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Challenges and Prospects of Internet Connectivity in Developing Universities in Nigeria A Case Study of Fountain University, Osogbo

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Abstract

The Internet is a network of networks, which serves as a tool that provides the fastest and latest information on what goes on around the world. In Nigeria, a large number of Institutions are still lagging behind in the area of Internet provision and connectivity. This work focuses on the challenges and prospects of Internet connectivity in developing universities in Nigeria, taking Fountain University, Osogbo as a case study. Data were gathered from records and documents reviewed from the ICT Unit of the university. Assessment through logs, diaries and documentations with Internet network survey was carried out all over the campus. Technical and administrative challenges were found and some prospects were recommended.

Keywords: Internet Challenges, Prospects, Nigerian Universities, Network Connectivity

Introduction

Internet growth in developing countries has been impressive (Mingxuan and Wu, 2006). The world is fast becoming a global village and a necessary tool for this process is an access to information on what is happening around the world at large. Internet serves as a key factor and an indispensable tool in the teaching and learning process. The Internet, which has become an integral aspect of higher institution education, plays an indisputable role in meeting information and communication needs of staff and students (Isaac, 2011). The internet has since the 1990s used as a civilian tool for communication, research, education, entertainment, etc. (Isaac, 2011).

In African countries, there is a high cost of Internet bandwidth, Internet accessibility for an

individual cost about 300 times compared to that in most European countries, institutions can only afford low bandwidth, and for example, Mbarara University Uganda pays US\$2190 per month for 384kbps bandwidth (Muwanga, 2013). National Universities Commission (NUC) of Nigeria envisaged an average cost of internet bandwidth per University to be \$1.50/kbps/month via faster and more reliable marine cables (Chafe, 2018).

Although Internet and telephone density has experienced quantum growth in the last ten years since President Obasanjo's Telecommunications Deregulation policy, a large proportion of the citizens, particularly those living in the remote

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communities do not still have access to telephone and the Internet (Osugwu, Okide, Edebatu, & Eze, 2013).

It is estimated that Massachusetts Institute of Technology (M.I.T) in Boston USA has bandwidth allocation that surpasses all the bandwidth allocated to Nigeria put together. Low bandwidth has been found to hinder effective Research and Development efforts by academics and professionals in Nigeria's tertiary institutions (Osugwu et al., 2013).

Figure 1 represents the chart of biggest Internet users in Africa, showing that Nigeria has the highest number of internet uses of 98.39 million and 50.2% penetration (Miniwatts Marketing Group, 2018). In the first decade of the new millennium, access across Africa is heavily dependent on the more expensive satellite such as Very Small Aperture terminal (VSAT) connections (Harle, 2009). Access to undersea cables on the western seaboard has improved enormously with Nigeria and Ghana having three Submarine cables (Main One & Glo-1) in addition to South Atlantic 3 (SAT-3) (Sutherland, 2014). Nevertheless, some countries are relatively vulnerable to breakages through having only one undersea cable: Guinea, Sierra Leone, Liberia, Togo, Benin, Cameroon and São Tomé. As shown in Figure 2, the African Coast to Europe (ACE) submarine communications cable presently runs from France to South Africa, there are plans to add more countries, where interconnection to other cables would significantly improve resilience (Sutherland, 2014).

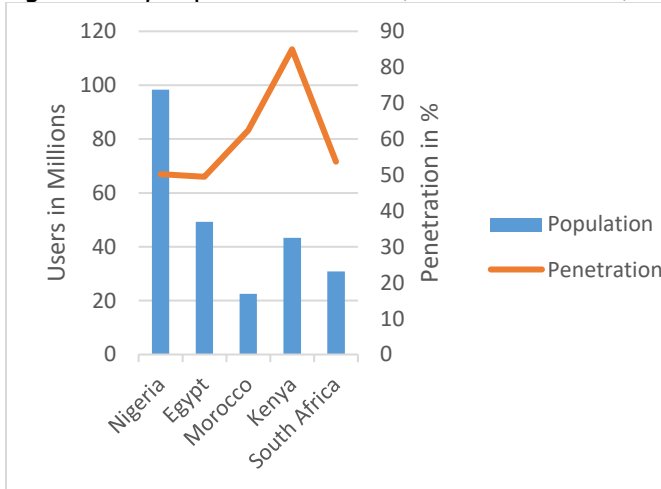


Figure 1: Internet Users population and penetration



Figure 2: ACE: 17,000km long broadband optical submarine cable between Africa and Europe

Nigeria has six active international submarine fiber optic cable networks that formed the core networks (Agboje, Adedoyin, & Ndujiuba, 2017). Five of them are connected to the world through Europe while the sixth is connected to Cameroon. Lagos, Nigeria is the landing points of all these fiber optic cables. The submarine cable to Cameroon is called Nigeria Cameroon Submarine Cable (NCSCS) with a cable length of 1,100km owned by Cameroon Telecom (CAMTEL) and its landing points are Kribi, Cameroon and Lagos, Nigeria (Agboje et al., 2017).

The submarine fiber optic cables connecting Nigeria to the world through Europe have a bandwidth capacity exceeding 27Tbps. Table 1 shows the details of the active international submarine fiber optic cable networks in Nigeria (Agboje et al., 2017).

Table 1: International submarine fiber optic connection in Nigeria (Agboje et al., 2017).

S/N	Cable	Distance (km)	Date Launched	Capacity (Tbps)	Landing Point	Owner in Nigeria
1	SAT-3	14,350	Apr-02	0.54	Lagos	NAT COM
2	Main One	7,000	Jul-02	4.96	Lagos	Main One
3	Glo 1	9,800	Oct-02	2.5	Lagos	Globacom
4	WACS	14,530	May-12	14.5	Lagos	MTN
5	ACE	17,000	Dec-12	5.12	Lagos	Dolphin
	Total capacity		Upgraded 2015	27.62		

Universities play an important national role in Africa. They are frequently the most effectively performing institutions in their countries (Echezona & Ugwuanyi, 2010). Staff and students of African Universities often lament the lack of current materials held in university libraries (Isaac, 2011). However, with Internet resources available and reachable, university students and faculties will be able to obtain information, which the institution library cannot provide from their shelves.

There are 74 private Universities in Nigeria, however, the majority of the universities' staff and students do not have access to the internet because of the ineffectiveness of the institutions' internet facility (Isaac, 2011). Nevertheless, the Association of African Universities (AAU) cautioned, "If our African universities fail to connect to the electronic network (Internet), we will have to face the fact that we will be awarding degrees of lesser quality" (AAU, p. 1) (Electronic Networking for West African Universities, 2015).

According to Quadri (2013), to allow more Internet users in Federal College of Education Library, Omoku, Rivers State, Nigeria, there is need to provide more computer workstation and dedicated bandwidth for library unit as against sharing resources with other units and colleges. If our universities are unable to adopt and employ the Internet as teaching and research resource, there is the danger that the digital difference between the developed and developing countries will grow even wider, as shown in the study of (Adomi, Omodeko, & Otolu, 2004, as cited in Isaac, 2011).

In Fountain University Osogbo, Internet facility presents such a substantial opportunity to enhance teaching, learning as encapsulated in the university

academic brief, as it plays a crucial role in meeting information, and communication needs of the generality of the university community. From the inception, the university has been driven by information and communication technology, which is a major trend in shaping global markets. This study aim at assessing and reviewing the challenges facing Internet connectivity and the way forward to improve it in developing universities in Nigeria in which Fountain University is one.

Methodology

In this study, data were gathered from records and documents retrieved from the ICT Unit of the university. Assessment through logs, diaries and documentation that were provided by the Head of the Unit along with the Internet network survey carried out all over the campus. A two-legged solution from the technical and the administrative perspective were provided after the assessment.

Findings and Discussions

From the information gathered through records and documents reviewed in the university, it was discovered that the institution has made a major investment in the provision of an Internet service. In an effort to improve on the quality of internet service within the university, the university has upgrades her internet bandwidth and has subscribed to different ISP such as GLO Nigeria, VDT Communications Nigeria and MTN Communications. Following this development, staff and students begin to realize the huge potential of the Internet as a tool for enhancing teaching, learning and research, a reflection of the importance of this service to student and staff.

The provision of an Internet access makes it possible for staff and students to access a wide range of information that is up-to-date during various activities such as researches, assignments and self-studies, which in this regard underpins the urge for better improvement of the present Internet connectivity in the university.

Arising from these facts, the followings enumerates the challenges that were found hindering the Internet service and connectivity of the university.

Technical Challenges

Network Geography: The location of devices for the campus area network and the structure of the buildings including staff offices, lecture halls, and students' hostels is a major challenge of Internet connectivity for its users in the institution. It was observed that, mostly, developing universities are enclosed with dispersed buildings in addition to a sloppy land topography. The effect of this is that Internet coverage penetration is diminished by building walls and trees that are situated close to each other.

Standby power supply: Power generation was observed to be an issue in providing uninterrupted Internet service on the campus. Internet facilities are powered by electricity that requires 24-hours electrical backup to prevent loss of Internet network. A good and reliable power supply will not only provide uninterrupted Internet services but also safeguard the Internet equipment from an electric power surge and prolong the life of the equipment.

Quality of the network device: Internet networking equipment might be small but are mostly expensive. Apart from the cost incurred in subscribing for Internet services from ISP, the provided service need to be distributed and broadcasted by network coverage devices. This is necessary to provide hotspot/Wi-Fi reception for the receiving users such as staff, students, and the university community as a whole. Because of the prohibitive cost of the broadcasting radios and access points, developing universities that could not afford high-cost equipment engage in purchasing

mid-range networking device hoping to serve their users because they are still developing and have small numbers of students and staff as the Internet users.

Decentralization of Internet access points: Multiple access points where Internet users connect their PCs and phones were a major issue of Internet connectivity because multiple points of Internet connection creates difficulties in managing the equipment at various terminals. A network administrator goes through a more complicated technique in monitoring if any of the Internet devices is switch off or tampered with at their location. In addition, it was observed that Internet radios interfere with each other when they are close to each other and operating on the same network frequency.

Administrative Challenges

We also look at the administration behind the internet service. The following were observed as factors that are needed to be thrashed for the improvement of Internet service and connectivity of a developing university.

Low Staffing: The issue of low staffing in Nigerian developing/private universities cannot be left out. ICT being a unit that manages the Internet service of an institution should be equipped with not only large but skilled and professional individuals.

Internet network tends to be challenging where network coverage devices such as access points, radios among others malfunction when they are powered on for days.

Inadequate Internet bandwidth subscription: Good Internet connectivity is supported by higher bandwidth. Developing universities in Nigeria are constrained by the cost of subscription for a higher Internet bandwidth, which in return affects their Internet connectivity activities. Having a good Internet coverage without a good Internet bandwidth is like having a tank of water with a small pipe diameter. Apparently, the effect of this is that the water passing through the pipe hole would not gush out due to the small passage it has. The same thing happens when there is a good Internet access but low bandwidth space.

Recommendations

After our fact-finding and in-depth analysis of the major setbacks of internet connectivity technically and administratively, the internet connectivity and performance at large can be improved by the following:

Technical Prospects

Repositioning of the Radios: Relocating the Internet radio broadcaster to a more centralized location at the centre of the campus. By doing this, Internet users will have a better reception of the Internet network irrespective of their location within the campus.

Provision of solar power and inverter batteries for power generation and backup: as highlighted as part of challenges in the findings above, power generation is a big issue that can be resolved by solar power technology. Solar energy as a source of electrical power can be use with inverter and power batteries. These batteries will be gaining frequent charging during the day but in the period of the solar outage, the power inverter will continue to produce electricity since it batteries had been duly charged during the day by the solar energy.

Procurement of quality networking devices: High-end network devices and equipment are recommended for the Internet distribution irrespective of the financial constraint of the developing institution. This is necessary because, at the long-term, quality devices will serve the purpose it expected to and there won't be a cause for changing or replacing the network devices after the university has been developed in future years' time. CAT 6e Cables are recommended for use to reduce attenuation. Networking cable tends to damage during years of usage and it will cost more to pull out the damaged cables since they might have been trunked underground.

Centralization of Internet access points: Installation of a high penetrating and long distance coverage wireless radio that will cover the whole university community whereby every Internet user will only see one available Hotspot networks will go a long way in reducing challenges of Internet connectivity. Internet radio interference, multiple access point management and others will be abridged. Imagine a situation where 75% of the Internet users

such as staff and students are connected to one broadcasting access point and receiving a good Internet access, the remaining 25% who make complains to the etwork administrator will mostly be considered as having a connection issue resulting to either their PCs or mobile phones in which they are using. The network administrator will know where to start his or her troubleshooting at this event.

Administrative Prospects

Employment of skilled IT staff: Internet connectivity issues are difficulties encountered when Internet users attempt to connect to a university or community hotspots. The connectivity problem may arise from a minor fault or unforeseen that ought to have been resolved earlier if the network administration is managed by skilled technical staff at a minimum number of three. One which will serve as a network administrator who will foresee unanticipated Internet issue, monitor the flow and data traffic, IP leasing and conflict, applying the different constraint, forwarding complaints to the ISP and many more to improve the Internet network and connectivity. In addition, the two of the available technical staff can function as a network supports staff who will move around the university campus to resolve issues encountered by users i.e. staff and students inability to connect to the Internet, assist in providing maintenance, daily check-up of the hotspot terminals if there are any power failure or hardware malfunctioning. By doing these, it will not only assist the novice Internet users but also the advanced users as they also encounter Internet connectivity issues.

Subscribing for a higher Internet bandwidth: Internet bandwidth subscription from Service Provider should be adequate for the immediate Internet users (staff, students and the university community). Taking Fountain University as a case study, the university which has a population of over three hundred concurrent internet users, an estimate of 155Mbps and above is required to complement the Internet coverage on campus and hostels.

In addition to the above prospects, internet access and connectivity could be improved at large by conducting network and power audit, proper IP provisioning through The African Network

Information Centre (AFRNIC), and deploying wide access coverage with fibre optics connection.

Conclusion

Most private universities still lack effective Internet distribution, which has hindered the automation of paperwork, memoranda, minutes of meetings, and communications within the university. Inadequate fund to set up Internet facilities for most private universities that will be satisfactory for its proposed users is still a major constraint. Notwithstanding, more funds should be provisioned for the NOC / ICT Unit of the university. Internet infrastructure in this part of the world is costly and to have the best, it will require more funds invested.

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