Impact of New Undersea Fiber Capacity in East Africa and Barriers to KENET in supporting Science and Science Collaboration

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Transforming Higher Education Using ICT
Impact of New Undersea Fiber Capacity in East Africa
Pre 2009 (before Fibre)

- 100% satellite connectivity
- Very expensive – prices starting from $2,000 per Mb (Megabit) up to $12,000 per Mb
- In country fiber was available but expensive local loop and not far reaching
- In Kenya, only one strong PDNO (KDN) and UTL for Uganda
- In Tanzania, Tanesco (Power company) and TTCL but not much reach, several small ISPs with own fiber
Pre-2009 prices (VSAT)

- Kenya – starting from around $ 2,000 – 3,500 USD per Megabit for one to one contention
- Uganda – similar, around $ 2,100 USD per megabit 1:1 to 3,500 USD
- Tanzania much more expensive – starting from 4,000 USD but could go as high as $ 12,000 USD per megabit
Undersea Cables landed in June 2009 and June 2011

- SEACOM reaches Kenyan port of Mombasa and activates in June 2009
- TEAMS completes link from Kenya to Fujairah and activates in July 2009
- SEACOM cheaper per Megabit for the ISPs, London IP Transit about $4 USD per Mb/s for KENET, Fujairah IP Transit around $50 per Mb/s
- EaSSY ready in 2010 in use in some countries but no direct transit
NREN bandwidth pricing in EA

- **Uganda** - Current pricing of 1 Mbps around $500
  - RENU in Uganda continues to negotiate better prices

- **Kenya** is between $200 (urban) to $450 (rural) per Mb/s
  - KENET strategy is to use flat pricing for all institutions independent of Geographical location

- **Tanzania** – Institutions paying between $1,000 and $2000 per Mb/s in Urban areas!
  - TERNET plans to reduce that to about $300 per Mb/s when institutions are connected to STM-1 SEACOM capacity
NRENs in EA

- RENU building infrastructure using funding from USAID
  - Has negotiated a bandwidth price for consortium
- EtherNET in Ethiopia – most universities connected by ETL fiber but no connection to UA!
- SUIN in North Sudan – fiber for universities and a shared STM-1 link provided by operator. Price is at $150 per Mb/s
- TERNET has a STM-1 link to London but only 3 institutions connected.
- KENET has 3 x STM-4 (TEAMS/SMW4) and 1 x STM-1 SEACOM all to London UA router
  - Connecting about 90 campuses and over 220,000 students
Barriers to KENET in supporting Science and Collaboration
Cost of bandwidth for faculty and researchers

• Bandwidth is FREE for faculty and researchers on campus!

• Only problem is campus access and the bandwidth available per PC

• Scientists working outside campus have access to 3G mobile Internet near urban areas or Edge in rural areas

• Challenging for NRENs to serve distributed clusters of scientists in rural areas
But Internet Availability in Campus Networks limited

- Some current campus Networks need to be upgraded and re-designed for high-performance
- Not all scientists and faculty have access to networked PCs in their offices or labs
  - Less than 10 networked PCs per 100 faculty members in EA!
- Challenges with retention of high-end ICT talent to design and support advanced campus networks
- Blame put on the NREN for poor services on campus!
- NREN often called in to solve internal network problems
Scientists are highly distributed

- Scientists are often stationed in remote areas (ie far from the capital city Nairobi)
- Penetration in those areas is often poor
  - Even big Mobile operators do not reach these areas with 3G speeds due to lack of enough population to justify the service
- No metro fiber in most of the urban towns in EA and limited last mile fiber spurs to institutions
- Leased last mile radio links expensive
  - About $6,500 installation cost per last mile link and over $400 per Mb/s per month recurrent charges
Scientists are highly distributed Cont'd

- Connected research institutes often have 20+ remote sites
  - Kenya Agricultural Research Institute has many remote locations where scientists work; reach only by 2G Mobile Internet.

- Building a WAN for each university or research institute expensive!
  - Scientists outside the main campuses therefore not NREN network (AS#)
Unregulated leased line prices

- Institutions often do not distinguish between the NREN and ISP
  - Both provide basic connectivity and only price matters
  - Many members only interested in commodity traffic, do not understand the benefits of an NREN
- Leased line prices are unregulated although there is competition in Kenya
  - But competition in IP bandwidth provision
  - Leased line prices often bundled with IP bandwidth
Last mile connectivity still expensive and unreliable

- Undersea fiber connectivity has solved international capacity requirements but local fiber connectivity still very expensive
- More expensive to connect locally than to connect internationally
  - KENET does not include financing of international links in pricing, only O & M is less than $50 per Mb/s
  - Commercial operators factor financing costs which are very high in Kenya (interest rate > 15%); lowest commercial prices about $250 per Mb/s
- Local fiber infrastructure still not reliable and backup links increase costs of connectivity
  - Fiber cuts with road construction common
  - Cable vandalism also happens
Difficulty in supporting distance collaboration

- African peering done in Europe, African cross border links none existent
- Latencies to NRENs in Asia and North America rather high
- IRU costs are high, at least $500,000 USD for STM 1 to Europe
- Links congested with commodity traffic, no NREN only links to Europe at the moment
- Cross border links priced similarly or higher than IRU Europe links!
KENET attempting to solve connectivity and reliability issues

- Buying a fiber ring to cover major Universities
- Backup radios being installed for remote sites
- Backup links from variety of providers being done for critical sites
- More international capacity being purchased and dropped in different POPs
- But all very expensive solutions, KENET bearing most of the costs
- Members have maintained their budgets since 2009!
Thank you!

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Q&A

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