DEPLOYING BROADBAND MOBILE COMMUNICATION NETWORKS TO FACILITATE GENERAL ELECTION IN NIGERIA

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Abstract

Electoral processes in Nigeria have, over the years been attended with numerous setbacks particularly in the conduct, coverage, computation and compilation of results as well as the considerable time-lag of results release which are altogether muffling the growth of our nascent democracy. This paper therefore proposed broadband deployment as a veritable tool to cater for easier collation of election results, fast transmission to designated and remote polling stations and quicker release of the final and acceptable results. It is believe that the application of broadband technology in Nigeria electoral system will strengthen our institutional capacity to conducting transparent elections in order to restore integrity to the process and to the country in the international arena.

Keyword: Broadband, Election, VoIP, Network, Fibre Optic, Teledensity

Introduction

The need to provide reliable and efficient communication facilities for any election cannot be overemphasized. The Nigeria landscape is complex and vast in its orientation; needing a comprehensive deployment of human and material resources to cater for proper and easy coverage of the geographical terrains. Our country is far more diverse, complex and fragmented than most people realized (Iwu, 2009b). The election system must be sufficiently robust to withstand a variety of fraudulent behaviours such as delays in the release of result, treats to life and election materials, and must be sufficiently transparent and comprehensible that voters and contesters can accept the outcomes of the general election without prejudice. There is the extremely high density of people to cast votes that will necessitate the establishment of many polling stations in order to reduce overcrowding and long queues. These many polling stations and their returning officers encounter numerous difficulties in the process of result compilation and submission. The Independent National Electoral Commission (INEC) believes that the hiccups that attended the 2007 polls would have been reduced if technology had been incorporated (Iwu, 2009a). In 2008 American election, Obama campaign team demonstrated the power of the Internet to mobilize supporters, raise voter turnout and their participation in the electoral process. Nigeria can take a cue from this.

The fast deployment of modern communication equipment and the expansive coverage by the wireless and GSM telecom operators within the Nigeria geographical terrains to fast track information delivery and easy communication is a welcome development. New developments in terms of this technology through the Internet, social media, and other digital platforms have grown. However, this in itself has brought high traffic congestion to the network payloads. The Federal Government in collaboration with these private agencies could take advantage of these developments and utilize as well as update these facilities to solve congestion problems and use it for the general election. Therefore, building and deploying a broadband mobile network to provide reliable high data rate transmission is a veritable tool to cater for easier collation of election results, fast transmission to designated centres and quicker release of the final and acceptable results.

This paper therefore seeks for the establishment of an enabling environment where Nigerians can gain maximum benefits from broadband infrastructure. In addition, to strengthen efforts geared towards stimulating the creation and adoption of broadband applications thereby fostering our future digital elections. These initiatives will demonstrate some key social opportunities made possible by high-speed broadband. Broadband also presents major opportunities to improve the delivery of vital public services (Conroy, 2009). This will particularly be the case in Nigeria geopolitical zones where resources are often lacking due to distance and sparse population in rural and remote places. Deploying high-speed broadband before any general election aims to deliver and facilitate improved electoral process for the Nigerian people.

Broadband Concept

The term *broadband* commonly refers to high-speed internet access or high-speed transmission technologies with the use of fibre cable link, cable modem, wireless and satellite links. The American Federal Communication Commission (FCC, 2010) defines broadband service as data transmission speeds exceeding 200 kilobits per second (Kbps), or 200,000 bits per second, in at least one direction: downstream or upstream. This means that it is possible for a host computer to adequately be a receiver and a sender of data. In distinguishing broadband from dial-up services, the following was their submission, that:

- Broadband service provides higher speed of data transmission—allows more content to be carried through the transmission "pipeline."
- Broadband provides access to the highest quality internet services—streaming media, Voice over Internet Protocol (VoIP) or simply *Internet phone*, gaming, and interactive

services. Therefore, broadband service may be increasingly necessary to access the full range of services and opportunities that the Internet can offer.

- Broadband is always on—does not block phone lines and no need to reconnect to network after logging off.
- Less delay in transmission of content when using broadband.

Broadband therefore enhances the followings (Omwenga, 2009): browsing related activities, messaging, fast file downloading, speed and response-time sensitive internet applications, online distributed software applications, net storage, static image delivery, audio delivery – download or streaming (real-time), (VoIP) calls, net radio, video – download and streaming. Broadband access to the Internet can enable or enhance the adoption of certain applications that have an impact on electoral processes. The use of Information and Communication Technology (ICT) and specifically broadband within electoral processes can be seen as forms of electoral reforms adopted to increase the credibility of election results. This reduces the cost of mobility, logistic bottlenecks and increases mass participation as voter could easily cast their votes anywhere within the stipulated time frame.

Nigeria Broadband Infrastructure

The Nigeria telecommunication landscape have been transformed since the licensing of three GSM networks in 2001 and a fourth in 2002. As a result, the country has continued to maintain her giant stride as one of the communication fastest growing markets in Africa with triple-digit growth rates almost every single year since 2001. In 2009, the Buddecom has this report on Nigeria's Internet sector as though hindered by the country's underdevelopment and unreliable fixed-line infrastructure, but that this is changing, competition has intensified, and new technologies are being able to deliver wireless broadband access. More than 400 Internet Service Providers (ISPs) have been licensed as well as a number of data carriers, Internet exchange and gateway operators. VoIP is already carrying the bulk of Nigeria's international voice traffic. The current deployment of the country's first Next Generation Networks (NGN) will drive further convergence of voice, data and video/TV, enabling the provision of triple-play services that will ultimately also involve the country's already competitive broadcasting sector. Ndukwe (2008) has this to say also, that the first eight years of the 21st century have continued to witness an upsurge in the application and use of telecommunications and information technology in nearly all aspects of human endeavour. The wireless revolution, the internet phenomenon, the broadband capabilities and the massive deployment of national and intercontinental optic fibre highways have accelerated Nigeria access to information resources and changed the way people live and transact business. Improved connectivity

within and outside the African continent is already in place. Earlier, an Africa-wide fibre optic cable named "Africa One" was developed and has a state-of-the-art undersea fibre optic self-healing loop around Africa. The network was to provide end-to-end connectivity for the African continent to 19 countries and 185 cities around the world (Omwenga, 2009. Also, another African submarine project has materialized as the Third Southern Africa Telecommunication /West Africa Submarine Cable/ South Africa-Far East Project (SAT3/WASC/SAFE). SAT3/WASC/SAFE connects Portugal to South Africa via linking the entire west coast of Africa (Omwenga, 2009) with terminal points in Lagos, Warri, Bony and Port Harcourt, the coastal part of Nigeria; then crossing the Indian Ocean to East Asia. An extension of the projects is shown in Figure 1. This shows that infrastructures for the smooth take-off of our election process are on course.
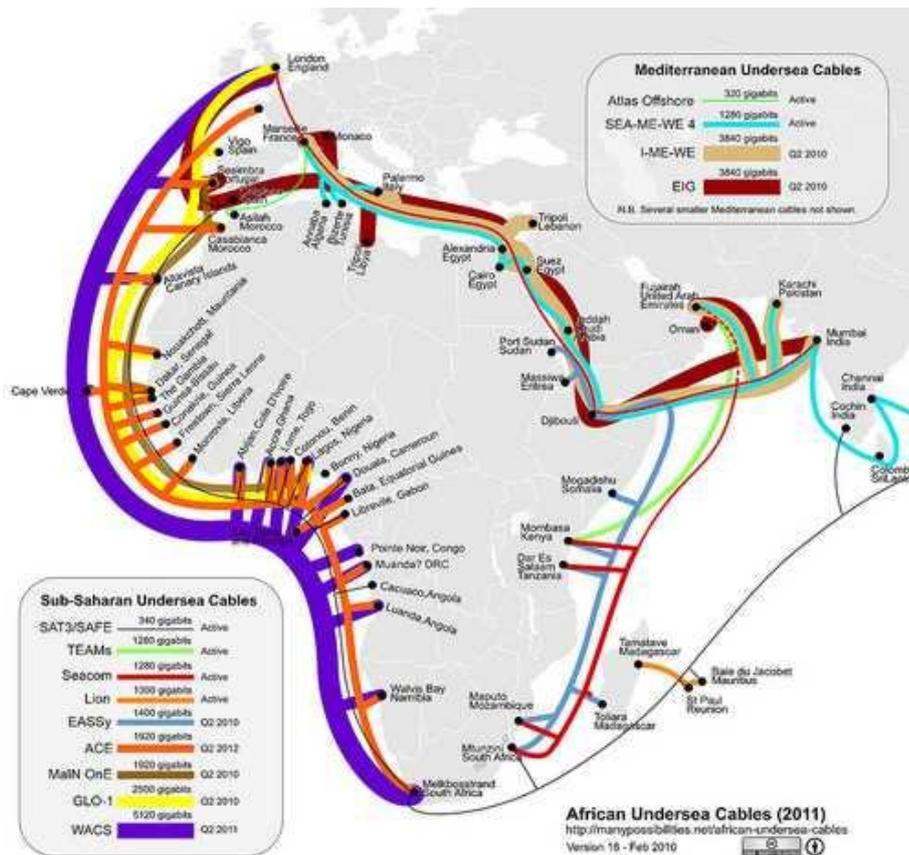

Figure 1: Africa Submarine Optic Fibre Cable Projects with links to Nigeria
Source: ShuttleWorth Foundation, Accessed March, 2010

Figure 2 shows the extent of telecommunication infrastructural development in Nigeria between 2006 and 2008. In 2008, Fibre optic had small coverage and is being trailed by Base Station infrastructure. Distance coverage for Microwave Radio showed greatest expansion than all the other two. We believe that if the trends of developments continue, we are sure to witness sufficient and complete coverage over the Nigeria geographic terrains.
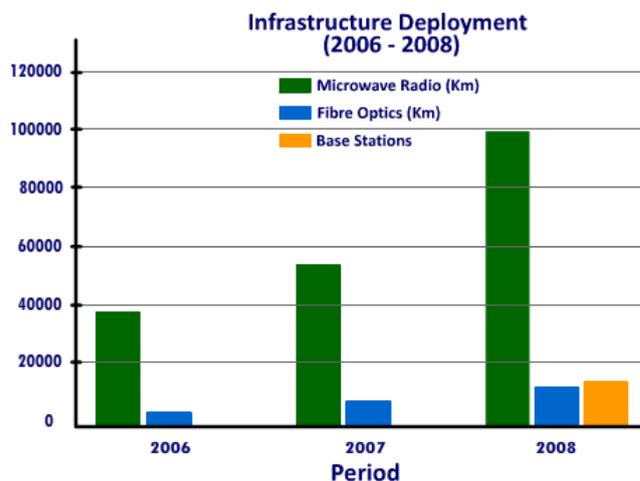

Figure 2: Coverage of Infrastructure Development over a period
Source: NCC Industry Statistics Accessed 20th March 2010

More so, fibre optic emerged in 2006 and showed small proportional growth with increase in 2007 and 2008, while Base Station coverage emerged significantly in 2008 and showed significant coverage, though not visible in the year 2006 and 2007. This indication of fibre optic does not really exclude its existence except that its deployment was minimal in use. More over, we could also see Base Station dominance over fibre optic in 2008. Implying that populating our cities and villages with these infrastructures is sine qua non to the viability and visibility of successful digitized election system in Nigeria as it enhanced sectorized area coverage.

Nigeria's Comparative Advantage

Figure 3 shows that Nigeria is not behind schedule in her internet usage as compared to other African countries, with second position as at July, 2009. Telecom operators have recently undertaken several projects to enhance connectivity and encourage the growth and use of the internet within the country. Several fibre optic projects have been constructed or are under construction with the promise of bringing connectivity to the remote localities. Nigeria have bundled the deployment of broadband Internet with economic and social development, a

promise that can only be verified by the test of time and the proper deployment plan and use of the Internet within the country.
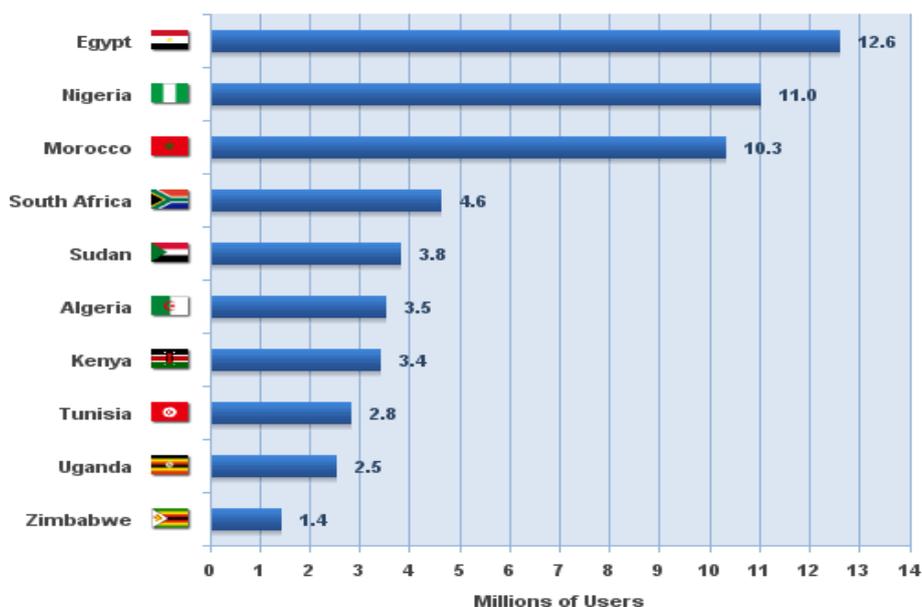

Figure 3: Continental Breakdown of Internet Users in Africa (June 2009)
Source: Internet World Statistics, Accessed 20th March, 2010

This is an achievement that would serve as a launch pad for greater broadband society. It will give credence to the electoral processes. As voting will become online and election collation and computation of vote data as well as election results will become real time processes. Table 1 shows Internet usage statistics for Africa with Nigeria internet users' growth of 5,400.0% between 2000 and 2009 and a penetration of 7.4% and 16.3% in Africa users rating. This is second in position to Egypt as compared to other African countries. Table 2 is a detail provision for Nigeria scenario from year 2000 to 2009. An indication of tremendous growth in internet usage and mass patronage by would be voters or consumers in comparism with the population strength.

Figure 4 shows that between 1999 and 2003 an asymptotic growth of both subscriber's lines and teledensity - a measure of telephone lines availability, was observed. Between 2003 and 2009, a positive steady steep growth was experienced; signally that usage is on the increase. The subscriber's lines growth was an indication of several factors played on the industry such as the development, deployment, Government policies and experimentation while the teledensity was the system workability, benefit and the general acceptance and involvement of the consumers.
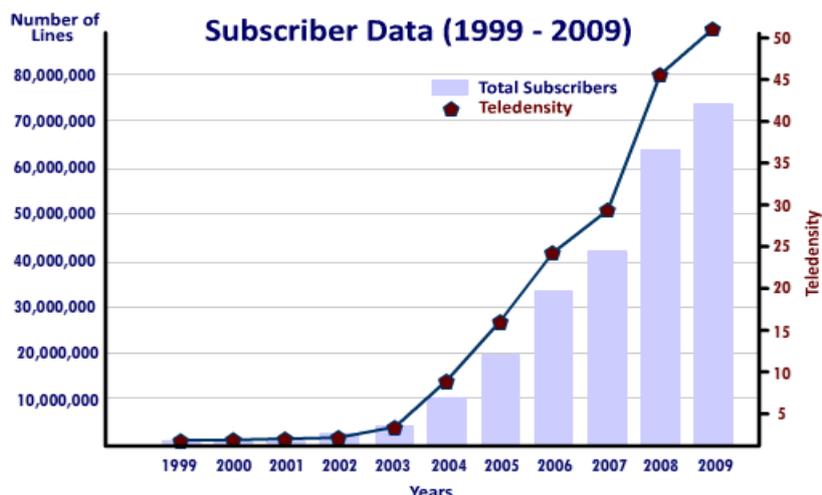
Figure 4:   Subscriber Base and Teledensity Profile
Source: NCC Industry Statistic Accessed 20th March, 2010

The broadband technology can adequately be applied in the general election in that the digital election can be used to access remote locations, provide information or educate the populace and mobilize for maximum participation.

Table 1: Internet usage Statistics for Africa

Africa	Population (2009 Est.)	Internet Users Dec/2000	Internet Users Latest Data	Penetration (% Population)	User Growth (2000-2009)	% Users in Africa
Nigeria	149,229,090	200,000	**11,000,000**	7.4 %	5,400.0 %	16.3 %
Morroco	31,285,174	100,000	10,3000,000	32.9%	10,200.0%	15.3%
Egypt	78,866,635	450,000	12,568,900	15.9%	2,693.1%	18.7%
South Africa	49,052,489	2,400,000	4,590,000	9.4%	91.3%	6.8%
Sudan	41,087,825	30,000	4,200,000	10.2%	13,900.0%	6.2%

Source: Internet World Statistics, Accessed 20th March, 2010

Table 2: Nigeria Internet Usage and Population Growth

Year	Users	Population	%Penetration	Usage Source
2000	200,000	142,895,600	0.1%	ITU
2006	5,000,000	159,404,137	3.1%	ITU
2009	11,000,000	149,229,090	7.4%	ITU

Source: Internet world statistic Accessed 19th March, 2010

Transforming the Nigeria Electoral Process Using Broadband Technology

What the nation does to progressively enhance the electoral process should be of greater concern and meaning than how much energy is exerted as seem to be the case at the moment with what would have been (Iwu, 2009a). The Nigeria government is currently faced with the great task of conducting general election, and the challenge to provide extensive

services and information with limited resources is enormous. The need to rely heavily on broadband networking technologies to perform and fast track important public services such as the forth-coming election is accentuated. The main contribution of broadband mobile communication to voting process and specifically of result collation and submission is the support it offers for returning officers mobility, allowing them to conduct election from any location and transmitting the results immediately via congestion free internet broadband access.

It will also be of great importance if electoral reforms give a pride of place to the application of the technology to the management of our elections. This will definitely go a long way to help the country meet the basic international requirements of election administration (Iwu, 2009b). A robust electronic voter's register, which is being updated with the continuous voters' registration progression and an upgraded IT platform through the implementation of pedestals Electronic Voting System (EVS), can be established.

There is potential to adopting broadband infrastructure for all aspects of elections administration but only after the technical challenges have been completely resolved in a transparent manner. Furthermore, any plan that intends to accommodate voting by broadband means must be based on principles that ensure integrity including, but not limited to: accuracy, transparency, trustworthiness, and security, in an auditable manner with complete accountability loops.
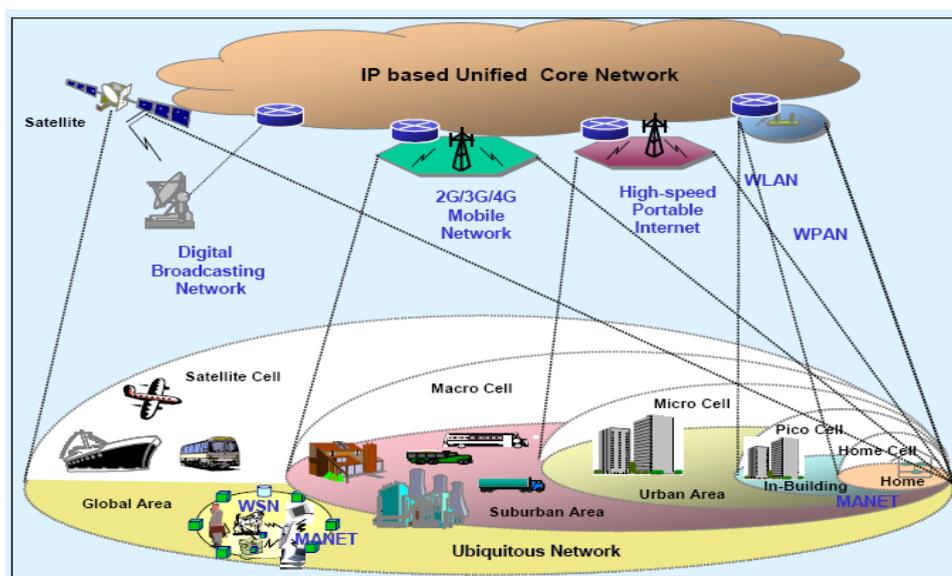

Figure 5:   Hierarchical Structure of Mobile Wireless Network Infrastructure

Source :   Srivastava and Kelly, 2004

The mobile wireless network infrastructure organized into a cell hierarchy as shown in figure 5 is based on the technology that is already deployed and can be used for electoral processes. Starting from the home cell with coverage in private buildings such as a house or office to public hotspot locations such as airport, train station, conference centre, service centre, remote and rural locations may be provided through an access point. In a hierarchical multi-layered cell environments, extra intelligence is required so that the network can find a specific terminal or the terminal can determine the boundaries between wireless networks and switch to the most appropriate one. In addition, the evolution to all-IP networks in mobile communication to enable the services that can operate in different networks will become an important issue for the future broadband mobile communications and the development of the Internet (Srivastava and Kelly, 2004) in Nigeria System of electoral process.

Internet voting as grouped by NSF (2001) is divided into three categories and is a feasible venture that can be pursued to a logical conclusion in the Nigeria context. These include;

• *Poll-site Internet voting*: It offers the promise of greater convenience and efficiency in that voters could cast their ballots from any poll site, and the tallying process would be both fast and certain. More importantly, since election officials would control both the voting platform and the physical environment, managing the security risks of such systems is feasible.

• *Kiosk voting:* Voting machines would be located away from traditional polling places, in such convenient locations as malls, libraries, or schools. The voting platforms would still be under the control of election officials, and the physical environment could be modified as needed and monitored (e.g., by election officials, volunteers, or even cameras) to address security and privacy concerns, and prevent coercion or other forms of intervention.

• *Remote Internet voting:* It seeks to maximize the convenience and access of the voters by enabling them to cast ballots from virtually any location that is Internet accessible. While this concept is attractive and offers significant benefits, it also poses substantial security risks and other concerns relative to civic culture. Current and near-term technologies are inadequate to address these risks.

Benefits

In Huang (2010) view of benefit, the following were presented:

- Broadband can strengthen the reach and relevance of mediated and unmediated information in our society. A healthy democracy requires an informed citizenry, and

broadband can change the way that people engage this information. This is true for mediated information, such as public media. This is also true for unmediated information, such as the data the government provides citizens.

- Second, broadband can enable citizens to engage in their democracy – through a variety of broadband-enabled tools that will make our democracy more participatory and more representative. Broadband-enabled technologies have already revolutionized the way citizens interact with each other in the private sector. Companies such as YouTube enable the distribution of "user-generated content" over the Internet. YouTube now supports more than 120 million viewers watching more than 10 billion videos monthly.

The Federal Government joint efforts with the private sector to improve communications services outside of our major metropolitan cities are of great benefit to the regional, state and local communities. In brevity, first, broadband can strengthen the reach and relevance of mediated and unmediated information in our society. Second, broadband can enable citizens to engage in their democracy – through a variety of broadband-enabled tools that will make our democracy more participatory and more representatives.

Wireless Networks for Nigerian Communities

The mobile phone has become nearly ubiquitous. In addition to using computers, many people access digital media and the Internet via their mobile phones. Indication suggests that many Nigerians access the Internet via their phones. Many are unaware that they are using the Internet when using mobile instant messaging services or accessing operator content via General Packets Radio Service (GPRS).

Next, a means of communication to the local electoral delivery mechanisms is needed. A team trained staff and implemented a satellite-based wide-area network communications infrastructure. Some of these areas had never had data communications services before. In addition to connecting local election officers to the INEC database, the communications infrastructure can also served as a basis for registration process. Marie (2000) has this to say of Mchunu, the chief electoral officer, and his information technology team at the Independent Electoral Commission of South Africa (IEC), that they were able to register 9.7 million people in the first weekend alone during their 2009 election. When it was time to vote, this communications system enabled the team to disseminate results in real time on large-scale Geographic Information System (GIS) maps so that the media and political parties could map the progress. The elections took 14 hours, with 16.2 million people voting. This is

an indication that Nigeria Government can borrow a leaf from the South Africa scenario and implement a customized constituency-specific technology for her election.

Security

For obvious reasons, many organizations and agencies are extremely cautious about any technology that might leave their networks vulnerable to intrusion. This robust solution is to provide a scalable, centralized security management and supports dynamic per-user, per-session encryption keys to protect the privacy of transmitted data. Adewale, Ogundele and Adetunmbi (2009) have succinctly shown the vulnerability accrue to security issues in voting system such as voter authenticity, voter anonymity, data confidentiality, data integrity, system accountability, system integrity, system diclosablity, system availability, system reliability, personnel integrity and operators authentication and control. From 1959 to 2007, general elections in Nigeria have been characterized by malpractices and controversies (Ohia, 2008). To forestall malpractice and controversies, vote data must be adequately secured else efforts at technology control would be a waste.

Rubin (2002) identifies the new risks brought about by introducing the state-of-the-art technology into electoral processes. The major security risks identified by introducing the state of the art broadband technology include those at the voting platform – including malicious payload (attack programs, remote administration and monitoring toolkits, etc.); and delivery mechanism (worms, viruses and bugs, active content downloaded automatically, etc.) – and the communications infrastructure – including (distributed) denial of service attack, DNS server attack, social engineering and in using specialized devices. With growth of cyber crime and hackers, vote data of INEC will indeed be subject to these security risks.

In a bid to breaking the re-occurrence of electoral disorder, violence, rigging, bigotry and corruption, broadband mobile network is a leverage to proffer solution to the aforementioned while needed modalities are put in place to secure the network against attacks. With Broadband networks capability to deliver data, video and voice communications to multiple destinations, a growing number of Emergency Management Services (EMS) operations around the world recognize the need to arm their responder personal devices with wireless high-speed data access. Communicating to a central command centre and to other responders improves response time and community safety, ensuring all parties receive up-to-date accurate information (Shannon, 2009). Miller (2009) highlighted security and privacy risks to be considered when implementing online voting. These include

- Integrity of the voting terminal, especially if a potentially malware compromised personal computer is utilized;

- Integrity of vote data as stored in the voting system's central data centre, including both threats from staff, and electronic intrusion by outsiders;

- Anonymity threats from trusted IT staff;

- Authentication of voters, in other words, the ability to uniquely identify voters in a way that is not easy for adversaries to misappropriate, and to this extent, the phishing and key-logging challenges of online banking provide some metrics; and

- Integrity and privacy of vote data in transit, and to this extent, the standard Internet Secure Socket Layer (SSL) mechanism for authentication and integrity can be used, but there remains the challenge of keeping voter data and vote data separate

Conclusion

The penetration of broadband and mobile communications is changing the communication environment, creating a distributed computing and information environment, and when combined with web-enabled communications, user-generated content and applications, online social networking tools, stimulate an age of interaction in electoral processes. The Federal Government moves towards universal broadband should be kept alive, and even redoubled, and it is not just to be widespread alone, but affordable as well. For people to have access, able to move on to these airwaves, use them and apply them, get information and be able to communicate, either which could be free or at very low cost for affordability is a worthy venture. When this becomes a reality, election would be easy to conduct and the desired goals of transparency, credibility, general acceptance and strengthening our democracy would be a reality.

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