NREN IMPLEMENTATION IN WACREN ZONE: A COMPARATIVE STUDY OF MALI & NIGERIA RENS

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WACREN 2019 Conference ACCRA - GHANA

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MaliREN
Réseau National d'Education et de Récherche du Mali

NgREN
The Nigerian Research and Education Network

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INTRODUCTION 1

- Over the years, Research and Education Networks (RENs) have matured significantly in various countries as a sustainable solution for ICT needs of Higher Education Institutions (HEI). Generally, a REN organization owns and administers a high performance national backbone network interconnecting all member campuses; thus, National Research and Education Network (NREN) is the interconnection of research and teaching focused institutions that are engaged in making use of scarce resources to offer adequate solutions for the purpose of realizing their set organizational goals

INTRODUCTION 2

In addition to the high speed, reliable, and affordable internet it affords, an NREN's unique and secure network between member institutions provides both a new communication avenue and a pooled technology platform in a hands-on link between cutting edge scientific research, new technologies, and entrepreneurship ideas and business plan development. Furthermore, its organizational body functions as yet another connector institution aiming to facilitate information and learning exchange between disparate entities.

METHODOLOGY

This research has adopted an interpretative approach within a multi-level Case Study context. To gain wider and rich context, this research has investigated NREN implementation in two member countries of West and Central Africa Research and Education Network (WACREN) namely Mali and Nigeria using a comparative analysis template developed by the authors from both NREN, MaliREN and NgREN.

NREN CREATION 1

MaliREN
The initial concept of an education and research network in Mali dates back to 1999. However, MaliREN in its actual structure was created in 2012 by public universities and research centers. The implementation of the Mali Government PADES project to support higher education with funding from the World Bank stressed in 2015 the necessity to rejuvenate MaliREN as a tool to enhance the quality of higher education. Thus, MaliREN with support from PADES is now progressively striving to implement the network.

NREN CREATION 2

NgREN

As MaliREN, the Nigerian Research and Education Network (NgREN) was incorporated as a Private Company Limited by Guarantee in 2012 with the mission "To provide state-of-the-art, high speed, efficient and affordable network infrastructure and services in aid of innovative research, communication and collaboration by member institutions

PROPOSED SERVICES BY THE REN

MaliREN Proposed Services

- High speed Internet
- Development Program
- Consulting Services
- Training
- Community building
- Identity Management
- Security Services
- Anti-spam filter
- Mail Relay
- Eduroam

Innovation projects
Registrar of domains
Data Centers services
Network Services
Communication Services
Institutional Applications
Data Management
Web hosting
Email
CSIRT services

PROPOSED SERVICES BY THE REN

In general, MaliREN policy is that services available in the market at reasonable rates are outsourced. For example, email for students, and even for staff, can easily be outsourced to an external company like Google

PROPOSED SERVICES BY THE REN

NgREN

The NgREN policy documents stated the followings as the key services that will run on its Network:

- High definition multimedia conferencing services delivering country-wide virtual conferencing.

- Collectively purchased of internet bandwidth delivering superior economics and significantly enhanced quality. Also as Local Internet Registry (LIR), NgREN has a mandate to acquired and issued IP address pools, ASN on behalf of member institutions

- 155mbps last mile connectivity to each member institution, in the first instance.

PROPOSED SERVICES BY THE REN

- Enterprise applications such as storage, web-hosting, email (spam filtering) leading to unified communication (email/ phone access for ALL students and faculty should be a base-metric for ICT status).

- Security, access & authentication management infrastructure (AAI), packet shapers, firewalls, distributed caching, Edu-roaming, multi-casting, VPN, bandwidth on demand, etc. to improve the overall network service.

- Digital Library Consortium, leading to a better purchasing power of electronic resources for libraries.

BUSINESS MODEL

MaliREN Business Model

The financial model proposed for MaliREN is based on the followings:

- Members fund MaliREN operational expenses (OPEX);

- Membership fees which depend on the bandwidth that is provided;

- IES current budget for external connectivity will be maintained and be located to MaliREN;

- Donors and government funding will be used for investment and training.

BUSINESS MODEL

- **NgREN Business Model**

The business model described for MaliREN is very similar to that of NgREN, although some few issues emerged in Nigeria as a result of the nature of operational status of NgREN.

BUSINESS MODEL

Nigerian Research and Education Network
Membership subscription fee

Initial one off cost

S/N	ITEM	AMOUNT
1	Router	₦500, 000.00
2	Microwave Radio	₦ 1,000,000.00
3	Connecting to Telco PoP	₦ 1,500,000.00
4	Mast (OPTIONAL)	₦ 300,000.00
5	Videoconferencing end point & Display (OPTIONAL)	₦ 7,000,000.00
6	Repositories and Identity Federation Equipment and setup (OPTIONAL)	₦ 4,620,000.00
	SUB-TOTAL	₦ 14,920,000.00 or ₦ 14,620,000.00 without mast or ₦ 3,000,000.00 without optional items

* Items 1-5 is not applicable to the 27 Universities already on the network, except those that require more than 1-STM microwave radio (item 2)

Mandatory annual services options (in Naira)

	Category A	Category B	Category C	Category D	Category E
Bandwidth	22,000,000.00 STM 1 (155mbps)	15,028,463.00 2 x DS 3 (90mbps)	8,516,129.03 DS 3 (45mbps)	3,275,434.24 15Mbps	2,365,591.40 10Mbps
Network and Connectivity	4,950,000.00				
Security Services	1,000,000.00				

Optional annual services (in Naira)

Ebsco host journals	6,000,000.00
Elsevier/ Sciencedirect journals	6,000,000.00
Hosting (web hosting, DNS)	50,000.00
IP telephony platform	1,000,000.00
Repositories and Identity Federation	1,000,000.00
Storage services; high performance computing	Not yet available

COMPARATIVE ANALYSES OF MALIREN AND NGREN

Legal Form of the NREN

1. MaliREN: Public Interest Association

2. NgREN: Private Company

COMPARATIVE ANALYSES OF MALIREN AND NGREN

- **NREN Services**

MaliREN and NgREN are proposing almost the same set of services to their members. However, out of the 20 services proposed by the two NREN, NgREN is currently providing 40% of them.

MaliREN which is yet to be operational is currently focussing on providing training and awareness services to its members.

COMPARATIVE ANALYSES OF MALIREN AND NGREN

Network Structure and Architecture

The network architecture of both NREN is based on MPLS and use mixed transmission technologies. Moreover, both NREN are centralised architecture and they both use multihomed Internet.

COMPARATIVE ANALYSES OF MALIREN AND NGREN

Type of Members Institutes Accepted by the NREN

MaiREN and NgREN has similar type of members. However, MaliREN is open to private universities, research centers while NgREN does not accept private institutions to its network. Furthermore, MaliREN is open to fundamental and high schools as well as to public and private hospitals. NgREN is limited to Universities and research centers

CONCLUSIONS AND FUTURE WORKS

This paper has discussed the evolution of NRENs implementation in two-member countries of WACREN which are Mali and Nigeria. The evolution of the two NRENS reveals very promising direction despite all their implementation difficulties.

CONCLUSIONS AND FUTURE WORKS

- We recommend that governments give more attention to NREN; if these networks are well established and operational, the quality of education and research will be enhanced to an excellent level.

- In our future works, we plan to investigate the implementation of NREN in WACREN and ASREN zone as well as Ubuntu Alliance region.

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QUESTIONS?