KENET

Kenya Education Network

National Research and Education Network for Kenya

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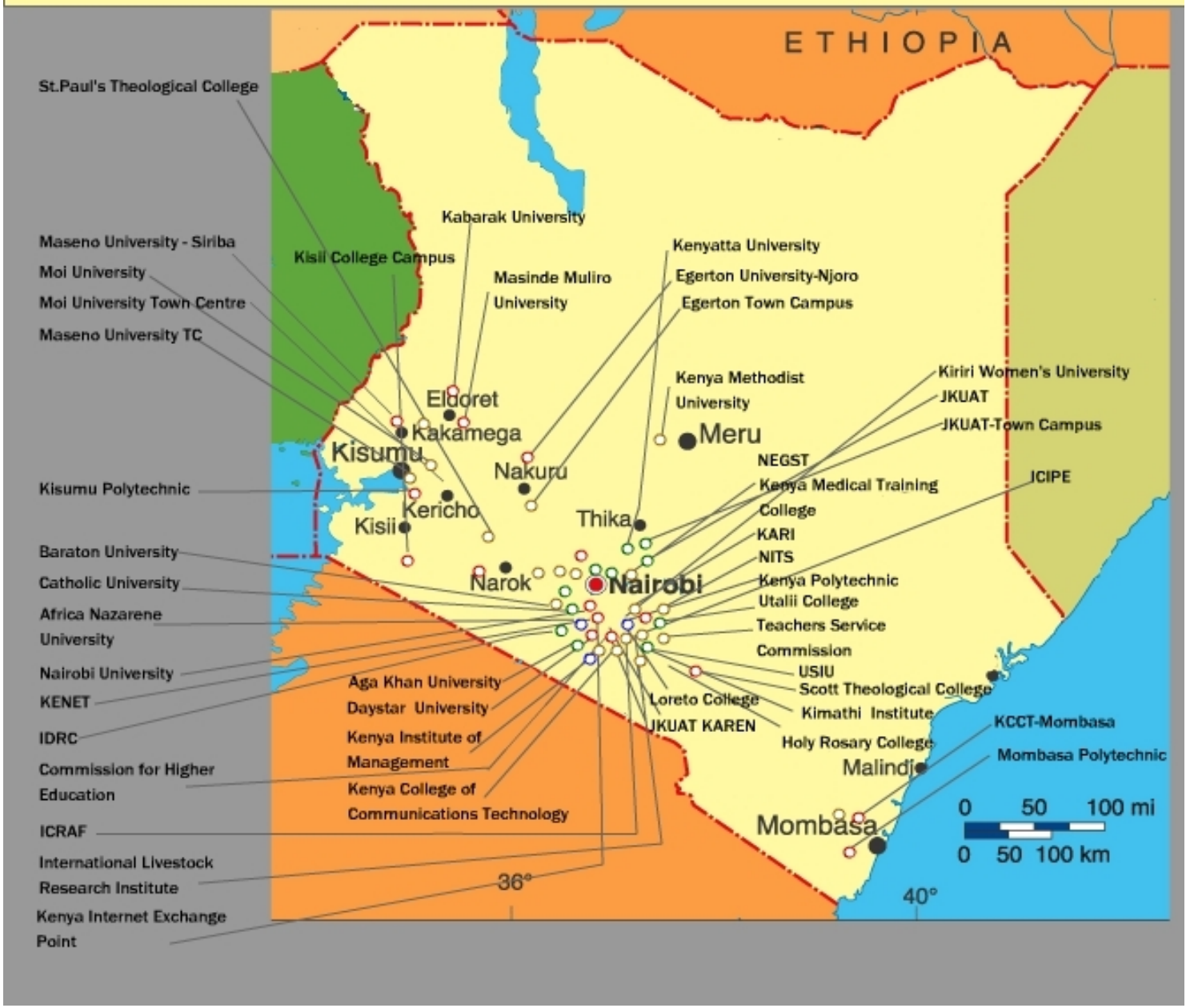
KENYA EDUCATION NETWORK INSTITUTIONAL COVERAGE MAP



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

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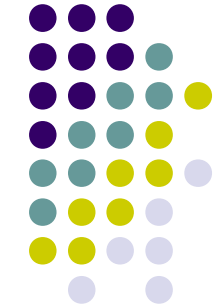

- Bandwidth services
  - At negotiated prices
- Services – mail hosting, backup, web hosting, setting up of custom servers, DNS Record hosting, monitoring for all connected hosts
- Server co-location
- Technical training of member technical staff
  - Bandwidth management training
- Network support and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

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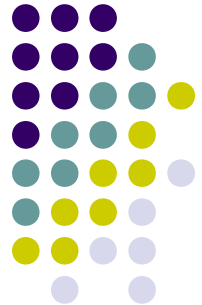


KENET Early Network

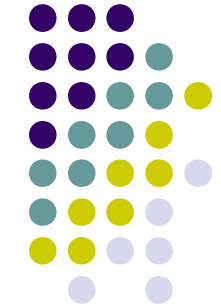
Old Infrastructure

- 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

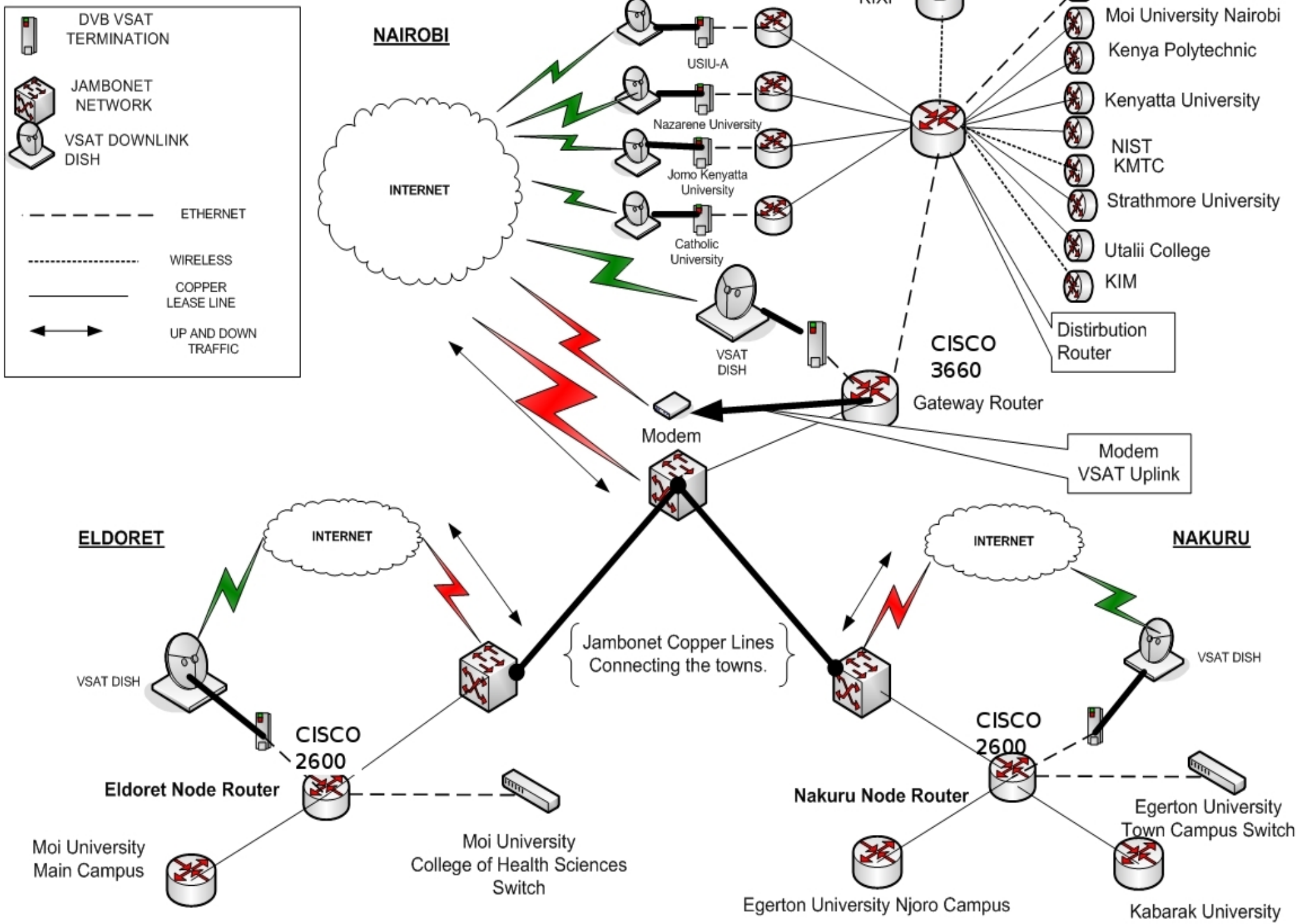
Early problems at KENET

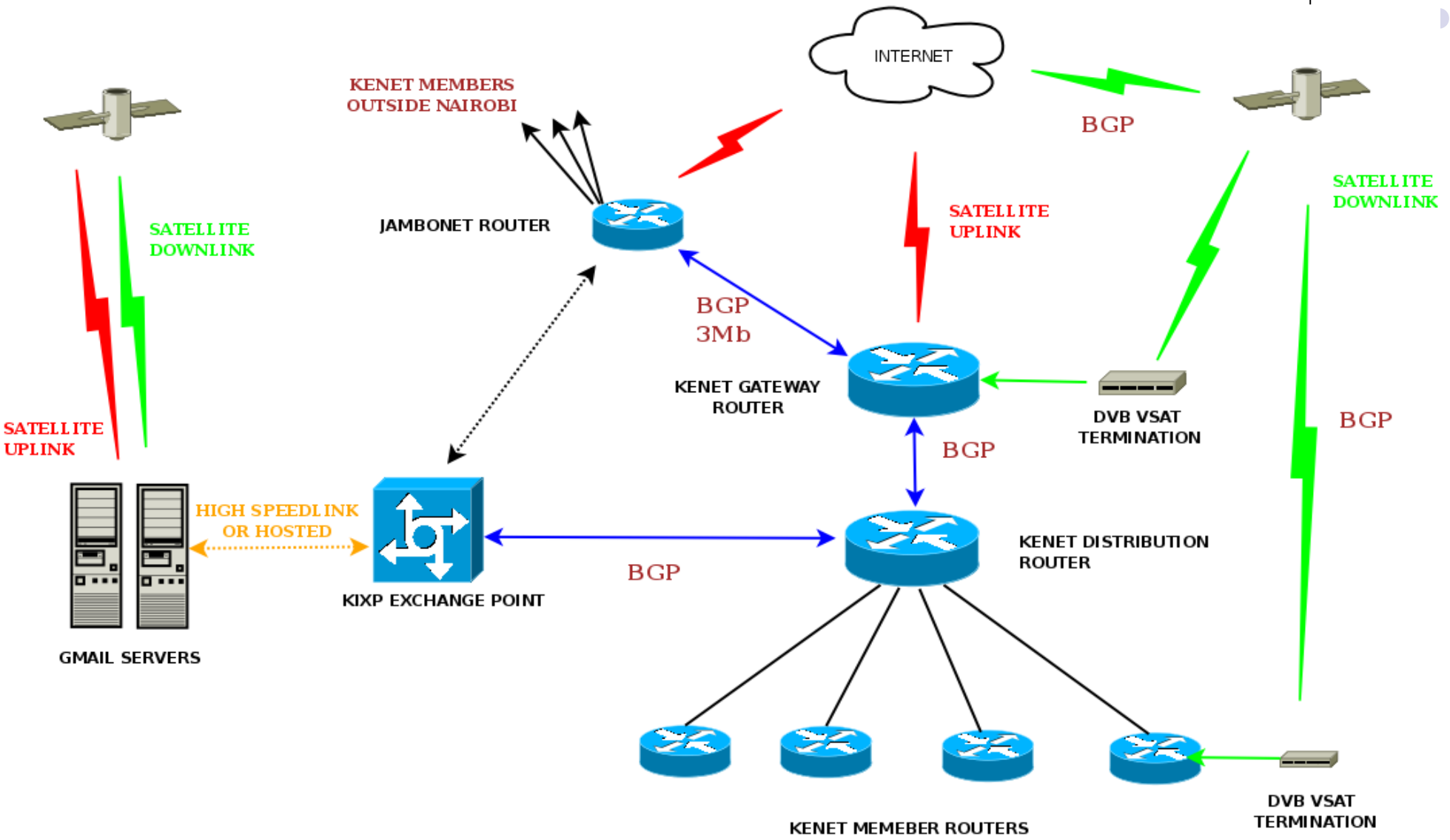
- Lack of policy both at KENET and at member institutions to govern ICT
- Lack of own infrastructure hence relying on other providers
- Lack of qualified technical staff at several member institutions
- High cost of bandwidth and bandwidth mis-management
- As a result of lack of trained staff some networks 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

Institution type	No.	Membership status	Student enrollment
Public Universities	7	Full members and active	110,000
Private Universities	10	Full and active members	20,000
Polytechnic University Colleges	2	Full and active members	15,000
Non-Degree Tertiary Colleges	6	Full and active members	15,000
National and International research institutions	4	Full and active members	-
Inactive full members	10	Full members but inactive	
Potential members	16	Friends of KENET	
Total	**55**	**KENET consortium Members**	**About 200,000**

KENET NETWORK DIAGRAM

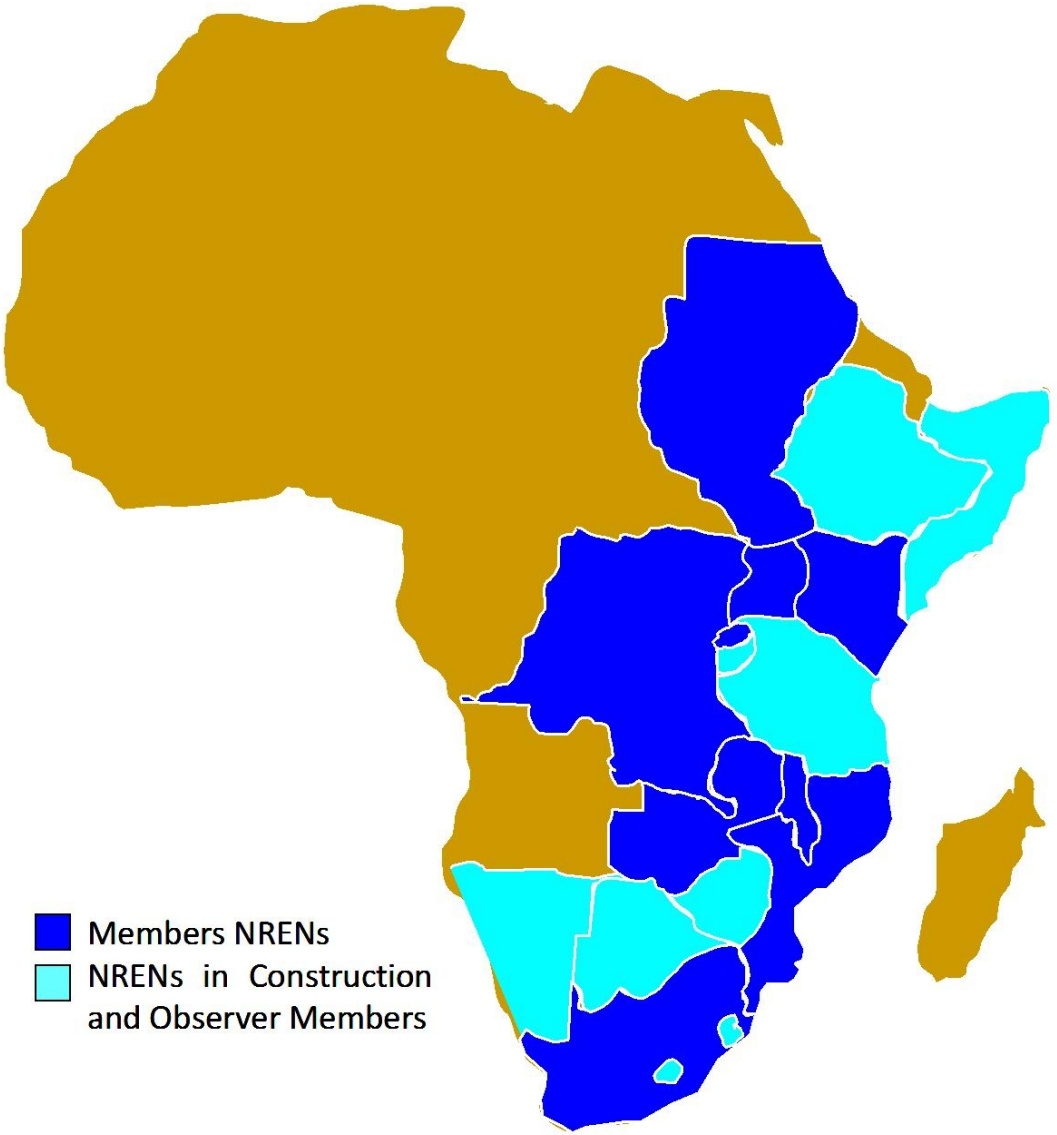



INTERNET
KENET MEMBERS
OUTSIDE NAIROBI
BGP
SATELLITE
DOWNLINK
SATELLITE
UPLINK
JAMBONET ROUTER
SATELLITE
UPLINK
SATELLITE
DOWNLINK
BGP
3Mb
KENET GATEWAY
ROUTER
DVB VSAT
TERMINATION
BGP
BGP
SATELLITE
UPLINK
HIGH SPEEDLINK
OR HOSTED
BGP
KENET DISTRIBUTION
ROUTER
KIXP EXCHANGE POINT
GMAIL SERVERS
KENET MEMEBER ROUTERS
DVB VSAT
TERMINATION

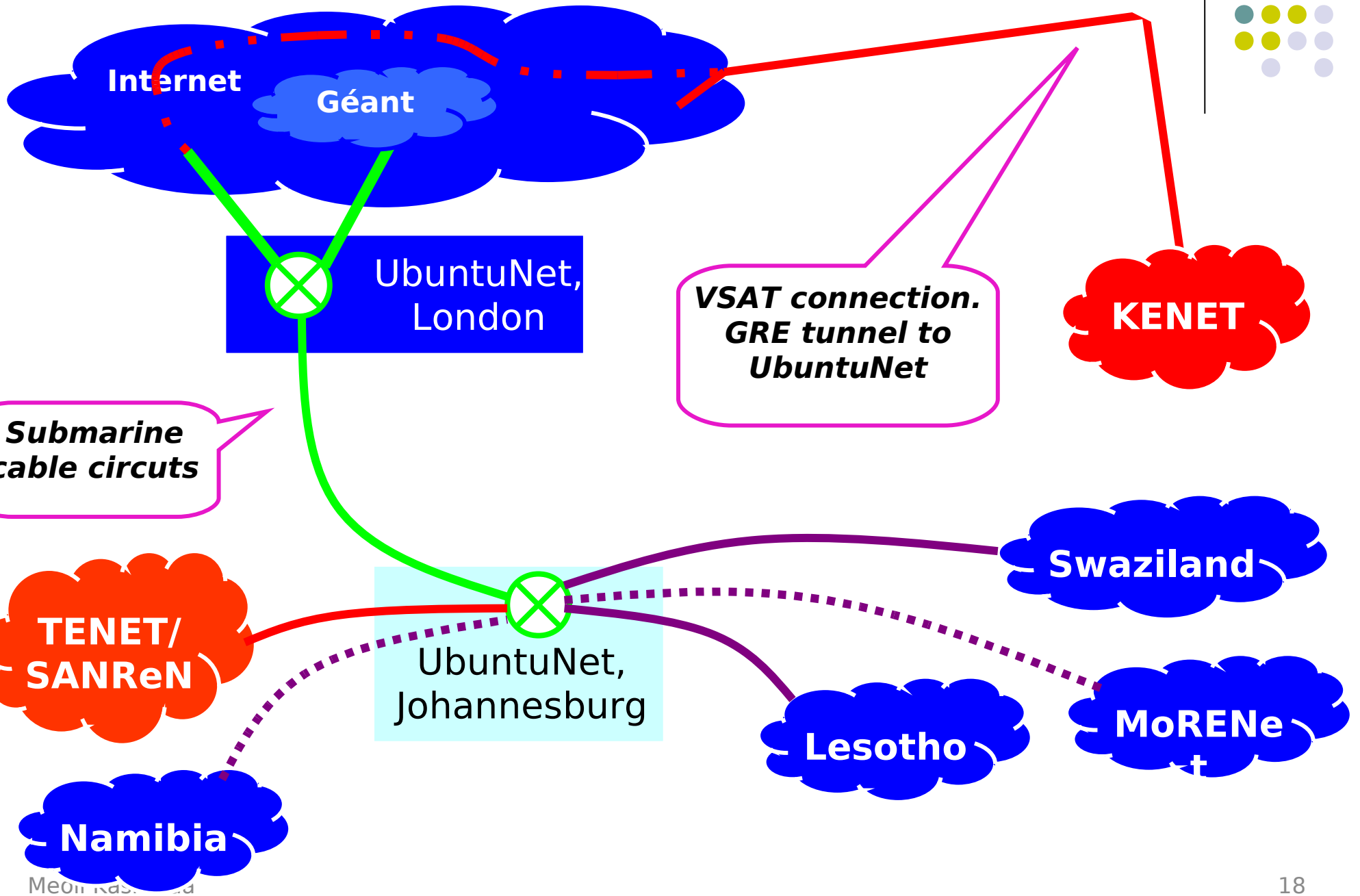
Value Proposition of KENET

- 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



Example: UbuntuNet today



KTCIP Project

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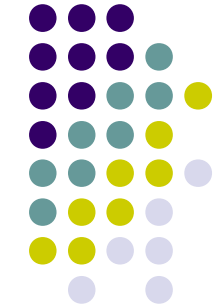
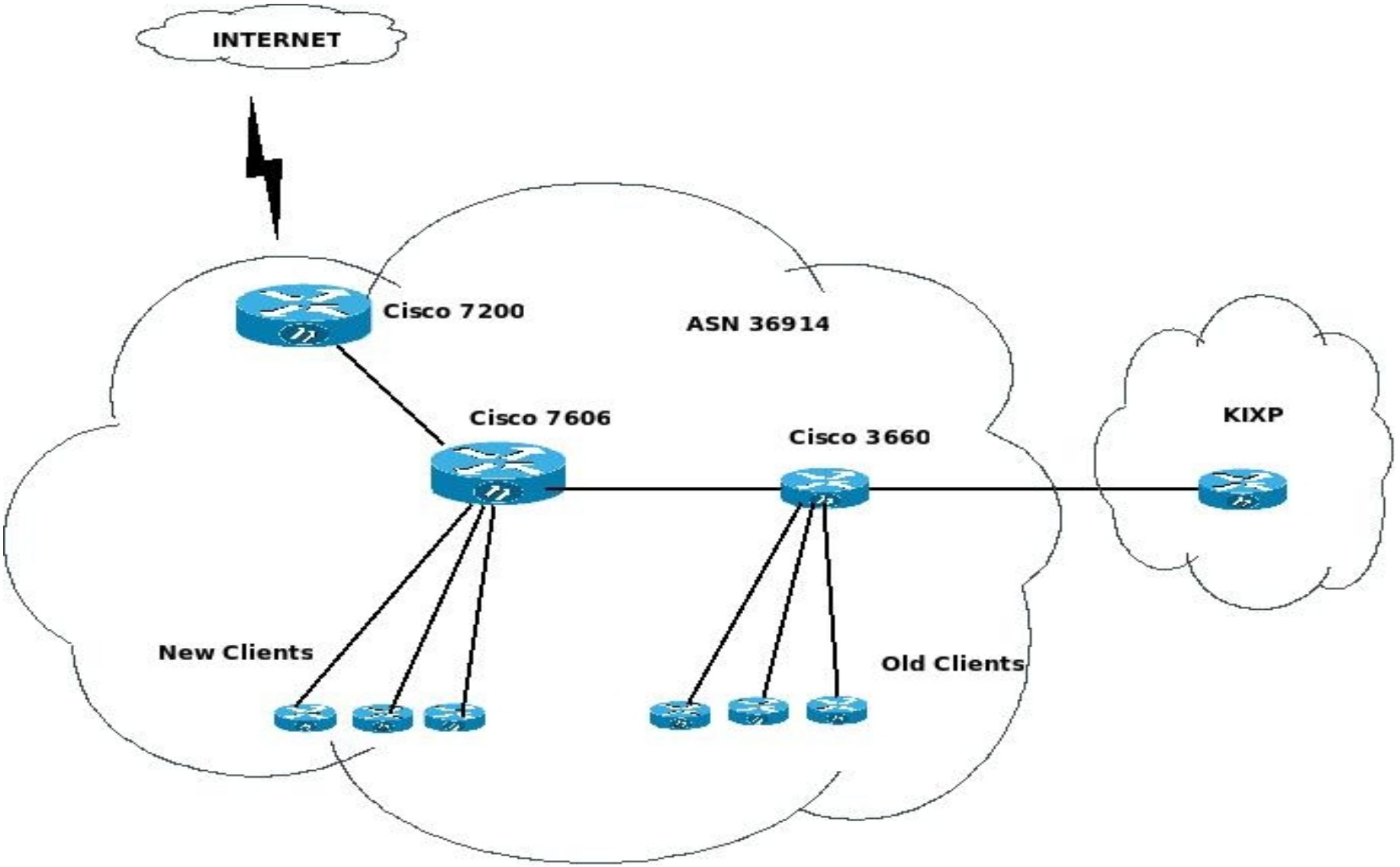
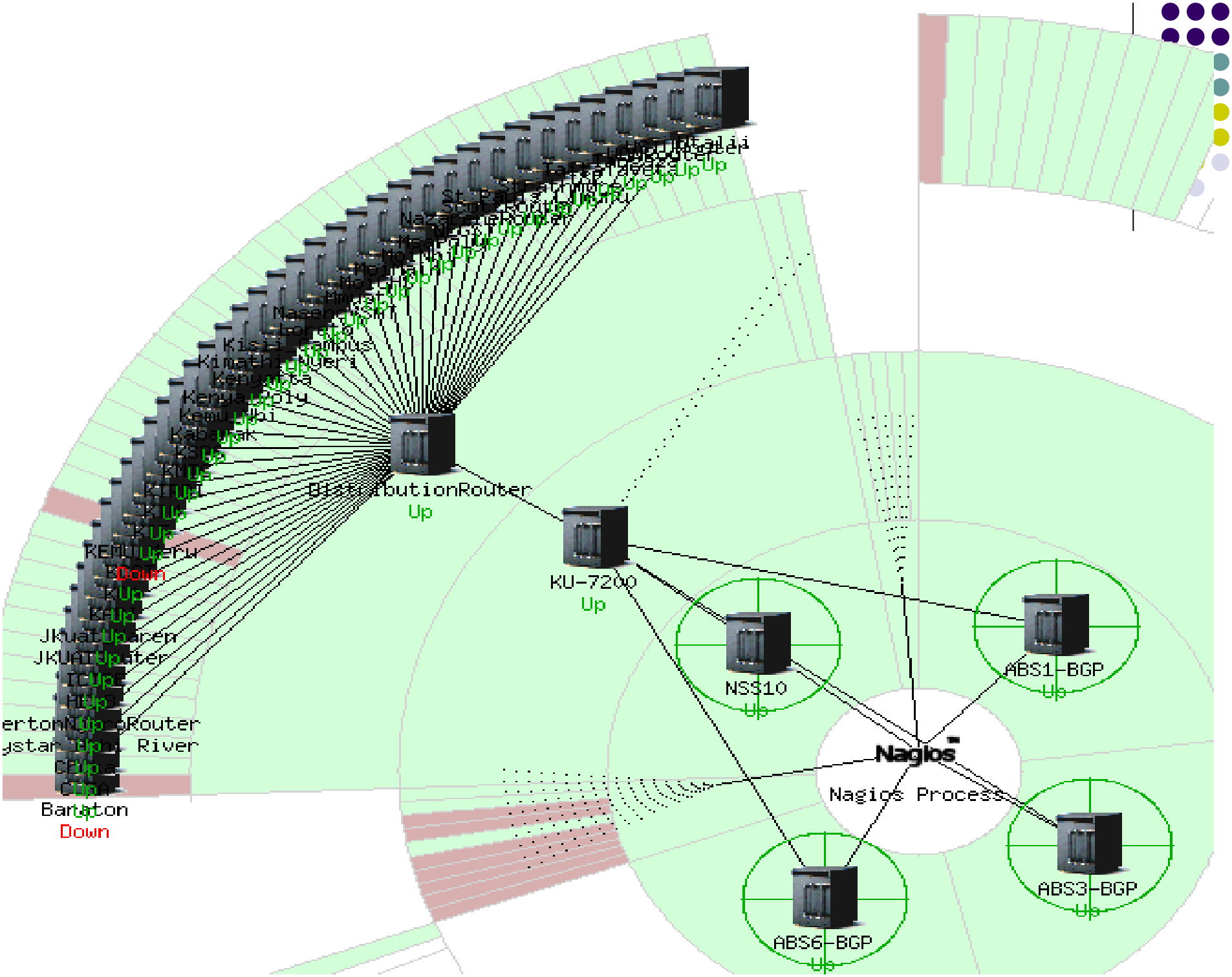


- Project to improve bandwidth access for Higher Education Institutions in Kenya
- Will upgrade Number of POPs to six across Kenya
- Increase total bandwidth to 200Mbps
- Improve local infrastructure to leased fiber to at least half of 62 participating institutions
- Improve all POPs to high standards
- 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.....




KU-7200
Up
NSS10
Up
ABS1-BGP
Up
ABS3-BGP
Up
ABS6-BGP
Up
Nagios
Nagios Process
Down

Changes?

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- 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

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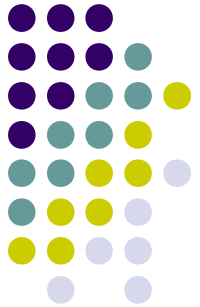

Thank you!

http://www.kenet.or.ke

Questions, Comments...