

EAST AFRICA UNDERSEA CONNECTIVITY UPDATE

*Joint Engineering Team Meeting – JT Internet2-
SLC 2010*

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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

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

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

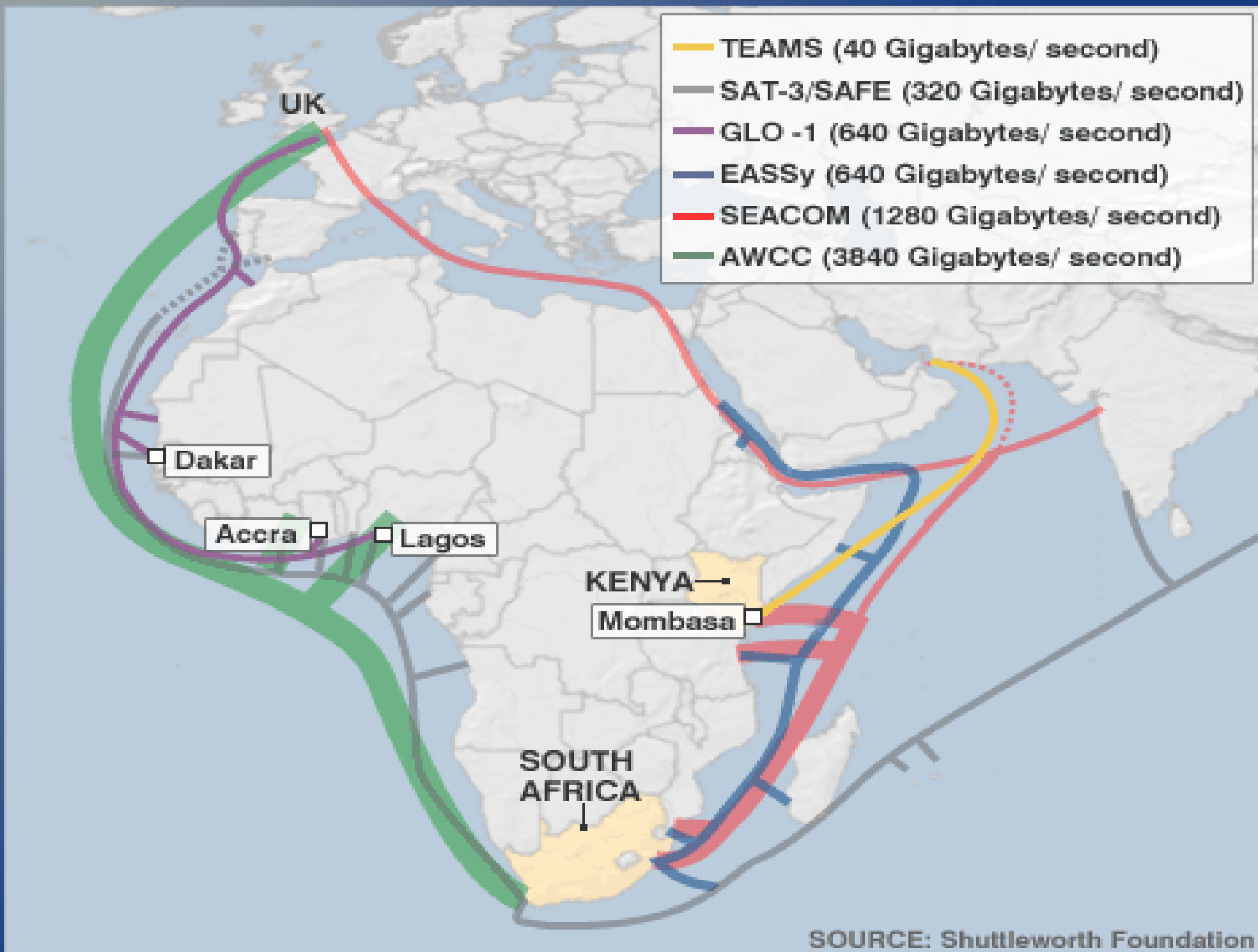
- Undersea connectivity was coming but many in the region were skeptical
- The three main cables on the way were: SEACOM, TEAMS and EASSy
- SEACOM to connect East Africa to London
- TEAMS to connect Kenya to UAE (Fujairah)
- EASSy focusing on inter-Africa connectivity to the rest of the world



SOURCE: SEACOM



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



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

- 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
- 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....

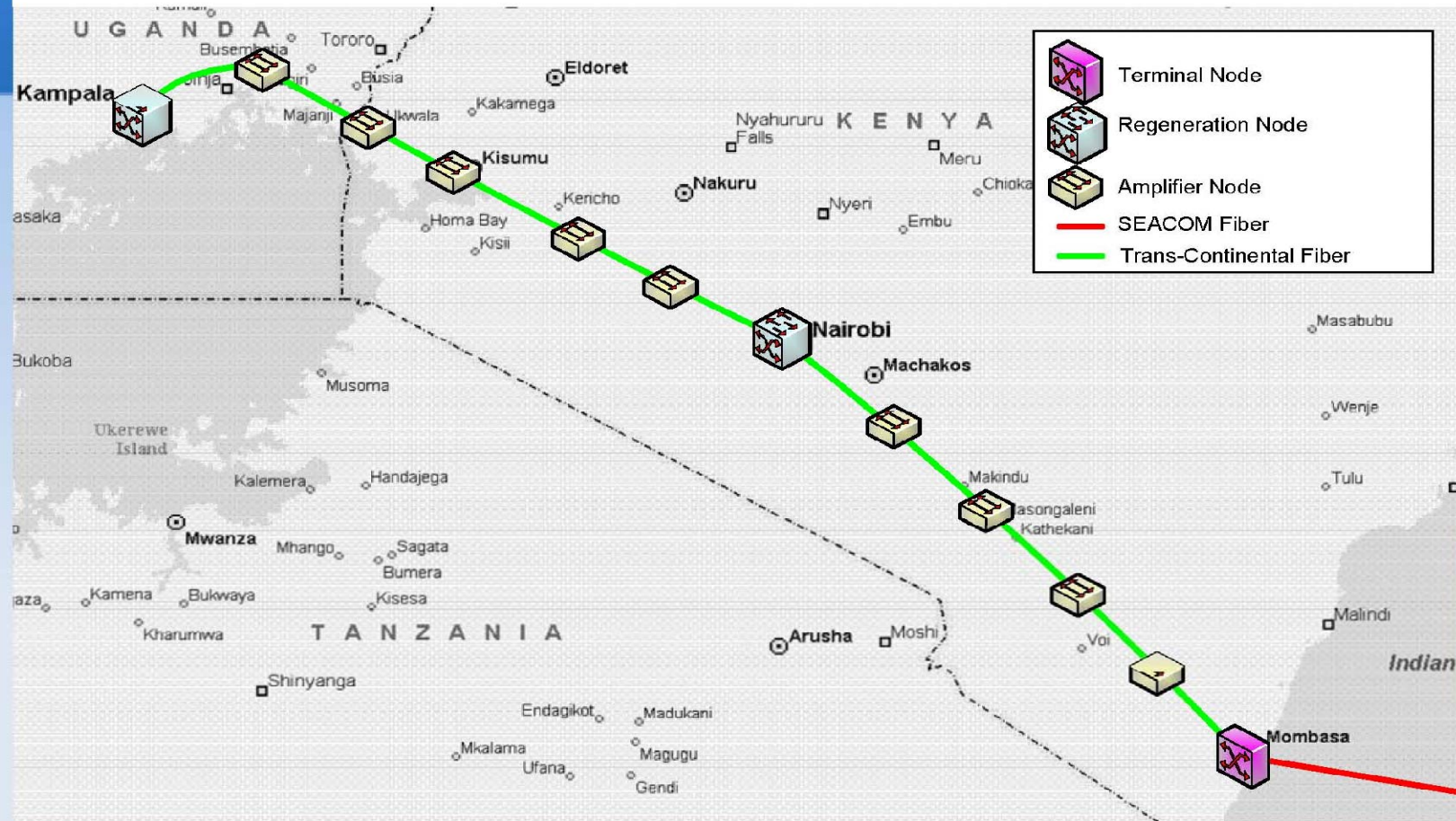
- SEACOM and TEAMS completed but EASSy still in progress, estimated completion is mid 2010
- SEACOM Fiber in Uganda is available to commercial ISPs via UTL
- Same story in Tanzania available via TTCL
- Rwanda also served by SEACOM via RTL from September 2009

CURRENT CONNECTIVITY – QUARTER 1 2010

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

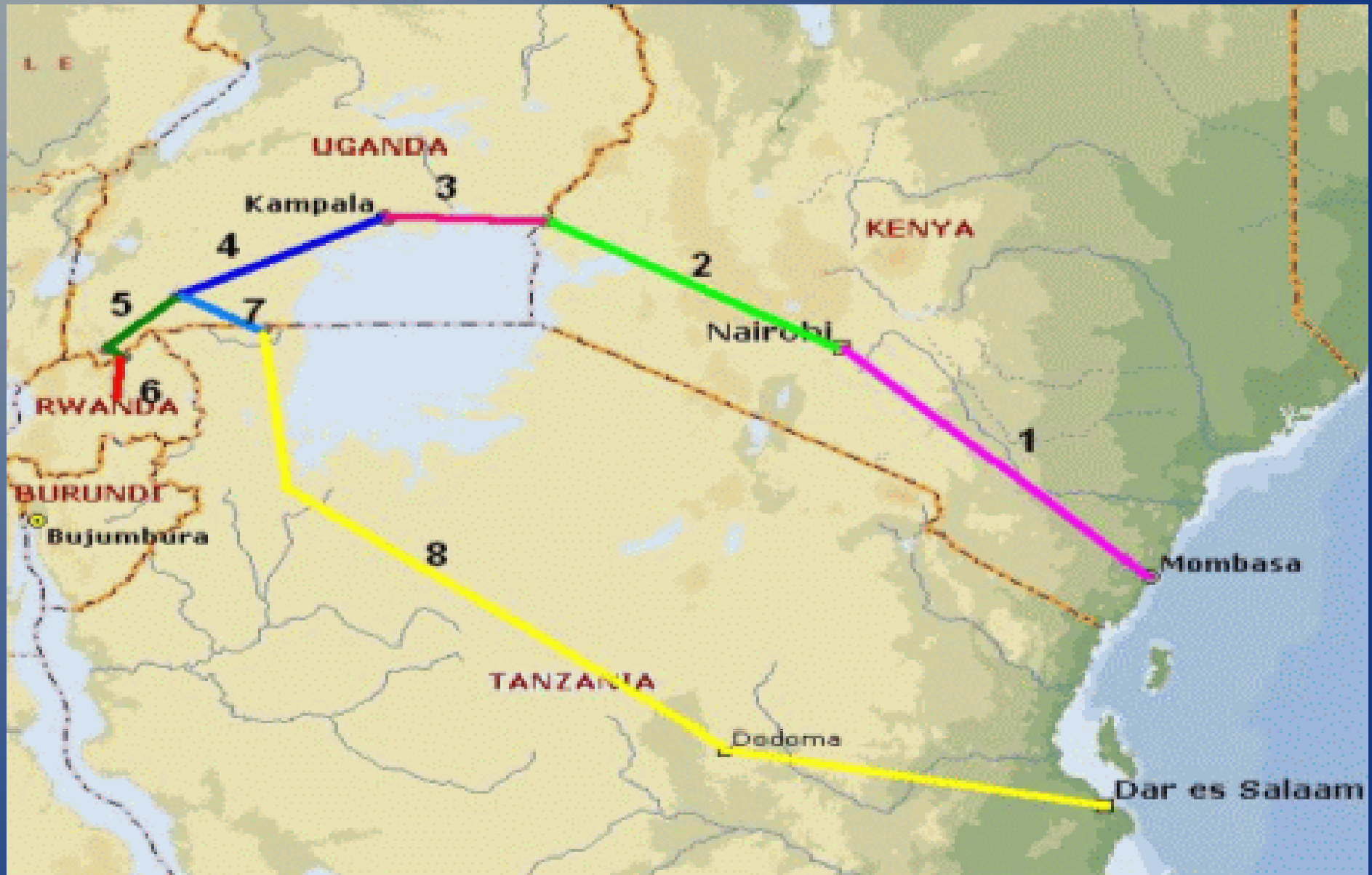
Kenya

- 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

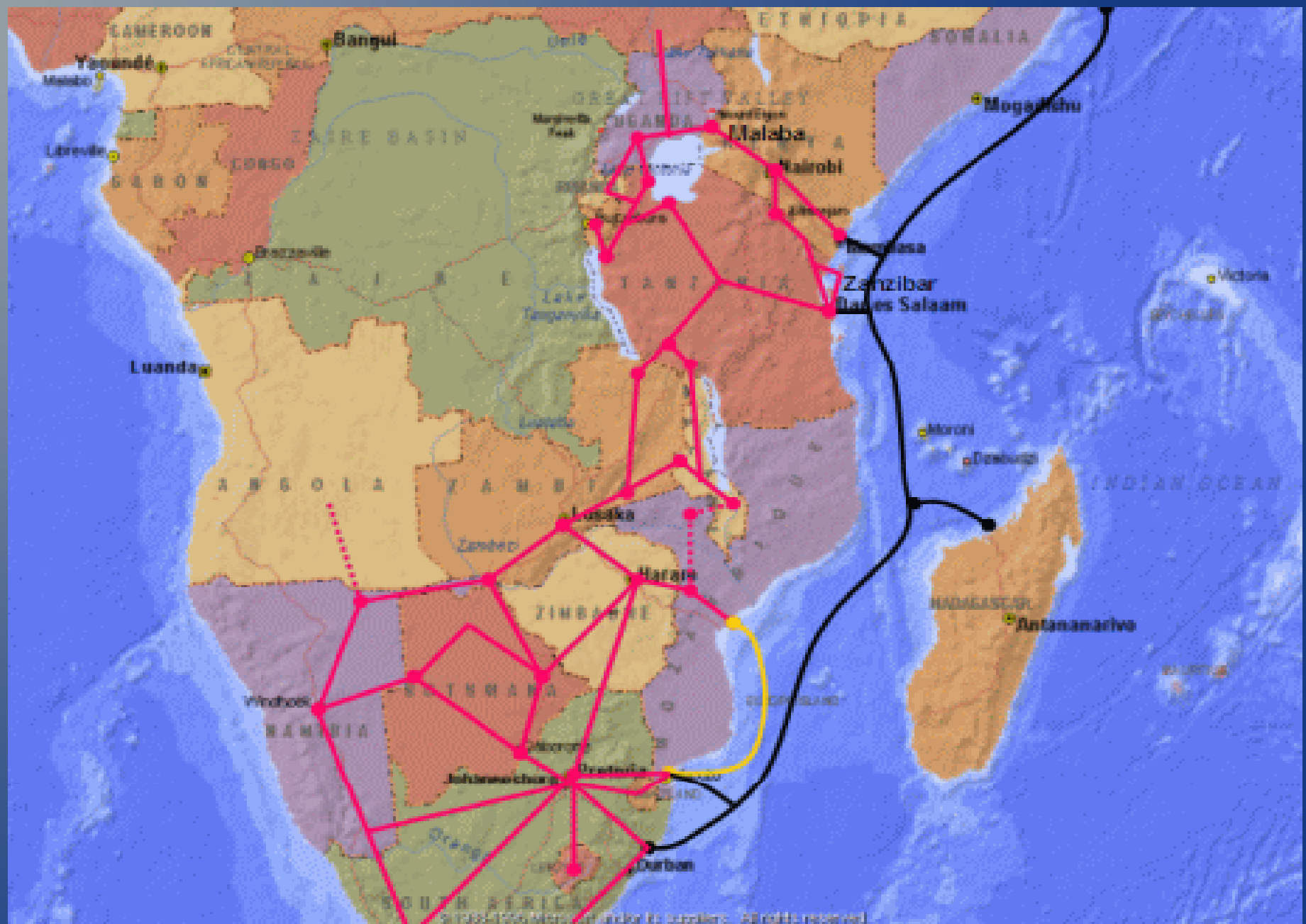
Tanzania

- SEACOM capacity is available via TTCL
- No other planned under sea cables at the moment apart from EASSy
- EASSy have estimated completion time of mid 2010

EASSy design for East Africa..



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



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

NRENS IN THE REGION AND THEIR CONNECTIVITY

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
- 50 connected institutions not all on fiber
- Enjoys massive support from large Universities – free hosting!

A bit on the consumption in KENET...

- 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 are planned this 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

OPTICAL FIBER NETWORKS FROM DIFFERENT OPERATORS SUPERIMPOSED ON KENET NETWORK

This map illustrates the geographical distribution of optical fiber networks across Kenya, highlighting the integration of various operators' infrastructure with the KENET network. The map shows major regions such as Western, Central, Eastern, North Eastern, and Coast, along with neighboring countries like Sudan, Ethiopia, Uganda, Somalia, and Tanzania.

KEY:

- NOFBI Optical fiber
- KENET member institution
- Telkom Optical fiber

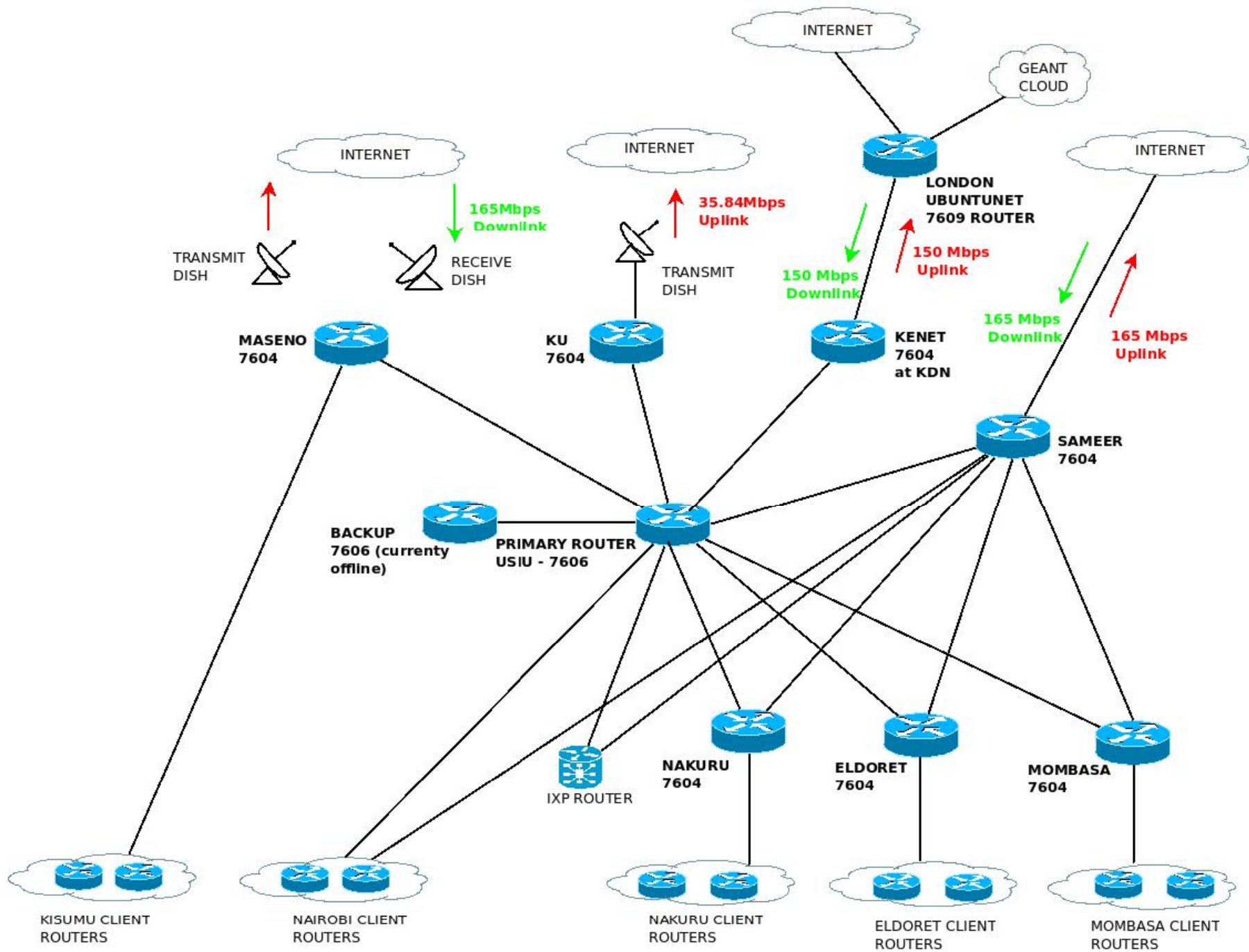
The map displays numerous locations where these networks intersect or terminate, including major cities like Nairobi, Mombasa, Kisumu, and Malindi, as well as smaller towns and institutions. A scale bar indicates distances up to 120 Kilometers, and a north arrow is provided for orientation.

[illegible]

EDGE LAYER eBGP

CORE LAYER IBGP

DISTRIBUTION LAYER OSPF and some IBGP



KENYA EDUCATION NETWORK INSTITUTIONAL COVERAGE MAP



NREN conclusion

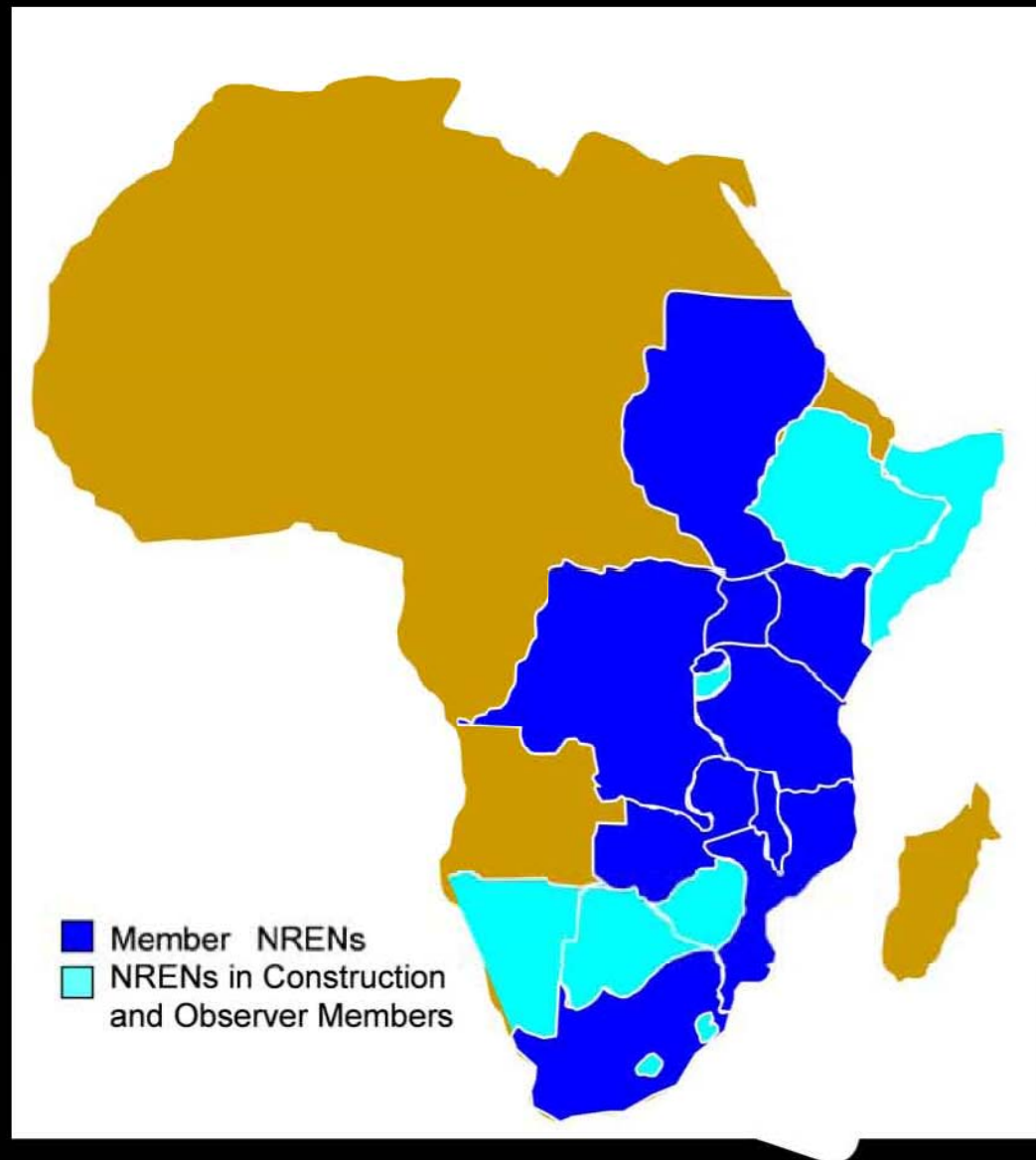
- Uganda are very close and will be active as soon as their equipment arrives. The delay has been more than a year and it is difficult to say when their equipment will arrive.
- Tanzania are also close and SEACOM have terminated. Once internal issues are sorted, they should come up before the end of 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

The UbuntuNet Alliance

What is Ubuntunet Alliance?

- A regional association of National Research and Education Networks (NRENs) in Africa.
- Established in the latter half of 2005 by five established and emerging NRENs in Eastern and Southern Africa with: MAREN (Malawi), MoRENet, (Mozambique), KENET (Kenya), RwEdNet (Rwanda) and TENET (South Africa).
- The driving vision was that of securing high speed and affordable Internet connectivity for the African research and education community in Gb/s rather than in Kb/s.

UbuntuNet Alliance



Source <http://www.ubuntunet.net>

UbuntuNet members

- * Eb@le, DRC
- * EthERNET, Ethiopia
- * KENET, Kenya
- * MAREN, Malawi
- * MoRENNet, Mozambique
- * RwEdNet, Rwanda
- * SomaliREN, Somalia
- * SUIN, Sudan
- * TENET, South Africa

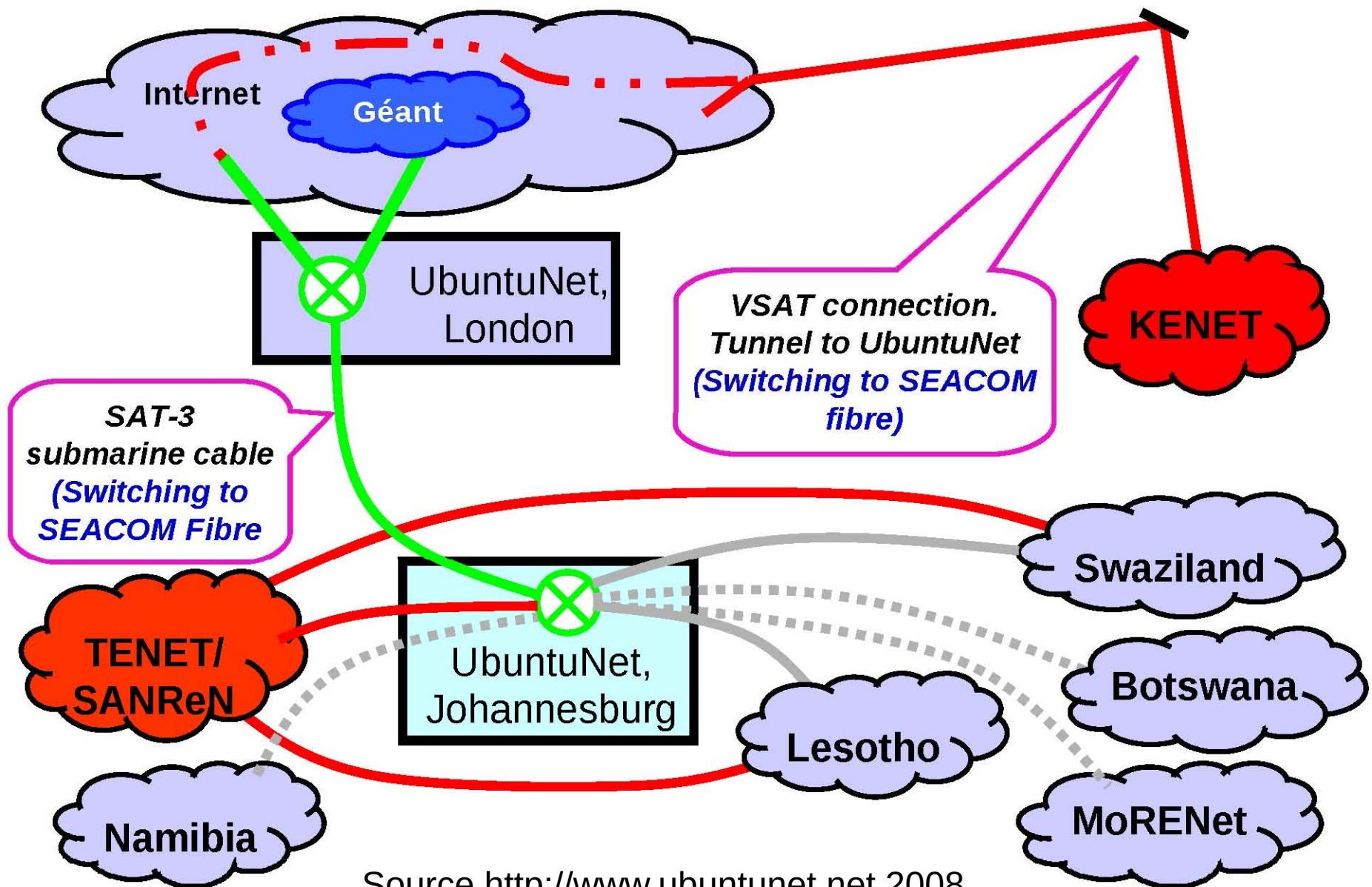
Current UbuntuNet Board

- Prof Zimani Kadzamira, VC, University of Malawi – Chairperson
- Mr Albert Nsengiyumva (from Rwanda) – Vice Chairperson
- Prof Meoli Kashorda (From Kenya)
- Dr Iman Abuel Maaly Abdelrahman (from Sudan)
- Mrs Margaret Ngwira (from Malawi)
- Dr Duncan Martin (from South Africa)
- Mr Steve Song (Shuttleworth Foundation)
- Prof John Kondoro (From Tanzania)

UbuntuNet NREN connectivity so far

- South Africa: 10Gbps on SEACOM
- KENET: 155Mbps on SEACOM, 500Mbps total
- RwEdNet: 155Mbps donation from government on SEACOM to London (pending)
- RENU: Working on 10Gbps connectivity on SEACOM with USAID and IEEAF
- Offers on the table for from SEACOM for TERNET; MoRENet, and UbuntuNet Alliance

UbuntuNet Current Operations



Source <http://www.ubuntunet.net> 2008

Planned activity

- TENET (SA) contracted to host Southern African NOC
- KENET contracted to host East African hub
- Inter NREN traffic will exchange in London for now but will change as soon as the NOCs are ready
- More advanced NRENs to help out the emerging ones

UbuntuNet hub in London

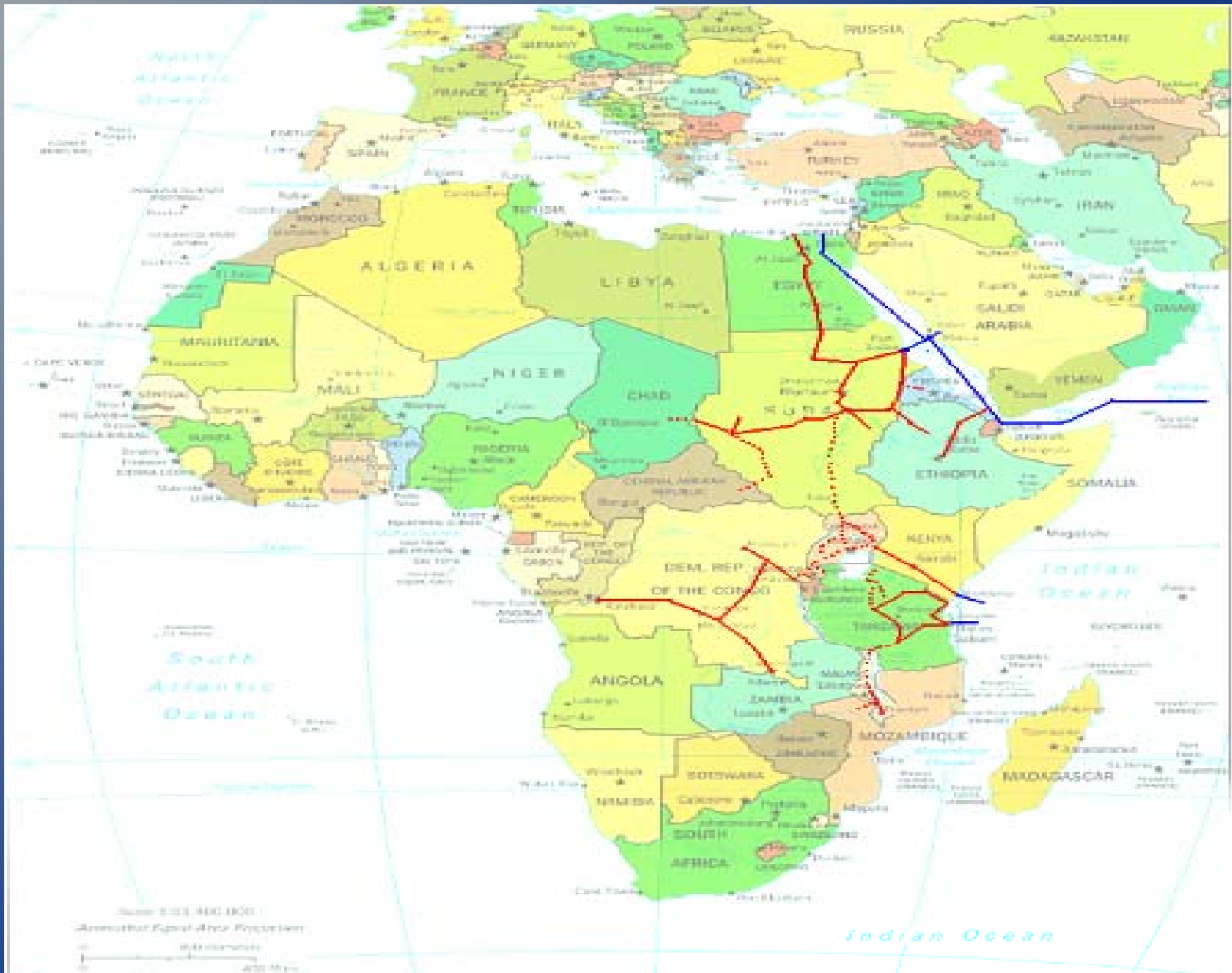
- Cisco 7609 router donated by Cisco Systems
- UbuntuNet's rack containing the router and other equipment is hosted by DANTE
- Hub became active in 2008
- UbuntuNet has own ASN
- TENET has been actively using the hub for sometime

UbuntuNet hub in London continued....

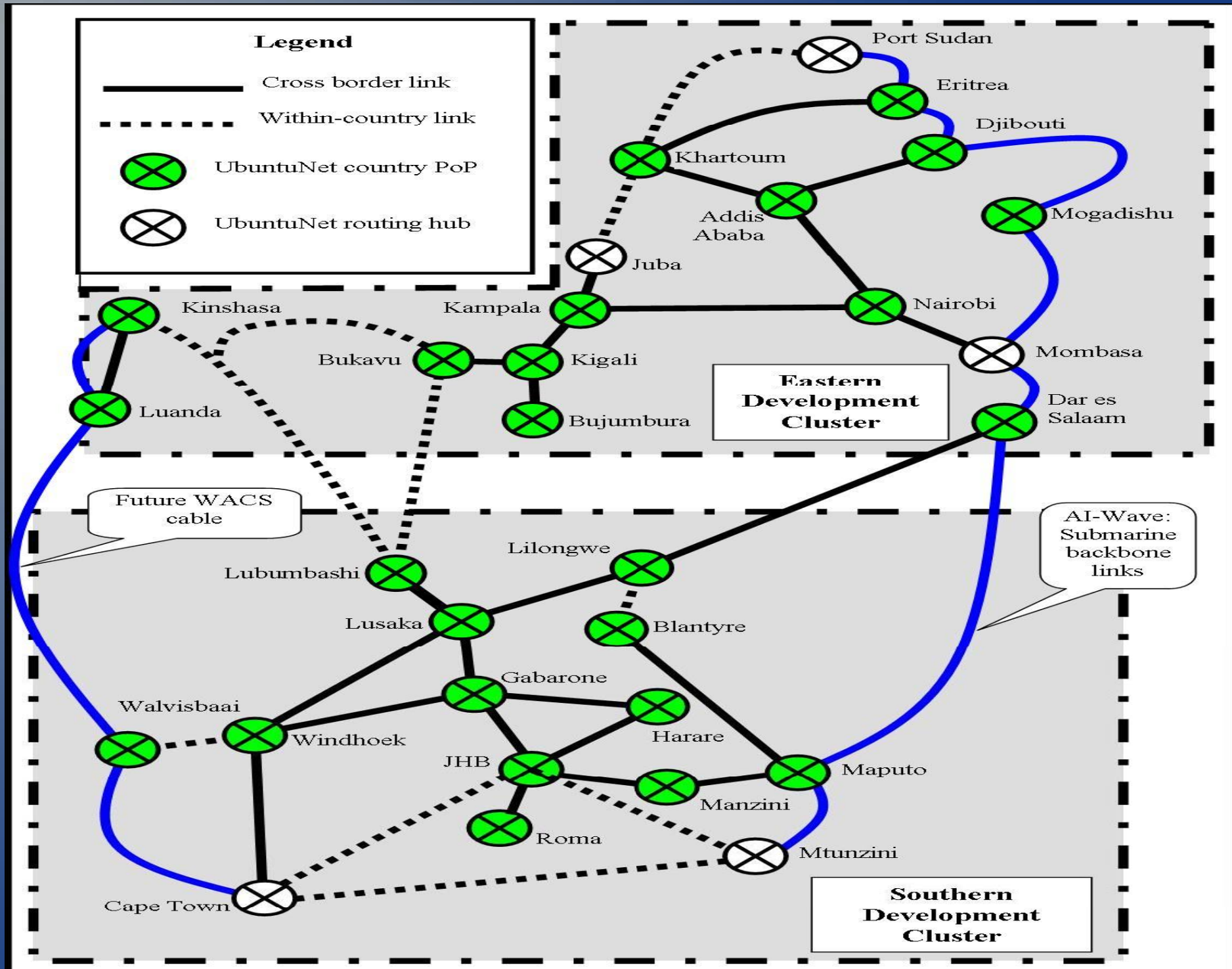
- KENET has just connected as of Jan 28th 2010
- Link is via SEACOM STM 1 155Mbps
- MTU has been set at 9216 Bytes
- Best latency 184ms
- Latency should improve once SEACOM complete Suez Canal route
- No current update on when that will be done

Conclusion

- TENET and KENET can now peer with GEANT
- TENET has been peering for sometime and is already doing MultiCast
- Most prepared NRENs are RENU (Uganda) and TERNET (Tanzania) and could be connected to UbuntuNet London before the end of the year
- Could look like:



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



Source <http://www.ubuntu.net> 2009

Thank you!

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<http://www.kenet.or.ke>

Q&A