

Developing Knowledge Infrastructure and Networks in Africa

**The findings of the African
Tertiary Institution Connectivity
Study (ATICS) and Lessons for
the Future of Knowledge
Networks**

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Universities as Leaders in Knowledge Networking

- Universities led the creation of the Internet before the commercial layer took hold
- African Universities also led the way in Africa but connected to the infrastructure as opposed to created an infrastructure.
- Why is there not more collaboration and inter-networking among African Universities?

African Tertiary Institution Connectivity Study (ATICS 2004)

Website: www.atics.info

Scope: 83 institutions in 40 countries in Africa participated.

Time: Data collected between August – November 2004

Objectives:

- **Assess types of connectivity, bandwidth capacity and costs at tertiary institutions**
- **Assess existing types of Internet service providers**
- **Assess VSAT use and license agreements**
- **Assess levels of computer infrastructure**
- **Assess bandwidth monitoring and management**
- **Assess planned ICT initiatives as well as degree of e-learning**

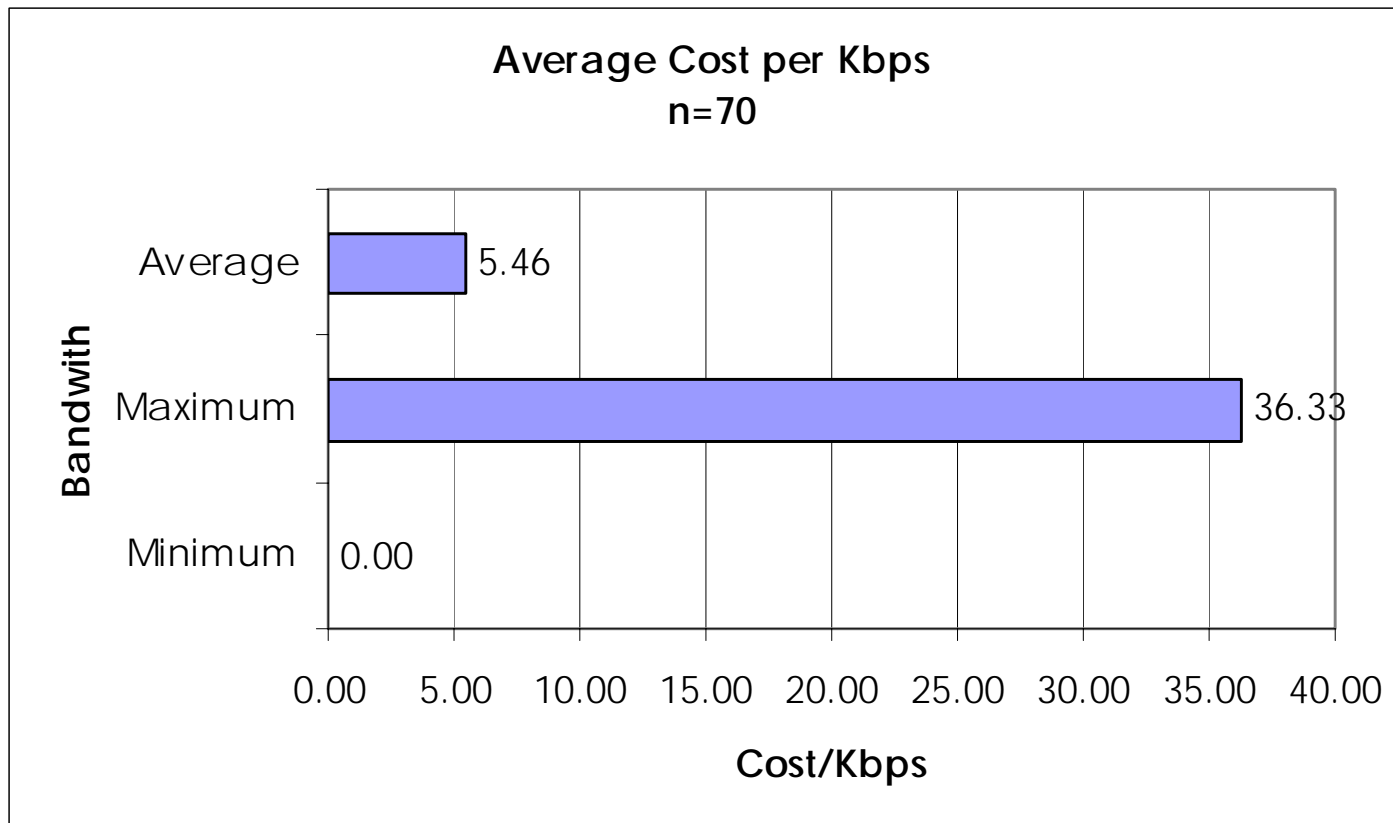
Bandwidth Availability

- Average university has no more bandwidth than the quantity of a residential connection in US or Europe. The average bandwidth reported for the sample is 537/769 Kbps.
- High Demand for bandwidth amongst most institutions -- the average percentage of time where links are at 100% capacity is over 60%. (Extremely high, given that this is measured over 24 hours a day every day of the month).

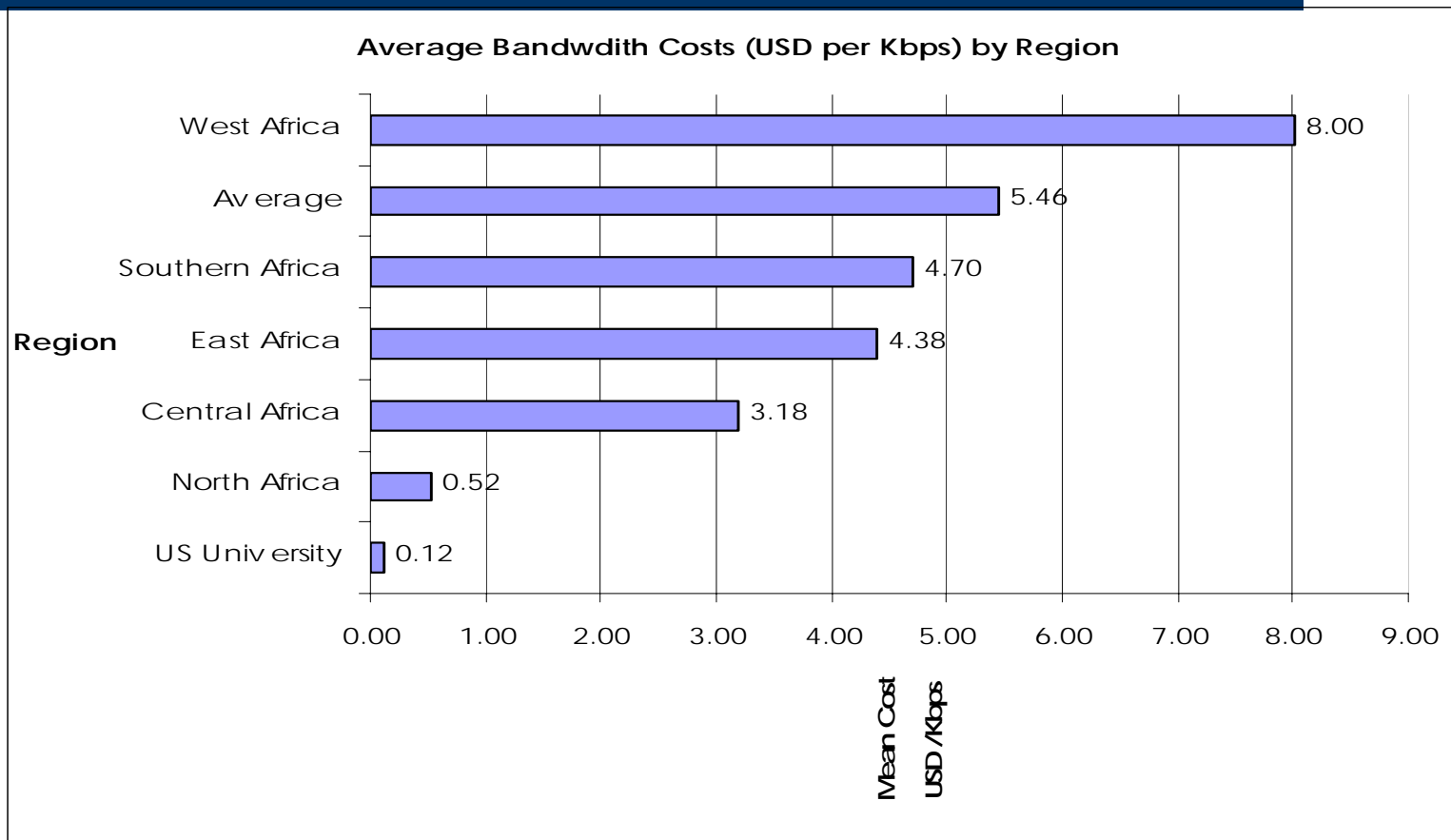
Bandwidth Cost

- On average, African tertiary institutions pay US\$5.46/Kbps -- roughly equivalent to fifty times what a typical US University would pay for the same quantity of bandwidth.
- The greater the volume of bandwidth → the lower the marginal cost of that bandwidth.
- Regionally, institutions from West Africa are paying the highest amount of US\$8/Kbps while institutions from North Africa are paying only US\$0.52/Kbps. This is due to consortiums that have been formed and access to fibre networks.
- High disparities within countries. Botswana College of Agriculture, while it is a part of University of Botswana, pays a much higher cost to the same provider, Botswana Telecommunications Corporation. University of Botswana pays 17000USD for 1MB/4MB wire connection (\$3.32/kbps) while Botswana College of Agriculture pays 4000USD for 128 Kbps wire connection (\$15.63/kbps).
- VSAT costs were found on average to be much more expensive than land-based connections. Although land-based connectivity in most countries in Africa ultimately comes from VSAT and has a much lower quality.

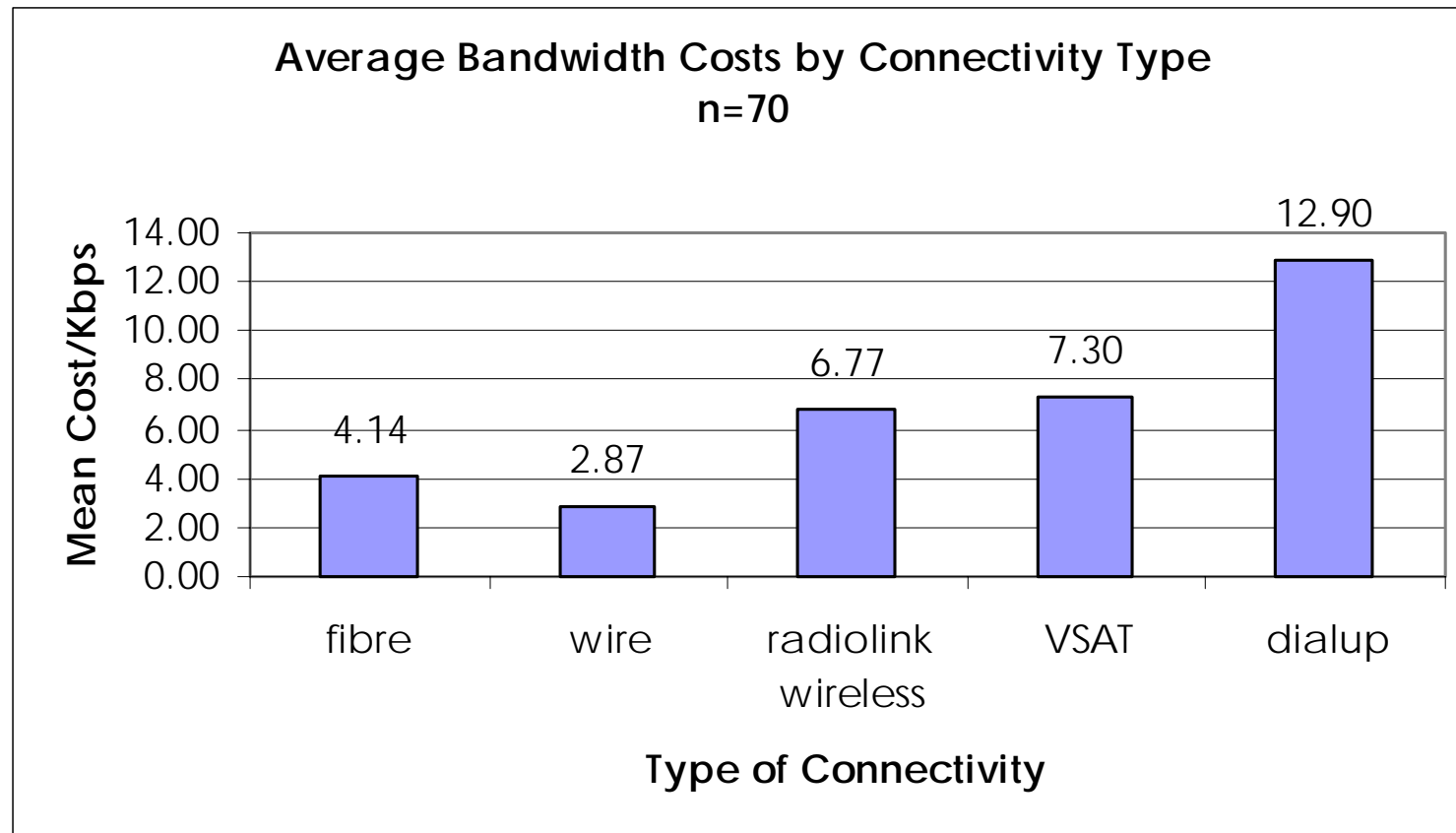
Average Costs Chart



Average Cost per Region



Average Cost by Connectivity Type



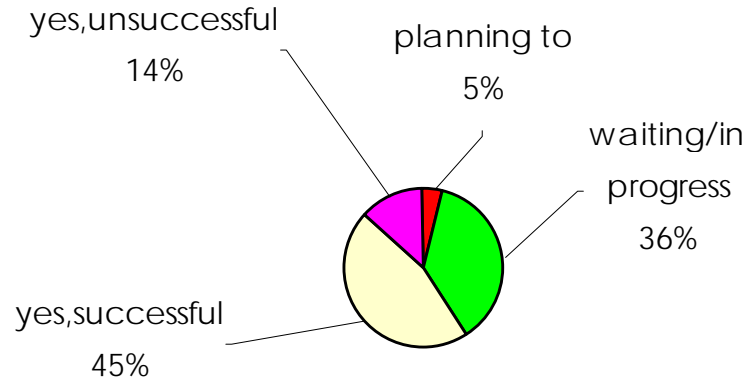
Regulatory Issues

- Only 14 of 52 countries have clearly defined competitive satellite regimes.
- Altogether 55% of universities had not been able to get a proper VSAT license.
- An encouraging result however is that the majority of the VSAT owning institutions (58%) said they had free licenses, in most cases through waivers for educational institutions.
- The average annual cost of a VSAT license is US\$13, 553. This average annual cost is far higher than the EU average of US\$426, showing that VSAT is still expensive in Africa compared to the developed world.

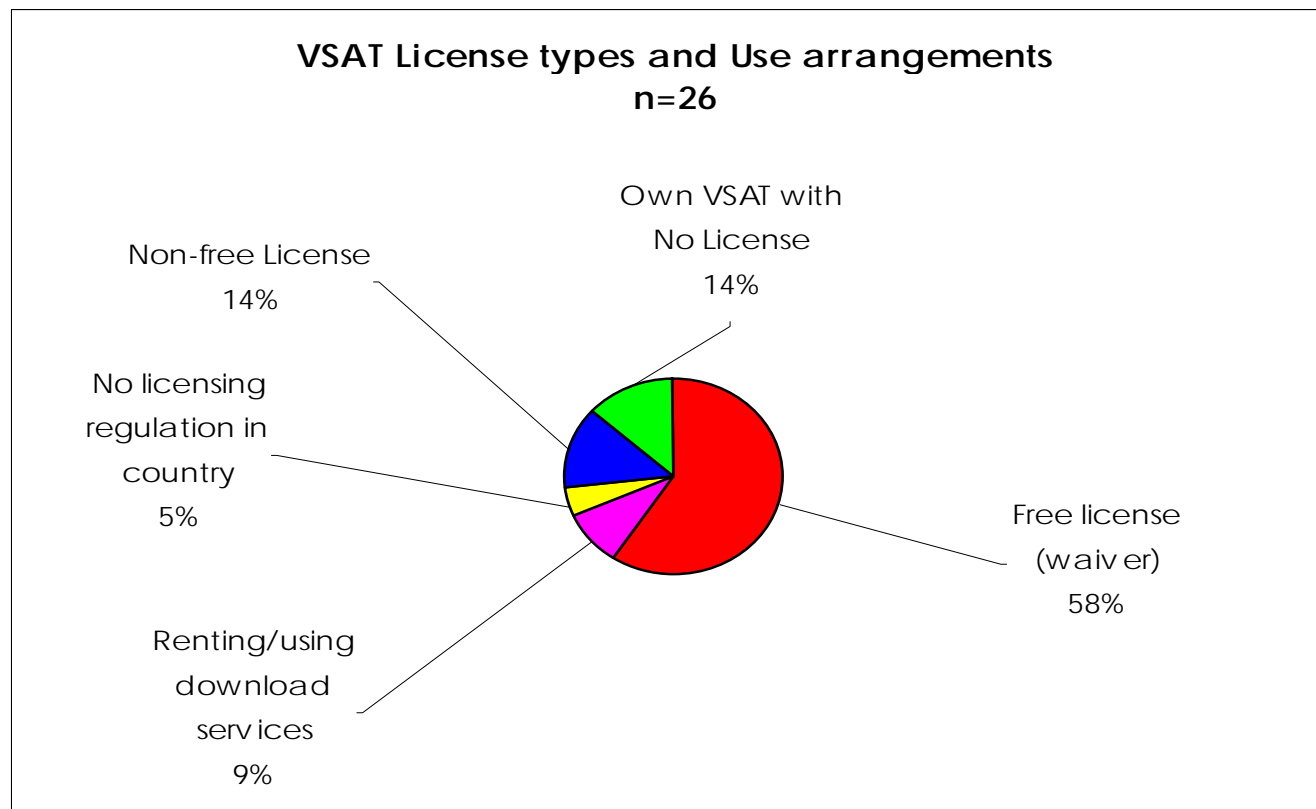
Note: The figure is skewed toward the high side by some extreme cases -
- with some institutions required to pay as much as US\$72, 000 (Zimbabwe) compared to some paying as little as US\$267 (Rwanda).

Attempts to obtain VSAT license

Attempts to obtain VSAT licenses
n=36



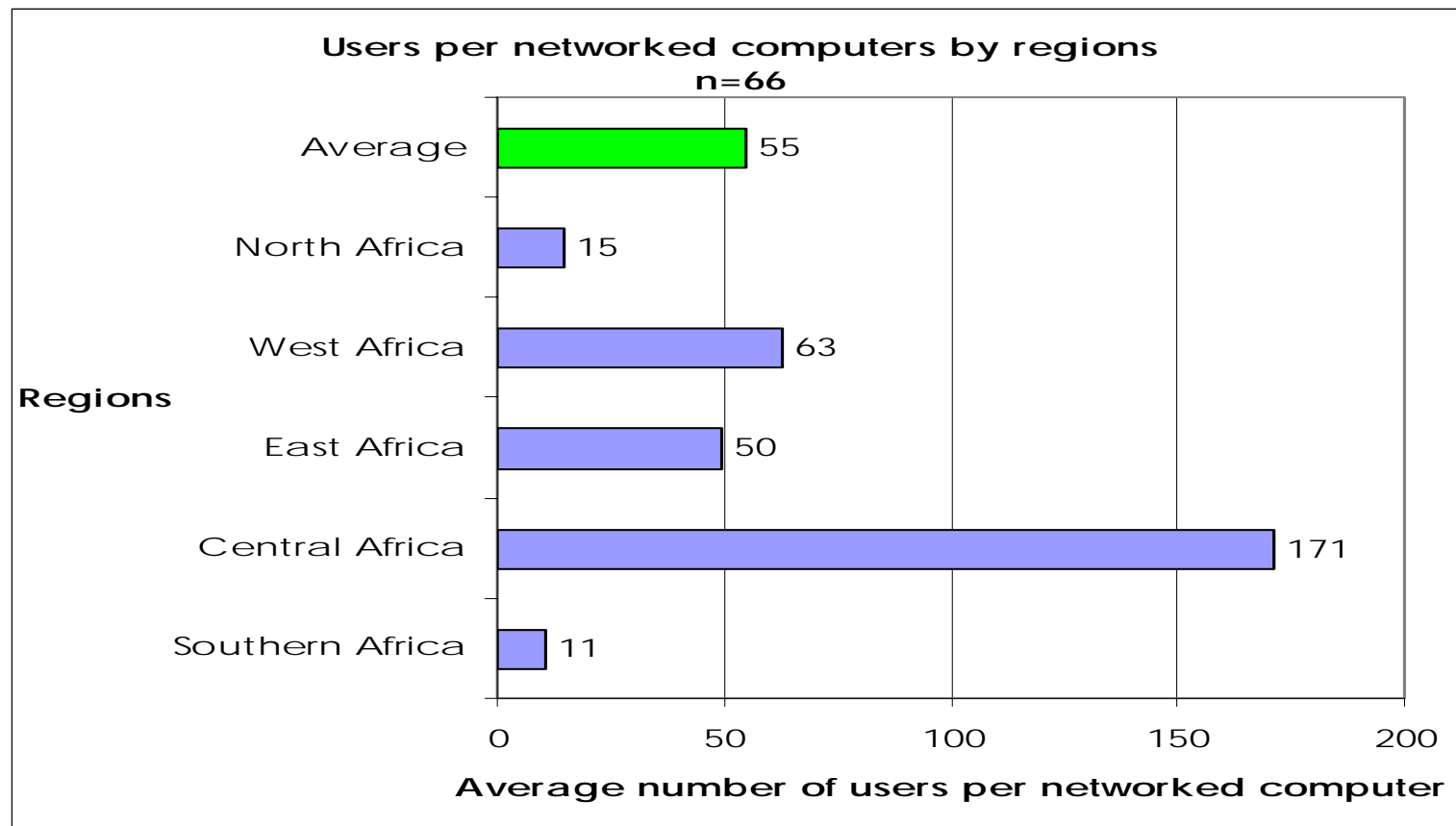
VSAT License Types



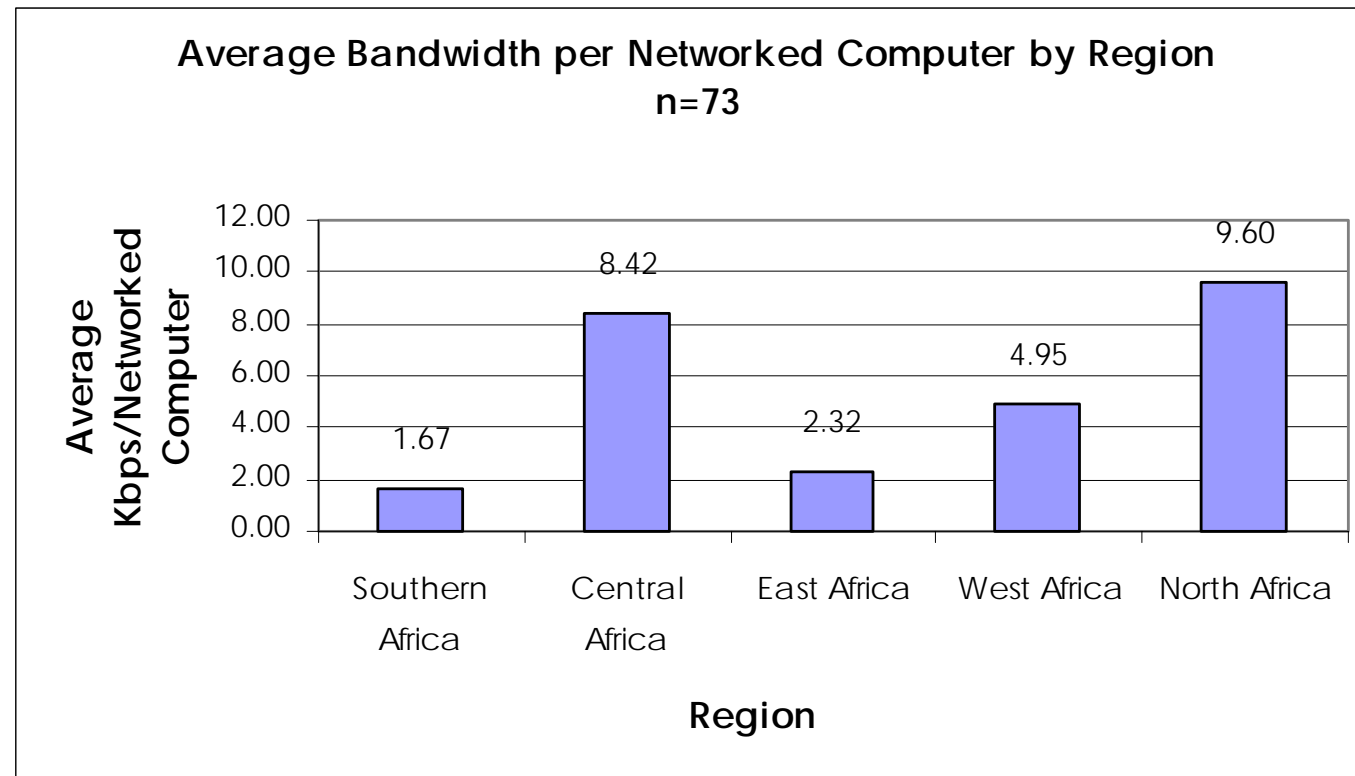
Bandwidth Utilization

- There are large differences in levels of computer access among the institutions. The highest number of users per computer is 929. The average across the sample is 55, which is still relatively high compared US institutions, which is thought to be about five.
- The lowest bandwidth per networked computer is 0.32Kbps compared to the highest bandwidth of about 37Kbps - roughly equivalent to a dial up modem connection. The average bandwidth per networked computer is 3.36Kbps.

Average users per networked computer by Region



Average Bandwidth per Networked Computer by Region



Bandwidth Management

- The majority of the respondents (59%) reported that they did not practice bandwidth management, or seldom did so, thus indicating a critical need for skills training in this vital area.
- Although 41% indicate that they monitor their bandwidth, only five of the universities could provide basic usage figures such as average bandwidth used, indicating that monitoring is sporadic at best.

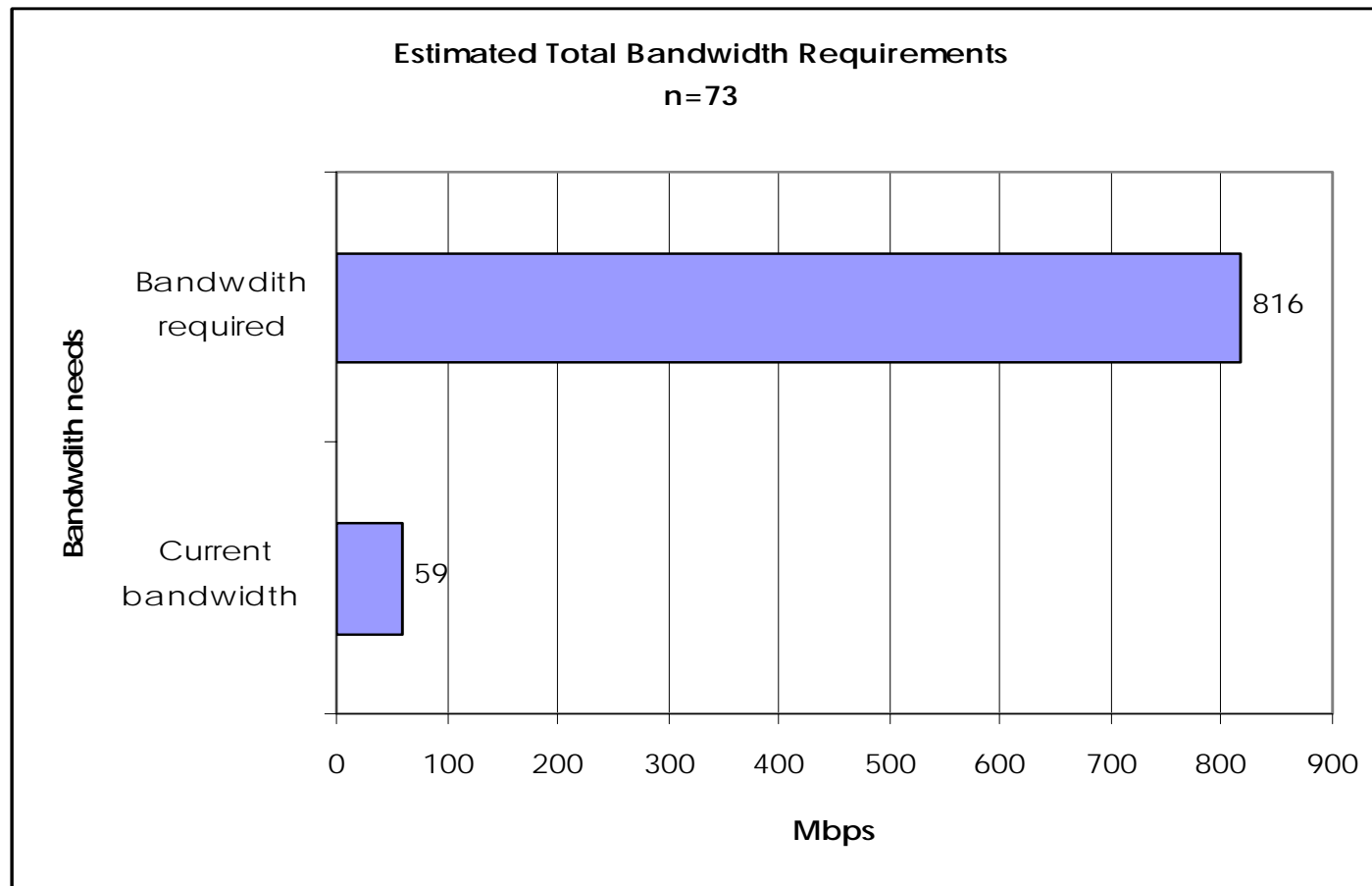
Bandwidth and ICT initiatives

- While 45% have a written e-learning/IT strategy an almost equal 42% do not.
- Perhaps more significantly, only 8 countries in Africa currently have National Educational & Research Networks, and only 22% of the institutions surveyed are members of these networks.

Bandwidth Requirements

- In comparing current bandwidth with estimated requirements for 73 Sub Saharan universities, calculation shows that bandwidth requirements are at least 10 times the current usage.
- This represents the capacity of 5 to 10 transponders if a VSAT solution was to be put in place.

Estimated Bandwidth Requirements



Knowledge Network Creation for Development

1. Economic Efficiencies.
 - Formation of Bandwidth Buying Consortium— could half the cost of bandwidth; digital libraries; learning management systems; etc. Improved Bandwidth Management.
 - Trust?
2. Cluster Formation.
 - Collaboration across institutions for research and curriculum development to create the best of African ideas.
 - Linkages with Industry and Financial institutions -- > MIT wealth creation.
 - Aggregating Expertise -- Centralized Network Management and Technical Capacity.

Knowledge Network Creation for Development

3. Access to Others

- Benchmarking.
- Breaking down of psychological and cultural isolation.
- Opportunities for international research contracts.

4. Pedagogy

- 21st century skills – information reasoning, teamwork, cultural understanding, information literacy.
- Teachers at schools with computer labs are 3.7 times more likely than other teachers to assign independent research and 4 times more likely to assign collaborative work (VSAT).
- Availability of computers and Internet each significantly increases the likelihood that teachers will assign work involving active learning (VSAT).

Knowledge Networks in the Future

- Networked Universities as Engines for Growth and Development in Knowledge Economy.
- Integral part of cluster of innovation – creation of ideas and skills.
- Competing internationally for the best minds and collaborating internally to create the best knowledge.



Thank You.



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