The Internet in an African LDC:

Uganda Case Study

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Michael Minges, Walter Brown and Tim Kelly wrote this report. Vanessa Gray and Mark Woodall provided editorial comments. The layout, formatting and production of the report was carried out by Nathalie Delmas. It is based on field research undertaken 21 – 25 February 2000 as well as reports and articles identified in the bibliography or as footnotes. We would like to thank Brian Reaves (CelTel), Graham Mathews (MSI) and Charles Tibenderana (UCC) for their valuable comments on the draft version of this report. We are particularly indebted to Dr. Godfrey Kibuuka, Commissioner Communications, who greatly facilitated our research; to Charles Musisi of Uganda On Line, who shared his frank and insightful views with us; to Daniel Stern of Uganda Connect, who provided detailed comments; and to the others identified in the 'Persons and Organizations met' who took the time to answer our countless questions. The views expressed are those of the authors and may not necessarily reflect the opinions of the International Telecommunication Union or its members or the Government of the Republic of Uganda. This is one of a series of Internet diffusion case studies, which are being undertaken by the ITU. More details can be found on the web site at http://www.itu.int/ti/casestudies.

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1. Country background

1.1 Overview

Located in Eastern Africa, the Republic of Uganda is bordered by Sudan on the north, Kenya on the east, Tanzania on the south, Rwanda on the southwest and the Democratic Republic of the Congo on the west. The capital is Kampala. Administratively, the country is divided into four statistical regions and 45 districts. Districts are further divided into counties, subcounties, parishes and groups of villages.

Although land-locked, Uganda is in the Great Lakes region of Africa with some 15 per cent of its surface area consisting of water. A significant portion of Lake Victoria—the largest fresh water lake in Africa and the source of the river Nile—is found in Uganda territory. Other large lakes include Lake Edward, Lake Albert, Lake Kyoga, and Lake George.

Figure 1.1: Map of Uganda

Source: The World Factbook.

1.2 Demography

The last census was carried out in 1991 when the population of the country was estimated at 16.7 million. The latest estimate, for mid-year 1999, places the size of the population at 21.6 million. The population growth rate during the 1990s was 2.6 per cent per year. Uganda has a young population with roughly half its inhabitants under the age of 14. This is partly due to a life expectancy of only around 40 years.

There are around 4.4 million households in the country with the average household consisting of five people. The largest city is Kampala with 890'000 inhabitants, around 4.1 per cent of the population. About a dozen other locations are classified as municipalities, none of which has more than 100'000 population. Around 85 per cent of Ugandans reside in rural areas.

English was introduced during the colonial period. Although it is the official language, it is not the first language of the vast majority of the population. Indeed, it was estimated that only around one million people spoke English as a second language in 1977.[1] Though that number has certainly risen, Ugandans primarily speak one of the over 45 other dialects used in the country. Over 15 per cent of the population speak Luganda, the most widely spoken second language after English.[2]

1.3 Economy

Uganda's 1998 Gross Domestic Product (GDP) was US$ six billion or US$ 287 per capita, ranking it as one

of the poorest countries in the world and officially classifying it as a Least Developed Country (LDC). Agriculture contributes over 40 per cent of GDP although its share has declined over ten per cent since 1990. Manufacturing and construction account for over 15 per cent of the economy. Services add around one third to the economy of which the communications sector (posts and telecommunications) share is 0.5 per cent. Uganda has been classified by the World Bank as a Heavily-Indebted Poor Country, a process that started in April 1997, which means that it is eligible for favourable consideration with regard to debt relief. In February 2000, the value of potential debt relief available to Uganda was raised to US$ two billion.[3]

The country balance of payments has been in deficit for some years, with the 1998 figure estimated at some US$ 400 million. Imports are roughly twice the value of exports. The bulk of Uganda's exports are agricultural products. Its main export is coffee (55 per cent of total export value). Tea, tobacco and fish are other traditional exports. Electric current is also exported, attesting to the country's vast potential for hydroelectric energy. The relatively low contribution of energy to total exports (2.2 per cent) is more a reflection of inexpensive prices offered to neighbouring countries rather than its true value. Ironically, Uganda's second largest import is petroleum needed for its largest import, road vehicles. Cereals and medicine are also major import products.

1.4 Human development

Uganda ranks 158 out of 174 countries in the United Nations Development Program (UNDP) Human Development Index (HDI) and is categorized as being in the low human development group. The HDI is a composite of key indicators of well being including life expectancy, literacy, school enrolment and per capita GDP. Although Uganda rates favourably in some indicators compared to other African countries, its life expectancy is one of the lowest in the world. Some human development indicators for Uganda are shown in Table 1.1. It should be noted that these are national averages and there are significant regional differences.

1.5 Political

Uganda was widely considered to have among the most favourable development prospects of any African nation following independence from the United Kingdom in 1962. This hope was shattered by a coup in January 1971 led by Idi Amin. The country was embroiled in civil unrest during Amin's reign. Nationalist forces aided by Tanzania toppled Amin and he fled the country in April 1979. Soon after, civil war broke out and finally ended with the leader of the National Resistance Army, Yoweri Museveni, selected as President in 1986. Museveni was voted into office in May 1996 in the first presidential election since independence.

Table 1.1: Human Development Indicators

Uganda, 1997

Indicator	Value	Note
Life expectancy at birth	39.6 years	Number of years a newborn infant will live.
Adult literacy rate	64%	Percentage 15 and older that can read and write.
School enrolment ratio	40%	Measures percentage of school age population attending first, second and third-level educational establishments.
GDP per capita (PPP$)	1'160	Measured in Purchasing Power Parity (PPP), which adjusts for the relative price levels.

Source: UNDP.

In October 1995 a new constitution was adopted. That same year, the government restored the legal system to one based on English common law. The National Assembly consists of 214 directly elected members and 62 appointed ones. Representatives serve for five years. Although political parties are allowed, they cannot sponsor candidates. In a June 2000 referendum, Uganda voted to retain the party-less system.

Uganda has recently faced political tension with bordering countries. The civil war from Rwanda has affected Uganda in terms of both Rwandan refugees as well as guerrillas entering Ugandan territory. In the north of the country, rebels forming part of the "Lord's resistance Army", who receive assistance from Sudan, cause problems. Finally, Uganda is one of five African countries with troops in the Democratic Republic of the Congo. This open-ended military commitment is consuming resources from development projects within the country (for instance, the national census has been postponed) and is making regional co-operation more difficult.[4]

[1] See the Ethnologue web site at http://www.sil.org/ethnologue/countries/Ugan.html.
[2] For more on the Baganda and Luganda see http://www.buganda.com/buganda.htm.
[3] See World Bank Press Release at http://www.worldbank.org/hipc/country-cases/uganda/uganda.html.
[4] The government spends 20 per cent of its budget on defence compared to 13 per cent on education, 3 per cent on health and less than two per cent on roads. See "Functional Analysis of Uganda Central Government Recurrent Expenditure" in Uganda Bureau of Statistics. *Statistical Abstract*. July 1999.

2. Information and communication technology status

2.1 Telecommunication Sector

2.1.1 Industry structure

The **Ministry of Works, Housing and Communications (MOWHC)** (http://www.miniworks.go.ug) is the line ministry with responsibility for postal and telecommunications matters, with the exception of broadcasting, which falls under the Ministry of Information. The Ministry grants "major" telecommunication licenses (i.e., facilities-based licences) and appoints three members of the Uganda Communications Commission (UCC). Three other Commissioners are nominated by the Uganda Institute of Professional Engineers, the Uganda Law Society and the Broadcasting Council. Once the six Commissioners have been appointed, they nominate the seventh Commissioner, who becomes the Executive Director.

The **Uganda Communications Commission (UCC)** (http://www.ucc.co.ug) is the national communications regulator. It was created from the reorganization of the Uganda Posts and Telecommunication Corporation (UPTC) as a result of the 1997 Uganda Communications Act. The Commission consists of seven members ("Commissioners") including the Executive Director, in addition to support staff (numbering around 20 in February 2000). The Commissioners were appointed in September 1998 and the Executive Director was appointed in December 1999. While radio and television broadcasting fall under the Ministry of Information, technical aspects such as frequency assignment, are the responsibility of UCC. The UCC also issues minor telecommunication licenses for activities such as paging, Internet service and private telecommunication services. The UCC is funded from spectrum fees, grants from government and other approved sources, and a share of revenues from licensed operators (currently set at one per cent). This one per cent levy, which is to be devoted to the Rural Communications Development Fund (RCDF), has never been collected but the UCC plans to demand payment in the very near future. The UCC also has significant real estate holdings that it inherited from the break-up of UPTC, which presently finances an important share of its operations.

Uganda Communications Tribunal (UCT). The Communications Act calls for the establishment of UCT. The Tribunal is to consist of three members appointed by the President and is to be responsible for any disputes related to communications services. It can issue decisions with the powers of a high court. These decisions can be challenged in the country's Court of Appeal. The members have not been appointed as of February 2000, nor are there presently any outstanding disputes that would merit its intervention at this time.

The sector itself comprises a Government owned postal services provider, Uganda Posts Limited, a telecommunications network provider undergoing partial privatization, Uganda Telecom Limited (UTL), and several private network and service providers providing fixed line and mobile telephony, and Internet services. The most significant of these is the Second Network Operator (SNO), MTN-Uganda, which gained its license via an open competitive tender in 1998. The structure of the sector is shown in Figure 2.1.

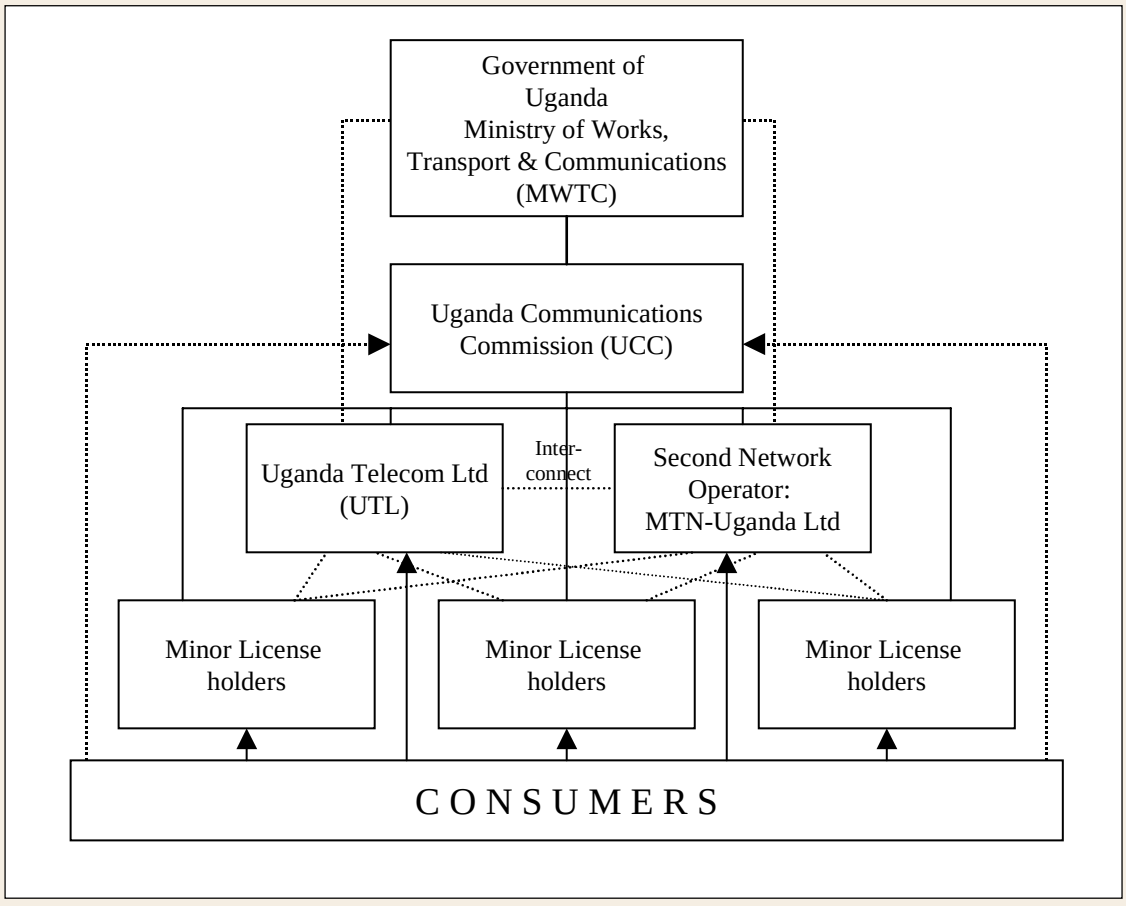
2.1.2 Industry players

Until 1994, all telecommunication services were provided by the Uganda Posts and Telecommunications Corporation (UPTC), the wholly government owned telecommunications service provider. Since then, the telecommunications sector has been progressively liberalized. Two fixed line telephone network operators and three

mobile telecommunication network operators have been licensed. By the end of 1999, the following network providers and operators were competing for market share in Uganda:

Uganda Telecommunications Limited (UTL). UTL is the successor of UPTC after the separation of postal from telecommunications functions. UTL was incorporated in February 1998 and is licensed to provide all telecommunication services—including fixed line, mobile, and data/Internet. However, up to the end of 1999, UTL provided only fixed line telecommunication services. Nevertheless, it is preparing itself for competition in all other services through a partnership with external strategic investors. Of particular note is UTL's interest in the Internet where a market study was commissioned from ITU in autumn 1999. UTL has developed a comprehensive business plan for the introduction of Internet networks and services throughout the country, and has the mandate to use these services for the provision of packet switched voice and data services.

Figure 2.1: Industry structure of the Ugandan Telecommunications Sector



Note: Celtel is regarded as a "minor license holder".
Source: Government of Uganda, Privatization of Uganda Telecom, Information Memorandum.

UTL's recently established partnership with Detecon of Germany and Telecel International, an outcome of the privatization process (see section 2.2.2), is expected to result in rapid expansion and development of Internet and mobile telephony services, in addition to the traditional fixed line networks.[5]

Celtel Uganda (http://www.nic .ug/CelTel). Celtel was the first private telecommunication operator to be licensed in Uganda in October 1994 after the decision to liberalize the telecommunication sector. It launched the country's first mobile cellular service in May 1995 using the GSM digital system. Celtel's shareholders were:

- Mobile Systems International (MSI)-Cellular (42%), an Amsterdam-headquartered cellular investment company (http://www.msi-cellular. com);
- Vodafone Airtouch (37%), UK-based and one of the world's largest mobile cellular operators (http://www. vodafone-airtouch-plc.com);
- International Finance Corporation (IFC) (10.5%), the World Bank's private sector development arm[6] (http://www.ifc.org); and
- Commonwealth Development Corporation (CDC) (10.5%), the UK's overseas development agency (http://www.cdc.co.uk).

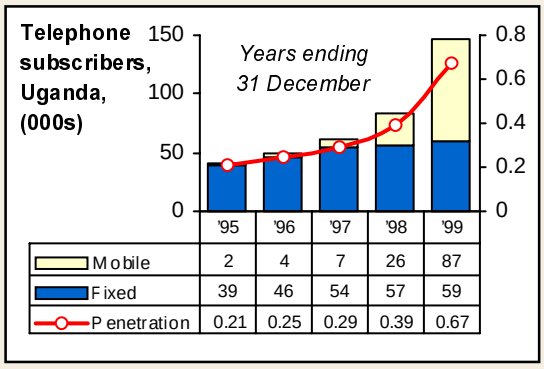
MSI has acquired Vodafone Airtouch's and CDC's shareholding and now has overall management control. Celtel's mobile network has grown to 22'000 users, 77 per cent of which are prepaid (17'000). However, since the introduction of competition in the mobile telephony sector, Celtel's growth has been limited. Subsequently, the company has developed new growth strategies and plans to increase its capacity and coverage significantly. This growth strategy includes entering the Internet market, and various new service offerings such as free voice mail.[7] Celtel's lead foreign partner, MSI, has announced a strategy for Africa-wide Internet development. To meet its network coverage expansion and Internet plans, Celtel has embarked on the roll out of a national 16x2Mbit/s microwave backbone, along the same physical route as UTL and MTN. Celtel has plans for international Internet connectivity via a VSAT link-up to Intelsat and to connect remote rural customers via domestic VSAT networks. Unlike MTN or UTL, Celtel does not have an international voice license nor does it have network roll-out obligations.

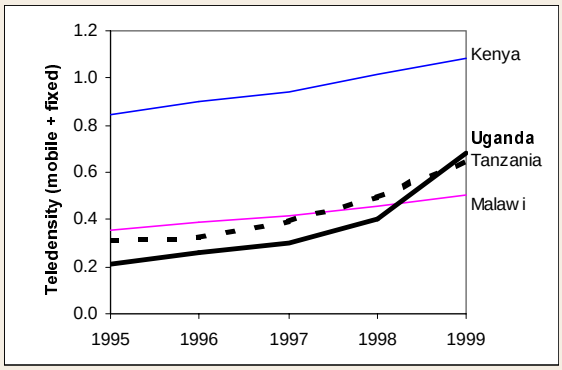
MTN Uganda. MTN (http://www.mtn .co.ug) was granted a so-called "Second National Operator's" license in April 1998. The license essentially covers any telecommunication service that MTN wants to provide including fixed, mobile, long-distance and Internet. It paid US$ 5.8 million for the license and is obliged to install 89'000 lines within five years (this apparently includes mobile cellular subscribers). MTN launched its wireless network in October 1998. Although fixed wireless has been available since the latter quarter of 1999, most customers have opted for the mobile service, and most of them have taken the pre-paid option. The telephone for fixed-cellular, provided by Siemens, at around US$ 700 each, is much more expensive than the equivalent mobile handsets, which are often bundled with the price of a subscription, and for which there is already a vibrant second-hand market. Consequently, the number of fixed-cellular subscribers by February 2000 was still under 200. By contrast, by the end of 1999, MTN already had over 60'000 mobile cellular subscribers, making it the largest telecommuni-cation service provider in the country. In just two years from its introduction, MTN's customer base has exceeded UTL's fixed line capacity and has overtaken Celtel, its mobile telephony competitor, by a wide margin. It has also succeeded in rolling out its network to all 46 main cities in the country, reaching parts of the country, which are not currently served with fixed-line access.

Although MTN focused its early roll out strategy on the lucrative mobile telephony market, it is now giving increased attention to the business market. MTN's solution is to use point-

Figure 2.2: Evolution of the Ugandan network

By communication service, and by comparison with East African neighbours, 1995-99





Source: ITU World Telecommunication Indicators Database.

to-point microwave radio to provide an ISDN primary rate wireless interface to buildings and businesses within line of site of its transmitters in the Kampala area. These customers can then provide local wiring for end users who include Internet and fax users as well as telephone users. Initial customers include computer distributors, hotels and trading companies. MTN Uganda's ownership structure is the following:

- Mobile Telephone Networks (MTN) (50%). The South African mobile operator also has cellular investments in Cameroon, Rwanda and Swaziland;
- Telia (30%), Sweden's incumbent telecommunication operator;
- Invesco (10%), a Ugandan company; and
- Tristar (10%), a Rwandan company.

2.2 Regulation and policy-making

2.2.1 Market liberalization

The government has embarked on a four-part strategy of liberalization in the telecom sector. Much of this strategy is outlined in the Uganda Communications Act, approved by Parliament in August 1997:

- Restructuring Uganda Posts and Telecommunications Corporation (UPTC). Uganda Telecom was split off from UPTC and incorporated in February 1998.
- Creation of an independent telecommunication regulator. The Uganda Communications Commission (UCC) was established in 1997 as a result of the Communications Act. Its executive director is Patrick Masambu, formerly with UTL.
- Introduction of competition. A private company, Celtel, obtained a license for mobile cellular in 1994. A full-fledged Second National Operator (SNO) license was awarded to MTN Uganda in 1998. The SNO license allows any telecommunication service to be provided. All non-basic telecom services are open to competition. According to the Uganda Communications Act, UTL and the second network operator are to be awarded a period of protection from further full-service competition (in particular, for international service) for a period of five years. This five year ex-

clusivity period began in June 2000 and will run until 2005.

- Privatization of incumbent operator. See below.

2.2.2 Privatization

The privatization process in Uganda's telecom sector commenced in October 1994 with the licensing of Celtel, a private company, to provide mobile cellular service. This was followed by the issuance of the SNO license to MTN Uganda in 1998. The sale to a strategic investor of a majority of shares in the incumbent fixed-line operator, UTL was intended to be an early part of the process. However, this was delayed for various legal and operational reasons. Initial talks with Telekom Malaysia broke down following the Asian financial crisis while a later attempt to involve WorldTel proved abortive. Consequently, Uganda was, until recently, in the unusual position of having introduced competition, including international services, *before* it had privatized the incumbent operator.

After two false starts, an agreement to sell was finally announced in February 2000, following a competitive bidding process. The process was concluded in June 2000. Some 51 per cent of UTL were sold to the international UCOM consortium for US$ 33.5 million.[8] Telecel International, the Pan-African mobile cellular operator, heads UCOM with 80 per cent, with the remaining 20 per cent held by Detecon (http://www.detecon.de/index_en.html), the international consulting subsidiary of Germany's incumbent telecom operator, Deutsche Telekom (http://www.telekom.de/english/index.htm).

The sale price values UTL at US$ 65.7 million, or just over US$ 1'000 per subscriber line. Given that the revenue per subscriber in 1999 was some US$ 870, this sum represents just over one year's revenue. However, it is perhaps more relevant to consider what *would* have been the price if the consortium had been bidding only for the mobile license (with international gateway) that UTL holds. Judging by the prices, which have recently been paid for mobile licences in countries close to Uganda, it is likely that the price of the mobile license alone would have been close to the entire price paid for UTL. In other words, the price paid for UTL's fixed line network and assets is very low and might even be negative. The delay in concluding the sale has allowed MTN to become the largest operator in the country and has arguably delayed UTL's own plans to enter the mobile and ISP markets. It would appear to be the case that this has resulted in a much lower price for UTL than could have been obtained a year or so ago.

Nevertheless, it should be taken into account that, in acquiring UTL, the consortium has also taken on considerable debts and pension liabilities (including staff of the former UPTC). UTL's debts, as of 31 March 1999 amounted to some Ushs 47.0 billion (US$ 31.4 million). This includes interest payable on loans from, *inter alia*:

- the World Bank (via IDA) for loans granted in 1987 and 1990;
- the French government;
- the African Development Bank;
- the government of the Republic of Korea.

UTL's cash flow in the 13 months to 31 March 1999 was Ushs 15.9 billion (US$ 10.6 million), which was more or less equivalent to the annual interest payable on loans, leaving UTL in a poor position to meet its other liabilities and to invest in network roll-out.

2.2.3 Universal service and quality of service obligations

In acquiring the majority shareholding in UTL, the Detecon-led consortium has also taken on a number of obligations with regard to future network roll-out during the period of duopoly. In particular, the operator must roll-out some 100'000 new lines within the five year period of which 30'000 subscriber lines and 3'000 payphones must be within specified regions (see Table 2.1). The remaining 67'000 lines

can be distributed according to demand.

In addition, UTL will take on quality of service obligations for nine specified indicators. Those indicators relevant to Internet service provision include the following targets:

- to increase local call completion rate to over 85 per cent within five years (the existing level is 35 per cent);
- to fix 85 per cent of faults within 24 hours and 90 per cent within 72 hours;
- to achieve 95 per cent network digitization; and
- to ensure a maximum connection time of ten days of request within urban areas.

2.2.4 Licensing

One of the major changes introduced by the 1997 Communications Act is the licensing regime for telecommunication operators and service providers, which is administered by the UCC. One of the principal functions of the UCC is to monitor, inspect, license and regulate telecommunications in the country. The licensing regime recognizes two broad types of license:

- **Major licenses**. These are issued directly by the Ministry, on the advice of the UCC. They cover the main facilities-based carriers in the fields of fixed and mobile telecommunication services, long-distance and leased lines capacity resale, satellite services and third party private network services.
- **Minor licenses**. These are granted directly by the UCC and mainly cover non-facilities based services (such as messaging, value-added services, private telecommunications services, equipment sale and leasing) as well as facilities-based networks for paging, telex, telegraph etc. Although it is not specifically stated in the Act, Internet Service Provision comes under the category of minor licenses and some eight ISP licenses had been awarded as of February 2000 of which four were already active.

Licensees are to contribute one per cent of their annual revenues to the UCC. It is intended that these fees should eventually be used as the basis for the Rural Communications Development Fund (RCDF). The UCC also manages licenses for radio frequency use. The market for private radio stations is particularly active.

Table 2.1: Regional structure of telephone demand and UTL roll-out obligations

Existing distribution at 31/3/99 and regional roll-out obligations to 2005

Region	Subscriber lines,	Public payphones,	Teledensity, at 31/3/99	Roll-out obligation, subscriber lines	Roll-out obligation, payphones
Kampala	36'472	565	1.86%	10'000	1'000
Central	3'920	162	0.1%	5'000	500
Eastern	4'560	106	0.09%	6'000	600
Northern	824	7	0.02%	3'000	300
Western	6'053	194	0.11%	6'000	600
National total	51'829	1'034	0.26%	30'000 *	3'000

Note: * These figures do not include a further 67'000 lines to be installed by 2005 according to the distribution of demand.
Source: Government of Uganda, Privatization of Uganda Telecom, Information Memorandum.

2.2.5 Tariff rebalancing

Uganda is in a relatively unusual position relative to other African countries in that the process of tariff rebalancing began early. Now, UTL's tariffs for international calls are among the lowest in Africa and its settlement rate with the United States (US$ 0.25 per minute at May 2000) is the lowest. However, UTL's local call tariffs are among the highest in Africa. The ratio between local and long distance calls is 1:2.5 (1:10 or more is common in Africa). Table 2.2 summarizes the main rates in force.

While the moves towards tariff rebalancing are to be applauded, the unintended side effect is that dial-up Internet usage is not as high as it would be if the local call charge was lower. However, the main problem here is not so much the high initial charge (Five US cents per minute), but rather that there are no internet-friendly tariffs that might allow, for instance:

- Untimed local call access after a certain length of time (e.g., after 15 minutes). Instead, the price of using the Internet for local call-dial-up is US$ 3 per hour (peak time);
- A national dialing code for local rate access to the Internet. Some 15 different African countries currently have national dialing codes[9]. The lack of one in Uganda means that the price of access for long-distance dial-up is US$ 8 per hour;
- A "premium rate" access number for Internet whereby the costs of Internet access are bundled into the cost of a local call. In Egypt, where this service was introduced in December 1999, it is already realizing more than a million dollars per month in revenues, shared between the participating ISPs and Telecom Egypt. ISPs in Uganda have requested such a facility but UTL has not yet delivered it.

2.2.6 Interconnection

Since the number of mobilephones in Uganda overtook the number of fixed-lines, in the second half of 1999, the issue of mobile/fixed interconnection has become more significant. However, the stakes have shifted considerably. While UTL was still the dominant operator, it could afford to charge relatively high prices for calls

Table 2.2: UTL's tariff structure

February 2000, in Ugandan Shillings and US cents per minute

Tariff	In Ugandan Shillings	In US$
Fixed charges (business & residential)		
• Connection fee	170'000	113.33
• Subscription	10'000 per month	6.67
Local calls:		
• Peak rate	75 per minute	0.05
• Economy (8pm – 6 am)	45 per minute	0.03
• Super-economy (2 pm sat – 8am Mon)	25 per minute	0.017
National long-distance rate	200 per minute	0.13
International calls:		
• East Africa	1'500 per minute	1.00
• Other int'l	1'800, 2'000 or 2'300 per minute	1.20, 1.33 or 1.53

Source: UTL.

terminated on its network. Now that it is not the dominant operator, a significant and rising proportion of UTL-billed calls now go to Celtel or MTN mobile subscribers. Thus, whereas UTL originally had a motivation to seek high interconnect rates, it is now seeking much lower ones.

In the eight months to May 1999, UTL's outgoing traffic to MTN was 9.2 million minutes and its incoming traffic was 4.5 million minutes. However, for much of that period, MTN had fewer than 20'000 subscribers. It is likely that the interconnect flows after May 1999 were much higher, with an increasing share of total traffic being between MTN subscribers.

The original interconnect arrangement was negotiated between Celtel and UTL and foresaw interconnect rates at 500 Ush per minute for termination of calls on Celtel's network (mobile) and 300 Ush per minute for terminating on UTL's network (fixed). These high rates are one reason why Celtel's original attempts to popularize mobile in Uganda were not successful.

MTN's entry into the market changed the situation radically. It offered UTL a termination rate for calls on the mobile network of just 350 Ush per minute and agreed to pay UTL 150 Ush for calls terminating on the fixed network. With these low prices in place, it was able to offer considerably reduced prices to consumers. MTN's initial efforts to negotiate a low rate of interconnect with Celtel for mobile to mobile calls was rejected and a rate of Ush 210 per minute was established. However, this was subsequently reduced and Celtel is now negotiating a lower interconnect rate with UTL, too, as part of its efforts to relaunch its service. As from 1 March 2000, Celtel's new interconnect rates are 160 Ush per minute for calls to and from the fixed network.

For the moment, there are no specific interconnect rates for mobile access to Internet-based services, for instance to develop WAP (Wireless Application Protocols) services or to encourage use of the Internet to send SMS messages to mobile subscribers. However, it is expected that these will come as mobile Internet applications enter the market.

The regulatory framework for interconnection is based on contracts between operators, which should be based on principles of neutrality, non-discrimination and equality of access. All interconnect agreements are subject to review and approval by the regulatory, the UCC, after a five-year period. All interconnect disputes should be arbitrated by a Commission established by the UCC.

2.3 Network

2.3.1 Backbone network

A Master Plan for the Ugandan network was developed in 1993 under a contract funded by NTT, Japan. This was updated in the form of a demand forecast, carried out in 1997 by a consultant and funded by the ITU. This is still used, though it has been overtaken by events, in particular the rapid expansion of mobile communications.

UTL's switching network comprises 17 digital, 26 analogue and 62 manual exchanges. In general, Kampala is well served with modern, digital equipment, but the rest of the country is not so fortunate and parts of the network are obsolete. Modernization of the network has depended on grants and loans from foreign partners, including from the Korean and Belgian governments. For instance, the Belgian government is funding a US$ 4.5 million project to establish a 3'000 line exchange in Gulu and an SDH microwave link between Gulu and Kampala. However, one problem with such donor-funded projects is that they are frequently awarded at above-market prices and the beneficiary is often locked into expensive maintenance contracts once the initial installation is implemented.

Around 90 per cent of subscribers are connected to automatic exchanges. Some fibre is deployed in the backbone network, specifically between Kampala and Entebbe but the major-

ity of the backbone network is provided by microwave links. International connectivity is provided principally by a satellite earth station at Mpoma, near Kampala.

UTL is involved in an East-African project for co-operation on the creation of a digital transmission network. The project was signed on 29 April 1997 and tender notices were issued in July 1999. UTL's contribution to the US$ 57 million project is some US$ 13 million. The project may have a higher chance of success if Detecon succeeds in the Tanzania Telecom privatization process.

MTN's backbone network, which is also based principally around SDH microwave links, has the advantage of being much more modern and homogeneous than UTL's network and is also more easily upgradeable, given its modular design and MTN's easier access to financial resources. It is also being extended more rapidly into secondary cities and rural areas of Uganda. There are provisions for sharing of resources (e.g., high sites) but apparently little enthusiasm to do so on the part of either UTL or MTN. Also, MTN recently launched an optical fibre network.

2.3.2 Rural access

Rural access is limited both by a lack of investment and by the fact that parts of the network were destroyed during the civil unrest of the 1970s and 1980s. While the network in the area around Entebbe and Kampala has benefited from World Bank funded investment, the rural network has generally been left to deteriorate. The one exception to this is the Gulu project noted above. World Bank and Nordic Development Funds are available for a second phase of this project. However, it is likely that wireless communication, both fixed and mobile, may provide a more viable prospect than copper-based solutions for rural areas. It would also be advisable to allow other network operators than just UTL to bid to use the donor funds.

One major problem which UTL has suffered from is the mismatch between availability of capacity and location of demand. Thus, while the available line capacity at the end of 1999 was just over 85'000 lines, fewer than 60'000 lines, or 70 per cent of capacity, had actually been installed. The available unused capacity is more than twice the size of the waiting list. Capacity utilization is highest in Kampala (>80%) and lowest in Central, Eastern and Northern regions (around 40%). A second problem plaguing UTL has been unpaid bills and difficulties over debt recovery, including from government departments. The pre-paid systems used by the cellular operators largely avoid this problem.

2.4 International service

2.4.1 International traffic

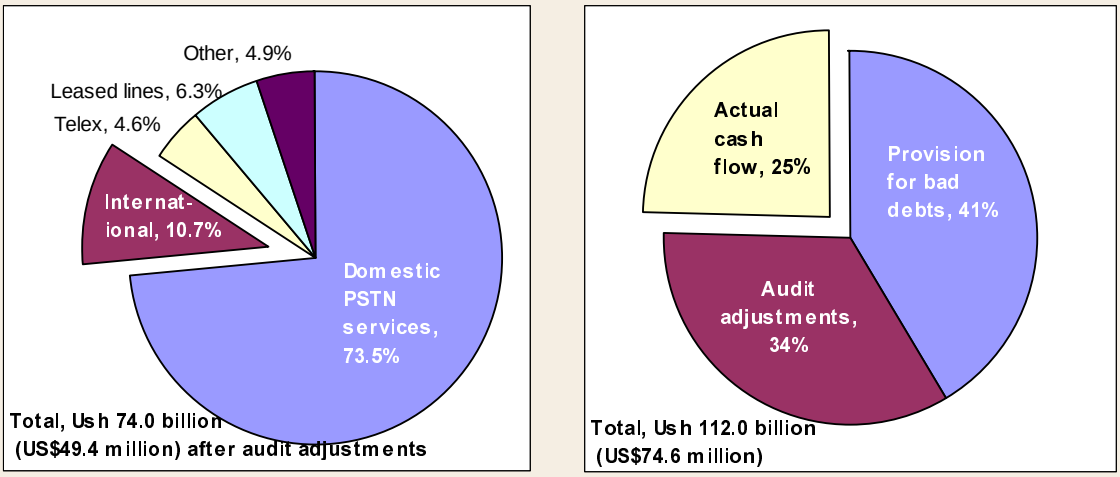
Like many other developing countries, Uganda is heavily dependent upon revenues from international telecommunications. However, the level of dependency is relatively low compared with that of other countries reviewed in the ITU/CTO/InfoDev country case studies series (see http://www.itu.int/wtpf/cases/Uganda/index.htm). Indeed, the overall level of revenue from international markets was just over ten per cent of UTL's total revenue (Figure 2.3).

There are a number of reasons why UTL gains so little from international services:

- UTL's overall inefficiency in collecting and retaining revenues. For instance, out of the US$ 75 million that was billed by UTL in the last financial accounts, some 40 per cent were lost as a provision for bad debt and a further 34 per cent were lost due to "audit adjustments".
- Billing inefficiencies mean that much traffic goes unrecorded. For instance, UTL reports only 4.4 million minutes of traffic coming from the US during 1998 whereas the FCC reports a total of 10.6 million minutes from US carriers.

Figure 2.3: UTL's billed and actual revenue, 1999

For 13 months, ending 31 March 1999

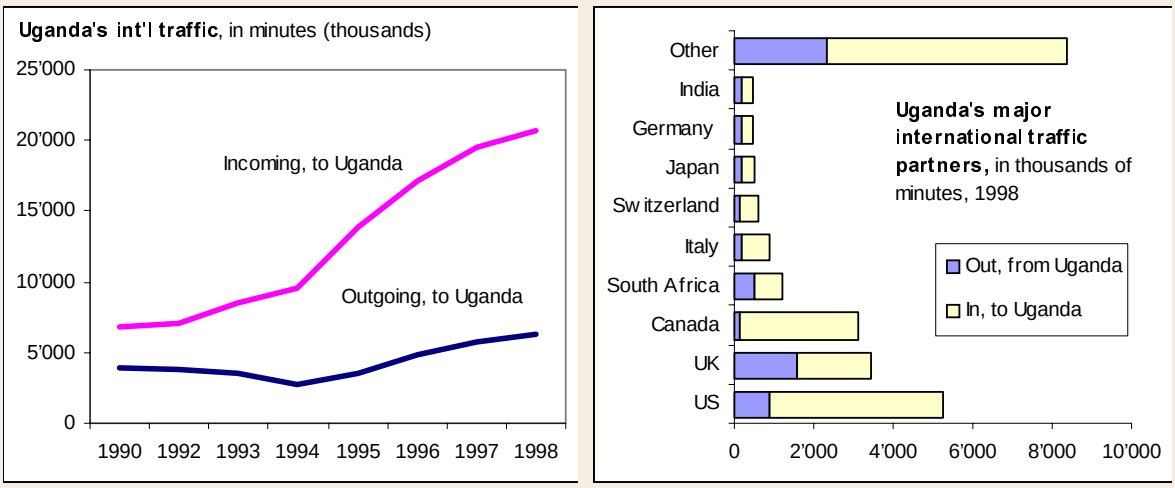


Source: UTL audit report and financial statements.

- UTL is a net payer to many developed countries, including UK, Germany and Sweden. This liability is mainly due to transit charges where UTL is paying well above market rates, perhaps due to commercial naivety or perhaps due to the fact that it is locked into multi-year contracts.
- There is strong evidence for refile of traffic via third countries. For instance, incoming traffic from Canada, a major refile hub, rose by 315 per cent in 1998 while traffic from the UK fell by 175 per cent. The fact that Uganda has traditionally been part of a sender-keeps-all agreement with

Figure 2.4: International traffic

Uganda's international traffic, 1990-98, and major traffic partners, 1998



Note: Excludes traffic with neighbouring East African countries which is outside the accounting rate system.
Source: ITU/TeleGeography Inc "Direction of Traffic Database".

Table 2.3: Telecom market indicators for Uganda

Years ending 30 June

	Unit	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
TELEPHONE NETWORK											
Main telephone lines		27'886	28'405	30'047	20'770	30'449	38'972	47'927	54'074	56'919	57'091
- Per 100 inhabitants		0.17	0.17	0.17	0.12	0.16	0.20	0.24	0.27	0.28	0.27
% digital main lines 1/		...	59.7	42.2	60.6	68.0	64.2	75.2	75.6	90.6	90.9
Public payphones 1/ 2/		...	...	314	354	378	693	799	1'158	1'333	1'380
Waiting list 1/ 3/		15'675	20'373	6'233	2'568	2'430	4'554	6'277	8'092	8'954	9'161
MOBILE SERVICES											
Cellular mobile subscribers		—	—	—	—	—	1'747	4'000	5'000	30'000	56'358
- Per 100 inhabitants		—	—	—	—	—	0.01	0.02	0.02	0.15	0.27
TRAFFIC (Millions of minutes)											
Total national		...	...	...	...	...	...	215.7	239.3	263.8	...
- Local		...	...	...	...	...	...	168.0	187.6	195.7	...
- National long distance		...	...	...	...	...	...	47.7	51.7	68.1	...
International bothway 4/		6.8	7.1	8.5	9.6	13.9	17.2	19.5	20.7	24.3	25.2
-International outgoing 4/		3.9	3.8	3.5	2.7	3.5	4.9	5.8	6.3	6.4	6.3
- International incoming 4/		2.8	3.3	5.0	6.9	10.4	12.3	13.7	14.4	17.9	18.9
STAFF											
Full-time telecom staff 5/		2'215	1'221	1'247	1'246	1'219	1'324	1'348	1'399	1'400	1'672
QUALITY OF SERVICE											
Faults per 100 main lines per year		...	...	...	380.0	100.0	120.0	110.0	80.0	80.0	...
TELPHONE TARIFFS (National currency, including taxes)											
Connection		...	...	21'250	21'250	125'000	138'000	138'000	170'000	170'000	170'000
Monthly fee		...	...	800	800	1'500	6'000	6'000	19'000	10'000	10'000
3 minute local call (peak rate)		...	...	50	50	50	200	200	...	225	225
REVENUE (National currency, billions of Uganda shillings)											
Total telecom services revenue	6/	12.4	21.5	33.4	32.8	40.7	47.8	45. 4	61.7	74.4	126.7
- Telephone service revenue		11.1	20.4	31.5	31.5	37.2	37.2	43.9	25.8	28.5	
CAPITAL EXPENDITURE (National currency, billions of Uganda shillings)											
Annual telecom investment	7/	3.0	11.6	14.2	11.8	9.2	22.4	30.4	26.6	22.3	80.3

Source: Uganda Telecommunications Ltd. (UTL).
Note: 1/ 1999 at August. 2/ UTL only. 3/ Excluding suppressed demand. 4/ Not including traffic with Kenya or Tanzania. UTL only. 5/ 1990 including postal staff. 1991-1997 telecom only staff of former Uganda Posts & Telecom Corporation. 1998 estimate of UTL staff. 1999 staff of UTL (1'430), CelTel (107) and MTN (125). 6/ 1997-1999 includes UTL annualized revenue. 1998-99 includes estimates from mobile cellular services. 7/ Including estimated investment in mobile cellular for 1998-99.

neighbouring East African countries makes it particularly vulnerable to sudden shifts in traffic.

- UTL's net settlement from the United States in calendar year 1998 amounted to only US$ 2.3 million after accounting for transit fees. By comparison, Kenya gained over US$ 13 million. Uganda's settlement rate with the US has been 25 US cents per minute since 1998, which is close to the FCC's benchmark rate of 23 US cents per minute for low income countries. By contrast, Kenya's settlement rate is 55 US cents per minute.

The lack of revenue gained from international services is one reason why UTL has been unable to expand its network at a faster rate. Funds for investment have been falling (in 1999,

for instance, only US$ 1.6 million was invested by UTL, which is only one tenth as much as in previous years). A further reason for the poor investment record is the uncertainty surrounding the stop-go privatization process.

2.4.2 IP Telephony

ISPs are not allowed to provide Voice over Internet Protocol (VoIP) services. VoIP is not illegal *per se* but ISPs are not allowed to provide voice services, which remain the exclusive monopoly of the two full-service operators, UTL and MTN. The restriction against VoIP is outlined in the ISP license. Other voice-related services such as Fax Mail are, however, allowed.

UTL's lack of dependency on revenue from international services puts it in a relatively stronger position than other African PTOs with regard to the possible threats from IP Telephony. The main opportunity for IP Telephony in countries such as Uganda is for termination of incoming calls. The gap between the official settlement rate (25 US cents per minute) and the unofficial rate offered on telecom minutes exchanges (19 US cents per minute is offered at www.arbinet.com) is relatively small compared with Uganda's neighbours (in Kenya, the gap is between 55 US cents official and 34 US cents unofficial). Thus the scope for price arbitrage is limited.

On the other hand, because Uganda is more open than its neighbours to incoming Internet traffic (the VSAT data market is liberalized, for instance) there is more scope for bringing IP voice traffic in. The official situation is that only two operators, UTL and MTN, are licensed to use IP Telephony though neither claims they are actually doing so (indeed, they appeared unaware when interviewed that they were able to provide IP Telephony). No ISPs admit to using IP Telephony, though they are rumoured to be franchisees for Net2Phone, a subsidiary of AT&T, who are active in the country. The UCC has not taken an aggressive stance against IP Telephony, unlike regulators in other African countries.

2.5 Information Technology Sector

This section identifies organizations involved in the Information Technology (IT) sector, summarizes the computer hardware market, and examines Internet service provision. No single government ministry or agency appears to have been designated the lead agency for IT in the country. Several are involved in IT-related areas with very little coordination. Government ministries with a role in IT include the MWTC and MOI (yet ironically neither even has a web site!). The former provides oversight for the telecommunication and postal sectors, while the latter performs the same duty for the mass media and broadcasting sectors. The Uganda Investment Authority (http://www. ugandainvest .com), the Uganda National Council for Science and Technology (http://www.uncst. go.ug), and the Institute of Computer Science at Makerere University (http://www.muk.ac.ug/faculty/compsc~1/index.html) are also involved in IT.[10]

IT user-based organizations in the country include the Uganda Computer Society, which arranges the annual AITEC computer show each April. Another IT-related organization is the local chapter of the Internet Society (Uganda ISOC) (http://www.isoc.or. ug).

2.5.1 Computer market

There are limited data on the Ugandan computer market. There are statistics available for the yearly value of imports of office machines and automatic data processing machines (see Table 2.4). There is no breakdown by units or disaggregation of personal computers (PCs). There is no domestic production of computers and limited assembly and import duties have been reduced to zero. There are roughly a dozen shops selling personal computers and other office equipment in Kampala. According to one vendor, there were around 30'000 PCs sold in the country in 1999. It is widely believed that sales of PCs have increased sharply over the last few years as a result of preparation for the Year 2000 problem and increased Internet activity.

Table 2.4: Personal computer market in Uganda

	1994	1995	1996	1997	1998	1999
Office machines & ADP imports ($m)	19.5	13.8	11.5	11.2	18.4	n.a.
Estimated PC sales (units)	9'000	7'000	7'000	8'000	15'000	30'000
Estimated stock of PCs	15'000	24'000	31'000	38'000	45'000	60'000
PCs per 100 inhabitants	0.08	0.12	0.16	0.19	0.22	0.28

Source: ITU estimates. Data on office machines and automatic data-processing machine imports are from the Uganda Bureau of Statistics.

We "guesstimate" that there were around 60'000 PCs in the country at the end of 1999, based on rough derivations of import data and 1999 unit sales estimates. This results in a PC penetration of 0.28 per 100 people, placing Uganda roughly between neighbours Tanzania (0.19) and Kenya (0.43). Almost ten per cent of Ugandan PCs are connected to the Internet.

2.5.2 The Internet market

The history of the Internet in Uganda dates back to April 1993 with references to a Fidonet node at Makerere University. Limited commercial e-mail services became available in August 1994 and the first host using the .ug (Uganda) domain name was detected in July 1995. By October 1995, several organizations were offering Internet connectivity. For example, the MUKLA (Makerere University Kampala) Internet Service was providing e-mail for students and faculty. In addition, StarLight Communications and Infomail were providing Internet access, while Transmail and InfomaNet were providing e-mail services.

The 1997 Uganda Communications Act introduced a licensing regime for Internet services. As of February 2000, UCC had issued eight "Internet Access Service" licenses. However, only two can be considered to be providing significant public Internet and email services (see Table 2.5).[11] Two small ISPs concentrate on niche markets, while most licensed ISPs have yet to begin operations. There are a growing number of Internet Cafés, providing "drop in" Internet and e-mail services mainly to foreign tourists, international staff on short term assignment to Uganda and local students. These Internet Cafés provide a useful public service and a valuable contribution to the growing awareness of the power and usefulness of ICT. One factor that limits Internet and e-mail usage in Uganda is the limited availability and affordability of computers; nonetheless, it is anticipated that Internet services will experience very high growth in the near future.

The number of Internet *subscribers* was around 4'100 at the end of 1999. There have been no surveys regarding the number of Internet *users* by either the national statistical agency or market research firms. Existing estimates vary tremendously. A March 1999 report pegged the number of Internet users at 15'000.[12] A news article cites a study by the United Nations Industrial Development Organization (UNIDO) claiming there were 10'000 users in Kampala in August 1999 and that this figure had risen to 40'000 by November 1999.[13] A more probable figure, based on various interviews and estimates of the number of users per subscription, suggests that there were around 25'000 Internet users in Uganda at the beginning of 2000. This estimate includes regular and casual e-mail-only users. Growth during 1999 appears to have been high. One cyber-café, which opened in March 1999, claims to have doubled the number of PCs in the establishment in less than a year.

Table 2.5: ISPs in Uganda

Licensed ISPs, February 2000

Name	Subscribers (12/99)	Web site
1 Infocom a, c	2'650	imul.com
2 Swift Global a, d	1'360	www.swiftuganda.com
3 Wilken Afsat a	57	www.afsat.com
4 Bushnet	25	www.bushnet.net
5 Spacenet a, b	-	www.spacenetuganda.com
6 Computers & Multimedia a, b	-	www.ugandaweb.com/cms
7 Africa Online a, b	-	www.africaonline.co.ug
8 Sanyutel b	-	
	4'092	

Note: a) Has license for international data gateway. b) Not operational at December 1999. c) Formed from merger of Infomail and Starcom and purchased by MSI in October 2000. d) Purchased by Africa online in March 2000.
Source: ITU adapted from UCC and ISP data.

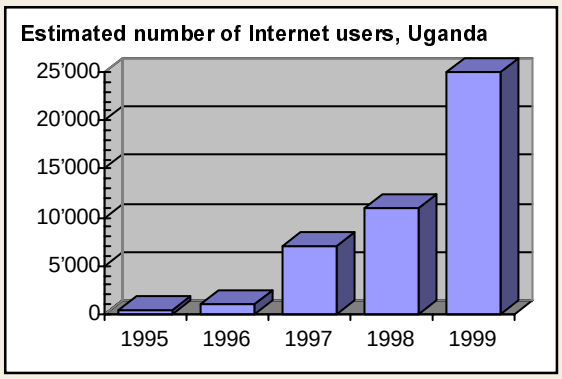
The most significant development so far for Uganda's Internet market is the entry by the country's existing telecommunication operators as well as foreign firms. An Internet business plan has been prepared for UTL but it is unlikely it will be acted on until its new strategic investors assume operational control of the company. The plan proposes that UTL become a retail ISP.

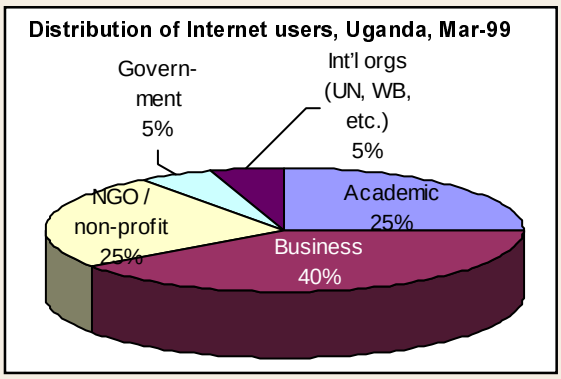
Africa Online, the regional Internet service provider with operations in six countries (Côte d'Ivoire, Ghana, Kenya, Swaziland, Tanzania and Zimbabwe), received an Internet access service and international data gateway license in January 2000. In March 2000, it announced that it had purchased Uganda's second largest ISP, Swift Global.[14] Meanwhile, MSI, the parent of CelTel, purchased Uganda's largest ISP, Infocom, in October 2000.[15]

MTN Uganda appears to be taking a different course with plans to use wireless technology for providing Internet

Figure 2.5. Internet users in Uganda

Estimated number of Internet users, 1995-1999 and classification of Internet users, March 1999





Source: Left chart: ITU estimates. Right chart: Charles Musisi.

Table 2.6: ISP international connectivity

February 2000

ISP	Bandwidth	Note
Infocom	256 kbps up / 512 kbps down 128 kbps full circuit	Two VSATs: 1st to Norway (taide.net, affiliated with Telnor), 2nd to NSN (Washington State, USA). Paying ~US$ 17'000 / month
Afsat	64 kbps up / 256 kbps down	Plans to upgrade to 128Kb full circuit (February 2000). Downlink: kersur.net
SwiftUganda	256 kbps full circuit	VSAT via Intelsat / France Telecom
SanyuTel	64 kbps full circuit	
BushNet	64 kbps full circuit	Using MTN
MTN	512 kbps full circuit	Via TeleGlobe (on Intelsat).
AfricaOnline	128 kbps up / 256 kbps down	Leased from MTN

Source: ITU adapted from ISP interviews and Charles Musisi.

access to its existing subscribers. Mobile phones are already being connected to PCs and used to dial-in to ISPs. However, the speed is presently limited to 9.6 kbps. In order to get around this limitation, MTN is exploring a number of options. One involves installing special software on its network that would strip out the graphics that overwhelm the low connection speed. Another possibility is the introduction of Wireless Application Protocol (WAP) that tailors Internet access for mobile phones. A third option is the introduction of General Packet Radio Services (GPRS) that uses packet-switching technology to achieve higher transmission speeds.

Uganda's international Internet bandwidth has been doubling over the last few years. It was 1.2 Mb up and 1.7 Mb down at February 2000 (see Table 2.6) compared to 640kb up/768 down in March 1999 and 384kb in April 1998. ISPs are allowed to have their own international connectivity provided they have obtained the proper license. All major ISPs have their own international connectivity via VSAT. The other ISPs lease capacity from them or telecom operators. Since incoming Internet traffic is greater than outgoing—reflecting the fact that most Ugandan surfers access content abroad—international connections are asymmetric. National peering is non-existent.

2.6 Mass media

2.6.1 Print

According to UNESCO statistics, there were two daily newspapers in 1996 with a circulation of 40'000 readers. This implies that only two out of 1'000 people read a newspaper in Uganda, far lower than radio or television penetration. These statistics seem strange, considering that over half the adult population is considered literate. Affordability may be a factor, with English-language dailies costing USh 600.

The two leading daily English language newspapers available in Kampala are *The Monitor* and *The New Vision*. They both have web sites, http://www.africanews.com/monitor and http://www.newvision.co.ug respectively. The current days edition for both newspapers is published on the web site for free; archives and subscriptions are also available. The *New*

Vision also has links to sister daily and weekly editions including one published in the Luanda language.

2.6.2 Broadcasting

2.6.2.1 Radio

Radio is by far the most popular source of information and entertainment with a reported 2.6 million radio sets in the country. Radio is cheap (receivers are relatively inexpensive compared to televisions, telephones or computers and service does not require a subscription); accessible (there is near nation-wide coverage and neighbouring country broadcasts can also be picked up); and easy (state-owned Radio Uganda broadcasts in English as well as 28 other local languages and radio listening does not require literacy or other skills). There are ten AM stations and several private FM stations in Kampala, some of which have their own web sites.[16] The Internet is serving Ugandan's love of music with audio streaming available on some of the FM radio web sites and downloading music clips a common application in Kampala's cyber cafés.

2.6.2.2 Television

There are nine TV stations across the country with coverage available in larger towns. Stations include government run Uganda TV, Sanyu TV, a religious station (Lighthouse Television, LTV) and WBS. There are an estimated 200'000 television households.

Subscription television is available in Kampala through MultiChoice Africa, a subsidiary of the South African MIH Group. There is both an analogue and digital service with 1'843 subscribers to the former and 2'110 to the latter at March 1999.

Figure 2.6: Mass Media Online

The New Vision newspaper and Radio Simba web sites

Source: As captured June 2000 from www.newvision.co.ug and www.simbafm.com.

Table 2.7: Broadcasting indicators

Indicator	Value	Source
Radio sets	2'600'000	UNESCO 1997
Radio sets per 1'000 inhabitants	130	UNESCO 1997
Television sets	315'000	UNESCO 1997
Televisions per 1'000 inhabitants	16	UNESCO 1997
Television households	200'000	MultiChoice, March 1999
Households with a television	4.5%	
Pay TV subscribers	3'953	MultiChoice, March 1999

Source: ITU adapted from Sources shown.

[5] In October 2000, UTL signed an agreement with Alcatel for a GSM mobile network. The network is targeted for completion by December 2001. See "Uganda Telecom Limited and Alcatel sign Agreement" at http://www.uganda.co.ug/investment/utl_alcatel.htm.

[6] In a curious conflict of interest, IFC also acted as the Ministry's advisor for the privatization of UTL.

[7] Celtel was in the process of applying for an ISP license in February 2000.

[8] International Finance Corporation. "Uganda Privatizes Telecom Utility with IFC Help." *IFC Press Release*. 24 February 2000. Washington DC. http://www.ifc.org/pressroom/Archive/2000/00_95/00_95.html.

[9] See paper presented by Ant Brooks, on the role of the regulator in the Internet market, at ITU/CTO "African Internet and Telecoms Summit", the Gambia, 5-9 June 2000, available on the ITU web site at http://www.itu.int/ti/africansummit.htm.

[10] For example all three have been examining national ICT policies.

[11] Although neither UTL or MTN Uganda currently provide ISP service, they are free to provide any telecommunication service without applying for a license.

[12] According to an e-mail sent from Charles Musisi to Steven G. Huter of the Network Start-up Research Centre (NSRC) entitled "The Internet in Uganda (3/99)". See the NSRC site at http://www.nsrc.org/db/lookup/ISO=UG.

[13] Serugo Moses. "Cyber-café's take off in Kampala." *The Monitor (Uganda)*. 23 February 2000. Page 22.

[14] Internet Moves: Africa Online Uganda Acquires Local Player". *Africa Online Press Release*. 22 March 2000. Kampala. http://www.africaonline.co.ke/uganda/pressrelease1.html.

[15] See MSI. "MSI acquires leading Ugandan ISP". *Press Release*. 24 October 2000.

[16] One constraint for FM radio in Uganda is that most vehicles cannot receive the full FM band. "Over 85% of vehicles in Uganda are Japanese reconditioned vehicles originally meant to stay in Japan. Therefore the radios in these reconditioned vehicles stop at 90MHz. Unlike the rest of the world, the Japanese FM spectrum is legally constrained to 76 - 90MHZ." Source: http://www.uganda.co.ug/radioone/.

3. Internet strategy & policy

3.1 Role of incumbent telecom operator in Internet

UTL, the incumbent telecom operator in Uganda, has thus far kept a very low Internet profile. It does not offer either retail or wholesale Internet services nor, at the time of this report, even have a web site. Nonetheless, it is indirectly involved in the Internet through the provision of incoming telephone lines to ISPs and earns increasing revenues from dial-up Internet traffic.

A major factor contributing to UTL's lack of Internet ambition has been its drawn out privatization process, which has left a void in the company's strategic development. It has been reluctant to make any major moves until the new owners have taken over management control of the company. An Internet business plan has been prepared for UTL recommending that, among other things, it become a retail ISP itself and directly provide Internet services to the public. UTL is certainly well poised to play a bigger role in the Internet. It has the only significant nationwide fixed-line network that it could leverage and upgrade to provide quality Internet services. It could also use its existing international voice backbone to develop an international data gateway. On the minus side, UTL is weak in information technology experience and skills as well as customer focus. This might be addressed by new management as well as by linking up with an existing ISP in Uganda or a foreign one. However, this could conflict with plans to also provide mobile cellular service since it would be difficult—resource- and staff-wise—to provide both services successfully in a short time span.

UTL has a mixed record among its current service to ISPs in providing telephone lines. Some ISPs complain that they have been overcharged and that service quality is often poor; others have stated that the relationship and service is good.

UTL does provide a limited, proprietary data service with around ten clients (using an X.25 network).

3.2 Pricing structure for Internet services

Despite a competitive ISP market, Internet tariffs in Uganda are relatively high. The standard tariff is US$ 50 per month for unlimited access (tariffs are priced in US$). There are no other variations other than full or e-mail-only access. Tariffs are comparable to East African countries but are high compared to other African countries. For example, unlimited access in Botswana is only US$ 16 per month (see Table 3.1). The lack of a low cost entry-level package effectively limits Internet access to the well-off in Uganda.

In addition to the ISP charge, dial-in users have to pay local telephone call charges, which for an average user, exceeds the ISP charge. For example, one estimate puts average Internet use in Uganda at about one hour a day or 30 hours a month. The telephone usage charge would amount to US$ 93.10, US$ 55.86 or US$ 31.03 respectively for peak, off-peak or weekend use. Added to the ISP charge, the total cost of dial-up Internet access ranges from US$ 81 – US$ 143 per month depending on peak or off-peak usage. At these prices, the leased line offering of US$ 200 per month for unlimited access (with no telephone usage charge and 64 kbps bandwidth) begins to look attractive. To put Internet pricing in perspective, the average GDP per capita in Uganda is US$ 287 (1998). Internet access prices are between 3 - 6 times more than GDP per capita so clearly out of reach of most of the population.

Table 3.1: Internet access prices in Africa

Unlimited monthly access, ISP charge, US$, February 2000

Country	ISP	Package	Connection	Subscription
Uganda	**Infocom**	**Internet**	**$ 50**	**$ 50**
Kenya	NairobiNet	Internet	$ 16	$ 128
Tanzania	Internet Africa	Internet	$ 100	$ 50
Burkina Faso	Onatel		$ 23	$ 23
Zimbabwe	Internet Unlimited	Private Diamond		$ 39
Botswana	Mega	Unlimited	$ 11	$ 16
E-mail only:				
Kenya	NairobiNet	Email	$ 16	$ 24
Tanzania	Cyber Twiga	Email		$ 36
Uganda	**Infocom**	**Email**	**$ 30**	**$ 30**

Source: ITU adapted from ISP data.

Further exasperating the situation is that there is no "Internet-friendly" tariff program for the telephone usage charge. There is no nation-wide dial prefix for Internet access meaning that users located outside an ISP's Point of Presence (POP) (basically the whole country outside Kampala) will incur long distance call charges. Users within an ISP's POP area pay the local call charge; there is no provision for reduced tariffs for Internet access.

Since the majority of Ugandans cannot afford current Internet access prices or an individual personal computer, one alternative would be access at public locations. But even here, prices are beyond the reach of most inhabitants. For example, one cyber café charges Ush 750 for five minutes of Internet access (around US$ 0.50 or US$ 6 per hour). Given that around 90 per cent of the population lives on less than US$ 2 per day, Internet use is problematic.

3.3 Regulatory status of Internet

3.3.1 Internet Service Provider (ISP) market

The ISP market is competitive. It requires a license from UCC. There is no limit on the number of licenses that can be issued. License types and fees vary depending on the type of service (see Table 3.2). There is some confusion as to whether a license application fee is required. ISPs are also required to pay one per cent of their annual revenue to UCC as a contribution to the RCDF. It has been inferred that, as a consequence, ISPs are underreporting their subscriber counts in order to give the impression that their revenues are less than expected. Also, it is believed that some cybercafés are operating without licenses.

ISPs can provide their own international connectivity if they have an "International data gateway" license, which includes the right to provide Internet access service. ISPs can also provide domestic wireless leased lines to users. Some are doing this using microwave technology. This requires a "2.4 GHz device and wireless spread spectrum" license (US$ 2'000/ year). It is not clear whether ISPs could provide "wired" leased lines. Some have complained that existing service offerings from the existing fixed-line providers are limited or service is poor. For example, UTL does not seem able to provide leased lines of sufficient bandwidth or in a timely matter. MTN

Table 3.2: Internet licenses

Type	Number issued	Amount
Internet access services	4	US$ 2'000 / year
International data gateway and Internet access service	5	US$ 4'000 / year
Public Internet service (e.g., cybercafé)	3	US$ 500 / year
E-mail access service	1	US$ 500 / year

Source: ITU adapted from UCC information.

only provides primary rate interface ISDN as a high-speed option. This poses problems for ISPs. First, they would be required to invest in ISDN modems. Second, they often do not need all the virtual lines (30) that come with the offering but must still pay for them. Third, the dial prefix for MTN's ISDN service is the same as its mobile service so users would be charged at a mobile rate.

There is as yet no national peering for domestic Internet traffic.

3.3.2 Top level domain name

Charles Musisi of Uganda OnLine is the administrator for the Uganda country code top level domain (ccTLD, (".ug").[17] The following conditions apply:

- Domains are registered at a rate of US$ 50 per annum (February 2000)
- The entity operating the domain must be operating in Uganda
- The domain must be used within 3 months or must be relinquished
- Domains are available as follows:

  - Top Level Domain-ug
  - Second Level -ac(academic), co (corporate),or (organization), go (government body)
  - Third Level- chosen with consultation of the administrator, and can be a school name, business name or non-profit organisation name

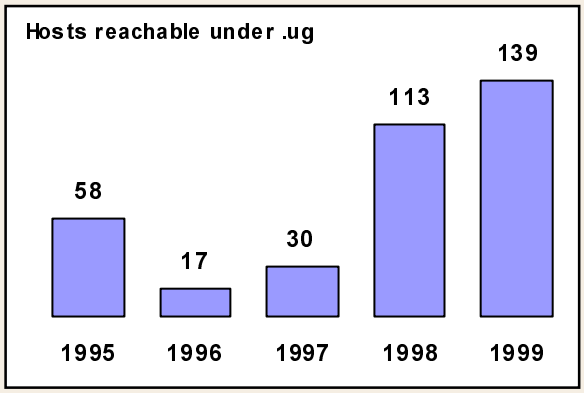
The Internet Software Consortium reported 139 reachable hosts under the .ug ccTLD in its January 2000 survey. The RIPE survey reported 180 reachable .ug hosts in December 1999. The growth of .ug hosts had been moderate since 1998, suggesting that either most Ugandan organizations aware of the Internet have already registered or they are using other TLDs (e.g., ".com", see Figure 3.1). It should be noted that many, if not most web sites in Uganda, do not use the .ug domain name. Part of the reason is that the domain registration is not considered to be handled by a neutral party and thus most ISPs prefer to register hosts using a generic TLD. Mr. Musisi counters that he processes the registrations in an orderly, transparent and professional manner. He is concerned that if responsibility is transferred to another party, it will not be handled properly. Unlike other ccTLDs such as .nu, .tm, or .tv, there does not appear to be as much "cachet" with .ug. Thus, there is little scope for commercializing the .ug ccTLD.

3.4 Universal access

With less than one per cent of the population having a telephone line and an even smaller percentage having Internet access, the diffusion of communication technology is clearly a major challenge for Uganda. The main government policy for improving ac-

Figure 3.1: Uganda's domain name

Number of .ug hosts, 1995-2000



Note: The .ug domain first became active in 1995.
Source: ITU adapted from www.isc.com.

cess—apart from the inherent benefits of introducing competition in order to foster greater supply of infrastructure[18]—is to mandate a certain number of telephone lines and payphones that the full license operators (UTL and MTN) must install. There is a requirement to install a certain number of each in specific localities to enhance rural access but otherwise operators are free to choose where to construct facilities. The targets are in line with the government's policy to achieve a telephone density of two by 2006. There are also plans to allow operators to draw on a planned rural development fund to subsidize the installation of networks in rural areas. Supposedly, new companies could be licensed to provide only rural service if the incumbents choose not to do so. There is no specific Internet component in Uganda's current universal access policy.

The wisdom of the government's line installation target policy is questionable. With an official waiting list of less than 10'000 people, the demand for individual telephone lines is theoretically not there. Therefore it seems that efforts should be concentrated on providing telephones and Internet access in public locations. This is being pursued through government targets mentioned earlier, private sector initiatives and donor assistance:

- At the beginning of the year 2000, Uganda had around 2000 public payphones, roughly split between UTL and MTN. The latter has been active in putting in payphones, including most recently, a pre-fabricated shelter, housing a number of wall-mounted units (see Figure 3.2). Both operators are supposed to meet payphone installation targets. While payphones per se do not provide Internet access they can be a starting point. For example, MTN mentioned that it may one day install payphones with computer keyboards. Also, since an operator mans its payphone shelter, personal computers with Internet access could be easily installed and supervised.

- The private sector has been active in providing public telecom access. The public payphone and call centre market has been liberalized for several years and anyone can enter the market by applying for a license. However, it is worth noting that one major public call centre operator, Starcom, has been retreating from the market. Reasons cited for this include greater availability of cellular handsets with pre-paid cards, more public payphones, and the growing number of cyber cafés that are siphoning off ancillary call centre services such as faxing. 1999 witnessed an explosion of cyber cafés in Kampala. There were at least ten in operation by February 2000 (see Table 3.3). However, this phenomenon has yet to reach other areas of the country[19]. The Uganda Post Office has also introduced e-mail at its main branch in Kampala, as well as two other towns. It has been in con-

Figure 3.2: Public payphone shelter

MTN payphone shelter in Kampala

Source: ITU.

tact with potential private partners about extending connectivity and public Internet access at its other branches. Africa Online plans to install its "E-touch" public access points at a number of locations.

- Foreign assistance has also been helpful for enhancing mass access to the Internet. Uganda was the first pilot country for The World Bank's "WorLD" program (see Section 4.3), which provides assistance to connect secondary schools to the Internet. Around 20 schools in Uganda are now hooked-up to the Internet through this project. CelTel, one of the mobile operators, has assisted in this endeavour even though it is not legally required to contribute to public access. Also of note are several foreign-funded IT projects at Makerere University that are enabling greater networking connectivity and Internet access for its students. Several Multipurpose Community Telecentres have also been installed in villages (see Box 3.1).

Table 3.3: Cybercafés in Kampala

February 2000

Internet café	Number of PCs
Shell Wandegeya	n.a.
Shell Bugolobi	n.a.
Cyberworld Café	22
Web Café (Udyan House)	5
Cyberdome Café	16
Post Office (UPL)	2
Aptech	n.a.
Makerere University	n.a.
German Cultural Society	n.a.
Alliance Francaise	n.a.

Source: ITU, UCC, The Monitor Newspaper.

Box 3.1: The Ugandan Telecentre experience

Multipurpose Community Telecentres (MCTs) have been hailed as a promising solution for enhancing information and telecommunication access in rural areas. An MCT is a kind of super cyber café. In addition to Internet access, the MCT offers telephone service, faxing, photocopying and sometimes a library and audio-visual facilities. MCTs should be supported and sustained by the community and supply a cost-based service, provide relevant content and information and offer a venue for training. An MCT is typically located where there is limited communication access and where entrepreneurs have not perceived a viable market opportunity. Therefore, MCTs are traditionally implemented with bi-lateral and multi-lateral assistance.

While MCTs sound good in theory, in reality, few have actually been installed around the world. One reason is the large cost not only of obtaining equipment but also of transporting it to remote locations. With a large rural population, Uganda has been an active test bed for MCTs. It provides an interesting case because several evaluations have been made of the MCTs that have been implemented.

The first MCT was launched in March 1999. It is located in Nakaseke, a village about 50 kilometres from Kampala. This MCT is a project of ITU, IDRC, UNESCO and several other bi-lateral and local partners. The Nakaseke MCT has a library with around 3'000 books as well as some newspapers and magazines, one television and video-recorder, five computers, one printer, one scanner, two telephone lines, a fax machine and a photocopier. The telephone lines have been beset with problems with frequent failures. The power supply is also unreliable. The most popular service is the photocopying machine while the least used is the fax.

The Nabweru MCT is funded by Canada's IDRC. It is only around five kilometres from Kampala with farmers making up a smaller proportion of the potential user community than the other MCTs. Nabweru MCT was launched in May 1999. There is no library but otherwise it has the same facilities as the other MCTs. Like the other MCTs, there are problems with the telephone line exasperated by common usage between Internet, faxing and telephone calls. Only one of the five computers is connected to the Internet.

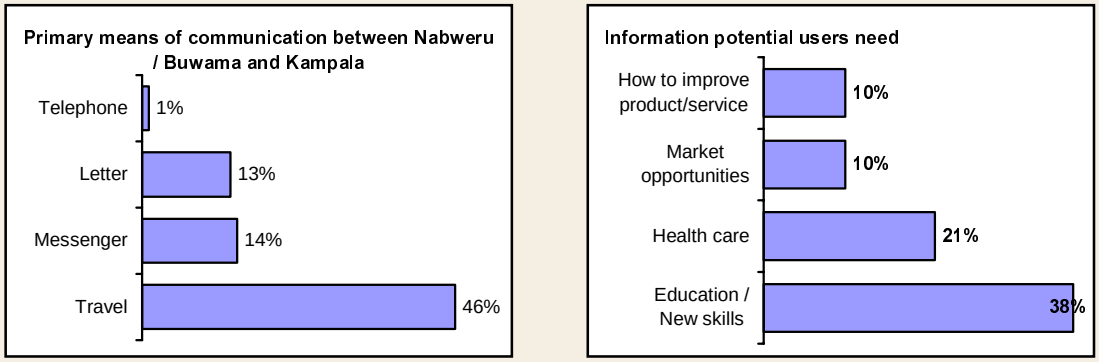
A third MCT is located in Buwama, about 64 kilometres from Kampala. Like Nakaseke this is a rural area with most people engaged in farming. Some are also involved in fishing since the area borders Lake Victoria. Like Nabweru, this MCT is funded by IDRC and it started operations in June 1999. At the time of a September 1999 evaluation, the telephone line had not yet become operational so Internet services were not available.

In addition to the three MCTs, there is Bunyoro Community Telecentre, located at the Hoima Teachers Resource Centre, about 200 kilometres from Kampala. Uganda Connect helped to set this up, using recycled PCs and other donated equipment. Uganda Connect has also helped with a 'mini-telecentre' in Kihihi. Electricity is provided by solar panels and it is connected to the Internet by HF radio.

One of the ironies of MCTs is that there is a perception that they create the same sort of 'digital divide' that they were supposed to overcome. For example, many of the inhabitants of Nakaseke are illiterate farmers who do not speak English. They perceive the MCT as something for the educated elite and the only services they could use are the telephone, photocopier and video.[20] Another perception is that the MCT is for government use. This is reinforced in the case of the Nabweru MCT, which is situated in a sub-county administrative headquarters, with the police station and local jail next door. This location has discouraged some potential users from going.

Despite the inevitable teething pains these MCTs are experiencing, they could prove beneficial for rural users. A survey of potential users found that the majority communicated with Kampala by travelling there personally or sending a message through contacts. This is because the post is considered unreliable and takes too long and telephones are scarce. The ability to use an MCT to make a call or send a fax or e-mail would save travel time and transportation costs. Access to the Internet would also provide badly needed information on farming techniques, local markets and prices and health. Suggestions for enhancing the value of MCTs include providing more relevant content in local languages and functionality for 'broadcasting' personal announcements such as births, weddings and funerals to radio stations in Kampala.

Box Figure 3.1: Rural communications



Note: Left chart: based on a 690 person sample in Nabweru and Buwama. Right chart: based on a 1'000 person sample.
Source: Kyabwe and Kibombo.

[17] Information about registering a host under the .ug domain is available at http://www.registry.co.ug.

[18] For example the number of telephone subscribers has doubled since the entry of MTN into the market. Equally important for enhancing access has been the impact of wireless technology and pre-paid cards. The latter has been particularly relevant for a cash-based economy where credit is hard to obtain and many would not qualify for subscription-based telecom services.

[19] One 'up-country' cyber café is *The Source Café,* the first Internet node outside Kampala.

[20] "There is among community people a perception that the centre is for the educated people…" See Mona Dahms. *For the Educated People only…Reflections on a Visit to two Multipurpose Community Telecentres in Uganda.* www.idrc.ca./telecentre/evaluation/html/14_For.html.

4. Sector absorption

4.1 Government

With only a few exceptions, computers within government departments and agencies are used for administrative processes such as word processing or spread sheet analysis. Very few have Internet access and of those that do, most are using it only for e-mail. Few government ministries or agencies are online (see Table 4.1). Of those that are, less than a handful have their own web site with the rest using pages hosted by others. For example, there is a web page hosted by Uganda Web Pages that claims to be the web site for the Government of Uganda (http://www.uganda.co.ug/govern). However, this web page provides limited information and does not provide links to the few government institutions that are online. All this adds to a sense of confusion and clearly suggests the need for one integrated, government-operated web site.

Senior government officials have attributed the limited use of computers in various ministries to two major factors – the lack of awareness of the use of computers as information and communications tools, and the high price of computers and other Information and Communication Technology (ICT) components. The use of the few computers available does not in general advance ICT skills – the PCs tend to be used mechanically for the processes directly related to the functions required, and do not therefore contribute towards improving computer literacy. For example, two reports received during interviews for this survey, indicated that government-owned financial and banking institutions had developed relatively sophisticated computer systems but, due to security and other concerns, users were not encouraged to develop computer skills other than those needed for immediate tasks. The government did not, therefore, contribute towards improving the computer literacy levels of their own staff.

A third important factor identified

Box 4.1: Uganda Government Web Presence

Of the top 20 Uganda web sites listed in a popular World Wide Web search engine, only one was directly linked to a Government agency – the Privatization Unit within the Ministry of Finance (http://www.perds.go.ug) The second most informative web site found was "Uganda–The pearl of Africa" (http://www.uganda.co.ug). This private web site is linked to the Privatization Unit web site, and provides most of the information and data. Other web sites covered tourism, culture and history, ecology, and ISP publicity. The only health related site, (http://www.tripprep.com) seems to focus on health risks for visitors to Uganda.

Table 4.1: Uganda government web sites

June 2000

National institutions	Web page / site
Parliament of Uganda	www.parliament.go.ug
Government of Uganda	www.uganda.co.ug/govern
Office of the Vice President	www.ovpuganda.net
Ministry of Education and Sports	www.educationsectoruganda.com
Ministry of Finance, Planning and Economic Development (MFPED) Uganda Privatization Program: PERDS Population Secretariat	 www.perds.go.ug www.uganda.co.ug/population
Ministry of Tourism, Trade and Industry Uganda National Bureau of Standards (UNBS) National Environment Management Authority	 www.uganda.co.ug/unbs.htm www.uganda.co.ug/nema
Ministry of Works, Housing and Communications	www.miniworks.go.ug
Uganda Police Training Planning Unit (TPU)	 www.geocities.com/Athens/Forum/7383/
Uganda Revenue Authority (URA)	www.ura.go.ug
Capital Markets Authority (CMA)	www.ugandacapitalmarkets.co.ug
Uganda Tourist Board (UTB)	www.utbsite.com www.visituganda.com www.africa-insites.com/uganda
Uganda AIDS Commission (UAC) National AIDS Documentation and Information Centre (NADIC)	 www.uganda.co.ug/nadic
Bank of Uganda	www.bou.or.ug
Office of the Inspector General of Government	www.uganda.co.ug/igg
Interim Electoral Commission	www.imul.com/interim
Uganda Investsment Authority	www.ugandainvest.com

Source: ITU adapted from http://www.gksoft.com/govt/en/ug.html.

during interviews is the relatively high dependence on international donor assistance for the modernization of the processes of governance, which often include relatively sophisticated ICT based management systems.[21] These development programs tend to focus on the processes themselves, and the information systems needed for their operation. They tend to be driven by computer literate international consultants, who do not have the time to develop internal champions to promote computer literacy in the government departments and institutions concerned.

A fourth factor inhibiting the use of ICT in governance is the poorly developed telecommunications infrastructure. Government processes must focus on the entire nation, but, with more than 80 per cent of the population residing in rural areas with virtually no access to basic telecommunication services and reliable electrical power, there is little incentive to consider ICT as a useful tool for improving the government's effectiveness.

Despite the many discouraging factors outlined above, there is a growing optimism in Uganda as a whole that

ICT processes will be introduced, and that the process of governance will be improved through the use of modern ICT tools. This growing optimism is demonstrated by the following developments:

- **Recognition of the importance of ICT, and a clear vision for its progressive introduction.** The most dramatic demonstration of this vision is the liberalization of the telecommunication sector, which has resulted in one of the highest growth rates of access on the African continent. Access to basic telecommunication via both fixed and mobile services has increased more than five-fold since the start of sector liberalization in 1994. While fixed line telecommunication services have stagnated, the disposal of 51 per cent of shares in UTL to a foreign strategic investor consortium provides grounds for renewed optimism.

- **ICT Policy.** The Hon. Minister of Works, Housing and Communications has further demonstrated the national vision by outlining the Government's plans to develop a *clear ICT policy*. The policy under consideration will build on recent sector successes, and encourage even more rapid growth of the whole ICT sector over and beyond the telecommunications component currently in focus, through broad national consultation and consensus building encompassing all national stakeholders. This ITU study was welcomed by the Minister, who looked forward to incorporating the findings of the study in developing the planned ICT policy.

- **Other Government support for ICT development.** National Government support for ICT growth initiatives is clearly demonstrated by the Government's decision to eliminate all customs tariffs on the importation of ICT equipment – the importation of computers and telecommunication systems is duty-free.

- **Simple regulatory processes for ICT development.** The national regulatory framework has been designed to encourage growth of the ICT sector in an orderly manner. Where protection of new entrants to the sector is required, such protection is provided transparently with clearly defined time limits. New entrants outside these controlled sectors are encouraged through simple and rapid licensing application and approval systems.

The following sections provide a brief outline of the initiatives in specific Government departments and institutions, for the development of ICT infrastructure and its utilization.

4.1.1 Communications

The Ministry of Works, Housing and Communication would like to play a lead role in the development of ICT infrastructure and utilization. The successes achieved to date are highly significant but indications are that use of ICT technologies and processes within the ministry itself are relatively underdeveloped. The few computers installed in the ministry are primarily used for administrative tasks, although some have been equipped with dial-up modems and have e-mail connections through various ISPs. There was very little evidence of the use of e-mail or the Internet to conduct ministerial business communications. However, a strong desire for the development of ICT within the ministry was expressed during interviews, and it is expected that the ministry will develop its own ICT networks and processes as it formulates policy for this sector.

The Ministry of Works, Housing and Communications has access to ICT knowledge through its control of government stakes in UTL and the postal services operator, UPL. Although both these organizations have yet to develop full ICT skills, they are well

placed to assist their parent ministry. UTL has valuable telecommunication skills, as the incumbent fixed line telecommunications network operator, but generally lacks computer and advanced ICT networking skills. These are likely to be provided in the short term through its strategic equity partners. UTL has about 100 PCs, nearly all of which are used primarily for administrative purposes.

Since the separation of posts from telecommunication services, UPL has focused much of its attention on developing new skills for its own survival. Prior to the separation, the forerunner of UPL depended largely on subsidies from the earnings of telecommunication services. Part of this survival strategy is to develop ICT skills for use in postal operations. During interviews with UPL executives, a high level of enthusiasm for ICT was demonstrated. UPL has establish its own web site (http://www.ugandapost. com). It has also embarked on the development of public e-mail and Internet services to supplement its postal services, on e-commerce to promote and market its philatelic business, and on other ICT services such as mail and parcel tracking and delivery control. UPL has plans to install local and wide area networks for its internal and geographically diverse presence. UPL is therefore likely to develop useful ICT skills in the near future, which will not only improve its own effectiveness, but may also contribute to the ICT knowledge base of its parent ministry.

Box 4.2: Digital Posts

Postal services have traditionally formed part of the communications sector. In many countries this was institutionalized through a combined post and telecommunication operator, such as Uganda with the Uganda Posts and Telecommunication Corporation. The wave of reform sweeping the telecommunication sector over the last decade has instilled the notion that the often loss-making, employee-bloated, old-fashioned postal service should be separated from telecommunications. Like many countries, Uganda went through this so-called restructuring exercise and separated posts and telecommunications in 1998.

A popular scenario envisaged the slow death of national post offices. On the one hand, growing competition from dynamic courier services would eat into one of the few profit-making areas. On the other hand, new electronic services such as fax and e-mail would erase the need for letters. However, the national postal service has some inherent advantages that it could exploit to transform itself into a leading cyber player. Uganda Posts Limited (UPL) recognizes this and is beginning to embark in a digital direction.

One advantage is that the post office is a regularly visited public location. UPL probably has one of the largest presences in the country with nine regional offices, 70 departmental offices and 236 sub post offices. UPL is well aware that its network of offices could be leveraged to provide public Internet services—regional and departmental offices are equipped with telephones—and indeed has started to do so. It offers e-mail service at the main post office in Kampala as well as the towns of Soroti and Jinja and plans to extend the service to all regional offices.[22] UPL has also been in talks with ISPs about a possible franchise agreement to provide public Internet services from post offices. UPL could also consider leveraging its 65'000 private letterboxes into a nationwide 'virtual' letterbox for all Ugandans.

Another advantage is parcel delivery. UPL has faced considerable competition in this area with private courier services allowed to operate in Uganda since 1989. It estimates that it has around 40 per cent of the market. One disadvantage for UPL is that, unlike the private couriers, it has a universal service obligation to try to ensure postal service availability in all parts of the country. The advent of e-commerce could be a boost for UPL as users increasingly turn to the Internet to order products and want speedy delivery. Though business-to-consumer e-commerce is practically non-existent in Uganda, this is bound to change. UPL is already gaining experience in this area through two fronts. On the one hand, it has implemented a package tracing facility on its web site. On the other hand, UPL itself is engaged in a crude form of e-commerce through the marketing of stamps on its web site.

It is ironic that in Uganda at least the postal sector seems to be a lot more aware and active in Internet activities than the telecom operators. However UPL must first overcome the public perception of long delays for postal delivery if it is to convince them of its readiness for the digital age.

4.1.2 Finance

Although the Ministry of Finance was not directly included in the survey, key institutions within the ministry such as the Bureau of Statistics, and the Commercial Bank of Uganda, provided valuable information for the preparation of this report. The Ministry of Finance itself has virtually no ICT presence besides a few autonomous organizations within its area of responsibility, such as the Bureau of Statistics and the Privatization Unit. The Ministry of Finance has a single mainframe computer used exclusively for pay-roll support of all public service ministries, and a small number of stand-alone PCs for administrative and analytical processes needed for its normal functions.

The largest user of ICT in the Ministry of Finance appears to be Uganda Commercial Bank (UCB), which is being privatized. Dr. Ham-Mukasa Mulira heads UCB's Management Information Systems division and is also very active in the whole ICT sector of Uganda, particularly in his capacity as an executive of the Uganda Computer Society. UCB has a clear policy and development program for the deployment of ICT for its own use. This program has to date provided nearly 500 PCs and servers for its internal functions, and is in the process of installing these in all branches spread throughout the country. The first step of the development strategy consists of automating all of the bank's 67 branches, followed by the introduction of internal networking, and finally the installation of a wide area network to link all branches within the country. At the time of the interviews, only a couple of the bank's computers had Internet access. A major training component forms part of the bank's automation strategy, however, this training is limited to specific banking processes, and will not contribute much to a broader ICT knowledge base in the near future. Professional computer operators have, in general, developed high level skills in automated banking processes but remain largely illiterate in the broader computer skills required to maximize the effectiveness of ICT services.

Although direct interviews with the Privatization Unit within the Ministry of Finance were not conducted, information provided indicates that this unit has ICT capacity, which can contribute well to the ICT knowledge base of its parent ministry. The information available, however, tends to suggest that the ICT capacity within the Privatization Unit has been driven more by the needs and interests of the international donors providing technical assistance to the unit, than by the national members of the unit itself. A close examination of the Privatization Unit web site, http://www.perds.go.ug, tends to support this assumption. Crucial information, such as the description of the privatization of the telecommunication sector, is found in a linked private web site, which itself contains minimal information.

4.1.3 The Bureau of Statistics

The Uganda Bureau of Statistics (UBOS) is the country's national statistical agency. It has been recently established as an autonomous body within the Ministry of Finance and inherits all the functions and responsibilities of the now defunct Department of Statistics. UBOS, with technical assistance from the Government of Denmark and the World Bank, is in the process of modernising its processes through the introduction of ICT. Plans for the construction of a local area network (LAN) are well advanced, but the construction of a wide area network (WAN) linking the 45 district offices under its control is constrained by the availability of electrical power and access to telecommunication services. The Bureau uses one of the major private ISPs in Uganda for its Internet and e-mail access. UBOS compiles an array of data published in paper reports that are not, however, easily obtainable. It is imperative for UBOS to establish a web site in order to expand access to the information.[23] Wider access to national statistics would enhance decision-making and planning and enhance transparency.

4.2 Health

Discussions with officials of the Ministry of Health indicated a high level of awareness of the benefits of ICT in the health delivery processes. The Ministry has a program in progress aimed at creating awareness and sense of urgency for the need for computer literacy and use of ICT products. While efforts to automate many of the health delivery processes started about six years ago, such efforts tended to be disjointed and uncoordinated. The need for closer coordination and rationalization of projects and programs has been recognized, and a National Telemedicine Committee has been established to coordinate activities related to telemedicine and to conduct sensitization workshops and training programs.

The Ministry of Health itself has about 120 computers installed at its headquarters for 200 staff but most of these are used for administrative functions only. There is an African Development Bank project to link 35 computers on a LAN. All district health offices have a computer and many have a telephone; however most PCs are used for administrative purposes and very few, if any, are networked. The ministry itself does not yet have a web site. The greatest level of Internet and e-mail connectivity can be found at the Makerere University Medical School, where researchers, staff, and students have access to the World Wide Web.[24]

There is an ITU-assisted telemedicine project comprising a three way agreement between the Ministry of Health, UTL, and the ITU to link the training hospital in Mulago with Mengo Hospital in Kampala. UTL is to provide ISDN connections between the two hospitals under an African Development Bank funded project.[25]

Ministry officials expressed concern over the huge awareness problem facing the ministry. At higher levels, it is estimated that 99 per cent awareness of the value of ICT in health delivery exists, but less than ten per cent have the skills or access to the equipment required. One way that it is trying to remedy this is through the provision of free computer lessons for staff. The Ministry of Health recognizes the serious consequences resulting from its inability to spread ICT products for health delivery services throughout Uganda. The sense of isolation by rural based medical practitioners, which results in high levels of mobility, and the inability to provide consultancy support to remote medical locations, is only one of the negative consequences mentioned.

As in other activities related to the delivery of social services, the poor telecommunications and electrical infrastructures have been recognized as the greatest obstacles to sustainable development.

4.3 Education

The educational system in Uganda can be broadly divided into three categories: primary (from age 6), secondary (from age 13) and university.

Box 4.3: NADIC

Acquired Immune Deficiency Syndrome (AIDS) is a devastating health problem in Uganda. An estimated 1.5 million Ugandans are infected with the AIDS virus and over half a million people have died from the disease since 1982, dramatically reducing life expectancy in the country. The government has taken tough steps to deal with the epidemic. It established the Uganda AIDS Commission (UAC) in 1992 to coordinate and implement projects for the control of AIDS. An important weapon in the battle against AIDS is access to information about treatment and prevention. The National AIDS Documentation and Information Centre (NADIC) was set up in 1995. Assistance from the French government has helped NADIC to enhance its services by providing full Internet connectivity and establishing a web presence (http://www.uganda.co.ug/nadic).

Education is highly valued and there is strong competition for admission to higher levels. However, as in many developing countries, government resources for schools and teachers are insufficient and the low income of the majority of the population limits the viability of private financing for education. Nonetheless, major strides have been made in school enrolment, particularly at the primary level. ICT applications such as distance education, information retrieval and electronic delivery of textbooks could help overcome resource limitations.[26] This is not yet widely supported by the government, particularly at lower levels of the educational system.[27] One major constraint is that roughly 60 per cent of schools do not have electricity. The Ministry of Education and Sports (http://www.educationsectoruganda.com) is responsible for overall policy in the sector. Significant operational responsibility has been devolved to the local community level.

4.3.1 Primary

The majority of government funding for education is aimed at the primary level where there are around five million students and 85'000 teachers.[28] The Universal Primary Education (UPE) policy, which provides free primary level education for up to four children in each family, was launched in 1997. The policy has doubled the number of students so that around 85 per cent of all primary age children now attend school. One concern is that UPE has affected the quality and effectiveness of primary education because of the large increase in students. Also, while enrolment levels have improved, keeping students in school is a challenge (e.g., the grade 7 completion rate is only 42 per cent). There is no policy for computer exposure during early schooling and, according to discussions with staff from the Ministry of Education, computer usage at the primary level is minimal.

4.3.2 Secondary

Uganda has almost 1'000 secondary schools with around 300'000 students.[29] Public secondary schools (56 per cent) receive government funding for teacher salaries while private secondary schools do not. In both cases, parents must cover tuition and other charges. This is a major reason why enrolment levels are much lower than for primary schools with only around 12 per cent of secondary age children in school.

As with primary schools, computer education is not part of the standard national program for secondary schools. Nevertheless, computers are available in a few private schools. There is a World Bank project for providing Internet access in some secondary schools (see Box 4.4), as well as several smaller initiatives. Apart from these few undertakings, computer and Internet usage at the secondary level is very limited.

4.3.3 University

Although Uganda has a dozen universities, the biggest by far is Makerere University (http://www. muk.ac.ug). Established in 1922, Kampala's Makerere University is the oldest in East Africa. It is also one of the region's largest with over 10'000 registered students and almost as many non-registered. The University consists of eleven faculties and six institutes.

Makerere has been involved with the Internet since its inception in Uganda. One of the earliest references to the Internet in Uganda mentions the existence of a Fidonet[30] node at Makerere University as early as April 1993. By October 1995, the MUKLA (Makerere University Kampala) Internet Service was providing e-mail for students and faculty. Today the university has around 600 computers, some connected to Local Area Networks.[31] There are over 10'000 Internet users at Makerere, representing roughly one third of all users in Uganda. Paid Internet access is provided from a number of access points throughout the university. Internet access is presently provided by one of the ISPs at full tariffs.

The Makere University Institute of Computer Science was established in

Box 4.4: WorLD

In July 1996, Uganda became the first country to benefit from a World Bank project when three secondary schools were provided with Internet connectivity. The purpose was to introduce students to computers and the Internet, use the Internet to teach students about different countries, carry out collaborative projects between schools inside and outside Uganda, and allow teachers to exchange experiences. This School-to-School Initiative was later transformed into a more ambitious Bank program known as World Links for Development (WorLD) (http://www.worldbank.org/worldlinks/english/html/uganda.htm). The WorLD objective is to establish a network linking students and educators around the world. Some 320 schools in 15 developing countries are currently participating in WorLD. In Uganda, WorLD has expanded to 20 schools and has ambitious plans to connect all the nation's schools.

The WorLD project in Uganda has been held back by infrastructure, human and social limitations. There are a limited number of computers per student, restricted time for using the dial-up telephone, and electrical outages. Usage is primarily e-mail and searching the Internet for information. The use of the Internet to teach subjects has not been fully realized, partly due to a lack of trained staff as well as the limited connectivity time (only one free hour a day). One result is that 'off-line' CDs such as Microsoft Encarta are used quite extensively. The project has also created a cultural revolution of sorts, pitting traditional teaching methods against interactivity and experimentation. For example, a number of schools do not allow students to use the computer labs during class times because they feel youngsters should concentrate on the traditional national curriculum and focus on exam-oriented results. On the other hand, teachers have been learning computer skills from students who are less inhibited about grasping new technology.

The program has proven popular with many parents who feel it adds to the prestige of the school and teaches important skills. The parents have been willing to pay extra to cover the cost of operating and maintaining the computers. One irony is that there has been significant digital exploration and collaboration with schools abroad yet very little interaction between the Ugandan schools.

1985. It offers a one-year program leading to a postgraduate diploma. This program has between 10-20 students a year and has graduated around 200. There are plans to develop both undergraduate and postgraduate degree courses in Computer Science. Basic computer training is also provided to all new students in order to allow them to use the library computing facilities.

Makerere is one of the campuses of the World Bank led African Virtual University (AVU). There is a videoconference facility from which students can hear and see lecturers deliver classes from a studio. The course is transmitted to AVU's central uplink facilities in the United States and then beamed by satellite to centres all across Africa, which are equipped with a satellite dish needed to receive the signal.

Makerere University demonstrates one of the highest levels of ICT usage and awareness in Uganda. The Vice Chancellor notes that the University plays a leading role in the promotion of ICT usage but he also expressed concern over the many disjointed initiatives past and present. ICT related initiatives in progress include:

- The Makerere Wireless Implementation Plan – a United States Agency for International Development program to provide direct Internet connectivity via satellite (128Kbps up/1Mbps down) and build a broadband wireless backbone linking university campuses and sites. This program aims to improve the university's research capabilities, its teaching functions, and its administrative functions.
- An African Development Bank funded project to build a local area network linking most departments of the university through fibre optic cable. Implementation of this project has been delayed for several years but recent activities have created a new enthusiasm that may result in its implementation.
- NORAD, the Norwegian Development Agency, has agreed to fund

a related project that will deliver many ICT components, including the development of a modern Management Information System, electronic library tools, etc.

The university is aware of the need to coordinate these initiatives closely so as to avoid costly duplication and wasted effort.

While Makerere University is well placed to lead the nation in ICT knowledge development, through the production of ICT literate graduates, researchers and teachers, there remains one major point of concern – the immense challenges of absorbing the expected output of Uganda's UPE program. To meet this challenge, the university thinks that an immense national effort must be made to ensure that other national players can join the university in providing the required tertiary education, and this can only be realized through the widespread use of ICT.

4.3.4 Other

There are commercial institutes in Kampala providing training in basic computer courses, primarily aimed at recent secondary school graduates or office workers who need to develop basic office application skills. These institutes provide a valuable service in that computer training is limited or non-existent at the primary and secondary school levels. However, effectiveness and quality varies.

Clearly Uganda has far to go to improve the level of computer training and access in its educational system. This is critical if the country is to build the expertise to successfully exploit information technology for its development needs. One often cited criticism is that the educational system has failed to encourage software development skills because creativity is not encouraged and the goal of many students is to be employable in traditional areas.

4.4 Business

Ugandan businesses with Internet access primarily use it for communications (e.g., e-mail, Internet faxing) or information retrieval. The use of the Internet to carry out electronic commerce (e-commerce) is at an early stage. This is due to a combination of limitations such as appropriate and affordable communication facilities and services, the structure and nature of the economy, awareness, expertise and government encouragement:

- While the country has made impressive progress in enhancing telephone access the last several

Box 4.5: Training the trainers

One of the most important functions of the educational system in the Information Age is to train students in ICT. This is a challenge for developing countries such as Uganda where there are hardly any computers in schools and very few teachers with the requisite skills. Some in the development community argue that the resources required for wiring and training developing countries at levels equivalent to developed ones are simply not available. They also argue that the top-down approach and ambitious ICT projects proposed by most donors are not sustainable. Instead, solutions should be appropriate to the capacity of the country and driven by grass-roots enthusiasm. This is the approach taken by Uganda Connect, which proposes low-cost technological solutions and a 'Train-the-Trainers' program. Uganda Connect has demonstrated the use of HF radio to connect a rural area hundreds of kilometres from Kampala to the Internet. It has also developed connectivity projects using GSM mobile and microwave radio. It has been developing ICT skills using donated personal computers and a core of volunteer trainers. It starts students off on the basics, first teaching them typing skills, then moving on to word processing and spreadsheets before finally leading them to e-mail and the World Wide Web. Advanced students become trainers themselves. At the end of the first year of this program, six original trainees were teaching 100 students. This experience has demonstrated "*how by very simple means—locally based Train the Trainer programs, which create a critical body of knowledge workers—a community within an emerging nation may use the Internet and Information Revolution to take the future into its own hands*." [32]

years, teledensity has not yet reached one telephone per 100 inhabitants. Furthermore, most of the increase has come as a result of mobile telephones, which are not currently ideally suited for developing e-commerce applications. Where suitable infrastructure is available, the costs of Internet connection are steep for a poor nation. Businesses desiring a web presence would also have to factor in the cost of web page development and hosting, and to have more impact, their own domain name and high-speed connection.

- Uganda's economy is not ideally suited for e-commerce. It is predominately rural-based and agricultural products comprise the main exports. Though privatization is underway, a number of large industries are state-owned and thus lack the incentive and initiative to adopt new methods of doing business. Owners of small and medium sized service-oriented businesses lack information technology awareness and skills. Furthermore, the domestic market for electronic trading is limited since the vast majority of Ugandans do not have Internet access. Finally, the economy is predominately cash-based, credit is dear and credit card ownership and usage limited.

- Awareness is a major barrier with many businesses and government officials unfamiliar or unconvinced about the benefits of e-commerce. There are few initiatives to spread e-commerce awareness such as workshops, task forces, etc.

- The capacity for the development of e-commerce applications is limited. Electronic trading requires sophisticated support, including interactive web sites, logistics and advertising. The case of Uganda Posts is a relevant example. It is keen to participate in e-commerce and has implemented a parcel tracking service on its web site. The Post Office is also using the Internet to provide information about Ugandan stamps, which has proven popular with overseas philatelists. Unfortunately, stamp orders have to be processed off-line because on-line credit card verification is not currently possible. Another irony is that most Ugandan web sites advertising online shopping provide links to popular overseas e-commerce sites rather than Ugandan ones.

- For e-commerce to take off, government commitment is necessary. The government needs to instill confidence by adopting an appropriate legal framework. Second, it must promote awareness through workshops, creation of national e-commerce task force, development of visible pilot projects, etc.[33] Few, if any, of these steps are currently underway.

Despite these barriers, there is some rudimentary e-commerce activity in the country aimed at providing static information for those with money (e.g., foreigners and overseas Ugandans). Several major newspapers and radio stations are on-line with web sites aimed at expatriate Ugandans (see Section 2.6).[34] They are beginning to use banner advertising and have online classifieds for jobs and buying cars. Most government web presence consists of pages with investment and economic information targeted at foreigners. These include sites such as the Uganda Privatization Program, Uganda Investment Authority, Uganda Exports Promotion Board, as well as the Ugandan embassy in the United States.

With approximately 238'000 tourists contributing around 20 per cent of export earnings in 1998, tourism is a promising e-commerce sector to aim at foreigners.[35] There are a growing number of travel-related sites such as the government Uganda Tourist Board as well as related Visit Uganda and Uganda Tourist Association web sites. About a dozen hotels and lodges also

Figure 4.1 Uganda Tourist Board Web site

Source: http://www.utbsite.com.

have web sites or web pages; many are listed on the Hotel and Catering Association of Uganda web pages (http://www.uganda.co.ug/hcau.htm).

The country's largest conglomerate has also established a web presence. The Madhvani Group, with an annual turnover of US$ 100 million and over 13'000 employees, has its own web site at http://www.madhvani.org. The online pages regroup and provide e-mail (and web site address where available) for Madhvani's diversified holdings, including a sugar cane factory, tea plantation, brewery, safari lodge, construction company and television channel. Though static, this is a clean-looking site suggesting some expertise. Indeed Madhvani owns an information technology company (Software Applications Ltd.) through which it could develop e-commerce applications.

Industry associations also have web pages containing business listings. The Uganda Manufacturers Association (UMA) (http://www.uganda.co.ug/uma), established in 1960, has a directory of its some 700 members on its web site. The Uganda National Chamber of Commerce and Industry (UNCCI) also provides a trade directory on its web site (http://www.uganda.co.ug/commerce.htm) and also claims to have a "Business and Computer Center" where it trains its members in information technology.[36] There is also an UNCTAD-developed Trade Point in Kampala (http://www.nic.ug/tradepoint) aimed at assisting small and medium-sized business with trading opportunities. Yet another business directory is hosted by Uganda Home Pages (http://www.uganda.co.ug/busines.htm). While these initiatives are to be encouraged, these sites tend to be slow, the web site names are not intuitive, company searches are awkward and incomplete and many pages are not available. A well-designed, comprehensive mega-directory to businesses in Uganda is sorely needed.

The financial sector in Uganda has a limited online presence. Only one commercial bank, Stanbic, has a web site (http://www.stanbic.co.ug/).[37] The nation's largest bank, the Uganda Commercial Bank (UCB), has between 400-500 personal computers for its 1'500 staff, some with Internet access but it does not have a web site or provide online banking. About half of its 67 branches throughout the country have PCs and LANs. It was mentioned that since all taxpayers must file their returns through UCB, which in turn passes them on to the Uganda Revenue Authority, there is scope to automate that process as a business-to-business (B2B) e-commerce pilot. There are a few ATMs in Kampala (at Barclays Bank). Although the country's stock exchange, the Uganda Securities Exchange, has a web site (http://www.ugandacapitalmarkets.co.ug), trading is limited and only one stock is listed. The country's central bank, the Bank of Uganda, has a web site (http://www.bou.or.ug) that provides daily foreign exchange rates, economic reviews and a directory of Uganda's financial institutions (totaling 26 commercial banks, credit institutions and development banks at March 2000).

One major drawback for e-commerce

is the lack of a professional, popular and comprehensive portal. Though there are a number of directories for the country (see Table 4.2), the names of these web sites would not be easy to guess. Perhaps the most obvious guess for the name of a Ugandan portal would be www. uganda.com but this has been "high jacked" by a North American discount travel company. Few companies in Uganda have their own web site; most use web pages hosted by ISPs. This is unfortunate since directories hosted by ISPs typically list only their clients.

Table 4.2: Destination Uganda

Selected web directories for Uganda, June 2000

Uganda Home Pages	www.uganda.co.ug
Uganda Web	www.ugandaweb.com
Online Uganda Guide	www.imul.com/uganda
Uganda Online	www.nic.ug
Orientation Uganda	ug.orientation.com
Africa Online	www.africaonline.co.ug
Uganda Page	www.sas.upenn.edu/African_Studies/Country_Specific/Uganda.html
Index on Uganda	www.africaindex.africainfo.no/pages/Country_pages/Uganda
Africa South of the Sahara	www-sul.stanford.edu/depts/ssrg/africa/uganda.html
Uganda – The Pearl of Africa	imul.com/uganda

Source: ITU.

[21] One donor web site lists 43 ICT-related development projects for Uganda. Most relate to Canadian government support, with many more unlisted projects involving other multi-lateral and bi-lateral organizations. A major complaint is that there is little coordination (let alone a master directory) of all the ICT projects being implemented in Uganda. For a partial listing perform a search on Projects & Activities for Uganda on the Global Knowledge web site: http://www.bellanet.org/gkaims.

[22] Some 456 e-mails were sent from the Kampala post office during the month of December 1999 while 207 were received. UPL charges Ush 1'000 for sending an e-mail and 500 for receiving one. This can be contrasted with the traditional postal tariffs which are Ush 300 for sending a national surface letter, Ush 400 for a national airmail letter (up to 20 grams) and Ush 600 for a ten gram letter to Europe. While postal tariffs are cheaper, they are not as reliable. Furthermore, e-mail prices are per e-mail; a large document sent via e-mail would not only cost less but would arrive sooner. Though e-mail contributed a minisule 0.1 per cent to UPL's US$ 4 million of revenues, it is a start and an amount that should grow as the service becomes more widely known and available.

[23] There exists one web page describing the old Department of Statistics (http://www.ugandaweb.com/stat). It is outdated and suggests that, sometimes, it is better to have no web presence than to have something misleading.

[24] The university library also hosts the local HealthNet node (http://www.healthnet.org/hnet/uga.html).

[25] "ITU brings telemedicine to Uganda". Press Release. 11 August 2000. www.itu.int/newsroom/press/releases/2000/18.html.

[26] All of these applications are available in the country, albeit on a very limited scale. For instance, the African Virtual University at Makerere University is using distance learning. Several secondary schools are using the Internet to retrieve information for class assignments. An example of electronic school book delivery was cited about a rural school. School officials normally travel numerous hours by motorised transport to a large town to purchase textbooks. It was often the case that the materials were not available. With the installation of an Internet connection, the school is now able to download course materials from the web.

[27] This may be changing according to a news report that the Ministry of Sports and Education plans to sensitize schools on the use of the Internet. See http://www.uconnect.org/vision%205%206%202000.html .

[28] Much of the information on primary schools comes from a United States Agency for International Development (USAID) "Activity Data Sheet" accessed on 28 February 2000 from www.info.usaid.gov/pubs/cp2000/uganda.html.

[29] Data for secondary schools comes from World Bank. "World Links for Development: Case Study of Uganda."

[30] Fidonet is a network for exchanging e-mails. For more information see www.fidonet.org.

[31] As cited in "Makerere Wireless Implementation Plan" prepared by Federal Systems Integration and Management Center for USAID/Leland Initiative. March 1999.

[32] See Daniel Stern. "Keys to Human Resource Development: Capacity Building Through Train-the-Trainer Programs and Universal Access Through Affordable Wireless Technologies." http://www.isoc.org/inet99/proceedings/3f/3f_4.htm .

[33] The AITEC 2000 conference in Kampala did have an e-commerce workshop where the lack of credit facilities were cited as a main barrier. At the same conference, a pilot project to electronically store government records was proposed.

[34] Unlike tangible products, newspapers are "virtual" and can be easily disseminated. This is the conclusion of a Canadian-financed e-commerce project for East Africa: "But 'virtual products' such as newspapers produced on the Internet could easily reach the sizeable market of East Africans living abroad." See Curt Labond. "Promoting Electronic Commerce in East Africa." IDRC Reports. 28 June 1999. http://www.idrc.ca/reports.

[35] The tourist statistics are from the World Bank "World Development Indicators 2000".

[36] UMA and UNCCI were jointly involved in a US$ 350'000 United National Industrial Development Organization (UNIDO) project to establish and information system to enhance their capability to promote investment and provide services for their members.

[37] Barclay's has some information about its Ugandan operations hosted on the corporate web site at http://www.africa.barclays.com/.

5. Conclusions

5.1 State of the Internet in Uganda

The Mosaic Group (mosaic.unomaha.edu/gdi.html) has developed a framework for characterizing the state of the Internet in a nation. They consider six dimensions, each of which has five ordinal values ranging from zero (non-existent) to four (highly developed). The dimensions are as follow:

- pervasiveness: a measure based on users per capita and the degree to which non-technicians are using the Internet.
- geographic dispersion: a measure of the concentration of the Internet within a nation, from none or a single city to nation-wide availability.
- sectoral absorption: a measure of the degree of utilization of the Internet in the education, commercial, health care and public sectors.
- connectivity infrastructure: a measure based on international and intra-national backbone bandwidth, exchange points, and last-mile access methods.
- organizational infrastructure: a measure based on the state of the ISP industry and market conditions.
- sophistication of use: a measure characterizing usage from conventional to highly sophisticated and driving innovation.

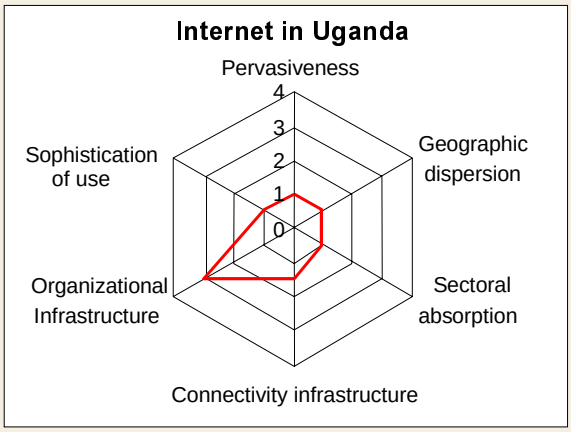
Ugandan values for these dimensions are shown in Figure 5.1.

Pervasiveness is rated as level 1, *Embryonic*. There are an estimated 25,000 users out of a population of almost 22 million for a user rate of 0.12%. This figure is just above level 1 but considering that many users are only using e-mail and concentrated in the capital, pervasiveness is embryonic.

Figure 5.1: State of the Internet in Uganda

February 2000

Dimension	Value
Pervasiveness	1
Geographic Dispersion	1
Sectoral Absorption	1
Connectivity Infrastructure	1.5
Organizational Infrastructure	3
Sophistication of Use	1
TOTAL	**8.5**



Note: Values range from 0 (non-existent) to 4 (highly developed).
Source: ITU, based on methodology developed by the Mosaic Group.

Geographic Dispersion is rated at level 1, *Single location*. All ISPs are located in the capital Kampala. There is no nationwide Internet dial prefix so calls to ISPs outside Kampala would involve long distance charges.

Sectoral Absorption is rated at level 1, *Rare*. The ranking is a function of the level of connectivity server ownership in business, government, health care and education, each of which are rated as *rare* themselves. There is moderate connectivity at Makerere University and a small amount of businesses and NGOs use leased lines. In sectors such as health and government, connectivity is rare and limited to dial-up access. Few organizations operate their own servers.

The **Connectivity Infrastructure** is at level 1.5, between *Thin* and *Expanded*. There is a microwave national backbone for the telephone network that could be adapted for Internet use. In addition, the two mobile operators are also building microwave networks. Bandwidth is limited to 64 kbps; it is a shame that resources are not combined to build a single, high-speed, fiber nationwide backbone. International connectivity, via a variety of VSAT and satellite links, is 1.2 Mbps up and 1.7 Mbs down. There is no Internet exchange. Most access is via dial-up but demand for high-speed leased lines is growing from heavy users keen to avoid telephone usage charges. There is some ISDN penetration.

The **Organizational Infrastructure** is at level 3, *Competitive*. There is free entry to the ISP market. ISPs must be licensed (for which there is a fee) and contribute up to two per cent of annual revenue to a telecom development fund. While eight ISPs were licensed, only four were in operation and of those, only two have any significant market presence. ISPs are allowed to provide wireless leased lines to customers (provided they hold the required license). ISPs can establish their own international links, again, provided they have a license for that activity.

Sophistication of Use is at level 1, *Minimal*. The most popular application is e-mail. Most other use is restricted to searching the web and downloading software or music. There are few sophisticated web sites and e-commerce is practically non-existent.

This framework has been applied in case and questionnaire studies in several other nations, including some in the region. The dimension values for

Table 5.1: Internet diffusion in Uganda

Various estimates, and by comparison with other African nations

	Date	P	GD	SA	CI	OI	SU	Total	Source
Uganda	2-00	1	1	1	1.5	3	1	8.5	
Uganda	12-99	2	1	2	1	3	2	11	Q
Uganda	12-99	1	2	1	1	3	1	9	Q
Uganda	9-98	1	1	1	1	0	2	6	Q
Cameroon	12-99	3	2	1	1	3	2	12	Q
Kenya	12-99	2	1	2	1	3	2	11	Q
Madagascar	12-99	2	2	1	2	2	2	11	Q

Note: **P:** Pervaiseveness, **GD:** Geographic Dispersion, **SA:** Sectoral Absorption, **CI:** Connectivity Infrastructure, **OI:** Organizational Infrastructure, **SU:** Sophistication of Use. Values range from 0 (lowest) to 4 (highest).
Source: M: national case study, MOSAIC Group (http://mosaic.unomaha.edu/gdi.html); Q: unvalidated questionnaire result, Press, Larry, "Second Internet Diffusion Survey", *OnTheInternet*, Vol. 5, No. 6, November/December, 1999 (http://som.csudh.edu/cis/lpress/gdiff/otidevnations.htm).

other nations in the region are shown in Table 5.1, for comparison with Uganda.

5.2 Strategies and recommendations

5.2.1 Coordination

A number of ICT projects are taking place with the assistance of bi-lateral[38] and multi-lateral[39] donor agencies and different sectors of Uganda's government. These include projects to improve connectivity in schools[40], telemedicine, establishment of telecentres[41], etc. It has also been inferred that there are several projects covering the formulation of IT policy and strategy.[42] There is no central repository covering all these projects and little, if any, coordination among them. This is unfortunate since there will undoubtedly be duplication, a lack of resource sharing and no coordinated strategy. As a result, many of these projects will operate in a vacuum and their long-term sustainability is questionable.

It is recommended to create a task force to coordinate ICT policy and strategy[43]. The task force would consist of relevant government agencies as well as representatives from the private sector. It is recommended that the task force itself be led by a key ministry dealing with ICT, such as the MWHC. Activities of this task force would include:

1) Compilation of a database of IT-related projects;

2) development of an inventory of computer and Internet availability in government institutions;

3) formulation of an ICT strategy and policy;

4) promotion of the strategy including ensuring that it has Parliamentary approval; and,

5) eventual implementation and review of the strategy.

5.2.2 Universal access

Very few Ugandans can afford to buy ICT equipment and pay for related service costs. If ICT is to be available for the majority of the country's citizens, it must be through community access. Emphasis must therefore be placed on developing public access points such as telecentres, cybercafés, etc. One way of doing this would be to connect existing community locations such as post offices, schools, health centres, etc. to the Internet. Resources for this could come from 1) partnership with the private sector, 2) license obligations for telecom operators, 3) bi-lateral and multi-lateral assistance and, 4) the Rural Telecommunication Development Fund.

1) An example of private sector partnership might be an arrangement between Uganda Post Limited (UPL) and an Internet Service Provider (ISP) to provide Internet access at village post offices.

2) Current license obligations call for certain telecommunication operators to provide a specific number of telecommunication access lines as well as public telephones. This might be made more specific by targeting public locations. For example, telecom operators could be obligated to provide access lines (either dial-up or high speed) to a certain number of post offices, schools, libraries, hospitals or administrative offices each year. The payphone obligations might be extended to include telecentres or cybercafés.

3) As mentioned, there are a number of ICT-related projects with multi-lateral and bi-lateral assistance agencies. These projects should be coordinated so that they align with the overall goal of enhancing universal access to ICT.

4) All licensed Telecom operators and ISPs are obligated to con-

tribute one per cent of their revenues to a Rural Telecommunication Development Fund. This fund will be used to subsidize telecom operators in rural areas, which have been designated as "uneconomic to serve" by UTL and MTN. The requirements might be extended to support for ISPs who wish to establish telecentres or cybercafés in rural areas. All licensed operators who contribute to the fund should be free to propose and compete for projects to utilize the fund's resources.

Affordable access to Internet is important for enhancing access. There are already certain instances where telecommunication operators are providing discounted or free service to educational establishments.[44] These schemes should be formalized and extended. They could be promoted, for instance, in the corporate marketing literature of the companies concerned.

The lack of personal computers is a major barrier to Information Technology usage in Uganda. The price of a personal computer is unaffordable to the majority of citizens. It is also a major cost for many government organizations and small businesses. One way of overcoming this deterrent is a program to receive contributions of used computers from developed countries. Some development projects have contributed used computers to Uganda. This could be formalized into a government-wide initiative with a local institution handling the administrative details and coordinating distribution.[45]

5.2.3 Internet-friendly tariffing

Since all ISPs are currently located in Kampala, users outside the capital must make expensive long-distance calls to access the Internet. It is recommended that a nationwide dial code for Internet access be established whereby all Internet access is charged at local calling rates. All ISPs should have equal access to calls to this dial code. The regulator might also want to encourage ISPs and telecom operators to collaborate by, for example, requiring operators that provide dial-up Internet access to share revenues derived from local call charges with the ISP. This would enable the ISP to offer "free" Internet access, along the lines of the model pioneered by Freeserve of the UK.[46]

5.2.4 Naming

A private company, Uganda Online (UOL), currently handles registration for the .ug domain name. While there is no reason to believe that UOL is not doing a good job, as a matter of principle, it would be better if administration of the .ug domain name was subject to a degree of regulatory supervision and, if possible, competition. This would also serve to avert possible conflicts of interest. For that reason, it is proposed that a regulatory framework be established whereby registrars are licensed by the regulator. Other firms may be encouraged to become registrars.

5.2.5 Awareness and training

Although growing, awareness of the Internet is still limited in Uganda. Efforts need to be made to promote the benefits of the Internet. This can be done by organizing seminars and trade shows as well as the government itself providing more information on the Internet to encourage its use. Furthermore, the ability to use the Internet effectively depends on having the proper skills. Efforts should be made to develop computer skills by including this in school curricula. One way of doing this would be to make a free e-mail address and/or account available to all school children.

5.2.6 Content

Presently, most Internet use in Uganda is to access information outside the country. This is understandable considering that most users are businesses needing external information and the fact that limited local information is available. However, for the Internet to be relevant and sustainable in Uganda, effort needs to be devoted to developing local content. Prime areas where this might be done include putting local newspapers, tourist information, directories and businesses, sports information, schools and universities online.

5.2.7 e-Government

If the government is serious about ICT, then it needs to set an example. There is currently very little IT use in government and few government web sites. There needs to be a government-wide project to extend ICT and to bring all ministries and key sub-units online. Government ministries should "learn by doing". By making the efforts to develop their own web sites and Intranets, they will be better positioned to advise others.

5.2.8 e-Commerce

Electronic commerce (e-commerce) needs to be supported and developed so that Uganda can benefit from trade over the Internet. There are a variety of e-commerce aspects that will require different strategies. A promising area that could deliver short-term results and provide a useful learning experience is Ugandan businesses "selling" to foreign customers.[47] This can be developed and supported by sensitizing Ugandan business about the potential, working with the local financial and courier industry to develop fulfilment systems and promoting external awareness by, for example, establishing a Uganda-wide e-commerce web site. Another promising area is developing local content for delivery to Ugandans abroad who would be likely to have the requisite tools (personal computers, Internet access and credit cards) for accessing and paying for this information, or making money transfers to family members in the home country.

The country might also benefit from a visible pilot project. Since most citizens do not have Internet access, short-term "business-to-Ugandan consumer" e-commerce would not have much impact. A more promising area might be the development of an agricultural market information system by the government. Agricultural traders are currently using cell phones or e-mail to inquire about the price of their products in Kampala, suggesting that this could be a beneficial application. Online pricing information would aid farmers in deciding whether to spend the time and money to bring their products to the market. The system could be supplemented with weather forecasts, farm input prices, etc. The project could be developed in conjunction with the establishment of public access centres in rural towns and funding might be sought from donor agencies such as the Food and Agriculture Organization (FAO).[48]

In terms of a longer-term strategy, a Uganda e-commerce committee should be created, as part of the ICT task force, bringing together government and industry to raise awareness, develop policy and tackle legal and financial issues.

5.2.9 Peering, interconnection and backbone

Currently, the majority of Uganda's Internet traffic is routed outside the country, even if it is e-mail from one citizen to another, or if it involves browsing of local web sites. This situation is wasteful of resources, especially expensive international bandwidth. The Uganda Communications Act gives the regulator the responsibility "to regulate interconnection and access systems between operators and users of telecommunication systems". The regulator should take a proactive role in encouraging local ISPs to interconnect and to peer their traffic locally. One way of doing this would be to invite a third party not directly involved in supplying Internet access to establish a local exchange point. Uganda ISOC has looked into this issue and may be a possible candidate.

Telecom operators and ISPs should also be encouraged to collaborate to build a broadband national backbone. There is currently little cooperation and hence significant duplication of narrowband infrastructure. Closer coordination could result in one fibre optic transmission network instead of multiple microwave networks.

Finally, the high cost of international Internet connection is passed on in the form of higher end-user tariffs, discouraging Internet diffusion. The government may want to pursue this issue by encouraging greater regional connectivity and presenting its case at appropriate international fora.

5.2.10 Market research

There is very little systematic information on IT in Uganda. The national statistical agency, the Uganda Bureau of Statistics collects no information on ICT.[49] Telecom operators and ISPs provide limited data; this data is not systematically published or aggregated. Thus, there is only speculative data on, for example, the number of Internet users and the number of personal computers in the country, let alone break downs by user groups (e.g., business, education, health, etc.).

In order to develop an effective ICT policy, it is imperative to have a reliable and timely set of information. It is recommended to develop a database of various indicators such as number of computers in different ministries, business, educational establishments, etc. This activity could be carried out as a project between the UBOS, the MWHC, the UCC, telecom operators, ISPs and local market research groups. One goal would be to provide this information online in order to provide consumer choice and to encourage investment in this sector as well as to aid local and international researchers in analyzing the role of ICT on development.

5.2.11 Promoting dot coms

A sustainable Ugandan Internet requires a backbone of ICT companies such as ISPs, off-shore software developers, content producers, e-commerce companies and others. These 'dot coms' must be nurtured through favorable ICT policies. The government has taken the right steps in this direction through zero tariffs on ICT equipment and limited restrictions on foreign investment. It needs to go further, such as no or limited licensing fees, tax breaks for ICT companies, etc. It should also facilitate incubator projects that aim to link budding domestic ICT businesses with foreign investors and multilateral institutions.

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38 For example of one such bi-lateral activity see the United States Agency for International Development (USAID) Leland Initiative activities for Uganda at http://www.info.usaid.gov/leland/ugaindex.htm.

39 The ITU itself is involved in telecentre and telemedicine projects.

40 The World Bank has connected 10 schools as part of its World Links for Development Program. See http://www.worldbank.org/worldlinks/english/html/uganda.htm.

41 For example see the Acacia Initiative which has developed two telecentres in Uganda (http://www.acacia.or.ug/index.html).

42 For example apart from the MWHC request, there are supposedly similar projects between the World Bank and Institute of Computer Studies at Makerere University, a UNESCO project with the Council of Science and Technology and a Board of Investment project. At a grass roots level, both Uganda Connect and the Uganda ISOC have been sensitizing policy makers about the relevance of ICT.

43 An ICT task force has recently been created in Uganda.

44 For example one of the mobile operators, Celtel, provides one hour of free Internet access per day to selected secondary schools.

45 The island of Anguilla in the Caribbean has such a program called "Anguilla Computes". The Anguilla National Trust co-ordinates the program from the Anguilla end, working with a United States charity. One incentive for the donors is that they obtain a tax break. See http://www.offshore.com.ai/anguilla_computes/.

46 See http://www.freeserve.co.uk/cserve/about.htm.

47 An embryonic example is the Uganda Post web site where stamps are marketed to overseas collectors. See http://www.ugandapost.com/stamp_br.htm.

48 FAO considers information technology in agriculture of major importance. Dr. Louise Fresco, Assistant Director-General of the Agriculture Department of FAO, described agriculture in the 21st century as "an information-intensive sector of the global economy, moving away from an artisanal, extensive, traditional activity towards a more sophisticated, computerised sector … where access to information is a necessity and not a luxury." See http://www.fao.org/news/2000/000606-e.htm.

49 The latest Statistical Abstract does contain some limited telecommunication data provided by Uganda Telecom. It also contains import data on IT imports. However the latter data are by value and combine office machines and automatic data processing equipment. Thus it is impossible to determine for example the number of personal computers imported each year. Furthermore, the national census is likely to be delayed until at least 2002.

Persons and organizations met

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Acronyms and Abbreviations

ICT	Information and Communication Technology.
IFC	International Finance Corporation. The private sector investment arm of The World Bank group.
ISDN	Integrated Service Digital Network. Provides either two or thirty 64kbps virtual lines over a regular telephone line.
ISP	Internet Service Provider.
IT	Information Technology.
MCT	Multipurpose Community Telecentre
MOWHC	Ministry of Works, Housing and Communications. The ministry responsible for telecommunications.
MTN	Mobile Telephone Networks Uganda. The holder of the Second National Operator license.
RCDF	Rural Communications Development Fund.
SNO	Second National Operator.
UCC	Uganda Communications Commission. The telecommunication regulator.
UG	The two letter Internation Standardization Organization (ISO) code for Uganda used for the Uganda domain name.
UNCTAD	United Nations Conference for Trade and Development.
UOL	Uganda On-Line. An Internet service company responsible for Uganda's Internet domain name (.ug).
UPL	Uganda Posts Limited.
Ush	Uganda Shillings. The national currency in Uganda. The exchange rate per one United States dollar at June 30 2000 was 1'600.
UTL	Uganda Telecom Ltd. The incumbent telecom operator.

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Telecommunication tariffs

	UTL	
	US$	**Ush**
Connection w/o IDD	$117.24	170'000
with IDD	$310.34	450'000
Deposit IDD	$689.66	1'000'000
Monthly subscription	$6.90	10'000
	$5.17	7'500
	$3.45	5'000

Local call (Per minute)	**UTL**		**Mobile**	
	US$	**Ush**	**US$**	**Ush**
Economy	$ 0.02	25	$0.17	250
Off-Peak	$ 0.03	45	$0.17	250
Peak	$ 0.05	75	$0.17	250

	MTN Pre-paid (Pay as you Go)		**MTN Contract (Talk Time)**	
	US$	**Ush**	**US$**	**Ush**
Connection	Sim Card		$31.03	45'000
Deposits N+I+R			$579.31	840'000
N+I			$331.03	480'000
N			$165.52	240'000
Monthly subscription	$12.41	18'000	$24.00	34'800

Local call (Per minute)	*MTN*		*UTL*		*CelTel*		*MTN*		*UTL*		*CelTel*	
	US$	**Ush**	**US$**	**Ush**	**US$**	**Ush**	**US$**	**Ush**	**US$**	**Ush**	**US$**	**Ush**
Economy	$0.06	90	$0.06	90	$0.36	520	$0.06	90	$0.06	90	$0.36	520
Off-Peak	$ 0.14	210	$ 0.17	250	$0.36	520	$ 0.10	150	$0.08	120	$0.36	520
Peak	$ 0.17	250	$ 0.21	300	$0.36	520	$ 0.14	200	$0.11	160	$0.36	520

	CelTel Pre-Paid (Cash & Talk)	**CelTel Contract**
	US$	**US$**
Connection	$28.00	$25.00
Deposits N+I+R		$600.00
N+I		$400.00
N		$200.00
Monthly subscription	$20.00	$20.00

Local call (Per minute)	*CelTel*	*UTL*	*MTN*	*CelTel*	*UTL*	*MTN*
Economy	$0.07	$0.23	$0.39	$0.06	$0.16	$0.30
Off-Peak	$0.16	$0.23	$0.39	$0.10	$0.16	$0.30
Peak	$0.20	$0.29	$0.39	$0.12	$0.19	$0.30

Note: February 2000. Inclusive of VAT except CelTel Contract package.