KENET

Kenya Education Network

National Research and Education Network for Kenya

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Governance and Operations

• Kenya Education Network Trust (KENET)
  - Trustees - 5 VCs, MD of Telkom Kenya, DG of CCK, PS, Education
  - Management Board representing Trustee VCs and research institutions
  - (ICT directors or senior ICT faculty)
  - Secretariat with a CEO “donated” by a member university (USIU)

• Licensed as Alternative Networks Operator by CCK
  - All license fees waived by the regulator since inception
  - International gateway license

• Provides Internet services in partnership with commercial operators

• 42 member institutions; 130,000 students + 17,000 staff members
KENET Secretariat

- 8 IT professionals permanent staff
  - 2 to 3 IT Interns at any one time from member universities
- One accountant and one administrator
- One CEO
- Physically hosted by the University of Nairobi in the Jomo Kenyatta Memorial Library
- Moving to USIU
What KENET offers to members

- Bandwidth services
  - At negotiated prices
- Services – mail hosting, backup, web hosting, setting up of custom servers, DNS Record hosting, monitoring for all connected hosts
- Server co-location
- Technical training of member technical staff
  - Bandwidth management training
- Network support and design
Current KENET NoC

- One NoC in Nairobi
- All services running on open source
- Cisco routers used for routing, BGP sessions with both uplink providers
- Colocates some elearning servers
KENET NoC cont'd

- Hosting the mirror.ac.ke which contains FOSS software available for free download
- Recognised by OpenOffice.org as the mirror for Kenya

- Provides link to KIXP to improve access to local sites (18 Mb/s)

- This link to KIXP also provides access to Google Apps Gmail accounts for Universities

- Web hosting and Email hosting for several Universities and institutions
KENET Early Network
Old Infrastructure

- **International Satellite bandwidth**
  - Access via local leased lines connected directly to Jambonet (Internet services operator)
  - In some case DVB satellite with uplink via KENET POPs or Jambonet POPs

- **Distribution Infrastructure used local leased lines**
  - No control – network owned by the Telcom and they offer no SLA

- **KIXP and some campuses connected using wireless links**
  - Not viable for far away institutions

- **Last mile for 4 member institutions via digital microwave radio installed in Telkom network in year 2002**
  - Moi, JKUAT, ANU, Baraton,

- **Three PoPs with VSAT nodes in Nairobi, Nakuru, Eldoret**
Previous Bandwidth capacity at KENET

- **Uplink** - 1Mb via Intelsat and 3Mb via Jambonet (Local Telco)
- **Downlink** – 3Mb via Jambonet and 1.8Mb via Intelsat burstible to 2.4Mb
- Larger Universities have their own VSAT downlinks via Intelsat
- 7Mb downlink shared from Intelsat to different geographic locations – Nairobi, Eldoret, Nakuru
- Those outside Nairobi uplink via Jambonet
- The dedicated Intelsat bandwidth is 5.7Mb and the rest is a shared burst
Old Bandwidth Costs at KENET

- VSAT – Intelsat Bandwidth costs about $1 for 2.3Kbps or $2,330 for 1Mb/s
- Commercial rate for that would be $3,000 for 1Mb/s
- Lease line via Jambonet – Approximately $6 per kilobit or $1 for 170bits
- Negotiated from commercial rate of $12
- Not 1:1!
- Bandwidth savings all gained by member institutions
Early problems at KENET

- Lack of policy both at KENET and at member institutions to govern ICT
- Lack of own infrastructure hence relying on other providers
- Lack of qualified technical staff at several member institutions
- High cost of bandwidth and bandwidth mis-management
- As a result of lack of trained staff some networks were/are poorly set up eg no proxy server for 20+ machines and IP addresses sometimes get black listed for spamming, viruses
- In 2005-2006, complaints were made to KENET concerning poor service. The already low capacity bandwidth were unusable for most institutions due to clogged networks
- Check out case study solutions at: http://wiki.bwmo.net
## KENET Membership

<table>
<thead>
<tr>
<th>Institution type</th>
<th>No.</th>
<th>Membership status</th>
<th>Student enrollment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Universities</td>
<td>7</td>
<td>Full members and active</td>
<td>110,000</td>
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<tr>
<td>Private Universities</td>
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<td>Full and active members</td>
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<td>Polytechnic University Colleges</td>
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<td>Full and active members</td>
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<td>Non-Degree Tertiary Colleges</td>
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<td>Full and active members</td>
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<tr>
<td>National and International research institutions</td>
<td>4</td>
<td>Full and active members</td>
<td>-</td>
</tr>
<tr>
<td>Inactive full members</td>
<td>10</td>
<td>Full members but inactive</td>
<td></td>
</tr>
<tr>
<td>Potential members</td>
<td>16</td>
<td>Friends of KENET</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>55</strong></td>
<td><strong>KENET consortium Members</strong></td>
<td><strong>About 200,000</strong></td>
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</tbody>
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Value Proposition of KENET

• Cheap Bandwidth and leased lines?
  - 1:1 ratio, best price
  - Consortium power in bandwidth and computer purchases?

• Provide gateways and connections to other RENs and partnerships
  - Autonomous System Number as an NREN, IP address block, routing and layer 3 services; Google partnership, UbuntuNet Alliance etc
UbuntuNet Alliance – A regional REN

Members NRENs
NRENs in Construction and Observer Members
Example: UbuntuNet today

- **Internet**
- **Géant**
- **UbuntuNet**, London
- **VSAT connection. GRE tunnel to UbuntuNet**
- **UbuntuNet**, Johannesburg
- **TENET/SANReN**
- **Swaziland**
- **Lesotho**
- **MoRENe**
- **Namibia**

**Submarine cable circuits**
KTCIP Project

- Project to improve bandwidth access for Higher Education Institutions in Kenya
- Will upgrade Number of POPs to six across Kenya
- Increase total bandwidth to 200Mbps
- Improve local infrastructure to leased fiber to at least half of 62 participating institutions
- Improve all POPs to high standards
- Install a main Data Center in Nairobi to provide top IT services
- All POPs will be ready to receive Fiber when Kenya's fiber network will be complete
- Lines will be leased but provider will be tied to hard SLA
The project so far.....
Changes?

- Need to change the IGP and improve the BGP
- Talk to the Universities and get help them organise their networks, some still have daisy chains
- Talk to the Layer 1 provider, current fiber is dropping packets, jitter. Might not be well done
- Get STP running on the switches
Thank you!

http://www.kenet.or.ke

Questions, Comments...