INVESTIGATION

OF

BANDWIDTH CONSOLIDATION FOR PARTNERSHIP UNIVERSITIES

A Report Prepared

By

The African Virtual University

For

The Partnership for Higher Education in Africa

FINAL REPORT

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October 15 2004

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Acronyms & Abbreviations

ACRONYM	MEANING
AAU	The Association of African Universities
AVU	The African Virtual University
BPSK	Binary Phase Shift Keying
BW	Bandwidth
BUC	Block Up Converter
CIR	Committed Information Rate
C-Band	Satellite frequency band (4 and 6 GHz)
DVB	Digital Video Broadcasting
GDES	General Data Equipment
HPA	High Power Amplifier
ICT	Information and Communications Technology
IT	Information Technology
IFL	Inter facility Link
IRD	Integrated Receiver Decoder
ISP	Internet service provider
Kbps	Kilo bits per second
Ku Band	Satellite frequency band (14 and 11 GHz)
KVA	Kilovolt ampere
LNB	Low Noise Block
Mbps	Megabits per second
MRTG	Multi Router Traffic Grapher
NOC	Network Operations Center
NSS	New Skies Satellite
NUC	Nigeria Universities Commission
NUNET	Nigeria Universities Network
PCs	Personal Computers
PSK	Phase Shift Keying
QPSK	Quaternary Phase Shift Keying
RFP	Request for Proposal
RRD	Round Robin Database
RX	Receive
SCPC	Single Channel Per Carrier
SFD	Saturation Flux Density
SLA	Service Level agreement
TDMA	Time Division Multiple Access
TOR	Terms of Reference
TX	Transmit
VAT	Value Added Tax
VSAT	Very Small Aperture Terminals
WIFI	Wireless Fidelity

Acknowledgements

We wish to sincerely thank all the Heads of IT and Vice Chancellors of the Partnership supported universities who extended their warmest welcome to us, provided or helped us find transport and accommodation. Also to all the IT staff that provided us with the information we required, replied the numerous emails and filled in the lengthy questionnaires: thank you.

Our sincere thanks also go to the staff of the MacArthur Foundation office in Nigeria for their help in coordinating and advising on the travel within Nigeria.

Lastly we wish to sincerely thank the Partnership Facilitator and all the Partnership Foundation staff who facilitated this investigation in any way.

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October 2004

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Partnership Supported Universities in Africa[1]

INSTITUTION	LOCATION (City, Country)
Association of African Universities (AAU)	Accra, Ghana
University of Education, Winneba	Winneba, Ghana
University of Ghana	Accra, Ghana
Eduardo Mondlane University	Maputo, Mozambique
Bayero University	Kano, Nigeria
Obafemi Awolowo University	Ife, Nigeria
Ahmadu Bello University	Zaria, Nigeria
University of Port Harcourt	Port Harcourt, Nigeria
University of Ibadan	Ibadan, Nigeria
University of Jos	Jos, Nigeria
University of Dar Salaam	Dar es salaam, Tanzania
Makerere University	Kampala, Uganda

Table 1- Partnership Universities in Africa

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[1] Includes the AAU which is not a university but is supported by the Partnership

1.0 Introduction

The Partnership for Higher Education in Africa contracted the AVU at the end of July of 2004 to investigate the possibilities of reducing the international bandwidth costs for Partnership supported universities by consolidating the universities' bandwidth needs to achieve economies of scale, greater bargaining leverage and command volume discounts.

Partnership supported universities are currently paying exorbitant and unsustainable costs for connectivity, with the greatest cost element identified as international bandwidth. In early 2004, the average cost of bandwidth for Partnership universities was approximately $10 per Kbps with a total bandwidth commitment of just a little over 12 Mbps[2].

From this investigation, it has been established that Partnership supported universities are currently paying an average of $5.73 per kbps per month for those with VSAT connectivity and $6.96 per kbps per month for those with leased lines for dedicated[3] bandwidth for a total network bandwidth amount a little over 16[4] Mbps. These figures indicate that Partnership supported universities are actively negotiating lower bandwidth costs while increasing their bandwidth commitments.

The target price proposed by the Partnership supported universities is $2.5 per kbps or lower after extensive discussions by the Conference of Partnership Universities' Vice Chancellors held in Dar es Salaam from September 10 to 13, 2004.

Preliminary negotiations with the AVU provider Netsat Express in early September of this year had indicated that it is definitely possible to reduce the cost to $3.5 kbps (at least 10 Mbps committed) for dedicated bandwidth or $2.64 per kbps for bursting bandwidth (11 Mbps CIR DVB outbound bursting to 22 Mbps and 4.2 Mbps inbound SCPC) with guaranteed CIR minimums.

The latest negotiations with Netsat have yielded least cost pricing for dedicated bandwidth of $3.1 per kbps (for a minimum of 10 Mbps) achievable with the use of 3.8 m antennas and 8 PSK modulation scheme across all the universities. Otherwise, the least cost using 2.4 m antennas would be about $3.8 per kbps for a minimum of 10 Mbps for dedicated bandwidth. Unfortunately, quotations were not received from New Skies despite repeated emails and telephone calls.

The quotations received and other data collected on the Partnership supported universities are analyzed in greater detail within this report. The methodology followed is also detailed and the report ends with key recommendations on the way forward.

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[2] Source: Partnership TOR
[3] Does not include universities with shared bandwidth
[4] Excludes UDSM VSAT used for the commercial service

2.0 Objectives of the Investigation

The Partnership contracted the African Virtual University (AVU) to undertake a three-month investigation focusing on the aggregation of demand to achieve economies of scale and lower bandwidth costs for the Partnership supported universities and the AAU.

Under the assignment, the AVU was expected to:
1. Ascertain from Partnership universities and the AAU the amount of bandwidth each institution would commit to purchase if costs were sufficiently lowered. Considering the fact that economies of scale reduce bandwidth costs substantially, grantees would be asked how much bandwidth they would purchase if the cost were $5.10 and how much they would purchase if the cost were $3.00 or less.

2. Determine the modalities and costs for Partnership institutions to switch to AVU for bandwidth purchase. Costs might include technical adjustments to VSATs, leased line costs for the AAU, and financial assistance and legal expenses for early cancellation of existing contracts.

3. Renegotiate its contract with Netsat Express and New Skies Satellite based on its plans to purchase more bandwidth.

3.0 Methodology Adopted

The investigation followed a rigorous approach whose steps are outlined below:

      3.1 *Planning:*

A survey questionnaire was refined and reviewed to ensure that it would capture the pertinent data. The questionnaire covered, among other data, how much bandwidth supported universities currently purchase, the per Kbps cost, amount of bandwidth the supported university would purchase if costs were lowered sufficiently, current vendor information, existing contract deals, and other relevant technologies of the existing connectivity system.

      3.2 Discovery:

This phase focused on the collection of data about the existing connectivity arrangements at the Partnership supported universities and the AAU. The data collection was conducted through questionnaires and physical site visits.

    Questionnaires- these were sent out to all the Partnership universities by email. The universities were requested to each complete the questionnaire and return it by email before physical visits could commence. About half the questionnaires were completed and returned on time. All completed questionnaires are provided as Appendix 3 to this report. Physical site visits- these were made to each of the Partnership supported universities between September 8 and September 20, 2004. During the physical visits, additional information was collected and information already provided clarified and verified through meetings with the institution's ICT Head and his/her staff. Site visits also provided the universities with the opportunity to have their questions about the AVU and the bandwidth process answered or clarified. This was especially useful to the universities in Nigeria that have previously not had any formal interactions with the AVU.

      3.3 Analysis:

Once the physical site visits to the Partnership supported universities and the AAU were completed, the analysis of the collected data begun. The analysis focused on determining the total bandwidth requirement, the target price per Kbps and the modalities, costs and the legal implications for switching to a new provider. The resultant data formed the "baseline data" that was used as the basis for negotiation for cheaper bandwidth with service providers. This data is analyzed and presented in detail in section 4 below.

The baseline data was also shared with Mr. Steve Huter of the National Startup Resource Center (NSRC), as required by the Partnership, who was expected to review and where necessary obtain comparative prices. The NSRC has considerable experience in implementing academic networks such as the one the Partnership envisages and, thus has excellent contacts with vendors as well as possessing a great deal of technical expertise. The NSRC will therefore serve as backup support to the AVU and help ensure that the final negotiated bandwidth price is indeed the lowest price. Feedback from Mr. Huter has indicated that the latest prices negotiated with Netsat are indeed competitive in the market. However, Mr. Huter is of the opinion that opening up the process to invite other service providers and stimulate competition could yield even better results. The AVU is inclined to agree with Mr. Huter.

      3.4 *Negotiation:*

Quotations were sought from Netsat Express (the AVU's provider) and New Skies Satellite and negotiations subsequently held. The engagement of both providers independently was

deliberate to maximize on possible discounts. Rather than open up the field to competition, contact was limited to these two providers in this phase for the following two main reasons:

i) The AVU had already selected Netsat Express through an International Competitive Bid (ICB) in accordance with the World Bank procurement guidelines and procedures for the supply of VSAT Internet services and broadcast services. New Skies is the provider of space segment under the Netsat proposal. The AVU was therefore trying to renegotiate the proposed contract to include the Partnership supported universities and thereby leverage scale and lower costs even further for both the AVU and the Partnership.

i) The bidding processes including negotiations, contracting and implementation can take anywhere from 6-12 months for a project of this magnitude and especially as the AVU must adhere to all the World Bank procurement rules. The AVU has already been through a lengthy period of bidding, and negotiations with Netsat and thus believed that continued negotiations was a faster and more cost effective approach to deliver lower bandwidth costs. The quotations provided by Netsat are analyzed in detail in section 6 below.

For these two reasons, the AVU felt that bidding at this time would not provide any economy or efficiency. The AVU's overall strategy was to negotiate with Netsat and obtain immediate relief for the Partnership supported universities from their current high costs of connectivity. The envisioned contract with Netsat was for one (1) year. At the same time, the AVU would embark, with the Partnership's agreement, on a more comprehensive and detailed open international competitive process to identify a longer term partner and lower costs even further. However, this strategy will be adjusted to undertake an international bid earlier than planned given the resultant quotations from Netsat that, although very competitive, could be challenged by universities already claiming lower costs. The proposed approach is detailed in the recommendations section and in Appendix 1.

By the time of writing this final report, New Skies had not provided any independent pricing information. New Skies did however indicate that they did not want to compete with any of their customers.

3.5 Presentation of draft report and outcomes of the Dar es Salaam conference

The initial negotiations efforts were concluded in early September and a draft report compiled and presented at a Conference of Vice Chancellors of Partnership supported African universities on Bandwidth Management and Applications from September 10 to 13 of 2004 in Dar es Salaam. Final negotiations were held incorporating feedback from the conference.

At this conference, the Vice Chancellors resolved to establish an initiative called Bandwidth Initiative for African Universities to lead to the availability of dedicated bandwidth for the network of universities at a target cost of $2.5 per kbps per month of downlink or uplink capacity by January 1 2005.

The Vice Chancellors also agreed to give the AVU the exclusive mandate until December 31 2004 to negotiate with satellite companies and providers on their behalf to procure bandwidth at the target cost of $2.5 per kbps per month.

3.6 Next steps

The negotiations have taken a lot longer than anticipated and the final pricing was received close to the completion of this assignment. As such, the latest price quotations have not been shared with the Partnership supported Universities to obtain their feedback or commitment to purchase.

The price quotations received from Netsat are considerably higher than the target of $2.5 per kbps. The lowest quotation is at $3.1 per kbps per month for dedicated bandwidth. This price is above what at least one Partnership supported university[5] reported to be receiving and as such would not be considered credible.

It is considered prudent that the approach be revised at this point and an international bid be floated. The time table for such a bid would be very tight in order to beat the December 31st 2004 cut off date for the AVU's exclusive mandate; however, it is the considered opinion that the tight deadline can be met, with a service start date of mid or late January 2005. A timeline for the bidding process is presented in Appendix 1. A draft Request for Proposal (RFP) is also attached to this report. Informal preliminary indications from the World Bank show that a new open bid would be welcome and probably useful at this stage and that the tendering process could be made flexible and expedited as well without having to follow rigorous World Bank rules.

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[5] UDSM

4.0 Bandwidth Requirements and Target Price

The data collected from the universities was analyzed to determine the current utilization and potential bandwidth requirements if the price was right and the optimum bandwidth requirements given the current numbers of connected computers in the universities. The analysis also includes an examination of the current connectivity technologies used as well as the intricacies of satellite connectivity pricing.

4.1 Current connectivity methods

Nine (9) of the Partnership supported universities currently use VSAT as their Internet access technology. The other three (3) utilize wired terrestrial connectivity methods (leased lines). Of the universities with VSATs, five (5) universities have dedicated or committed bandwidth.

4.2 Bandwidth requirements

Table 2 summarizes the current utilization, potential and optimum bandwidth requirements for the Partnership supported universities. These requirements are defined in the following section.

Institution	Current Utilization	Potential Demand	Optimum Demand
	kbps	kbps	kbps
University of Dar Salaam	3,000	3,000	15,000
Makerere University	3,768	6,000	30,000
Eduardo Mondlane University	2,560	4,000	24,000
University of Ghana	1,536	5,000	6,000
University of Education, Winneba	1,064	384	4,000
Ahmadu Bello University	640	2,560	4,500
Obafemi Awolowo University	768	2,512	9,500
Bayero University	192	1,280	1,780
University of Ibadan	1,280	2,560	8,050
University of Jos	768	1,280	3,000
University of Port Harcourt	384	3,072	2,500
Association of African Universities	128	386	250
Total BW	**16,856**	**32,034**	**108,580**

Table 2- Analysis of current, potential and optimum connectivity bandwidth

4.2.1   Current Utilization

At the start of 2004, Partnership universities were estimated to purchase a little over 12 Mbps. This investigation has revealed that these universities are currently purchasing a little over 16

Mbps although the total amount of dedicated bandwidth may be lower considering that some universities do not have dedicated bandwidth.

4.2.2   Potential requirements

The universities indicated during the site visits and in the completed questionnaires that if the cost of bandwidth was reduced to about $3 per kbps, they would purchase about 32 Mbps, with most of them in effect doubling their bandwidth. The potential demand, for the purposes of this report is thus the bandwidth the universities would purchase if the bandwidth cost were $3 per kbps.. Some universities also argued for bursting bandwidth and advised that any provider selected should be able to provide bursting as an option.

4.2.3   Optimum bandwidth requirements

It is difficult to arrive at a precise figure for how much bandwidth a university requires. The AVU estimates bandwidth requirements based on the bandwidth per PC and the number of connected PCs. The AVU recommends a total of 10 kbps[6] (8 kbps receive and 2 kbps transmit) per connected PC. This assumption considers that universities have very many students but fewer computers to meet the high demand with the available computers being utilized all the time throughout the day. However, the typical browsing habits of many users is such that users load a webpage and then spend some time reading it or in the case of web based email composing or responding to a message. For this reason, the typical commercial ISP model assumes a share ratio of users (in this case PCs) to a unit of bandwidth of 10:1. This is also called the overbooked ratio. If we consider that university users are "Power Users" and will access a lot of multimedia content, digital library content (which is usually large PDF files), one can assume then that the 10 kbps per connected PC is reasonable as any PC accessing the multimedia content at any time will require a lot more than 10 kbps and thus borrowing from the other PCs bandwidth. The optimum bandwidth requirement, for the purposes of this report is this defined as the ideal bandwidth required given the number of connected PCs per university. Following this argument, the universities would require a total optimum bandwidth of about 108 Mbps.

4.3 Comparison of bandwidth costs

A comparison of the costs for the different universities is very hard to achieve because of the different access technologies (VSAT and leased line) and due to the fact that some universities have shared and others committed bandwidth. Even comparison of universities with VSATs is difficult to achieve because of the various VSAT access technologies, antenna size and satellites used among other factors. Because of all these differences, the cost per kbps per month is used as a comparator. While this is not perfect, it does provide a good indication of one university's cost relative to another.

Table 3 below shows current access technologies and associated costs for the Partnership supported connectivity.

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[6] Based on Jacob Nielsen's work in the USA

Institution	Current bandwidth in kbps			Shared/ Dedicated	Type of Link	Link Monthly Charge	
	In bound	Out bound	Total			Total	per kbps
University of Dar Salaam	1000	2000	3000	CIR	Leased Line	$ 10,000	$ 3.33
Makerere University	256	512	768	CIR	Leased Line	$ 8,219	$ 10.70
	1000	2000	3000	CIR	Leased Line	$ 20,499	$ 6.83
Eduardo Mondlane University	512	2048	2560	CIR	VSAT	$ 10,000	$ 3.91
University of Ghana	512	1024	1536	CIR	VSAT	$ 8,448	$ 5.50
University of Education, Winneba	64	1000	1064	Shared	VSAT	$ 2,250	$ 2.11
Ahmadu Bello University	128	512	640	Shared	VSAT	$ 5,000	$ 7.81
Obafemi Awolowo University	256	512	768	CIR	VSAT	$ 6,912	$ 9.00
Bayero University	64	128	192	Shared	VSAT	$ 1,920	$ 10.00
University of Ibadan	256	1024	1280	CIR	VSAT	$ 4,800	$ 3.75
University of Jos	256	512	768	CIR	VSAT	$ 5,000	$ 6.51
University of Port Harcourt	128	256	384	Shared	VSAT	$ 4,000	$ 10.42
Association of African Universities	64	64	128	Shared	Leased Line	$ 600	$ 4.69
Totals	4,496	11,592	16,088			$ 87,648	$ 6.51

Table 3- Current connectivity status with access technology and cost

The comparison of current costs is analyzed by access technology and against whether the connectivity is shared or not in order to eliminate distortions caused by these two factors. Average costs are summarized in the table below.

Access Technology	Average cost per kbps per month	Least cost per kbps per month	Greatest cost per kbps per month
VSAT with CIR	$5.73	$3.75	$9.00
VSAT with shared bandwidth	$7.51	$2.11	$10.42
Leased Line with CIR	$6.96	$3.33	$10.70

Table 4- Average connectivity costs

4.4 Price Dynamics and Target price

Satellite bandwidth pricing is a very complicated business depending on a myriad of factors including whether the bandwidth is dedicated, shared, pre-emptible or non pre-emptible, the

particular satellite characteristics, receiving antenna characteristics, modulation and coding schemes used and the length of the contract one is willing to enter into.

The key question that everybody asks is what is the best possible price to achieve? Earlier work by the AVU[7] had indicated that it is theoretically possible to obtain space segment capacity for a little under $2 per kbps if purchasing an entire transponder for a period of at least 3 years (assumes sites equipped with 2.4 m antennas). This cost excludes uplink or teleport costs which could add another 15-30% on top.

At the beginning of the year, the Partnership supported universities were paying on average about $10 per kbps per month. Currently, the universities pay an average of about $5.73 per kbps per month for those with VSAT access for dedicated bandwidth ranging from $3.75 per kbps per month paid by the University of Ibadan to $9.00 per kbps per month paid by Obafemi Awolowo University. It is worth noting that the University of Dar es Salaam has managed to negotiate $2.83 per kbps per month for the University Computing Center (UCC) VSAT link which is used for commercial purposes. UCC indicates that this is for dedicated bandwidth. However, scrutiny of the contract reveals that there is no written contractual commitment to provide dedicated bandwidth on the DVB carrier. It should be noted that the DVB technology for the outbound carrier is inherently broadcast and usually shared in practice. In any case, this price is not included in the calculations as the link is not used by the university, which instead relies on the leased line link for which they are paying about $3.33 per kbps. Scrutiny of this leased line contract too reveals that the dedicated access seems to be for the 4 wire leased line from the university to the local PTT and its national backbone and does not make any provision for dedicated international bandwidth access.

The average suggested price considered fair, from the questionnaires completed by the universities for this assignment is $2.72 per kbps ranging from suggestions of $1.5 - $2 per kbps by the University of Dar es Salaam to $4 per kbps by Bayero University. It is instructive to note that no university considered any price above $4 per kbps to be reasonable in any way.

However, deliberations at the Partnership supported universities Vice Chancellor's conference in Dar es Salaam from September 10 to 13 arrived at a target price of $2.5 per kbps. This target will be used as a guide when negotiating for bandwidth.

It should be noted that the achievement of this price is dependant on so many factors and that it is prudent to perform a total network cost benefit analysis for any price obtained. For instance, it may be possible to achieve this price by equipping all the universities with larger antennas. However, the cost of this antenna, when spread over the contract period may negate the recurring cost reduction in price achieved.

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[7] Detecon Report

5.0 Switching Costs

The costs of switching from the universities' current providers to a new provider can be divided into three components:
- i) Cost of new or replacement equipment- this depends on the service to be utilized.
- ii) Contract buy out- this is the cost related directly to termination penalties for universities that have existing contractual agreements and that will need to terminate these contracts to take advantage of the new providers offer.
- iii) Logistical costs- these costs relate to shipment, installation and configuration of new or replacement equipment.

The analysis of switching costs undertaken in this section is based on the service proposed by Netsat in section 6. Since DVB is an open standard, these switching costs would be comparable for any service based on the same technologies provided by any other provider. Tables 6 and 7 below summarize the current equipment, technologies used and contract details of the Partnership supported universities for their connectivity solutions.

5.1 Cost of VSAT equipment

Netsat has proposed two possible scenarios: one based on an outbound DVB carrier to terminate into 2.4 m antennas and the other to terminate into 3.8 m antennas. Both scenarios assume a DVB outbound carrier and an SCPC return carrier with QPSK and 8 PSK modulation respectively. The 2.4 m antennas will require a 5 W HPA and the 3.8 m antennas a 10 W HPA.

Note that the cost of the VSAT terminal is heavily influenced by the transmitter (HPA) power. The transmitter power required depends in turn on the satellite to be used (SFD), size of Hub antenna and the VSAT technology (e.g. TDMA or SCPC). The above scenarios are thus based on the use of the New Skies Satellite NSS 7. The HPA cost could thus change significantly if another satellite or technology were to be used. For example, a 20 W HPA could cost upwards of $20,000.

The typical[8] costs for the equipment required for the two scenarios is provided in table 5 below.

2.4 m scenario		3.8 m Scenario	
Equipment	**Cost in US $**	**Equipment**	**Cost in US $**
2.4 Antenna	4,000	3.8 m antenna	13,000
5 W HPA	4,000	10 W HPA	11,000
Modem (broadband)	10,000	Modem (broadband)	10,000
DVB IRD	1,200	DVB IRD	1,200
Router	1,900	Router	1,900
Pole mount	900	Pole mount	900
Shipping	3,000	Shipping	5,000
Installation[9]	2,500	Installation	3,500
Total	**27,500**	**Total**	**46,500**

Table 5- Typical Equipment Costs

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[8] From Netsat equipment quote and AVU's equipment cost research by Detecon
[9] Installation assumes local labor and not engineers flying in from the USA or Europe

Institution	Satellite	Frequency Band	Antenna Diameter (meters)	BUC (Watts)	Access Tech	Receiver Make, model	Modem Make, model
University of Dar Salaam[10]	NSS 803	C Band	3.8	10	DVB/ SCPC		
	Leased Line				4-Wire Copper wire (leased)		
Makerere University	Leased Lines				Fiber (leased)		
Eduardo Mondlane University	Telstar 10	C Band	3.8	40	DVB/ SCPC		Comtech EF Data SDM 300A
University of Ghana	Pas 4	KU	3.8	4			Radyne ComStream DMD2401 LB/ST
University of Education, Winneba	NSS 7	C Band	2.4	2			
Ahmadu Bello University[11]	NSS 7	C-Band	2.4	5		Skystream EMR 5000 IRD	ViaSat Linkstar
	(In active)	C-band	3.8	20			EF Data SDM 300A
Obafemi Awolowo University	NSS 7	C-Band	3.8	10	DVB/ SCPC	Ipricot QPSK IRD	Radyne ComStream DMD2401 LB/ST
	In active		2.4				
Bayero University	NSS 7	C Band	2.4	5	DVB/ SCPC	Radyne ComStream IPSat	Radyne ComStream IPSat
University of Ibadan	Pas 4	C-Band	2.4	5	DVB/ SCPC	EMR1600	SPL2048 Modem
University of Jos		C-Band	2.4	5	DVB/ SCPC	Ipricot QPSK IRD	Radyne ComStream DMD2401 LB/ST
University of Port Harcourt[12]	PAS 1R	Ku	2.4	2	DVB/ SCPC	Radyne ComStream IPSat	Radyne ComStream IPSat
Association of African Universities	Leased Line						

Table 6- Equipment types and access technology

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[10] The VSAT system is used for a commercial service by UCC

[11] The 2.4 m antenna belongs to the service provider. The 3.8 m antenna belongs to the university

[12] University has three other 2.4 m antenna systems on camps- see summary by institution

Institution	Contract start date	Contract Term	Expiry	Penalties for early termination by university
University of Dar Salaam[13]	15 Aug 2004	2 years	14 Aug 2006	
	01 Dec 2003	1 year	30 Nov 2004	Payment of remaining contract term
Makerere University				None for both links- contract expired and now on automatic monthly renewals
Eduardo Mondlane University		2 years	31 Dec 2004	Payment of remaining contract term
University of Ghana		36 months		
University of Education, Winneba				
Ahmadu Bello University		6 months	14 Nov 2004	
Obafemi Awolowo University		1 year	Mar 2005	Payment of remaining contract term
Bayero University		6 Months (trail basis)	Oct 2004	Payment of remaining contract term (already paid upfront)
University of Ibadan			No formal contract exists	
University of Jos		6 months	Nov 2004	
University of Port Harcourt		1 year	Oct 2004	
Association of African Universities				60 days notice

Table 7- Contract details

It can also be assumed[14] that shipment of modem, HPA, Router and IRD only will cost around $1,000 because these are not very bulky or heavy and that local VSAT engineers can configure the system for under $1,000.

5.2 Scenario 1- Carrier sized for 2.4 m antennas

Most universities would not have to change their equipment. The only university that will incur penalties due to cancellation of the existing contract if it decided to switch to a new provider would be Obafemi Awolowo University. All the other universities' contracts either end by December 2004 or do not have formal existing contracts.

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[13] Used for the commercial service.
[14] Based on past AVU contract with Netsat

A summary table is provided below that shows the required switching costs for this scenario.

Institution	Equipment required	Cost of Equip required (US$)	Logistics (Ship + Install) US $	Service Activation fee (US$)	Penalties (US$)	Total Switching Costs (US$)
University of Dar Salaam	Complete 2.4 m kit	22000	5500	$1,000	None	**$28,500.00**
Makerere University		0	0	$1,000	None	**$1,000.00**
Eduardo Mondlane University	DVB IRD	1200	2000	$1,000	None	**$4,200.00**
University of Ghana	HPA + DVB + Router	14100	2000	$1,000	None	**$17,100.00**
University of Education, Winneba	HPA + Modem + DVB + Router	17100	2000	$1,000	None	**$20,100.00**
Ahmadu Bello University	-			$1,000	None	**$1,000.00**
Obafemi Awolowo University	-	0	0	$1,000	20,736	**$21,736.00**
Bayero University		0	0	$1,000	None	**$1,000.00**
University of Ibadan		0	0	$1,000	None	**$1,000.00**
University of Jos		0	0	$1,000	None	**$1,000.00**
University of Port Harcourt	HPA	4000	0	$1,000	None	**$5,000.00**
Association of African Universities		0	0	0		**0**
TOTAL						**$101,636.00**

Table 8- Switching costs for 2.4 m carrier scenario

Please note that:
1. University of Dar es Salaam has an existing VSAT system but this is used for the "commercial" arm of the university (University Computing Center or UCC). UCC has indicated that it desires the universities connectivity solution to be separate and distinct from it own.
2. The amount of bandwidth required by AAU is not sufficient to warrant investment in a VSAT system of the type under consideration here. More cost effective solutions are proposed for AAU in the recommendations section of this report.

5.3 Scenario 2- carrier sized for 3.8 m antennas

If all the universities were to switch to 3.8 m antennas so as to take advantage of better bandwidth efficiency and therefore lower per kbps cost, five (5) universities would have to buy new antennas. The table below shows the total switching costs for this scenario. It has been

assumed that the modulation scheme would be 8 PSK so to take maximum advantage which would require probably changing all the IRDs at the universities.

Institution	Equipment required	Cost of Equipment (US$)	Logistics	Service Activation fee (US$)	Penalties (US$)	Total Switching Costs (US$)
University of Dar Salaam	Complete 3.8 m kit	38000	8500	$1,000	None	**$47,500.00**
Makerere University		0	0	$1,000	None	**$1,000.00**
Eduardo Mondlane University	DVB IRD	1200	2000	$1,000	None	**$4,200.00**
University of Ghana	HPA + DVB + Router	14100	2000	$1,000	None	**$17,100.00**
University of Education, Winneba	Complete 3.8 m kit	38000	8500	$1,000	None	**$47,500.00**
Ahmadu Bello University	DVB IRD	1200	2000	$1,000	None	**$4,200.00**
Obafemi Awolowo University	DVB IRD	1200	2000	$1,000	20,736	**$24,936.00**
Bayero University	3.8 m antenna + HPA + DVB IRD	25200	8500	$1,000	None	**$34,700.00**
University of Ibadan	3.8 m antenna + HPA + DVB IRD	25200	8500	$1,000	None	**$34,700.00**
University of Jos	3.8 m antenna + HPA + DVB IRD	25200	8500	$1,000	None	**$34,700.00**
University of Port Harcourt	3.8 m antenna + HPA + DVB IRD	25200	8500	$1,000	None	**$34,700.00**
Association of African Universities		0	0	$0		**$0.00**
TOTAL						**$285,236.00**

Table 9- Switching costs for 3.8 m scenario

5.4 Modalities and legal implications for switching

About 6 university's contracts end by December 31 2004. In almost all of these cases, the universities have paid for their connectivity upfront. As any new service will start at the beginning of 2005, these universities will not need to pay any penalties for switching provided they do not renew their contracts. The remaining universities do not have clear formal contracts and in some cases the contracts have expired and therefore it has been difficult to ascertain concretely what the termination penalties are. These universities pay for the service in advance

and it is assumed that therefore they would simply cease to pay for the service to terminate the contract.

Only Obafemi Awolowo University has any commitments past December 2004. The university has paid for services upfront through March 2005. Details of contract lengths and termination dates are summarized in table 5 above.

6.0 Quotation received from Netsat Express

The AVU requested and received from Netsat Express pricing for various scenarios. These scenarios are summarized as dedicated and shared services and are explored in detail in the following sections. All pricing information in the sections below is **confidential and may only be used for and by the Partnership and their supported universities.**

6.1 Proposed Service

The proposed service will utilize a DVB outbound carrier, with bandwidth dedicated to universities in the network. Each university's return carrier will operate using SCPC technology, it is important to note that all bandwidth will be dedicated at all time for the dedicated bandwidth scenario. In other words, each university will always get exactly what you are paying for.

Each site will require a 2.4 or 3.8 meter antenna, along with compatible modulator (modem). Further, some sites may require the addition of an IRD to receive the DVB carrier.

The service will be provisioned on New Skies NSS 7 East Hemi beam using a 9.3 m antenna at the Hub. The Netsat Hub is located in New York, United States of America.
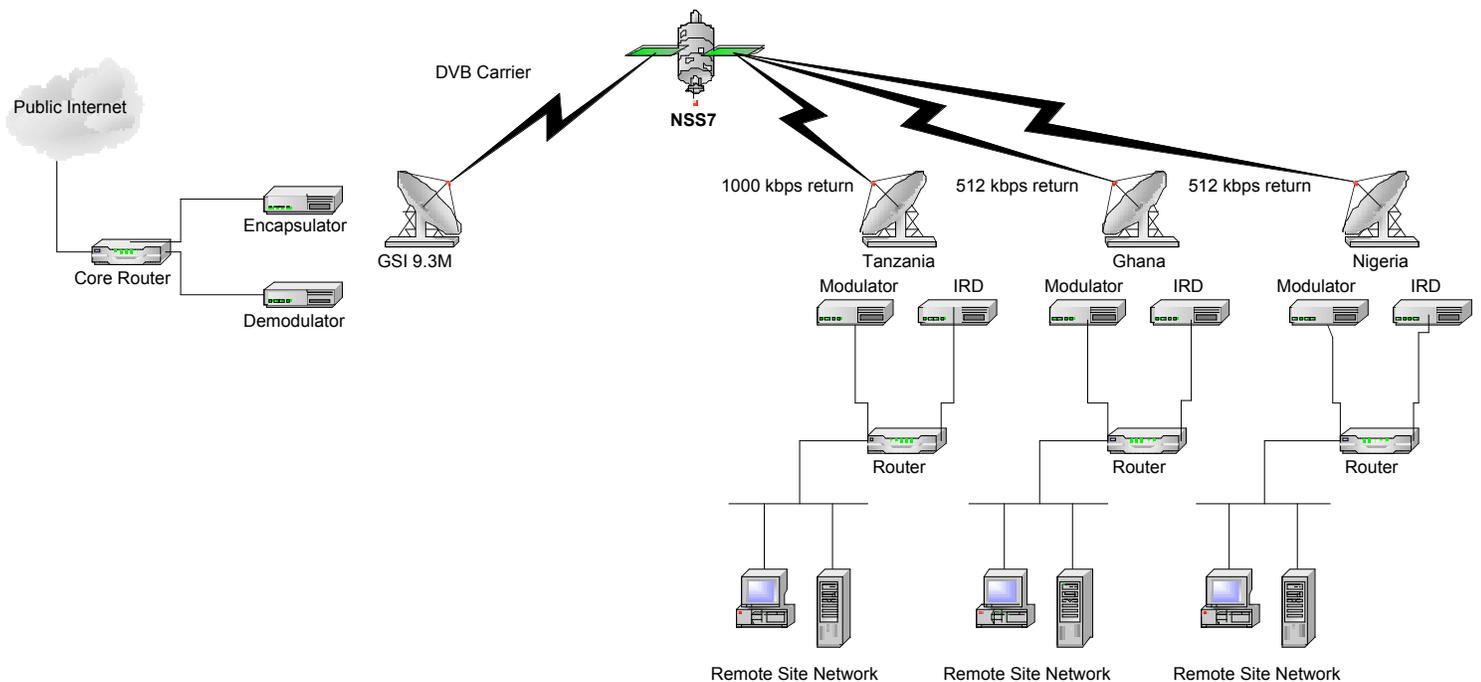
Figure 1- Block diagram of proposed Network

The service provided is turnkey and inclusive of the following:

➢ Space segment (NSS 7)

- ➢ Teleport (uplink) services
- ➢ NOC
- ➢ 24 X 7 technical support
- ➢ Direct connection to the US Internet backbone via redundant OC-3's (AT&T / Globix)

6.2 Price Quotations- Terms and Conditions

The price quotations below are subject to the following terms and conditions:

i)   A minimum contract term of 1 year
ii)   Minimum total bandwidth commitments of 10 Mbps
iii)   Prices exclude a $150 per site per month management fee
iv)   Prices exclude a one time set up fee of $1,000 per site
v)   An advance deposit equivalent to one (1) months service cost is required at contract signing
vi)   Billing is done on a monthly basis and at the beginning of the month and invoices should be paid within 30 days
vii)   Incremental bandwidth only in chunks of 64 kbps for inbound and 128 kbps for the outbound

6.3 Scenario 1- Dedicated Bandwidth

Two scenarios are explored for dedicated bandwidth:
i)   If the outbound carrier is sized for 2.4 m antennas with QPSK modulation, the average cost per kbps for dedicated bandwidth will be **$3.8 per kbps per month**
ii)   If the outbound carrier is sized for 3.8 m antennas with 8 PSK modulation, the average per kbps for dedicated bandwidth will be **$3.1 per kbps per month**

Table 10 below shows the relative bandwidth that each university would receive under these two scenarios for dedicated bandwidth assuming the university budget remained constant. Analysis shows that almost all the universities would benefit under both scenarios with a majority of the universities doubling their current bandwidth if they switched to 3.8 m antennas. However, this has got to be weighed against the switching costs before final judgment can be pronounced.

6.4 Scenario 2- Shared or bursting bandwidth

For shared or bursting bandwidth, the cost per kbps based on the current bandwidth requirements and ability to burst to twice the current bandwidth would be $2.69 per kbps per month.

Institution	Current bandwidth (kbps)	Current Budget payment for link (US $)	2.4 m antenna		3.8 m antenna	
			Bandwidth[15] received if cost were $3.8 per kbps at current budget (kbps)	%age increase/ decrease in bandwidth	Bandwidth received if cost were $3.1 per kbps at current budget (kbps)	%age increase/ decrease in bandwidth
University of Dar Salaam	3000	$ 10,000	2,592	-14%	3,184	6%
Makerere University	768	$ 8,219	2,128	177%	2,608	240%
	3000	$ 20,499	5,360	79%	6,560	119%
Eduardo Mondlane University	2560	$ 10,000	2,592	1%	3,184	24%
University of Ghana	1536	$ 8,448	2,176	42%	2,672	74%
University of Education, Winneba	1064[16]	$ 2,250	560	-47%	672	-37%
Ahmadu Bello University	640	$ 5,000	1,280	100%	1,568	145%
Obafemi Awolowo University	768	$ 6,912	1,776	131%	2,176	183%
Bayero University	192	$ 1,920	464	142%	576	200%
University of Ibadan	1280	$ 4,800	1,216	-5%	1,504	18%
University of Jos	768	$ 5,000	1,280	67%	1,568	104%
University of Port Harcourt	384	$ 4,000	1,008	163%	1,248	225%
Totals/ Averages	15,960.00	87,048.00	22,432.00	70%	27,520.00	108%

Table 10- Bandwidth per university under Netsat quoted prices

6.5 Effect of switching costs on bandwidth at current budgets levels

Assuming a 3 year contract for connectivity services and spreading the total switching costs over 3 years or 36 months, the relative average increase in bandwidth for the 2.4 m scenario is 54% compared to 59% for the 3.8 m antenna as shown in table 11 below. These calculations assume a situation whereby the universities would have to pay for their entire switching costs. In this case, it is much more relatively economical overall to stay with a 2.4 m antenna scenario as the cost to achieve an average increase of 5% is more than double the cost for the 2.4 m scenario. However, this will penalize those with existing 3.8 m antennas.

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[15] Rounded off to the nearest 16 kbps and includes payment of the $150 per site per month.
[16] Bandwidth figures in red italic refer to shared bandwidth

Institution	Bandwidth with 2.4 m (kbps)	%age increase or decrease	Bandwidth with 3.8 m (kbps)	%age increase or decrease	Switching cost 2.4 m	Additional cost per month due switching to 2.4 m (36 months)	Switching cost 3.8 m	Additional cost per month due switching to 3.8 m (36 months)
University of Dar Salaam	2,383.77	-21%	2,751.79	-8%	$ 28,500.00	$791.67	$47,500	$ 1,319
Makerere University	5,347.69	78%	6,555.23	119%	$ 1,000.00	$27.78	$ 1,000	$ 28
Eduardo Mondlane University	2,561.40	0%	3,139.78	23%	$ 4,200.00	$116.67	$ 4,200	$ 117
University of Ghana	2,058.68	34%	2,523.55	64%	$ 17,100.00	$ 475.00	$ 17,100	$ 475
University of Education, Winneba	405.70	-62%	251.79	-76%	$ 20,100.00	$558.33	$ 47,500	$ 1,319
Ahmadu Bello University	1,269.01	98%	1,526.88	139%	$ 1,000.00	$ 27.78	$ 4,200	$ 117
Obafemi Awolowo University	1,620.58	111%	1,957.85	155%	$ 21,736.00	$ 603.78	$ 24,936	$ 693
Bayero University	458.48	139%	260.04	35%	$ 1,000.00	$27.78	$ 34,700	$ 964
University of Ibadan	1,216.37	-5%	1,189.07	-7%	$ 1,000.00	$27.78	$ 34,700	$ 964
University of Jos	1,269.01	65%	1,253.58	63%	$ 1,000.00	$27.78	$ 34,700	$ 964
University of Port Harcourt	976.61	154%	931.00	142%	$ 5,000.00	$138.89	$ 34,700	$ 964
Totals/ average	19,567.31	54%	22,340.57	59%	$ 101,636.00		$285,236.00	

Table 11- effect of switching costs on bandwidth taken at current budget levels

6.6 Two carriers Scenario

Detailed discussions with the provider have indicated that indeed a two carrier scenario is possible but only if the bandwidth for each carrier is significant enough so as to offset the duplication of services, economies and efficiencies lost with a two carrier operation. The provider did indicate that the scenario would be feasible if both carriers were greater than 10 Mbps. An analysis of this scenario shows that the universities with a 2.4 m antenna (UDSM included for a new 2.4 antenna) would require an aggregated bandwidth (at $3.8 per kbps per month and current budget levels) of about 8.9 Mbps and the 3.8 m equipped universities (at $3.1 per kbps per month and current budget levels) would require about 16.6 Mbps. If one considers that the AVU universities will be equipped with 2.4 m antennas, then the aggregated bandwidth for the 2.4 m equipped universities would be over 10 Mbps making the two carrier operation feasible and the best option as this option would involve minimum switching costs for all the universities involved.

Under the two carrier scenario, the price for the 2.4 m equipped universities would lead to an average increase in bandwidth of about 60% across the network and this should be even higher due to the shared bandwidth pricing distortions that are not considered. For the 3.8 m antenna group of universities, the price of $3.1 per kbps per month is better than that currently held by

any of the universities and would lead to an average network bandwidth increase of 120%. Tables 12 and 13 provide more details.

In fact, if the consideration is to serve as many universities as possible in the future and to keep switching costs as low as possible; it may be of great advantage to have two carrier groups sized for 2.4 m and 3.8 m antenna operation. The draw back of this operation is the inability to use a single multicast for all the universities although the economic benefits may outweigh the need for a single multicast and dictate the use of a double multicast stream.

The dual carrier analysis conducted here is only rudimentary and further detailed analysis is required to justify this approach.

Institution	Current bandwidth in kbps	Current Budget payment	2.4 m antenna	
			Bandwidth received if cost were $3.8 per kbps at current budget	%age increase/ decrease in bandwidth
University of Dar Salaam	! 3000	$ 10,000	! 2,592	! -14%
University of Education, Winneba	1064	$ 2,250	560	-47%
Obafemi Awolowo University	768	$ 6,912	1,776	131%
Bayero University	192	$ 1,920	464	142%
University of Ibadan	1280	$ 4,800	1,216	-5%
University of Jos	768	$ 5,000	1,280	67%
University of Port Harcourt	384	$ 4,000	1,008	163%
Totals/ Average	7,456.00	34,882.00	8,896.00	62%

Table 12- 2.4 carrier group

Institution	Current bandwidth in kbps	Current Budget payment	3.8 m antenna	
			Bandwidth received if cost were $3.1 per kbps at current budget (kbps)	Bandwidth
Makerere University	768	$ 8,219	2,608	240%
	3000	$ 20,499	6,560	119%
Eduardo Mondlane University	2560	$ 10,000	3,184	24%
University of Ghana	1536	$ 8,448	2,672	74%
Ahmadu Bello University	640	$ 5,000	1,568	145%
Totals/ Average	**8,504.00**	**52,166.00**	**16,592.00**	**120%**

Table 13- 3.8 carrier group

7.0 Key Findings with Recommendations and suggested Next Steps

This section summarizes some of the major findings of the investigation. The findings are considered relevant in the quest to obtain better bandwidth pricing or making more efficient use of existing bandwidth. The findings stem from observations during the physical visits, analysis of collected data, quotations received and communication with the service provider. Key recommendations have been included under each finding.

7.1 Price of connectivity

It should be understood that comparison of pricing for satellite bandwidth is a complicated and imprecise affair due to the numerous considerations such as satellite characteristics, hub characteristics, remote terminal characteristics, and modulation schemes used. The metric used for this study is the price per kbps per month which is considered a very good indicator of relative pricing.

The prices quoted by the AVU provider Netsat Express at best case scenario (3.8 m antenna with 8 PSK modulation) of $3.1 per kbps per month and worst case (2.4 m antennas with QPSK modulation) scenario of $3.8 per kbps and the terms given are <u>considered very competitive</u> based on an AVU past market survey[17] which found satellite bandwidth at $4 per kbps per month to be competitive and on general comparison with the Partnership universities current prices.

However, the survey of the Partnership supported universities has also found that at least 3 universities (UDSM, UEM and University of Ibadan) are currently paying under $4 per kbps with UDSM paying under $3 per kbps for the commercial VSAT link for what they claim as dedicated bandwidth. Further, AVU's own studies have shown that it is theoretically possible to achieve about $2 per kbps if a large enough amount of bandwidth is committed for a substantial amount of time. Whatever the case, the prices provided by Netsat are subject to challenge and may not be credible given the circumstances and the lower pricing currently claimed by some of the Partnership universities. The whole rationale behind this study is that the universities coming together should be able to muster lower prices than any single university alone.

Recommendation for 7.1
To avoid any doubt, it is proposed that an international bid be conducted at this stage. The bid would have to be fast tracked and a review of the timelines indicates that this can be accomplished and a supplier selected to commence service by January 15 2005 or February 1 2005 at the latest.

The AVU future demand would also be considered in this bid. The AVU's business plans calls for its Partner Institutions to pay for connectivity recurring costs themselves and it is therefore of utmost importance for the AVU to find the lowest cost for a quality service. World Bank procurement rules are rigorous and may cause undue delay. The World Bank has informally indicated that it shall favorably consider any process provided that it is open, transparent, economical and efficient.
The AVU has conducted a VSAT service international bid before and has got the necessary capacity and experience to undertake this bid.

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[17] Detecon survey

A timeline is provided in Appendix 1 below. A draft RFP is also submitted with this report. It should be noted that the timelines are very tight and require almost immediate decision by the Partnership and the supported universities for early and timely commencement.

7.1 Effect of Switching Costs and two carrier operation

It is quite apparent that antenna size has a significant impact on price. However, larger antennas are very expensive at almost $50,000 for an installed complete 3.8 m antenna VSAT system as compared to a little under $30,000 for an installed complete 2.4 m antenna VSAT system. This price differential translates to an additional ~146 kbps per month at $3.8 per kbps. Further the higher cost of the 3.8 m antenna may become a barrier to entry for some sites in the future. On the other hand, large bandwidth universities stand to gain significantly from the lower price of $3.1 per kbps per month if they upgraded to a 3.8 m antenna. The choice will depend on the amount of bandwidth projected in the short and medium term. What is clear is that a two carrier operation may make more sense in terms of switching costs and flexibility than a single carrier operation.

Recommendation 7.2
The two carrier operation requires more detailed review and analysis to ascertain the real economic gains and practical implementation. A more detailed review is proposed for the period through December 31 2004.

Certainly, prospective service providers must be asked to provide proposals and quotations for a dual carrier service operation.

7.2 Contract renewals in the period through December 31 2004

A sizeable number of connectivity commitments (contracts) will be coming to an end in the last quarter of this year or the first quarter of next year (Bayero University, University Eduardo Mondlane, Obafemi Awolowo University, University of Jos, University of Port Harcourt and Ahmadu Bello University) which provides a perfect opportunity to switch relatively soon without incurring large costs due to contract terminations.

Recommendation 7.3
It is recommended that these contracts should not be renewed for more than a month at a time until a new provider is selected and ready to commence service early next year. Some providers may pressure the universities for renewal; such pressures must be resisted.

7.3 Connectivity for the Association of African Universities (AAU)

The AAU office has about 25 PCs connected. The current bandwidth required under ideal situations is about 256 kbps. This bandwidth is on the low side to warrant the kind of VSAT system under consideration. The AAU's justification for increased bandwidth is to host the database of journals which does require substantial bandwidth. However, the additional bandwidth required may not be justified as a hosted or collocation solution may be much more cost effective.

Recommendations
   i)   As the AAU office is in Accra, a leased wired or wireless line to the University of Ghana or even to a reliable ISP in Accra is considered a more economic approach.

If the local infrastructure in Ghana is poor, a different VSAT system that requires a smaller antenna and uses different technology to achieve the required low data rates at much lower cost would be recommended. The later option needs further examination.

ii)   The AAU would do well to consider collocation of the servers hosting the Database of journals at the University of Ghana and administer the server remotely.

7.4 Other key observations and recommendations

7.4.1   All the Partnership supported universities visited expressed their desire to see concrete progress made in obtaining cheaper bandwidth. They all indicated that they were rather tired of studies and surveys. The AVU team indicated in all cases that this assignment was different and would lead to practical and cheaper bandwidth solutions as the single biggest outcome.

7.4.2   New Skies Satellite also indicated that they had received several requests for quotes for bandwidth for African countries with bandwidth consolidation schemes and had provided several quotes without any concrete action being taken by any of the requesting entities. New Skies Satellite indicated that they had also been contacted by some "American Foundations" although they did not divulge specific identities. It appears that the satellite providers too are wary and tired of providing quotes for African university bandwidth.

Recommendations for 7.4.1 and 7.4.2:
There is a study and quotation fatigue from both African Universities and service providers. The credibility of any future endeavors to aggregate bandwidth for African Universities therefore hinges on taking practical steps in the very short term. The Partnership supported universities and the AVU Partner Universities should form the vanguard of any such efforts. At the same time, the Partnership should consider initiating dialogue with other development partners with a view to harmonizing efforts and initiatives. This factor must be considered when floating an RFP and potential service providers need to be made aware that the universities are committed to switch if they obtain a good deal. Otherwise some providers will simply ignore the RFP thinking that this is just another study to obtain pricing or that the universities are not serious.

7.4.3   It is worth noting that no university is actually undertaking bandwidth management at the moment. Although some universities do indicate that they have bandwidth management systems in place in the completed questionnaires, these are hardly ever used or are under trial. Some of the network managers interviewed indicated that they did not believe in bandwidth management as a practical solution at the moment.

Recommendation:
The partnership supported universities should consider bandwidth management as a priority if they are to realize maximum gains from their current scarce and valuable bandwidth resources available. It would be prudent to invest in capacity enhancement of university network administrators through focused practical training sessions and seminars on available tools and techniques for bandwidth management. It is worth noting that bandwidth management was identified as a crucial issue that requires urgent redress by the Partnership meeting in Dar es Salaam from September 10-12 2004.

7.4.4   It is not clear from most of the universities whether they are receiving actual bandwidth that their current providers claim they are providing or that they are paying for. During the physical visits, the team attempted in all cases to site the monitoring tools used. Almost all the universities rely on MRTG for monitoring and most of them rely on the providers MRTG graphs, which are considered highly suspect.

Recommendation

It is strongly recommended that a bandwidth measuring exercise using professional equipment and techniques be undertaken for all the Partnership universities at the earliest. This is very important to ascertain the true bandwidth currently being purchased and as such ascertain a true per kbps so as to avoid price distortions and trying to achieve an unrealistic price target.

7.4.5   Almost all the universities do not have formal contracts with their providers. Either the contracts have expired and are "automatically extended" or payment is made on the basis of a letter of commitment and usually in advance or the Head of IT was not in possession of the contract.

Recommendation

Contracts are essential if SLAs and Quality of Service expectations are to be achieved. In addition, payments made without contracts do not constitute good financial management practices. It is recommended that the partnership universities try not to sign long term contracts as the technology is evolving very fast and the prices of connectivity are coming down due to increased competition. Certainly, contract periods of more than three (3) years are considered long term and not encouraged. It must be noted, however, that shorter contract periods usually mean higher costs for satellite bandwidth. Therefore the universities should be willing to sign one (1) year contracts at the very least. The Netsat proposal has very fair terms calling for 1 year contracts.

INVESTIGATION

OF

BANDWIDTH CONSOLIDATION FOR PARTNERSHIP UNIVERSITIES

A Report Prepared

By

The African Virtual University

For

The Partnership for Higher Education in Africa

APPENDIX 1

APPENDIX 1- Time line and modalities for international competitive bid

Activity	Realistic schedule	Earliest Date
Prepare RFP	October 29	October 22
Comments on RFP	November 5	October 29
Issue RFP	November 8	November 1
Deadline for receiving proposals	December 3	November 26
Evaluation of Proposals	December 10	December 3
Negotiations end	December 17	December 10
Notification of Universities	December 20	December 10
Receipt of Universities Responses	January 7 2005	December 17
Notification of Award to winning company	January 14 2005	December 20
Service start date	February 1 2005	January 10 2005

The schedule above is heavily dependent on quick turn around by:

i) The Partnership Foundations and Universities on this report
ii) Comments on RFP by the Partnership Foundations and the Universities
iii) Evaluation committee working overtime to finalize any clarifications and evaluations
iv) Accelerated negotiations
v) University's commitment on the final cost

It is also proposed that two members of the Secretariat established by the Partnership supported universities together with two AVU technical personnel should form the proposal evaluation committee.

INVESTIGATION

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APPENDIX 2

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October 15 2004

APPENDIX 2- Summary of ICT Status, Issues and Concerns by University

University of Ibadan

- **Independent ICT Unit**: The ICT unit was created a year ago as a sub unit of the Management Information Systems (MIS) Department which has been in existence for 12 years. The unit has fully trained and competent engineers and IT personnel. The unit is tasked with the development of all ICT activities including the development of networking, internet and e-learning systems, policies and strategies across the University.

- **Internet Connectivity**: The University currently purchases 256/1024 Kbps from Sky Vision of Israel through a local representative, General Data Engineering Services (GDES). Most equipment is standard and can be re-used by the AVU provider. This equipment includes the 2.4m Antenna, LNB, BUC, DVB receiver. There are several excellent locations to install a new antenna including an existing VSAT mast currently unused or on the flat roof of the ICT center.

- **Internet Distribution**: All departments have been provided with internet via 2.4 GHz WIFI Systems. The campus is dominated by WIFI Hot spots.

- **Issues and concerns**
    - The University supports the bandwidth consolidation initiative and is willing to increase its current bandwidth if provided with lower costs.
    - No VSAT license required due to the educational waiver provided by the NUU.
    - There is a potential delay in the procurement of any new equipment as any equipment shipments require prior customs /VAT exemptions arranged by the NUU.
    - The University has does not have funds to buy new equipment and would be interested in exploring alternative options with the AVU to fund the purchases.

Other Recommendations
- The ICT Center Server Room is well established as shown in the Figure 1 above. However, the Server could be enhanced with the use of more professional equipment cabinets, cabling and truncking.

Obafemi Awolowo University (OAU)

- **Independent ICT Unit**: The IT department is well established across campus and provides internet access to all the departments via wireless systems.

- **Internet Connectivity:** The University owns the VSAT equipment comprising of a 3.8 meter dish with 10 Watt BUC. The VSAT service is provided by BT Nigeria via NSS 7. The university also owns a 2.4 meter VSAT that was used as a backup link but is currently inactive. Both these equipment sets can be reused by the AVU provider.

- **Internet Distribution:** Most departments are connected to the IT Server Room (or Data Center) either by Fiber or Wireless system.

- **Issues and Concerns:**
    - The University is currently utilizing the providers VSAT License. However, if switching to another provider is to occur, the license will not be an issue as there is an educational waiver provided by NUU.

- Any equipment to be shipped requires prior customs tax exemptions facilitated by the Nigerian Universities Commission.
- Most equipment can be re-used including the inactive 2.4 meter dish that can be re-activated.
- The university advocates for a provider who has local support in Nigeria
- The university considers ability to burst at all times with reasonable cost to be important

Other Recommendations

The University has a well set up data center that utilizes the latest servers. Revamping the data centre to include backup and disaster recovery systems and better cable trunking would be an added bonus. There is no ICT policy- the development of a suitable policy should be a priority.

Bayero University

- **Independent ICT Unit**: The Bayero Nunet chaired by Dr. Dan Isa is responsible for all connectivity initiatives on the campus. The majority of the ICT activities are carried out at the IT building which was funded jointly by the University and the Macarthur Foundation. The IT center houses at least 4 labs with access to PCs for students.

- **Internet Connectivity:** Internet connectivity is provided via a 2.4 M Prodelin with 5 W BUC and Rydane Comstream Ipsat Tx/Rx VSAT by BT of Nigeria utilizing NSS 7. The University has signed a six month contract to evaluate the suitability of the service. The current VSAT system is located on the roof with ample space for additional VSAT dishes. Most of this equipment can be reused.

- **Internet Distribution in Campus:** Internet is distributed by fiber in the main and old campus while the other campuses are served by a wireless system.

- **Issues and concerns**
  - The University is currently utilizing the providers VSAT License. However, If switching to another provider is to occur, the license will not be an issue as there is an educational waiver provided by NUU
  - All the VSAT equipment is owned by the University in addition to a 2.4M dish with associated electronics which could be reused with another provider.

Other recommendations
- The control room is in relatively good shape but would benefit from professional trunking.

University of Port Harcourt (Uniport)

- **Independent ICT Unit**: Before the Information and Communications Technology Centre (ICTC) was established, every department carried out ICT activities autonomously. The ICTC was revamped in Nov. 2003 by the Shell/ MacArthur Foundation and currently the department is undertaking a tremendous amount of work in the coordination of ICT activities across various departments on campus.

- **Internet Connectivity:** ICTC has a 2.4 M 2 Watt Ku-Band VSAT System, using PAS-1R. The VSAT service is provided by Direqlearn International Ltd. of South Africa. Other

departments at the university have their own connectivity solutions. This includes the Faculty of Health Sciences (2.4 m Dish VSAT system), the Petroleum Institute (2.4 Gilat Shiron System) and a Direct PC located at the Department of Electrical Engineering. The ICTC department plans to integrate and consolidated all these different initiatives to utilize one link and keep the other systems as backup systems. The KU Band system will require replacement in the event that the switch to the AVU provider is undertaken.

- **Internet Distribution:** ICTC has a professionally set-up data centre and consolidates all ICT activities including the laying a fiber across campus to interconnect all the departments. The existing departmental VSAT connections will act as a backup once the project is completed.

- **Switching Requirements**
    - The University is currently utilizing the providers VSAT License. However, if switching to another provider is to occur, the license will not be an issue as there is an educational waiver provided by NUU.
    - Any equipment to be shipped requires prior customs tax exemptions facilitated by the Nigerian Universities Commission.
    - The Ku band System requires replacement if switching to the C-band system

Other Recommendations
The ICTC Centre has made great strides in consolidating the ICT activities on campus save for the different VSAT systems currently available on the campus. ICTC needs to consolidate and aggregate the connectivity systems in order to realize economy and efficiency.

Ahmadu Bello University (ABU)

- **Independent ICT Unit**: The University has no central ICT department. All ICT activities are under-taken by the University Task Force with most of the activities within the campus being coordinated by Dr FP Taylor, HOD, Electrical Engineering Department and Dr Aminu (part time ABU staff and part time NUC staff). The University has a secure data centre that is professionally done and backed up by a 5 KVA UPS system.

- **Internet Connectivity:** The University owns a 20 W Comtech EFdata 3.8 m VSAT system which is currently not in use. The current ISP deployed its own equipment (2.4 m VSAT system) to provide internet connectivity until the University raises approximately 4 Million Naira to purchase its own equipment. The 3.8m dish could be reused at a much cheaper cost than the required 4 million Naira if switching providers to the AVU provider.

- **Internet Distribution:** The University deploys wireless systems for extending the connectivity to other department. There are no fiber connectivity systems in campus but plans are underway.

- **Issues and Concerns**
    - Lightening is a major issue and this should be taken care during any equipment installation.
    - The University is currently utilizing the providers VSAT License. However, If switching to another provider is to occur, the license will not be an issue as there is an educational waiver provided by NUU

- Any equipment to be shipped requires prior customs tax exemptions facilitated by the Nigerian Universities Commission

University of Jos

- **Independent ICT Unit**: The ICT administrative services are coordinated by the University of Jos Network (UJNet) as well as the provision of connectivity and ICT services throughout the campus. The University computing centre conducts ICT training and the library unit is tasked with Library Information Systems. The University of Jos also has a private venture (University of Jos Consultancy Ltd) that operates its own private VSAT connection and provides internet services. UJNet has an advanced power backup systems that utilizes a combination of solar and mains supply for protection of all IT systems.

- **Internet Connectivity:** Internet connectivity is provided by Brainwave Nigeria (256/512 Kbps CIR) with a wireless backup link to internet through Afrione (Emporium). The VSAT System utilizes a 2.4 m STM wireless System dish and Radyne Comstream indoor equipment through News Skies Satellite 7 (NSS 7). The VSAT equipment is owned by the University. Power fluctuation and lightening is a major issue and proper earthing has been provided for the equipment. Most of the equipment is reusable if the university switches providers.

- **Internet Distribution:** Some of the campuses are linked via a fiber system and the rest utilize wireless system. UJNet is deploying a wireless network to distribute internet to the unconnected buildings.

- **Issues and Concerns**
    - The University is currently utilizing the providers VSAT License. However, if switching to another provider is to occur, the license will not be an issue as there is an educational waiver provided by NUU.
    - As power is an issue in Nigeria, the university suggests that an alternative power source should be considered (e.g. solar system).
    - Lightening is a major issue and this should be taken care during any equipment installation.

University of Dar es Salaam (UDSM)
- **Independent ICT Unit**: The University Computing Center (UCC) is constituted as an independent for profit Company wholly owned by the University. UCC provides services to both the university and external commercial clients.

- **Internet Connectivity:** Internet connectivity to the university is provided via a 1 / 2 Mbps fiber leased line to the state owned Telecom Company. However, UCC also has a separate VSAT system used to provider services for the external commercial clients. This VSAT system is also used to provide service to university departments that have fast connectivity needs if they are willing to pay for the service.

- **Internet Distribution in Campus:** The University has an extensive and well developed fiber network.

- **Issues and concerns**
    - UCC has recently signed a 2 year contract for the commercial VSAT operation at very competitive rates of $2.83 per kbps. As such, UCC will advise the university to switch to the AVU provider if costs are very close to what UCC is currently commanding.
    - The University will require a full VSAT kit.

Makerere University

- **Independent ICT Unit**: The University has a well developed ICT unit (DICTS).

- **Internet Connectivity:** Internet connectivity to the university is provided via two fiber leased line links: the primary link of 1 / 2 Mbps link to the state owned (privatized) Telecom Company and the other 256/512 kbps link to MTN Uganda, the Second National Operator (SNO) acting as the backup. The University will require a full VSAT kit.

- **Internet Distribution in Campus:** The University has an extensive and well developed fiber network.

- **Issues and Concerns**
    - The University is willing to switch to VSAT if a reasonable cost can be negotiated and will require a full VSAT kit. Some funding proposals have been developed
    - The University insists on having local provider presence to provide support and maintenance services.

University Eduardo Mondlane

- **Independent ICT Unit**: The University has a well developed ICT unit CIUEM.

- **Internet Connectivity:** Internet connectivity to the university is provided via a 3.8 m antenna through Telestar 10. The university also hosts the Mozambique Global Distance Learning Network (GDLN) which is equipped with a 3.8 m antenna with internet and videoconference services provided through Intelsat. This system doesn't appear to be in regular use at the moment.

- **Internet Distribution in Campus:** The University has an extensive and well developed fiber network with wireless links to the off-campus schools and faculties.

- **Issues and Concerns**
    - The University negotiated for and received funding to pay for connectivity under a World Bank credit for the next 4 years. Any switch of providers would require a tendering process.

University of Ghana, Legon

- **I Independent ICT Unit**: The University has a fairly well developed ICT department.

- **Internet Connectivity:** Internet is provided via a 3.8 M antenna with 4 Watt BUC VSAT system through PAS 1 R. The service is provided by EMPERION of Denmark. The University has a 36 month agreement paid for on quarterly basis. Most of the equipment can be reused if switching occurs.

- **Internet Distribution:** Some buildings access the Internet through the fiber network and a wireless network has been deployed to extend these services to the other buildings.

- **Issues and concerns**
    - Legon embraces the Bandwidth Consolidation Initiative.
    - The University has a VSAT License and pays for services three months in advance.
    - Most Equipment can be re-used.

University of Education, Winneba

- **Independent ICT Unit**: The ICT initiatives at the University are run by the Coordinator of ICT Programs, Mr. Yousuf Yidana who sits on the Computer Board, of which the Vice Chancellor is the chairman, and they are charged with formulating all the ICT policies for the University. The University's Institute for Educational Development and Extension (IEDE) department has been operational for five years. The IEDE department was responsible for procuring the VSAT used in the departments distance programs and throughout the University.

- **Internet Connectivity:** Internet is provided via a 2.4 M C Band VSAT through NSS-7 by Afrinet Communications and the dish is located on the roof of the Institute for Educational Development and Extension. Most of the equipment can be reused if switching occurs.

- **Internet Distribution:** A wireless network has been deployed to extend Internet services to the north and south campuses.

- **Issues and concerns:** Winneba embraces the Bandwidth Consolidation Initiative.

- **Other Recommendations:** eDegree is running a one semester pilot project with one of their distance programs; it would of great benefit if the University could increase its current bandwidth to accommodate the projected increase in student numbers and users accessing the content.

Association of African Universities (AAU)

- **Independent ICT Unit**: The Association of African Universities is an international non-governmental organization set up by the universities in Africa to promote cooperation among themselves and between them and the international Academic community. As

such there are no students but a staff of approximately thirty one to manage the daily tasks.

- The AAU runs the Database of African Thesis and Dissertations (DATAD) from African researches and scholars and there are plans to expand the database in 2005. The AAU has plans to host the Africa Journals Online a paid subscription service that requires all subscribers to access the resources at any time thus justifying the subscription costs. The AAU is also involved in building a database of African Experts which can be accessed by users. All the above projects are added impetus for the AAU to increase their current bandwidth.

- **Internet Connectivity:** The University is currently on a 128 Leased Line connection to a local ISP.

- **Possible locations for VSAT.**
- The roof of the AAU is made of aluminum metal sheets, fixed on to wooden truss. Therefore it cannot carry the weight of a satellite dish.

INVESTIGATION

OF

BANDWIDTH CONSOLIDATION FOR PARTNERSHIP UNIVERSITIES

A Report Prepared

By

The African Virtual University

For

The Partnership for Higher Education in Africa

APPENDIX 3

Prepared by:
Alex Twinomugisha
Joseph Magochi
Sandra Aluoch

October 15 2004

APPENDIX 3: Completed Questionnaires

University of Ibadan

Organisational Details	
Institution Name:	UNIVERSITY OF IBADAN
City:	IBADAN
Country:	NIGERIA
Website address:	www.ui.edu.ng
Number of full-time students	21,000
Number of part-time students	5,000
Number of faculty	1,300 Teaching, 4,500 Non-Teaching
Is there an independent IT department/ Unit in your institution?	Yes
Is there a national research and education network (NREN) in the country?	**If yes, please give any relevant details and comments:** This is yet to fully take off, but, being organised by the National Universities Commission.

Questionnaire Respondent/International Bandwidth Project Contact Information	
Name:	Dr. A E Oluleye
Position:	Director MIS Unit
Telephone Number:	(234) 802 290 2807
Email address:	ayodeji.oluleye@mail.ui.edu.ng or aoluleye@skannet.com

Connectivity Details

1. Type of connectivity used to link the Institution to the Internet Service Provider

Leased Line – Fiber	
Leased Line – Copper Wire	
Leased Line – Radio link/Wireless	
Satellite/VSAT	X
Dial Up	

2. Capacity of connection:

Uplink (Kbps):	256 kbps
Downlink (Kbps):	*1 Mbps*

3. What do you use your connection for:

Data access (internet)	**X**
Voice Over IP (VOIP)	
Video conferencing	
Other	

4. Service Provider Name (if more than 1, provide details of primary or main provider):	**SkyVison LCC (of Israel) c/o General Data Engineering Services (GDES-Nigeria)**

5. Service Provider Address:

Street. Address	18b Oshin Road
City, Country	Kongi-Bodija, Ibadan, Nigeria
Telephone	(234)- 2- 810 5156
Email	info@skannet.com
URL	http://www.skannet.com

6. Service Provider Type

	Private ISP	X [GDES-Local Representative]
	National Telecom	
	VSAT company	X [SkyVision LCC of Israel
	Other:	

7. Does the Service Provider have a local Office	
Yes	X
No	
Local Office address, if different from 4 above	See 5 above

8. If VSAT does the institution have a VSAT license?	
Yes	
No	**X**
8a. If Yes cost of license if any (in $US/year)	
8b. If No what license arrangements are in place if any	**The National Universities Commission obtains waivers for Universities.**

9. Cost of Bandwidth per month (if dialup is being used, please include phone costs and Internet fees)	
Local currency	696,000 Naira @ $1: 145 naira
Converted to $US	$ 4,800/Month

10. Length of existing (current) bandwidth contract commitment	
Number of years of contract	**Nil** *(No formal contract exists)*
Expiry date	**One month notice on termination**
Does the contract specify penalties for early termination? **(Give details)**	**As above.**

11. Does the Contract provide for Quality of Service Penalties?	
Yes (provide details)	**X [Provides 24 hour compensation for downtime greater than 6 hours]**
No	

12. If VSAT is used, what is the current equipment in place? (size of dish, electronics type, cost etc)	
Frequency Band (e.g. C-Band, KU-Band)	**C-Band**
Satellite used	**Panamsat 4 [PAS4]**
Size of Antenna/Dish – Diameter in Meters	**2.4 Meters**
Make / Model number of antenna	**Channel Master**
Make, model and power of HPA/ BUC (outdoor electronics)	5W BUC
Make, model of receiver, modem (indoor equipment)	SPL2048 Modem, EMR1600 DVB, Cisco 3600 Router

13. Does the link have a committed Information rate (CIR)?	
Yes	X
No	
Question not answered/Not Sure	

13a: If there is a CIR what is the rate:	
(a) national	
(b) International	**256k Uplink, 1024k Downlink**

14: Does the link have burstable capacity	
Yes	
No	X
Question not answered/Not Sure	

14a: If yes what can it burst to over what period:	

15: Are there any other additional Internet bandwidth links into the university (e.g. to specific departments)

If yes:-

Type	Purpose	Bandwidth amount
a. *Direct on PC Satellite*	*College of Medicine Academic & Administration*	*128 kbps/128 kbps*
b.		
c.		

16: How many computers do you have on campus

a) Total number	1,300
b) Total networked	805
c) Total with Internet access	805

17. How many servers do you have on campus? [Excluding those for specific departments?]

Number   15 (Main -8   College of Med-7)

18. Do you provide email services for:

All staff	X
All students	X [through units and free for now, subscription coming]
If Yes, what is the email domain?	**mail.ui.edu.ng**

19. Type of on-campus network available

Copper (10BaseT or 100BaseT)	X (Within buildings
Wireless	X (WIFI Inter-buildings)
Fiber	
Hybrid/Mixed	
Question not answered/Not Sure	

20. Are there any planned ICT initiatives (e.g. upgrade of connectivity, campus network, wireless systems, E-Learning and Enterprise Resource Planning applications)? Please list providing brief details with planned implementation dates:

Initiative 1:	Wireless systems
Initiative 2:	Optical fiber network across the campus
Initiative 3:	e-learning and ERP applications

21. Is there a written IT and/or E-learning strategy for the campus?

Yes	X
No	
Question not answered/ Not Sure	

21a. If yes please attach a copy   **See executive summary of Strategic plan**

22. Are there any installed e-learning applications or projects

Yes	
No	**X [not yet, but being planned]**

22a. If yes, Please list

E-learning project 1:	
E- learning project 2:	

23. Do you monitor your bandwidth usage?

Yes	X
No	

23a. If yes

Monitoring tools used (name/ details)   Multi Router traffic Grapher using RRD tools [MRTG-RRD]

Average Usage in kbps over past 3-6 months (uplink, downlink:	256 kbps/1 Mbps
% of time link 100% utilized:	80%
Ave Hours/month that link is down	**6 hours**
Major cause(s) of link outage	**Power problems**

24. Do you manage your bandwidth in any way (i.e. content filtering, limiting department usage)

	Yes	X
	No	

24a. If yes please specify

Bandwidth management software	YDI Bandwidth Manager (tested to be deployed)
Bandwidth management plan/ policy	Apportion 4 kbps per connection

25. What do you feel is the fair cost for sustainable BW for African institutions given how much you are paying today?

$2.5/kbps

25a. If you could obtain this pricing, how much bandwidth would your institution purchase

512 kbps/2 Mbps

25 b. How much bandwidth would your institution purchase if the cost were $5 per kbps?

25 c. How much bandwidth would your institution purchase if the cost were $3 or less per kbps?

512 kbps/2 Mbps
from late 2004

26. Please provide any additional information that may enhance this investigation

Obafemi Awolowo University

Organisational Details

Institution Name:	Obafemi Awolowo University
City:	Ile-Ife
Country:	NIGERIA
Website address:	www.oauife.edu.ng
Number of full-time students	24,000
Number of part-time students	500
Number of faculty	-
Is there an independent IT department/ Unit in your institution?	YES.
Is there a national research and education network (NREN) in the country?	If yes, please give any relevant details and comments. YES NUNET (Nigerian Universities Network. Inactive)

Questionnaire Respondent/International Bandwidth Project Contact Information

Name:	1. Engr. Prof. L. O. Kehinde
Position:	Director, Information Technology and Communications Unit
Telephone Number:	234-803-329-8567
Email address:	lkehinde@oauife.edu.ng lokehinde@yahoo.com
Name:	2. Engr. Kanmi Adewara
Position:	Network Administrator
Telephone Number:	234-803-351-7445 [234-803-405-8134]
Email address:	kanmiade@oauife.edu.ng

Connectivity Details

1. Type of connectivity used to link the Institution to the Internet Service Provider

Leased Line – Fiber	
Leased Line – Copper Wire	
Leased Line – Radio link/Wireless	
Satellite/VSAT	X
Dial Up	

2. Capacity of connection:

Uplink (Kbps):	256 Kbps
Downlink (Kbps):	512 Kbps (burs table to 1 Mbps)

3. What do you use your connection for:

Data access (internet)	**X**
Voice Over IP (VOIP)	**Rarely**
Video conferencing	
Other	

4. Service Provider Name (if more than 1, provide details of primary or main provider):	**BROADBAND TECHNOLOGIES LTD LAGOS NIGERIA (Reseller of New Skies)**

5. Service Provider Address:

Street. Address	8bB Ademola Street, Off Awolowo Road
City, Country	SW Ikoyi, LAGOS, NIGERIA
Telephone	234 1 2673531; 234 803 525 0987
Email	info@btlimited.com h.etomi@moneynett.com
URL	http://www.btlimited.com

6. Service Provider Type

Private ISP	X

National Telecom VSAT company	X	
Other:		

7. Does the Service Provider have a local Office	
Yes	X
No	
Local Office address, if different from 4 above	

8. If VSAT does the institution have a VSAT license?	
Yes	
No	**X**
8a. If Yes cost of license if any (in $US/year)	
8b. If No what license arrangements are in place if any	**Educational Institution Waiver**

9. Cost of Bandwidth per month (if dialup is being used, please include phone costs and Internet fees)	
Local currency	
Converted to $US	$9/Kbps/month x 768=$6,912/month

10. Length of existing (current) bandwidth contract commitment	
Number of years of contract	1 year.
Expiry date	March 2005. The university has paid up to March 2005
Does the contract specify penalties for early termination? **(Give details)**	Forfeit any monies paid upfront to the end of the contract.

11. Does the Contract provide for Quality of Service Penalties?	
Yes (provide details)	
No	No.

12. If VSAT is used, what is the current equipment in place? (size of dish, electronics type, cost etc)	
Frequency Band (e.g. C-Band, KU-Band)	C-Band
Satellite used	NSS 7
Size of Antenna/Dish – Diameter in Meters	3.8 meters
Make / Model number of antenna	Prodelin
Make, model and power of HPA/ BUC (outdoor electronics)	10W (CODAN)
Make, model of receiver, modem (indoor equipment)	DVB Platform, **Tx**-Radyne Comstream, model 2401. TDM-QPSK **Rx**-Ipricot DVB modem

13. Does the link have a committed Information rate (CIR)?	
Yes	X
No	
Question not answered/Not Sure	

13a: If there is a CIR what is the rate:	
(a) national	
(b) International	

14: Does the link have burstable capacity	
Yes	Twice as much as shown on MRTG graphs
No	
Question not answered/Not Sure	

14a: If yes what can it burst to over what period:	
	256 Kbps up/ 1 Mbps down indefinitely-
	Confirmed by viewing MRTG graphs

15: Are there any other additional Internet bandwidth links into the university (e.g. to specific departments)

If yes:

Type	Purpose	Bandwidth amount
a. VSAT	Backup	256 kbps down/128 kbps up
		Link No longer active
b.		
c.		

16: How many computers do you have on campus

a) Total number	About 1,400
b) Total networked	950
c) Total with Internet access	950

17. How many servers do you have on campus?
[Excluding those for specific departments?]

Number	7 (6 at the Network Control Centre
	1 at teaching Hospital- Connected via Wifi)

18. Do you provide email services for:

All staff	**Yes**
All students	Most students
If Yes, what is the email domain?	oauife.edu.ng

19. Type of on-campus network available

Copper (10BaseT or 100BaseT)	Node access-100%
Wireless	Backbone-30%
Fiber	Backbone-70%
Hybrid/Mixed	X
Question not answered/Not Sure	

20. Are there any planned ICT initiatives (e.g. upgrade of connectivity, campus network, wireless systems, E-Learning and Enterprise Resource Planning applications)? Please list providing brief details with planned implementation dates:

Initiative 1:	Backbone (Campus) Full migration from wireless to Fiber
Initiative 2:	Provision of wireless Hot spots on campus network
Initiative 3:	Implementation and deployment of e-portals for learning , administrative and academic records

21. Is there a written IT and/or E-learning strategy for the campus?

Yes	X (in draft)
No	
Question not answered/ Not Sure	
21a. If yes please attach a copy	**Please see attachment**

22. Are there any installed e-learning applications or projects

Yes	
No	**Presently being developed**
22a. If yes, Please list	
E-learning project 1:	Development of support programs for Kewl. Not yet implemented but in serious consideration
E- learning project 2:	

23. Do you monitor your bandwidth usage?

Yes	X
No	

23a. If yes

Monitoring tools used (name/ details)	MRTG (Multi Router Traffic Grapher, NTOP
Average Usage in kbps over past 3-6 months (uplink, downlink:	100 Kbps/500 Kbps
% of time link 100% utilized:	80%
Ave Hours/month that link is down	**0.5 hours/month**
Major cause(s) of link outage	**Local power outage but this has now been resolved by battery backup inverter purchased from Carnegie Corporation grant.**

24. Do you manage your bandwidth in any way (i.e. content filtering, limiting department usage)

Yes	X
No	

24a. If yes please specify

Bandwidth management software	SQUID, CBQ (Class base queuing)
Bandwidth management plan/ policy	a. Per user max. bandwidth- At 64K /PC/TX b. Per network max bandwidth-at 250K/Subnet c. Traffic/Protocol type priority d. Time scheduling e. File size priority

25. What do you feel is the fair cost for sustainable BW for African institutions given how much you are paying today?	$3/ Kbps/month
25a. If you could obtain this pricing, how much bandwidth would your institution purchase	Aggregate 1.5-2.0 Mbps
25 b. How much bandwidth would your institution purchase if the cost were $5 per kbps?	Approximately 1 Mbps down, 512 Kbps up
25 c. How much bandwidth would your institution purchase if the cost were $3 or less per kbps? **26. Please provide any additional information that may enhance this investigation**	Approximately 2 Mbps down, 512 Kbps up 1. It is important that whatever is bought from AVU must be burs table to almost twice nominal value as is our present situation. 2. There must be local support in Nigeria for any provider

University of Port Harcourt

Organisational Details	
Institution Name:	University of Port Harcourt
City:	Choba, Port Harcourt, Rivers State
Country:	NIGERIA
Website address:	www.uniport.edu.ng
Number of full-time students	**15,000**
Number of part-time students	**-**
Number of faculty	
Is there an independent IT department/ Unit in your institution?	Yes.
Is there a national research and education network (NREN) in the country?	Yes. But has been inactive

Questionnaire Respondent/International Bandwidth Project Contact Information	
Name:	1. Prof. Ebi,BIO. Awatua-EfeboL. O. Kehinde
Position:	Director,
Telephone Number:	+234-803-301-6945, +234-805 533 2582
Email address:	Awotua_efebo@hotmail.com,awotua-efebo@yahoo.com

Connectivity Details

1. Type of connectivity used to link the Institution to the Internet Service Provider	
Leased Line – Fiber	
Leased Line – Copper Wire	
Leased Line – Radio link/Wireless	
Satellite/VSAT	X
Dial Up	

2. Capacity of connection:	
Uplink (Kbps):	128 Kbps
Downlink (Kbps):	256 Kbps

3. What do you use your connection for:	
Data access (internet)	**X**
Voice Over IP (VOIP)	Rarely – Although the VOIP systems (Cisco) is installed and works perfectly
Video conferencing	
Other	
4. Service Provider Name (if more than 1, provide details of primary or main provider):	**Direqlearn International Ltd. of south Africa**

5. Service Provider Address:	
Street. Address	Direqlearn House, Plot 772, Ishiaku
City, Country	Rabiu Estate, Wise 2, Abuja , Nigeria
Telephone	+234-804-61-9055, +234 803 402 9801
Email	info@direqlearn.org
URL	

6. Service Provider Type	
Private ISP	X
National Telecom	
VSAT company	X
Other:	

7. Does the Service Provider have a local Office	
Yes	X
No	
Local Office address, if different from 4 above	

8. If VSAT does the institution have a VSAT license?	
Yes	
No	**X**
8a. If Yes cost of license if any (in $US/year)	
8b. If No what license arrangements are in place if any	**Educational Institution Waiver**

9. Cost of Bandwidth per month (if dialup is being used, please include phone costs and Internet fees)

Local currency	N520,000
Converted to $US	$ 4000

10. Length of existing (current) bandwidth contract commitment

Number of years of contract	**1 year (no Contract sited at university as contract is between provider and Shell)**
Expiry date	**Oct 2004**
Does the contract specify penalties for early termination? **(Give details)**	**We have no option as the current provisions by Donors have to expire**

11. Does the Contract provide for Quality of Service Penalties?

Yes (provide details)	
No	**No. The Link is very slow sometimes**

12. If VSAT is used, what is the current equipment in place? (size of dish, electronics type, cost etc)

Frequency Band (e.g. C-Band, KU-Band)	**Ku-Band**
Satellite used	**Panamsat (PAS 1R)**
Size of Antenna/Dish – Diameter in Meters	**2.4 meters**
Make / Model number of antenna	**Channel master**
Make, model and power of HPA/ BUC (outdoor electronics)	**2 watts Spot Byte Earth station Equipment**
Make, model of receiver, modem (indoor equipment)	DVB Platform-IPSAT Terminal, **Tx**-Radyne Comstream, **V+ Firewall and Cisco catalyst 4506**

13. Does the link have a committed Information rate (CIR)?

Yes	
No	No
Question not answered/Not Sure	

13a: If there is a CIR what is the rate:

(a) national	
(b) International	

14: Does the link have burstable capacity

Yes	
No	No
Question not answered/Not Sure	

14a: If yes what can it burst to over what period:

15: Are there any other additional Internet bandwidth links into the university (e.g. to specific departments)
If yes:

Type	*Purpose*	*Bandwidth amount*

a. **VSAT (Health sciences)**	**Only for the department**	**BW: Not Known**
		Equipment: Channel Master VSAT 2.4 m.
	Connected to Heath services cybercafé (20 PC)s	
		Provided free by Elf
b. **VSAT (Electrical Engineering)**	**Direct PC to Local ISP for Department**	**23 K. Provided free till November 04**
C **VSAT (Petroleum Institute)**	**Gilat VSAT for the institute**	**2.4 meter Dish with Gilat shiron intersky system.**

16: How many computers do you have on campus

a) Total number	**About 500**
b) Total networked	**300**
c) Total with Internet access	**250**

17. How many servers do you have on campus? [Excluding those for specific departments?]

Number	**2 at the Network Control Centre**

18. Do you provide email services for:

All staff	**No. Access to internet only**
All students	**No. Access to internet only**
If Yes, what is the email domain?	**Uniport.edu.ng; This domain has not been open to staff and students**

19. Type of on-campus network available

Copper (10BaseT or 100BaseT)	
Wireless	
Fiber	
Hybrid/Mixed	X
Question not answered/Not Sure	

20. Are there any planned ICT initiatives (e.g. upgrade of connectivity, campus network, wireless systems, E-Learning and Enterprise Resource Planning applications)? Please list providing brief details with planned implementation dates:

Initiative 1:	Networking the whole University with fiber
Initiative 2:	
Initiative 3:	

21. Is there a written IT and/or E-learning strategy for the campus?

Yes	
No	X
Question not answered/ Not Sure	
21a. If yes please attach a copy	

22. Are there any installed e-learning applications or projects

Yes	
No	**X**
22a. If yes, Please list	
E-learning project 1:	
E- learning project 2:	

23. Do you monitor your bandwidth usage?

Yes	
No	**X**

23a. If yes

Monitoring tools used (name/ details)	N/a
Average Usage in kbps over past 3-6 months (uplink, downlink:	
% of time link 100% utilized:	
Ave Hours/month that link is down	
Major cause(s) of link outage	

24. Do you manage your bandwidth in any way (i.e. content filtering, limiting department usage)

Yes
No **x**

24a. If yes please specify

Bandwidth management software
Bandwidth management plan/ policy

25. What do you feel is the fair cost for sustainable BW for African institutions given how much you are paying today?	$4/ Kbps/month
25a. If you could obtain this pricing, how much bandwidth would your institution purchase	Aggregate 12 Mbps
25 b. How much bandwidth would your institution purchase if the cost were $5 per kbps?	Approximately 10Mbps
25 c. How much bandwidth would your institution purchase if the cost were $3 or less per kbps?	Aggregate 12 Mbps
26. Please provide any additional information that may enhance this investigation	

University of Jos

Organizational Details

Institution Name:	University of Jos
City:	Jos
Country:	Nigeria
Website address:	www.widernet.org/josproject
Number of full-time students	13500
Number of part-time students	12000
Number of faculty	650 full time.
Is there an independent IT department/ Unit in your institution?	There are three. I) The University Computer Centre UCC), ii) one for the network, UJNet and iii) one for administrative services, MIS. There is a library information system, LIS unit in the library.
Is there a national research and education network (NREN) in the country?	If yes, please give any relevant details and comments. In the making. Still to be formally set up.

Questionnaire Respondent/International Bandwidth Project Contact Information

Name:	L. S. O. Liverpool
Position:	Professor of Mathematics and University ICT Coordinator
Telephone Number:	234 8037000213, 234 73611839
Email address:	liverpoo@unijos.edu.ng, lsoliverpool@yahoo.com

Connectivity Details

1. Type of connectivity used to link the Institution to the Internet Service Provider

Leased Line – Fiber	
Leased Line – Copper Wire	
Leased Line – Radio link/Wireless	X (Wireless back up link)
Satellite/VSAT	X
Dial Up	

2. Capacity of connection:

Uplink (Kbps):	256
Downlink (Kbps):	512

3. What do you use your connection for:

Data access (internet)	**Yes**
Voice Over IP (VOIP)	Contract has been awarded for installation of first set of VOIP services.
Video conferencing	
Other	

4. Service Provider Name (if more than 1, provide details of primary or main provider):

Brainwave Nigeria. (New Skies - VSAT). Back up, Afrione Nigeria (Emporium). Wireless Link to Afrione.

5. Service Provider Address:

Street. Address	Tafawa Balewa Street
City, Country	Jos, Nigeria
Telephone	234 8037152879, 234 73 454221
Email	bestman@bwave.net
URL	Bwave.net

6. Service Provider Type

Private ISP	X
National Telecom	
VSAT company	
Other:	

7. Does the Service Provider have a local Office	
Yes	X
No	
Local Office address, if different from 4 above	

8. If VSAT does the institution have a VSAT license?	
Yes	
No	We do not have license.
8a. If Yes cost of license if any (in $US/year)	
8b. If No what license arrangements are in place if any	Licensing is under cover of provider.

9. Cost of Bandwidth per month (if dialup is being used, please include phone costs and Internet fees)

Local currency	690,000
Converted to $US	$5000

10. Length of existing (current) bandwidth contract commitment

Number of years of contract	Half a year
Expiry date	November 2004
Does the contract specify penalties for early termination? **(Give details)**	No.

11. Does the Contract provide for Quality of Service Penalties?	
Yes (provide details)	
No	**None.**

12. If VSAT is used, what is the current equipment in place? (size of dish, electronics type, cost etc)

Frequency Band (e.g. C-Band, KU-Band)	C band
Satellite used	New Skies
Size of Antenna/Dish – Diameter in Meters	2.4 meters
Make / Model number of antenna	STM wireless
Make, model and power of HPA/ BUC (outdoor electronics)	We use CODAN Down converter and SSPA(5watts) Down converter detail model: 5700
Make, model of receiver, modem (indoor equipment)	INDOOR EQUIPMENT Modem RADYNE COMSTREAM DMD 2401 satellite modem DVB -Ipricot Router(2600)

13. Does the link have a committed Information rate (CIR)?	
Yes	X
No	
Question not answered/Not Sure	

13a: If there is a CIR what is the rate:	
(a) national	
(b) International	**256/512 kbps**

14: Does the link have burstable capacity	
Yes	
No	X
Question not answered/Not Sure	

14a: If yes what can it burst to over what period:

15: Are there any other additional Internet bandwidth links into the university (e.g. to specific departments)
If yes:

Type	Purpose	Bandwidth amount
a.		
b.		
c.		

16: How many computers do you have on campus

a) Total number	400	
b) Total networked	**300**	
c) Total with Internet access	**300**	

17. How many servers do you have on campus?
[Excluding those for specific departments?]

Number	**5**

18. Do you provide email services for:

All staff	**Yes**
All students	**Yes**
If Yes, what is the email domain?	

19. Type of on-campus network available

Copper (10 BaseT or 100 BaseT)	**CAT 5 within buildings**
Wireless	Yes. Being developed.
Fiber	Backbone is fiber and there is a fiber link between two of our three campuses. The third campus is linked by radio.
Hybrid/Mixed	
Question not answered/Not Sure	

20. Are there any planned ICT initiatives (e.g. upgrade of connectivity, campus network, wireless systems, E-Learning and Enterprise Resource Planning applications)? Please list providing brief details with planned implementation dates:

Initiative 1:	Consolidating network services to provide zero down time. 2004
Initiative 2:	Establishing and popularizing wireless links. 2004
Initiative 3:	Fiber link to science laboratories and introduction of VOIP. 2004

Establishing and popularizing e learning services 2004 -2006
Establishing enterprise MIS services 2004.
Human resource development – continuous and indefinite.
Extending network to student dorms and staff housing estate. 2006
MORE INDICATED IN ICT STRATEGY ATTACHED.

21. Is there a written IT and/or E-learning strategy for the campus?

Yes	We are attaching ICT project plans up to 2006. The second cycle (5 years) of the university strategic plan is nearing completion. Some of these tasks have been realized already and there have been additional new initiatives. (NetTel@Africa is not mentioned in project documents and all campuses are already linked as planned)
No	
Question not answered/ Not Sure	
21a. If yes please attach a copy	**Sent as an attachment.**

22. Are there any installed e-learning applications or projects

Yes	Several
No	
22a. If yes, Please list	

E-learning project 1:	Cisco Academy
E- learning project 2:	NetTel@Africa
E- learning project 3:	**Departmental projects. Eg. Math will use KEWL to facilitate delivery of project detailed in attached. Theatre art and communication has several initiatives. An online student newspaper has been started.**

23. Do you monitor your bandwidth usage?

Yes	
No	**X**

23a. If yes

Monitoring tools used (name/ details)	
Average Usage in kbps over past 3-6 months (uplink, downlink:	
% of time link 100% utilized:	
Ave Hours/month that link is down	
Major cause(s) of link outage	

24. Do you manage your bandwidth in any way (i.e. content filtering, limiting department usage)

Yes	X
No	

24a. If yes please specify

	Filtering has just been started.
Bandwidth management software	
Bandwidth management plan/ policy	

25. What do you feel is the fair cost for sustainable BW for African institutions given how much you are paying today?	There is no fair cost. We are cashed strapped and will continue to make every effort to fund bandwidth. We can sustain the costs we meet today for higher bandwidth at lower costs.
25a. If you could obtain this pricing, how much bandwidth would your institution purchase	We shall buy as much bandwidth as our current expenditure can procure.
25 b. How much bandwidth would your institution purchase if the cost were $5 per kbps?	We shall buy as much bandwidth as our current expenditure can procure. (256/512)
25 c. How much bandwidth would your institution purchase if the cost were $3 or less per kbps?	We shall double our current bandwidth.(256/1 Mbps)
26. Please provide any additional information that may enhance this investigation	

Ahmadu Bello University

Organisational Details

Institution Name:	Ahmadu Bello University
City:	Zaria
Country:	Nigeria
Website address:	www.abuzaria.org own Domain: abu.edu.ng
Number of full-time students	25,000
Number of part-time students	3000
Number of faculty (staff)	5846
Is there an independent IT department/ Unit in your institution?	No, But There is a task force within the university that is handling all ICT activities
Is there a national research and education network (NREN) in the country?	If yes, please give any relevant details and comments. Nunet (Not very Active)

Questionnaire Respondent/International Bandwidth Project Contact Information

Name:	Dr. PFU Taylor
Position:	Head, Electrical Engineering Dept, Coordinator Cisco Academy
Telephone Number:	+234-069-551237, +234-803-3173135
Email address:	taylorpfu@yahoo.com,pfutaylor@myway.com

Connectivity Details

1. Type of connectivity used to link the Institution to the Internet Service Provider

Leased Line – Fiber	
Leased Line – Copper Wire	
Leased Line – Radio link/Wireless	
Satellite/VSAT	X (VSAT 3.8 dish Owned by University but not active. Currently University utilizing the Provider's 2.4 m Dish)
Dial Up	

2. Capacity of connection:

Uplink (Kbps):	128
Downlink (Kbps):	512

3. What do you use your connection for:

Data access (internet)	X
Voice Over IP (VOIP)	
Video conferencing	
Other	

4. Service Provider Name (if more than 1, provide details of primary or main provider):
Broadband technologies Ltd

5. Service Provider Address:

Street. Address	8B Ademola Street , South West, Ikoyi
City, Country	Lagos, Nigeria
Telephone	+234 15553707
Email	dibhawoh@btlimited.com
URL	

6. Service Provider Type

Private ISP	
National Telecom	
VSAT company	VSAT Provider
Other:	

7. Does the Service Provider have a local Office

Yes	X
No	
Local Office address, if different from 4 above	

8. If VSAT does the institution have a VSAT license?

Yes	
No	No, Utilizing VSAT License of the provider

8a. If Yes cost of license if any (in $US/year)
8b. If No what license arrangements are in place if any

9. Cost of Bandwidth per month (if dialup is being used, please include phone costs and Internet fees)

Local currency	
Converted to $US	$5000

10. Length of existing (current) bandwidth contract commitment

Number of years of contract	Paid Upfront for only Six Months
Expiry date	14th November 2004
Does the contract specify penalties for early termination? **(Give details)**	None as we paid upfront

11. Does the Contract provide for Quality of Service Penalties?

Yes (provide details)	
No	**None**

12. If VSAT is used, what is the current equipment in place? (size of dish, electronics type, cost etc)

Frequency Band (e.g. C-Band, KU-Band)	C-Band, 3.8M	C band 2.4 M dish*
Satellite used	-	NSS7*
Size of Antenna/Dish – Diameter in Meters	3.8 M	2.4 m *
Make / Model number of antenna	Prodelin	Prodelin 8
Make, model and power of HPA/ BUC (outdoor electronics)	Efdata BUC, 20W	5W, NJt5025F*
Make, model of receiver, modem (indoor equipment)	EFdata SDM 300A	Viasat Link Star*
		Skystream EMR 50*

Means Not owned by the university

13. Does the link have a committed Information rate (CIR)?

Yes	
No	X
Question not answered/Not Sure	

13a: If there is a CIR what is the rate:

(a) national	N/a
(b) International	N/a

14: Does the link have burstable capacity

Yes	Yes
No	
Question not answered/Not Sure	

14a: If yes what can it burst to over what period: 256 kbps /1.5 Mbps

15: Are there any other additional Internet bandwidth links into the university (e.g. to specific departments)

If yes:

Type	Purpose	Bandwidth amount
a.		
b.		
c.		

16: How many computers do you have on campus

a) Total number   600
b) Total networked   450
c) Total with Internet access   450

17. How many servers do you have on campus? [Excluding those for specific departments?]

Number   **3**

18. Do you provide email services for:

All staff   No. Only access to internet which they pay at cafes
All students   No. Only access to internet which they pay at cafes
If Yes, what is the email domain?   Abu.edu.ng

19. Type of on-campus network available

Copper (10BaseT or 100BaseT)   Yes Intra Building
Wireless   Inter Building
Fiber   None
Hybrid/Mixed
Question not answered/Not Sure

20. Are there any planned ICT initiatives (e.g. upgrade of connectivity, campus network, wireless systems, and Enterprise Resource Planning applications)? Please list with planned implementation dates:

Initiative 1:   MIS project
Initiative 2:   ICT intervention (Purchase of PC for Staff)
Initiative 3:   Multimedia initiative Laboratory
Initiative 4   Digital Library – digitalization of content

21. Is there a written IT and/or E-learning strategy for the campus?

Yes   Draft almost complete
No
Question not answered/ Not Sure

21a. If yes please attach a copy

22. Are there any installed e-learning applications or projects

Yes   X
No

22a. If yes, Please list

E-learning project 1:   Cisco Networking Academy
E- learning project 2:

23. Do you monitor your bandwidth usage?

Yes
No   **X**

23a. If yes

Monitoring tools used (name/ details)
Average Usage in kbps over past 3-6 months (uplink, downlink:
% of time link 100% utilized:
Ave Hours/month that link is down
Major cause(s) of link outage

24. Do you manage your bandwidth in any way (i.e. content filtering, limiting department usage)

Yes
No   X

23a. Please list

Bandwidth management software

25. What do you feel is the fair cost for sustainable BW for African institutions given how much you are paying today?	$2.5
25a. If you could obtain this pricing, how much bandwidth would your institution purchase	512/2048 kbps
25 b. How much bandwidth would your institution purchase if the cost were $5 per kbps?	256/2048 kbps
25 c. How much bandwidth would your institution purchase if the cost were $3 or less per kbps? **26. Please provide any additional information that may enhance this investigation**	512/2048 kbps If African Universities can organize themselves and bulk purchase BW, there could be legitimate grounds to request and obtain price reduction if not better than our target of $ 3 /kbps

Bayero University

Organisational Details

Institution Name:	Bayero University
City:	Kano
Country:	Nigeria
Website address:	www.kanoonline.com/buk
Number of full-time students	29,224
Number of part-time students	Approx. 3000
Number of faculty	615
Is there an independent IT department/ Unit in your institution?	Yes. The Bayero Nunet Undertakes all Connectivity initiatives in the campus
Is there a national research and education network (NREN) in the country?	Yes, we have the Nigerian Universities Network (NUNet) in Nigeria. This is a unit coordinated by the National Universities Commission (NUC) to which all universities connect for email purposes (connection is mostly by UUCP).

Questionnaire Respondent/International Bandwidth Project Contact Information

Name:	Dr. Ado Dan-Isa
Position:	NUNet Chairman
Telephone Number:	+234 803 7050304, +234 64 666021
Email address:	ado_danisa@yahoo.com, danisa@tec.buk.edu.ng

Connectivity Details

1. Type of connectivity used to link the Institution to the Internet Service Provider

Leased Line – Fiber	
Leased Line – Copper Wire	
Leased Line – Radio link/Wireless	
Satellite/VSAT	√ 2.4 m System Wholly Owned by the university
Dial Up	

2. Capacity of connection:

Uplink (Kbps):	64
Downlink (Kbps):	128

3. What do you use your connection for:

Data access (internet)	√
Voice Over IP (VOIP)	
Video conferencing	
Other	

4. Service Provider Name (if more than 1, provide details of primary or main provider): Broadband Technologies

5. Service Provider Address:

Street. Address	8b Ademola Street (off Owolowo Street)
City, Country	Ikoyi, Lagos, Nigeria
Telephone	+234 1 2673531, +234 1 2673532
Email	dibhawoh@btlimited.com, iokon@btlimited.com
URL	

6. Service Provider Type

Private ISP	
National Telecom	
VSAT company	√
Other:	

7. Does the Service Provider have a local Office

Yes	√
No	
Local Office address, if different from 4 above	Bank of North Building, Zaria Rd, Kano.

8. If VSAT does the institution have a VSAT license?

Yes	
No	√

8a. If Yes cost of license if any (in $US/year)

8b. If No what license arrangements are in place if any   The provider has the license

9. Cost of Bandwidth per month (if dialup is being used, please include phone costs and Internet fees)

Local currency	268,800
Converted to $US	$1,920

10. Length of existing (current) bandwidth contract commitment

Number of years of contract	Committed to only Six months contract for testing the systems.
Expiry date	October 2004
Does the contract specify penalties for early termination? **(Give details)**	No. We paid upfront for the six months and No penalty can be slapped on termination

11. Does the Contract provide for Quality of Service Penalties?

Yes (provide details)	
No	√

12. If VSAT is used, what is the current equipment in place? (size of dish, electronics type, cost etc)

Frequency Band (e.g. C-Band, KU-Band)	C-Band
Satellite used	NewSkies, NSS7
Size of Antenna/Dish – Diameter in Meters	2.4m
Make / Model number of antenna	Prodelin
Make, model and power of HPA/ BUC (outdoor electronics)	NJT5656F Amplifier , 5W
Make, model of receiver, modem (indoor equipment)	Make – IPSat Radyne Comstream Modem Model – 00 10 65 1201 E5
	Other Equipment: Cisco 3500,2600 and 2950

13. Does the link have a committed Information rate (CIR)?

Yes	
No	
Question not answered/Not Sure	√

13a: If there is a CIR what is the rate:

(a) national	N/a
(b) International	N/a

14: Does the link have burstable capacity

Yes	
No	
Question not answered/Not Sure	√

14a: If yes what can it burst to over what period:

15: Are there any other additional Internet bandwidth links into the university (e.g. to specific departments)

If yes:

Type	Purpose	Bandwidth amount
a. CDRT	Dialup	28kbps
b. Sch. Of Physiotherapy	Wireless	64kbps (shared)
c. AKTH	Wireless	64kbps (shared)

16: How many computers do you have on campus

a) Total number	460
b) Total networked	178
c) Total with Internet access	178

17. How many servers do you have on campus? [Excluding those for specific departments?]

Number	8

18. Do you provide email services for:

All staff	Yes
All students	No
If Yes, what is the email domain?	buk.edu.ng

19. Type of on-campus network available

Copper (10BaseT or 100BaseT)	√ (all campuses)
Wireless	√ (all campuses except CDRT)
Fiber	√ (old and main campuses only)
Hybrid/Mixed	
Question not answered/Not Sure	

20. Are there any planned ICT initiatives (e.g. upgrade of connectivity, campus network, wireless systems, E-Learning and Enterprise Resource Planning applications)? Please list providing brief details with planned implementation dates:

Initiative 1:	Extending the WAN to all campuses
Initiative 2:	Providing Internet connectivity to surrounding institutions
Initiative 3:	Reselling the bandwidth (being reconsidered in the face of the Partnership initiative)

21. Is there a written IT and/or E-learning strategy for the campus?

Yes	
No	√ (but the ICT Policy Committee will soon release its Draft Policy)
Question not answered/ Not Sure	

21a. If yes please attach a copy

22. Are there any installed e-learning applications or projects

Yes	
No	√

22a. If yes, Please list

E-learning project 1:	
E- learning project 2:	

23. Do you monitor your bandwidth usage?

Yes	
No	√

23a. If yes

Monitoring tools used (name/ details)	
Average Usage in kbps over past 3-6 months (uplink, downlink:	
% of time link 100% utilized:	
Ave Hours/month that link is down	
Major cause(s) of link outage	

24. Do you manage your bandwidth in any way (i.e. content filtering, limiting department usage)

Yes	
No	√

24a. If yes please specify

Bandwidth management software	
Bandwidth management plan/ policy	

25. What do you feel is the fair cost for sustainable BW for African institutions given how much you are paying today?	$4
25a. If you could obtain this pricing, how much bandwidth would your institution purchase	64/512 kbps
25 b. How much bandwidth would your institution purchase if the cost were $5 per kbps?	64/256 kbps

25 c. How much bandwidth would your institution purchase if the cost were $3 or less per kbps?	256/1024 kbps
26. Please provide any additional information that may enhance this investigation	Nigerian federal universities have not had grants from the government for the last three years. Therefore any help is welcome.

University of Ghana, Legon

Organisational Details	
Institution Name:	University of Ghana
City:	Accra
Country:	Ghana
Website address:	Http://www.ug.edu.gh
Number of full-time students	23,000
Number of part-time students	Nil
Number of faculty	700+
Is there an independent IT department/ Unit in your institution?	YES
Is there a national research and education network (NREN) in the country?	If yes, please give any relevant details and comments.

Questionnaire Respondent/International Bandwidth Project Contact Information	
Name:	Prof. M. Dakubu
Position:	ICT Director
Telephone Number:	233-021-501919/502262 mobile: 233-0244-296-001
Email address:	mdakubu@ug.edu.gh

Connectivity Details

1. Type of connectivity used to link the Institution to the Internet Service Provider	
Leased Line – Fiber	
Leased Line – Copper Wire	
Leased Line – Radio link/Wireless	
Satellite/VSAT	X
Dial Up	

2. Capacity of connection:	
Uplink (Kbps):	*512 kbps*
Downlink (Kbps):	*1024 kbps*

3. What do you use your connection for:	
Data access (internet)	Yes
Voice Over IP (VOIP)	
Video conferencing	
Other	
4. Service Provider Name (if more than 1, provide details of primary or main provider):	EMPERION in Denmark

5. Service Provider Address:	
Street. Address	Middlefartgate 7
City, Country	DENMARK
Telephone	+45 29 35 30
Email	noc@emperion.net info@emperion.net
URL	http://www.emperion.net

6. Service Provider Type	
Private ISP	
National Telecom	
VSAT company	X
Other:	
7. Does the Service Provider have a local Office	

Yes No Local Office address, if different from 4 above	No (In Nigeria yes)

8. If VSAT does the institution have a VSAT license?

Yes No	YES
8a. If Yes cost of license if any (in $US/year) 8b. If No what license arrangements are in place if any	$2,000.00

9. Cost of Bandwidth per month (if dialup is being used, please include phone costs and Internet fees)

Local currency	¢76,032,000.00
Converted to $US	$8,448.00

10. Length of existing (current) bandwidth contract commitment

Number of years of contract	36 months paid for on a quarterly basis
Expiry date	
Does the contract specify penalties for early termination? (Give details)	No

11. Does the Contract provide for Quality of Service Penalties?

Yes (provide details)	X
No	

12. If VSAT is used, what is the current equipment in place? (size of dish, electronics type, cost etc)

Frequency Band (e.g. C-Band, KU-Band)	KU
Satellite used	PanAmSat PAS1R
Size of Antenna/Dish – Diameter in Meters	3.8m
Make / Model number of antenna	
Make, model and power of HPA/ BUC (outdoor electronics)	NJR BUC/4 W RF
Make, model of receiver, modem (indoor equipment)	DMD2401 LB/ST Modem

13. Does the link have a committed Information rate (CIR)?

Yes	X
No	
Question not answered/Not Sure	

13a: If there is a CIR what is the rate:

(a) national	
(b) International	1024 kbps Downlink and 512 kbps Uplink

14: Does the link have burstable capacity

Yes	X
No	
Question not answered/Not Sure	

14a: If yes what can it burst to over what period:

15: Are there any other additional Internet bandwidth links into the university (e.g. to specific departments)

If yes:

Type	Purpose	Bandwidth amount
a.		
b.		
c.		

16: How many computers do you have on campus

a) Total number	1000 (by September 2004)
b) Total networked	About 600 (September 2004)
c) Total with Internet access	

17. How many servers do you have on campus?
[Excluding those for specific departments?]
Number   10 (By September 2004)

18. Do you provide email services for:
All staff   Yes
All students   Not yet (to start in September/October
                                                    (2004)
If Yes, what is the email domain?   Ug.edu.gh

19. Type of on-campus network available
Copper (10BaseT or 100BaseT)
Wireless
Fiber
Hybrid/Mixed   Yes + DSL
Question not answered/Not Sure

20. Are there any planned ICT initiatives (e.g. upgrade of connectivity, campus network, wireless systems, E-Learning and Enterprise Resource Planning applications)? Please list providing brief details with planned implementation dates:
Initiative 1:   E-Learning (Just started setup) Using KEWL
Initiative 2:   Wireless systems (all campus) 2005; wireless computers
Initiative 3:

21. Is there a written IT and/or E-learning strategy for the campus?
Yes	Yes: in the Strategic Plan
No	
Question not answered/ Not Sure	
21a. If yes please attach a copy	Not readily available for attachment

22. Are there any installed e-learning applications or projects
Yes	Yes
No	
22a. If yes, Please list	
E-learning project 1:	KEWL Installation and workshop for faculty on use (done)
E- learning project 2:	Creating courses (in progress)

23. Do you monitor your bandwidth usage?
Yes   Yes
No
   23a. If yes
Monitoring tools used (name/ details)   MTRG
   Average Usage in kbps over past 3-6 months
(uplink, downlink:
% of time link 100% utilized:
Ave Hours/month that link is down   Hardly done. If down then local power is cause
Major cause(s) of link outage   Power (even though there is a generator)

24. Do you manage your bandwidth in any way (i.e. content filtering, limiting department usage)
Yes   Partially; will start fully in November
No
   24a. If yes please specify
   Bandwidth management software   Cequrux Firewall
Bandwidth management plan/ policy
25. What do you feel is the fair cost for sustainable BW for African $3 to $4 per kbps
institutions given how much you are paying today?

25a. If you could obtain this pricing, how much bandwidth would your institution purchase	5 Mbps
25 b. How much bandwidth would your institution purchase if the cost were $5 per kbps?	2 Mbps
25 c. How much bandwidth would your institution purchase if the cost were $3 or less per kbps? 26. Please provide any additional information that may enhance this investigation	5 Mbps

University of Education, Winneba

Organisational Details

Institution Name:	University of Education, Winneba
City:	Winneba
Country:	Ghana
Website address:	www.uew.edu.gh
Number of full-time students	**12,000**
Number of part-time students	**4,000**
Number of faculty	**5**
Is there an independent IT department/ Unit in your institution?	**Yes**
Is there a national research and education network (NREN) in the country?	**In process of being established**

Questionnaire Respondent/International Bandwidth Project Contact Information

Name:	Hubert Asior
Position:	Network Administrator
Telephone Number:	233 – 277439204
Email address:	hasior@uew.edu.gh

Connectivity Details

1. Type of connectivity used to link the Institution to the Internet Service Provider

Leased Line – Fiber	
Leased Line – Copper Wire	
Leased Line – Radio link/Wireless	
Satellite/VSAT	VSAT
Dial Up	

2. Capacity of connection:

Uplink (Kbps):	64 KBPS (TDMA)
Downlink (Kbps):	1 MEG (TDMA)

3. What do you use your connection for:

Data access (internet)	**Data**
Voice Over IP (VOIP)	
Video conferencing	
Other	

4. Service Provider Name (if more than 1, provide details of primary or main provider):

AFRINET COMMUNICATIONS LTD

5. Service Provider Address:

Street. Address	BOX CT 1167
City, Country	GHANA,ACCRA
Telephone	770214
Email	ADMIN@AFRINETCOM.NET
URL	WWW.AFRINETCOM.NET

6. Service Provider Type

Private ISP	
National Telecom	
VSAT company	X
Other:	

7. Does the Service Provider have a local Office

Yes	X

	No	
Local Office address, if different from 4 above		

8. If VSAT does the institution have a VSAT license?

Yes	
No	**X**

8a. If Yes cost of license if any (in $US/year)
8b. If No what license arrangements are in place if any

9. Cost of Bandwidth per month (if dialup is being used, please include phone costs and Internet fees)

Local currency	
Converted to $US	$2,250

10. Length of existing (current) bandwidth contract commitment

Number of years of contract	
Expiry date	
Does the contract specify penalties for early termination?	
(Give details)	

11. Does the Contract provide for Quality of Service Penalties?

Yes (provide details)	**YES**
No	

12. If VSAT is used, what is the current equipment in place? (size of dish, electronics type, cost etc)

Frequency Band (e.g. C-Band, KU-Band)	C-BAND
Satellite used	NSS7
Size of Antenna/Dish – Diameter in Meters	2.4M
Make / Model number of antenna	CHANNEL MASTER
Make, model and power of HPA/ BUC (outdoor electronics)	NJC 2WATTS
Make, model of receiver, modem (indoor equipment)	SPC ELECTRONICS

13. Does the link have a committed Information rate (CIR)?

Yes	
No	
Question not answered/Not Sure	Not Sure

13a: If there is a CIR what is the rate:

(a) national	
(b) International	

14: Does the link have burstable capacity

Yes	Yes
No	
Question not answered/Not Sure	

14a: If yes what can it burst to over what period:

15: Are there any other additional Internet bandwidth links into the university (e.g. to specific departments)

If yes:

Type	Purpose	Bandwidth amount
a.		
b.		
c.		

16: How many computers do you have on campus

a) Total number	450
b) Total networked	400
c) Total with Internet access	400

17. How many servers do you have on campus?
[Excluding those for specific departments?]

18. Do you provide email services for:

All staff	**Yes**
All students	**No**
If Yes, what is the email domain?	**uew.edu.gh**

19. Type of on-campus network available

Copper (10BaseT or 100BaseT)	
Wireless	
Fiber	
Hybrid/Mixed	Mixed
Question not answered/Not Sure	

20. Are there any planned ICT initiatives (e.g. upgrade of connectivity, campus network, wireless systems, E-Learning and Enterprise Resource Planning applications)? Please list providing brief details with planned implementation dates:

Initiative 1:	E-Learning
Initiative 2:	
Initiative 3:	

21. Is there a written IT and/or E-learning strategy for the campus?

Yes	
No	
Question not answered/ Not Sure	**Not Answered**

21a. If yes please attach a copy

22. Are there any installed e-learning applications or projects

Yes	
No	**No**

22a. If yes, Please list

E-learning project 1:	
E- learning project 2:	

23. Do you monitor your bandwidth usage?

Yes	Yes
No	

23a. If yes

Monitoring tools used (name/ details)	
Average Usage in kbps over past 3-6 months (uplink, downlink:	
% of time link 100% utilized:	
Ave Hours/month that link is down	
Major cause(s) of link outage	

24. Do you manage your bandwidth in any way (i.e. content filtering, limiting department usage)

Yes	X
No	

24a. If yes please specify

Bandwidth management software	Sonic Wall
Bandwidth management plan/ policy	

25. What do you feel is the fair cost for sustainable BW for African institutions given how much you are paying today?

25a. If you could obtain this pricing, how much bandwidth would your institution purchase

25 b. How much bandwidth would your institution purchase if the cost were $5 per kbps?	256 kbps Downlink 128 kbps Uplink
25 c. How much bandwidth would your institution purchase if the cost were $3 or less per kbps? **26. Please provide any additional information that may enhance this investigation**	256 kbps Downlink 128 kbps Uplink No undue restrictions on usage of bandwidth

Association of African Universities

Organisational Details	
Institution Name:	Association of African Universities
City:	Accra
Country:	Ghana
Website address:	http://www.aau.org
Number of full-time students	Not applicable
Number of part-time students	NA
Number of faculty	NA
Is there an independent IT department/ Unit in your institution?	Yes
Is there a national research and education network (NREN) in the country?	**If yes, please give any relevant details and comments.**
Am not aware of any.	

Questionnaire Respondent/International Bandwidth Project Contact Information	
Name:	Taye Assefa
Position:	Head, Communication and Services
Telephone Number:	233-21-774495/761609
Email address:	taye@aau.org or info@aau.org

Connectivity Details

1. Type of connectivity used to link the Institution to the Internet Service Provider	
Leased Line – Fiber	
Leased Line – Copper Wire	Yes
Leased Line – Radio link/Wireless	
Satellite/VSAT	
Dial Up	

2. Capacity of connection:	
Uplink (Kbps):	64 Kbps (in theory)
Downlink (Kbps):	64 Kbps (>>)

3. What do you use your connection for:	
Data access (internet)	To get as well as provide access
Voice Over IP (VOIP)	
Video conferencing	
Other	

4. Service Provider Name (if more than 1, provide details of primary or main provider):	Internet Ghana Ltd.

5. Service Provider Address:	
Street. Address	Mama Abui Plaza
City, Country	Accra, Ghana
Telephone	233-21-251871-4
Email	administrator@ighmail.com
URL	http://www.internetghana.com

6. Service Provider Type	
Private ISP	Yes
National Telecom	
VSAT company	
Other:	

7. Does the Service Provider have a local Office	
Yes	Yes
No	
Local Office address, if different from 4 above	

8. If VSAT does the institution have a VSAT license?

Yes	
No	

8a. If Yes cost of license if any (in $US/year)
8b. If No what license arrangements are in place if any

9. Cost of Bandwidth per month (if dialup is being used, please include phone costs and Internet fees)

Local currency	----
Converted to $US	$600 per month

10. Length of existing (current) bandwidth contract commitment

Number of years of contract	2 years
Expiry date	
Does the contract specify penalties for early termination? **(Give details)**	Yes, we have to give 60 days advance notice or pay two months' subscription fee plus any other related costs.

11. Does the Contract provide for Quality of Service Penalties?

Yes (provide details)	
No	No

12. If VSAT is used, what is the current equipment in place? (size of dish, electronics type, cost etc)

Frequency Band (e.g. C-Band, KU-Band)
Satellite used
Size of Antenna/Dish – Diameter in Meters
Make / Model number of antenna
Make, model and power of HPA/ BUC (outdoor electronics)
Make, model of receiver, modem (indoor equipment)

13. Does the link have a committed Information rate (CIR)?

Yes	
No	No
Question not answered/Not Sure	

13a: If there is a CIR what is the rate:

(a) national	
(b) International	

14: Does the link have burstable capacity

Yes	
No	No
Question not answered/Not Sure	

14a: If yes what can it burst to over what period:

15: Are there any other additional Internet bandwidth links into the university (e.g. to specific departments)

If yes:

Type	*Purpose*	*Bandwidth amount*
a.		
b.		
c.		

16: How many computers do you have on campus

a) Total number	31
b) Total networked	**25**
c) Total with Internet access	**25**

17. How many servers do you have on campus? [Excluding those for specific departments?]

Number	4

18. Do you provide email services for:

All staff	Yes
All students	---
If Yes, what is the email domain?	aau.org

19. Type of on-campus network available

Copper (10BaseT or 100BaseT)	Yes
Wireless	
Fiber	
Hybrid/Mixed	
Question not answered/Not Sure	

20. Are there any planned ICT initiatives (e.g. upgrade of connectivity, campus network, wireless systems, E-Learning and Enterprise Resource Planning applications)? Please list providing brief details with planned implementation dates:

Initiative 1:
Initiative 2:
Initiative 3:

21. Is there a written IT and/or E-learning strategy for the campus?

Yes	
No	No
Question not answered/ Not Sure	

21a. If yes please attach a copy

22. Are there any installed e-learning applications or projects

Yes	
No	No

22a. If yes, Please list

E-learning project 1:
E- learning project 2:

23. Do you monitor your bandwidth usage?

Yes	Just started a week ago.
No	

23a. If yes

Monitoring tools used (name/ details)	MRTG
Average Usage in kbps over past 3-6 months (uplink, downlink:	Inadequate data
% of time link 100% utilized:	95%
Ave Hours/month that link is down	1-2 hours
Major cause(s) of link outage	Not sure why

24. Do you manage your bandwidth in any way (i.e. content filtering, limiting department usage)

Yes	
No	No

24a. If yes please specify

Bandwidth management software

25. What do you feel is the fair cost for sustainable BW for African institutions given how much you are paying today?	$2.5/Kbps
25a. If you could obtain this pricing, how much bandwidth would your institution purchase	512 Kbps
25 b. How much bandwidth would your institution purchase if the cost were $5 per kbps?	256 Kbps
25 c. How much bandwidth would your institution purchase if the cost were $3 or less per kbps?	386 Kbps
26. Please provide any additional information that may enhance this investigation	("or less is" confusing! We computed at $3 only; see above at $2.5) The AAU runs the Database of African Theses and Dissertations (DATAD), which is expected to expand in 2005. It is also planning to host African Journals Online (AJOL), which has a huge database and large number of online users. In addition, it is developing other databases such as the database of African experts, which can be accessed by users. For these and other related online services, we need to increase our bandwidth capacity at reasonable cost.

The amount of bandwidth need cited above is based on the assumption that it is a dedicated line if not a Vsat, and that the amount can be increased in future if the fund is available.

Makerere University

Organisational Details

Institution Name:	Makerere University
City:	Kampala
Country:	Uganda
Website address:	www.makerere.ac.ug
Number of full-time students	Apprx. 35,000
Number of part-time students	**-**
Number of faculty	
Is there an independent IT department/ Unit in your institution?	Yes, Directorate for ICT Support (DICTS)
Is there a national research and education network (NREN) in the country?	**If yes, please give any relevant details and comments.**
	UNINET. Has not been formally set up

Questionnaire Respondent/International Bandwidth Project Contact Information

Name:	Joseph Kimali
Position:	Network Manager
Telephone Number:	+256-41- 531343
Email address:	joe@dicts.mak.ac.ug

Connectivity Details

1. Type of connectivity used to link the Institution to the Internet Service Provider

Leased Line – Fiber	x
Leased Line – Copper Wire	
Leased Line – Radio link/Wireless	
Satellite/VSAT	
Dial Up	

2. Capacity of connection:

Uplink (Kbps):	1 Mbps
Downlink (Kbps):	*2 Mbps*

3. What do you use your connection for:

Data access (internet)	**X**
Voice Over IP (VOIP)	
Video conferencing	
Other	

4. Service Provider Name (if more than 1, provide details of primary or main provider):

Uganda Telecom LTD

5. Service Provider Address:

Street. Address	
City, Country	Kampala, Uganda
Telephone	
Email	
URL	www.utl.co.ug

6. Service Provider Type

Private ISP	
National Telecom	X (privatized)
VSAT company	
Other:	

7. Does the Service Provider have a local Office	
Yes	X
No	
Local Office address, if different from 4 above	

8. If VSAT does the institution have a VSAT license?	
Yes	
No	**X**

8a. If Yes cost of license if any (in $US/year)
8b. If No what license arrangements are in place if any

9. Cost of Bandwidth per month (if dialup is being used, please include phone costs and Internet fees)	
Local currency	
Converted to $US	$20,499 (inclusive of 17% VAT)

10. Length of existing (current) bandwidth contract commitment	
Number of years of contract	No contract at moment
Expiry date	
Does the contract specify penalties for early termination? **(Give details)**	

11. Does the Contract provide for Quality of Service Penalties?	
Yes (provide details)	Originally contract did
No	

12. If VSAT is used, what is the current equipment in place? (size of dish, electronics type, cost etc)

Frequency Band (e.g. C-Band, KU-Band)   **Note: have put in a funding proposal for VSAT to Carnegie Corporation of New York**

Satellite used
Size of Antenna/Dish – Diameter in Meters
Make / Model number of antenna
Make, model and power of HPA/ BUC (outdoor electronics)
Make, model of receiver, modem (indoor equipment)

13. Does the link have a committed Information rate (CIR)?	
Yes	X
No	
Question not answered/Not Sure	

13a: If there is a CIR what is the rate:	
(a) national	**1 / 2 Mbps**
(b) International	**1 / 2 Mbps**

14: Does the link have burstable capacity	
Yes	
No	X
Question not answered/Not Sure	

14a: If yes what can it burst to over what period:

15: Are there any other additional Internet bandwidth links into the university (e.g. to specific departments)

If yes: Yes

Type	Purpose	Bandwidth amount
a. *Leased Line- Fiber*	*Backup*	*256 / 512 Kbps (costs $8,219 per month, provider MTN Uganda www.mtn.co.ug)*

b.

c.

16: How many computers do you have on campus

a) Total number	2700
b) Total networked	**2500**
c) Total with Internet access	**2500 (of which about 1,325 are available to students)**

17. How many servers do you have on campus? [Excluding those for specific departments?]

Number	**13**

18. Do you provide email services for:

All staff	**X**
All students	**Those who wish (decentralized to departments)**
If Yes, what is the email domain?	**Mak.ac.ug**

19. Type of on-campus network available

Copper (10BaseT or 100BaseT)	
Wireless	
Fiber	
Hybrid/Mixed	X
Question not answered/Not Sure	

20. Are there any planned ICT initiatives (e.g. upgrade of connectivity, campus network, wireless systems, E-Learning and Enterprise Resource Planning applications)? Please list providing brief details with planned implementation dates:

Initiative 1:	**ACADEMIC RECORDS INFORMATION SYSTEM (ARIS)**
Initiative 2:	**FINANCIAL MANAGEMENT AND INFORMATION SYSTEM (FINIS)**
Initiative 3:	See http://www.makerere.ac.ug/makict/progress/index.htm for full listing of ICT initiatives

21. Is there a written IT and/or E-learning strategy for the campus?

Yes	X (IT Policy includes E-learning component)
No	
Question not answered/ Not Sure	
21a. If yes please attach a copy	**See http://www.makerere.ac.ug/makict/documents/policydoc/contents.htm**

22. Are there any installed e-learning applications or projects

Yes	x
No	
22a. If yes, Please list	
E-learning project 1:	Black Board
E- learning project 2:	KWEL

23. Do you monitor your bandwidth usage?

Yes	X
No	
23a. If yes	
Monitoring tools used (name/ details)	MRTG, SMORT (analysis) and RRD for plotting
Average Usage in kbps over past 3-6 months (uplink, downlink:	
% of time link 100% utilized:	From 8 am to 10 pm 100% usage

Ave Hours/month that link is down   Hardly ever goes down

Major cause(s) of link outage

24. Do you manage your bandwidth in any way (i.e. content filtering, limiting department usage)

Yes

No   X (however, used to block web mails such as yahoo in the past)

24a. If yes please specify

Bandwidth management software

Bandwidth management plan/ policy

25. What do you feel is the fair cost for sustainable BW for African institutions given how much you are paying today? $2 -$3 per kbps

25a. If you could obtain this pricing, how much bandwidth would your institution purchase   Pay same amount of money for more bandwidth

25 b. How much bandwidth would your institution purchase if the cost were $5 per kbps?   Whatever our current payment can get us

25 c. How much bandwidth would your institution purchase if the cost were $3 or less per kbps?   Whatever our current payment can get us. Basically would like to double bandwidth at same cost.

26. Please provide any additional information that may enhance this investigation

1. Would prefer if any provider has local presence to ensure faster support response time
2. Would not like to enter into any contract for more than 1 year and would prefer a month to month contract

Universite Eduardo Mondlane

Organisational Details	
Institution Name:	University Eduardo Mondlane
City:	Maputo
Country:	Mozambique
Website address:	www.uem.mz
Number of full-time students	Apprx. 10,000
Number of part-time students	**-**
Number of faculty	Aprox. 1,000
Is there an independent IT department/ Unit in your institution?	Yes, University Informatics Center (CIUEM)
Is there a national research and education network (NREN) in the country?	**If yes, please give any relevant details and comments.** -

Questionnaire Respondent/International Bandwidth Project Contact Information	
Name:	Antonio Godinho/ David Bila
Position:	Network Administrator/ Systems Administrator
Telephone Number:	+258-1-492601
Email address:	Antonio@nambu.uem.mz/ david@zebra.uem.mz
	** Interviewed by Alex Twinomugisha

Connectivity Details

1. Type of connectivity used to link the Institution to the Internet Service Provider

Leased Line – Fiber	
Leased Line – Copper Wire	
Leased Line – Radio link/Wireless	
Satellite/VSAT	X
Dial Up	

2. Capacity of connection:

Uplink (Kbps):	512
Downlink (Kbps):	*2048*

3. What do you use your connection for:

Data access (internet)	**X**
Voice Over IP (VOIP)	
Video conferencing	
Other	

4. Service Provider Name (if more than 1, provide details of primary or main provider):
Verestar

5. Service Provider Address:

Street. Address	*Verestar - Fairfax*
	3040 Williams Dr.
City, Country	*Fairfax, VA 22031, USA*
Telephone	Phone - U.S: toll free 866-244-5012
	Phone - Outside of the U.S.: +1-703-914-1332
Email	
URL	www.verestar.com

6. Service Provider Type

Private ISP	
National Telecom	
VSAT company	x
Other:	

7. Does the Service Provider have a local Office	
Yes	
No	X (has representation in South Africa)
Local Office address, if different from 4 above	

8. If VSAT does the institution have a VSAT license?	
Yes	X
No	
8a. If Yes cost of license if any (in $US/year)	**3,500**
8b. If No what license arrangements are in place if any	

9. Cost of Bandwidth per month (if dialup is being used, please include phone costs and Internet fees)	
Local currency	
Converted to $US	$10,000

10. Length of existing (current) bandwidth contract commitment	
Number of years of contract	2 years
Expiry date	**31 Dec 2004**
Does the contract specify penalties for early termination? **(Give details)**	**Yes- payment of rest of contract**

11. Does the Contract provide for Quality of Service Penalties?	
Yes (provide details)	X (no details)
No	

12. If VSAT is used, what is the current equipment in place? (size of dish, electronics type, cost etc)	
Frequency Band (e.g. C-Band, KU-Band)	**C-Band**
Satellite used	**Telstar 10**
Size of Antenna/Dish – Diameter in Meters	**3.8**
Make / Model number of antenna	**Prodelin**
Make, model and power of HPA/ BUC (outdoor electronics)	40 W
Make, model of receiver, modem (indoor equipment)	Comtech CDM 600

13. Does the link have a committed Information rate (CIR)?	
Yes	X
No	
Question not answered/Not Sure	

13a: If there is a CIR what is the rate:	
(a) national	
(b) International	**512/ 2048 kbps both links SCPC**

14: Does the link have burstable capacity	
Yes	
No	X
Question not answered/Not Sure	

14a: If yes what can it burst to over what period:	

15: Are there any other additional Internet bandwidth links into the university (e.g. to specific departments)

If yes: Yes

Type	Purpose	Bandwidth amount
a. *VSAT (belongs to GDLN)*	*GDLN center*	*Not sure*
b.		
c.		

16: How many computers do you have on campus

a) Total number	3,000
b) Total networked	**2,400**
c) Total with Internet access	**2,400**

17. How many servers do you have on campus? [Excluding those for specific departments?]

Number	**12 (plus about 15 proxies at the departments)**

18. Do you provide email services for:

All staff	**X (started last year)**
All students	**Only if requested (but decentralized to department level)**
If Yes, what is the email domain?	**Uem.mz**

19. Type of on-campus network available

Copper (10BaseT or 100BaseT)	
Wireless	X (between campuses)
Fiber	X (within campuses)
Hybrid/Mixed	
Question not answered/Not Sure	

20. Are there any planned ICT initiatives (e.g. upgrade of connectivity, campus network, wireless systems, E-Learning and Enterprise Resource Planning applications)? Please list providing brief details with planned implementation dates:

Initiative 1:	
	Upgrade Campus fiber network to 1 Gbps
Initiative 2:	
	Upgrade International Internet bandwidth
Initiative 3:	Library Information System
	Financial management system

21. Is there a written IT and/or E-learning strategy for the campus?

Yes	x (currently ICT Strategic Plan 2001-2005)
No	
Question not answered/ Not Sure	

21a. If yes please attach a copy

22. Are there any installed e-learning applications or projects

Yes	
No	**X**

22a. If yes, Please list

E-learning project 1:	
E- learning project 2:	

23. Do you monitor your bandwidth usage?

Yes	X
No	

23a. If yes

Monitoring tools used (name/ details)	MRTG
Average Usage in kbps over past 3-6 months (uplink, downlink:	
% of time link 100% utilized:	From 8 am to 5 pm 100% usage everyday
Ave Hours/month that link is down	Hardly ever goes down
Major cause(s) of link outage	Modem problems- modem was replaced and everything is now stable

24. Do you manage your bandwidth in any way (i.e. content filtering, limiting department usage)

Yes

No   X (however, used to block ports in the past)

24a. If yes please specify

Bandwidth management software
Bandwidth management plan/ policy

25. What do you feel is the fair cost for sustainable BW for African institutions given how much you are paying today? $2

25a. If you could obtain this pricing, how much bandwidth would your institution purchase   Pay same amount of money for more bandwidth

25 b. How much bandwidth would your institution purchase if the cost were $5 per kbps?   Getting less than this cost already

25 c. How much bandwidth would your institution purchase if the cost were $3 or less per kbps?

26. Please provide any additional information that may enhance this investigation

Whatever our current payment can get us. Basically would like to double bandwidth at the same cost we are paying.

3. The current connectivity costs are paid through a World Bank credit to Mozambique. This payment is guaranteed for at least another 4 years.
4. If required to change provider, will have to tender
5. Don't mind if provider has no local office provided provider can guarantee fast response.

University of Dar es Salaam

Organisational Details

Institution Name:	University of Dar es Salaam
City:	Dar es Salaam
Country:	Tanzania
Website address:	www.udsm.ac.tz
Number of full-time students	**10,000**
Number of part-time students	**-**
Number of faculty	**700**
Is there an independent IT department/ Unit in your institution?	**Yes**
Is there a national research and education network (NREN) in the country?	**If yes, please give any relevant details and comments.**
	Yes……TENET it is under formation, MoU signed and charter proposed

Questionnaire Respondent/International Bandwidth Project Contact Information

Name:	B. Mutagahywa
Position:	MD
Telephone Number:	255 22 2410645
Email address:	bmutag@udsm.ac.tz

Connectivity Details

1. Type of connectivity used to link the Institution to the Internet Service Provider

Leased Line – Fiber	
Leased Line – Copper Wire	x
Leased Line – Radio link/Wireless	
Satellite/VSAT	
Dial Up	

2. Capacity of connection:

Uplink (Kbps):	1 Mbps
Downlink (Kbps):	*2 Mbps*

3. What do you use your connection for:

Data access (internet)	**X**
Voice Over IP (VOIP)	
Video conferencing	
Other	

4. Service Provider Name (if more than 1, provide details of primary or main provider): | **TTCL national telco**

5. Service Provider Address:

Street. Address	
City, Country	
Telephone	
Email	
URL	www.ttcl.co.tz

6. Service Provider Type

Private ISP	
National Telecom	X
VSAT company	
Other:	

7. Does the Service Provider have a local Office	
Yes	x
No	
Local Office address, if different from 4 above	

8. If VSAT does the institution have a VSAT license?	
Yes	X
No	
8a. If Yes cost of license if any (in $US/year)	**1000**
8b. If No what license arrangements are in place if any	

9. Cost of Bandwidth per month (if dialup is being used, please include phone costs and Internet fees)	
Local currency	
Converted to $US	$ 10,000

10. Length of existing (current) bandwidth contract commitment	
Number of years of contract	**open**
Expiry date	
Does the contract specify penalties for early termination? **(Give details)**	

11. Does the Contract provide for Quality of Service Penalties?	
Yes (provide details)	
No	**X**

12. If VSAT is used, what is the current equipment in place? (size of dish, electronics type, cost etc)

Frequency Band (e.g. C-Band, KU-Band)
Satellite used
Size of Antenna/Dish – Diameter in Meters
Make / Model number of antenna
Make, model and power of HPA/ BUC (outdoor electronics)
Make, model of receiver, modem (indoor equipment)

13. Does the link have a committed Information rate (CIR)?	
Yes	X
No	
Question not answered/Not Sure	

13a: If there is a CIR what is the rate:	
(a) national	**1 Mbps/2 Mbps**
(b) International	**1 Mbps/2 Mbps**

14: Does the link have burstable capacity	
Yes	
No	X
Question not answered/Not Sure	

14a: If yes what can it burst to over what period:

15: Are there any other additional Internet bandwidth links into the university (e.g. to specific departments)

If yes:

Type	**Purpose**	**Bandwidth amount**
a. VSAT	*Back-up/commercial on demand*	*1 Mbps/2 Mbps*
b.		
c.		

16: How many computers do you have on campus

a) Total number	~2500
b) Total networked	**~1500**
c) Total with Internet access	**~1500**

17. How many servers do you have on campus? [Excluding those for specific departments?]

Number	**10**

18. Do you provide email services for:

All staff	**X**
All students	**X**
If Yes, what is the email domain?	**Udsm.ac.tz; (faculty/dept).udsm.ac.tz; sts.udsm.ac.tz**

19. Type of on-campus network available

Copper (10BaseT or 100BaseT)	
Wireless	
Fiber	
Hybrid/Mixed	X
Question not answered/Not Sure	

20. Are there any planned ICT initiatives (e.g. upgrade of connectivity, campus network, wireless systems, E-Learning and Enterprise Resource Planning applications)? Please list providing brief details with planned implementation dates:

Initiative 1:	Wireless hotspots
Initiative 2:	Network sequrity/VLANs
Initiative 3:	Expand and consolidate E-learning

21. Is there a written IT and/or E-learning strategy for the campus?

Yes	X
No	
Question not answered/ Not Sure	

21a. If yes please attach a copy

22. Are there any installed e-learning applications or projects

Yes	X
No	

22a. If yes, Please list

E-learning project 1:	Blackboard
E- learning project 2:	WebCT
	KEWL

23. Do you monitor your bandwidth usage?

Yes	X
No	

23a. If yes

Monitoring tools used (name/ details)	MRTG
Average Usage in kbps over past 3-6 months (uplink, downlink:	516/867
% of time link 100% utilized:	95
Ave Hours/month that link is down	**1**
Major cause(s) of link outage	**Technical**

24. Do you manage your bandwidth in any way (i.e. content filtering, limiting department usage)

Yes	X
No	

24a. If yes please specify

	Bandwidth management software	Etinc/allot/Gsco CAR
	Bandwidth management plan/ policy	Limited
25. What do you feel is the fair cost for sustainable BW for African institutions given how much you are paying today?		1.5 to 2 us$ per K
	25a. If you could obtain this pricing, how much bandwidth would your institution purchase	Total 5 Mbps
	25 b. How much bandwidth would your institution purchase if the cost were $5 per kbps?	Nill
	25 c. How much bandwidth would your institution purchase if the cost were $3 or less per kbps?	Less than $2 see 25a
26. Please provide any additional information that may enhance this investigation		