

# Rural Connectivity and Energy for ICT in Jamaica

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# Purpose of the study

The study is intended to make information available on the availability and cost of internet access in various locations of the country, particularly in rural areas. Currently this information is not in a systematic manner and the preparation of this report will identify underserved areas in the country; benchmark the connectivity status in Jamaica as of November 2007, and six months hence, and lay the basis for continued monitoring of this status.

It is anticipated that the report will be able to contribute to appropriate forms of intervention in support of improved rural connectivity. In continuing the process of monitoring the rural connectivity status of the country it is hoped that in the future, there will be greater cooperation by service providers in making the salient information available. The absence of this cooperation by some of the major players has proved to be the biggest challenge for the present exercise.

The preparation of the report is carried out under the auspices of ICT4D Jamaica which will make the findings available to IICD, the government of Jamaica, other key public, private NGO and civil society stakeholders and partners and ensure that it is accessible on-line in a timely manner.

# Historical perspective of the Internet in Jamaica

The Internet first appeared in Jamaica at the University of the West Indies in 1991. At the time, the University was participating in an OAS funded project geared toward facilitating email storage and forwarding services among Caribbean and Latin American Universities. The service was found to be so popular among academics that the project was extended, and by 1994, the UWI, through the Jamaica Electronic Network (JAMNet) was able to extend email, and later Internet service to several development agencies, educational institutions and government agencies. Connection was enabled through a 64K leased line at considerable cost through the only telecommunications company at that time, Cable and Wireless Jamaica. The UWI Mona Campus was the first English speaking full Internet Service Provider (ISP) in the Caribbean region.

The first commercial ISP was Jamaica Online which started in 1994 with a leased dial up connection to the UWI. Infochannel, now the second largest ISP after Cable and Wireless, came on stream in 1995. The company acquired connection through leased line arrangements with Cable and Wireless. Their service was later boosted by a licensed earth station VSAT, which soon ran into problems because of a challenge to their licence by Cable and Wireless, who also charged that the company was using its facilities to terminate long distance calls. At the time, Cable and Wireless had a licence which allowed them a monopoly on all telecommunications (wired and wireless) and the internet service providers which gradually came on stream could only be connected through leased line agreements with the company. This created a conflict because Cable and Wireless itself was also by this time offering Internet services and so was in direct competition its these clients. The result was tension in the sector, unreliability in Internet services and very high prices for the consumer.

Overall dissatisfaction with the state of the telecommunications sector led to a decision by the government in 1999 to break the Cable and Wireless monopoly through negotiation (the company previously had a 25 year licence scheduled to end in 2013), and introduce competition on a phased basis.

**Phase 1** (March 2000 - August 2001) involved establishment of a new Telecommunications Act; the issuing of 2 spectrum licences to facilitate cellular competition; increased Internet services licences and the establishment of call centres.

**Phase 2** (September 2001 - February 2003) involved the awarding of licences for Fixed Wireless and Wired Facilities and provision of Internet Service by cable TV providers

**Phase 3** (from March 2003) involved full liberalization and saw the International Voice Services Market opened up to a number of players

Jamaica was a pioneer in this process as it was the first country in the region to break a major telecommunications monopoly and move toward modern telecommunications legislation and a liberalized sector. It became the model for countries in the CARICOM region to follow.

# Telecommunications in Jamaica

The telecommunications infrastructure in Jamaica is fairly advanced, consisting of a mix of fixed line and wireless technologies. The island has an automatic digital domestic network that allows for direct dialling to most countries. Transmission across the island is facilitated by twisted pairs, analogue microwave radios, digital microwave radios, fibre optic systems digital multiple access radio systems for rural telephones and digital automatic cross connect systems.<sup>1</sup>

Fixed line density is however one of the lowest in the region at an estimated 14.3% in 2006<sup>1</sup>. Exact figures range between 330,000 (Cable and Wireless, 2006) and 500,000 OUR, 2006). This marks a decrease from a density of over 19% in 2002, with the decline likely to be due to the 100% increase in fixed line rates imposed in 2002, and the rapid growth and wider coverage of mobile telephones. Although the sector has been fully liberalised since 2003, Cable and Wireless remains the dominant fixed line provider with over 90% of the market. Although awarded a licence to provide fixed line service in 2002, GOTEL controls less than 2% of that market. Other providers such as Flow with its "triple play" (cable/Internet/telephone) offerings are also set to make inroads into the fixed line market. The main constraint is still the high cost of interconnectivity to other networks which makes calls to outside of the network more expensive than calls made within traditional networks.

The major change on the telecommunications scene since liberalisation is in the area of mobile telephony. The number of mobile users overtook the number of fixed line users since early 2002. The ratio of mobile to fixed line phones in 2006 was 6:1. In 2006, there were more than 2,000,000 mobile telephones in operation and it is estimated that there is now more than 100% penetration<sup>2</sup>. It is not infrequent for one individual to subscribe to up to three services. Coverage by mobile telephony is estimated at more than 99% island-wide.

The mobile operators are Digicel, which in 2005 controlled 62% of the market; Cable & Wireless accounting for 31% of the market, and Oceanic Digital Jamaica, with 7% of the market.

## Regulatory framework

The Telecommunications Act 2000 governs the telecommunications industry. It covers interconnection, spectrum management, competitive safeguards, universal service and consumer protection.

The **Office of Utilities Regulation (OUR)** is the national telecommunications regulator. Established by the OUR Act 1995, it is responsible for promoting telecommunications competition among carriers and service providers, economic regulation and consumer protection. It is currently in the process of establishing Quality of Service standards by which the performance of carriers and service providers will be measured.

Other agencies with regulatory and legislative jurisdiction impacting rural connectivity are the Spectrum Management Authority (SMA.) and the Broadcasting Commission.

The **Spectrum Management Authority (SMA)** is a limited liability company wholly owned by the Government of Jamaica and established under the Telecom Act, 2000. It has been operational since April 2001 and its main functions include frequency allocation (band planning), monitoring of the spectrum, interference management, licensing of users and collection of spectrum licence fees. The Authority also provides policy and technical advice on spectrum management issues to the Ministry of Industry Technology, Energy and Commerce (MITEC).

The **Broadcasting Commission** is a statutory body established by the Broadcasting and Radio Re-Diffusion Amendment Act of 1986. Its role is to monitor and regulate the electronic media, broadcast radio and television, as well as subscriber television industries, balancing the interests of consumers, the industries and the creative community in implementing public policy and law.

The **Fair Trading Commission** collaborates with the OUR to ensure the maintenance and encouragement of fair competition practices in the telecommunication industry.

The **Universal Access Fund Co Ltd** which was established in 2005, as a government owned company is funded by a 2% surcharge levied on international calls that terminate in the island. The UAFs mission is to facilitate the provision of universal access to the information superhighway by accelerating the deployment of broadband services. A particular focus is on the provision of an island-wide broadband network that will allow public access to the information super highway through schools, public libraries, post offices and other agencies and institutions. A Request for proposal issued in April 2006 to provide this service attracted 4 proposals, but no award has yet been made. Revenues

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<sup>1</sup> Jamaica-Telecom Market Overview and Statistics.doc . Paul Budde Communication Pty. Ltd. 2007

<sup>2</sup> Dainsworth Richards CITO

of the of JA 1.38 for 2006/7 are somewhat lower than anticipated due to the growth of VOIP and resulting decreased revenue from international calls, and has raised concerns for the long term sustainability of the company.

## General level of access to internet

Prior to the liberalization of the telecommunications sector, Cable and Wireless was the only Tier 1 carrier in the island and provided connectivity via a submarine cable. In 2006 however, two licences were awarded for additional submarine fiber optic connections.

Today, the country is connected to the internet by three main channels. One is the submarine cable owned by Cable and Wireless and which comes into Jamaica via The Montego Freeport from North America. The other connection is via the Fibralink network which is a submarine fiber optic network with three landing points in Jamaica with a connection to the ARCOS network in Dominican Republic. Designed with a 160 Gb/s capacity, the Fibralink network is owned by Columbus Communications of which Flow Jamaica is a subsidiary. The network became operational in 2006.

A third internet link is the submarine cable TCCN1 being established by Trans Caribbean Cable Company (TCCC) to link the US Mexico, the Caribbean and South America. TCCC is a consortium of 32 foreign and local telecom carriers and service providers. Members of the consortium that have agreed to build the first phase of the infrastructure include CW Jamaica, Jamaica Network Access Point, Digicel Jamaica and Reliant Enterprise communications. The cable will have transmission speeds of close to 2 terabits per second.

## The Internet market

Presently, a range of technologies facilitate Internet connectivity in Jamaica. These include:

- Dial up Access
- ADSL/DSL
- Cable
- VSAT
- GPRS
- CMDA
- WIMAX
- WIFI

The most commonly available connectivity is still via dial up. A 2006 survey carried out by the Office of Utilities Regulations revealed that 50% of all connections island wide are dial up. This is followed by DSL, (33%) cable modem (4%), mobile wireless (8%) and fixed wireless (5%). However, the roll out of the additional fiber optic links have together increased opportunities for broadband connections across the island. Over the last 12 months the cost has been reduced significantly. Notwithstanding this, so far broadband connection is still mainly an urban phenomenon.

The number of Internet users (which includes persons with access at home, their place of work, school, or public access points) has grown from 60,000 in 2000 to 600,000 in 2002 and 1,067,000 in 2006. This represents a 39.6% penetration rate<sup>3</sup>.

The OUR survey also showed that most residential connections were via dial-up (54%) followed by DSL(26%), wireless(17%) and cable modem (3%). Most business connections were found to be via DSL (48%), dial-up (36%), wireless 10% and cable modem (6%). An estimated 120,000 households have internet connection.

The number of licensed ISPs stood at over 76 in 2005<sup>4</sup>. Of this amount however, only about 10 are currently active. A number have either ceased operation or have been absorbed into larger companies. Most of those in operation focus largely on urban areas and only Cable and Wireless and Infochannel have POPs in each of the 14 parishes. When there was a differential between local and long distance local calling rates, this meant that only these two ISPs offered their customers across the island local dial up numbers. However, now that all inland calls have the same cost, technically the opportunity to offer competitive dial up service is open to most ISPs.

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<sup>3</sup> World Telecommunication /ICT Development Report 2006: Measuring ICT for Social and Economic Development. ITU

<sup>4</sup> OUR Data

## Broadband market

The lower overall cost and higher speeds offered by broadband has increased demand for this service significantly, and the growth in this market segment is only hindered by the ability of the providers to deliver it. Industry figures show an annual rate of increase of nearly 500% from 4,000 in 2004, to about 23,500 in 2005 and 100,000 in 2006.

Presently, the main broadband provider is Cable and Wireless with Infochannel being the main competitor. However, Flow Jamaica is currently rolling out digital services geared at providing cable, internet and land phone service ("triple play") throughout the island. To date, Kingston St Andrew and certain parts of St Catherine are being wired. The company expects to complete coverage of the island in 2-3 years.

A number of licensed subscriber television (STV) or cable operators have been awarded licences which allow them to provide Internet services via coaxial cable. Because of their island wide reach (an estimated 80% of households have cable television, only half of which are legal connections), this was felt to provide great potential for the wide deployment of broadband. This roll out, however, has been slow in materializing. Among some of the reported reasons are the cost of equipment, human capacity constraints and the zoning restrictions on cable operators.

A number of licences have been also been awarded for use of the 3.5MHz bandwidth to transmit wireless services. One such licence has been awarded to Digicel for the roll out of their WIMAX service which is being piloted in Kingston and St Andrew. Both Cable and Wireless and GOTEL also use this bandwidth.

# Rural connectivity

While Internet connectivity is readily available in urban areas, with the majority of ISPs offering services in these locations, rural connectivity still lags considerably and is largely dependent on the presence of fixed telephone lines. Where there is connectivity, it is still mainly via dial up. The only estimates of urban vs. rural internet use is from the 2001 National Census and shows marked disparities in computer ownership and Internet subscriptions between urban and rural parishes. There is presently no data that will allow for mapping of the distribution of internet access across the island.

## Critical Issues affecting rural connectivity

Among the main issues affecting rural connectivity are the following:

**1. Initial cost of deployment.** This is important for providers who are seeking to generate profit from their installations. If there is not a critical mass of persons who are interested in and able to afford the service, then the investment will not be seen as worthwhile and will not be made.

**2. Power.** While much of the island has the benefit of centrally generated electricity, there are remote locations where electricity is not available. The ability to provide alternate sources of energy for these locations will be critical for them to be able to access connection to the internet. This is an added cost that is likely to deter commercial providers. In other areas with electricity, power backups will also be necessary to provide support in power outages.

**3. Security.** The possibility of theft and destruction of property is always a risk and several providers have sought to reduce this risk by placing equipment on the compounds of police stations or other public or private property where some level of security can be found. It is usual for a rental fee to be paid to the owner of the premises and this has implications for cost.

**4. Technical support.** The availability of technicians able to respond to equipment breakdown or malfunctions is an important aspect of providing sustainable and reliable services. Unfortunately, these persons are most likely to be found in the urban areas where the opportunities for jobs are greater. This means that there is a cost to mobilise these resources into the areas needing the expertise on an as required basis. The ideal situation is one where equipment placed in distant locations can be remotely programmed and operated.

**5. Quality of service.** Systematic determination of Quality of Service is not yet carried out in Jamaica. The responsibility for this rests with the OUR which has only recently drafted a document outlining standards it expects to apply to the provision of landlines, mobile services and Internet connections. The QOS provisions for Internet services relates to: installation (time frames), timely fault clearance, limits on service disruption, benchmarks for network availability, limits and notification of planned disruptions, time frame for reconnection following disconnection. In addition, basic guidelines are provided for pricing and billing, installation and customer assistance and communication.

## Prospects for rural penetration

Other challenges lie in the area of the commercial value of rolling out to last mile for private entities. Good business sense has meant that private companies do not prioritise last mile connectivity as it is generally not economically feasible. The challenge is therefore how the government can implement a sustainable Universal Service Order in the Telecoms Act. This would translate to a policy that effectively balances making it worthwhile to companies looking to invest and already existing ones to provide access to deep rural areas and business districts at a fair cost to the provider.

It is felt that rural connectivity and last mile connectivity will respond to market demand which in turn will depend on people's awareness of how Internet connectivity can improve their lives. An example is through encouraging the use of the Government's e-government services (the most developed online government service in the Latin American and Caribbean region) and increased use of ecommerce by local businesses. This latter has been somewhat hindered by inadequate security provisions for online transactions through local financial institutions. However, this is expected to be addressed through the enactment of the Electronic Transactions Act, now under development and review. As local online transactions become safer and the banks become willing to provide merchant accounts for local businesses, then more businesses will participate in ecommerce and this should further increase demand for internet services.

# ICT policy process and effects on rural connectivity

The government is committed to a policy of Universal Access not only for voice transmission but also for Internet connectivity. Further, the vision of broadband connectivity for the entire island is being pursued from a number of angles including those mentioned before such as the provision of licences for:

- Establishment of two additional submarine cables thus ensuring the availability of more bandwidth to the island
- Provision of Internet services by cable operators
- Use of the 3.5MHz bandwidth which is capable of providing WIMAX connectivity
- Transmission of internet over power lines by Jamaica Public Service

The imperative for rural connectivity is also addressed within the Telecommunication Act 2000 which includes a framework for Universal Access. The framework recognizes that the principal constraints to access is 1) affordability, where some segments of the population cannot afford the service and 2) inadequacy in the geographic coverage of the network due to technical or economic reasons. Under the Act, the OUR has the responsibility to inform the Minister regarding addresses the issue of Universal Access<sup>5</sup> and has as its guiding principles:

- **Non discriminatory access**- given that reasonable telecommunications access is an important tool in the development of a country's economy, all citizens including those living in rural areas, the urban poor and the disabled should have access to telecommunication services on a non discriminatory basis.
- **Competitive Bidding** – the provision of universal service/access should not only be affordable but of a certain quality. As such the right to provide these services should be earned through a process of competitive bidding.
- **Universal Service/Access Costs and Funding** - A funding scheme based on revenues generated by the telecommunications industry is probably the most appropriate means of funding Universal Access.
- **Monitoring and Review** - Guidelines and standards laid down for the provision of service must be adhered to by the universal service providers. In addition, given the frequent technological innovations in the industry, it follows that the definition of universal service/access will have to be constantly reviewed to ensure that services provided to customers remain current and relevant.

Most specifically, the establishment of the Universal Access Fund to collect and utilize the funds from the Universal Access levy to fulfill its mission to "provide an island-wide broadband network that will allow public access to the information super highway through schools, public libraries, post offices and other agencies and institutions. This is taking place through the operationalisation of the National Broadband Network initiative. Within this context a request for proposals was issued in 2006 for the provision of the necessary broadband service, however to date the contract has not been awarded. It is anticipated that once established, the island wide network will also fulfill the demand for broadband connection where it exists across the island.

More broadly, the government's outlook on the importance of rural connectivity is reflected in the national ICT policy framework which is embodied in the NICT Strategic Plan 2007-2017, developed by the Central Information Technology Office (CITO) in the Ministry of Technology, Energy and Commerce (MITEC).

The plan identifies the ICT challenge of the next five years for Jamaica as: **to significantly increase the number of citizens that are educated and computer literate, to improve their access to the ICT networks at affordable prices and to generate more active use of the Internet for education, business development and public administration.**

The eight areas of focus identified in the Plan are:

1. e-Inclusion: Open Access to ICTs
2. Education and Training
3. Network Readiness and Infrastructure Development
4. e-Government
  - i. e-Services, Information and Records Management
  - ii. E-Health
  - iii. Security
  - iv. Agriculture
  - v. Tourism
  - vi. Labour
5. e-Business and the ICT Industry Development

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<sup>5</sup> *Definition of Universal Access*

6. Research and Innovation
7. Cultural Content and Creativity
8. Legislative and Policy Framework

A number of these focus areas address the need for improved rural connectivity. For example, the main policy goals for E-Inclusion are:

- Make more Internet-ready computers and Open Source Software (OSS) available to the general population at more affordable rates
- Establish a more widely dispersed ICT infrastructure and deep broadband penetration including into rural Jamaica and inner city communities.

The Strategic Objectives in the area are:

- Encourage public and private sector partnerships to establish wireless LANs in public spaces, government buildings and housing developments
- Develop greater public awareness of the capability of ICTs and their potential impact on economic and social life
- Ensure involvement of rural and inner city communities in the implementation of national ICT strategies

## Plans to improve access in rural areas

ADSL is most rapidly being introduced into areas with fixed phone lines, and the more enterprising cable companies are also moving to fill the demand for high speed broadband in rural areas. Flow Jamaica has a connectivity plan that anticipates the availability of cable connections to most of the island by the end of 2008. The ubiquitous distribution of cellular telephones throughout the island means that the GPRS (Cable and Wireless and Digicel) and CMDA (MiPhone) technologies are also available for individual users to have internet connection, but there is not widespread use of it (8% of total users), and indications are that only the more sophisticated users are making use of the facility possibly as an adjunct to other connectivity they may have access to. Digicel estimates that close to 100,000 of their active customers are using WAP<sup>6</sup> enabled Internet. The decision to use WAP or HTML is based on what is most efficient and thus best given the connection status and the nature of one's handset. More recent handsets assess the options and make the decision for you. Most websites are moving to XML or Extensible Markup Language combination of XML and phones that automatically choose the best technology given one's geographic location makes for a better experience in general.

The much wider use of GPRS is being contemplated by Digicel which maintains that the deployment of 10,000 more GPRS units to rural areas in an effort to provide internet connectivity would not be a challenge technically or logistically. Digicel would deploy these units free of cost. One such system has been installed at the Highgate High School in St. Mary, providing Internet access to their computer lab which is now also serving the wider community.

Wimax technology is expected to increase in importance particularly for rural areas. Presently, the technology is being piloted by Digicel in corporate entities in twenty two areas of Jamaica including Kingston, Montego Bay and some rural towns such as Lucea, Falmouth, Sav-La-Mar, Negril, May Pen, Mandeville, Spanish Town, White Marl and Boscobel as well as in several locations along the north coast. According to the company, the limiting factor to wider deployment to non commercial clients is the cost of customer premises equipment (CPE). Current cost is approximately over US\$4,000, however it is anticipated that with China entering the CPE production market, the cost could become less prohibitive by end of 2008.

With Digicel having 1,020 cell sites and providing 95% geographic access and 99% population access, once the CPE is cost effective the only challenge to wider rural connectivity will be "Wi-Max enabling" the existing mobile towers.

## Rural Energy for ICT

The various phases of the Rural Electrification Programme of the country have ensured that there is good island wide coverage. In 2005, Jamaica was estimated to have a grid-connection rate of about 95%, based on the basic requirement that at least 20 houses need to be located within one mile of a distribution line<sup>7</sup>. There are still some remote areas which do not fulfill the criteria for grid connection, and the lack of adequate demand and limited ability to afford the service makes deployment uneconomical in these areas.

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<sup>6</sup> WAP is an open international standard for applications that use wireless communication. Its principal application is to enable access to the Internet from a mobile phone or PDA(wikipedia.org)

<sup>7</sup> Energy Policy review , UNPAN

If areas such as these are to benefit from access to the Internet, alternate sources of energy need to be found and provided to facilities which are readily accessible to the public such as designated CAPs, the local post office, church hall, basic school etc. **Annex 3** shows a list of the equipment required for such a location and the approximate energy consumption of each item.

Sources of energy for a CAP site or telecenter not connected to the grid can be provided either by a fossil fuel powered generator or by renewable energy sources. LPG powered generators are the more economical and environment friendly option for those areas with few alternate energy options, and even where there are such options, these generators are useful as backup.

As far as renewable options go, these are considerably underutilized throughout the country. In 2005, it was estimated that only 5.5% of the energy requirement of Jamaica was being provided by renewable sources. The technologies currently in use include solar, biogas, wind and mini hydro. For the purposes of powering small facilities in remote areas, the most appropriate technology would be solar energy because of the following:

- even where the necessary natural resources are available, the cost of infrastructure for mini hydro is extremely expensive
- only a relatively few areas have the sustained winds (average >7mph) to provide consistent and reliable power to such facilities- the best locations are in the parishes of St Elizabeth, Manchester and St Catherine
- the infrastructure required to convert biogas into useable electricity for small scale purposes is still fairly expensive.

There are a number of suppliers and centers of expertise on alternate energy solutions in the country. These are found in Annex 4. Ecotec Ltd. in particular has been working on energy options to power containerized and mobile telecenter facilities.

# Conclusions and Recommendations

In the years since the liberalisation of the telecommunication sector, there has been considerable progress in connectivity in the country. However, because of disparity in demand and considerations regarding returns on investment, deployment of the various technologies have been more aggressive in urban areas than in rural areas. This has resulted in higher costs for comparable or even lower quality and less reliable connections in rural areas. As such, individual rural users and organisations in rural areas establishing CAPs and telecenters are burdened with dial up costs, the monthly internet charges for which may be reasonable, but the per minute telephone charges (JA\$0.60-0.90) per minute add up to a significant amount with 40 hr per week usage. More economical connectivity options therefore lie with wider broadband deployment and more extensive use of GPRS and CMDA technology. Increased investment by providers and thus wider availability and lower costs will depend, not only on government policy provisions, but more importantly on increased demand that will alert service providers to the market opportunities which exist outside of the urban areas.

Demand in rural areas will increase through the following:

- “Upskilling” of persons to use the technology in various communities
- Multi-ownership of access technology to drive down cost per person through the establishment of Community Access Points(CAPs)
- Raising awareness on empowerment that can be facilitated through increased connectivity especially in rural areas
- Maintaining no taxes and no GCT on importation of personal computers and other computer hardware
- Promoting initiatives to decrease cost of end user terminals to facilitate increased access
- Provision of a competitive market that will increase market players and decrease service and end user terminal costs.

# Annex 1: Internet services available in Jamaica

Service	Description
1. Dial up	<p>Dial-up access is a form of Internet Access through which the client uses a modem connected to a computer and a telephone line to dial into an Internet Service Provider's (ISP) node which in turn connects to the Internet via a high speed link.</p> <p>The types of modems that can be used to connect under Dial-up include:</p> <ul style="list-style-type: none"> <li>• Fixed Line, the standard copper wire telephone line</li> <li>• A Fixed Cellular Terminal/ PC card- This enables you to connect to the Internet through GPRS (General Packet Radio Service) and enables connectivity wherever there is mobile phone network coverage.</li> <li>• Fixed Wireless Terminal - Enables you to connect to the Internet through CDMA (Code Division Multiple Access) available in selected areas through a telecom company</li> </ul>
2. DSL	<p>An acronym for Digital Subscriber Line. This is a form of high speed Internet service over ordinary phone lines using broadband modem technology. DSL technology allows Internet and telephone service to work over the same phone line without requiring customers to disconnect either their voice or Internet connections. It supports data rates ranging from 256 kbps up to 8.448. Typical rates are 1.544 Mbps or lower</p>
3. Cable	<p>Another form of high speed internet service, but which uses a cable modem connected to the residential cable TV service, while DSL modems connect to residential public telephone service. The performance of a cable modem can vary depending on the utilization of the shared cable line in that neighborhood, but typical data rates range anywhere from 500 Kbps to 3500 Kbps.</p>
4. VSAT	<p>VSAT is an acronym for Very Small Aperture Terminal. It is a two way satellite ground station with a dish antenna smaller than 3 meters (usually 75 cm-1.2m) and is able to transmit data from narrow band up to 4 Mbps. VSATs work by relaying data from small remote earth stations or terminals to other terminals or hubs or to provide Satellite Internet access, VOIP or video. They are also useful because they are mobile and can provide internet access for mobile computer lab for example.</p>
5. Wireless IP	<p>Radio-based systems that allow transmission of information without a physical connection, as opposed to transmission systems that require a physical connection, such as copper wire or optical fibre. Some wireless systems include WIMAX, WiFi, CDMA, and GPRS</p>
6. WIMAX	<p>WIMAX is the acronym for Worldwide Interoperability for Microwave Access. This technology provides wireless data over long distances, in a variety of different ways, from point to point links to full mobile cellular type access. It enables a user, for example, to browse the Internet on a laptop computer without physically connecting the laptop to a wall jack. WIMAX offers last mile wireless broadband access as an alternative to cable and DSL.</p>
7. WiFi	<p>Short for Wireless Fidelity and is meant to be used generically when referring of any type of 802.11 network, whether 802.11b, 802.11a, dual-band, etc. The term is promulgated by the Wi-Fi Alliance. The technology is used to provide wireless access in hot spots</p>
8. CDMA	<p>Acronym for Code Division Multiple Access. This is a wireless interface technology used in some digital cellular, personal communications services and other wireless networks. It is presently the technology used by Mi Phone systems.</p>
9. GPRS	<p>Acronym for General Packet Radio Services. This is a 2.5-generation technology (being implemented in GSM networks) that may offer wireless data access speeds of up to 144kbs in end-user devices. This is the technology used by Cable and Wireless and Digicel mobile phones.</p>
10. Leased Line	<p>A leased line is a telecommunications line connecting two locations on a 24 hour per day, 7 days per week basis. They can be used for telephone, data or Internet services. These are mostly used by businesses and tend to be very expensive. They are gradually being replaced by DSL lines.</p>
11. ISDN	<p>Short for Integrated Services Digital Network is a digital telephone line that can be used for voice, fax, and data communication like a regular telephone line but can transfer data five times faster and allow you to talk on the phone with one person while sending data to another. Speeds are typically 64kbps. The technology has been surpassed by other more efficient technologies.</p>

## Annex 2: Internet Service Providers in Jamaica and their services

ISP	Services Offered	Installation Cost	Geographical Coverage	Bandwidth, Price per month (US\$)
<b>Cable and Wireless</b>	<b>Dial-Up, DSL, ADSL, Wireless.</b>	US\$39.99 for All Residential Bandwidth US \$49.99 for All Business Bandwidth	Island-wide	56K \$24.99 mthly (unlimited) <b>Residential Bandwidth</b> 256K/128K \$29.95/mthly 512K/128K \$34.95/mthly 1024K/256K US\$49.95/mthly <b>Business Bandwidth</b> 1024K/256K US\$325/mthly 1544K/384K US\$500/mthly 1544K/384K US\$149/mthly 2048K/512K US\$249/mthly
<b>Infochannel</b> includes Colis Internet Services, EmailJA, JamWeb	<b>ADSL, Dial-Up, Wireless, NetKyaad, AirNet, Leased Lines, Web Hosting, NetStream</b>	\$50 Activation fee  US\$100 Activation fee US\$145 Activation fee  US\$50 Activation fee US\$50 installation fee	Kingston, St. Andrew, St. Catherine, Portland, Montego-Bay, Mandeville, May-Pen, Ocho Rios, Negril and Santa-Cruz	ADSL Lite 512/128K US \$30 ADSL Home 768/256K US \$40 ADSL Pro 1544/256K US\$50 ADSL SOHO 1544/384K US \$145 ADSL SOHO Intermediate 1544/384K US \$175 2048/512K US \$240 ADSL Corporate Combo A 2048/512K US \$340 ADSL Corporate Combo B 2048/512K US \$440 <b>Wireless- AirNet Regular, 144 US\$25</b> <b>Wireless &amp; ADSL- IC Combo 144; 128/64K, dial-up US\$50</b> <b>Leased Lines.</b> Speed from 128kpbs to 1544kpbs.
<b>Cybervale Limited</b>	<b>ADSL, DSL, Dial-Up</b>      <b>CyWi Fixed</b> <b>CyWi Mobile</b> <b>CyWi Pro</b>	US\$20  US\$29.99  US\$100	Kingston/St.Andrew, St.Catherine and St.James.     Kingston/St.Andrew and St.Catherine	<b>Residential (1yr contract)</b> 256K/128K US\$29.95/mthly 512K/128K US\$34.95/mthly 1024K/256K US \$49.95/mthly <b>Business (2yr contract)</b> 1024K/256K (not available) 1544K/256K US\$149/mthly 2048K/512K US\$249/mthly 115K/75K US\$25/mthly 115K/75K US\$25/mthly + Phone and Cable cost. 300 kbps/100 kbps US\$30/mthly 600 kbps/200 kbps US\$50/mthly
<b>FLOW</b>	<b>Broadband Internet, DSL, ADSL, Dial-Up, Wireless</b>	All Packages-US\$58	Island-wide(presently only in Kingston and St Andrew)	1,024/256 Kbps \$10 for 10Hrs & \$0.90/hr 1,024/256 Kbps \$18 for 30Hrs & \$0.30/hr 4,096/512 Kbps \$28/mthly 6,144/768 Kbps \$37/mthly

ISP	Services Offered	Installation Cost	Geographical Coverage	Package/Bandwidth/Price
<b>Kasnet Online Communications Limited</b>	<b>Dial-Up &amp; Wireless</b>	US\$40 Registration fee  US\$50 Registration fee	Island-wide	<b>Dial-Up Residential</b> Unmetered mthly access US\$25 Economy 10 US\$12 Economy 15 US\$18 Economy 20 US\$24 <b>Business Dial-Up</b> CorpNet - Silver <i>Use w/ proxy server only</i> US\$100 CorpNet - Gold <i>Use w/ proxy server &amp; domain mail routing</i> US\$200 <b>Wireless</b> <b>Corporate Wireless starts at US\$200</b>
<b>Jacs Amalgamated Cable Systems</b>	<b>Cable, Broadband Internet</b>	US\$17.	St. Catherine	<b>128K US\$24.95</b> <b>256K US\$27.95</b>
<b>N5 Systems LTD</b>	<b>Dial-Up</b>	US\$24	Island-wide	<b>56K US\$21</b>
<b>AnBell Telecommunications LTD. (Offers Service through Cable and Wireless)</b>	<b>Dial-Up &amp; DSL</b>	US\$22	Island-wide	<b>256K US\$34</b> <b>512K US\$40</b> <b>1M US\$56</b>
<b>GOTEL</b>	<b>Fixed wireless, Broadband</b>			<b>64 K \$15</b> <b>128K \$ 30</b> <b>256K \$65</b> <b>512K \$85</b> <b>768K \$100</b> <b>1024 K upon request</b>
<b>Emoquad</b>	<b>Dial up</b>	US\$ 0		<b>US\$16.20</b>
<b>Telstar</b>	<b>Cable wireless Broadband Internet</b>	US\$ 47	Sections of St Andrew	<b>Cable US\$ 34</b>  <b>Wireless US\$ 56</b> 3000/512 kbps
<b>Entertainment Systems</b>	<b>Cable Broadband internet</b>		Sections of St Andrew	

## Annex 3: Overview of energy consumption for ICT tools

Type of ICT Equipment	Power rating of ICT Equipment (Watts = Amps x Volts)	Number of items	Usage per 40 hr week	KWH per month
Printer	80	1	40	3,200
Desktop PC and monitor	200	4	160	32,000
Fluorescent tubes	32W per bulb	6	240	7,680
Router	600	1	168	100,080
WIMAX base station	60 <sup>8</sup> -400W	1	168 hrs	10,080-67200

<sup>8</sup> <http://www.intel.com/design/telecom/prodbref/wimaxbbc.pdf>

## Annex 4: Main expertise centres for alternate energy

Company	Geographic Coverage	Technologies Offered
<b>ECO-TEC</b> Bluefields Westmoreland Tele: (876) 955-8177 Fax: (876). 955-8791 E-Mail: <a href="mailto:lippotec@hotmail.com">lippotec@hotmail.com</a> ; <a href="mailto:lippy@go2ecotec.com">lippy@go2ecotec.com</a> Web site: <a href="http://www.go2ecotec.com">http://www.go2ecotec.com</a>	Island-wide	<ul style="list-style-type: none"> <li>• Solar energy</li> <li>• Generator systems</li> </ul>
<b>Econergy Engineering Services Ltd</b> 80A, Main Street, Ocho Rios. 974-2981/ 974-1103/ 974-5064	Offered throughout the Caribbean	<ul style="list-style-type: none"> <li>• Energy Conservation</li> <li>• Alternate Energy (Solar, and Biogas)</li> </ul>
<b>Appropriate Technologies</b> 94K Old Hope Rd. Kingston 6. 978-1334/ 978-5028	Provides services mainly in Kingston	Solar services for homes and businesses
<b>Automatic Control Engineering Limited</b>	Kingston and rural areas, but the latter to a lesser extent.	Solar Technologies- Sources of power independent of JPSCo. Typically runs all household appliances.

## About ICT4D Jamaica

ICT4D Jamaica is an open, Jamaican-based network organization established to define, promote and facilitate the use of information and communication technology in the development process. ICT4D Jamaica believes that the secret to prosperity for all mankind lies in the effective use of information for learning and earning and that with reducing resources we must strive, as a matter of policy, to produce more with less if we are to achieve growth and competitiveness.

Our philosophy is to demonstrate new levels of democracy, open, void of prejudices, characterized by tolerance, the ability to learn, the propensity to share, the willingness to be fair and to distribute benefits in accordance with equity considerations and as a reward for contribution. Our approach is one based on partnership with existing entities that takes full advantage of ICTs to develop the group and maintain its services. It operates along networking lines and principles, and therefore within a non-hierarchical structure and framework.

Membership is an open invitation to all individuals and groups from Jamaica, the region and the rest of the world who have experience, knowledge or an interest in the application of ICT in the development process; those who wish to contribute, share, research, learn and/or effectively apply ICT to governance, education and training, community development, business and commerce and particularly within the context of the Jamaican socio-economic and cultural experience and for the benefit of society.

## About IICD

The International Institute for Communication and Development (IICD) assists developing countries to realise sustainable development by harnessing the potential of information and communication technologies (ICTs). The driving force behind IICD's activities is that local 'change agents' themselves identify and develop proposals for realistic ICT applications - local ownership forms the essential basis for sustainable socio-economic development.

Acting as a catalyst, IICD's three-pronged strategy is mainly delivered through a series of integrated Country Programmes. First, IICD facilitates ICT Roundtable Processes in selected developing countries, where local stakeholders identify and formulate ICT-supported policies and projects based on local needs. Second, working with training partners in each country, Capacity Development activities are organised to develop the skills and other capacities identified by the local partners. Third, IICD draws on its global network to provide information and advice to its local partners, also fostering local information exchange networks on the use of ICTs for development.

The best practices and lessons learned are documented and disseminated internationally through a Knowledge Sharing programme. In support of these activities, IICD invests in the development of concrete partnerships with public, private and non-profit organisations, thus mobilising knowledge and resources needed by IICD and its local partners. Country Programmes are currently being implemented in Bolivia, Burkina Faso, Ecuador, Ghana, Jamaica, Mali, Tanzania, Uganda and Zambia.

