THE NIGERIAN RESEARCH AND EDUCATION NETWORK (NGREN) – PROSPECTS AND POSSIBILITIES FOR THE UNIVERSITY LIBRARY

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Abstract

Universities and other higher educational institutions have a responsibility of providing an enabling environment for research and learning. This entails the provision of, among other infrastructural requirements, access to current trends in research in every field of learning as may interest the members of the serviced community. This cannot be fully achieved without collaboration and synergy between these institutions and their contemporaries, both locally and internationally. This article x-rays a vital aspect of this collaboration in the form of a research and education network (REN), especially as it applies to the Nigerian educational institutions in general and their libraries in particular. Particular emphasis was made on the Nigerian Research and Education Network (NgREN) – its origin, incorporated services and current state of implementation. It also explores how the library and its management could maximally exploit its availability in order to deliver a robust resource base for the members of the university community. This is geared towards world-class research and learning experience.

Keywords: NgREN, REN, University Library, Education Network, Research Collaborations, NUC.

Introduction

Research and learning is mainly the reason for the establishment of institutions of higher learning especially the university. A good educational institution therefore must, as a matter of obligation, keep abreast of the current findings in all areas of research which are of interest to its community. It must in the least, boast of having a fairly up to date collection of documented research findings and publications from its locality and region; but this would only make it a local and limited knowledge store. An institution which is limited and local, resource-wise, is unhealthy for its members and will ultimately breed limited and local researchers. To be current and to compete favourably on a global stage, researchers are compelled to increasingly demand for advanced services and stronger networks most of which are very expensive or critically scarce. These demands could sometimes be beyond the reach of some institutions due to the amount of resource and fund required for all of such services.

In order to forestall such unsavoury situation, institutions of higher learning and research have over time learned to synergize in order to share resources, and be acquainted with happenings with their 'neighbours'. They create linkages, they create collaborations, and they create networks. One of such networks is called the Research and Education Network (REN).

Research and Education Network (REN)?

A Research and Education Networking (REN) is the provision of computer networks for interconnecting research and educational institutes in order to facilitate exchange of information for research and teaching purposes. In other words, it is the interlinking of educational and research institution with computer networks for the purpose of sharing of information among them which would aid learning and research. They can exist at local and regional levels, although in most countries they are formally organised as National Research and Education Networks (NRENs). (GEANT Association, 2017). NRENS originated in the 1970s as a product of the search by academic researchers to find efficient and cost effective ways to share scarce, expensive computer resources, to communicate and to collaborate (Twinomugisha, 2006).

A National Research and Education Network

(NREN)refers to organizations engaged in the designing, building and managing of physical telecommunication network specifically for education and research purpose and use by education community (Twinomugisha, 2006). It is a specialised Internet service provider dedicated to supporting the needs of the research and education communities within a country.

NRENs provide connectivity and services to higher education establishments (typically universities) and research institutes, but can also support schools, Colleges of Education, libraries and other public institutions. In some cases, services may be provided to government and healthcare sectors as well (GEANT Association, 2017). It can provide the latest and fastest communication services and comprehensive access to state-of-the-art applications and resources available digitally within and outside of the country. This is required for quality learning and research.

RENs are increasingly becoming a vital and integral part of the educational institutions worldwide. According to Khan (2006), between 1990s to date, the Internet transformed from being used just as an auxiliary service to becoming the 'central artery' in the running of modern universities and research organizations. There are over 100 RENs across the globe (GEANT, 2016). Figure 1 shows a map of known operational RENs across different countries of the world.

Benefits of REN to a Country

The 'island' mode of operation of some institutions prevent them from benefiting from resources or equipment owned by some of their contemporaries, largely because there is no avenue for sharing them. Some specialized laboratory equipment which are essential for research are beyond reach to some institutions because of their prohibitive cost. A REN can become the catalyst of multiplication to whatever each institution owned by giving them access to much more from other institutions. For example, through the REN, a piece of research equipment existing in one of the institution could be shared, through collaboration, with other connecting institutions to aid their research activities.

A REN provides a unique opportunity for universities and other institutions to close knowledge gap with other institutions across the globe. Without a REN most research institutes and higher education establishments within a country will be disconnected from each other and would remain stagnant while their colleagues elsewhere would be advancing via

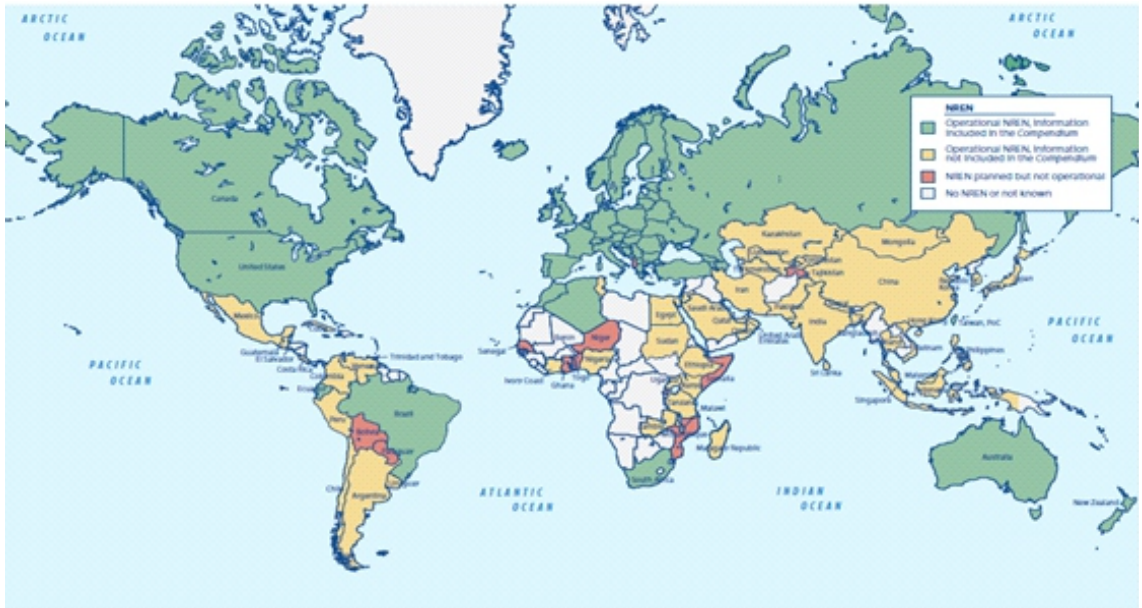

Figure 1: NRENs known to be operating in different countries (GEANT, 2016).

collaboration assisted by ICT.

Most universities or research institutes have an enormous collection of trending research documentation lying around in libraries. Via collaboration, industries and universities can put those ideas to work to solve local and national problems. Developing countries may also loose rights on its intellectual resources without the REN.

With a REN also, economies of scale could be applied in the acquisition of resources. Collaborating institutions could pool resources together to acquire resources like bandwidth, subscription to e-resources, software licensing and so on at cheaper rates than if they were purchasing alone.

Services on a REN

One significant thing about a REN is that once the infrastructure is in place, it enables connecting institutions to take full benefit of ICT and therefore a whole new range of services and applications can be instituted. Major services which can run on typical RENs include(NgREN Team, 2013):

Network & Connectivity Services viz:

- Basic IP address allocation (Local Internet Registry)
- Procurement of bandwidth
- DNS services
- Network Support services (help desk, network monitoring, etc)
- DNS Registration Services

Security Services – these could include:

- Computer Security Incident/Emergency Response Team (CERT) – consultations, reporting security incidences, capacity building, etc.
- Anti-virus, anti-spam control.
- Intrusion prevention

Authentication Services – services here include:

- Authentication & Authorization Infrastructure (single sign on for all applications/services)
- Identity management systems
- Public Key Infrastructure certificate service
- Server Certificate Services
- Education Roaming (EDUROAM) Services

Storage and Hosting Services

- Co-location services
- Web hosting
- E-mail services
- Back up services
- Disaster recovery – off site back up services
- Storage Area Network (SAN) – infrastructure
- Hosting services/applications for research and educational community (for Subscribed e-resources, digitized contents, students' portals, research information index, etc).
- Streaming facilities *(streaming server, podcasting, point-to-point facilities, video on demand)*

Network Communication Tools & Conferencing

- Videoconferencing
- VoIP / IP-Telephony
- Mailing list services
- E-Mail gateway services
- Search Engines

Network Computing Resources-

Access to super computers, large databases, digital repositories, specialized software, research instruments, world-wide expertise, grid computing.

E-Learning / Tele-teaching /e-research

- Virtual Learning Environments (VLE's)
- Digital Repositories
- Distance learning

User interaction - Knowledge Dissemination

- Consultancy and advise
- Training: workshops, seminars
- User (advisory) groups /forums
- User conferences

1. The Nigerian Research And Education Network (NgRen)

In recognition of the critical role that research and education plays in the development path of an education system, and indeed a nation state, the National Universities Commission (NUC) in

partnership with the Committee of Vice Chancellors of Nigerian Universities, CVC, sought to establish a foundation that would ensure that universities could communicate, collaborate, access and share resources across national and international boundaries; primarily for the purpose of research and learning but with added capabilities to offer the efficiencies of unified communications and consolidation of digital content. (Nigerian Research and Education Network, 2017)

It was against this backdrop that the Nigerian Research and Education Network (NgREN) was incorporated, as a Private Company Limited by Guarantee (RC 1011289) on the 21st of February 2012. It was positioned to provide connectivity infrastructure for efficient service delivery to its members and to assume full legal and technical responsibilities to the Internet Corporation for Assigned Names and Numbers (ICANN) and the African Network Information Centre (AfriNIC) while operating under the guidance of the *Companies and Allied Matters Act, 1990,* as amended in 2004. (Nigerian Research and Education Network, 2017)

NgREN Implementation

So far, a number of these REN services have already been fully implemented in NgREN, They include:

i) Network and Connectivity Services – Under this service implementation, the 27 federal universities in Nigeria were connected (in the first instance) through fiber optics (last mile microwave) connection delivering an STM1(155Mbps) Internet bandwidth. The NgREN also acts as a local IP Internet registry for connecting institutions and offers DNS and network support services.

ii) Security Services - The Network Monitoring Center (NMC) of NgREN has Computer Security Incident/Emergency Response Team (CERT) which monitors and reports security incidences on the entire network.

iii) Network Communication Services – Installed on all the connecting institutions (27 in the first instance) is a video conferencing equipment for video correspondence, remote teaching e-learning/tele-teaching and user interaction/knowledge dissemination among the universities. Also implemented under this service are the mailing list services, email gateway and the Voice over Internet Protocol(VoIP) services.

Storage and hosting services, authentication services and network computing resources (especially digital repositories) are still under implementation across some of the connecting institutions.

Benefits to the University Library

The library, being a place for assemblage of resources for use by the public or members of the university community, is expected to be at the forefront of the campaign for full integration of the REN in the university because of its obvious advantages to the university generally, and the library in particular.

- Firstly, having a fully operational research and education network in the university would imply that the collective resources resident in all the institutions connected to the REN would be available for the library and its users. This includes all the digital contents and e-books in all the member institution's library and all the published works (including project reports, thesis, dissertations, journals and other articles) in those institutions.
- The contents already existing in the library could also be backed up using the Storage area network infrastructure of the NgREN to an offsite destination as a disaster recovery system.
- Also available for the library through the REN are subscriptions to varied e-

resources which could be acquired at a much cheaper rate if resources are pooled together by connecting institutions. This saves funds, guarantees sustainability and has potentials for additional 'treats' and 'add ins' accompanying these subscriptions having been bought en-bloc.

- Another key benefit of the REN to the library is the available cheap and sustainable Internet bandwidth acquired through pooling together of resources. Again this comes from the advantage of bulk purchase using pooled resources. Hence one receives better deals at unbeatable prices.

How to Get Involved

For the library to benefit maximally from the opportunities offered by the NgREN, a few things need to be on ground.

i) A robust and comprehensive Local Area Network (LAN). Since the NgREN is basically a network based service, the library must have a robust and comprehensive local area network to be able to fully utilize the potentials in the network. With a well laid out LAN, the services on the REN can easily be accessed by users in the library. These include the robust Internet service, the resources made available by networked institutions, the subscribed services, the video conferencing and VoIP services, and so on. All these 'ride' on the network and without a good LAN, a bottleneck would easily develop when users try to access these services. This would make user experience less than desirable.

ii) Robust digital content. A library joining a REN should not just 'feed' on the resources of other connecting institutions. It should also bring its own digital contents in order to be an active and responsible member of the community. This enhances the rating of the university while projecting the rich research culture of the university community. Therefore, part of how to get involved is to build a strong repository of digital contents from researches and other works from the university community.

iii) Collaborate. Videoconferencing services enable users to collaborate over long distances. With the NgREN, distant learning could be made available to members of the university community. Hence it becomes easier to glean from the wealth of knowledge of renowned experts in academic fields without necessarily travelling the long distances which may separate them from the intending audience. Library management could begin to utilize this medium to deliver lectures/tutorials in fields of choice making, use of professionals in the field from anywhere in the world.

iv) Negotiate. Applying the economies of scale, the library management could collaborate with the management of other institutional libraries across the network in order to pool resources together and access subscribed resources and licensed software at a reduced cost. This would save a lot of funds for the management; hence enable them to purchase more resources with the limited fund available.

v) With a well-structured REN and rich repository, members of the university community do not need to be in the library physically to access their desired research materials. Riding on the identity federation and EDUROAM services, researchers

could access the contents of both their library and other connecting libraries from any of the connecting institutions in the country and beyond. This puts a lot of flexibility and mobility in the access of stored content.

Conclusion

The Nigerian Research and Education Network (NgREN) offers ample opportunity for collaboration and sharing of resources through its internetworking of various higher educational and research institutions in the country. It can enable the library and indeed the university to achieve more with less. It opens doors of opportunities and access to almost unlimited resources available due to the pooling together from various universities, research centres and other institutions of higher learning in Nigeria of these invaluable works.

It is recommended therefore that the university library and its management, apart from putting in place the necessary infrastructure required to 'tap' into the opportunity posed through the NgREN, should rally with their colleagues in other higher educational institutions to identify sharable resources within their keep and plug same into the network in order to maximise the potentials afforded by the network.

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