

# Neutralizing the Demand and Costs of Bandwidth Connectivity in the East African Universities

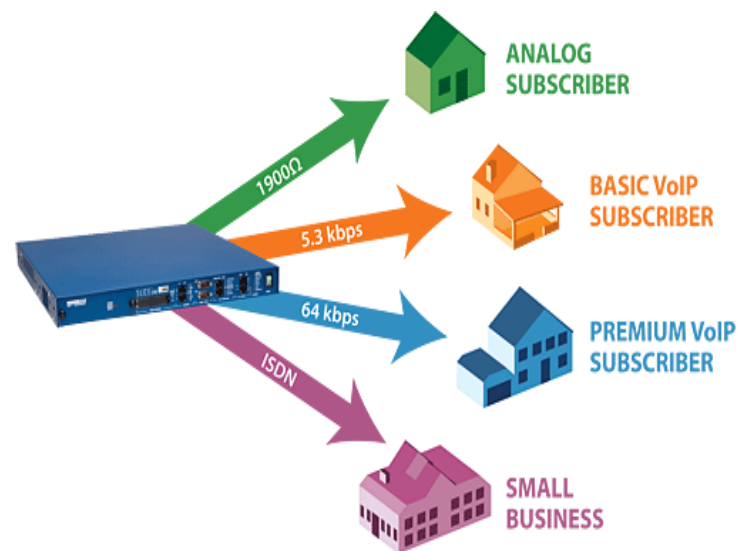
## EXECUTIVE SUMMARY

Institutions require integration of ICT in daily activities of administration, research, teaching and outreach services to community. Technology advancement has allowed educational activities to be undertaken ubiquitously through the internet connection. These types of activities call for provision of more bandwidth, which happen to be expensive in particular in the East African region. Several factors contribute to high bandwidth prices one of them being lack of affordable distribution networks to universities in the region. Most of the East African countries do not have private or public national backbone networks to extend access to major towns and cross-border let alone the distribution in the landing towns. The highest cost components are due to national distribution network and the last mile connectivity to universities. International bandwidth prices have fallen to under \$50 Mb/s for a typical NREN. Strategies to strengthen NRENs and reduce costs for national distribution network and the last mile connectivity to universities could have a significant impact on reducing the price of bandwidth in East African universities. It is recommended that the Inter-University Council for East Africa (IUCEA) promotes NRENs in the region, in terms of regulatory support and in funding capital development of their networks as well as human capacity development.

## THE CONTEXT

The demand for high speed Internet connectivity in EA region has been rising in recent years due to the increasing need to integrate ICT in the day-day activities of administration, research, teaching and consultancy. This has called for provision of more bandwidth. However the cost of bandwidth within the East African region is still high. This has curtailed the effective integration of ICTs in educational activities. Working in isolation to acquire bandwidth, low level of usage of internet, poor infrastructure, improper usage of the bandwidth, lack of subsidies from governments and telecom regulators, lack of affordable distribution networks to universities in the region, lack of private or public national backbone networks to extend access to major towns and cross-border all combine in different proportion to increase cost of bandwidth. With the exception of Kenya that has both private and public distribution networks that could be used to distribute undersea bandwidth to universities, other countries within the region lack such infrastructure. This has kept bandwidth prices high especially for rural universities.

Undersea Optical fiber cables that landed on the East African coast in July 2009, have provided



increased bandwidth to EA universities. Consequently, many EA universities have increased bandwidth capacity by two or three times in the period July 2009 to November 2010. Even if this is the case, the cost of bandwidth within the region is still high as compared to the rest of the world.

Table 1 shows the reduction in the average price of bandwidth for universities in the five EA countries.

**Table 1: Average price of bandwidth for universities in five EA countries in 2008 – 2010 period**

Country	Average BW prices per meg per month before arrival of undersea fibre optic cable(US dollars) 2008	Average BW prices per meg per month upon arrival of undersea fibre optic cable(US dollars) July 2009	Average BW prices per meg per month after arrival of undersea fibre optic cable(US dollars) November 2010
Burundi	1,100		
Kenya	3,000	1,200	400
Rwanda	3,000	1,400	200
Tanzania	9,333	2,400	750 to 1,200
Uganda	2,300	900-1,500	520 – 800

We note however that EA universities have significant Internet budget constraints even with the reduced prices. This means bandwidth prices need to fall significantly in EA for the full impact of undersea bandwidth to be translated to broadband connectivity defined as at least 5 Mb/s per 1000 students in recent EA e-readiness study conducted by KENET. This necessitates the need to develop common regional approaches/strategies for reducing bandwidth costs. A study was undertaken to establish approaches for reducing bandwidth costs with the East African region. Information was collected from NRENs about the situation of connectivity in the member universities and current initiatives for reducing bandwidth price. Also 1-2 universities were visited to verify the information provided by NRENs. Communication regulatory authorities were also visited to collect further information concerning bandwidth connectivity.

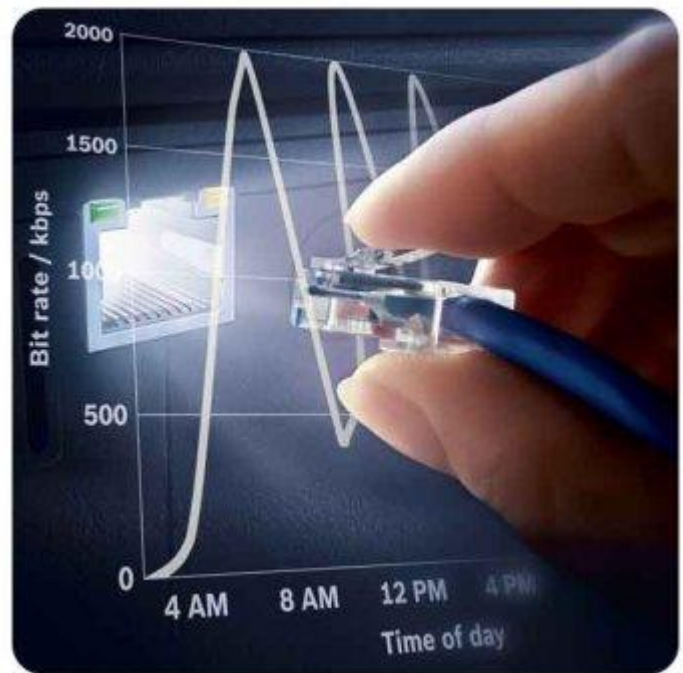
## FINDINGS

Five major findings emerged from the study;

- i. East African Partner States have established NRENs including: RENU, KENET, RwaNET and TELNET. These networks have the mandate to among other things, mobilize universities in their respective countries to acquire ICTs such as bulk bandwidth. As compared to other international research networks, the East African NRENs are yet to fully fulfill their mandates.
- ii. NRENs in East Africa are still working in isolation. There exists no umbrella body to coordinate their activities for the purpose of further reducing bandwidth cost. Infeasible Rights of Usage (IRU) capacity from the undersea cable providers is still low due to isolated subscriptions from individual NRENs. This has resulted into a high unit cost of bandwidth acquisition.
- iii. There is poor usage of available bandwidth within the universities emanating from poor infrastructure, unsecure networks, improper use ICT systems and lack of awareness on effective use of bandwidth.
- iv. Funding for bandwidth in many universities is still inadequate. However, there exist numerous initiatives that can be tapped into to fund the acquisition of bandwidth for universities. Some of these include universal/rural access funds from telecom regulators.
- v. A number of universities have one form of connectivity. This creates intermittence in connection whenever faults occur with sole provider. This affects the effective working of the different stakeholders within the universities.

## POLICY RECOMMENDATIONS

- I. **Universities should adopt multiple connectivity approaches:** currently there is a national distribution network that connects most of the large universities in East Africa. However, there are still many universities that might not be directly connected on the core network especially small teaching universities in the rural areas of East Africa. It is estimated that 25-40% of the universities fall into this category and yet they need connectivity. The bandwidth requirements in such universities are often relatively low. Therefore non-fiber access strategies would be sufficient to provide the required connectivity. The multiple connectivity within the universities would allow easy switch from one connection to another in case of an emergency.
- II. **Strengthen the National Research Networks (NRENs):** East African Partner States have established NRENs that are aimed at, among other things, mobilizing universities to form consortium for bulk bandwidth acquisition. However, the NRENs are still weak in their mandate of acquiring and providing cheap bandwidth for the universities. Strengthening NRENs would therefore translate directly into reduced bandwidth cost for universities.
- III. **Constitute a regional consortium of NRENs for international connectivity:** Universities should purchase Indefeasible Rights of Usage (IRU) from the undersea cable providers as consortiums. East African countries have already established NRENs through their universities that enhance service provision in several aspects. Therefore, a regional consortium bringing together all NRENs within East Africa should be formed to increase the IRU capacity and therefore reduce the unit costs. This will help to raise awareness on the importance of national and regional educational and research network and hence attract support from the Government.
- IV. **Establish funding to promote ICT usage in universities:** Reducing the cost of the national & regional distribution networks depends entirely on the usage by the stakeholders. The consortia of universities each have strategies that ensure that they are part of the national, regional, and global research and education networks. However there exist no regional strategies that promote the proper usage of ICTs including the available bandwidth. Establishing ICT advocacy and ICT readiness sensitization and research studies to promote proper ICT usage by stakeholders in education, research and management can make a difference.
- V. **Tap into existing universal/rural access funds:** One of the ways to reduce the cost for Last Mile Connectivity is through tapping into interventions by the communications regulators. One of the interventions provided by communications regulators is the universal/rural access funds meant to



provide connectivity to rural areas. These funds can provide last mile connectivity to universities. The cost of last mile connectivity reduces as the universities to be connected increases. This is because all such links attract operations and maintenance charges that decrease with large number of institutions. Through the regulators, NREN can be recipients of universal access funds or rural access funds when connecting institutions in rural areas. Universal/rural access funds to subsidize bandwidth costs in higher education institutions need to be availed through the regulators.

- VI. **Universities should adopt multiple connectivity approaches:** currently there is a national distribution network that connects most of the large universities in East Africa. However, there are still many universities that might not be directly connected on the core network especially small teaching universities in the rural areas of East Africa. It is estimated that 25-40% of the universities fall into this category and yet they need connectivity. The bandwidth requirements in such universities are often relatively low. Therefore non-fiber access strategies would be sufficient to provide the required connectivity. The multiple connectivity within the universities would allow easy switch from one connection to another in case of an emergency.

This policy brief is based on the report of a study on “Instituting Common/Regional Approaches/Strategies to Reduce Bandwidth Costs”. It was part of the MRCI project entitled “Enhancing the Capacity of East African Universities to Utilize ICT for Sustainable Regional Development”, being implemented by the Inter-University Council for East Africa.

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