KENET

Kenya Education Network

IMPACT OF UNDERSEA CAPACITY IN EAST AFRICA

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Transforming Higher Education Using ICT

What I'll cover.....

- Regional undersea connectivity before 2009 and as at the end of 2009
- What connectivity for the region may look like by the end of 2010 and beyond
- East African NREN status
- UbuntuNet
- Q&A

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CONNECTIVITY IN EAST AFRICA BEFORE 2009 AND AS OF THE END OF 2009

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Pre 2009

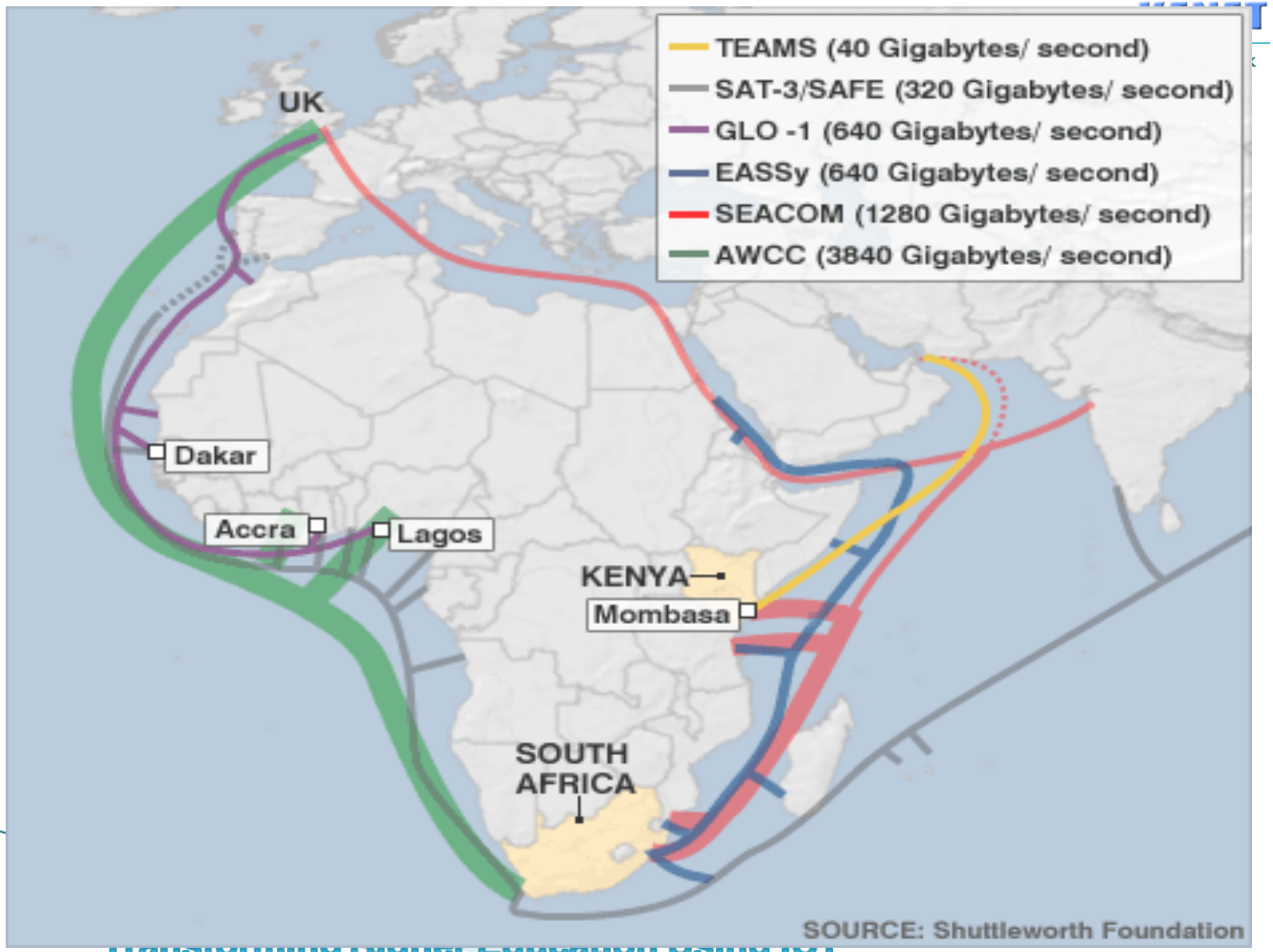
- 100% satellite connectivity
- Very expensive – prices starting from $2,000 per Mb (Megabit) up to $7,000 per Mb
- In country fiber was available but expensive local loop and not far reaching
- In Kenya, only one strong PDNO (KDN) and UTL for Uganda
- In Tanzania, Tanesco (Power company) and TTCL but not much presence, several small ISPs with own fiber

Pre-2009 connectivity

- Undersea conectivity was coming but many in the region were skeptical
- The three main cables on the way were: SEACOM, TEAMS and EASSy
- SEACOM to connect East Africa to London
- TEAMS to connect Kenya to UAE (Fujairah)
- EASSy focusing on inter-Africa connectivity to the rest of the world

SOURCE: SEACOM

SOURCE: http://www.habari.co.tz/node/bulletins/agm2005/eascs.html


TEAMS (40 Gigabytes/ second)
SAT-3/SAFE (320 Gigabytes/ second)
GLO -1 (640 Gigabytes/ second)
EASSy (640 Gigabytes/ second)
SEACOM (1280 Gigabytes/ second)
AWCC (3840 Gigabytes/ second)
UK
Dakar
Accra
Lagos
KENYA
Mombasa
SOUTH AFRICA
SOURCE: Shuttleworth Foundation

Cables completed in 2009

- SEACOM reaches Kenyan port of Mombasa and activates in June 2009
- TEAMS completes link from Kenya to Fujairah and activates in July 2009
- For Kenya, a lot of excitement especially in regards to drop in bandwidth prices
- Seacom is more favoured, lands in Europe where prices are cheaper and has a contract in Kenya with provider to distribute its capacity in country and to Uganda

SEACOM vs TEAMS

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- SEACOM cheaper per Megabit for the ISPs
- TEAMS is more expensive, because of monopoly prices in UAE, took time to take off but is currently in use
- TEAMS encountered some problems in Kenya
- Some of its shareholders were unable to pay up and went to court to challenge their being thrown out with their shares being distributed among the larger shareholders.

As at end of 2009....

- SEACOM and TEAMS completed but EASSy still in progress, estimated completion is mid 2010
- SEACOM Fiber in Uganda is available to commercial ISPs via UTL
- Same story in Tanzania available via TTCL
- Rwanda also served by SEACOM via RTL from September 2009

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CURRENT CONNECTIVITY – 2010

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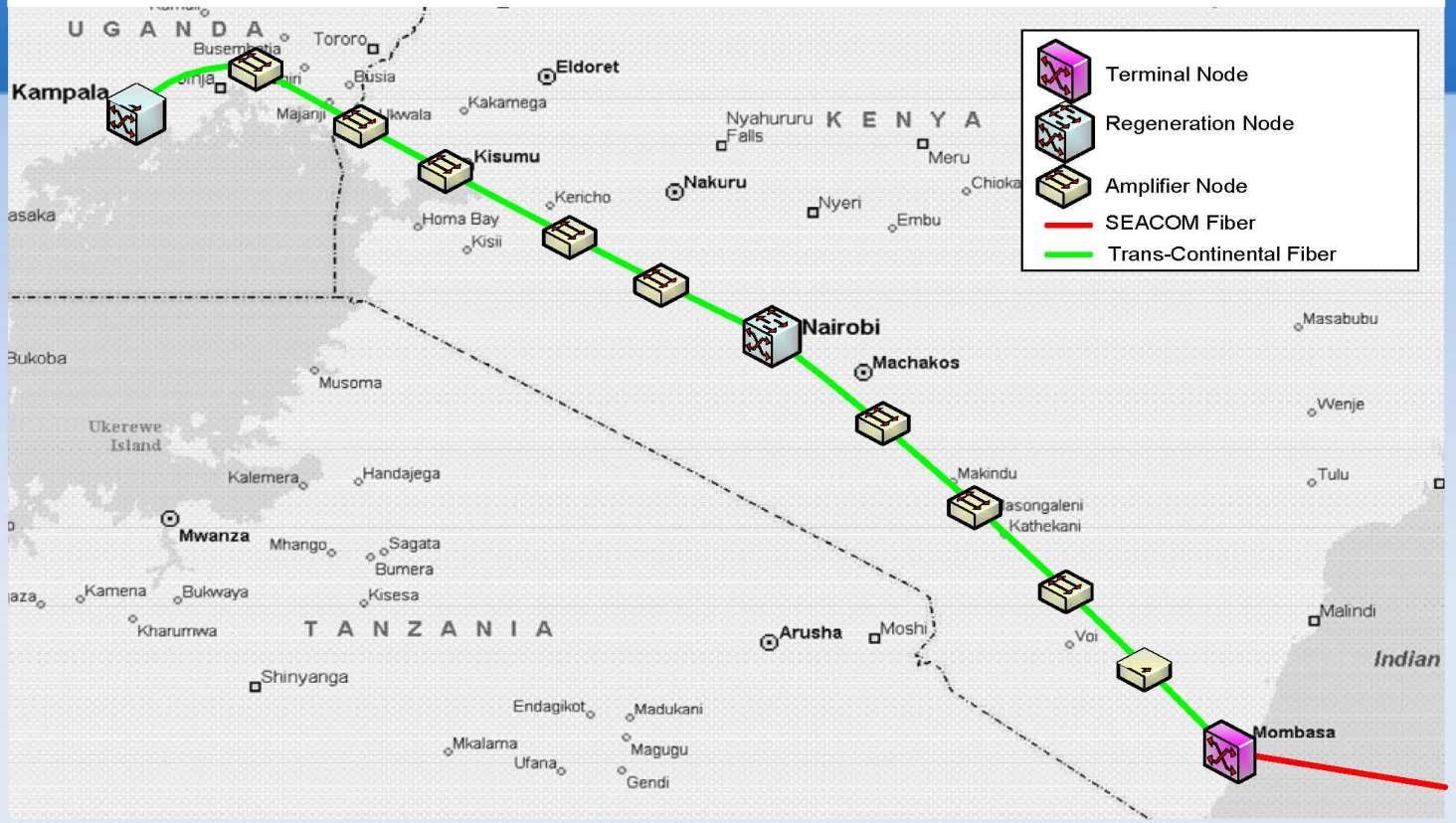
Uganda

- There is undersea capacity but no redundancy
- Still maintain VSAT for backup
- Traffic passing via Kenya and the stiff competition in Kenya sometimes leads to inter ISP sabotage and Uganda and Rwanda unfortunately suffer
- Route is via Kenya ending up in Mombasa

Kenya/Uganda Fiber Route



Source: RENU

Kenya

- The best served in terms of bandwidth and reach of the three countries
- Prices have reduced but not to expected levels because ISPs still have Satellite contracts
- Best current price per Megabit around $120 per Mb with a buy one get 4 arrangement
- Mainly because in country infrastructure is not really ready to absorb all the bandwidth, ISPs have much more than they can sell but can't really reduce cost very much due to VSAT contracts
- ISP market is highly competitive, vandalism and sabotage is common

Tanzania

- SEACOM capacity is available via TTCL
- No other planned under sea cables at the moment apart from EASSy
- EASSy completed connectivity in mid 2010

EASSy design for East Africa..

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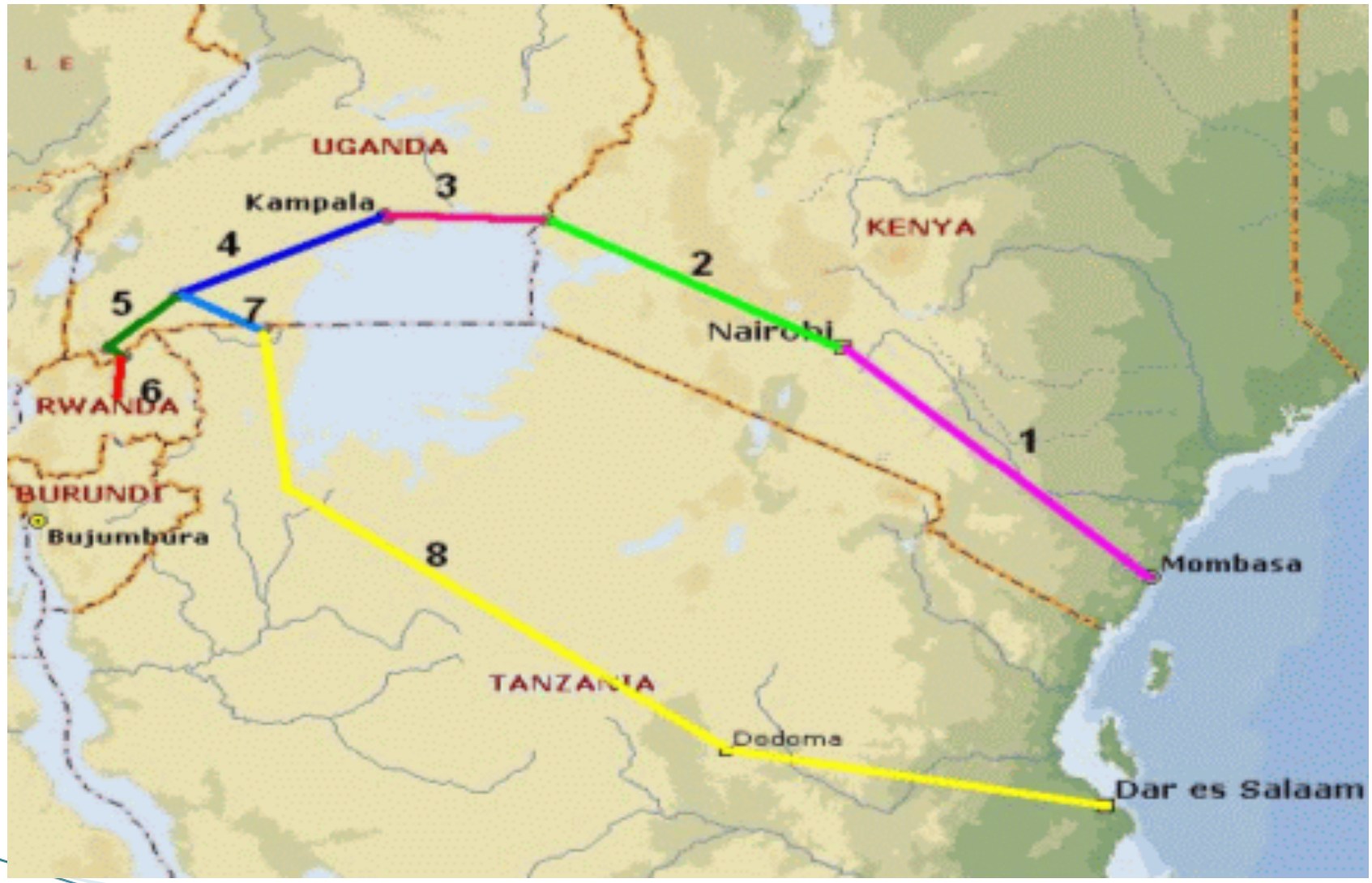

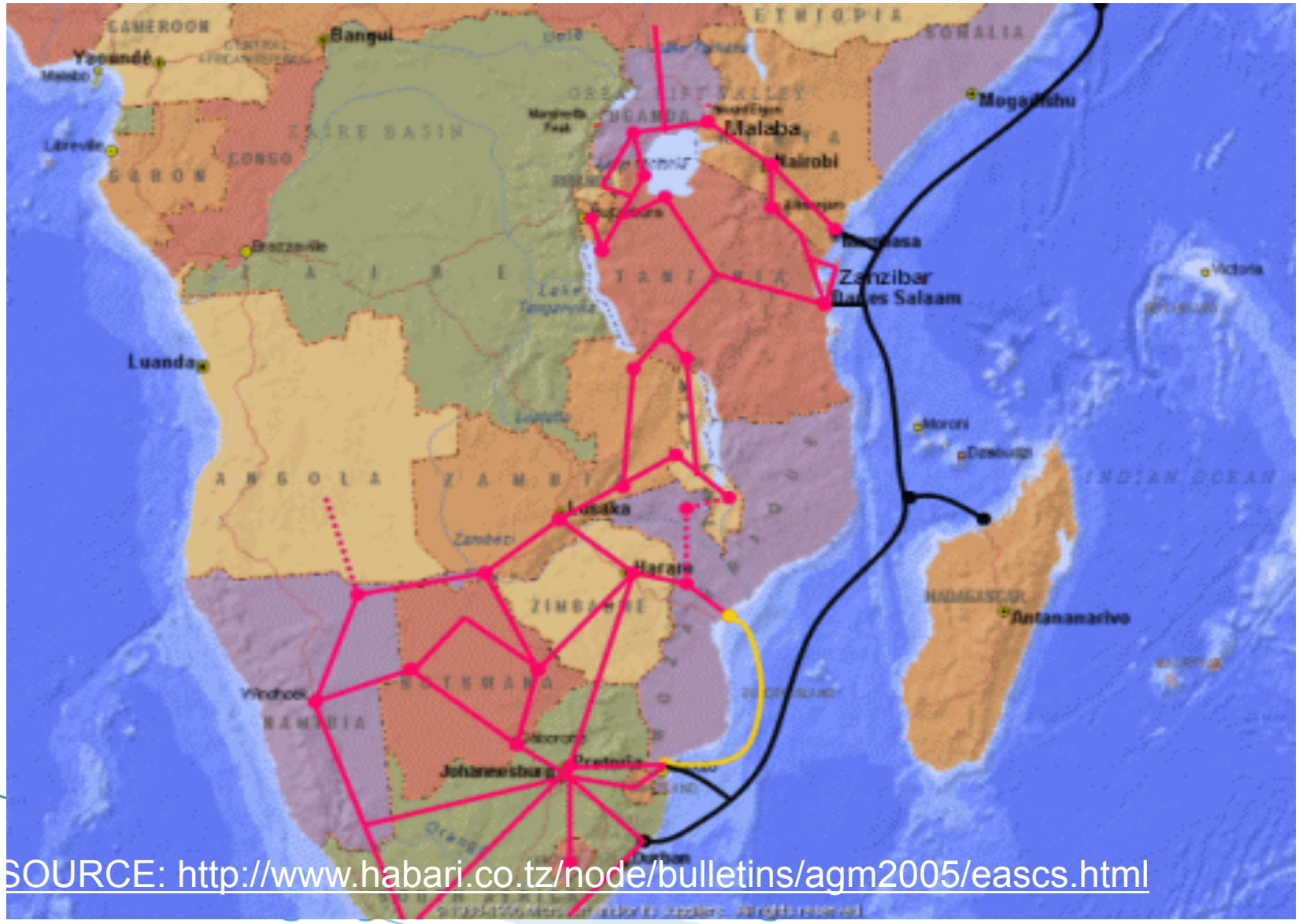

SOURCE: http://www.habari.co.tz/node/bulletins/agm2005/eascs.html

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NRENS IN THE REGION AND THEIR CONNECTIVITY

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Uganda – RENU

- RENU is not yet active, is participating in a project in collaboration with IEEAF to acquire under sea capacity at 10G
- Have partnered with UTL to use its existing infrastructure to reach member universities
- Their equipment was to be provided by USAID but has been delayed for sometime
- No permanent staff as yet, mainly volunteers but have established their structures
- Have ASN and /18 IP space from Afrinic

Tanzania – TERNET

- TERNET also not active but SEACOM is terminated at University of Dar Es Salam
- The SEACOM cable was ready around the same time as Kenya's but there have been delays mainly in purchasing fiber equipment and signing up to SEACOM
- However, as of mid Jan 2010, an agreement with SEACOM was reached
- Will probably lease capacity from existing provider, have acquired own IP space

Kenya

- KENET has undersea capacity via KDN (SEACOM partner) and as of 28th January 2010, direct connectivity to London via acquired STM 1 IRU (20 year NREN price)
- KENET has been active for a number of years and has grown from having lease line copper to lease line fiber charged at $16 per 10Mb (Megabit) local loop
- 77 connected sites mostly on fiber
- Enjoys massive support from large Universities – free DC hosting!

A bit on the consumption in KENET...

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- Made the big leap from VSAT to Fiber
- Member campus networks were not ready – were only absorbing <10Mbps each
- Even on VSAT, campuses were poorly designed and equipped
- KENET distributed switches donated by NSRC to help mitigate this, were a big success allowing students to be reached better
- Campuses still poorly designed, trainings done in March with NSRC and UoO

More on KENET

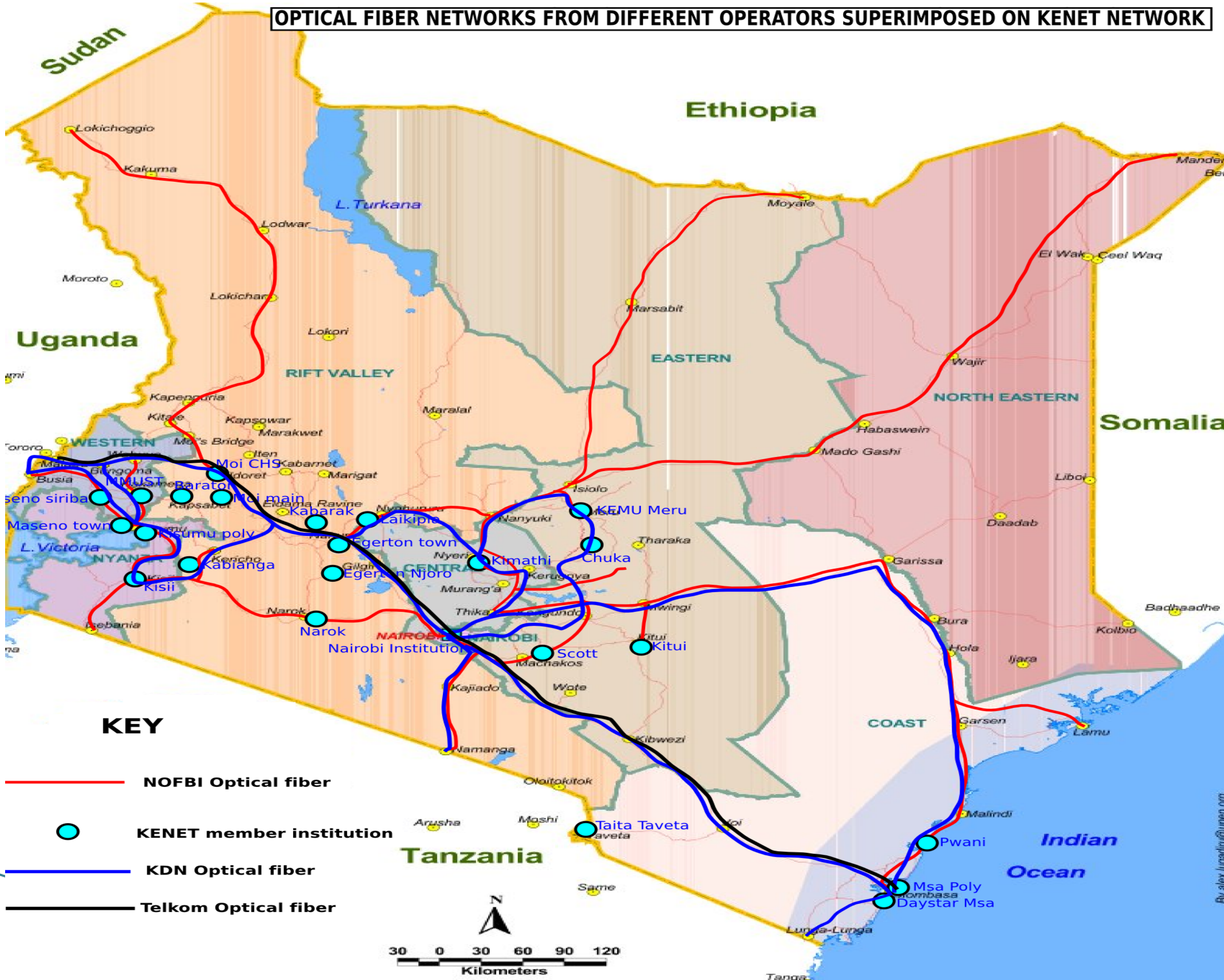
- Run a training program and mailing list called Bandwidth Management and Optimisation and has grown to include members from Malawi, Zambia, Sudan, Tanzania and Rwanda
- Focuses on teaching net admins to monitor, manage and optimise their links
- Has carried out E-Readiness surveys in the region to evaluate how prepared the countries are to absorb capacity – http://eready.kenet.or.ke

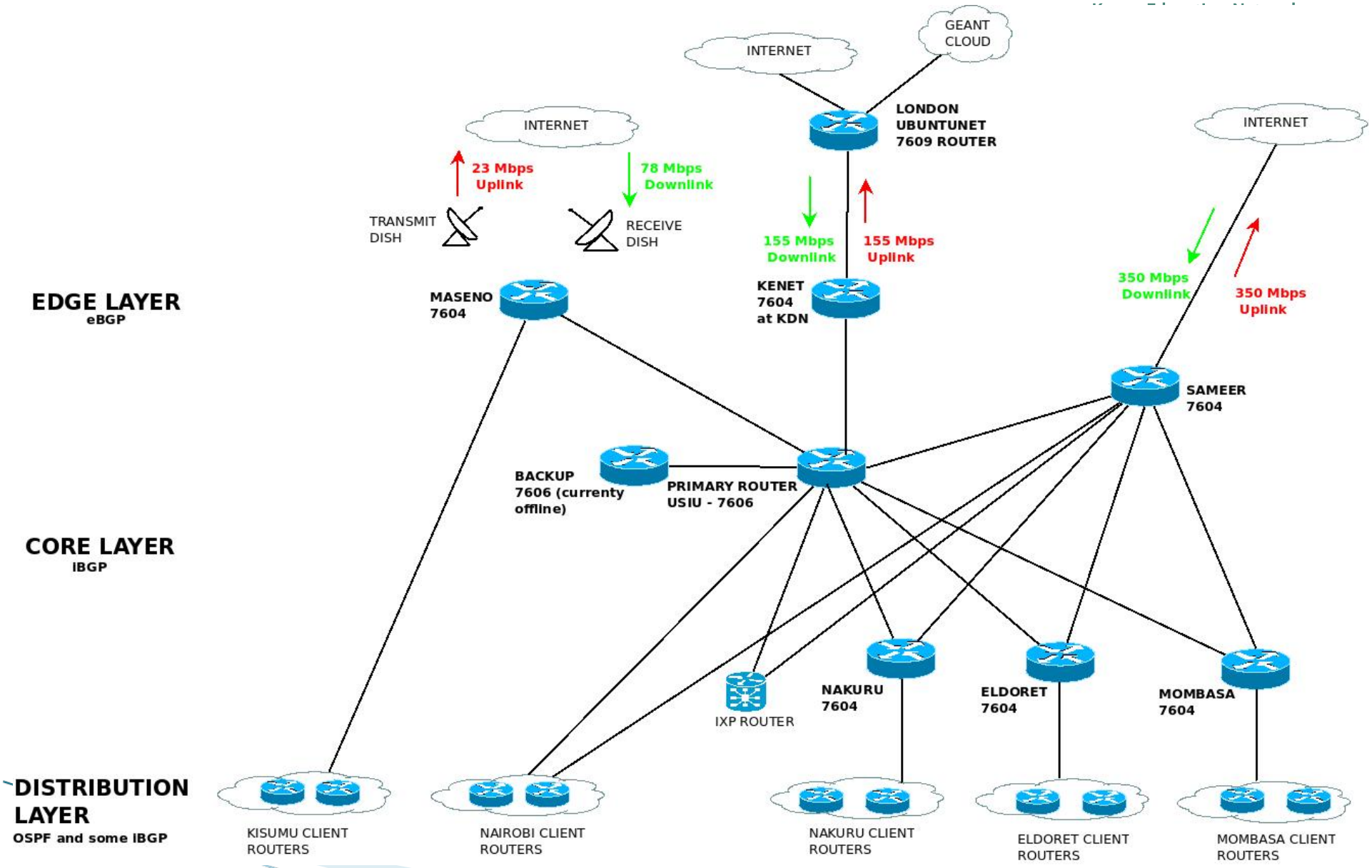
Even more on KENET....

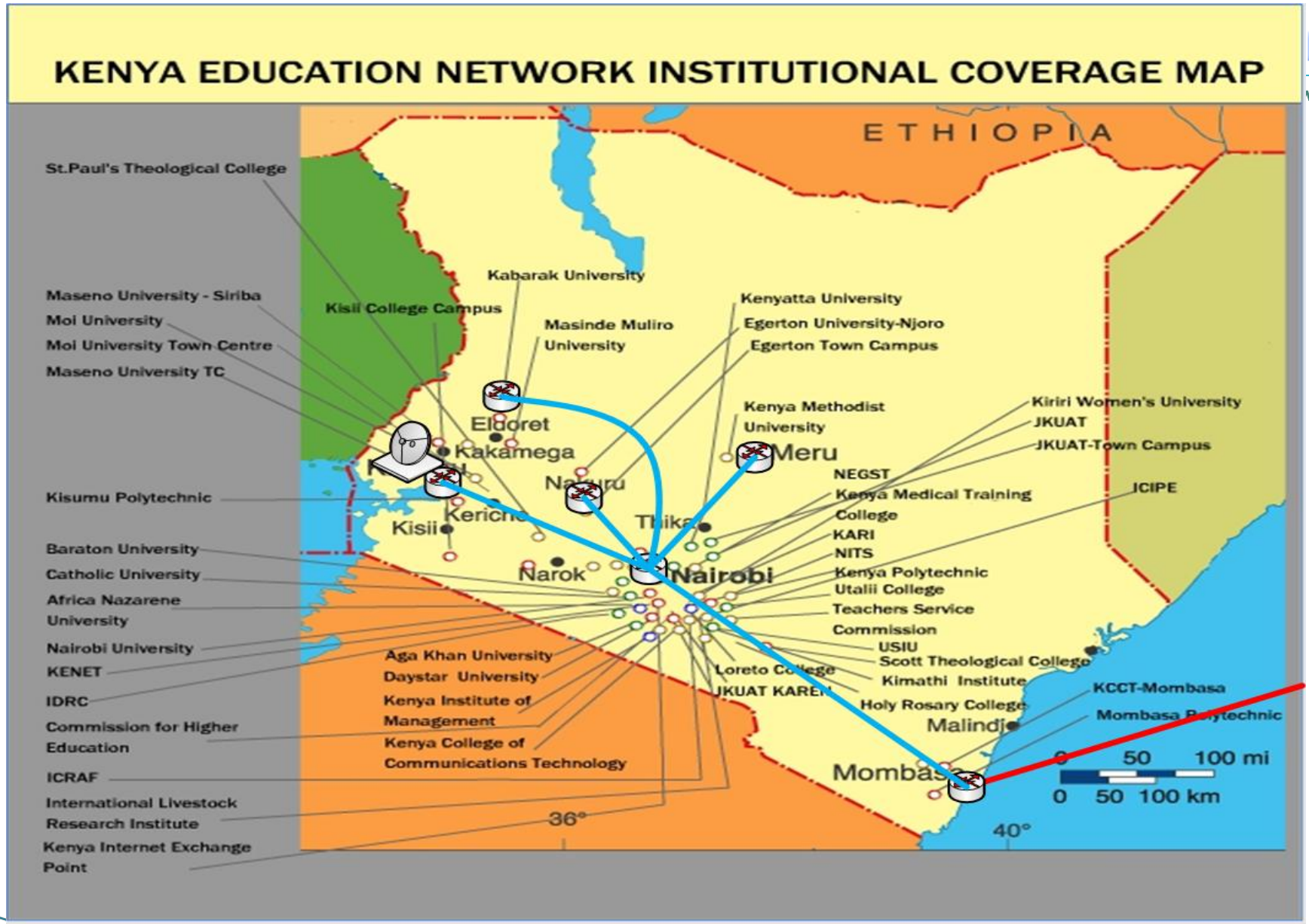
- Using leased lines to reach members
- Government has donated its TEAMS capacity to Fujairah – STM 4 but not activating this soon
- Will also benefit from National Fiber Optic Backbone Infrastructure NOFBI project
- Currently only HEIs but may expand to include schools
- Also have 200Mbps VSAT till Jan 2011 but will retain some capacity for redundancy

KENET Network

- IPv4 /16 and /19
- Ipv6 /32
- ASN 36914
- Network migration to /16 underway, IPv6 also being introduced. Will be complete once DNS transitioned to BIND9
- Previously did only OSPF with Universities but network became unstable
- BGP for traffic and OSPF for infrastructure now in place and Network is much more manageable


OPTICAL FIBER NETWORKS FROM DIFFERENT OPERATORS SUPERIMPOSED ON KENET NETWORK
Sudan
Ethiopia
Uganda
Somalia
Tanzania
Indian Ocean
L. Turkana
L. Victoria
RIFT VALLEY
EASTERN
NORTH EASTERN
WESTERN
CENTRAL
NAIROBI
COAST
Lokichoggio
Kakuma
Lodwar
Moroto
Lokichar
Lokori
Kapenguria
Kitale
Kapsowar
Marakwet
Maralal
Moyale
Marsabit
Mandera
El Wak
Ceel Waq
Wajir
Habaswein
Mado Gashi
Liboi
Daadab
Garissa
Isiolo
Nanyuki
Tharaka
Bura
Hola
Ijara
Badhaadhe
Kolbio
Garsen
Lamu
Malindi
Kibwezi
Oloitokitok
Namanga
Kajiado
Wote
Machakos
Thika
Murang'a
Narok
Kericho
Kisii
Busia
Tororo
Moi CHS
Moi main
MMUST
Baraton
Kabarak
Laikipia
Egerton town
Egerton Njoro
Kimathi
KEMU Meru
Chuka
Kitui
Scott
Nairobi Institution
Kabianga
Maseno town
Kisumu poly
Taita Taveta
Pwani
Msa Poly
Daystar Msa
Lunga-Lunga
Tanga
Arusha
Moshi
Same
KEY
NOFBI Optical fiber
KENET member institution
KDN Optical fiber
Telkom Optical fiber
N
30 0 30 60 90 120
Kilometers
By alex.lugadiru@unep.org


GEANT CLOUD
INTERNET
INTERNET
INTERNET
LONDON UBUNTUNET 7609 ROUTER
23 Mbps Uplink
78 Mbps Downlink
TRANSMIT DISH
RECEIVE DISH
155 Mbps Downlink
155 Mbps Uplink
350 Mbps Downlink
350 Mbps Uplink
EDGE LAYER
eBGP
MASENO 7604
KENET 7604 at KDN
SAMEER 7604
BACKUP 7606 (currenty offline)
PRIMARY ROUTER USIU - 7606
CORE LAYER
IBGP
IXP ROUTER
NAKURU 7604
ELDORET 7604
MOMBASA 7604
DISTRIBUTION LAYER
OSPF and some IBGP
KISUMU CLIENT ROUTERS
NAIROBI CLIENT ROUTERS
NAKURU CLIENT ROUTERS
ELDORET CLIENT ROUTERS
MOMBASA CLIENT ROUTERS


KENYA EDUCATION NETWORK INSTITUTIONAL COVERAGE MAP
ETHIOPIA
St.Paul's Theological College
Maseno University - Siriba
Moi University
Moi University Town Centre
Maseno University TC
Kisumu Polytechnic
Baraton University
Catholic University
Africa Nazarene University
Nairobi University
KENET
IDRC
Commission for Higher Education
ICRAF
International Livestock Research Institute
Kenya Internet Exchange Point
Kabarak University
Kisii College Campus
Masinde Muliro University
Kenyatta University
Egerton University-Njoro
Egerton Town Campus
Kenya Methodist University
Kiriri Women's University
JKUAT
JKUAT-Town Campus
ICIPE
NEGST
Kenya Medical Training College
KARI
NITS
Kenya Polytechnic
Utalii College
Teachers Service Commission
USIU
Scott Theological College
Kimathi Institute
Holy Rosary College
KCCT-Mombasa
Mombasa Polytechnic
Aga Khan University
Daystar University
Kenya Institute of Management
Kenya College of Communications Technology
Loreto College
JKUAT KAREN
Eldoret
Kakamega
Nakuru
Meru
Kericho
Kisii
Narok
Nairobi
Malindi
Mombasa
0 50 100 mi
0 50 100 km
36°
40°
Fibre Network
Seacom
POP
Satellite Dish

NREN conclusion

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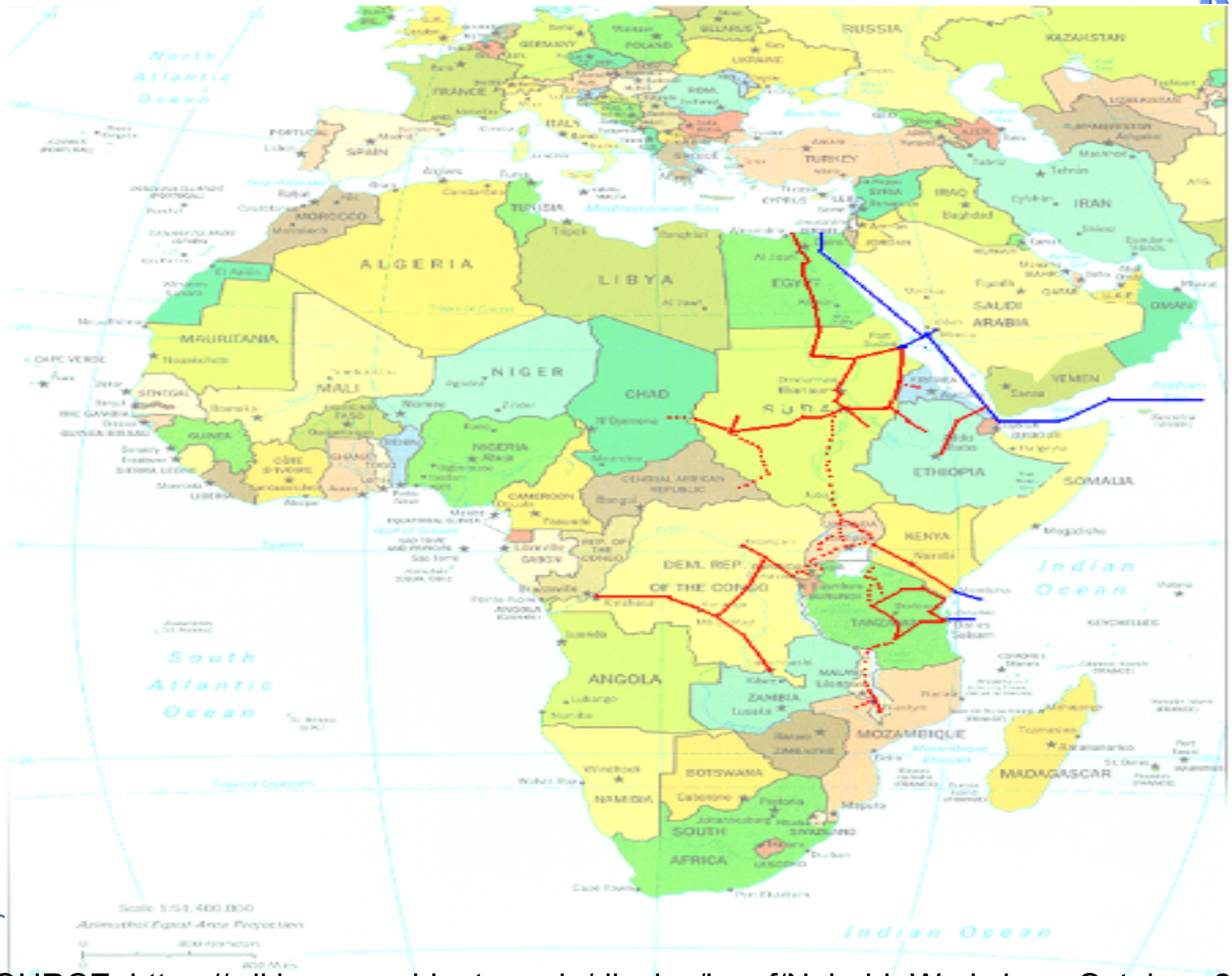
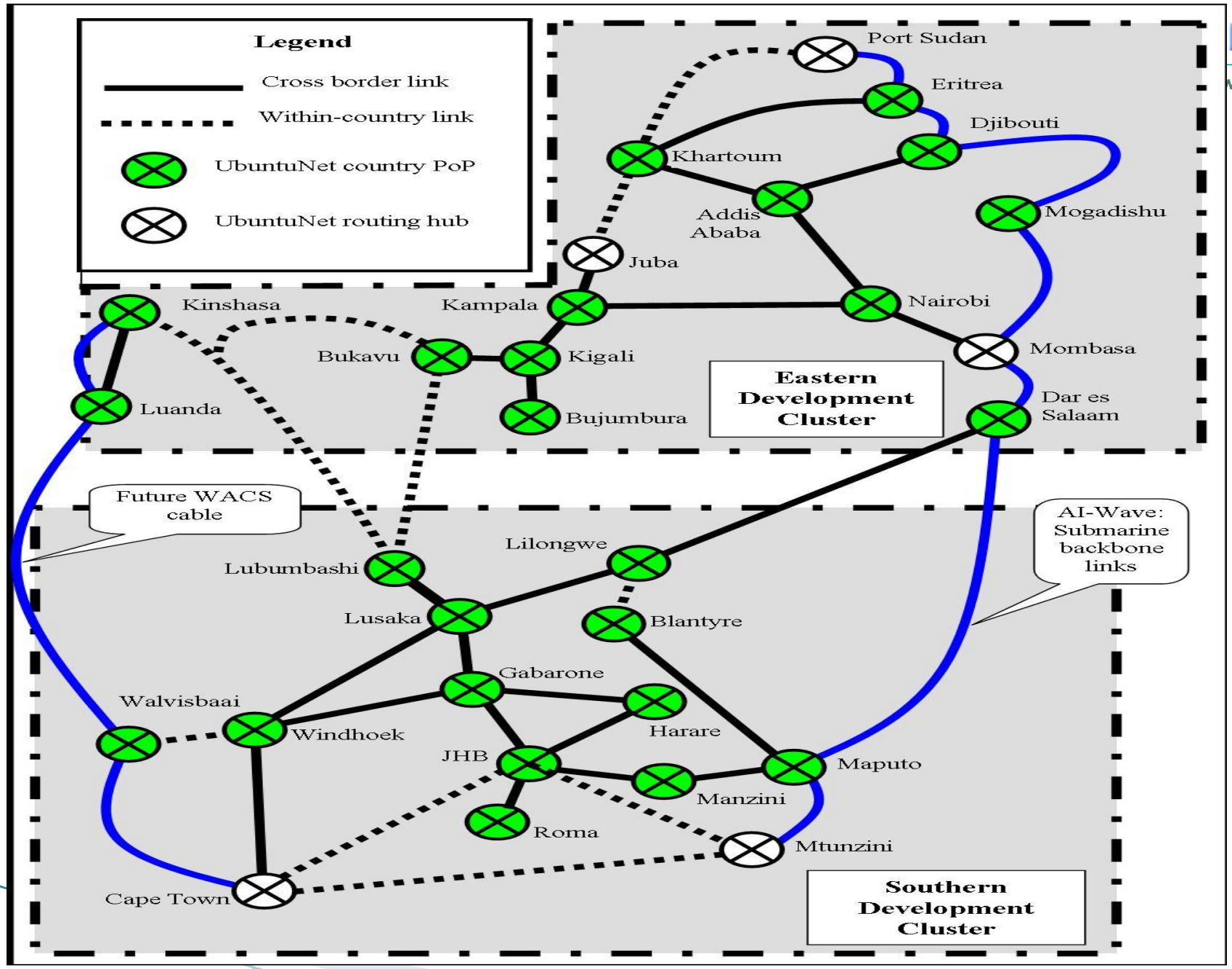
- Uganda are very close and will be active as soon as their equipment arrives. The delay has been more than a year and it is difficult to say when their equipment will arrive.
- Tanzania are also close and SEACOM have terminated. Once internal issues are sorted, they should come up before the end of 2010
- KENET is up and could function as the regional NREN. UbuntuNet has contracted KENET to this end and this could be a reality soon
- National backbones being dug in all countries and will be completed soon and NRENs to benefit



SOURCE: https://wiki.cac.washington.edu/display/ieeaf/Nairobi+Workshop+October+2008



Source: http://www.ubuntunet.net

Thank you!

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Q&A