VSAT Case Studies
(Nigeria, Algeria and Tanzania)

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Date: 12 March 2004

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Executive Summary

This report covers three country case studies on the status of VSAT commissioned by the IDRC through the GVF as part of CATIA component 1a on low cost satellite access in Africa. The country case studies were conducted in Nigeria, Algeria and Tanzania. The report analyses VSAT from two angles: firstly, from a policy and regulatory perspective and secondly, from an economic and usage perspective. In the first instance, the report finds that Algeria, Nigeria and Tanzania are on different points of the ICT development curve. The significant explanatory factor for the various levels of development are the different levels of sophistication of the policy and regulatory bodies of each country.

Nigeria has seen dramatic growth in the levels of investment in the ICT sector since 2001, coinciding with the liberalisation and deregulation of the sector. Algeria is undergoing a dramatic sector restructuring project following a previously absent policy and regulatory framework. The success of this path is limited by the lack of skills in the regulator. Tanzania rivals Nigeria in its move towards liberalisation and deregulation. However, Tanzania's commitment to unfettered competition along with the regulators perception of its function as a revenue generator for the national treasury, have limited local investment and consequently the development of the sector.

There is no doubt that VSAT has a substantial role to play within each country. However, its development is hindered by the lack of knowledge in key areas. Broadly, the recommendations arising from the surveys conducted for each of the country case studies to improve the profile of VSAT can be summarised as:

- Nigeria – the dissemination of VSAT technical literature and the marketing of Ku band VSAT as a viable alternative to C band (particularly from a cost perspective)
- Algeria – technical (issues around installing a local hub), economic (monitoring costs of bandwidth) and regulatory (case studies of other countries that have followed the liberalisation path) support
- Tanzania – entering into dialogue with government and the regulator with the aim of developing the local ICT sector rather than solely representing international satellite interests

In the second instance, the report finds a diversity of opinions amongst primary users in different countries but greater consistency amongst consumers. In Nigeria, commercial users consider the NCC to have undergone a transformation from a bureaucratic and inefficient organisation to one run along business lines. The challenge in Nigeria is not a regulatory one (though with a moratorium on new VSAT licences it could become one) but the lack of technical skills, particularly the belief that Ku band suffers tremendously from rain attenuation.

In Algeria, users are concerned about the regulators vacillation around the issue of licensing VSAT and see the attempt to impose a satellite sky tax as indicative of the lack of understanding of the industry. Clumsiness on the part of the regulator is creating an inward looking industry (witness the move towards games on the LAN by cybercafé consumers rather than the use of cybercafes to access the World Wide Web.).

In Tanzania, users are demanding the active involvement of government in the sector, arguing that the lack of regulation has negatively impacted on the industry. The large number of players ensures a highly competitive environment but one where few parties are prepared to risk increased investment because of the perception that there will be low returns. Consequently, Tanzania lags behind other countries in terms of local Internet exchanges or in local VSAT hubs.

The survey paints a picture of the average African cybercafé consumer and his or her demands and expectations. The environmental differences described above are reflected in the cybercafé usage patterns. The frequency of usage is highest in Lagos and consumers are demanding more bandwidth intensive applications. In Algeria, the uncertain environment has created a tendency amongst consumers to turn to applications that do not use bandwidth, such as games. The stagnating market in Tanzania is reflected in the high percentage of consumers that report the same cybercafé usage patterns over the last six months.

Finally, one effect of the stagnating market in Tanzania has been the effort to find alternative markets. The partnership between a public data operator and a local ISP to provide rural connectivity is one that merits further research in other locations. It indicates that a sustainable model for connectivity is possible.

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1. Part One: Introduction

Over the last few years there has been increasing research on the digital divide. The digital divide refers to the discrepancy between access to communication infrastructure and services in Developed Countries (DC's) and Least Developed Countries (LDC's) - the international digital divide - as well as the discrepancy within countries, between those with access to Information, Communication Technology's (ICT)'s and those without - the domestic digital divide[1]. There are fears amongst the international development community, and marginalised countries themselves, that the ICT gap between DC's and LDC's will continue to grow. Over the last few years there has been a concerted effort internationally to exploit the digital opportunities that provided low cost, rapidly deployable technologies to reduce these digital divides. Very Small Aperture Terminal (VSAT) is such a technology. The characteristics that determine this potential include:

- its distance independence makes it suited towards locations that are not easily accessible for more traditional forms of connectivity such as fixed line technologies
- installation is relatively inexpensive and rapid
- maintenance costs are low and the technical expertise needed to maintain equipment is relatively low
- allowing for the use of applications, such as Voice over Internet Protocol (VoIP), that can reduce the cost of service to low-income people.

1.1. Objective of study

The overall objective of the research is to determine the existing licensing and regulatory framework for VSAT and, further, how VSAT is being used in a country specific context. Specifically, this study looks at the use of VSAT in three countries, namely Nigeria, Algeria and Tanzania.

1.2. Research methodology

The primary purpose of the research was to establish the status of VSAT usage in each of the three countries. The methods used included desktop research to obtain background information on the socio-economic and regulatory situation in the three countries followed by data collection and finally quantitative and qualitative analysis. Interviews to survey the views of different interests and gather further data on usage patterns were also conducted.

For the purposes of the research a distinction was made between users and consumers. Users were defined as commercial companies making use of VSAT in some way. Consumers were defined as the end user and, for the purposes of this research, were the limited to cybercafés.

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[1] Spanning the Digital Divide. www.bridges.org. Retrieved on 1st November 2003.

The quantitative analysis conducted involved enumerators covering a total of fourteen cybercafés in Nigeria and twelve cybercafés each in Algeria and Tanzania. A total of 418 questionnaires were completed in Lagos and 350 in Algiers. In Tanzania, 297 questionnaires were conducted in Dar es Salaam and a further 196 in the rural town of Mtwara.

The qualitative analysis involved a series of interviews with industry experts, ISP's, industry stakeholders (such as telecom companies); appropriate regulatory bodies and Small, Micro and Medium Enterprises (SMME's). Select interviews were conducted with the owners/managers of cybercafés to get a more qualitative understanding of consumer trends. In addition, a further set of two focus groups were conducted amongst a wide range of consumers in Nigeria.

2. Part Two: Nigeria

2.1. Nigerian ICT Policy

The National Policy on Telecommunications was published in 1998. The Policy is clearly aimed at achieving the expansion of telecommunication networks and integrating the country into the global telecommunication network. To achieve this aim, the policy document outlines institutional roles and responsibilities and enables the formation of a transparent and accountable regulatory framework[2].

The overall goals of the telecommunications sector, as laid out by the Nigerian government's Vision 2010 Committee, are:
- to increase teledensity from 1 telephone per 200 people to 1 telephone per 50 people;
- increase landlines to 4 million and mobile lines to 3 million;
- to attain global universal coverage, global connectivity via a communications network that is part of the information superhighway;
- institutional reform of the telecommunications sector and removal of existing monopolies in order to improve efficiency and quality and to make services more readily available;
- development and enhancement of domestic capacity in telecommunications technology and services provision; and
- streamlining of processes and procedures so as to attract foreign and domestic investors[3]

2.2. Regulatory Framework - Nigeria

The Nigerian Communications Commission (NCC) was created by Decree 75 of 1992 as a response to the lack of development of the Nigerian telecommunications sector. Since incorporation, in 1985, of the incumbent telecom operator (NITEL), Nigeria had lagged behind other developing countries in terms of connected lines. The purpose of the NCC was to:
- create a regulatory environment to facilitate the supply of telecommunications services and facilities;
- facilitate the entry of private entrepreneurs into the telecommunications market; and
- promote fair competition and efficient market conduct among all players in the industry

In this regard, the NCC issued licences in the following areas:
- Installation and operation of public switched telephony
- Installation of terminal or other equipment

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[2] Africa ICT Policy Processes (unpublished) compiled by bridges.org and Miller, Esselaar and Associates. October 2003.

[3] BMI-Techknowledge Communication Technologies Handbook, 2002.

- Provision and operation of public payphones
- Provision and operation of private network links employing cable, radio communications, or satellite within Nigeria
- Provision and operation of public mobile communications
- Provision and operation of telephones
- Provision and operation of value-added network services
- Repair and maintenance of telecommunications facilities
- Cabling[4]

Analysts have seen the issue of the GSM licences in February 2001 as indicative of the NCC's ability to create an accountable and transparent regulatory process. The bidding process and the award of the GSM licences was seen as competitive and fair.

Since his appointment in 2000 as CEO, Engineer Ernest Ndukwe has stated that he sees three technologies available to bridge the digital divide within Nigeria:

> "My view is that three major technologies hold the key to solving the challenge of accelerating digital access to most Africans within the shortest possible time: Mobile Communications, VSAT and Internet"[5].

To create an enabling environment, the NCC embarked upon a process of market liberalisation and privatisation of state assets. In the past, the VSAT operator obtained an Operator Licence from the NCC, then had to obtain a Frequency Licence from the Ministry of Communications and finally, spectrum or bandwidth from the incumbent fixed line operator, NITEL[6]. To obtain a VSAT licence, the operator had to go through three agencies. This was time consuming and expensive.

In 2000, certain sectors of the market where deregulated. One of these was the provision of domestic VSAT services. Other markets that were deregulated include:
- sales and installation of terminal equipment;
- Internet services, and
- tele-centres/cybercafés.

The number of regulatory bodies that a potential licencee had to go through has been cut down to only one – the NCC. Licences have been consolidated into three major types:
- permits,
- basic licences, and
- major licences.

Permits are valid for a period of 12 months and cost considerably less than basic licences. All the cybercafés interviewed held permits. Basic licences are held for a period of five years and include both a licence fee as well as a percentage of annual net turnover (2.5%).

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[4] National Telecommunications Policy www.ncc.gov.ng/telecommunications_policy.htm. Retrieved on the 2nd of November 2003.

[5] Keynote address by Ernest Nkukwe "Contributions of Government to the Development of Information and Communications Technology in Nigeria. June 2003.

[6] Speech by Engineer Johnson. http://www.ncc.gov.ng/Speech%20by%20Engr.%20J.%20Asinugo.htm

2.3. Licence Fees

There are primarily two categories of licence: permits and basic licences. Services such as cybercafés require a permit which costs 5,000 Naira in rural areas and 25,000 Naira in urban areas. These permits are valid for twelve months.

Basic licences incorporate ISP's, Satellite Network Services (VSAT) and the sales of satellite terminal equipment. An ISP licence costs 500,000 Naira, is valid for 5 years and has an annual operating fee of 2.5% of net turnover. A Satellite Network Services Licence is valid for 10 years, costs 8.45 million Naira and also has an annual operating fee of 2.5% of net turnover.

2.4. Current situation – Nigeria

2.4.1. Licences

Since early 2003 no VSAT licences have been issued. When the GSM and Second Network Operator licences were issued, they included international VSAT licences. Since the winners of these licences (MTN, Econet Wireless and Globalcom respectively) paid such a premium for their licences, it seems that the NCC wished to increase the value of the licences by preventing open competition in VSAT service provision. In addition, many of the VSAT licences originally awarded are not operational. Of the 88 VSAT licences that were issued, it is estimated that about 80% are not operational.

The process of applying for VSAT licences, while time-consuming, is a transparent process. Part of the licence requirement was how the operator intended to source the funds and all successful licence holders reported that there were no hidden costs. It is possible that the reason for such a large number of licence holders not implementing VSAT services has more to do with business inexperience than the licensing process. The cost of hardware in particular is decreasing, potentially allowing more licence holders into the market. However, since no new VSAT licences are being issued, this has artificially pushed up the price of VSAT licences as operators bid for the limited number of licences or compete to form partnerships with existing licence holders.

2.4.2. The role of the Nigerian Communications Commission

Ernest Ndukwe, the chairperson of the NCC, is perceived, amongst the larger telecoms companies, to have transformed the NCC from an inefficient bureaucracy to a governmental organisation run with private sector efficiencies. From their point of view, the NCC is transparent and participative. Large telecom companies are asked to contribute to policy-making and inputs are acknowledged and often implemented.

"He has brought dynamism and initiative to the NCC"[7].

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[7] Mr Christopher Ajayi. 21st Century Technologies. Interview.

Companies now believe that they have "government support" in doing business and believe that the telecommunications industry is a successful example of how to deregulate an industry. All of the larger telecom companies interviewed believed that the NCC's credibility was enhanced through the GSM licencing process.

The dominant view is that the policy makers must further deregulate the industry. Specifically, Voice over Internet Protocol (VoIP) needs to be unleashed. Once VoIP is deregulated, point-to-point voice traffic will become more widespread. VoIP was seen as an application that could reduce the cost of calls, both locally and internationally. Call charges (mobile and fixed line) were seen as exorbitant and that there is strong demand for a service that can reduce these prices. While the NCC was generally applauded for its role in reducing governmental bureaucracy, government was still seen as not responsive enough to the rapidly evolving technology needs of the Nigerian telecommunications environment. As one interviewee put it:

> "Any government who comes in the way of change can't survive".

Amongst SMME's, the perception of the NCC is more mixed: Licence and permit fees are   perceived to be overpriced. SMME's have difficulty getting access to licences for several reasons:
- high levels of bureaucracy. (For example, it is advantageous to have a lawyer to act as a third party to ensure that all forms are correctly filled in).
- getting a licence is a time consuming process. (Even though the licence forms are available online one still has to go to the NCC offices in Abuja to have them processed).

Amongst SMME's, unlike the larger operators, the NCC is seen as uncommunicative. The accusation is that it does not understand SMME's needs and is only interested in high licence and permit fees.
> "We are trying to make the Internet accessible, but the NCC is interfering in the channels by which the medium is growing".

The clear implication amongst SMME's is that NCC interference means that there is less chance for growth for small companies.

2.4.3. Distinction between C and Ku bands

The introduction of Ku band for cybercafés, ISP's, SMME's and corporates is perceived as a relatively new phenomena. Around 90% of all interviewees stated that there is a negative attitude towards Ku Band because of the perception that it is unreliable and effected by the weather. Estimates of the downtime that users of Ku band experienced ranged from 1 hour per day to 60 days per year.

With the exception of large telecom and VSAT operators (such as IPDirect and Direct on PC), cybercafés and ISP's reported no links to industry specific literature on VSAT networks. Thus the incorrect impression that Ku band is unreliable persists. One of the responses to customer reservations about using Ku band was to point out the price discrepancy between C band and Ku band. However, this is not a consistent response since some companies provide very little distinction, in terms of price, between Ku

band and C band to customers. Only with the advent of mass roll-out of Ku band by companies such as Direct on PC and IP Direct is the lack of price discrepancy being addressed.

A common theme amongst interviewees was that a greater awareness of VSAT needed to be introduced into the Nigerian market. This was substantiated by the cyber café user survey, which indicated that nearly all respondents understand that VSAT is a satellite technology. However, there is little understanding of the different types of VSAT networks and the advantages and disadvantages of Ku vs. C band.

2.4.4. Alternatives to VSAT

Lagos is the world's third most densely populated city and it is estimated that 60% of national telecom revenue is generated within Lagos and surrounds, despite poorly developed infrastructure. With strong economic growth expected in Lagos and an increasing desire for connectivity amongst the population, investment in fibre optic cable is becoming a serious alternative. Of the large telecom companies interviewed, all were moving towards optical fibre because of its lower cost (based on large numbers of users) and increased functionality. However, the ubiquitous availability of fibre optic cable in Lagos is estimated to be at least five years away. Fibre optic cable was also seen as a viable alternative for corporates in the short-term future (within one year) and for SMME's and cybercafés within five years.

Optical fibre is used, primarily, to connect corporates to the Internet rather than consumers (including cybercafés). In terms of an alternative to VSAT it is interesting to note that fibre optic cable has a common characteristic with Ku band. It is associated with dialup by consumers (this is not the case with corporates) and in turn is associated with Nitel and unreliability and high costs. In other words, the only technology currently believed to be reliable by the majority of users is C band VSAT.

2.4.5. Uses of VSAT

There are two types of users of VSAT networks. The first is the corporate user, particularly banks and oil companies. The second type of user is the individual consumer that uses VSAT, usually because it most successfully supplies connectivity. The majority of individuals use VSAT through cybercafés. The uses of VSAT can thus be divided into two areas: corporate and individual use:

Corporate	Individual (i.e. cybercafé)
Transaction based, between remote branches (for e.g. banks)	Greater than 50% of time is spent on social activities on the web, including chat and email
Information based, between remote branches (for e.g. oil companies)	Telephone calls, particularly to international destinations using VoIP
Voice & data connectivity	Web surfing

In the cybercafé proprietors survey, 8 out of 10 reported that voice was a growth area for international calls. Call charges using traditional networks are too expensive, resulting in high demand for Internet based telephony. For example, it costs between

20 & 30 Naira per minute to call a fixed line phone in the USA. The cost of a local fixed line call, in contrast, is estimated at about 35 Naira.

2.4.6. Technical expertise

In the survey conducted amongst ISP's and cybercafé proprietors, all reported a lack of local technical skills. The time taken to install VSAT equipment ranged from two days to six weeks, with the average being around 7 working days. Given the simplicity of the VSAT installation, this would suggest that there is inadequate training and expertise. Those ISP's that were subsidiaries of foreign companies seemed to faire better in installing VSAT equipment. Those ISP's that relied on local technicians had a more extended installation time. For example:

> "The local engineers didn't understand the installation diagram, thereby making it long and some equipment was damaged".

All ISP's reported that "local technicians could not be trusted". Of all the interviews conducted, only one company actively trained local technicians. From this company's viewpoint, locally trained technicians were cheaper, knew local conditions and could respond faster and more effectively than imported technicians. However, resources had been dedicated to training local technicians, something that did not seem to be taking place in any other companies.

The lack of local technical skills is further exacerbated when VSAT equipment and bandwidth is sold in neighbouring countries. Installation is often done on tight budgets and with no training of local technicians. The result is that when something goes wrong the costs of correcting it can be too high for the VSAT supplier to countenance.

2.5. Recommendations - Nigeria

There are several factors that must be taken into account when making an assessment of VSAT in Nigeria including the regulatory framework; the credibility of the regulator; alternatives to VSAT; and threats and opportunities for VSAT.

The deregulation and liberalisation process begun in 2000 has transformed the Nigerian telecommunications market. The result has been a spectacular increase in investment in the industry. The number of people connected has increased. Bandwidth has increased and prices are on a steady decline. Both the corporate and individual consumer market are benefiting from the increased range of options to connect them to the information superhighway.

The regulator, the Nigerian Communications Commission, has proved its credibility amongst the operators and service providers who have benefited from regulatory reform. However, smaller players who do not have the financial and technical resources to secure VSAT licences and have therefore not been beneficiaries of the reform process view the regulator less favourably.

The central obstacle to the development of VSAT within these areas is the misconception that Ku band suffers from serious reliability problems, primarily rain attenuation. As more companies begin to offer Ku band with competitive pricing, Ku band will become a cheap and an effective alternative to C band. This process could be fast-tracked by improving access to technical literature about the distinction between Ku band and C band and the advantages and disadvantages of each type of technology.

The research revealed the lack of local technical expertise to deploy VSAT optimally in Nigeria. A common theme was the distrust of local providers based on their perceived lack of skills. Therefore one recommendation is to focus on the provision of technical skills in order to overcome this negative perception and the development of local expertise in installing and maintaining VSAT (specifically Ku band) technology. A consequence of the lack of local technical skills is that African VSAT suppliers routinely underestimate the costs and difficulties of doing business in other areas of Africa, most particularly in neighbouring countries.

3. Part Three: Algeria

3.1. Algerian ICT Policy

The liberalization of Algeria's telecoms sector has been fixed for April of this year [2004]. The Minister of Posts, IT and Communications Amadou Tou admitted that current transmission capacity was weak and that the solution was the liberalisation of the sector. He admitted that though they had come to this conclusion a little late the total liberalisation of the sector was vital to the growth of fixed and mobile telephony in the country[8].

The Ministry of Post, Information and Communication Technologies (PICT) has targeted 2004 for liberalisation of various sectors of the telecoms market. PICT is following a planned liberalisation process. Each step depends upon the previous one being completed:

GSM ⟹ VSAT ⟹ GMPCS ⟹ Rural Telephony ⟹

International Telephony ⟹ Fixed line network
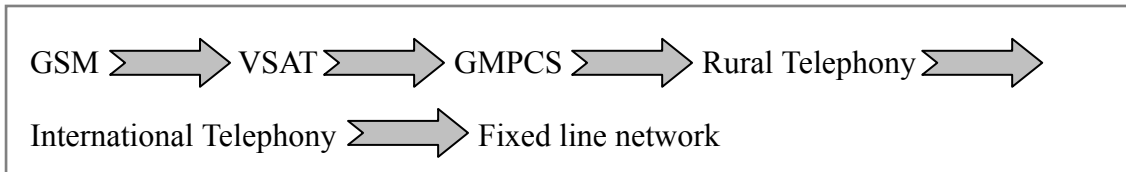
The planned liberalisation process arises out of the National ICT Policy formulation committee that began in 2000. The Ministry of PICT wishes to establish Algeria as an ICT hub in North Africa. It wishes to extend connectivity to all Algerians and sees GSM as the first step in this process. Because of the advantages that VSAT offers (most importantly that it is distance independent) it is seen as the second step in the planned liberalisation process.

3.2. Regulatory Framework – Algeria

The Algerian regulator, Autorité de la Poste et des Télécommunications (ARPT) was formed in May 2000. It reports to parliament annually. It is funded through operators' contributions and does not receive any government funding. It does not report to any other organisations and the regulator is not legally obliged to consult or inform any other organisation prior to making decisions. The role of the regulator is to ensure that policy decisions of government are enforced. The ARPT is the regulator for both the Algerian Post Office and the telecoms sector.

The ARPT was created by government to manage the liberalisation and deregulation process initiated in 2000. The completion date is 2004. The ARPT is a relatively young organisation and still coming to terms with its duties. There is plainly a shortage of skilled staff with a significant portion of staff coming from the incumbent,

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[8] Algeria: Liberalisation fixed for April 2004. Balancing Act. March 8. http://www.balancingact-africa.com/news/current1.html

Algeria Telecom (AT). This creates a tendency to rely on data supplied by AT in making rulings. A recent example of this is local call price increase in June 2003. Local calls were increased by 355%, based on the argument by AT that the existing tariff structure was not covering its costs. The impact on the Internet users has been deleterious and the impact on the industry, and the economy more generally, is still being felt.

The see-sawing between issuing VSAT licences, withdrawing the licence, allowing multiple VSAT users and suppliers and then potentially re-issuing two licences is indicative of the lack of regulatory experience and therefore ability to provide an enabling but stable environment. The imposition of a sky tax of $5000 per month per ISP on space segment is illustrative of a lack of understanding of the negative impact on the cost of VSAT. While this was subsequently withdrawn, the fact that it was implemented also shows a lack of consultation with major industry players and yet a desire to correct the error once the implication became clear.

In effect, the ARPT is on a steep learning curve. Greater consultation internationally and internally, plus development of human capital are vital components to its success. Government is committed to a fast liberalisation process, but without sufficient human resources the 2004 target is unlikely to be met.

3.3. Current situation – Algeria

Different technologies are required for different geographic areas. Algeria is more densely populated in the North. The southern parts of the country are dry with few inhabitants. It is not economically viable to operate networks other than VSAT in the southern parts of Algeria. The northern parts of the country are mountainous and fixed wireless and fibre optic networks are difficult to install and maintain. VSAT, in both the ARPT and the Ministry of PICT's opinion, is the solution to these problems.

Direct to Home (DTH) VSAT networks used for broadcasting purposes are widespread. There are no licence or registration (authorisation) requirements for DTH VSAT systems or receive-only VSAT systems. Two-way VSAT systems require authorisation. The motivation for duplex VSAT systems to have authorisation was provided by the military who were concerned that they would be used for 'terrorist' purposes, particularly in the south of Algeria. The result is that many cybercafés use receive-only VSAT for the downlink and dial-up for the backhaul.

3.3.1. Licences

There are currently two categories of licence:
- Private network
- Public network

The ARPT has not issued any public network licences. To understand this (and the distinction between public and private licences), one must also understand the ARPT's definition of a VSAT network. A VSAT network requires a public licence if it fulfils two conditions: firstly, the hub is located in Algeria and secondly, if bandwidth is being resold using this local hub. According to this definition, there are currently two VSAT operators: Algeria Telecom and Tele Diffusion of Algeria (TDA). Algeria

Telecom is the incumbent and operates a VSAT network. Algeria Telecom does not need a VSAT licence. TDA is primarily a broadcaster, though it also sells bandwidth to ISP's (basically, it is a carrier of carriers). Since both are government owned and the existing legislation is under review, the ARPT has decided not to issue VSAT operator licences to these two organisations. Instead, when the new licensing requirements are issued in 2004, TDA will have to apply for one of the two VSAT operator licences being offered. It is assumed that the two operator licences being considered are in addition to Algeria Telecom.

In terms of private network licences, any company may use VSAT. (Please note that the ARPT does not view any ISP selling bandwidth via VSAT and connecting to the PSTN (Algeria Telecom) as having a public network). If a company sells VSAT *equipment*, authorisation must first be acquired. There is no licence fee for importing VSAT equipment. The authorisation consists of registration with the ARPT.

Any company *using* VSAT equipment is required to obtain an authorisation from the ARPT. The existing authorisation process is as follows:
- Letter of request
- Technical details of equipment
- Copy of company's status and/or contract between demanding organisation and Algeria Telecom.
- Company registration form
- 3000 Dinar per VSAT station

Authorisation forms are easy to obtain and copies may be made. Once the forms have been completed they must be submitted to the ARPT. Online or faxed forms are not accepted.

In all the interviews conducted, amongst both ISP's and users, the time period for a VSAT authorisation was about three months. ISP's and users argued that this was the major obstacle to the broader roll-out of VSAT . Companies got frustrated with the extended time period and would look to alternative methods of providing connectivity. The authorisation process is as follows:
- Submit authorisation documents to the ARPT
- The documents are then delivered to the Ministry of Posts, Information and Technology
- The Ministry of PICT in turn delivers the documents to the army for clearance
- The army returns the documents to the Ministry of PICT
- The documents are returned to the ARPT

The extended time period and the arbitrariness of the granting of authorisations have led to accusations of corruption against the ARPT and government. The view amongst ISP's is that those individuals that are too critical of government are unlikely to receive authorisation.

3.3.2. *Licence Fees:*

There are currently no licence fees. The administrative fees are:

Description	Duration	Amount
Fee per VSAT installation	Not applicable	3,000 DA (US$ 43)
Usage fee	1 year (annual fee)	20,000 DA (US$286)

The proposed VSAT operator licences will be awarded to the highest bidder. The Ministry of PICT is budgeting for around US$2 million for both licences.

The telecommunications regulatory regime is being reviewed. The government is intent (at this point) on re-instating VSAT licences (specifically two licences will be granted). The intent of the proposed licencing regime is to create a local VSAT network with a hub in Algeria. The Ministry of PICT argues that the current configuration of VSAT networks with the hub outside of Algeria limits the number of VSAT terminals within Algeria. The demand for VSAT is so great within Algeria that the creation of a local hub is the only way of satisfying this demand at the best price possible. Once the VSAT operator licences have been granted, users will be encouraged by the ARPT to purchase bandwidth from the licence holders. The ARPT argues that users will migrate to either of the two licence holders because the pricing will be better than any other operator (specifically, those using international satellite service providers). The ARPT will ensure this through the monitoring of bandwidth prices.

Existing ISP's that re-sell bandwidth provided by international satellite providers will be allowed to continue to operate under their ISP licences.

The Ministry believes that licensing VSAT will:
- provide a revenue stream (note that the ARPT is not funded by government); and
- increase Internet connectivity in Algeria.

The Ministry of Posts, Information and Technology commissioned a report in 2000 that argued for the re-imposition of VSAT licences. The argument was based primarily on the point that currently no VSAT service providers operate a hub in Algeria. The Ministry argues that no single local operator can handle the potentially high demand for VSAT – estimated by the Ministry of Posts, Information and Technology at over 10,000 individual stations. Thus, one of the requirements of the new licensing regime will be the installation of a local hub.

Incumbent ISP's are gravely concerned about the anticipated changes to the regulatory regime. The proposed licensing regime will mean that the importation of

VSAT equipment requires only authorisation (type approval), the use of VSAT equipment (as an end user) also requires only authorisation (different from the import of equipment). The selling of bandwidth requires an ISP licence, but is not difficult to get. A user may purchase bandwidth from any company. There is no distinction between local and foreign service providers. However, once the VSAT operator licences are issued, preference will be given to one of the two licenced operators.

3.3.3. *Universal Service Obligations:*

Both GSM and the incumbent operator (Algerie Telecom) have universal service obligations. The Universal Service Fund (Fonds du Service Universel) was set up at the beginning of 2003. Operators are required to contribute 3% of turnover per year. The fund pays out monies to those operators that extend their networks to villages and communities with less than 2000 inhabitants. The list of villages and communities that qualify for USF assistance is yet to be compiled.

There have been no payments out of the Universal Service Fund to date. Payments are scheduled to begin in 2004.

3.3.4. *Voice over Internet Protocol:*

With the current regulatory regime under review, the ARPT has been reluctant to issue any licences. According to current legislation, the provision of Voice over IP (VoIP) must be licenced. To get around this conundrum, the ARPT has issued a number of experimental licences. Of the ISP's interviewed, all had received the experimental licences without any difficulty. Specifically, the VoIP licences are called "test" licences. There is a general expectation that with the new licensing regime in 2004, these test licences will be withdrawn.

3.3.5. *Distinction between C and Ku bands:*

In the Nigerian case study, the study found a strong distinction between C and Ku bands. This distinction does not apply in Algeria. The Ku band coverage of Algeria is excellent because of its proximity to Europe. The applicable distinction in Algeria's case is between receive-only VSAT and duplex VSAT. Because of the current regulatory regime, users (both corporate and individual) tend to choose receive-only. The documentation needed to acquire authorisation is simple but the bureaucracy behind the authorisation process prevents VSAT's wide-scale adoption. This means that for Internet access, the preferred method of connecting is through receive-only VSAT and then backhaul through dial up.

3.4. Recommendations - Algeria

Algeria is unusual in that it changing from a relatively absent regulatory environment, that has been successfully exploited by operators, to an inhibiting regulatory environment. The desire to unleash the potential of telecommunications and specifically VSAT is there, but it is nullified by the lack of understanding of what an enabling regulatory environment can achieve. VSAT has great potential within the

Algerian environment because of the geographic challenges that the country faces, and its relatively high GDP.

The key recommendation for Algeria is to build both regulatory and technical expertise. The Ministry of PICT is convinced that a planned liberalisation process is instrumental in developing the ICT industry, but has little access to resources. The ARPT has several challenging issues in the next few months. These include
- the setting up of a local VSAT hub,
- licensing of two VSAT operators, and
- monitoring costs (specifically bandwidth)

Support from a technical, regulatory (for example, other countries experiences) and economic perspective (monitoring of costs) is needed.

4. Part Four: Tanzania

4.1. Tanzanian ICT policy

Despite good intentions, Tanzania has been plagued by an unclear and inconsistent policy environment. This is acknowledged in the National ICT Policy was approved by parliament:

> The lack of an overall policy and poor harmonisation of initiatives, has led to random adoption of different systems and standards, unnecessary duplication of effort, and waste of scarce resources, especially through the loss of potential synergies. Therefore, this National ICT policy deploys a broad-based strategy to address Tanzania's developmental agenda.
>
> The need for an appropriate institutional arrangement to ensure that all stakeholders can rise to the challenge of implementing this ICT policy, cannot be overemphasised[9].

The policy is divided into several key areas which include (but is not limited to) the development of ICT infrastructure and Universal Access. Nearly a year later, how successful has the National ICT policy been? Has it achieved any of its stated aims or objectives? The success – so far – of the policy can be evaluated through two representative examples: the creation of the Tanzanian Internet Exchange and the Rural Telecommunications Development Fund.

The National ICT Policy has as its first objective the need to:
> Foster efficient, inter-operable, reliable and sustainable national ICT infrastructure commensurate with grass-roots needs, and compliant with regional and international standards, with increasing access while reducing cost[10].

A key to realising this objective must be the creation of a domestic Internet exchange. This will reduce costs in two key ways: firstly, by bypassing the international gateway for domestic communication and secondly, by allowing ISP's the ability to purchase a greater volume of bandwidth, leading to reduced bandwidth prices. The policy acknowledges this and states that:
> Government will set up national IXP's and hierarchical IXP's in collaboration with other countries as well as regional information and communications infrastructure[11].

Unfortunately, due to the lack of any implementation strategy, this objective has not been achieved by government. Instead, the private sector has set up an IXP (the Tanzanian Internet Exchange) with funding from international donor agencies. Beyond writing a letter of encouragement, neither the Tanzanian government nor the TCRA has been involved in the actual establishment of the TIX.

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[9] National ICT Policy. Ministry of Communications and Transport: March 2003.

[10] Ibid pp. 17

[11] Ibid pp. 18

The Rural Telecommunications Development Fund (RTDF) which is meant to provide mechanisms to decrease the divide between urban and rural ICT access is dormant As a result, operators have suspended payments to the Fund until it is operationalised and there is no implementation strategy. It is understood that a study on the issue of the implementation of the RTDF will be completed by the end of March.

Both of the above examples highlight Tanzania's inability to implement objectives that it sets itself. The ICT policy process further highlights this. The ICT policy was completed in October 2002. The policy steering committee was disbanded until approval by parliament, which occurred in March 2003. The committee was re-established in August 2003 to develop an implementation strategy for the National ICT policy. This outcome is still awaited.

4.2. Regulatory Framework - Tanzania

The Tanzanian Communications Regulatory Authority Act of 2003 combined the Tanzanian Communications Commission and the Tanzanian Broadcasting Commission into one body named the Tanzanian Communications Regulatory Authority (TCRA). The Act stipulated that a Board of Directors and a Director General had to be appointed. The Board consists of four non-executive members, a Chairman, Vice Chairman and a Director General. A nomination committee is currently interviewing candidates to the positions and a shortlist is to be submitted to the Minister of Communications. It is expected that the Board of Directors will be appointed within the next few months. While the telecommunications and broadcasting commissions have been assimilated, the corresponding functions within government continue to exist. The TCRA reports to two ministers, the Minister of Communications and the Minister for Broadcasting.

The Act defines the functions of the TCRA into three broad categories:
- Licensing
- Monitoring
- Dispute resolution

The TCRA's primary raison d'être is the issuing or cancellation of licences. It is important to note that this is not an independent function in the sense that the TCRA can make a decision to grant or cancel a licence on its own. Any licence relating to universal access or with a time period of more than five years must be approved by the Minister of Communications or the relevant sector minister[12].

On the key role of monitoring, the functions of the TCRA are laid out in the Act:
To monitor the performance of the regulated sectors including in relation to –
 i. levels of investment
 ii. availability, quality and standards of service
 iii. the cost of services
 iv. the efficiency of production and distribution of services

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[12] The Tanzanian Communications Regulatory Authority Act, 2003. pp. 9.

v.   other matters relevant to the Authority[13]

Based on this section, the TCRA is expected to develop the capacity to monitor the size and growth of the ICT sector in Tanzania.

Since the regulatory authority is in transition, no new decisions can be made. Among decisions that are currently awaiting the newly constituted board are:

- Legal action against the TTCL for failing to meet its infrastructure roll-out targets (the fine is currently sitting at 46 million USD and a schedule of payment is expected to be submitted by the TTCL to the TCRA by the end of March).
- Granting of new licences such as Public Data Operator licences
- Implementation strategy for the Rural Telecommunications Development Fund
- Reduction of the royalty fee paid by Public Data Operators from 3% to 1.5% as stipulated in the Tanzanian Communications Regulatory Authority Act of 2003

In addition, existing licensing documentation is being revamped. Specifically, documentation referring to VSAT station licences is being reviewed. In the past, all telecommunication stations using the radio spectrum were licenced using the same forms (Radiocommunication Station Licence). This is under review and VSAT will, in future, have its own licensing forms and supporting documentation.

Currently the TTCL is the only operator allowed to transmit voice over its networks. This is expected to change in 2005 with data operators being allowed to utilise VoIP. One of the challenges highlighted in the National ICT Policy document is to

> Promote convergence of voice, data, computing and video (for example, multimedia services, VoIP)[14].

The exclusivity period granted to TTCL ends in February 2005.

4.2.1. Licences:

There are currently five basic categories of telecommunications operators of which three are relevant to this report:

- Public data communication operators
- Private data communication operators
- Internet service providers

There is full competition in each of these categories. The barriers to entry are primarily financial (namely, start up capital and licence fees) rather than regulatory.

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[13] The Tanzanian Communications Regulatory Authority Act, 2003. pp. 9.

[14] National ICT Policy. March 2003.

The licence fees for the categories relevant to VSAT and the existing number of operators are captured in the table below:

Type of Licence	Number of Operators	Application Fee (US$)	Initial Licence Fee	Annual Fee (Royalty)
Public data communication service	10	$1,000	$100,000	3% of annual gross turnover or $30,000 whichever is higher
Private data communication service	6	$500	$5,000	$500
Internet Protocol Service (Commercial)	23	$75	$1,000	$5,000

In addition to the above licence fees, there are spectrum charges. For every VSAT station there is a $1,000 annual fee. A VSAT station is defined by the TCRA as any satellite system that is capable of receiving and transmitting data or, other words, has a transceiver.

4.3. Current situation - Tanzania

The key theme across the Tanzanian ICT industry is the lack of government implementation. In certain areas, the lack of any government coordination has created competitive sectors in the market, such as the ISP sector. While other sectors, such as public data operators, are dysfunctional. One of the unstated themes of Tanzanian ICT policy is that a competitive market will provide more efficient services and reduce the burden on government. This has meant that the data communication sector has been thrown open to whomever can afford the licence fees.

The belief in competition has informed the approach of the TCRA to the ICT sector. The regulatory body sees itself as primarily the generator of revenues for the government. It does not currently play, or forsee itself playing (at least under the current management), any constructive role in the active creation of "a conducive framework for investments in capacity building"15. The TCRA is currently a reactive body (reactive primarily to government) rather than a proactive body that is intent on creating value in the ICT sector.

The previous section (the regulatory framework) laid out the functions of the TCRA according to the Tanzanian Communications Regulatory Authority Act of 2003. Specifically, it highlighted the section on monitoring. The TCRA is required to monitor the levels of investment in the sector, the availability, quality and standards of service, the cost of services and the efficiency of production and distribution of services. Each of these functions is addressed below.

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[15] National ICT Policy. March 2003. pp. 2.

4.3.1. Levels of investment

Several interviews were conducted with public and private data operators. The majority of these companies use VSAT as the only available alternative to fixed line technology. The oft-repeated complaint about the TTCL is that the leased line service is far too expensive, the levels of service are appalling and the waiting period for connection is too long. Thus VSAT has a large role within the Tanzanian ICT economy.

Of the ten public data operators, only seven are operational. Of the seven functioning operators, only one (Satcom Networks) has built a local hub at a cost of approximately 2.5 million USD. This is despite the fact that operators are obliged to build local hubs as part of their licence conditions. Satcom Networks argue that the provision of a local hub serves two purposes: it removes latency in the network by eliminating an extra hop to an international gateway and it provides a higher quality of connection.

The other public data operators interviewed stated that they were not willing to mimic Satcom Networks and build a local hub because the investment environment was too risky. It is too risky because the TCRA has stated that it sees no limit to the number of data operators that can be licenced. Thus, there is the danger of the market being over-traded (something that existing data operators argue is already the case). Adding to the uncertain environment, the high royalty fees (3% of revenues) on revenues encourage the operators to maintain a high margin business with low sales growth focused on the corporate market. Operators are, in a sense, incentivised not to grow too fast or invest too much because the sales will be disproportionately taxed through the royalty system.

4.3.2. Availability, quality and standards of service

If ICT is to be an enabling sector of the economy and contribute to economic growth, one of the objectives must be availability. VSAT is particularly suited towards connecting locations that are not served by the existing infrastructure. However, the lack of any universal access policy retards the availability of connectivity. More importantly, the lack of any coordinating body (or, in the words of one interviewee, a 'harmonising' entity) means that there are multiple initiatives underway to expand connectivity. None of these initiatives is coordinated leading to duplication of infrastructure and more strain on limited financial resources.

4.3.3. Cost of services

It is outside the scope of this study to analyse trends in costs of services. However, costs are unlikely to be low in an environment that encourages
- High margins and low number of clients (by penalising high increases in sales)
- That does not incentivise access to connectivity by the majority of people, regardless of location (for example, through the RTDF)
- Low levels of investment

4.3.4. *Efficiency of production and distribution of services*

One of the stated aims of the National ICT Policy is to build ICT equipment. Given the low levels of investment, it is unlikely that his has been achieved. There are several, uncoordinated efforts to achieve distribution of services (or, as this report puts it, access to connectivity):

The Tanzanian Posts Corporation is in the process of setting up a VSAT network to connect 14 of its postal branches to an internal network. The network will allow the transfer of monies between branches (there is a building society component to the post office) and faxes can be reliably sent between branches. In addition, post offices will offer cybercafé facilities at selected branches. The cybercafés are currently not profitable, but they are perceived by the post office as a potential avenue for revenues (the network was funded by international donor agencies).

International donor agencies such as SIDA are investigating setting up a VSAT network for distance education, linking teachers together so that information can be exchanged on teaching methods and tools. This VSAT network will be one of the largest in the country (approximately 34 stations). It is seen as a test case for the provision of connectivity at an affordable cost.

The Department of Management Information Systems at the President's Office is investigating upgrading existing government VSAT networks to connect local government branches and to migrate applications such as payroll and other HR functions onto the network. The Ministry of Defence currently owns an analogue VSAT network of which only 10% is utilised. The project is investigating whether this network can be digitalised and more effectively utilised by government departments.

In terms of a sustainable private sector model for VSAT implementation, the most promising candidate is a private sector initiative supported by **Simbanet**, a local public data operator. The model assumes that multiple sources of revenues have to be found in order for rural projects to be sustainable (and therefore profitable). There are several steps to Simbanet's model:

- To partner with local businesses
- To sell value added services to local businesses in the surrounding area (in other words, to become the *local* ISP)
- To create a 50% partnership between Simbanet and the local business entrepreneur which shares the start-up costs

The model has many advantages. By partnering with the local business, Simbanet places the local business under its public data operator licence and thereby avoids the need for the local business to be registered with the TCRA and to pay its licence fees. Simbanet pays the annual VSAT spectrum fee as part of its contribution to the costs of the new business and removes that area of red tape from the entrepreneur. The equipment is leased by Simbanet to the entrepreneur16. If one includes the costs of

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[16] At the site visited in Mtwara, C band was selected. The reason supplied was that there is severe rain attenuation during the wet season when Tanzania experiences torrential downpours. In addition, C band

depreciation, the number of small businesses that must be signed up to the local ISP for it to survive is in the region of 70 to 75. The cybercafé installed at the ISP offices is seen as a side business which brings in much needed revenue, but one that is not reliable and does not have much growth given current income levels in the area. While the one site visited cannot be a representative sample, similar models are worth investigating as a sustainable method of introducing connectivity to rural areas with limited consumers and businesses.

Within the private sector (specifically the corporate sector) the commitment of the TCRA to untrammelled competition is having another effect. The corporate market represents an area of high margins for local public data operators. The lack of any incentive to invest combined with onerous licensing fees has contributed towards high costs. This has encouraged well-resourced companies to bypass public data operators and to install their own private VSAT networks. Many multinational companies and NGO's have agreements with suppliers in their countries of origin, bypassing local operators. The requirements for operating a private network is a $5,000 USD annual licence fee. The effect has been to limit the size of the market and adds to the lack of incentive on the side of public data operators to invest in local infrastructure and skills.

4.4. Recommendations - Tanzania

More by default than by intent, Tanzania has adopted an open market access model for the ICT sector. The current regulatory body does not play an active role in the creation of a vibrant and growing ICT sector. The effect has been strong competition in some sectors but with low investment in local infrastructure. To achieve its policy vision of increased affordable access to the ICT sector by the Tanzanian people, the following issues need to be addressed:

- Enforce the licence conditions of the public data operators, specifically the requirement that for a local hub. This should have the effect of reducing the number of operators (not all operators will be able to afford the capital investment).
- Review the royalty fee system altogether and look at mechanisms to encourage operators to provide low cost bandwidth. By influencing bandwidth prices, it is possible that ISP's will be able to provide lower cost access to subscribers.
- For the TCRA to play an active role in the coordination of different initiatives to provide access to connectivity and prevent duplication of initiatives and ineffectual use of financial resources.
- To conduct more in-depth research of the public data operator – local ISP partnerships. In particular, to investigate what the break-even point is in terms of providing local ISP services and which areas of Tanzania would meet these criteria.
- To increase the ICT human capital of the TCRA and thereby enable it to effectively fulfil its mandate to monitor investment, availability and distribution of infrastructure and cost of service.

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could provide dedicated bandwidth while Ku band was shared. This was perceived to lead to a potential decline in service.

5. Part Five: Cybercafe Surveys

5.1. Introduction

As part of the study, surveys of cyber café consumers were conducted in each of the three countries. In Nigeria a largely pre-coded quantitative survey was administered to 418 cybercafé consumers at 14 cybercafés in 12 districts in Lagos. In Algeria a similar survey was conducted amongst 350 cybercafé consumers at 12 cybercafés in 10 different districts in Algiers. In Tanzania, the same type of survey was conducted amongst 297 cybercafé consumers at 12 cybercafés in 10 districts in Dar es Salaam. In addition, six in-depth interviews were conducted amongst consumers in Algiers, seven in-depth interviews and two focus groups of twelve and fourteen respondents in Lagos and six in-depth interviews in Dar es Salaam. In Tanzania, an additional 194 consumers were interviewed at 2 cybercafés in Mtwara, which is a perfect example of rural town. Located in far south of the country on the coast at the Mozambique border, Mtwara is an underdeveloped town that is the main urban centre for a very underdeveloped region. The findings for Mtwara are presented in tabular form, however a detailed description of these, as well as for all the other areas can be found in the country specific reports.

The research was undertaken during October 2003 in Lagos, November 2003 in Algiers and March 2004 in Dar es Salaam and Mtwara. In all the areas the surveys, wherever possible, were spread throughout the week across a daily eight-hour spell (11:00 to 19:00), including weekends, in order to allow for all types of potential consumers to be reached. The aim of these surveys were to profile cybercafé consumers and by implication consumers of VSAT technology. In all three countries, local researchers and enumerators administered the interviews, which were in English in Lagos, French in Algiers, and Swahili in Dar es Salaam and Mtwara.

5.2. Demographic Specifics of Cyber Consumers

In all the surveys respondents were asked a number of questions relating to demographic variables, from which the average age of the cybercafé consumers in Lagos was enumerated at a little under 28 and one-half years, compared to a little over 25 years in Algiers and 29 years in Dar es Salaam. It would seem that at the lower end the 'entry' age for using cybercafés is between 15 and 17 years, with the number of consumers increasing into the 20-year age cohort, before levelling out and declining. In Algiers, this decrease is already noticeable amongst consumers over the age of 30 , being somewhat higher in Lagos and Dar es Salaam (40 years).

There is a perceptible gender imbalance amongst cybercafé consumers, with men accounting for 72% of all consumers in Lagos, 59% in Algiers and 55% in Dar es Salaam. Although the reasons for this discrepancy are not distinctly accounted for, as it is the case in many other activities in African countries, gender can be a critical variable in defining the culture of using the Internet, and shaping access to and knowledge about the technology. As a case in point, traditional beliefs and prejudices

regarding gender based role divisions and thus the tacit inhibitions females feel in relation to showing up in public places without the courtship of men, among other things, could partly explain the lesser proportion of female cybercafé consumers. This could also be related to the relatively lower occurrence of women involvement in higher education and formal employment, as will be later shown that the vast majority of the cybercafé consumers were found to be scholars and full time employees by vocation. This finding was also further substantiated by visits on campus Internet cafés in all three capital cities, where it might be supposed that women might be more likely to be found using cybercafés than elsewhere in those cities, however in all cases the similar ratios of consumers with other cybercafés were observed.

Qualitative information would suggest that women simply lacked interest in the types of subjects that were found on the Internet: general news, sports, pornography and music. Additionally in Algiers, it emerged that women's travel from their place of residence was more limited than that of men, and the lack of cybercafés in residential areas limited their scope to utilize them, however, as will be shown later, cybercafés exist in sufficient numbers in locations close to where consumers live, thus discounting this hypothesis as a reason. In Dar es Salaam the difference was not as large as in the other two cities and when raised as an issue, it was said that at the entry level, "girls" tend to take up the usage of cybercafés a little later than "boys" but then catch up, whilst at the older age cohorts, men dominate, but that this would fade away as they are swamped by new younger consumers of both genders.

What is striking about the demographic composition of cybercafés consumers is their high levels education, with 72% of consumers in Lagos being currently in tertiary education and 13% either in or having completed a secondary school. In Algiers 83% had either received or were still in tertiary education and all the rest having either completed or currently in secondary school. In Dar es Salaam, similar trends were found with 43% of consumers having either completed or were still currently in tertiary education and 51% of consumers either completed or were still currently in secondary education. Such high levels of education would mean that a there would be a high correlation between employment and consumers, which is borne out by the fact that just over 60% of consumers in Lagos are engaged in a full time work with a little under 10% on a part time basis, with scholars and students accounting for 19% of all consumers. In Algiers there was an inverse relationship amongst consumers, between on the one hand scholars and students (56%) and on the other those working full-time (24%), and like Lagos, a little under 9% were working part-time and 10% were unemployed. In Dar es Salaam, 43% were employed, 36% were scholars or students and 7% unemployed.

The fact that the distribution of the cybercafé consumers was highly skewed in favour of scholars and those involved in full time employment can be related to the financial capability and/or appreciation of the different technology services availed of by these consumers. If the aim of proponents of VSAT technology is to secure and consolidate what currently represents the existing market, then a narrow band of the population needs to be targeted, which given the nature of its education levels the message would have to be no different to that used elsewhere in the world. Furthermore, given their predominance in the employment sector, it ought to be a group of consumers for which usage should not decline, however, this trend is tested for later.

5.3. Communications and Computation Patterns

In order to better understand communications and computation configuration of cybercafé consumers, they were asked a number of questions about the types of telephones found within their households, the contractual arrangements relating to these telephones, and usage in terms of monthly costs. In addition, they were asked whether they had access to a computer or the Internet, either at home or at work, and a number of usage patterns were also probed for.

In Lagos, a cybercafé user typically comes from a household that will on average have 2.5 working mobile phones and in all except for 1.4% of consumers there would be at least one mobile phone in their household. In Algiers, cybercafé consumers households averaged 2.1 working mobile phones, however, 22.6% of user households do not have a working mobile phone at all. In Dar es Salaam the average number of working mobile phones per cybercafé user is 1.8, with 7% not having a mobile phone. In Lagos, the overwhelming majority (95%) of mobile phones are on a pay-as-you go basis which is similar to 97% in Dar es Salaam, however in Algiers, 34% of all mobile phones amongst cybercafé consumers and their family members were on a monthly contract.

In Lagos a cybercafé user spends 4,200 Naira (US$34.62) per month on their mobile phone, with the similar expenditure being 1,200 Dinar (US$16.67) for Algiers and 19,115 Shillings (US$17.54) for Dar es Salaam. Cybercafé consumers were also asked whether they had a fixed phone at home, with slightly more than 42% having one in Lagos, 71% in Algiers and 40% in Dar es Salaam having one.

Table 1: Mtwara Cybercafé Consumers – demographic, communications and computation statistics

|		
Gender composition	64% male	36% female
Average age	28.7 yrs	
Education Level - completed	32.3% secondary	19.5% tertiary
Vocation - employed	23% students	60% employed
Personal mobile telephone, ownership	58%	
Personal mobile telephone, monthly expenditure	US$ 20.19	
Household fixed telephone, ownership	34%	
Fixed telephone, monthly expenditure	US$ 26.45	
Personal computer home ownership	22%	
Internet connection at home	14%	
Use of computer at school / work	27%	
Internet connection at school / work	23%	
Average time spent on internet at home and school / work	19.8 hrs	

Home-based personal computer ownership was recorded at 40% for cybercafé consumers in Lagos, 51% in Algiers and 36% in Dar es Salaam. In Lagos, only 12% of all cybercafé consumers have an Internet connection at home, the same applying to 18% and 11% of cybercafé consumers in Algiers and Dar es Salaam respectively. In Lagos, those respondents with working Internet connections in their homes, claimed to spend on average 7.7 hours per week on line. In Algiers cybercafé consumers with an Internet connection at home claimed to spend approximately 15.1 hours a week on-line, this would compare with 12.4 hours per week for the same generic sub-group of cybercafé consumers in Dar es Salaam. For the month preceding the survey, consumers reported to have paid or have an account, which included fixed line telephony, of an average of 8,204 Naira (US$63.10) in Lagos, 4,001 Dinars (US$56.57) in Algiers and 22,522 Shilling (US$20.66) in Dar es Salaam.

In Lagos, 62% of cybercafé consumers had access to a working computer at school and/or work, with 32% also having an Internet connection for personal use, which on average was used for six hours per week. In Algiers 34% have access to a fully functional computer at school and/or work, with 31% having Internet that was used for approximately six hours a week. In Dar es Salaam, 32% have regular and 47% occasional access to such a computer, 36% to Internet and on average spend four hours a week on-line. A combination of home and school or work based Internet usage shows that cybercafé consumers spend an average of 9.2 hours in Lagos, 18.4 hours in Algiers and 5.1 hours per week in Dar es Salaam,. However, this is applicable to 65% of cybercafé consumers in Lagos, 44% in Algiers and 45% in Dar es Salaam. However, what this demonstrates is that for a proportion of cybercafé consumers, a significant amount of time is spent on the Internet away from cybercafés, therefore it can be assumed that if time and cost factors can be made to be compatible to consumers abilities, the scope to increase usage time exists.

5.4. Cybercafé Usage

Respondents were asked a series of questions about the cybercafés they use, the distance these are from their homes and pace of study or work, the amount of time and money spent at these cybercafés and a few questions as to what might influence their selection of a particular cybercafé.

Figure 1: Frequency of Weekly Usage of Cybercafés
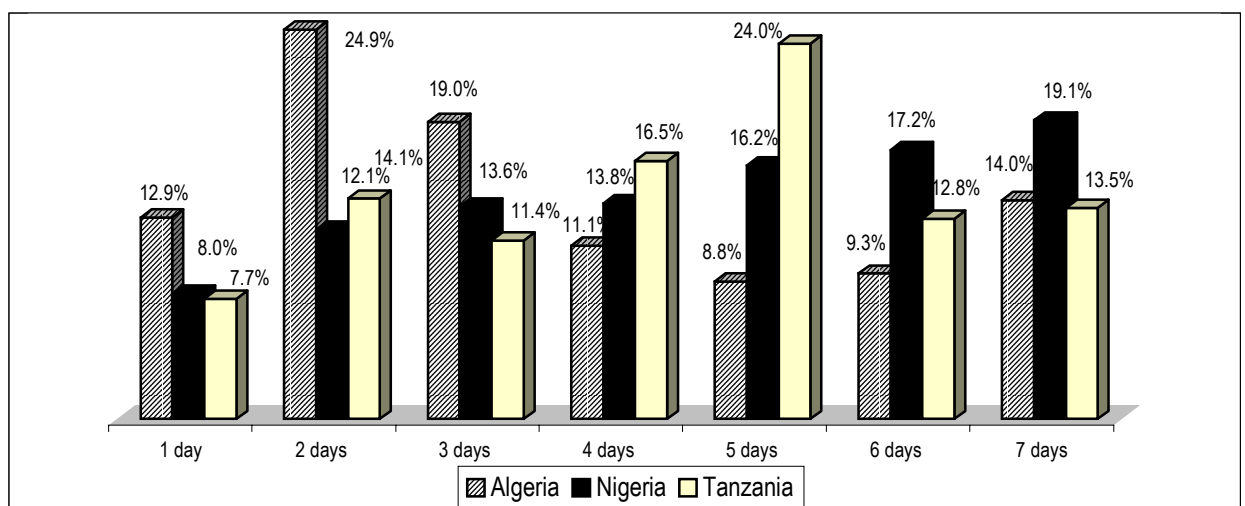
In Lagos the average time to get to the nearest cybercafé from home is 11.5 minutes, with one quarter of all respondents having a cybercafé less than five minutes walk from their homes. The nearest cybercafé from school or work is 15.3 minutes away, with one quarter of all consumers being within three minutes of a cybercafé after leaving their place of study or work. In Algiers the nearest cybercafé from home is eight minutes and from school or work approximately 10 minutes, whilst in Dar es Salaam 21 minutes and 11 minutes respectively were recorded for the cybercafés closest to home and school or work.

Interestingly however, only 19% and 26% of cybercafé consumers in Lagos, 45% and 10% in Algiers and 28% and 32% in Dar es Salaam used the cybercafé closest to their home or school or work. The rest traveling an additional 15 minutes in Lagos, 18 minutes in Algiers and 17 minutes in Dar es Salaam to use a different cybercafé. The reasons for this were that a relationship had been created between them and the either the owner or other consumers at this further away cybercafé, speed of connection was noticeable faster, hardware both better and more varied and the ambiance more to their likening. The latter included the cybercafé layout, including space between consumers, privacy in terms of what was being viewed and air-conditioning.

Figure 2: Six-Monthly Usage Change of Cybercafés
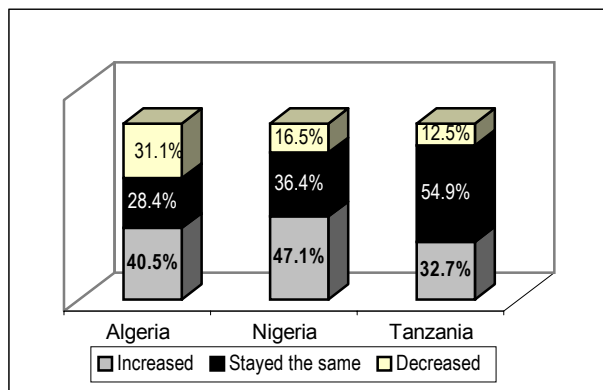
In Lagos, cybercafé consumers visited a cybercafé on an average of 4.5 days per week with 47% saying that the frequency of their visits had increased and 35% of the consumers had not undergone any change over the six months preceding the survey. In Algiers, cybercafé visits averaged 3.6 days per week, having increased for 41% of consumers and decreased for 28% of consumers. In Dar es Salaam, 4.0 days was the weekly average cybercafé use, with 33% having recorded an increase and 55% no change during the six months preceding the survey.

On average a Lagos based cybercafé user spent 239 Naira (US$1.84) per visit with 51% of the consumers stating that there had been an increase in their average expenditure in the cybercafé, 10% a decline and 39%) a consistency in their average expenditure at the cybercafé during the six months preceding the survey. In Algiers, the amount of money spent per cybercafé visit averaged 123 Dinars (US$ 1.70), with 45% feeling that their average expenditure in cybercafés has increased, 37% stayed the same and 18% decreased over the previous six months. In Dar es Salaam, average cybercafé expenditure per visit was 890 Shilling (US$0.82), which was an increase for 35% of consumers, a static amount for 52% of consumers and a decrease for 13% of consumers over a six-month period.

Figure 3: Six-Monthly Expenditure Change at Cybercafés
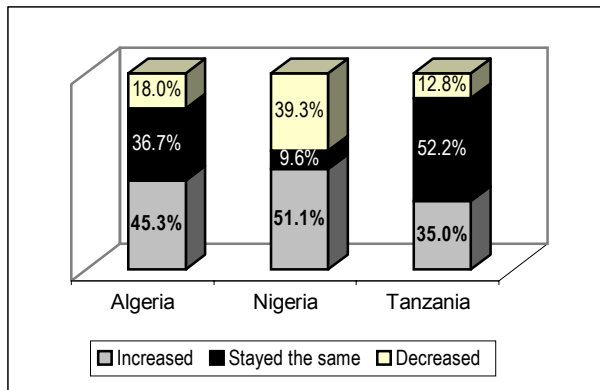
Such expenditure patters meant that consumers spent an average of 4,179 Naira (US$32.15) in Lagos, 1,720 Dinars (US$23.89) in Algiers and 16.657 Shilling (US$15.28) in Dar es Salaam on average cybercafé each month. However, in such instances it might be prudent to control for extreme expenditures at the outer levels and look at the median expenditure, which is the 50% point, which measured US$22.62 for Lagos, US$15.60 for Algeria and US$9.63 for Dar es Salaam.

In the focused discussion with consumers, the trend for Internet usage was reported to decline amongst those participants who use the Internet for e-mailing purposes alone and/or those who did browse a little or none at all. On the other hand, over one-fifth of the participants who use the Internet for socializing purposes like chatting, reported that their use of the Internet has increased through time and they envisage an even greater usage (amounting to half of the time they spend on line) over the months to come. Furthermore, during focused discussions it was revealed that the participants spent a lot of time browsing and the most popular sites were the International Press. In fact, a number of students said that this accounted for more than half of all the time spent surfing the net. Music and video sites were the next most popular, however only one respondent claimed to download from the net. Hobby and sports sites also emerged in the list, as did fashion and clothing accessory sites. Finally, pornography sites were also mentioned as sometimes being used, resulting in a debate where it was claimed that these were the most popular, although not necessarily amongst the group discussing the issue. Interestingly, International Press sites were more common amongst women than men, music and video the younger as opposed to older respondents and pornographic sites the exclusive preserve of younger men. During the discussions it was unanimously agreed in the discussion that women did not visit pornographic sites, and such sites were described as the exclusive preserve of men.

It was also claimed that the Internet is used, among other things, as a way of passing time - browsing and socializing- chatting, and/or as an information source- job related. Interestingly, unemployed and students claimed that that browsing accounted for more than half of all the time spent surfing the net, whilst employed cybercafé consumers tended to use the email most often. Chat rooms were used more by younger women than other respondents. It was argued that the usage of chat rooms seems to have declined during the past year, as had the downloading of music, although music and video sites remained the most popular amongst younger consumers and second most popular overall. The wide usage of the Internet by current students does not necessarily mean that they use the technology for academic reasons. The finding from the focused discussion suggests that the Internet is not conducive for studying purposes. In addition, it was argued that the reason that the Internet tended

not to be used for study purposes was attributed mainly to the user unfriendliness of information sourcing, and the prohibitive cost of surfing while trying to locate relevant materials.

In Lagos, 55% of cybercafé consumers had noticed a positive (9% negative) qualitative difference in both the quality and the speed of the Internet during the previous six months. In Algiers, 61% of consumers indicated that there has been no noticeable difference, 23% that the speed of Internet access had increased while 15.4% said that Internet connection has slowed down during the six-month period preceding the survey. In Dar es Salaam 69% said that there was no noticeable difference in speed, 21% felt that they had noticed an increase and 10% said that they felt that the speed had decreased.

In order to test price elasticity, respondents were asked whether they would pay more money to go to cybercafé which is no further than that most frequently patronized but having a faster Internet connection. In Lagos, 80%, Algiers, 79% and Dar es Salaam, 74% of consumers reported that they would pay more money for a speedier access. In a focused discussion, speed was argued as being essential when browsing, as it saved money and reduced levels of frustration, but was not considered as being important when the Internet was used for other purposes. It was also argued that most consumers were 'single finger' typists and as such a speedy connection did not make much of a difference when mailing was in operation.

Those respondents that would not migrate to a cybercafé with a faster connection were asked to explain their responses, which were: user cybercafé loyalty, possible higher user costs and current satisfaction with the service (including speed of connection) and facilities, as well as the location of their current preferred cybercafé. Of those user that would be willing and capable to pay more for an Internet connection that is faster than it is at the current café, in Lagos cybercafé consumers will willing to incur an average of 18% more, in Algiers 26% more and in Dar es Salaam 13%, more than their current average expenditure, which could then be projected to average monthly expenditure for cybercafé consumers of US$26.69 for Lagos, US$19.66 for Algeria and US$17.40 for Dar es Salaam.

Table 2: Mtwara Cybercafé Consumers – cybercafé statistics

Length of trip to cybercafé from home or school or work (shortest)	28.9 mins	
Number of days per month that cybercafé is used	12.5 days	
Change in usage during previous six-months	27% increase	28% decrease
Average monthly expenditure at a cybercafé	US$ 10.30	
Increase in expenditure during previous six-months	23% increase	16% decrease
Knowledge of operating system	22% yes	
Additional amount willing to pay for better service	20.8%	
Potential monthly expenditure for better service	US$ 12.43	

Finally, cybercafé consumers were asked what factors inhibited a greater usage of the Internet and by implication cybercafés. In Lagos - 18%, Algiers – 28% and Dar es Salaam 31%, reported that they have no inhibitions whatsoever in relation to having optimum usage of the Internet and no changing conditions would convince them to increase usage. In all three areas respectively 55%, 43% and 42% cited a lack of time and 27%, 28% and 27% - financial constraints, with the rest saying that it was an interplay of both together with the poor quality of the service (including Internet traffic and poor network), self discipline from or fear of being addicted, inconvenience of the working hours of the cybercafés, remoteness of cybercafés from one's residence, reasons related to one's profession and inadequate resources in the cybercafé were the other factors mentioned as accounting for the inability of respondents to use the Internet more. In theory however, a better and more convenient service that would not result in increased costs could potentially result in increased usage time for approximately three-quarters of all current consumers.

5.5. VSAT

Finally, respondents were asked whether they were interested in knowing what of operational system the cybercafé they frequent uses. In Lagos - 69%, Algiers – 70% and Dar es Salaam - 93% had no idea as to how the cybercafés they patronised were connected to the network. Those who did know however argued that they placed a high importance on such knowledge, whilst the rest shrugged off their lack of knowledge by claiming that it did not matter, so long as the systems worked. In Lagos, a fraction over 22% of those who knew the technology used, said that a knowledge of the latest technology was important for it increased their ability to choose, in terms of being able to access easier and faster browsing. In Algiers a different type of trend was recorded with 60% not considering knowledge of the type of system used as being important. Of those who assigned importance to knowledge on the type of system the cybercafé uses, 44% of respondents claimed that it was important to know if the connection was fast or slow. In Dar es Salaam, only 9% felt it was important to know what operational system cybercafés had, because it would be interesting and might save money.

Respondents were then asked whether they knew what VSAT is. In Lagos, the sample was almost evenly divided, with 45% knowing about VSAT and 55% having no idea at all what VSAT is. Those consumers who claimed knowledge reported different responses when asked to state what exactly they think VSAT is. The majority of the consumers (41%) consider VSAT as the use of Internet through satellite. The second most mentioned response (14%), was that VSAT constitutes a small apparatus, which is used for Internet connection. The next most mentioned reply (10%) described VSAT as an ISP connector. 9% of the consumers prefer to describe VSAT in terms of the benefits it endows to the consumers, i.e. speedy access. For 7% of the consumers VSAT is an apparatus for satellite reception, for 6% of the consumers VSAT signifies a very small antenna and for just over 5% of the consumers VSAT was the new Internet. A small proportion of consumers (2%) described VSAT as the modem through which computers work. One respondent said that it was, "the exam one must pass if they wished to emigrate". There was no difference in knowledge of VSAT in terms of age, gender, education, or vocation. There was however a difference in terms of consumers of cybercafés that had VSAT. This finding, as well as that from focus

groups and in-depth interviews, would suggest that once a cybercafé moves to VSAT technology, regular consumers find out fairly quickly. In addition, they tend to then form an opinion on the speed of connection and quality of service.

In Algiers, 83% of cybercafé consumers did not know what VSAT is and of those that did, the overwhelming majority - 97%, answered simply by saying it is a satellite connection to the Internet. One respondent said that it was linked to ARABSAT and that the connection is excellent with another saying it is a video satellite. In Dar es Salaam, only 5.4% of consumers knew what VSAT was describing it as a wireless connection that was faster than using fixed line dial-up. Finally, in Mtwara 10% knew what VSAT was.

6. Part Six: Conclusion

If one were to plot telecommunications development for Algeria, Nigeria and Tanzania, Algeria would be at the bottom of the development curve, Tanzania somewhere in the middle and Nigeria some distance above it. The explanation for Nigeria's higher position on the developmental curve can be attributed to how much further it has progressed in liberalising and deregulating its market. But the underlying explanation for Nigeria's progress is the superiority of the regulator in comparison to both the Algerians and Tanzanians.

Growth of the Algerian ICT market is being held up by an opaque and inconsistent regulatory framework, creating a high regulatory risk for investors. The erratic policy environment however reflects the desire by government to create an enabling environment. The fundamentals of transparent and consultative administration and implementation are absent. While the endpoint is clear, the understanding of how to get there from both government and the regulator is not. This is due to a lack of human capital skills in both organisations.

As the VSAT policy process shows, there is a strong possibility that future development of the industry in Algeria is going to be inhibited. Through a combination of a lack of proper consultation with industry players and stifling bureaucracy, a regulatory framework is being put in place that is unlikely promote development. The impact of this is going to be the stagnation of the industry and very slow growth in access to the majority of the Algerian population.

In contrast, the regulatory framework in Nigeria is open, relatively consultative and enabling, particularly for the larger players. Of course, the moratorium on the issue of new VSAT licences might have an impact on the sector and the effects will have to be monitored over time. Nevertheless, the result is a growing telecom sector and increasing demand. In fact, the primary constraint to increased usage identified amongst cybercafé consumers was a lack of time rather than a lack of financial means. However, there is a danger that VSAT will be bypassed in this growth curve. Obstacles to VSAT's growth include a lack of local technical skills and the perception that Ku band VSAT suffers inordinately from rain attenuation. Both obstacles can be easily removed with some simple information dissemination, demonstration and marketing.

Algeria does not suffer from the same technical skill deficiency. Rather, its growth in terms of consumers will be effected by a constraining regulatory environment. Price increases, the issue of new licences where none used to exist and a bureaucratic approach to regulation of the market has stifled growth. Unlike Nigeria, consumers report cost as the largest obstacle to increased usage of the Internet. Interviews with cyber café owners indicated that using the LAN for playing games was becoming more popular than surfing the web. Games didn't even feature in the Nigerian case study.

The Tanzanian ICT market risks continued underdevelopment based upon the regulators insistence on not taking an active or participatory role in the ICT sector. The TCRA perceives its function to be the collecting of taxes rather than the development of the sector. Thus the TCRA continues to licence new operators. The result has been that operators (such as the public data operators) focus on high margin business such as corporates in order to pay their licence fees. Operators do not perceive Tanzania to have an environment that will provide them with a return on their investment and this explains their reluctance to invest in a local hub. The development of VSAT is dependent upon the creation of an environment suitable to local investment. The role of institutions such as the Global VSAT Forum should be in pressurising the Tanzanian government and the regulator to play a role in the creation of local investment rather than supporting one set of interests, such as international satellite operators (a criticism of the GVF in Tanzania).

As urban development increases, VSAT usage will be pushed out to areas where it is not economically feasible to install alternatives such as fibre optic cable (for example, rural areas). The three case studies highlight different sets of problems: firstly, the inhibiting regulatory framework in Algeria, secondly, the lack of technical skills in Nigeria and thirdly, the high regulatory transaction costs and poor investment environment in Tanzania. The cybercafé consumer surveys reflect these differences. Usage is increasing dramatically in Nigeria with consumers requiring more bandwidth intensive applications. Consumers in Lagos use cybercafés more regularly than their counterparts in either Dar es Salaam or Algiers. This is also reflected in Figure 2 where 47.1% of consumers stated that they had increased their usage of cybercafés compared to 40.5% in Algiers and 32.7% in Tanzania. In Algeria, usage is increasing steadily but consumers are beginning to turn towards applications that do not require excessive bandwidth. A significant portion of consumers (31.1% compared to 16.5% and 12.5% in Lagos and Tanzania respectively) in Algiers reported that their usage had decreased over the last 6 months. In Tanzania, a common complaint is the high prices of bandwidth. 54.9% of consumers reported that their usage patterns had remained the same. The conclusion to be drawn here is that the consumer and user market is stagnating without investment in local infrastructure.

The consumer surveys undertaken in all three capital cities of the countries, which were identified as case studies, was meant to supplement the findings on the regulatory environment and what suppliers, industry stakeholders and service providers were saying. The consumer surveys, however, are dynamic in their own right for what they reveal is a composite picture of demand including some demographic criterion of cybercafé consumers, including some communications and computer patterns and cybercafé trends. What is striking is the similarity in the usage trends, and although these findings are limited they do indicate that a similarity in demand that is driven by the need for affordable, reasonably fast connectivity. If VSAT is able to do this more effectively, this is what they want..

7. Appendix 1. Interview Schedule - Nigeria

Name of Institution/ Organisation	Officials
Linkserve Limited Corporate Headquarters PO Box 74045 Victoria Island Lagos	Mr Cyril Amago Support Engineer, Wireless/ VoIP
21st Century Technologies Limited Plot 249A Muri Okunola Street Victoria Island Annex Lagos	Mr Christopher Ajayi Head, Business Development
ACCAT Limited 39 Creek Road Apapa, Lagos	Mr Obilor Dozie Sales Engineer
GS Telecom PO Box 75628 Lagos	Mr Adeyinka Adedayo General Manager, Business Development
Direct on PC Limited Plot B, Block 1 Ilupeju Industrial Avenue Lagos	Mr Sandeep Jayaswal Managing Director
Cellcom Limited 33 Saka Tinubu Street Victoria Island Lagos	Mr Wally Molere Network Administrator
General Telephone & Electronics 9 Estaport Avenue, Soluyi, Gbagada Lagos	Mr Micheal Anialoa Chief Engineer
Ecobank-Nigeria PLC PO Box 72688 Victoria Island Lagos	Mr Rasheed Oredegbe Information Technology Manager
Smart.comm 140 Awolowo Road Ikoyi, Lagos	Mr Gbenga Ore Managing Director
Compumetrics Solutions Limited PO Box 2267, Marina, Lagos	Mr Jimmy Adeyemi-Offor General Manager

8. Appendix 2. Interview Schedule - Algeria

Name of Institution/ Organisation	Officials
Autorité de la Poste et des Télécommunications (ARPT) Rue Kaddour Rahim Hussein Dey Alger 16008	Sidi Med Bouchenak Khelladi Membre du Conseil
Autorite de la Poste et des Telecommunications (ARPT) Rue Kaddour Rahim Hussein Dey Tel. 213 21 47 9628	Mme Khenchelaoui Director of Networks
Ceriste Departement Reseaux et Serveurs Rue des Trois Freres Aissiou Ben-Aknoun	Mme El-Maohab Aouaouche Technical Director
Etablissement de Gestion de Service Aeroportuares (EGSA) Tel. 213 21 50 91 91	Maamar Abdessalam Commercial Director
General Computing Systems 126 cite Mohamed Saidoune Djenane Ben Omar ygrar@gecos.net	Younes Grar Chief Executive Officer and President of the Algerian ISP Association
Algeria Telecom Route National No. 5 Cinq Maisons El Mohammadia chiheb@postelecom.dz	Abdelaziz Chiheb Chef de Division Marketing et Gestion Qualite
Telediffusion d'Algerie B.P. 50 Route de Bainem Bouzareah	Abdelah Nemer Directeur General Adjoint nemer@tda.dz
Swan Informatique & Satlinker Technologies 56A, lot.En-nahda, 16012 Alger	M. Kahlane C.E.O
Gradient Management 33 rue Dar El Alia Bouzareah www.gradient-management.com	Amine Haddam Directeur General a.haddam@gradient-management.com

Sei-Net	M. Said Cherfi Technical Director 41
Ministry of PICT	M. Irzouni Central Director

9. Appendix 3. Interview Schedule - Tanzania

Name of Institution/ Organisation	Officials
Standard Chartered Bank (T) Limited PO Box 9011 Dar es Salaam	Mr Gratis Sakaya Head, Technology & Operations Technology & Operations
Tanzania Internet Exchange (TIX)	Mr Frank Habicht Treasurer
United Nations Development Programme (UNDP) PO Box 9182 Dar es Salaam	Mr Charles Owe Information Management Analyst
KPMG PO Box 1160 Dar es Salaam	Miss Lollobrita Mushema Consultant – Information Technology
Satcom Networks Africa Ltd PO Box 79315 Dar es Salaam	Miss Leena Kapadia Marketing Manager
Tanzanian Communications Regulatory Authority PO Box 474 Dar es Salaam	Colonel Nalingigwa Acting Director General Mr J. A. K. Magesa Senior Telecom Engineer, Frequency Management and Spectrum Planning
Afsat Communications (T) Ltd PO Box 6154 Dar es Salaam	Mr Frank Goyayi Marketing Manager Mr Douglas Mutembei Technical Analyst
University of Dar es Salaam Computing Centre Ltd. PO Box 35062 Dar es Salaam	Professor Beda Mutagahywa Managing Director
Cats Tanzania Ltd PO Box 2569	Mr Joe Pereira Deputy Managing Director
Tanzanian Postal Corporation	Mr David Mtake Chief Analyst Programmer
Raha.com PO Box 12933 Dar es Salaam	Mr Hussein Dharsee Managing Director

Simbanet (T) Limited PO Box 14827 Dar es Salaam	Mr Gregory Almeida Operations Manager
Sida Embassy of Sweden PO Box 9274 Dar es Salaam	Mr Nils Jensen ICT Project Manager
Economic and Social Research Foundation PO Box 31226 Dar es Salaam	Mrs Margareth Nzuki Coordinator
President's Office Department of Information PO Box 9143 Dar es Salaam	Mr David Sawe Director - Management Information Systems
Makondenet PO Box 6528 Dar es Salaam	Mr Vipul F. Mistry Managing Director

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