT

Civic engagement is widely recognized as the lifeblood of any democracy and the bedrock of its legitimacy. Civic engagement starts with an informed public. Broadband facilitates the timeliness of both mediated and unmediated information, and extends their reach. Social networks, MMS, Instant Messaging and YouTube are broadband-driven platforms that have fostered the explosion of civic engagement. Platforms such as opengovfoundation.org, eVoting, and 1-gov.net are used as media for remodelling terms of engagement with governments. There is however a need for a higher level of government presence online. The Government shall encourage online presence of Ministries, Departments, and Agencies (MDAs) as an essential step towards enabling increased civic engagement. This ensures people have easier access to government and are able to impact government decisions. Government also benefits by the ease of performing certain functions such as tax collection, civic registrations, and receiving feedback.



**Figure 7:
Broadband
Enabling
Engagement**

1.11 BROADBAND IN HEALTHCARE

In medical practice broadband networks facilitate electronic exchange of information such as data, images and video. Telemedicine, tele-therapy and advanced diagnostics are just a few of the capabilities made possible by broadband for the benefit of modern medical practice.

Broadband encompasses technologies that enable video consultations with specialists in far flung geographic locations, remote monitoring of patients, and transmission of clinical images in the case of remote radiology. Remote Radiology requires the transmission of extremely detailed pictures with huge amounts of information, which can only be done through broadband networks. Real-time transmission of medical procedures for diagnostic and training purposes in high definition video has become increasingly common in countries with adequate broadband infrastructure.

A report published in 2008 by World Health Organization in collaboration with Global Health Workforce Alliance titled: "Scaling up, saving lives (2008)"¹⁸, has revealed an estimated shortage of 4.3 million medical staff worldwide, with the situation being most severe in developing nations. The report foresees the possibility of mitigating the gaps through the leveraging of broadband to deliver medical advice and training, as well as, diagnose and monitor patients.

Broadband enabled healthcare solutions offer the potential to improve healthcare outcomes while simultaneously controlling costs and extending the reach of the limited pool of healthcare professionals. Today's patients in many jurisdictions communicate with their physicians via email, but a trend is already emerging whereby patients would engage in video consultations with their physicians. Broadband has ushered the capability wherein Patients can have face-to-face video chat with doctors at distant locations.

Similarly, a practice known as mobile healthcare is increasingly deployed. Mobile Healthcare emphasizes leveraging mobile broadband technologies and Smartphone applications to drive active participation by clinicians and consumers on critical health issues.

In Nigeria, government has been saving lives lately, starting from when it empowered the citizenry with a mobile healthcare platform that uses SMS to verify fake drugs or the authenticity of their origins. Government can build on this by setting up a citizen broadcast platform that enables users to send in images of suspected fake drugs packaging, drug peddlers and illegal manufacturing plants etc.

Electronic records of a patient's health history including patient demographics, diagnosis, medications, progress notes, vital signs, medical history, immunizations, laboratory data and radiology reports can be gathered and stored for easy and fast access. The availability of such

¹⁸ http://www.who.int/workforcealliance/documents/Global_Health%20FINAL%20REPORT.pdf

records over a broadband network is likely to help in quickening medical interventions irrespective of the doctor and medical facility being approached for treatment. This is even more useful in cases of emergency.

Medical practitioners and their patients are likely to be better equipped to make better decisions, engage in innovations, become more efficient, and gain prompt understanding about individual personal health and public health more effectively.

1.12 BROADBAND ENABLING PUBLIC SAFETY

Public safety and national security are vital to Nigeria's prosperity. But they are often seen only from the perspective of the military and paramilitary responses. It is even less obvious that basic safety systems like the ubiquitous CCTV surveillance systems in homes, offices, streets and public places rely on broadband to record images and transmit them to storage sites where the images are later analysed.

Broadband provides a platform for efficient and reliable communication before, during, and in the aftermath of disaster emergencies. Broadband is enabling new ways of achieving public safety – including new ways of calling for help and receiving emergency response swiftly.

In the aftermath of the London underground rail bombing in 2005, the British authority shut down the city's transportation network, but refrained from shutting down mobile networks. They took this approach, recognizing the importance of high-speed communication networks during an emergency or disaster situation.

Broadband networks are essential in the gathering and transmission of data for monitoring extreme weather conditions to anticipate natural disasters such as flood, famine, or the threat from extraordinary weather event such as Hurricanes, Typhoons, Tsunamis etc.

During a disaster of an epic proportion, such as Nigeria's flood disaster of 2012, the availability of high-speed networks would make all the difference in terms of emergency response coordination. Under such a circumstance, someone with a Smartphone in his hand can relay vital information to aid forward planning by relief agencies and for news gathering.

The Federal Government of Nigeria is establishing Emergency Call Centres in all the 36 states of the federation and the FCT with a three-digit emergency code number, known as E112. When people dial 112 the call goes to the nearest Emergency Call Centre. Broadband makes the E112 Emergency system more capable and efficient by providing more voice channels for the service, including voice over IP, VOIP.

1.13 BROADBAND IN SMART GRID AND ENVIRONMENT MANAGEMENT

The energy industry powers any national economy and drives industrial productivity, commercial activity and enhances quality of life. In generating and transmitting power, energy efficiency is critical. Countries like Australia for example, started the innovative National Energy Efficiency initiative in 2009 combining broadband with intelligent grid technology and smart meters at homes and offices to achieve greater energy efficiency.

Broadband-connected smart homes and businesses are able to automatically minimize the consumption of electricity by managing lights, thermostats and other appliances over the network. New companies are emerging that offer remote facilities management services over the internet for electricity consumption. Apart from creating new jobs, these energy saving initiatives promise that appliances in homes and offices will consume just a fraction of the electricity they consume today.

Smart Grid has been envisaged to integrate data acquisition, supervisory control and new sensing technologies for the purpose of realizing two-way communications across the energy generation, transmission and distribution chains. This capability allows utility companies to operate the grid reliably and efficiently reducing outages and blackouts, as well as, fault detection, prevention and repair. But more importantly, it helps to keep electricity bills low by virtue of smart sensors that automatically turn-off the light bulbs when there's enough daylight; and other devices when they are not in use. This would mean pervasive communications among the connected endpoints within the system.

The amount of data moving across smart Grids is modest today, but it is expected to grow significantly because the number of devices, frequency of communications, and complexity of data transferred are expected to increase. Various parties have attempted to estimate bandwidth requirements for Smart grid, but none expect the existing narrowband communications to be able to support the growing number of endpoint devices requiring connectivity in the modern grid.

Broadband has also been demonstrated to hold great potential for improving the environment. Every time broadband enables us to telecommute, videoconference or use internet to negotiate views online instead of face-to-face encounters, we are not only avoiding travelling and transportation costs, but we are also cutting carbon emission and preserving the environment.

SECTION TWO: A REVIEW OF BROADBAND IN NIGERIA

2 WHERE WE ARE WITH BROADBAND

The broadband supply chain comprises of international connectivity, a national backbone network, metropolitan access links, and the local access network (the last mile).

Nigeria has a population of over 167 million¹⁹ people and a land mass of 923,768 square kilometres. The telephone subscriber figure for Nigeria as at the end of February 2013 was 116,601,637 active lines²⁰. The four active GSM operators²¹ have about 96% market share while the three active²² CDMA operators have the rest. 2G mobile coverage is at 98% but 3G coverage which is mostly concentrated in urban areas is very limited at less than 35%. Internet penetration is quoted at 33% and Broadband penetration is at 6%²³. Though the internet was first introduced in Nigeria in 1996 no appreciable uptake was recorded until the further opening of the market since 2001. The slow uptake of internet has been largely attributed to network infrastructure deficiency among other factors.

Nigeria currently boasts of primary fibre Optic Backbone infrastructure presence in all the 36 states and the federal capital territory, with most fibre infrastructure concentrated in state capitals and a few urban centres. Of the 774 existing local government headquarters very few that happen to be on the route of the primary fibre backbone are connected.

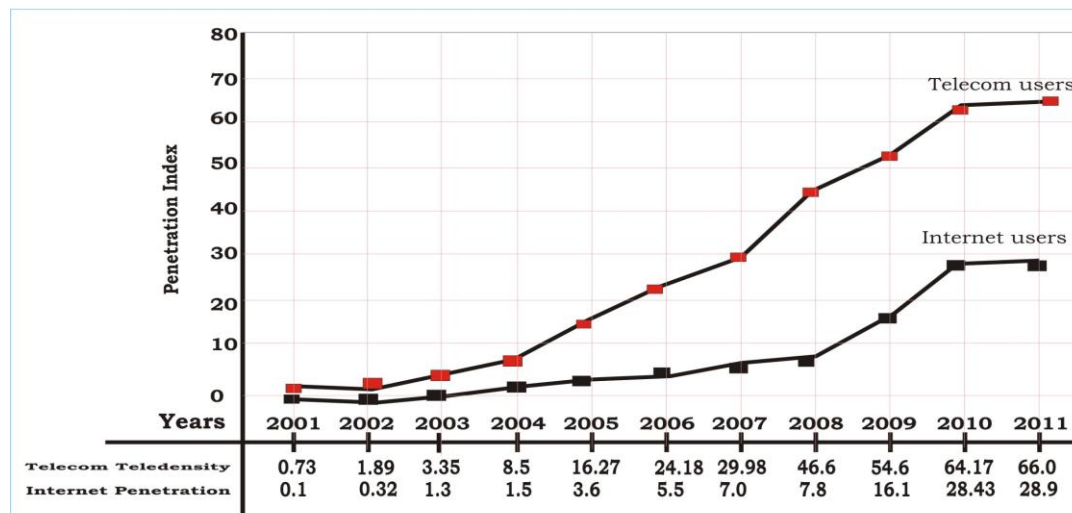


Figure 8: Nigeria's Tele-density and Internet Penetration

¹⁹ Source Director General, National Population Commission, Aug 2012, [BusinessDay Online](#)

²⁰ Source NCC Subscriber data, Feb 2013, www.ncc.gov.ng

²¹ MTN, Globacom, Airtel and Etisalat are active, MTEL is not in operation but has a valid license

²² MultiLinks, Starcomms, and Visafone are active, MTS Wireless, Reltel, GTE, Intercellular, are inactive

²³ Source, Federal Ministry of Communication Technology

The Nigerian National Broadband Plan 2013 - 2018

The infrastructure landscape of Nigeria as at 2012 is estimated to be made up of 25,000 base stations, 116,000 kilometers of microwave and 41,000 kilometers of terrestrial-and-aerial fibre optic network (excluding metro fibre)²⁴. Presently 4,000 kilometers²⁵ of fibre optic network has been deployed on High Voltage transmission lines and several points of presence have been commissioned at various sites located in key cities.

To overcome the infrastructure challenges contributing to the slow uptake of the internet, microwave infrastructure fast became the dominant medium for delivering long distance transmission and in many cases backhaul capability. The following charts show the explosive growth in the deployment of base stations or microwave towers across the country. The subsequent success led to increased mobile service and mobile internet service penetration. Comparative studies with other countries show that Nigeria still has a significantly low number of base stations.

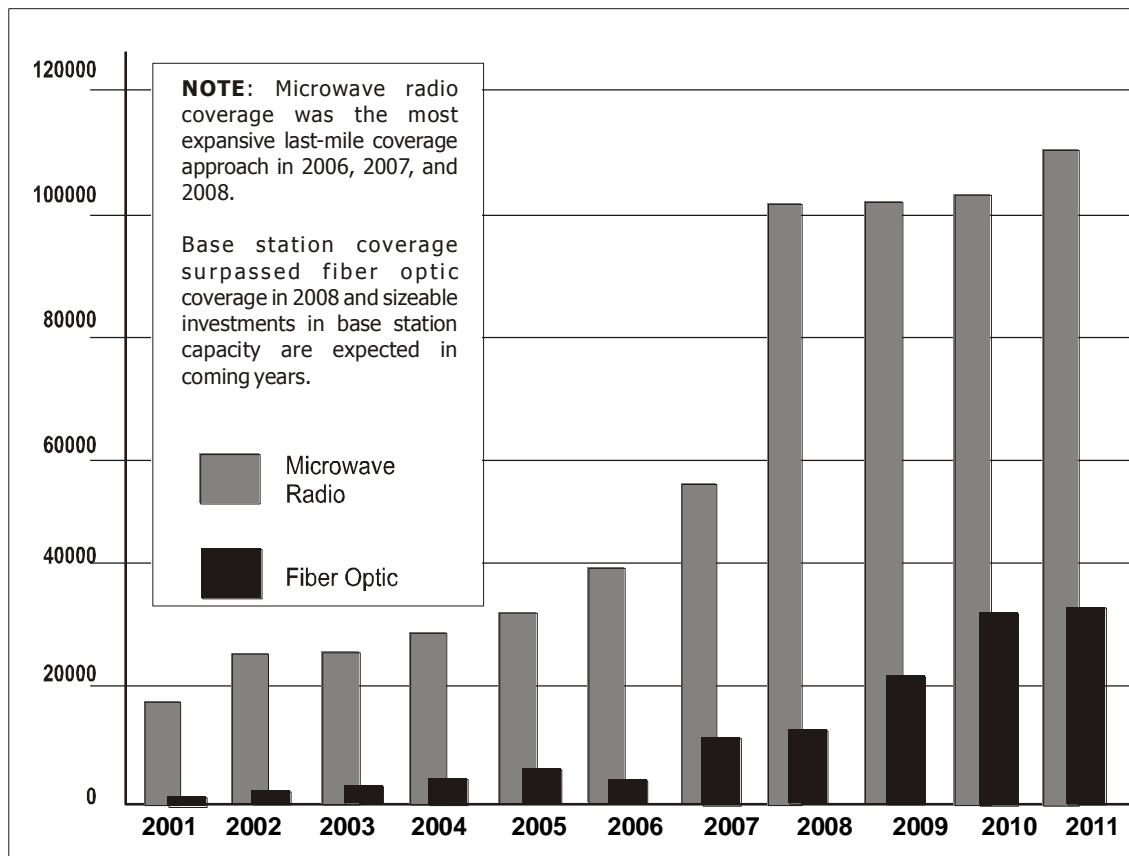


Figure 9: Kilometres Covered by Microwave and Fibre Networks

²⁴ Sources: Africa's ICT Infrastructure, Williams, Mayer, and Minges, World Bank, 2011, and Hamilton Research, 2012, NCC, 2012

²⁵ Phase3 Telecom, 2013

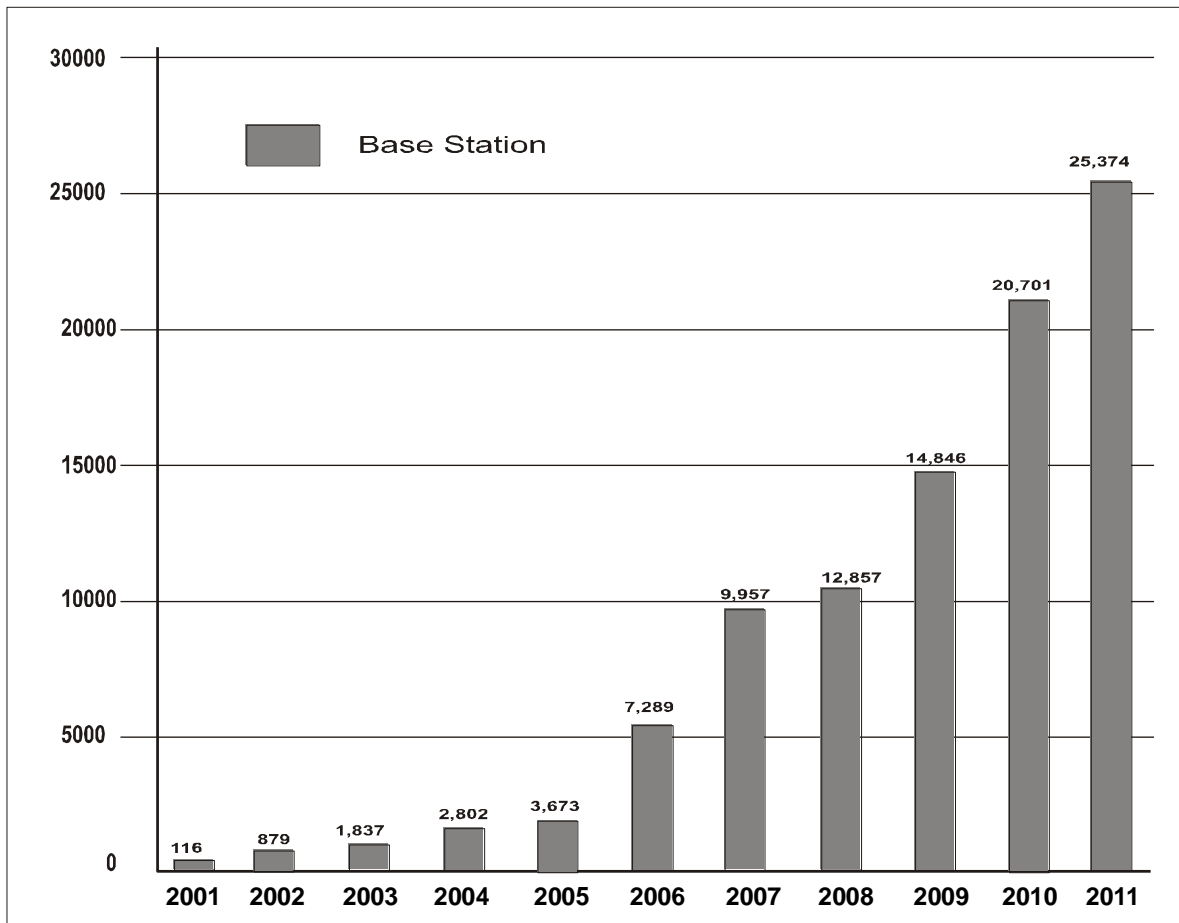


Figure 10: Base Station Headcount in Nigeria

Source: Sundry Corporate Reports, Press Releases, NCC and other Industry publications.

2.1 FEDERAL GOVERNMENT INITIATIVES

The Federal Government has been active in addressing the broadband access and availability issue and many initiatives have been established for specific areas.

Figure 11 depicts the initiatives that have an impact on broadband supply, access or the use of broadband reliant services.

The Nigerian National Broadband Plan 2013 - 2018

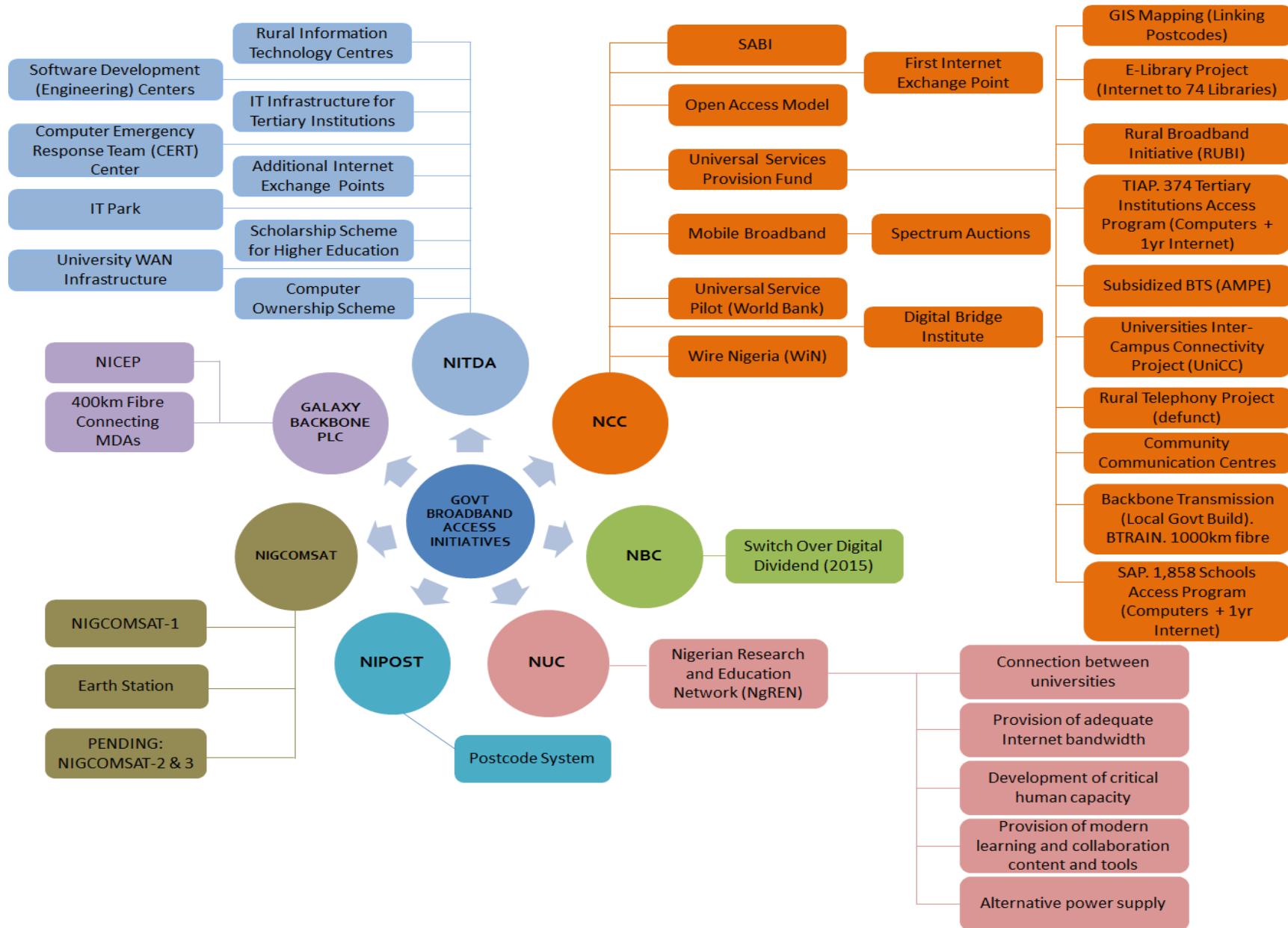


Figure 11:
Various Nigerian Government Broadband ICT Initiatives

The Nigerian National Broadband Plan 2013 - 2018

2.2 INTERNATIONAL CONNECTIVITY

Nigeria's International connectivity landscape has come a long way from a single international submarine cable system with 340 GB total capacity installed in 2001 to a total of four cable systems with international bandwidth capacity of over 9 Tbit/s by 2012. This development was welcomed with a lot of optimism for the impact it promises to have on international bandwidth costs. Indeed wholesale bandwidth prices witnessed substantial reduction. However all these cable landings have only one entry point into the country through Lagos State and due to inadequate distribution infrastructure and channels to areas of need inland, the cables currently have less than 5% capacity utilisation. Additional landing points to other coastal states will improve access and reduce the risk associated with Lagos as a single point of entry and communications failure.

Table 2: Nigerian Cables Landed Capacity

CABLE	CAPACITY (Gigabits)	TERMINATION LOCATION	STATUS
SAT3/SAFE	340	Lagos State	Active
MainOne	1920	Lagos State	Active
GLO-1	2500	Lagos State	Active
WACS	5120	Lagos State	Active
TOTAL IN-SERVICE	9880		

West Coast Africa Fibre Cable Active Capacity

Indeed with the new submarine cable projects in the pipeline it is anticipated that by end of 2014 there could be 97.92TB of international capacity available in Nigeria (Table 3).

Table 3: Proposed Additional Cable Systems

CABLE	CAPACITY (Gigabits)	TERMINATION LOCATION	STATUS
ACE	5120	?	Planned 2012
SAex	12800	?	Planned 2014
WASACE	40000	?	Planned 2014
SACS	40000	?	Planned 2014
TOTAL IN-SERVICE	97920		

West Coast Africa Fibre Cable Planned Capacity

The following figure depicts both the landed and the planned cable systems for Africa.

The Nigerian National Broadband Plan 2013 - 2018

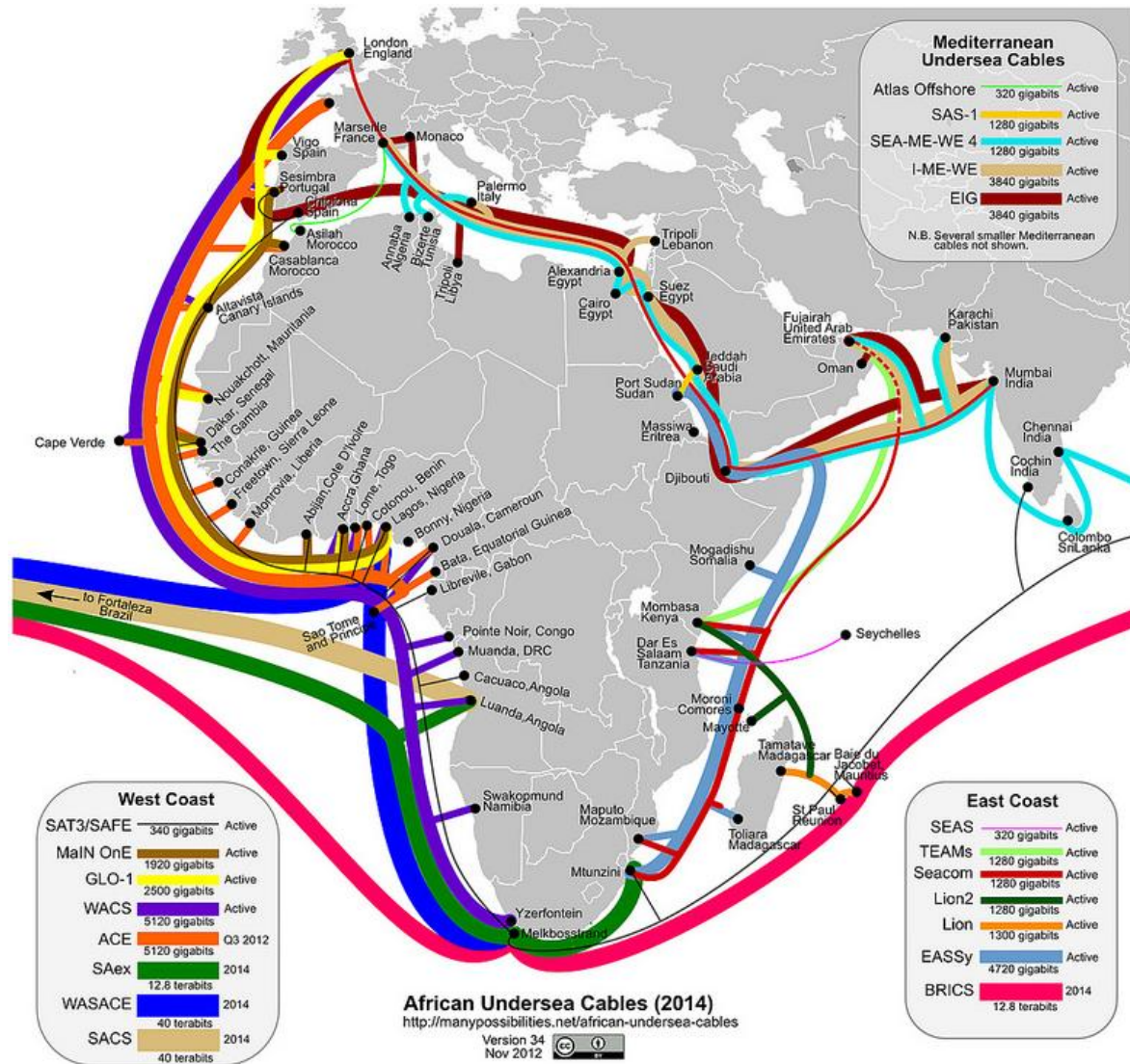


Figure 12: African Undersea Cables (2014)²⁶

2.3 NATIONAL BACKBONE & METRO NETWORK

The review of the Fibre cable infrastructure map indicates that Nigeria already has a substantial amount of national backbone infrastructure installed by multifarious licensed carriers; even though it can be observed that the infrastructure is seen to be concentrated only on certain routes connecting state capitals and big urban cities. While some routes have multiple cables installed, vast expanses of rural areas are left out. For instance, there are about six fibre optic networks between Lagos and Abuja alone; while other routes in the country have none. Though two of National Long Distance Operators are still rolling out fibre infrastructure over power lines which by their nature run through rural areas, this situation requires special government intervention to extend fibre cable infrastructure to include regional networks and links to most of the rural and unserved communities.

²⁶ Source: www.manypossibilities.net

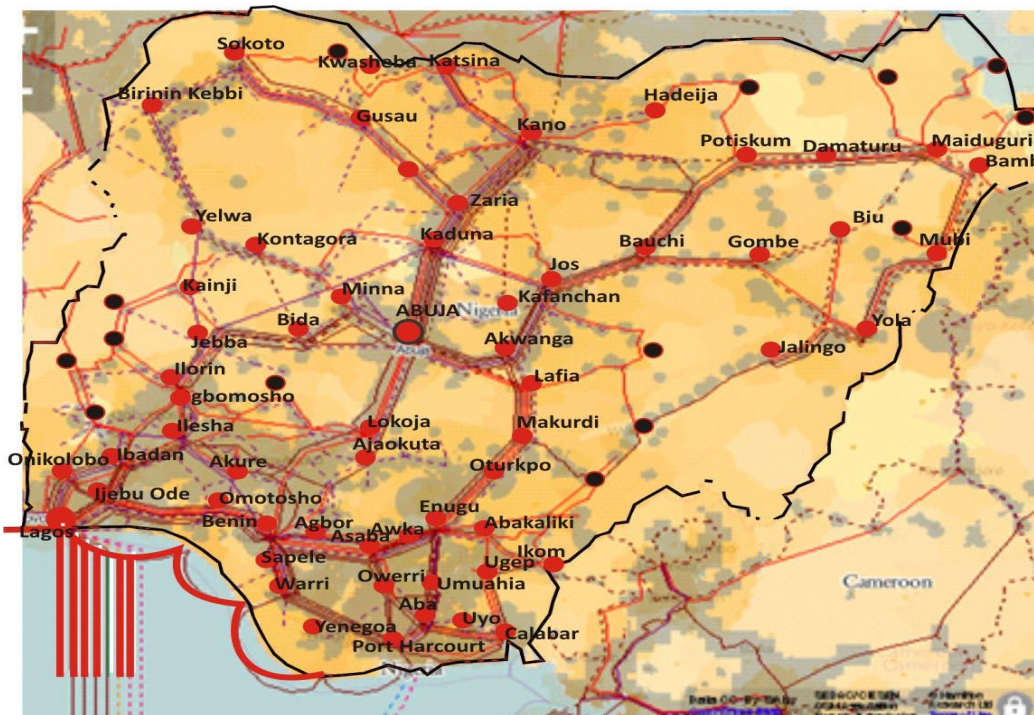
The Nigerian National Broadband Plan 2013 - 2018

Metro networks are still limited to the major cities and state capitals like Lagos, Abuja and Port Harcourt. Table 4 depicts the estimated points of presence of fibre infrastructure to population centres.

Table 4: Estimated Coverage of Fibre Infrastructure²⁷

Category	Area Description	Estimated Coverage
Category 1	Fibre Backbone to All State Capitals and FCT	100% (37 of 37)
Category 2	Metropolitan Area Networks in Cities	10% (mostly Lagos, Abuja and Port Harcourt)
Category 3	FTTB , Fibre to the Base Station	10% of all Base Stations
Category 4	FTTC, Fibre to the Cabinet, buildings or estates	unknown (e.g. 744 local governments)

Consequently Nigeria’s backbone and metro network infrastructure although extensive in many parts of the country consists of islands of infrastructure that are not linked to each other.



A detailed and dynamic map of all existing infrastructure is required.

Figure 13: Nigeria Fibre Optic Transmission Network, 2012²⁸

²⁷ These figures are based on coverage maps supplied by operators

²⁸ Source africabandwidthmaps.com

2.4 LAST-MILE BROADBAND INFRASTRUCTURE

Wireless technology is the primary delivery medium for broadband access in Nigeria. The licensing, rollout and upgrade of Mobile networks based on 2.5G (GPRS), EDGE, UMTS, HSPA, HSPA+, HSUPA, HSDPA and CDMA EV-DO technologies, as well as, the introduction of smartphones and other mobile devices with seamless capability to connect the internet have been responsible for the current growth in internet access and usage recorded in Nigeria.

This trend will receive further boost with the wider rollout of 3G, across the country making it possible for many subscribers to access broadband internet using their mobile devices. Currently outside the key cities of Lagos, Abuja and Port Harcourt, broadband access is generally unavailable. While the investment in the deployment of 4G/LTE broadband networks is still being awaited, operators have continued to deploy 3.5G, 3.75G, and HSPA technologies. Mobile broadband is therefore emblematic of the potential quick win for broadband adoption and usage in Nigeria.

2.5 RELEASED SPECTRUM

Following the liberalization and deregulation of the country's ICT sector the government undertook extensive spectrum allocation and assignment initiatives to support the market expansion and growth. In January 2001, the Nigerian Communications Commission made available four slots of 15 MHz each of spectrum in the 1800 MHz band and 5 MHz each in the 1500 MHz band for a historic Digital Mobile License Auction.

Four spectrum slots were assigned to MTN, Econet (now Airtel), NITEL (M-TEL) and Globacom, enabling them to rollout their GSM networks. Also, one outstanding spectrum slot in each of the 1800 MHz and 900 MHz bands was subsequently assigned to Etisalat. The issuance of these Digital Mobile Licences was followed by spectrum assignment processes for 3.5GHz band, 1900/2100 GHz band (for 3G), 800MHz band and 2.3GHz spectrum bands. Also, dating back to 1998, a number of PTOs operating CDMA networks (some dating back to 1998) were assigned some slots in the 800 MHz frequency Spectrum band.

2.6 SERVICES

Currently Nigeria has limited locally generated broadband based services. In Government, twenty one out of the thirty six ministries have online presence, while 370 of the 810 MDAs have some web presence. More government services need to get online and this should improve with the introduction of the single service portal 'services.gov.ng'. States like Lagos, Ekiti, Akwa Ibom, and Rivers are also leading by example having developed very comprehensive websites. Also more political leaders are using social media to engage with the polity; President Goodluck Jonathan being one of the first to run a campaign engaging Nigerians via Facebook.

The Nigerian National Broadband Plan 2013 - 2018

One of the success stories of Internet usage in Nigeria today is that of JAMB²⁹ going online. It was discovered that spikes in internet usage coincided with the release of JAMB results or the beginning of the JAMB registration process. Another good example is the American University in Yola which was at one time responsible for 52% of all Nigerian Internet traffic, as a result of students having free access to hardware and high bandwidth. Usage can also grow faster if there is compelling local content and access.

2.7 END USERS

There were 2 billion reported global mobile broadband subscriptions as at 2012 and Africa represents 4% of the global figure, which is expected to rise to 6% by 2013. Nigeria's Internet penetration is quoted at 33% and Broadband penetration is at 6%³⁰.

Figure 14: Top 10 Most Visited Nigerian Sites

In spite of Nigeria's large population, end user adoption for broadband is still low. This is due to several factors including availability, accessibility, and affordability. Subscription to the internet has been via a mobile handset, internet dongle, desktop computer or a business centre facility.

TOP TEN NIGERIAN MOST VISITED WEBSITE - 12/09/12			
RANK	CATEGORY	WEBSITE	ALEXA TRAFFIC RANK
1	FORUM	nairaland.com	1,550
2	PUBLISHING	Vanguardngr.com	1,686
3	BANKING / CORPORATE	Gtbank.com	3,542
4	PUBLISHING	punchng.com	3,120
5	CLASSIFIED / CORPORATE	vconnect.com	4,456
6	CLASSIFIED /CORPORATE	jobberman.com	4,906
7	PUBLISHING	lindaikeji.blogspot.com	5,507
8	ECOMMERCE	jumia.com.ng	10,212
9	PUBLISHING	naij.com	6,252
10	PUBLISHING	nationsnewspaper.com	5,704

Source: Alexa.com

Copyrights 2012, WWW.LEUNAMME.COM

However, individual subscriptions to broadband would require ownership of access devices such as computers, smart phones, and tablets. The cost of these devices constitutes a major barrier to adoption and usage for over 80% of the population. In addition, limited awareness and digital literacy constitute further barriers to the adoption and usage of broadband services. User education via digital literacy programs will help to drive demand and enhance digital inclusion.

According to Alexa Rankings the top 3 internationally visited sites are Facebook, Google, and Yahoo. Of the top 10 most visited Nigerian sites, the profile suggests that most popular web destinations are: news publishing, banking service, job search, and ecommerce.

²⁹ JAMB, Joint Admissions Matriculations Board, <http://www.jamb.org.ng/>

³⁰ Ministry of Communications KPIs to FEC, August 2012

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2.8 CURRENT BUILD OUT COSTS

The cost of build out of broadband infrastructure today is relatively high and this is one of the major factors contributing to high cost of broadband services. The high cost of Right of Way (ROW), Civil build costs, and securing of fibre equipment installations are the main cost drivers. The indicative cost drivers are as follows:

2.8.1 Build Costs

Area	Long Haul (per m)	Metro (per m)	FCDA/Abuja	Submarine
R.O.W	\$1 (N150)	\$40 (N6500 ³¹)	\$10 (N1650) ³²	
CIVILS	\$10	\$46	\$0	\$55
FIBRE	\$4 (32 core)	\$6 (96 core)	\$6	\$6
EQUIPMENT	\$	\$11.25	\$11.25	
SUBTOTAL	\$15	\$103.25	\$27.25	\$61

2.8.2 Operational Costs

Area	Long Haul (per m)	Metro (per m)
Fibre Rebuild	\$12	\$48
Fibre Replace	\$2.4	\$7.2
Maintenance	\$0.62	\$0.62
SUBTOTAL	\$15.02	\$55.82

2.8.3 Total Costs³³

	Long Haul	Metro	FCDA/Abuja	Year
TOTALS (per m)	\$22	\$70	\$27.25	2012 ³⁴

³¹ This is based on the highest available cost for ROW which is now Ogun State at N6500 per meter. Lagos State used to be N13000 per meter but is now N5000 per meter

³² Abuja's prices are for 3 years, so every 3 years the fee is due for payment

³³ Verifiable and comparable pricing was provided by Operators and averaged across sample size, capital costs are depreciated over 10yrs

³⁴ This shows a reduction in prices from those of 2010 in dollars per meter (LH) \$30.02 (M) \$159.07 (ABJ) \$27.25

3 THE CHALLENGES OF BROADBAND OPERATORS

Operators in the ICT sector have identified the challenges common to them as:

- High costs of right of way and resulting in the high cost of lease and transmission
- Long delays in obtaining permits³⁵
- Backhaul capacity constraints
- Multiple and illegal regulation and taxation at Federal, State, and Local Government levels
- Damage to fibre infrastructure during road works
- Lack of reliable, clean public electricity supply
- Lack of major green energy initiatives and support

3.1 RIGHT OF WAY

Operators have stated that the cost for procurement of Right-Of-Way (ROW) for laying fibre and for procuring sites for base stations has been prohibitively expensive and that the process is time consuming. Indeed available data shows that the cost of obtaining ROW could account for as high as 50% to 70%³⁶ of the total cost of deploying fibre in various states of the Federation. Lengthy approval times (in some cases up to two years), also contribute greatly to delays and escalation of costs in rollout of broadband networks. Despite the fact that sufficient international bandwidth capacities have been achieved with multiple international cable landings to the shores of the country, excessive upfront charges for rights-of-way for national fibre optic cable roll-out initiatives, have hampered efforts to extend these capacities inland to reach all parts of the country.

3.2 REGULATION AND TAXATION

3.2.1 Regulation: Multiple regulators

While the Nigerian Communications Commission, NCC is identified under Nigerian Communications Act as the regulator for telecommunications and therefore broadband, there are other agencies at different tiers of government whose regulatory oversights are incidental to public ICT/Broadband infrastructure. These include Federal, States and Local Government MDAs on Environment, Aviation, Town Planning and Consumer Protection. All these agencies in carrying out their statutory functions individually occasionally try to enforce special rules for the deployment of broadband infrastructure leading to multiple approval processes being required and conflicting standards being imposed. Operators being required to get permits from several regulatory bodies can be unduly onerous, costly and time consuming. Industry regulators and regulation shall be assessed and streamlined.

³⁵ Current time standards have been given as 3 months, this could still be reduced

³⁶ This cost is mostly in the States, Federal ROW costs have significantly reduced to about 5%

3.2.2 Taxation: Multiple Taxes

It has been suggested that revenue generation has in many cases been the primary purpose of some public authorities in getting involved in exercising regulatory interest in the telecommunications industry; thus making telecommunication companies prime targets for revenue generation and imposition of all kinds of taxes and levies on telecommunications infrastructure build. Some make deliberate unsubstantiated claims about supposed health hazards of telecommunications infrastructure only to demand taxes and levies without proffering any remedial or palliative measures for their claims.

3.2.3 Illegal Taxation

Illegal taxation happens when some public authorities and even private individuals demand payments, taxes or levies that are not backed by any law and resort to threatening and oftentimes vandalising infrastructure in order to compel operators to make payments.

3.2.4 Discriminatory and High Taxes

This is where the taxes are legal and backed by law and where special taxes and levy rates are demanded from operators in great disparity to what is demanded from other companies not in the telecoms and ICT sector, thus amounting to discriminatory taxes. These taxes shall be assessed and streamlined.

3.3 SECURITY OF INFRASTRUCTURE

Vandalism, bombing and outright economic sabotage of telecom infrastructure has become a frequent occurrence in the Nigerian ICT sector. Some operators have reported more than 70 cuts on their respective nationwide fibre networks on a monthly basis. This is generally caused by theft, wilful damage, or accidental disruption due to road construction or expansion. Often, the phenomenon is accompanied by widespread service downtime and economic losses due to unearned revenues not only by the telecom operators, but also by the vast community of Nigerian business people who use these networks to conduct their businesses. One operator has reported it spends about U\$D90 million annually to repair fibre network cuts.

Security of outdoor telecommunications infrastructure and safety of technical field staff have become part of the avoidable burdens that have befallen telecom operators in the country. Such phenomenon is among the factors hampering the deployment and operations of broadband networks around the country. **Certain ICT and Telecoms Infrastructure are critical to the National Interest and shall be protected.**

3.4 SPECTRUM ALLOCATION

The challenges of spectrum allocation and assignment in the country have been identified as follows:

- Underutilization and Non-utilisation of spectrum: Not all the companies assigned frequency spectrums have rolled out services. Even where services are rolled out, there have been cases where capacity, coverage, and the resulting subscriber base had fallen

far behind the anticipated performance due to underutilization of spectrum. While the first scenario calls for greater enforcement of the use-it or lose-it provisions in our law, the second scenario might be mitigated by a regime that permits spectrum trading (selling, leasing and sharing).

- **Insufficiency of assigned spectrum:** The spectrum size assigned for certain frequency allocations have not been optimal to support a robust rollout of full broadband networks. For instance, in the case of 2.3GHz allocation where slots of 20MHz spectrum currently allocated in that frequency will be deemed sufficient ordinarily. However, it has been determined that, given the prevailing infrastructure challenges in the country, 30 MHz spectrum slots would have permitted the deployment of more robust broadband networks on that frequency.
- **Lack of guard bands:** The lack of guard bands between adjacent frequencies assigned to operators have been reported as the cause of harmful interference to networks requiring the need for spectrum restructuring in some bands to accommodate guard bands.
- **Conflicting and overlapping spectrum licensing regime existing between the NBC and NCC:** There have been cases where spectrum issued by NBC have been deployed to offer telecoms or internet access services, signalling the need to formalize spectrum convergence regulation in Nigeria to remove such grey areas.
- **High cost of spectrum licences:** The high cost of spectrum licences in the country contributes to high sunk cost and challenges associated with accessing spectrum for the rollout of high-speed networks. In some cases, the current high licence fees for spectrums have eroded the resources for rolling out their networks.

3.5 INVESTMENT AND FUNDING

Nigeria has enjoyed considerable investment over the years in the telecoms industry amounting to an estimated \$22billion.

However, funding has not been flowing to areas where operators do not regard as commercially viable such as rural areas and remote sparsely populated locations. The Universal Service Provision Fund has been involved in initiatives to help bridge the funding gap for extending services to rural and underserved areas.

Telecoms infrastructure is capital intensive and it is also true to say that even the level of investment so far would have achieved more in terms of subscriber base and national spread if operators had shared infrastructure at various levels. Instead, infrastructure is unnecessarily duplicated.

While the bigger companies seem to enjoy better access to funding, most small ISPs and small telecom companies have been finding it difficult to access funding for new rollout programs.

With local bank loan interest rates at double digit levels that are deemed unsustainable,³⁷ the industry will benefit from a vibrant Venture Capital base that could help significantly in funding good business opportunities in Broadband services provision.

In summary the relative difficulty in accessing long term low interest funding for the purpose of building or extending broadband infrastructure is limiting the pace of rollout of such infrastructure to only those areas where operators are convinced of significant financial return. The implications are clearly visible in the limited broadband infrastructure all over the country resulting in the slow adoption of broadband based services, and consequently stunted growth in demand for these very same broadband services. The use of broadband is its very own demand stimulus as users get more access to it and find that they are able to do even more.

Without focused funding and dedicated public and private partnerships to address this limitation of funding and rollout options, growth in broadband demand and adoption will always remain stunted. The Federal Government will set up a funding roundtable with all local and international stakeholders to devise innovative and in some cases new ways of making broadband and investment in the enabling networks for broadband a viable option for investors and funding institutions alike.

³⁷ IFC Final Report on Investment Opportunities in Western Africa ICT Sectors

SECTION THREE: STRATEGY AND ROADMAP

4 STRATEGY & ROADMAP GOALS AND OBJECTIVES

The key objectives of the Nigerian National Broadband Plan are to promote pervasive broadband deployment; increase broadband adoption and usage; and ensure availability of broadband services at affordable prices. These are aimed at maximising the socio-political and economic benefits of broadband to the people.

It is intended over the period of this plan to see more than a fivefold increase in internet and broadband penetration figures. It is also intended that all state capitals and urban cities have metro fibre infrastructure installed. Certain estates and business districts within major cities shall have fibre to the home or premises whereas on a national scale it is the intention of government to facilitate full rollout by operating companies of 3G networks with the potential for immediate transition to 4G/LTE as spectrum becomes available.

It is widely acknowledged that Broadband is an essential right and basic utility for societal transformation and development and that prioritised focus on the rapid spread of mobile broadband will ensure that all Nigerian citizens enjoy World Class wireless broadband as a basic access medium for broadband.

The Nigerian National Broadband Plan 2013 - 2018

4.1 TARGETS

The tables below summarise targets at state cities, national and community levels depicting the strategies to be adopted for the different classifications of each area; for instance cities shall have a higher incidence of fibre and metro infrastructure in addition to the national strategy of mobile broadband coverage. Where 3G is depicted it can also be noted that other wireless technologies such as TV White space and satellite are applicable. For increased capacity and ability to support the demands on a growing network, core infrastructure especially for backhaul will be gradually upgraded to fibre to the base stations and exchanges to begin with, and then fibre reaching to some customer premises.

Table 5: Broadband Targets for Cities

Target Type	Medium	Current (2013)	Short Term Targets (2015)	Medium Term Targets (2018)	Long Term Targets (2020)
Availability (Coverage)	Wired	1.5%	10%	16%	25%
Penetration (Usage)	Wired	0.5%	3.3%	5.3%	8.3%

Table 6: Broadband National Targets

Target Type	Medium	Current (2013)	Short Term Targets (2015)	Mid Term Targets (2018)	Long Term Targets (2020)
Availability (Coverage)	Wireless	35%	60%	80%	95%
Penetration (Usage)	Wireless	6%	21%	42%	76%

Table 7: Broadband Target for Communities

Target Type	Medium	Current (2013)	Short Term Targets (2015)	Mid Term Targets (2018)	Long Term Targets (2020)
Community Public Access Venues	Wired or Wireless Hotspots	15%	25%	65%	100%

4.2 STRATEGY FOR BROADBAND

The strategy that supports the objectives and targets of this National Broadband plan is anchored on the **pervasive rolling out of wireless broadband networks nationwide based on 3G and 4G access technologies as the paramount objective.**

In addition licensees shall be encouraged to build out fibre to all their base stations, exchanges, and interconnect points employing the Open Access and Shared Infrastructure Framework. For rural and remote locations, low cost 3G satellite backhauled, solar powered solutions will be employed. Original Equipment Manufacturers (OEMs) and Software developers also have important roles to play in this plan because availability of access devices that are affordable represents a critical factor in the achievement of universal broadband access. Local OEMs shall be challenged to produce smart access devices at the sub-\$30 price points; while developers shall be encouraged to produce content that reflects its local origins³⁸.

To design a strategy for achieving the set targets for effective broadband growth and distribution across all geographical locations in Nigeria, certain definitions are necessary for adequately categorising target areas and the appropriate strategy for addressing each category. These are broadly classified as the served, under-served and unserved areas.

4.2.1 Define Served, Under-served and Unserved Areas

An unserved area is defined as an area where less than 10% of households and individual users have either no access to internet or have the most basic access such as EDGE. Essentially this is classified as end users only able to do the most basic of functions via the internet, mostly via their mobile phones, internet dongles, or smart devices.

The strategy for delivering broadband here is a hybrid of wireless solutions including satellite, fixed wireless and mobile broadband networks. In addition Public Access Points (e.g. a NIPOST outlet or Local Government HQ) can be deployed within a 2km radius at the most, to support those who cannot afford their own devices. The 450MHz band and the TV White spaces (TVWS) technology are ideally suited for rollout of services in these rural communities.

An underserved area is defined as an area where less than 50% of the households or individual users have access to a minimum of 1.5 Mbit/s. These broadband speeds are delivered via a combination of wireless and wired solutions to the homes or premises, with fibre being the ultimate medium for delivery.

The strategy for delivering broadband here is a hybrid of wireless, Satellite and Fibre; Fibre to the X, FTTX encapsulating everything from fibre to the base station, to the Exchange and to the home. Primary access is via smart devices, Customer Premises Equipment (CPE), and Laptops.

³⁸ One Nigerian games developer has developed a Mosquito Squash game as part of a Public Health and Safety broadcast.

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A served area is defined as an area where over 50% of households and individual users have access to broadband speeds of at least 1.5 Mbit/s.

The strategy here will be a gradual transition to fibre optic infrastructure where this is available and demanded.

Table 8: Strategy Matrix for Unserved, Underserved, and Served Areas

	Unserved Areas	Underserved Areas	Served Areas
	less than 10% of households and individual users have Internet Access ³⁹	Less than 50% of households and individual users have Broadband Access	50% and above of households and individual users have Broadband Access
Strategy	Strategy is Low cost ⁴⁰ wireless Solutions, Satellite, TVWS Mobile Broadband & Public Access within 2km	Strategy is hybrid of wireless, Satellite and FTTx Mobile Broadband, Fixed Wireless and FTTB	Strategy is Fibre to the Base Station, and FTTH Increased Fibre Penetration
Tactic	3G Wireless Coverage provided as a minimum to 80% of the population	4G/LTE Wireless Coverage and Fibre to the BTS for increased capacity	Full Migration to Fibre in cities for High Speed Networks FTTx

4.2.2 Develop Clear Policy, Regulation, and Roles for the Government

For the sustainable development and growth in the ICT sector, government has a critical supporting role to play in establishing good policy and regulatory framework for the sector. The new National ICT Policy already addresses many of the points and raises the need for an update to the Nigerian Communications Act, 2003. Regulation and Policy also need to be more far reaching from a holistic perspective to involve the building of new infrastructure such as roads, broadband ready homes, and utilities.

³⁹ Basic Internet Access defined as less than 1.5 Mbit/s accessible via EDGE or 3G

⁴⁰ An alternative base station or wireless solution such as Altobridge or Fibre Wire that is cheaper to rollout than the typical GSM and WiMAX Base stations. Price differentials are quoted between \$60,000 per base station to \$200,000 for a typical GSM lattice base station.

The Federal Government shall initiate a review and update of the Nigerian Communications Act, 2003 to cover broadband (wireless and fixed) and more critically ICT infrastructure as an essential social right in the class of a utility.

The Federal Government shall also engage at other major levels such as State and Local governments to ensure that a common thread of collaboration, consolidation and support runs through this singular drive for increased broadband penetration. Recent government focus on Right Of Way challenges for the industry holds promise for possible reduction or outright waiver on ROW costs on Federal, State and Local Government roads.

The Government shall also encourage the construction and infrastructure sectors to build cities of the future; 'Smart Cities' of highly connected and networked homes and businesses without neglecting the rural sector which makes up to 70% of the land mass.

The government shall work with the private sector to find commercially viable and cost effective ways to reach those who are unreached, and to serve the un-served.

4.2.3 Ensure Resilient Submarine Cables

In Nigeria there are now an appreciable number of submarine cable landings on the shores and providing over 9 Tbit/s of combined capacity. However, there is concern about the fact that they all land in Lagos and that access to other parts of the country is choked due to the limitations of distribution infrastructure to the rest of the country. For National Security and resilience purposes, it is considered critical that these cable companies all have demonstrable recovery and restoration agreements with each other, and that the cable systems are extended to other coastal regions or states. This will help to further accelerate the expansion and distribution of the currently underutilised bandwidth to the rest of the country.

The Federal Government shall therefore promote rapid establishment of recovery agreements and facilitate the delivery of additional cable landings to other coastal states such as Delta, Rivers, Bayelsa and Ondo as soon as is possible.

4.2.4 Promote Enabling National Infrastructure

The distribution value chain includes National Long Distance Infrastructure, Regional Infrastructure, Metropolitan Area Networks, and Last Mile Access.

Because of the diverse nature of the country in terms of class and geography, different technologies will be deployed including, terrestrial wireless networks, optic fibre transmission networks, fibre to the home/premises, DSL systems, satellite systems and fibre/broadband over power lines. This will ensure the provision of solutions tailored to the needs of individual groups or communities.

National Backbone Infrastructure: Nigeria's transmission infrastructure landscape comprises of National Long Distance infrastructure, and Regional Long Distance infrastructure. Where these

are interconnected they become a National Backbone Network. Currently the National Long Distance Operators and Regional LDOs are not interconnected with one another.

The National Long Distance infrastructure landscape features extensive Microwave networks and optic fibre cable routes running across the whole country with presence in all the States and the FCT. On some routes there are multiple optic fibre cable infrastructures running side by side, installed by different operators. In spite of the fact that large amounts of cable infrastructure actually exists to fill the existing demand gap, operators are not interconnected making it difficult to seamlessly deliver services that cut across a number of operator networks. There are also cases where dark fibres exist on some routes but are not accessible to other licensees who need them.

The Federal Government shall ensure that all cable infrastructure is interconnected as a critical prelude to facilitate an open access regime across the country, and will ensure that the current laws and regulations on these issues are complied with in order to achieve an integrated national backbone infrastructure.

In the Regional Long Distance area there is insufficient cable infrastructure linking the various cities and towns within each region or state. There is therefore a need to facilitate the build out and interconnection of uncovered routes to ensure that all large population centres are linked to the National Backbone.

Metropolitan Area Network Infrastructure Layer: It is essential that all major cities including state capitals have fibre cable infrastructure coverage to facilitate broadband access. Only a few cities such as Lagos, Abuja, and Port Harcourt currently have any appreciable fibre infrastructure coverage. Government shall facilitate the proliferation of interconnected metro fibre build outs on open access basis.

Last Mile Access Layer: There are two options for last mile access, namely wired and wireless solutions. In Nigeria, the most prevalent option is the wireless solution but consumers are unable to have true broadband experience due to certain limitations occasioned by not having fibre cable from the switching centres to most base stations (fibre to the base station, FTTB). Another limitation has been insufficient spectrum in terms of the size of the bandwidth that guarantees true broadband experience. Government shall undertake the restructuring of some spectrum assignments to ensure that relevant licensees have sufficient spectrum bandwidth to implement higher broadband speeds in their networks.

LTE is today the technology of choice for 4G services. Government will conduct spectrum licensing rounds for LTE by 2014/2015 in the 2.5GHz/ 2.6GHz bands (generally considered to cover the frequency range between 2500-2690 MHz). The 2.5/2.6 GHz bands offer abundant FDD spectrum suitable for building LTE networks.

For the 800 MHz band, there are 5 active Operators presently deploying CDMA technology to provide services in the band. Embarking on total re-farming of the band will be a daunting

challenge because there are active CDMA Operators duly licensed and providing services in the band. Re-farming the whole band will require decommissioning the CDMA Operators with their subscribers. This will take over 5 years to accomplish and at a very high cost because of their licences and deployments.

Attention will therefore be directed at freeing up and licensing the 700MHz spectrum band for LTE as soon as possible. Due to its physical characteristics, 700 MHz band penetrates walls fairly well. This chunk of spectrum is therefore perfect for either mobile cellular or long-range wireless broadband deployments.

Roll out of LTE will also require that there is a corresponding increase in backhaul capacity to enable mobile operators to carry the extra traffic load back into their networks. Fibre no doubt is the perfect medium for high capacity backhaul, but it takes time to install and the cost of deploying it can only be justified in more densely populated areas. Microwave systems will therefore be fulfilling a growing proportion of the backhaul requirements and the need for future licensing of 28, 32, 40 GHz spectrum and may be followed later by 60GHz and 80GHz since the sub-40 GHz bands are expected to become increasingly saturated in future as mobile broadband traffic rises and operators introduce LTE networks over the next two to five years.

It has also been observed that the current costing formula for spectrum in the country is considered high. In order to encourage broadband growth Government shall ensure that the cost of spectrum acquisition is aligned with market realities.

For wired solutions, Nigeria has limited last mile wire line (especially fibre) infrastructure; however more fibre infrastructure has become desirable for providing high speed internet access to homes and business premises. Nigeria will benefit from laying the necessary wire line infrastructure for last mile access to deliver speeds exceeding 20 Mbit/s. The biggest challenges have been the high uneconomic cost of acquisition of ROW, and the long delays for approvals. Government shall continue to encourage current efforts to cooperate with state and local governments to resolve these issues for the rapid build out of wire line last mile infrastructure.

4.2.5 Provide Required Investment

For Long Distance infrastructure as previously established, a good proportion of the network already exists. Taking full advantage of this will require funding for interconnections and further expansion. However significant investment is required to provide regional and metro fibre networks that will give sufficient coverage. The funding for this build out will come from market sources and in some cases from government intervention funds.

Reducing or entirely waiving the fees for acquiring licences is another strategy that will reduce funding requirements for deploying broadband infrastructure.

Using comparative sizing, previous research⁴¹, and local knowledge of the Nigerian market it is estimated that about \$2 billion in funding (private and government provided) will be required annually over the next five years to bridge the broadband infrastructure gap. A detailed assessment of the cost drivers and implications will be undertaken to more accurately determine this requirement. For instance the projections could significantly change if ROW fees are completely eliminated and device import duties are reduced.

4.2.6 Critical National Infrastructure & Cyber Security

Engagement with industry stakeholders including presentations by ATCON, ALTON and other major stakeholders made a clear call for action to stem the tide of frequent destruction of ICT infrastructure and equipment. ICT networks are indeed critical infrastructures that have serious socio-economic implications when they are out of service. They are classified in this modern age as essential service utilities along with Power, Transportation, and Water.

The government realizes that every modern nation state depends on the reliable functioning of its critical infrastructure to guarantee national and economic security.

The term critical Infrastructure in this plan, refers to ICT networks and systems, that are crucial to the Federal Republic of Nigeria to the extent that the damage, destruction or ineffectiveness of such networks and systems, whether physical or virtual, would have adverse impact on our national security, economic wellbeing, public safety, food security or any combination thereof.

Threats of Cyber-attacks and Physical (vandalism, sabotage and theft) attacks are two broad categories of threats that could adversely affect the nation's critical ICT infrastructure.

In many countries, legislations have not kept pace with developments in the cyber world, and legal interpretations of certain online phenomenon in a borderless global context such as the cyberspace are not entirely clear. For instance, in a situation where websites are accessible virtually to anyone anywhere in the world, it is often difficult to predict where cyber threats can come from. Businesses and national security infrastructure have been targets of cyber-attacks from overseas countries where perpetrators are beyond the reach of conventional national laws. International cooperation is therefore necessary in fighting cyber threats and attacks.

Without a cutting-edge cyber security and cybercrime law, the traditional legal concept of jurisdiction and arrest warrant may be difficult to enforce due to the cross-border and transnational character of the internet. Conventional national laws are increasingly proving inadequate to address the legal challenges emanating from the cyberspace.

⁴¹ Australia's budget over twelve years for a national broadband network is estimated at about \$50 billion. Malaysia spent \$16.2 billion, Portugal \$1.9 billion million, Poland \$1.4 billion. Research by The Last Mile Company

Government shall focus more attention to law-and-order and socioeconomic issues that arise from cyberspace. It is the intention of government to maintain a cyber-environment that encourages economic prosperity and certainty of transaction execution while promoting efficiency, innovation, safety, security, privacy and business confidentiality. The government shall therefore enact a comprehensive Cyber security Law to address the liability and criminal risks that may originate from fraudulent and inappropriate use of internet infrastructure such as cyber-fraud, cyber-intrusion, cyber-attacks, cyber-bullying, spam, privacy violation, copyright infringement, online defamation and other forms of cybercrime.

Government shall also encourage the establishment of a team of local experts with competency in the preventive detection and proactive interdiction of cyber threats and attacks, as well as, in forensic recovery of systems after attacks.

With regard to physical threat to infrastructure, the government shall enact a Critical Infrastructure Protection Act that has ICT infrastructure among objects to be protected, as well as, direct appropriate security agencies to elevate their surveillance and protective oversight for such infrastructure.

4.2.7 Optimise Spectrum Utilisation

Government shall undertake a reallocation and reassignment strategy to ensure a more effective utilisation of spectra available for broadband services. Also government shall be looking at new spectrum sources to harness for broadband rollout including the Digital Dividend and white spaces spectra. The Digital Dividend is the excess spectrum that will be freed up after analogue television broadcasting switches to digital transmission in 2015. Digital television uses spectrum far more efficiently than analogue television and the NFMCA will ensure the release of the excess spectrum for other services. Governments around the world have benefitted from releasing part of this spectrum to mobile broadband services.

In the quest for spectrum that supports cost effective rural coverage, the 450 MHz Spectrum band has been identified as having great potential for broadband deployments to some rural locations where going 'on-line' today is considered inconceivable. The 450 MHz band is ideally suited for such service because its long reach provides wide area rural coverage at relatively low cost.

Government shall also consider use of TV White Spaces (TVWS) spectra for broadband services in rural areas. TVWS are mostly unused gaps between TV channels in the UHF spectrum that can be made available for use at locations where spectrum is not being used for licensed services. Since there are fewer TV broadcast signals in rural areas TVWS technology is ideally suited for rural communities. This technology was nicknamed 'super Wi-Fi' because of its longer reach and its ability to penetrate obstacles such as foliage, buildings and difficult terrain.

The 2.5GHz and 2.6GHz spectrum bands will also be freed up before 2015 to provide more spectra for broadband services. Government shall take the necessary steps to urgently

complete the merger of the NBC and NCC to expedite the process of streamlining spectrum allocations and assignments to meet the demand for broadband.

The NPMC⁴² in conjunction with the NCC shall carry out a full spectrum audit, and plan for the effective utilisation of Spectrum including the digital dividend (2015) and unutilised spectrum. Where spectrum has been licensed and unused for at least 2 years the Government shall enforce the use-it or lose-it principle.⁴³

Government is committed to the proposed plan for the switchover from analogue to digital terrestrial television (DTT) by the end of 2015 and will immediately commence the processes required to ensure the timely realisation of this goal.

4.2.8 Employ an Open Access Model for Network Infrastructure

In terms of a National Backbone fibre optic infrastructure the Long Distance Carriers have amongst themselves fibre presence in all the thirty six states and the FCT. Findings also indicate that while many routes in the country still do not have fibre coverage, there exists a proliferation of optic fibre cable installations along some routes. Moreover the cables on these routes that have multiple fibre installations are mostly not interconnected to offer the required redundancy to promote network resilience. While islands of fibre infrastructure may be good for some of the operators, it is definitely not good for the nation as it does not engender a truly national network.

The Government shall therefore promote a seamless interconnectivity regime and an Open Access Infrastructure sharing agreement among licensees.

In providing a National Broadband Network, the Industry is agreed on the need to implement an Open Access Framework. It is recognised that current laws and regulations clearly support the principles of Open Access. It has now become critical to implement open access principles across networks in order to better utilise installed capacity and to accelerate the spread of broadband.

The Government shall facilitate a private-sector driven open-access framework where relevant infrastructure is openly shared between licensees.

4.2.9 Provide Transparent Costs & Capped Pricing

The cost of build out of broadband infrastructure today is relatively high and this is one of the major factors contributing to high cost of broadband services. The high cost of Right of Way (ROW), Civil build costs, and securing of fibre equipment installations are the main cost drivers. It has however been observed that the lack of infrastructure sharing, and not interconnecting the cable infrastructure, are mostly responsible for non-competitive transfer pricing between

⁴² National Frequency Management Council

⁴³ http://www.apc.org/en/system/files/OpenSpectrumNigeria_EN%20modified%203.pdf

licensees. To promote affordability it is clear that cost based-pricing, industry price caps, and shared infrastructure, need to be implemented.

To encourage transparency and infrastructure-sharing a transparent cost model employing widely available industry and operator figures for arriving at a fair transfer price will be adopted. The Telecoms Sector Regulator shall immediately carry out a detailed cost-based pricing assessment as a prelude to mandating infrastructure sharing on a cost based pricing model and possibly a price cap regulation by June 2013.

4.2.10 Develop a National Fibre & Wireless Broadband Coverage Map

In a study of available fibre network coverage it was observed that there is lack of up to date data on which areas are truly covered by network infrastructure. This lack of easily accessible information makes it all the more difficult to know how to plan for the delivery of much needed services to the unserved and underserved areas.

There is need for a publicly accessible and up to date fibre infrastructure map covering the entire nation down to street levels. This map must show existing and planned fibre links, overlaid with 3G to LTE wireless coverage. Only through this medium can the glaring gaps in network infrastructure be identified and systematically targeted for resolution.

The Federal Government recognises this need and shall see to the immediate development of a GIS based telecoms infrastructure map that will be publicly available and up to date.

4.2.11 Drive Demand through Digital Advocacy, Literacy and Inclusion

In further consultations across the industry, stakeholders agree that building extensive broadband infrastructure is a primary enabler for improved access and availability. But a common complaint was that often when operators have built to certain areas they see no immediate uptake of their services. In stakeholder panels dealing with demand it was apparent that campaigns focused at increasing demand and usage were essential for growing internet usage and promoting sustainable broadband penetration.

This means actively raising awareness of broadband access and its benefits via adequate training, development and exposure, ensuring that Nigerians of all ages have access and indeed feel included in a National Campaign for increased broadband usage.

The Federal Government shall promote such a campaign by pushing a Government Online strategy that sees major service points of all Ministries, Departments, and Agencies moved online. This will see many government services such as applications for driver's licenses and land registry applications going online. In the private sector more businesses, formal or informal also need to see the benefit of having an online internet presence as evidence shows that online presence encourages new business discovery, and the development and distribution of local content.

4.3 THE ROADMAP

It is the intention of government that the national broadband roadmap addresses not only the broadband challenges of today, but is flexible enough to evolve over time in line with emerging realities in technologies and the market.

This national broadband roadmap recognizes short-term (2013), mid-term (2015) and long-term (2018) performance milestones and emphasizes quick wins in terms of broadband infrastructure deployment, service pricing, as well as adoption and utilization, particularly in schools and tertiary institutions of learning (Table 9).

The implementation of a National Broadband plan requires long-term commitment and significant action by Federal, States and Local Governments, as well as, the Executive and legislative branches of government – alongside strong private sector participation.

Driving the implementation of a national broadband plan and measuring its impact over time is a critical challenge. Many countries have depended on long-term and high-level coordination and collaboration efforts across government agencies⁴⁴.

Up until now, the responsibility for implementing broadband policy in Nigeria has been spread across many federal agencies. However, successful implementation of this plan will require the need for coordination among all the actors.

The Minister of Communications Technology shall establish a Broadband Council to provide periodic evaluation of progress, facilitate coordination and collaboration, and highlight areas of program adjustment to permit the realization of new and emerging opportunities. Also, the Council shall be the forum for relevant agencies to discuss and fine-tune implementation strategies, assign responsibility for joint duties, share best practices and coordinate broadband funding so that government spending on broadband has maximum economies of scale and maximum impact. The Council shall ensure that a six-monthly periodic assessment is published to report where the country stands in broadband deployment, adoption and utilization; in benchmarked competition across networks, devices and applications; and in how effectively national priorities embrace the power of broadband. The government recognizes the need to measure progress and adjust programs to improve performance in a manner that will permit the realization of new and emerging opportunities.

⁴⁴ The UK established a high-level coordinating body to implement its broadband strategy. The implementation plan created a Broadband Programme Board, responsible for policy proposals, cross-agency coordination, monitoring progress and ensuring value for public financial investment. In the US, it was recommended that the Executive Branch create a Broadband Strategy Council (BSC) to coordinate implementations of the National Broadband Plan, while the FCC was tasked with publishing periodic evaluation, dashboard and benchmark of progress using several indicators e.g. how many businesses have access to broadband, how many subscribers, what speeds they get, how much they pay and what they do with it. Other countries e.g. South Korea via its Informatisation Promotion Committee, IPC have expanded their broadband data collection and dissemination efforts to drive their broadband plans and provide information to policy-makers and consumers. The IPC is chaired by the Prime Minister of South Korea. Source: Connecting America, The National Broadband Plan by Leonard, 2010

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Table 9: Broadband Coverage Roadmap

ITEM	DESCRIPTION	TIMELINE	RESPONSIBLE
Policy & Regulation	Define the open access framework and secure ROW Waivers with states	2013	FMCT, NCC
	Enable expedited ROW permits for the rapid rollout of base stations	2013	FMCT, State Govs, FMoW
	Declare Critical National Infrastructure	2013	National Assembly, State Govs
	License new operators as required		NCC
Enabling Infrastructure	Interconnect National and Regional Long Distance Operators	2013	FMCT, NCC, FMoW Licensees,
	Incentivise rollout of fibre infrastructure	2013- 2014	FGN, NCC, State Govs
	Agree 3G Rollout Target implementation with operators		NCC, Licensees
	Publish plan for freeing up more Spectrum for LTE rollout	2013	NFMC, NCC, NBC
	Conduct spectrum licensing for LTE in 2.5GHz, and 2.6GHz bands	2013	
	Release spectrum on the sub-40GHz bands for mobile backhaul	2014 – 2015	NCC
		2014 – 2015	NCC, NFMC

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ITEM	DESCRIPTION	TIMELINE	RESPONSIBLE
Costing & Pricing	<p>Agree cost-based lease pricing model and implement agreed wholesale price caps</p> <p>Agree Plan for review of the cost of acquiring spectrum licenses</p>	2013	<p>NCC, Licensees</p> <p>NFMC, NCC</p>
Funding & Investment	<p>Agree Financial Incentives for achieving rollout targets</p> <p>Agree Funding Options for accelerating broadband Infrastructure rollout</p>	2013	<p>FMCT, NCC, MoFI, Licensees</p> <p>FMCT, NCC, USPF, Ministry of Finance</p>
Driving Demand	<p>Set up Public Access Points and ICT Training Centres</p> <p>Educate women on the use and benefits of ICT</p> <p>Interconnect all Internet Exchange Points</p> <p>Connect all universities</p> <p>Connect schools, colleges and hospitals</p> <p>Incentivise OEM sub \$30 smart phone devices</p>	2014	<p>NITDA, USPF, DBI, State Govs</p> <p>FMCT, NCC, USPF</p> <p>NITDA, NCC</p> <p>GBB, NUC, FMCT, USPF</p> <p>State Govs, NCC, USPF</p> <p>NCC, Local Manufacturers & Blackberry, Nokia, Samsung, Huawei, ZTE, etc.</p>

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ITEM	DESCRIPTION	TIMELINE	RESPONSIBLE
Building Fibre Infrastructure	Build Metro fibre networks in all the major cities and state capitals	2014	Licensees, FMCT, State Govs
	Incentivise building of last mile wire line infrastructure to homes, estates, and commercial premises		NCC, Licensees
	Extend international cable landing points to other coastal states		FMCT, NCC, Licensees
Wireless Broadband Infrastructure Upgrade and Expansion Phase 1	All new cell sites to be LTE compatible	2014	Licensees
	Spread 3G to at least 50% of the population	2015	NCC, Licensees
	Complete Digital Dividend spectrum migration		Licensees, NBC, NCC
	Release more spectrum for LTE		NFMC, NCC
Wireless Broadband Infrastructure Upgrade and Expansion Phase 2	Spread 3G/LTE to at least 70% of the population	2017	Licensees, NCC
Wireless Broadband Infrastructure Upgrade and Expansion Phase 3	Spread 3G/LTE to at least 80% of the population	2018	Licensees, NCC

To support these roadmap objectives Figure 15 depicts the broadband chart progression for increased internet penetration against infrastructure coverage and penetration, including available broadband speeds and corresponding price points for those speeds.

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4.4 THE BROADBAND PROGRESSION CHART

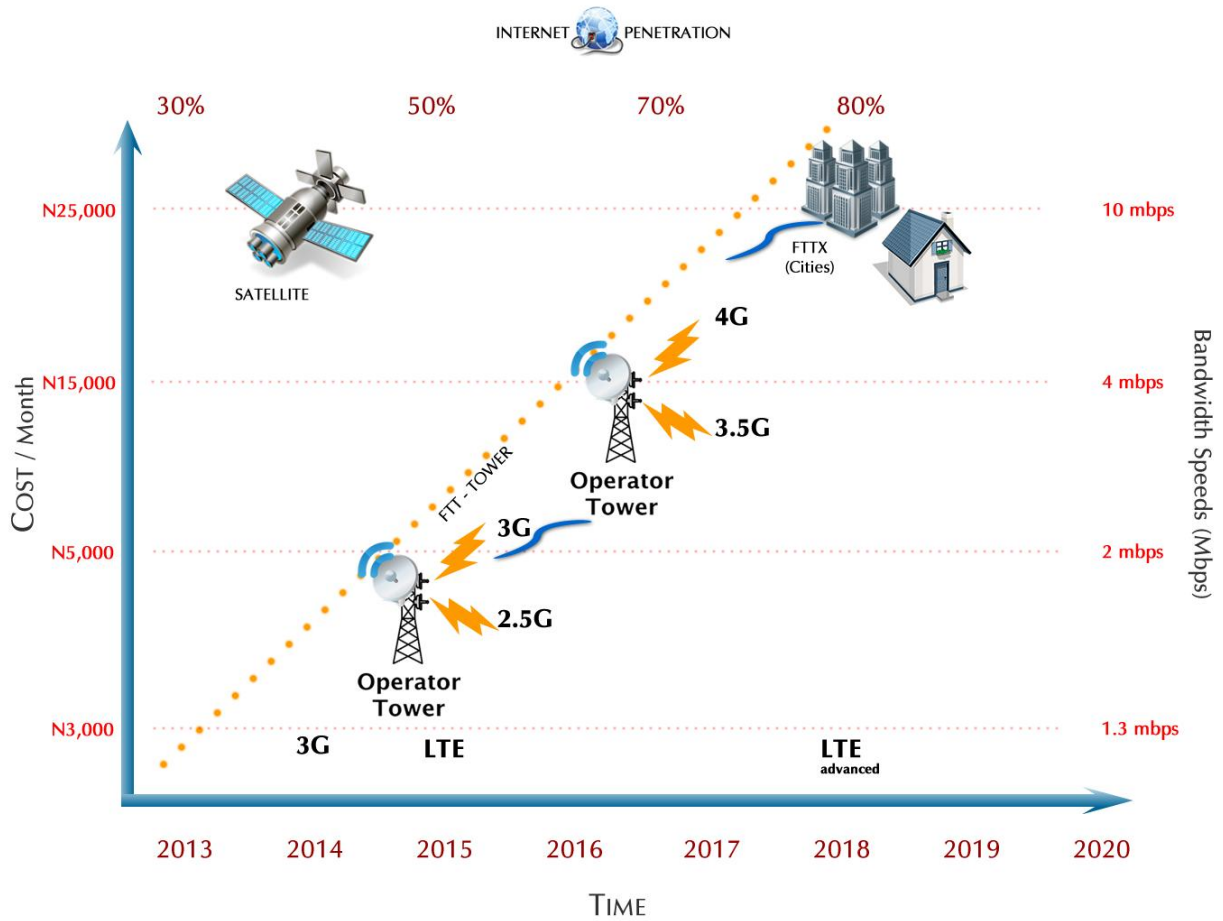


Figure 15: Nigeria's Broadband Progression Chart

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4.5 KPIs AND PERFORMANCE MONITORING

For any plan to be effective it must be monitored, and the success of the program evaluated. Table 10 lists some proposed Key Performance Indicators for a coordinated program on accelerated broadband expansion. These will be monitored and reported by the Broadband Council.

Table 10: Key Performance Indicators

KPI ID	KPI Description	Baseline (Jan. 31, 2013)	Mar. 31, 2013	June 30, 2013	Sept. 30, 2013	Dec. 31, 2013	Mar. 31, 2014	June 30, 2014
1	Percentage of National Population with access to 3/4G Mobile Internet Service							
2	Percentage of National Population with access to Fixed Broadband Internet Service							
3	Number of active Public Access Points							
4	Average price of 3/4G mobile internet subscription							
5	Average price of Fixed Broadband internet subscription							
6	No of households in all major cities without broadband							
7	Average Broadband Speed							

5 ROLES FOR GOVERNMENT AND OTHER STAKEHOLDERS

Governments at various levels have a critical role to play in the drive to have pervasive broadband infrastructure across the nation. Government no doubt has interest in converting the states and local governments in Nigeria into digital havens that will be fully networked and ready to be integrated into the new world order of digital citizens in an environment of e-governance, e-health, e-commerce and e-agriculture among others.

It is recognised that some have taken steps to partner with telecommunications/ICT service providers to deploy necessary fibre and other electronic infrastructure for the benefit of their citizens. Governments have necessary roles to play in removing many bureaucratic difficulties and obstacles that hinder faster broadband rollout.

5.1 FEDERAL GOVERNMENT

5.1.1 Policy & Regulation

As Policy makers and regulators government has the primary role of providing a level playing field to all players in the industry so that the nation remains attractive to investors. And by so doing create an environment for widespread and successful implementation of digital technologies and broadband services.

Federal government contribution is therefore focused on providing overall policy and regulatory framework as well as institution building for private sector led growth and development in the ICT sector. Government has also recently developed a National ICT Policy to give clear guidelines on industry structure and responsibilities of the various entities therein.

5.1.2 Administration of Right of Way

The Federal Ministry of Works and the Federal Ministry of Communication Technology have been working on the issue of streamlining cost structures for Right of Way on Federal roads across the country. This effort has led to the publication of guidelines for effective right of way administration. This will reduce the cost of acquiring right of way, eliminate duplication, and reduce fibre cuts. It is expected that this will serve as examples for the State Governments to emulate on state and local government roads and property.

The Federal Government is in discussion with State governments about how to simplify right of way administration and the possible reduction or outright waiver of ROW fees for the next four years to boost rapid broadband growth and expansion.

The government shall also provide federal incentive to broadband communication service providers by classifying overhead expenses associated with broadband services provision as approved deductible expenses for Annual Operating Levy (AOL) computations.

Other roles expected of the federal government include

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- Providing funding for network build and broadband infrastructure development through Public Private Partnership programmes, and the deployment of Universal Service Funds for rural and unserved areas.
- Participating in state level negotiations and advocacy in communicating the economic impacts of broadband
- Facilitating the enactment of new building codes and standards requiring the installation of telecoms/ICT infrastructure as a basic requirement for new buildings and estates
- Developing a national broadband availability Map
- Promoting green energy ICT initiatives
- Fast tracking current efforts to provide stable electricity supply
- Moving government services and processes online to stimulate broadband adoption and demand
- Generating Nationwide Awareness of the benefits of broadband
- Enacting laws where necessary to support the National ICT policy
- Engaging the Governors and positioning broadband as a recurring agenda item

Therefore the objective for the Federal Ministry of Communications Technology with respect to broadband is one of accelerating penetration and access to broadband.

5.2 STATE & LOCAL GOVERNMENT

As Federal Government does its part, states and local governments must also play their part in ensuring their citizens have access to the necessary infrastructure vital for access to the information superhighway in the digital age. There have been reports about some areas of the country where government agencies at State and Local government levels create bottlenecks in the deployment of ICT facilities by licensees, either by imposing taxes arbitrarily, or obstructing, delaying, or denying right of way applications. There are on-going efforts to ensure that these cases are minimised.

The support of State Government is very important in stimulating demand for broadband as well as ensuring adequate supply of affordable broadband within the state. ICT infrastructure should be treated as essential public infrastructure that must be protected by communities and states where they are installed.

States will also facilitate broadband growth and adoption by

- Removing barriers such as right of way cost and multiple taxation

- Participating in local government level negotiations and advocacy in communicating the positive economic impacts of broadband
- Enabling and promoting the spread of metro networks
- Providing funding for network build and broadband infrastructure development through Public Private Partnership programmes including for rural and unserved areas

The Local Government is a focal point for community development and it is recommended that Local Governments can facilitate broadband growth and adoption by

- Working with communities to reduce disruption to infrastructure build and operation
- Educating communities on the benefits and importance of broadband
- Driving community based public services such as community access centres
- Migrating local government services (e.g. salaries, health services civic registrations, levy and fees collections etc.) online
- Eliminating delayed or unduly long permitting processes

5.3 THE NATIONAL ASSEMBLY

The Legislature has a significant role to play in supporting broadband growth in the country by enacting new and relevant legislations that support the policy goals, plans and incentives for growing broadband in Nigeria.

It has been 10 years since the National Communications Act was enacted. Since then several developments have occurred in the ICT sector. This presents an ideal opportunity for the National Assembly to put broadband at the centre of Nigeria's Communication Strategy. The Communications Act is due for a review and the National Assembly is rightly placed to set the Nation on a path to digital inclusion and leadership in the African region. The 2003 Act should be reviewed and updated to reflect this.

5.4 THE PRIVATE SECTOR

The private sector's role is very central to the roll-out of broadband infrastructure, deployment of services and growth of broadband usage in Nigeria. The private sector will build on its existing contribution by improving the quality of existing Internet service, extending coverage to new areas and connecting new users to the broadband experience. Working with government, consumer groups and other stakeholders, the private sector will also work to fill the gap between advertised broadband services and the actual experience that users have. The private sector will also play a critical role in attracting and providing required financing for the investments that Nigeria needs for infrastructure deployment, quality of service improvement and connecting new broadband users. In addition to the leadership and conducive environment

provided by government, and the contribution of other stakeholders, the implementation of Nigeria's broadband plan will rely strongly on the contribution of the private sector.

5.5 CIVIL SOCIETY

Civil society organisations fill important gaps in society, and support the efforts of government and private sector towards meeting agreed objectives. They can often act as a watchdog of industry performance and service provider quality and as such play a major role in keeping service providers accountable and raising awareness both to the government and the regulator. For broadband services in Nigeria, civil society organisations will play such roles as awareness raising, capacity building and consumer advocacy. Civil society organisations, especially those that work in unserved or underserved areas, will be helpful in raising awareness around the benefits of broadband services to improve adoption. They will also provide capacity building opportunities as part of their work with disadvantaged groups who can then benefit from the use of broadband services towards improving their livelihoods. Civil society organisations will also work with consumers to educate them on their rights as subscribers to broadband services, including the right to experience advertised quality of service.

6 POLICY AND REGULATORY PRIORITIES

The government is cognisant of the fact that global telecommunications industry is at a crossroads as some of the policy and regulatory mindsets developed for legacy PSTN networks, and early mobile telephony networks may not neatly suit the emerging broadband environment.

For instance: prior to the emergence of broadband, traditional telecommunication had been a vertically integrated sector, with licensees owning and operating all elements of their networks while serving end users. However, vertical integration has the potential of discouraging new investments in broadband networks as operators might be wary of incurring deployment costs and having to share access to their infrastructure. Market forces alone cannot resolve these issues. Governments are using policymaking and instruments of regulation to proactively address and resolve such potential sources of friction in the sector.

Worldwide, governments are evolving policymaking and regulatory practices in response to the challenges of the emerging high-speed, high-capacity and always-on interactive networks designed for voice, data, and video communications.

The Federal Government of Nigeria supports regulatory practices that are aligned with international best practice. For example, where a particular spectrum has been internationally identified for commercial purposes, government shall expect such a spectrum to be reserved for commercial purpose in Nigeria.

The government sees the need for a policy and regulatory regime that will make Nigeria, one of the world's most attractive markets for broadband services, applications, devices and infrastructure. As a result, it has identified a number of policy and regulatory priorities, which includes, but not limited to:

6.1 ADMINISTRATIVE POLICIES

The government shall streamline the administration of the ICT industry and complete the merger of the regulatory bodies in order to ensure a single, consistent regulatory regime that will bring about better efficiency in the management of scarce resources.

The government shall review all ICT laws in order to ensure that they support and facilitate ICT/broadband development and give legal backing to the ICT policy and this National Broadband plan.

The government shall take all necessary steps to address the enactment of a national cyber-security law to ensure adequate legal protection of broadband internet users from identity theft, privacy violation, fraud, defamation, online bullying and abuse of confidentiality.

The government shall promote partnerships and understanding within all tiers and MDAs of government and a unity of purpose amongst them for the promotion of the national

broadband agenda. It is important that all tiers of government work in tandem to incorporate ICT/Broadband service provision considerations in town planning and road designs.

The government shall explore, facilitate and promote opportunities for Public Private Partnerships to realize the national broadband agenda.

The Ministry of Communication Technology shall monitor the implementation of the national broadband plan and report regularly on the status of implementation of this plan and undertake relevant studies on the impact of broadband on national development.

6.2 DEMAND-SIDE POLICIES

As part of the broadband demand-side policies, government shall:

Make every effort to promote the creation, distribution, use, integration and management of information as an important economic, political, and cultural activity. Federal agencies shall be mandated to make significant part of public information and services to Nigerian citizens available on-line and the Federal Government shall offer technical assistance to all other tiers of Governments to achieve this same capability for all their MDAs.

Make cyber security issues of primary importance. Security issues have assumed new dimensions, with growing incidence of Cybercrime, identity theft, etc. Indeed privacy of transaction is constantly being threatened and the same consumers that are to benefit from the new technologies and services will be demanding even more protection from the service providers and regulators. Laws would therefore be upgraded to cover new areas such as electronic transactions, e-commerce and cyber security.

Government shall engage in partnership with international communities to address issues of network and cyber security and take other measures to ensure confidence in the use of the Internet by Nigerian Citizens.

Government shall also support efforts and initiatives to encourage digital literacy on the one hand, as well as, the development of web interface application for the physically and educationally challenged persons on the other. Government shall also support initiatives to translate web content into local languages and provision of services in such languages.

6.3 SUPPLY-SIDE POLICIES

Similarly, as part of the broadband supply-side policies, the government shall:

Pursue a general policy aimed at promoting investments in broadband infrastructure. Such policy shall have provisions for the reduction of import duties and levies, as well as, granting of priority to the clearance of designated broadband infrastructure components through the ports.

Take all necessary steps to promote the accelerated deployment of ICT/Broadband infrastructure, including the removal or reduction of taxes and levies; as well as streamlining of

the pre-deployment approval processes and other bottlenecks that can retard accelerated deployment. These facilitations are particularly important in relation to the processes for obtaining Rights of Way (ROW) and Base Stations building permits.

Prioritize the classification and declaration all public ICT/broadband infrastructure deployed under a national licence as a critical strategic national resource, and as such must be protected from vandalism, theft and unauthorised tampering or by any enforcement action by any authority without a valid order from a high court.

Provide legislative backing to the protection for the country's broadband infrastructure by enacting an ICT Critical Infrastructure Act, and issuance of Federal Executive Directive to security agencies for the administrative protection of such important security and economic sensitive infrastructures.

6.4 REGULATORY PRINCIPLES

In implementing general regulatory principles, the federal government shall continue to encourage the sustenance of a fully liberalised technology-neutral regulatory regime without barrier to entry of private sector network infrastructure and services.

The regulator shall give effect to the open access principles enshrined in the Information and Communications Technology Laws based on the principles of the Land Use Laws that vest lands and rights of way in public authorities as a public resource for the benefit of the general public. Therefore no infrastructure deployed on these public resources shall be administered to the detriment of the general public.

The government encourages the streamlining of regulation to eliminate the phenomenon of multiple taxations and other potential sources of uncertainty in the market. The regulator shall be proactive in its market monitoring and enforcement functions in order to maintain a competitive market environment. Specifically, the Regulator shall:

- Maintain level playing field in the market in order to encourage competition and new investments in broadband infrastructure;
- Develop fiscal incentive plans to enhance and improve any layer within the broadband infrastructure value chain that suffers more than a 50% gap; such a layer may be positioned for further liberalisation and may qualify for special incentives by government;
- Proactively monitor and address any anti-competitive behaviour among providers in the broadband value chain. Practices such as market collusion, predatory pricing, punitive pricing at the intermediate markets, and infrastructure hoarding in violation of public interest shall be actively resisted and sanctioned.

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- Initiate, where necessary or applicable, the process for optimizing spectrum assignments which may entail refarming, reassigning and reallocation of spectrum frequencies to facilitate the rollout of new wireless broadband technologies capable of delivering high speeds at the access layer of broadband networks.
- Develop a regulatory framework that will promote optimal use of spectrum and make spectrum hoarding, idling (none utilisation) and warehousing impossible. These may include: spectrum recovery for none usage or spectrum trading and sharing among licensees.

Goal	Policy
Promote competition and investment	<ul style="list-style-type: none"> • Implement policies or regulations to create conditions to attract private investment in broadband networks • Implement technology- and service-neutral rules or policies giving operators greater flexibility • Promote effective competition for international gateways and possible policies for service-based competition for gateway operators to provide access to their facilities on a wholesale nondiscriminatory basis • Develop policies to facilitate interplatform competition
Encourage government coordination	<ul style="list-style-type: none"> • Adopt common technical standards and facilitate the development of international, regional, and national backbones • Incorporate broadband planning into land use and city planning efforts
Allocate and assign spectrum	<ul style="list-style-type: none"> • Assign additional spectrum to allow new and existing companies to provide bandwidth-intensive broadband services • Allow operators to engage in spectrum trading
Promote effective competition and encourage investment	<ul style="list-style-type: none"> • Encourage multiple providers to share physical networks (wireline and wireless), which can be more efficient, especially in low-density areas
Facilitate access to rights-of-way	<ul style="list-style-type: none"> • Facilitate access to public rights-of-way to ease the construction of both long-distance (backbone) and local connections • Develop policies that provide open access to government-sponsored and dominant-operator networks to enable greater competition in downstream markets
Facilitate open access to critical infrastructure	<ul style="list-style-type: none"> • Develop policies that provide open access to government-sponsored and dominant-operator networks to enable greater competition in downstream markets • Consider implementation of LLU if necessary to facilitate competition

Checklist of Policies to Promote Supply for Broadband Networks

Source: Telecommunication Management Group Inc

Figure 16: Examples of Policies that Promote Broadband⁴⁵

⁴⁵ Source the Telecommunications Management Group

7 ADOPTION AND UTILISATION

Broadband access is gradually gaining acceptance in Nigeria but its wide adoption and utilisation remain unevenly distributed, lagging considerably among low income groups, the elderly and people living in rural communities. The difference in adoption distribution is largely attributed to three key drivers of broadband adoption, notably: literacy, Age and Income.

For instance, many subscribers with business and professional interest are using mobile internet dongles on their personal computers to access broadband services from their homes and offices. Educated and working class adults are beginning to have broadband experience in their workplaces. Young students in secondary and tertiary institutions are very active online and are generally fascinated with accessing broadband services on mobile devices such as smart phones, netbooks, laptops.

The government sees the divide in broadband adoption and utilisation as a gap that must be bridged. It also sees the promotion of broadband adoption and utilisation as an effective policy prescription, especially when demand is perceived to be low and needs to be stimulated.

The government shall undertake three-pronged efforts to stimulate broadband adoption and utilisation, focusing on issues of awareness, affordability, and attractiveness of broadband services. To overcome barriers associated with these three categories, government shall embark on initiatives that target populations which are lagging behind, and are less likely to embrace the use of broadband services without some form of training or facilitation.

7.1 AWARENESS CREATION INITIATIVES

The government shall, through the agencies under the Ministry of Communications Technology, facilitate an extensive nationwide awareness campaign to highlight and educate citizens on the benefits of broadband access both as a means of enhancing productivity and national competitiveness while supporting individual self-improvement in solving everyday basic life challenges. . The campaign initiatives shall incorporate immersive digital literacy training programs delivered through formal and informal education systems. This shall be tailored to meet the needs of all groups: including rural dwellers, senior citizens, SMEs, teachers, school children, etc.; with particular emphasis on those at risk of exclusion.

Awareness of the benefits of broadband and the capability to use broadband are critical first steps in getting people online and promoting adoption.

Government's commitment to promoting broadband awareness initiatives for citizens is informed by the fact that not every likely user of broadband service is aware of its service values and its life-enhancing benefits.

The government shall also address broadband awareness creation by improving digital literacy and encouraging the use of broadband in the delivery of government services on-line.

Government realizes the need to direct the awareness initiatives at rural communities and at

Small and Medium sized enterprises (SMEs) because both categories are not likely to have the knowledge of how broadband can benefit business functions or rural lifestyle. They will find e-government programs particularly helpful, especially if they can only access government services online and apply for permits, file taxes, or obtain government services over the internet.

By educating users through awareness campaigns under digital literacy programs, government hopes to help in driving adoption to a broader user base while educating citizens at the same time. Such a program may even become more important as improvement in adoption rates will create the need to ensure that digital divide will not creep up in the country.

7.2 AFFORDABILITY: ADDRESSING COST BARRIERS

Government's efforts to address affordability gaps in the country shall focus on facilitating the reduction of costs of broadband services and access devices. It is the government reasoning that reducing the price of broadband service may provide the incentive citizens need to embrace and adopt broadband services. For instance, if broadband costs were to fall because of lowering prices many consumers might be more willing to try it – in spite of any doubt they may have about their ability to use the service.

The government is concerned that, as more of life opportunities continue to be moved online, citizens who have not been connected to online resources will face an increasing challenge to overcome poverty and become active and productive members of twenty-first century society.

Because the current pricing of broadband service in the country is considered to be out of the reach of most people Government shall structure intervention measures to drive down the cost of broadband services and access devices.

Government shall employ best practice intervention models with possible government financial incentives that have proven successful in lowering broadband subscription prices and reducing cost barriers in other jurisdictions, such as the Connect2Compete and Every Community Online by Connected Nation both of which are available in the United States of America.

7.3 ATTRACTIVENESS

In order to generate demand for broadband, consumers must not only be aware of it, and be able to afford to pay for it; they must also see the relevance and attractiveness of it. The government shall contribute to the attractiveness of broadband services through the delivery of substantial number of government services over the internet.

7.4 DEMAND STIMULATION

Demand can be seen as coming from three areas:

1. Consumers buying services from service providers
2. Businesses using the network and buying services from service providers
3. The public sector using the network and buying services from service providers

Various types of demand stimulus programs address four main barriers to adoption identified as the high price of broadband services, the lack of ownership of access devices, low level of digital literacy, and poor perception of the value of broadband.⁴⁶

A key issue that makes it uneconomical to deploy broadband infrastructure in many areas could be said to be the level of demand for the services –(essentially when there are not enough people in the area prepared to pay for a service to cover the cost of implementation). Government’s involvement in demand stimulation and facilitation of broadband internet adoption shall be by:

1. Raising broadband awareness
2. Encouraging the use of broadband education in schools to promote digital literacy and inclusion
3. Training micro, small and medium enterprises on the benefits of broadband
4. Providing training on security and privacy
5. Supporting secure e-transactions
6. Making broadband affordable
7. Lowering user device costs by reducing or eliminating import duties and other taxes or through targeted subsidies
8. Providing broadband devices and equipment to educational institutions at cost or via subsidies
9. Making grid electricity supply stable and affordable
10. Providing government real estate (e.g. NIPOST) at subsidized or no rental cost to data centre operators to drive cloud and hosted applications
11. Supporting the creation of local and relevant content in local languages
12. Creating and enforcing cloud based e-government by delivering an increasing number of government service touch points online for free and making paper based touch points available at a cost
13. Creating a cloud based e-health diagnosis database
14. Creating cloud based e-agriculture processes by making best practice tips and knowledge databases available online and Internet based services that provide information to aid farmers and traders
15. Establishing a conducive environment to support online booking in the aviation sector

In summary, the options available to the government for promoting adoption and utilisation are:

- Using intervention funds to facilitate the purchase of computers and mobile devices that will be used to access broadband internet, targeting low income populations in the unserved and underserved communities.

⁴⁶ Horrigan, 2009a, 2009b, 2010

- Launching intensive nationwide broadband awareness campaigns and initiatives to inform and educate the citizenry of broadband service values and the life-enhancing opportunities that can accrue from adopting and utilizing broadband services;
- Establishing locations for shared or community access to computers and other devices to facilitate the use of broadband services. Community Access Centres as a way to promote awareness and a means of facilitating broadband affordability. Public funded access facilities are particularly justified in localities where privately operated telecentres or internet cafes are not yet available;
- Introducing measures aimed at reducing or eliminating taxes on broadband services so as to reduce the final prices paid by consumers.
- Introducing digital literacy education and training programs, leveraging the community access centres established across the country, and incorporating such programs into the primary and secondary education curriculum.

7.5 ADDRESSING DIGITAL LITERACY BARRIERS

The government realizes that a significant segment of the Nigerian population is still unable to use computers and go online. This includes the population that lacks the necessary skills and competency to access, manage, integrate, evaluate, or create online information. It is also true that many of these non-adopters have strong concerns about the hazards of going online for reasons related to cyber privacy, security, identity theft or fraud. Yet, another category of the population are those who are simply very satisfied with their offline lifestyle, to the extent they consider internet to be a waste of time and resources. All these constitute impediments for people to embrace broadband internet.

Understanding the benefits of broadband, and having the skills to make use of the available services, require some level of digital literacy as well as basic literacy. Digital literacy is the key to being able to reap the benefits of ICT and broadband.

The government shall make “digital confidence building” for citizens a cornerstone of its ICT policies. This will not be limited to building the confidence to use technology, but will also include the confidence that personal information will be protected and secured. To enhance the digital confidence level of citizens, government shall facilitate the rollout of extensive digital literacy training and campaign initiatives to address the concerns of those who are not online and to convince them that broadband access can be safe as well as productive.

Government has established the National Information Technology Development Fund, NITDEVF to support digital literacy programs such as the one envisaged under this broadband plan. Such fund will permit the government to:

- Enhance awareness of the benefits of broadband in Nigeria; and facilitate digital literacy through formal and informal education systems tailored to meet the needs of all

groups, particularly those at risk of exclusion such as rural dwellers, teachers, senior citizens, SMEs, etc.

- Ensure that community tele-centres, Rural ICT Centres (RITCs), or Community Access Communication Centres (CCCs) or Public Access Venues are established as part of universal service programs in every Local Government Area in the country. It is also important to ensure that no LGA is left behind and digital literacy education includes induction programs for people who are using broadband services for the first time, including training on how to use basic online tools such e-government services
- Undertake digital literacy campaigns in partnership with the private sector and in conjunction with educational institutions. Basic digital literacy skills shall be promoted as part of general educational programs. The initiative must regularly upgrade skills content to cope with technical and economic developments
- Support the measuring of national digital literacy achievements.

Digital literacy training and education programs will empower consumers with the confidence they need to search for information and participate in online transactions. It will also enable businesses to become more efficient and compete in a global marketplace; while providing children the capability to learn online

7.5.1 The Importance of Addressing the Gender Gap

It is acknowledged that internationally there is an increase in recognition and the drive for greater inclusion of women in technology. The Nigerian Government recognises the need for inclusion of women in ICT.

With global statistics estimating the gender gap in developing countries as 43%⁴⁷ the Nigerian government is serious about reducing the gap between the number of women versus men with access to the internet, broadband and technology. A greater inclusion for women will mean growth in GDP, better home education, and reduced cultural barriers to civic engagement from women adding further impetus to the Nigerian adage that says 'you train a woman, you train the population'. Classes of women who would not normally see the need for the use of ICT shall be of particular focus.

To specifically address the adoption of broadband by women, the FMCT shall monitor specifically the number of women without access to the internet; provide incentives for private educational centres and civil society organisations to train more women in the use of the Internet, and have dedicated centres at Local government headquarters to serve as safe technology access centres for women. Courses on safe use of the internet for girls will also be delivered using ICT.

⁴⁷ Women and the Web, Intel and Dalberg Report, January 2013

8 LOCAL CONTENT IMPERATIVE

Internet today is a veritable tool for social interaction and economic transactions and its major purposes include disseminating knowledge, creating and consuming information or content. It is widely acknowledged that content is king and central to what the internet represents to the average user. Therefore there is need for more people to participate in the creation of content, especially content that truly serves the need of the local internet users.

The content available for use over the internet that appeals to the local user has a direct role in increasing the use of the internet for the local population and for local consumption. This extends not just to the content being available online, but being accessible in local languages and script⁴⁸. The Nigerian Entertainment industry is rich and already flourishes worldwide with demand for its music and films. The content industry can indeed flourish with targeted campaigns that promote the creation, storage, and distribution of such content.

8.1 NIGERIAN LOCAL CONTENT

A good example of Nigerian content that benefits from broadband is Nollywood. It is the leader in providing web based content that is in high demand not just by Nigerians, but by Africans, blacks, and other ethnic groups worldwide. The explosive growth in the use of such services as Afrinolly, iRokoTV, and ViewNaija, are a testament to this fact. Other services such as online commercial stores like Jumia, buyallthingscommon.com, review sites like Bella Naija, and LostinLagos.com are also on the increase. Another site, Google maps has helped in a large way in assisting with search and find directory services while other start-ups like essentialApps lead the way in directory services to the phone.

Still there simply isn't enough local content and there is still room for developing clear strategies for driving diverse content such as e-services that support Health, Education, Government Services, Public Safety and National Awareness Programs and many more. Some initiatives have already begun to move Nigerian businesses online. This increases the ability for businesses to be found irrespective of physical location, and for commercial transaction to hold without the need for physical presence. Replicating such successes on a much larger scale will result in a significant boost to the economy.

The Federal Government shall encourage programs that move more processes online and increase the availability of Nigerian content such as making Company Registration processes faster and available online, and enabling better access to e-payment and mobile payment facilities.

⁴⁸ Russia saw a major boom in the uptake of the internet when it introduced the ability to deliver websites written in Cyrillic characters e.g. русский алфавит

8.2 NATIONAL INITIATIVES

There are several initiatives that can address local content delivery at a national level. These range from the interconnection of data centres regionally to the actual creation and distribution of locally relevant content online for end users.

8.2.1 Internet Exchanges (IXPs)

IXPs are critical to the internet access value chain and the benefits include: customers pay less for internet access, it enhances local connectivity, and growth in connectivity, and has a multiplier-effect on the national economy through its impact on other sectors of the economy.

There has been a steady increase in the number of IXPs in Nigeria which however need to be seamlessly connected to each other. IXPs provide savings on the cost of Internet traffic by reducing the need to route internet traffic outside the country. This local traffic routing thus eliminates the need for international transit charges.

Creation, promotion and usage of content go inextricably hand in hand with internet experience. Firstly content creators must be encouraged to store or host content locally. Most content today is hosted outside the country on platforms provided abroad.

The Government shall promote initiatives that will encourage the hosting of more websites within the country. These could be Nigerian based websites, websites for global businesses based in Nigeria, and websites for content providers targeted at Nigerians at home and in the diaspora. This has the added value of reducing the demand burden on international connectivity, while also ensuring that web pages are delivered even faster.

The Government shall facilitate the seamless connection of all IXPs in the country to promote the spread and distribution of local content.

8.2.2 School Content Online

A major area for impact of broadband is in education. The Internet makes it easy to get study materials such as textbooks, video and audio recordings, software and other educational materials needed for learning. Student content can be multi-disciplinary and highly varied, and access to text books, journals, research reports and other materials can be costly and challenging. Text books, encyclopedias and journals are out-of-date as soon as they are printed, but those on the web can be updated and amended as new information or research results become available. Relying on textbooks alone will leave the average student without online access lagging well behind those that have online access. The Internet also provides opportunity even for teachers to learn new materials to update their knowledge. The Federal Government shall initiate getting Nigerian syllabuses, text books and relevant educational and instructional materials and contents online as soon as possible.

This will provide a level playing ground especially for those who otherwise would not be financially able to obtain this educational material. Educational content is critical material that can boost online demand.

8.3 STATE INITIATIVES: LOCAL LANGUAGE CONTENT

The States play a significant role in the lives of their constituents, delivering utilities and services and providing safety. They are major custodians of timely and relevant information, and knowledge. State governments and their supporting websites should be major touch points for state residents ranging from simple public safety announcements to more involved online applications and processes. State governments can also make this information more relevant by offering all available information in the languages relevant to its constituents.

The government sees this particular initiative as a very important one that could make significant shifts in citizen and end user behaviour. Fast and easy to access information in the relevant languages has the potential to enhance citizen engagement and improve information flow.

8.4 LOCAL PRIVATE INITIATIVES: EDUCATING LOCALS

Broadband has the greatest potential for impact at the community level, reviving whole towns and villages, making them more integrated and self-sustaining. Currently interaction with the local government structure is limited. There are a number of opportunities to make a substantial impact at this level.

8.4.1 Community Social Benefits

The social benefits of broadband are easily summarised as **'it connects consumers, business and government; facilitates social interaction and delivers information'**.⁴⁹ However, building a broadband network is only the first step in developing a knowledge economy. A range of policies and programs will encourage and normalise the use of broadband as both government and businesses need to invest in services and applications that encourage users to go online.

A study by the International Economic Council highlights the immediate tangible benefits of broadband as a major community engagement and revival tool⁵⁰, listing its benefits as

- Attracting New Businesses
- Reviving Business Districts
- Helping Local Companies grow in reach
- Reviving communities
- Improving Individual's ability to earn an income
- Helping home businesses grow
- Boosting worker training and e-learning by
 - improving job skills and professional development
 - helping to transition into a new industry or profession
 - making job searching easier

⁴⁹ OECD 2009, 7

⁵⁰ Moving the Needle Forward on Broadband and Economic Development, Craig Settles, October 2012

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Economic impact of wireless broadband			Economic impact of fiber broadband		
	Direct	Indirect		Direct	Indirect
Attract businesses	39.9%	20.1%	Attract businesses	58.3%	15.5%
Revive businesses districts	22.5%	19.8%	Revive businesses districts	28.5%	24.5%
Local companies	39.3%	26.8%	Local companies	51.8%	22.9%
Revive communities	20.2%	19.4%	Revive communities	27.5%	19.4%
Improve individuals	21.0%	21.9%	Improve individuals	30.1%	27.3%
Home businesses	41.3%	22.7%	Home businesses	48.0%	23.8%

Figure 17: Economic Impact of Broadband for Communities

8.4.2 Local Skills Training and Manpower Development

It has been identified that there is a major gap or lack of locally sourced high level and/or relevant skills in the ICT sector. This calls out for focused and targeted training and development to bridge the skills gap in the sector by targeting Nigerians willing to work and be productive in the ICT sector. Organisations like the Digital Bridge Institute (DBI), Aptech, and New Horizons were set up for training and the development of such skills. The Federal Government shall strengthen the contribution and performance of institutions like the DBI, and also provide a conducive environment for private initiatives, to ensure that the skills necessary to support the active participation of Nigeria in the digital age are put in place immediately and sustainably. Government shall also work with academic institutions at every level to align curriculum, research (where relevant) and teaching with national demands of the ICT sector.

With the population and economic potential of the nation, Nigeria is in a good position to be a hub for the development of human capital for the African continent and hub for manufacturing industries that will tailor equipment and design of networks to the needs of African countries. Nigeria shall therefore ensure a well-organised human resources development approach in this vital sector such that professional education and training are adapted to a well-articulated set of objectives for the nation.

8.4.3 Involvement of Local Nigerian Companies in ICT

Government intends that local companies in Nigeria should play a major role in the supply of skilled workforce, services and materials to the local ICT industry. As has been seen with the manufacturing of scratch cards for the mobile telephone industry, local entrepreneurs in the industry need to be encouraged to raise industry skill levels and participation as well as domesticate manufacturing of some of the requirements in the ICT industry. This will lead to increased employment and reduced capital flight. Government will need to look specifically at what is needed to get Nigerian artisans, professionals and others involved in the supply and delivery of ICT software, hardware, skills and services in the local industry. This must be in addition to identified need for the development of local online content.

SECTION FOUR: IMPLEMENTATION PLAN

9 PLAN IN SUMMARY

For Nigeria to become one of the world's leading economies by year 2020, high-speed broadband networks that will provide every Nigerian with fast, reliable and affordable internet access is a fundamental requirement. Broadband has been variously described as a transformative technology that levels the playing field and gives businesses access to regional, national, and international markets irrespective of geographical location. Mr President's goal in this Plan is to produce a strategy and realistic roadmap that will make affordable broadband accessible to all Nigerians within the shortest possible time frame.

The huge success of digital mobile services is a great platform upon which to build a national broadband strategy. The Federal Government is committed to resolving identified challenges to the quest for accelerated broadband penetration in Nigeria and will collaborate with the Private Sector and other stakeholders to achieve the goal. Government also recognises that some incentives may be required to push services to the areas deemed less commercially viable. The Federal Government's position is that pervasive broadband services are in the best interest of the nation and no effort must be spared to reach all the currently unserved or underserved areas.

For improved access to infrastructure, the private sector is agreed that it must open up access to existing infrastructure including transmission networks and fibre ducts to enable more rapid cross country delivery of services. This must be done with transparent cost-based pricing and this can be implemented immediately and all future network deployments will operate under the same principle.

Due to paucity of wire-line last mile access infrastructure, the primary medium for nationwide delivery will be mobile broadband. Effort will however be made to encourage deployment of fibre to homes or premises where feasible.

Other critical and urgent requirements will be to declare ICT/Telecoms infrastructure as critical national infrastructure that qualify for special protection; secure ROW fee waivers from State Governments interested in building digital havens of highly connected communities; embark on awareness creation schemes to achieve universal acceptance of the transformative impact of broadband to the society and conduct digital literacy programs at all levels. The full implementation plan details other work streams but a brief summary is provided below.

The Plan in Summary

How to go about delivering a five-fold increase in broadband penetration is crucial and this document provides within it a roadmap and timelines for achieving this. Essentially government shall

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- Establish policies that regard ICT networks and installations as critical national infrastructure that qualify for special government protection.
- Promote transparency of pricing and reduction of build-out costs by encouraging an increased level of infrastructure sharing and interconnections and introducing price caps where necessary or when market forces fail.
- Take necessary regulatory measures to ensure better performance levels in the delivery of broadband services.
- Facilitate rapid rollout of wireless and wire-line infrastructure and provide incentives to encourage a national 3G wireless coverage to at least 80% of population by 2018.
- Timely release of more spectrum for broadband services
- Foster attractive investment climate by targeted schemes for stimulating demand and providing targeted concessions, tax incentives, grants or support where needed.
- Raise digital literacy & inclusion by using existing national assets for community access
- Advocate and demonstrate the benefits of broadband within the levels of government and also among the people

Broadband has the potential to make significant contributions and improvements to the wellbeing of the Nigerian populace. These benefits range widely from improved access to health services, agricultural best practices, online and cheaper self-driven Education, economic growth and development via improved commerce, and enhanced public safety and security measures.

Prioritising the acceleration of deploying broadband infrastructure is therefore a primary imperative that the Federal Government has identified as a key component to harnessing these benefits. The Federal Government's strategy is therefore to immediately provide the means for rapid proliferation of mobile broadband across the whole country and the consolidation of all broadband impacting initiatives under a single well-coordinated plan of action.

This National Plan integrates all the major inputs of all stakeholders into a single feasible plan. This will enable faster, better coordinated deployment and promote synergies in the rollout of various programs and initiatives, bringing down costs of deployment and developing systems for longevity and sustainability.

With this implementation plan the Federal Government shall collaborate with all levels of government and private sector stakeholders to deliver 80% mobile broadband penetration by 2018 and an open access shared infrastructure environment to support future growth. The Federal Government shall push to see a rapid implementation of these identified opportunities, resolutions and quick wins.

Nigeria's broadband roadmap and strategy shares the global optimism concerning the opportunity for broadband to contribute to socioeconomic advancement and competitiveness of nations. The strategy aims at maximizing investment in broadband infrastructure through

the lowering of infrastructure deployment costs, promoting competition, unleashing new spectrum, removing barriers and fostering mass market for broadband.

Broadband can be provided using a range of different types of technology, each with its own particular strengths and weaknesses. The best overall solution will usually combine several technologies, involving trade-off of costs, performance and coverage. The most suitable mix depends on the economics of the technologies being considered, in relation to geography of the terrain, as well as, population density involved.

At this juncture in Nigeria, 3G (or HSPA) mobile broadband technology provides the fastest way for the delivery of universal mobile broadband access now and in the near future while targeting LTE technology for future high capacity networks. 3G and LTE are indeed the most ideal solutions for leapfrogging Nigeria to high speed broadband delivery.

As a result, the Nigerian mobile broadband industry needs more spectrum for broadband rollout. The Federal government shall encourage its relevant organs to move quickly towards allocating more spectrum for mobile broadband.

The government also realizes how crucial it is for Nigeria to move forward as quickly as possible to remove all outstanding barriers and gaps in the broadband ecosystem.

9.1 IMMEDIATE TACTICAL & STRATEGIC OPTIONS

The following points summarise the actions to be taken in fulfilment of this plan

9.1.1 Tactical Solutions

1. Promote Instant Shared Infrastructure amongst existing operators
 - a. Introduce Transparent Cost-Based Price Caps
2. Establish a SMART CITY Anchor Project with select and qualifying States
 - a. Secure 4-Year ROW Waiver Agreements
3. Mandate pre-installation of ducts when constructing new roads and buildings
4. Publicise the ROW Guidelines and Build Standards established with the Ministry of Works
5. Produce a GIS-based National Fibre Infrastructure Map
6. Classify the NBN as Critical National Infrastructure
7. Introduce Low Cost Wireless & Satellite Solutions To Hard To Reach Areas

9.1.2 Strategic Solutions

8. Initiate LTE-Ready Spectrum Directives including fast-tracked release of spectrum
9. Review spectrum pricing to lower the cost of spectrum for broadband rollout

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10. Establish Centres for Community Access using Public Property like Post Offices, School Computer Labs, and Local Government Headquarters
11. Build Awareness Campaigns for Digital Advocacy and emphasising the need for Digital Literacy and Inclusion
12. Help licensees negotiate reduced right of way fees for fibre builds or secure ROW waiver agreements and also simplify the right of way application process.
13. Pre-pay for public sector broadband to stimulate demand; for example pay for four years' worth of broadband supply for public sector offices upfront to enhance usage and stimulate patronage of private sector providers.
14. Promote cheaper access devices from OEMs
 - a. Challenge the sector to produce sub-\$30 smartphone access devices
 - b. Support the zero import duty taxes for mobile and computing devices to stimulate demand (e.g. for smartphones and laptops) which would help individual Nigerians access the Internet once the infrastructure is in place.
15. Explore opportunities for use of TV White Spaces / unlicensed spectrum to achieve last mile connectivity especially in rural areas
16. Encourage infrastructure sharing by
 - a. Financial incentives for infrastructure sharing especially in rural /underserved areas drawn from the Universal Service Fund.
 - b. Providing Tax exemptions (e.g. AOL) on earnings from infrastructure sharing.
 - c. Creating a working group with operators, service providers, municipalities, local authorities to implement infrastructure sharing.
 - d. Negotiating for fibre with each licensee and asking for excess capacity for underserved communities; parties of interest would be ISP (regional or national) or a social entrepreneurship entity.

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NATIONAL BROADBAND IMPLEMENTATION PLAN

9.2 THE IMPLEMENTATION PLAN

ITEM	PROJECT TASK	2013	2014	2015	2016	2017	2020
1	REGULATORY & POLICY	█					
	REVIEW AND UPDATE COMMS ACT 2003	█					
	ESTABLISH BROADBAND COUNCIL	█					
	SECURE ROW WAIVERS AT STATE AND LGA LEVELS	█					
	DECLARE CRITICAL INFRASTRUCTURE	█					
	DEFINE OPEN ACCESS FRAMEWORK	█					
	RESIDENTIAL ESTATES FIBRE MANDATE	█					
	FASTRACK BTS/ROLLOUT FOR 3G NETWORKS	█		█			
	PUBLISH PLAN FOR FREEING UP SPECTRUM FOR LTE	█					
2	INFRASTRUCTURE	█		█		█	
	MANDATE INDUSTRY FIBRE INTERCONNECT	█					
	COMPLETE OPEN ACCESS FRAMEWORK		█				
	CONNECT ALL INTERNET EXCHANGE POINTS		█	█			
	CENTRALLY MAP ALL FIBRE INFRASTRUCTURE	█		█			
	INTEGRATE GIS MAPS WITH NIPOST POST CODES		█	█			
	PHASE ROLLOUT PLAN TO UNSERVED AREAS		█		█		
	OPTIMISE SPECTRUM PLAN FOR 2.3GHz	█	█				
	RELEASE LICENCES FOR 2.5GHz, 2.6GHz & 700MHz		█				
	RELEASE LICENCES FOR SUB-40GHz FOR BACKHAUL		█				
3	COST AND PRICING	█			█		█
	AGREE WHOLESALE PRICING FRAMEWORK	█					
	IMPLEMENT PRICE CAPS BASED ON FRAMEWORK	█					
	COMPLETE COST BASED PRICING ANALYSIS	█			█		
	REVIEW OF SPECTRUM LICENSING FEES	█	█		█	█	█

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NATIONAL BROADBAND IMPLEMENTATION PLAN

ITEM	PROJECT TASK	2013	2014	2015	2016	2017	2020
4	SERVICE DELIVERY						
	AGREE OPERATOR 3G ROLLOUT TARGETS						
	DETERMINE SATELLITE DELIVERY ZONES						
	IMPLEMENT SMART CITY INITIATIVE WITH STATES						
	ROLLOUT PUBLIC ACCESS POINTS (NIPOST, LGA)						
5	DEMAND STIMULATION						
	MOVE LAND REGISTRY PROCESSES ONLINE						
	MOVE SELECT CRITICAL MDA PROCESSES ONLINE						
	PROMOTE BROADBAND CONTENT COMPETITIONS						
	MOVE CAC BUSINESS REGISTRATIONS ONLINE						
	SECURE OEM AGREEMENT TO PRODUCE SUB \$30 SETS						
6	DIGITAL ADVOCACY & INCLUSION						
	INITIATE SMART CITY AWARENESS CAMPAIGN						
	PUBLISH QRTLY BROADBAND STATUS REPORT	◇	◇ ◇	◇ ◇	◇ ◇	◇ ◇	◇ ◇
	HOLD QTRLY BB REVIEW MEETING FG, STATE & LGAS		◇ ◇	◇ ◇	◇ ◇	◇ ◇	◇ ◇
	REVIEW SCHOOL & UNIVERSITY HALF YEAR REPORTS						
7	INCENTIVES FOR STIMULATING ROLLOUT						
	PRE-PAY FOR PUBLIC SECTOR BROADBAND						
	REDUCE OR ELIMINATE IMPORT DUTIES ON DEVICES						
	AGREE FINANCIALS FOR INFRASTRUCTURE SHARING						

SECTION FIVE: ENDNOTES AND REFERENCES

10 ENDNOTES AND REFERENCES

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SECTION SIX: APPENDICES

11 APPENDIX A: TERMS OF REFERENCE

The terms of reference of the committee are:

- I. Articulate acceptable definitions and perspectives of Broadband and related issues that are current and dynamic for the country.
- II. Evaluate and analyse the current position of broadband infrastructure and service delivery in the country, if possible define broadband served, un-served and underserved areas of the country and articulate an agenda for bridging the gap between the “haves” and the “have nots” within the country and showcasing possible challenges.
- III. Expatiate and detail additional strategic and tactical approaches for reinventing the country as a broadband rich digital haven capable of supporting electronic and mobile architecture for commerce and trade, education, health, agriculture, citizens’ empowerment among others; and thereby capable of attracting internal and external investments for development.
- IV. Consider and articulate the role of different levels of government: Federal, State and Local Government in ensuring the timely achievement of the Roadmap.
- V. Consider and articulate the funds requirement for the ubiquitous rollout of broadband in the country.
- VI. Consider and articulate other related and reasonably connected relevant plans and agenda that are incidental to broadband development in the country.
- VII. Produce a comprehensive National Broadband Roadmap for Nigeria

11.1 MAJOR ISSUES FOR CONSIDERATION

1. Integrated National Transmission Backbone: Infrastructure Sharing, Interconnection And Network Access
2. Acceleration Fibre Transmission To Last Mile Deployment (Fttc & Ftth)
3. Right Of Way Cost and Approval Processes
4. Digital Dividend, Spectrum Re-farming For Wireless Broadband: Special Needs Of Rural Nigeria
5. Stimulating Broadband Demand
6. Broadband and Information Society/Knowledge Economy (E-Government, E-Education, E-Health, E-Commerce, E-Agriculture)
7. Universal Broadband Infrastructure and Services

12 APPENDIX B: FUNDING ESTIMATES FOR DEPLOYMENT

In calculating funding requirements the following assumptions have been made. Long distance fibre already exists and states need rings essentially to connect to this Long distance fibre. Within States, State Capitals and major cities will also need Metro fibre networks built and integrated. The cost of building fibre within cities is estimated at \$60,000⁵¹ per kilometre while the cost of building fibre around states is estimated at \$20,000 per kilometre. This difference can be attributed to the higher number of civil works, road crossings and restoration that will be required for Metro Fibre networks.

12.1 FUNDING STATE TO ZONAL RINGS

The average Number of States per geopolitical zones = 6

Number of geopolitical zones = 6

In calculating the funding required for state ringed fibre optic infrastructure, the respective states have been broken down by land mass into Large, Medium and Small, requiring an approximated fibre network of 750km, 500km and 250km respectively.

The list is broken down below

- Large States (750km): Bauchi, Borno, Taraba, Adamawa, Yobe, Zamfara, Niger, Kaduna
- Medium States (500km): Sokoto, Kebbi, Katsina, Jigawa, Benue, Kogi, Kwara, Plateau, Oyo, Edo, Ogun, Cross River, Kano, Delta, Nassarawa, Gombe
- Small States (250km): Lagos, Osun, Ekiti, Ondo, Anambra, Imo, Enugu, Ebonyi, Abia, Akwa Ibom, Rivers, Bayelsa,

New Calculations Based on state categories:

1. Large States: 8 states x 750km x \$20,000 = \$120,000,000
2. Medium States: 16 states x 500km x \$20,000 = \$160,000,000
3. Small states: 12 states x 250km x \$20,000 = \$60,000,000

TOTAL FOR ALL STATE RINGS	\$340,000,000.00
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⁵¹ These figures include network equipment but do not include the cost of Right of Way, ROW Fees

12.2 FUNDING METRO RINGS

The average cost of laying fibre (including electronics but excluding right of way charges) in Nigeria is estimated at \$60,000.00 per kilometre

An average State Capital (excluding Lagos, Abuja and Port Harcourt)⁵² shall require 250 kilometres of fibre for a metro ringed design.

The cost estimation for 33 State Capitals is therefore

$$33 \text{ capitals} \times 250\text{km} \times \$60,000 = \$495,000,000$$

TOTAL FOR METRO IN 33 CAPITALS	\$495,000,000.00
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TOTAL FOR ALL STATE RINGS	\$340,000,000.00
TOTAL FOR METRO IN 33 CAPITALS	\$495,000,000.00
OVERALL TOTAL	\$795,000,000.00

The addition of ROW fees and other project administration costs can lead to an equivalent amount resulting in a doubling of costs.

⁵² It is estimated that Lagos, Abuja and Port Harcourt already have substantial fibre or duct infrastructure and need to be treated separately for additional metro fibre calculations.

13 APPENDIX C: GOVERNMENT INITIATIVES ON BROADBAND

13.1 THE NCC & USPF

Table 11: NCC Initiatives⁵³

	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 Nigerian manpower in the ICT sector	To encourage the use of ICT in primary, secondary and tertiary institutions
Mechanism	Subsidies based on per kilometre of fibre and incentives to encourage rapid deployment of on non-commercially viable routes	Subsidy on terminal equipment based on broadband infrastructure deployed in state capitals and urban and semi-urban centres	Subsidies to the private sector.	ICT training for over 2,000 local and international students per annum.	Supply of Computers and internet facilities to educational institutions for basic ICT training for teachers and students

Table 12: Universal Service Provision Projects

	Community Communication Centre (CCC)	Schools, Universities Access Programme (SUAP)	Rural Broadband Internet (RUBI) Access	Accelerated Mobile Phone Expansion (AMPE)	Backbone Transmission Infrastructure
Aim	To provide Voice, internet and ICT services to underserved communities on a shared basis	To provide computers and internet facilities in schools and universities. To make this also available to neighbouring communities when not in use.	To provide wholesale bandwidth to CCCs, cybercafés, rural service providers	To extend mobile network roll out to unserved towns and villages in the country	To provide Voice and data access points in 60 Local Government Area headquarters with at least 3mbps.
Mechanism	Establish communications centres by offering up to 80% subsidies for building centres in rural underserved or unserved communities.	Delivery of computers to schools and universities nationwide free of charge for both students and their teachers to encourage adoption and use.	Subsidies to private sector service providers for the installation costs of providing community access broadband networks in rural areas.	Subsidies for the provision of mobile network infrastructure such as Base Stations in unserved and underserved areas.	Install fibre infrastructure to link unserved and underserved areas to the National Transmission Backbone.

Government shall consolidate initiatives taking maximum advantage of private sector input and involvement, and shall ensure competition and quality of service is enhanced through these initiatives.

⁵³ Source Report for GSMA, Assessment of Economic Impact of Wireless Broadband In Nigeria, Feb 2011, Analysys Mason

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13.2 NITDA

The National Information Technology Development Agency of Nigeria, NITDA has a series of programs targeted at expanding ICT and access to Broadband.

Table 13: Summary of NITDA Projects Relevant to National Broadband Plan

S/N	PROJECTS	GOALS/OBJECTIVES
1.	Rural Information Technology Centres (RITCs) 315 centres already completed across the country.	Making ICT services readily available and affordable to rural and underserved communities in the country.
2.	Provision of IT Infrastructure in Tertiary Institutions. 81 Centres already established across the 6 geo-political zones of Nigeria	To enhance IT awareness and usage in tertiary institutions.
3.	Establishment of Internet Exchange Points (IXPNs)	To keep local internet traffic local and reduce the usage of bandwidth. It encourages more accessibility at reduced price and enables additional applications with considerable multiplier effect on the economy.
4.	Scholarship Scheme for Higher Education in Core IT Courses. (74 Masters and 12 PhD currently on going in universities across the world)	To develop a pool of globally competitive IT Human Capital
5.	Software Development (Engineering) Centres Two (2) already established (1 in the North and 1 in the South)	To serve as a platform/incubation centre to encourage Research and Development in Software Engineering
6	Computer Emergency Response Team (CERT) Centre Pilot site on going.	To establish a well-equipped and manned centre to anticipate, receive, document and intervene in attacks on systems and networks in the country
7	IT Park On going	To create a pool of highly trained professionals and a one-stop-centre for ICT products and services
8	University WAN Infrastructure. (on going in 4 Nigerian Universities)	To provide broadband access for teaching and learning in Nigerian tertiary institutions.

13.3 NUC

The National Universities Commission has implemented the Nigerian Research and Education Network (NgREN), below is a description of the program.

In recognition of the critical role that research and networking play in the development of an education system, and indeed a nation state, the National Universities Commission (NUC) is driving the establishment of a foundation that would ensure universities could communicate, collaborate, access and share knowledge across national and international boundaries. This is primarily for the purpose of research and learning but with added capabilities to offer the efficiencies of unified communications and consolidation of digital content. Thus, as it is in other countries, a project that seeks to establish a Research and Education Network in Nigeria called the Nigerian Research and Education Network (NgREN) is currently being implemented.

The summary of the issues that the project intends to address include:

- a) Creation of interconnectivity among Universities. This will aid the ability of institutions to interact, collaborate, communicate and share resources and consequently, promote the pace and quality of learning, research and overall development and reduce/eliminate inter-university communication costs.
- b) Provision of adequate internet bandwidth. The project will deliver a minimum of 155 Mbit/s of internet bandwidth to each campus, thereby making access to internet resources as well as collaboration with global research community very easy. Services such as video conferencing and telemedicine will be provided cheaply and efficiently.
- c) Development of critical human capacity. A series of capacity building initiatives have been proposed. These will be in the form of targeted technical trainings for technical staff (these may include Systems Administration, management of networks' servers, configuration and trouble shooting of core/border routing and switching equipment), workshops or seminars meant to raise awareness and attract support for the network.
- d) Provision of modern learning and collaboration content and tools. Digital content is driving knowledge and making the frontiers of learning borderless. These tools include mission critical resources like high quality video communications equipment for virtual collaboration, e-books and e-journals.
- e) Alternative power supply. The project will also install an innovative green power system. It will create a backup power system to power all its active equipment from renewable energy sources (solar and wind).

13.4 SPECTRUM CONSIDERATIONS

Below lists some candidate Spectrum for Broadband:

- 694 – 790 MHz is under study by ITU till 2015.
- 790 – 862 MHz is planned for LTE but currently encumbered until 2015 due to existing assignment and allocations. Serious re-farming techniques might be required and consideration for buy-back or pay-off of incumbents might be an option.
- 2.3 GHz: 40 MHz is presently available, and the spectrum has been assigned to three licensees with 20 MHz each with serious interference from adjacent mutual transmissions as there are no guard bands. These may need to be re-planned to 30 MHz each for efficiency and high traffic capacity, and with additional 10 MHz spread across the band as guard band to provide protection for inter-operations and adjacent bands.
- 2.5 – 2.6 GHz band: Currently occupied by Cable TV operators. These cable operators can vacate such spectrum to enable clean and fresh planning.
- 1427.9 – 1452.9 MHz/1475.9 – 1500.9 MHz: not yet explored. Studies for maturity and viability should be conducted.

Spectrum aggregation across the whole band may be considered

14 APPENDIX D: PRESIDENTIAL COMMITTEE MEMBERS

Table 14: Committee Members

Dr. Ernest Ndukwe, OFR Chairman, Open Media (CO-CHAIRMAN)		Mr Jim Ovia Chairman, Visafone Group (CO-CHAIRMAN)
Alhaji Bala Mohammed Commissioner for Science and Tech, Kano	Juliet Ehimuan-Chiazor Country Manager, Google Nigeria	Stanley Jegede CEO, Phase 3 Telecom
Engr. Fidelis I. Onah Asst Dir of Engineering, NCC	Junaid Dikko Non-Executive Director, Etisalat Nigeria	Vincent Olatunji Dir Corporate Strategy and Research, NITDA
Gbenga Sesan Exec Dir, Paradigm Initiative Nigeria	Kayode Jegede Ekiti State Head of Bureau of Infrastructure	Ayoola Oke NOC - SA, Telecoms FMCT
Engr. John O. Ayodele Dir of Telecom and Postal Services, FMCT	Lynda Saint-Nwafor CTO, MTN Nigeria	Kabir Wudil Director HRM, FMCT
Dr. Joshua Atah Head of ICT Projects, NUC	Rasheed Adegoke Head IT/CIO, First Bank	Philip Chukwueke Reg Director, Africa CDMA Development Group
		Consultants: Business Unusual Ltd www.b-unusual.com MD, Jinmi Sonuga