



Institute for Connectivity in the Americas

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Caribbean Distance Learning Network Mission

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Table of Contents

Overview	3
Caribbean Connectivity Overview and Issues	4
Regional	4
Telecommunications Sector Reform	6
Colleges	7
CDEN Core Design Suggestions	9
Human Systems & Operational Design	9
Technical Design	10
CDEN Operations Center (CDEN OC)	10
CDEN Wide Area Network (CDEN WAN)	13
Client Network Access	14
Video Conferencing	14
Appendix A – Country Connectivity Overview	16

Overview

Small States in the Caribbean are struggling to renew and develop local post-secondary education capacity that can respond to international standards. They face specific issues linked to their size and situation such as the difficulty to develop cost effective training programs for a limited number of students, the cost of telecommunications, the lack of qualified teaching staff, and the limited financing available. New information and communication technologies (ICTs) offer opportunities to change the mode of operation and delivery and to improve access to knowledge. The World Bank, the Institute for Connectivity in the Americas (ICA), the Inter-American Agency for Cooperation and Development and island Governments, are exploring the feasibility of developing and investing in a sub-regional partnership network to support such development efforts.

In February 2003 a team visited the following countries: Saint Kitts and Nevis, Antigua and Barbuda, Dominica, Saint Lucia, Barbados, Grenada, and Saint Vincent and the Grenadines. The mission carried out an assessment of needs and capacity in post secondary institutions for the Caribbean Centre of Excellence/ Distance Education Network (CCEDEN). In each of the countries, meetings were held with the Minister of Education, the Education Permanent Secretary, heads of the Community Colleges and other tertiary institutions and representatives of the business community.

The mission was lead by: Peter Darvas (pdarvas@worldbank.org), Senior Education Economist, World Bank; accompanied by Michael Foley (mfoley@worldbank.org), Senior Distance Education Specialist, World Bank Institute; Theresa Pittman (theresa.pittman@northatlantic.nf.ca), Instructional Design Specialist, College of the North Atlantic; and Kuzvinetsa Peter Dzvimbo (kdzvimbo@worldbank.org), Senior Education Specialist, World Bank.

The focus of the discussions were on the key education issues this initiative could address and how they would fit into the objectives of the country's education policy; the services that the proposed CCEDN could provide in response to competing needs, on the financial, institutional, technical, regulatory and human resources capacity and the constraints for distance learning.

The team found strong support for the proposed project agenda, significant initiatives to upgrade the college capacities to meet expanded demand for tertiary education services, and receptivity towards new technical solutions and organizational innovations, which could help meet the new demand. As a result an issues paper was developed.

As a direct outcome of the mission, the heads of community colleges and the permanent secretaries of the Ministries agreed to participate in a workshop held March 17-19, 2003 in Washington DC to further develop the project concept.

The mission team collected key information about each visited country and tertiary education institutions, their strategies, capacities, and technical resources that need to be considered at the feasibility stage. Wayne Hann (wayne.hann@northatlantic.nf.ca), Manager of Information Systems, College of the North Atlantic provided network design and connectivity consulting support to the project team.

Caribbean Connectivity Overview and Issues

Online distance education, often termed e-learning, can support and provide for learning opportunities not otherwise possible due to a host of reasons including: geographical distance to education institutions; work schedules; institutional space constraints; and limited financial resources. The development of an e-learning network in the Caribbean region could allow for an increase in the number of individuals participating in tertiary level programs, increased teacher training, and increased access to programs with particular relevance to a developing economy. It also could impact the current situation whereby a high percentage of individuals are leaving the island to study and a low percentage of those are returning upon graduation. A distance education network could potentially increase economies of scale and reduce overall infrastructure costs in the education system.

Full utilization of ICT for enhancing tertiary education depends on several main factors: affordable telecommunications & connectivity costs; reliable well-designed learning network; and ICT skills in both the usage and maintaining the ICT structure (in areas of content, teaching & technical).

In order for e-learning to be successful there are a number of key success components that need to be integrated. These include (but are not limited to): adequate learner support; adequate faculty/facilitator support (teaching and instructional design); reliable & accessible technology; relevant content & programs; interactive learning environment; responsive feedback mechanisms; appropriate resources for learners and faculty; appropriate evaluation mechanisms; and sufficient IT skills available to support the network as well as other institution requirements.

In general, past experiences with distance education in the Caribbean, albeit limited, have not been overly positive. "Those colleges and universities that have tried to develop distance education programs using today's technology have run into barriers in the form of high costs, lack of faculty skills need to take advantage of the technologies, lack of student access to the technologies, and lack of infrastructure to deliver the instruction."¹ This is not unlike early DE initiatives in other areas of the world. However, with a comprehensive well-supported online network based on global best practices and lessons learned, this could be a very successful endeavor.

Regional

The report *Higher Distance/Virtual Education in The Anglophone Caribbean* written by Badri Koul (October 2002) for IESALC² presents a table on connectivity levels by island based on 2000 data. The regional connectivity calculated was only 3.5%, which is eleven times lower than the USA figure of 44%. Only three countries, BVI [14.2%], Barbados [10.8%] and St. Kitts & Nevis [10.3%] show more than 10% of the population connected. The others ranged near or less than 5%. These included: Dominica [5.7%], Trinidad and Tobago [5.2%], Grenada [4.5%], St. Lucia [3.1], Jamaica

¹ The Development of Virtual Education: A global perspective. Dr. Glen M. Farrell, editor. The Commonwealth of Learning, 1999. Chapter 4 -Distance and Virtual Learning in the Caribbean by Dr. Peter J. Dirr Available online <http://www.col.org/virtualed/chapter4.pdf>

² Koul, Badri. (2002) A Report on the Evolution, Present Status, and Future Prospects of Higher Virtual Education in the Anglophone Caribbean, The International Institute for Higher Education in Latin America and the Caribbean (IESALC), UNESCO

[2.8%], St. Vincent & Grenadines [2.6], Belize [2.3] and Guyana [0.4%]. Connectivity is a basic requirement for online education and this is an issue of concern for the Caribbean region. The success of an e-learning network will be influenced by the ability of the learners to 'access' the online content. Supplementary provisions such as access centres in strategic locations, based on the target learner profile, will need to be considered.

The Koul report also provides some analysis based on a review of the current infrastructure and human resources. It concluded the region as a whole has come only about one third of the way as far as ICT infrastructure and the related human resources are concerned. The worst aspects are: the very high cost of connectivity; the low levels of computer literacy; and the poor availability of e-professionals (pg.19-20).

The following table provides a quick overview of the teledensity, number of Internet users, and number of personal computers by country. While the Caribbean region is clearly lagging behind, the trend in recent years has been progressing upwards. Currently, underdeveloped and uneven access exists. There is a significant range in terms of connectivity infrastructure, as well as the availability of 'e-skills' by country. This diversity would need to be accommodated in the design of a regional e-learning network.

Table 1³

Country	Population (M) 2001	Teledensity [telephone subscribers per 100 inhab 2001]	Internet Users (k) 2001	Internet Users per 10,000 inhab 2001	Estimated PCs (k) 2001	PCs per 100 inhab 2001
Antigua & Barbuda	0.08	80.42	5.0 [2000]	652.03		
Barbados	0.27	67.24	15.0	553.99	25	9.23
Dominica	0.08	30.98	6.0 [2000]	777.77	6	7.50
Jamaica	2.6	44.90	100.0	384.91	5.53	5.00
Grenada	0.10	39.16	5.2	520.00	5.2	13.00
St. Kitts & Nevis	0.05	59.99	2.0 [1999]	516.10	2.0 [1999]	17.45
St. Lucia	0.13		3.0			
St. Vincent & the Grenadines	0.11	24.04	3.5 [2000]	308.57	13	11.61
Trinidad & Tobago	1.3	43.69	120.0	923.08	90	6.92
Canada	30.01	103.78	13,500.0	4,498.94	12,000 [2000]	40.31
USA	284.80	111.79	142,823.0	5,014.91	178,000	62.50
Americas	838.93	62.05	182,942.3	2,181.85	219,905	26.91

³ ITU 2002 Basic Indicators

A more comprehensive country by country telecomm and connectivity description is provided in the appendix A

Telecommunications Sector Reform

In the past six years, much work has been ongoing in the OECS, to reform the telecommunications sector. In May 2000, the Eastern Caribbean Telecommunications Authority (ECTEL) was formed. As a result there has been some significant change to the telecommunications sector in the participating countries (Dominica, St. Kitts-Nevis, Grenada, St. Lucia, and St. Vincent). ECTEL is designed to promote liberalization and fair competition, harmonization of regulations and policies across member states, universal service, fair pricing, and access to advanced services. ECTEL and the National Telecommunications Regulatory Commission (NTRCs) have continued to build on their reform momentum in which the countries have moved from a monopoly sector to one of licensing competitive service providers under the regulatory supervision of both the national and the regional authority. Recently, approximately 10 new service providers have been issued fixed and mobile licenses, and there exists great anticipation in the marketplace. ⁴

The average dialup monthly cost in the Caribbean is \$42 US. This amount is 7.5% of GDP/capita per month. Barbados has the lowest rate at about 4.7%, and St. Vincent & the Grenadines has the highest at 26%. These rates can be considered very expensive particularly when compared to a rate of 0.76% for the USA. ⁵ The current cost of connectivity in the Caribbean region certainly has been a prohibiting factor in terms of e-learning initiatives and the development of tertiary level institutions ICT capacity.

In addition to the legal, regulatory and cost issues of telecommunications and Internet access on a user (potential learner) level, the basic cost of hardware/software is another constraint. Even though the price of a computer has fallen with increasing competition and innovation worldwide, in the Caribbean it can remain a relatively expensive item. Estimating the price of an average computer at \$1000 US, as shown the table, the cost can range from 27% of per capita income in Jamaica to 6% in Barbados. ⁶

Table 2 Relative Cost of a PC in the Caribbean

Country	GDP per capita (PPP\$), 2000	PCs as a % of GDP per capita
Antigua & Barbuda	\$10,541	9%
Barbados	\$15,494	6%
Dominica	\$5,880	17%
Dominican Republic	\$6,033	17%
Grenada	\$7,580	13%
Guyana	\$3,963	25%

⁴ Rob Schware, World Bank

⁵ Koul, Badri. (2002) Table 1.1, pg. 18

⁶ Henry, Lester. The Digital Divide, Economic Growth and Potential Poverty Reduction: The Case of the English Speaking Caribbean. (Table 4) Source: Human Development Indicators 2002 Available online at [http://www.caribank.org/Workshop.nsf/b1da8bcd1e18562585256bb100553716/\\$FILE/Doc8.pdf](http://www.caribank.org/Workshop.nsf/b1da8bcd1e18562585256bb100553716/$FILE/Doc8.pdf)

Jamaica	\$3,639	27%
St Kitts & Nevis	\$12,510	8%
St Lucia	\$5,703	18%
St Vincent & Grenadines	\$5,555	18%
Trinidad & Tobago	\$8,964	11%

Several governments, St. Kitts and Nevis for example, have reduced or eliminated the tax on computers in order to encourage purchases.

Colleges

Few colleges in the Caribbean have what could be considered, by most general standards, adequate computing capabilities for teaching and administration. However there are exceptions. Grenada for example, has almost 300 computers with a complete fiber optic college network with shared Internet access for faculty and staff. Other colleges, such as Antigua State College have less than 50 operational computers (approximately 10 with internet access) to serve the entire student population.

Several have been able to secure external funding for the implementation of shared computer labs and/or technical support. The ability to maintain these labs long-term in terms of upgrades and replacement components is questionable. At current, technical support and maintenance of the existing systems is proving to be a challenge for the majority of community colleges.

The cost of connectivity in colleges is not consistent across islands. Several colleges have negotiated (temporary) arrangements with the local provider (Cable and Wireless in most cases) for free or fee-based services. The costs vary depending on level of access and bandwidth. There currently exist a number of issues relating to affordability and availability of network equipment, routers, servers, security, reliability, software, training, and technical support for both installation and maintenance.

Some general observations as a result of the February 2003 mission are as follows:

- While some colleges visited had adequate IT capacity (hardware/software/tech support), the majority of colleges had limited and below adequate resources in terms of availability and quality of physical facilities.
- There was no consistency with regard to Internet telecommunications availability. Some colleges were connected to the Internet via ADSL/Cable Modem while other colleges were connected to the Internet via dialup. Several colleges received connectivity at no charge, while others paid upwards of \$900 EC per month for access. In order for a college to properly function as a full-function learning center as part of CDEN, investments in high-speed Internet access would be required.
- There was a noted lack of (human) technical support and IT planning/management in a number of colleges. Only about 30-40% colleges showed some evidence of IT planning and resource allocation considerations. This deficiency would need to be addressed and possibly supported.

- There appeared to be real budget constraints in the majority of the colleges regarding technical equipment, software, replacement parts, suitable furniture, and other peripheral devices.
- None of the colleges were delivering web-based courses at the current time. Several colleges had faculty who were or had participated in DL courses for PD. Therefore in terms of DL delivery (technical and human skills), it essentially would require starting at point A. Some resistance and skepticism of DL was expressed, and this would need to be addressed early in the process and factored into the design.
- The majority of colleges did not operate internal networks (or MIS), which would include administration, library, and computer labs. Several colleges however such as Sir Arthur Lewis and T.A. Marryshow Community College did have good internal systems in place with plans to increase capacity over the short term. Most computer labs were set up with on local server configuration with varying degrees of capacity.
- The level of staff capacity (or potential local availability) in terms of Instructional Design, Multimedia Development, Connectivity Support, IT Planning & Management was not assessed.
- The level of Internet security implemented was not assessed.

CDEN Core Design Suggestions

Human Systems & Operational Design

The following supports need to be built into system and further determination of the specifics need to be identified in the feasibility study phase. (This list is not exhaustive).

- Faculty Support
 - Skill development in: online teaching; effective use of technology; managing and motivating students by distance; feedback mechanisms; effective evaluation/assessment approaches integration of resources / online research; online team work/collaboration, etc.
 - Technical Support (helpdesk)
 - Assess to Instructional Design Assistance
 - Consideration given to Lead Instructor/Faculty model
- Learner Supports
 - Orientation (to DL) process; learner guides
 - Technical Support (helpdesk)
 - Student inquiry mechanism
- Institutional Support
 - Delivery issues; technological support considerations
 - Overall business/operations model
 - Security concerns
 - IP Policy implications
 - Centralized support mechanisms; Program information and general student support services (registration, fee payment system, textbook coordination, examination scheduling, service evaluation; etc)
 - Partnership Development/Maintenance
 - Quality Assurance Systems / Review mechanisms
- Content Development/Delivery Supports
 - Conversion of existing courses considerations
 - Development of new courses considerations
 - Course franchise implications
 - Instructional Design Support
 - Content/Course/Program Sharing Framework (Course Repository possibility)

It is suggested that the network should build local capacity balanced with integrating lessons learned from other successful initiatives. In addition, a capacity inventory should be carried

out in terms of the HR skills and currently existing amongst local partners (this would include ICT skills, Instructional Design, Network Administration, Multimedia/Web Development Skills, Online Facilitation Skills/Experience, etc.). It is also important for a determination of content (prioritized) based on demand, relevance, and possibly e-readiness be implemented.

Any network system, however technically well designed, will only be as successful as the content and management systems put in place to support it.

Technical Design

Various technical options exist for the creation of the Caribbean Distance Education Network (CDEN) and these options would be considered in the feasibility study. One scenario put forth for consideration is for the network to consist of the following components:

- CDEN Management Structure Requirements
 - Content Delivery and Supports
 - Content Development & Delivery Support
 - Institutional Supports/ Operational Model
 - Learner Supports
 - Faculty Supports
 - Technical Configuration
 - CDEN Operations Center (CDEN OC)
 - CDEN Wide Area Network (CDEN WAN)
 - Client Network Access
 - Video Conferencing

Content Delivery and Supports can be either centralized or decentralized and CDEN learning centers could be located at each participating college. These learning centers could contain learning management and instructional design employees. Technical support systems could be located in one centre or offsite in an alternate location, or a combination of both.

Proposed Technical Configuration Option

CDEN Operations Center (CDEN OC)

The CDEN Operations Center would consist of network and server infrastructure necessary to provide learning objects to clients and learning centers in the OEDC region. The components of the CDEN OC are:

- Server Infrastructure
- Security Infrastructure
- Network Infrastructure

The CDEN OC can be located anywhere on the Internet. Consideration should be given to locating the CDEN OC at a neutral location not associated with a specific learning center.

- Server Infrastructure

The server infrastructure component would consist of the following:

- Learning Management Server

The learning management server would house the learning objects and the learning management system. The platform for this server infrastructure could be Intel-based and could be based on the Linux operating system. One option is to utilize the WebCT platform as an option for the learning management system. This operating system is suggested due to its suitability to run WebCT and to its cost of acquisition. A quad processor 2.x ghz Intel Zeon could function as the WebCT server.

- Mail Server

This server would provide mail and messaging services to the CDEN community. An option for the mail server could be an Intel-based using a quad processor 2.3 ghz processor with the Microsoft Windows 2003 Advanced Server operating system. Microsoft Exchange 2003 could be used as a mail and messaging system.

- Web Server

The web server would provide web services to the CDEN community. One option is for the web server to be an Intel-based using a quad processor 2.x ghz processor with the Microsoft Windows 2003 Advanced Server operating system. The web services could be provided by the Windows 2003 Operating System. The Web server would contain all web-based information relevant to CDEN including links to all network content.

It is recommended storage for these servers would be via a state-of-the-art storage area network and all servers be rack-mounted.

- Security Infrastructure

The security infrastructure component should consist of an antivirus server, firewall, and intrusion detection.

- Antivirus Server

One option is to implement the MailMarshal software product from Mail Marshal Incorporated in conjunction with McAfee's SMTP antivirus software to combat internet-borne viruses. In addition, this software could then be used to filter incoming Internet email for spam mail and other inappropriate messages.

- Firewall

One option is for the CDEN operations center to be protected from Internet intrusion by a Cisco PIX firewall. This firewall would sit between the Internet and the CDEN OC. It would strictly control access to the CDEN OC and permit only authorized users and network protocols to this resource.

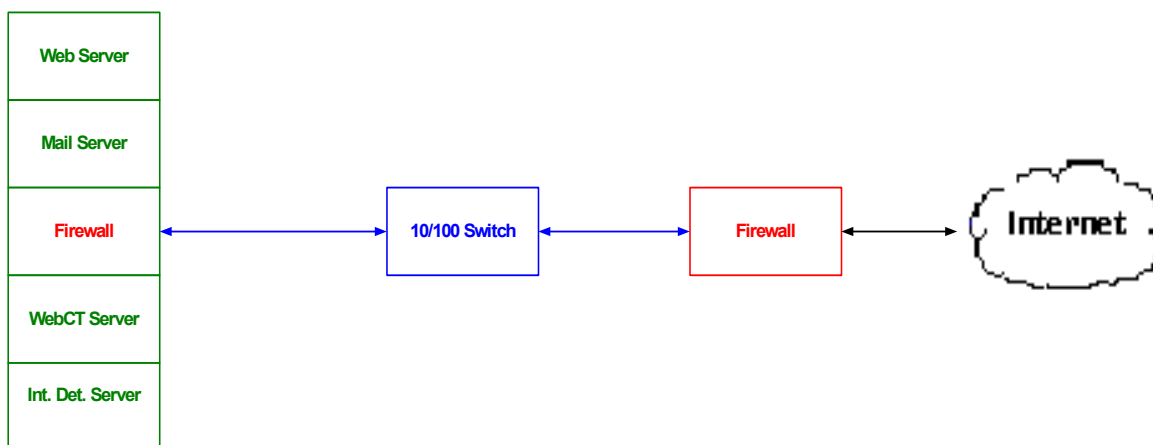
- Intrusion Detection

Proactive intrusion detection would permit the CDEN OC to run with minimal impact from internet-borne intrusions. It will work in conjunction with the firewall to ensure that the CDEN OC technology assets are not disrupted in any way by internet-borne intrusions. This subscription-based intrusion detection system would provide a proactive approach to identifying and preventing known intrusions to network resources.

- CDEN OC Network Infrastructure

It is reasonable to assume the CDEN-OC would acquire a high-speed local area network to which the server infrastructure is connected. It is desirable to have a 10/100 switched local area network at minimum.

In addition, a fiber-based storage area network (SAN) could be used to store content associated with CDEN. The server infrastructure would contain enough storage to accommodate the operating system and any application software. All other storage requirements will be via the SAN.



Suitable servers indicated above will be deployed in the CDEN OC, which will provide network services to the learning community.

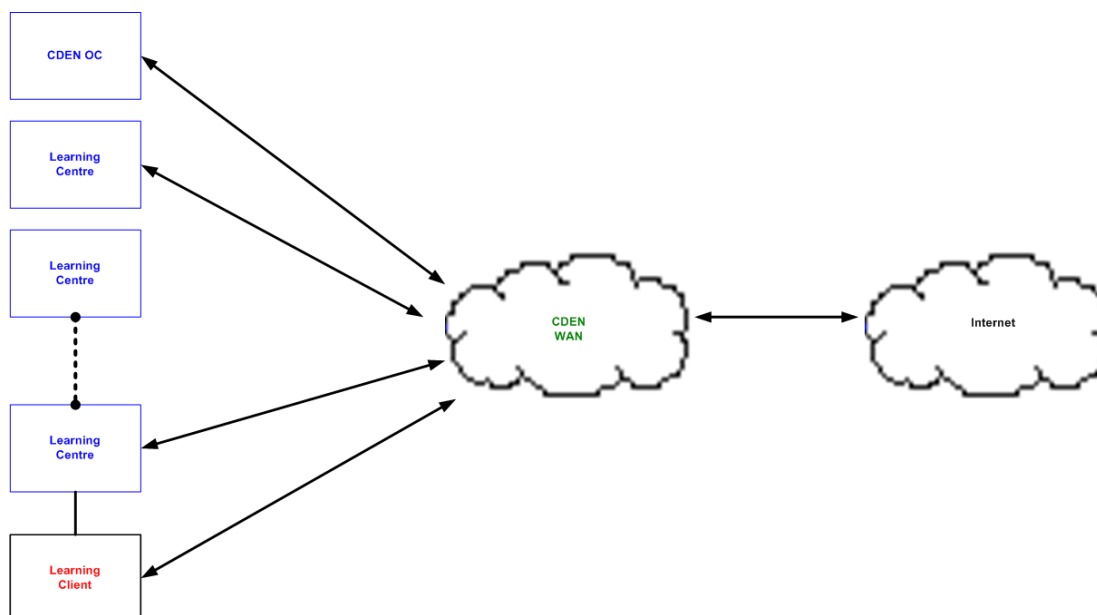
CDEN Wide Area Network (CDEN WAN)

Cable and Wireless is a communications provider in the OECS region. For many years, this communications provider has been operating as a monopoly in the region. Efforts are underway in the OECS whereby a more competitive and open environment is created. This is highly desirable and will hopefully result in a higher quality service with a more favorable pricing structure. Since Cable and Wireless may not provide suitable service for a suitable price, satellite communication should be considered as an alternative. 802.x wireless technology may be utilized between and among buildings that are within line of sight or within sight of a relay point.

For this option, all learning centers and the CDEN OC would require network connectivity. The CDEN OC and learning centers would be connected to a private Wide Area Network (WAN). This type of infrastructure is required in order to facilitate multiway TCP/IP-based video conferencing. All learning centers would require a dedicated leased facility with Quality of Service (QOS). All Learning Centers and the CDEN OC would be connected to one another using either satellite, terrestrial, or wireless technology. It is suggested at least 512kb/s of bandwidth should be allocated for video conferencing and at least 128 kb/s (preferably 256 kb/s or 512 kb/s) should be reserved for Internet access. The entire WAN will have one shared point of presence to the Internet.

Internet Caching should be heavily utilized in order to cut down on data transmission from the Internet. It is desired that the aggregate speed of this Internet link should be at least 512 kb/s. Link speeds of 1.5 mb/s or higher would be preferred.

A high level depiction of a possible CDEN WAN is as follows:



The choices for communication medium are: satellite, terrestrial, and wireless.

Satellite

This communication medium can be an expensive option, however will probably need to be considered and a implementation and operational cost determined. VSAT technology would be the satellite communication of choice. The learning centers would each have a two-way satellite link.

Terrestrial

This option should be considered only if Cable and Wireless (or another provider) can provide reliable connectivity at an affordable price. The provider would provision facilities into the CDEN OC (if applicable) and each of the learning centers. The preferable terrestrial medium is fiber. Copper can be considered in areas where fiber is not available.

Wireless

Wireless technology should be considered to connect multiple buildings that are within close proximity and line of sight to one another. In cases where multiple buildings are in close proximity to one another but not within line of sight, these buildings can all point to a common relay sight as a means of connection. One satellite or terrestrial link can then be purchased to connect multiple buildings rather than purchase one satellite or terrestrial link per building. The cost of hardware to connect each building via wireless technology is in the range of \$10,000 US.

Such capital expenditures will be incurred to acquire the wireless electronics. Recurrent expenditures will not be required to maintain building connections with this technology. Savings in recurrent expenditures could be used to offset the initial capital expenditures.

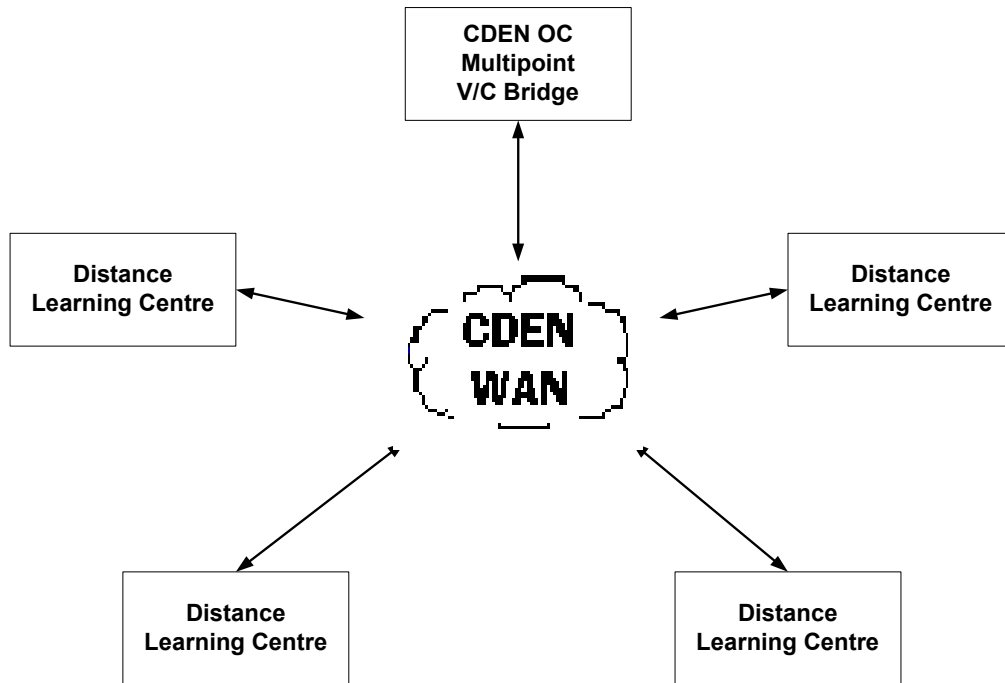
Technology is available today that will allow connections between wireless buildings to run minimally between 4.5 mb/s and 11 mb/s depending on the technology purchased

Client Network Access

Network access to courses/content from users at the CDEN OC and each learning center would be via the CDEN network described herein. Clients located elsewhere will require network access to the CDEN. This access would be accomplished via either dialup or high speed DSL or cable modem technology. Community-based Internet facilities could be used in cases where clients do not have individual Internet access.

Video Conferencing

If synchronous video conferencing is determined to be a network design requirement, H.323-based TCP/IP video technology could be deployed at each learning center. Each learning center would require a video suite equipped with suitable audio and video facilities that will permit video communication between and among learning centers. Point to point conferences could occur between individual learning centers. The CDEN OC would contain a multipoint video bridge necessary for three or more sites to participate in multipoint videoconferences.



Appendix A – Country Connectivity Overview

Antigua & Barbuda							
Basic Stats ⁷	Area: 440 sq km Population: 68,487.3 [2001] <table> <tr> <td>GDP per capita (PPP\$), 2000⁸</td><td>\$10,541</td></tr> <tr> <td>PCs as a % of GDP per capita⁹</td><td>9 %</td></tr> <tr> <td>Internet Dialup Access – % of GDP/capita per month¹⁰</td><td>6.1%</td></tr> </table>	GDP per capita (PPP\$), 2000 ⁸	\$10,541	PCs as a % of GDP per capita ⁹	9 %	Internet Dialup Access – % of GDP/capita per month ¹⁰	6.1%
GDP per capita (PPP\$), 2000 ⁸	\$10,541						
PCs as a % of GDP per capita ⁹	9 %						
Internet Dialup Access – % of GDP/capita per month ¹⁰	6.1%						
Telecomm	Telephone subscribers [2001] -Total: 62.3(k); per 100 inhabitants: 80.42 Cellular subscribers [2001]– Total: 25(k); per 100 inhabitants: 32.29¹¹ - Antigua Public Utilities Authority (APUA) is a wholly owned government agency responsible for providing domestic wireline and wireless (PCS -GSM 1900 MHz Technology) telecommunications services. They also provide ISDN services. ¹² The service is fully digital, with 80% of the switching network served by fibre optic cable.¹³ - International network is under Cable and Wireless monopoly. - Connected to the Eastern Caribbean Fibre System¹⁴						

⁷ World Bank Group – Country Profile Table. Source: World Development Indicators Database, April 2002

⁸ Henry, Lester. The Digital Divide, Economic Growth and Potential Poverty Reduction: The Case of the English Speaking Caribbean. (Table 4) Source: Human Development Indicators 2002 Available online at [http://www.caribank.org/Workshop.nsf/b1da8bcd1e18562585256bb100553716/\\$FILE/Doc8.pdf](http://www.caribank.org/Workshop.nsf/b1da8bcd1e18562585256bb100553716/$FILE/Doc8.pdf)

⁹ Henry.

¹⁰ Koul, Badri. (2002 October). Higher Distance/Virtual Education in the Anglophone Caribbean. Prepared for the International Institute for Higher Education in Latin America and the Caribbean (IESALC), UNESCO, Caracas, Venezuela. (Pg 18)

¹¹ ITU, 2002

¹² (CANTO) - Caribbean Association of National Telecommunications Organizations <http://www.canto.org>

¹³ Primus, Wilma J. (1998) “Status Report on Information and Communications Technology (ICT) infrastructure in the ACS States” Prepared by for the Secretariat of the Association of Caribbean States. Available at <http://www.acs-aec.org/primus2.html>

¹⁴ The Eastern Caribbean Fibre-optic System - <http://www.candw.lc/ecfs.htm> *The Eastern Caribbean Fibre System or ECFS for short is an advanced undersea fibre optic cable system that has been laid through the Eastern Caribbean by Cable and Wireless, France Telecom, Barbados External Telecommunications (BET), Telecommunications Services of Trinidad and Tobago (TSTT), St. Kitts and Nevis Telecommunications Ltd. (SKANTEL), Grenada Telecommunications Ltd. (GRENTel) and AT&T. The system connects the British Virgin Islands in the North to Trinidad in the South via the islands of the Eastern Caribbean and connects the island chain to North America and Europe via existing undersea fibre optic systems that operate from Tortola (BVI) and Trinidad.*

Internet	Internet ¹⁵				PCs	
	Internet Hosts 2001	Hosts per 10,000 inhabs	Users (k) 2000	Users per 10,000 inhabs 2001	Total (k) PCs	Per 100 inhabs 2001
	786	101.52	5	652.03		

Dial-up constitute the main means of connectivity in the country. Two main ISP's, ACT-online and C&W, provide Internet access. (There are 16 registered ISPs¹⁶)

- Cable & Wireless offers several connectivity options: a) Direct Connection with connection speeds range from 64kbit/s to E1 (2Mbit/sec); and b) Dialup – range from 35 EC\$/month for 10 hours plus 4EC\$ for each additional hour to 120 EC\$ month for 50 hours plus 1.5 EC\$ for each additional hour. [\[http://www.cwantigua.com/\]](http://www.cwantigua.com/) ¹⁷ Cable & Wireless lease of a T-1 line...costs EC\$28,000 per month.¹⁸

- ACT-Online, owned by Antigua Computer Technology Co. Ltd., offers several access plans for dial-up customers.
 - Residential dial-up ranges from 29.95 EC\$/Month with 10 Hours Access, additional charge of 3.50 EC\$ per extra hour, (1 Login, 1 e-mail account) to 119.00 EC\$/month with Unlimited Hours of Access, (1 Login, 6 e-mail accounts).
 - Commercial accounts range from: Dial Up Customer Account 119.00EC\$/Month with Unlimited Hours of 56K – 64K Access, (1 Login, up to 6 e-mail accounts) to 699.00EC\$/Month with Unlimited Hours of 56K – 128K Access, (10 users, up to 20 e-mail accounts). [\[http://www.actol.net/plans.htm\]](http://www.actol.net/plans.htm)
 - Act-Online uses the Cable & Wireless gateway as well as having satellite connectivity also as back-up.¹⁹

¹⁵ ITU, 2002

¹⁶ World Fact Book 2002 <http://www.cia.gov/cia/publications/factbook/fields/2152.html>

¹⁷ <http://www.cwantigua.com/>

¹⁸ Singh, A.D. (2001) A Rainbow Technology for a Rainbow People: E-Business Capacity Development for the CARICOM Region – Report of a Diagnostic Mission June –August 2001. London: Commonwealth Secretariat London. Available online at <http://unpan1.un.org/intradoc/groups/public/documents/caricad/unpan005810.pdf>

¹⁹ Singh (2001). Note: “The logic and compulsion of government is to ensure full redundancy and 100% reliability of the network as Antigua today has the world’s largest number of Internet Gaming companies registered and they need this level of guarantee of reliability.”

Barbados																							
Basic Stats	Area: 430 sq km Population: 268.2 thousand [2001]																						
	GDP per capita (PPP\$), 2000 ²⁰			\$15,494																			
	PCs as a % of GDP per capita ²¹			6 %																			
	Internet Dialup Access – % of GDP/capita per month ²²			4.7%																			
Telecomm	Telephone subscribers [2001] –Total: 182.1(k); per 100 inhabitants: 67.24 Cellular subscribers [2001]– Total: 53.1(k); per 100 inhabitants: 19.62²³ ▪ Cable & Wireless Barbados Ltd. Is a private telecommunications company jointly owned by Cable & Wireless (74%) and local investors (26%). They are the domestic exchange carrier with a 100% digital network, providing voice, data and enhanced business services. They also provide cellular services. ²⁴ ▪ The international services are provided by Barbados External Telecommunications Ltd. (BET), 85% owned by C&W and 15% by local investors.²⁵ ▪ Fibre optic ring around the country and alternative support is available through undersea cable and satellite.																						
Internet	<table><tr><th colspan="4">Internet²⁶</th><th colspan="2">PCs</th></tr><tr><th>Internet Hosts 2001</th><th>Hosts per 10,000 inhabs</th><th>Users (k) 2001</th><th>Users per 10,000 inhabs 2001</th><th>Total (k) PCs</th><th>Per 100 inhabs 2001</th></tr><tr><td>130</td><td>4.8</td><td>15</td><td>553.99</td><td>25</td><td>9.23</td></tr></table> ▪ All Internet Service Providers receive their Internet feed from BET. The external Internet feed is a fractional T1 providing a 128K link into Barbados. Other services are dial-up access, ISDN access, and managed leased connections.²⁷					Internet ²⁶				PCs		Internet Hosts 2001	Hosts per 10,000 inhabs	Users (k) 2001	Users per 10,000 inhabs 2001	Total (k) PCs	Per 100 inhabs 2001	130	4.8	15	553.99	25	9.23
Internet ²⁶				PCs																			
Internet Hosts 2001	Hosts per 10,000 inhabs	Users (k) 2001	Users per 10,000 inhabs 2001	Total (k) PCs	Per 100 inhabs 2001																		
130	4.8	15	553.99	25	9.23																		

²⁰ Henry.

²¹ Henry.

²² Koul (Pg 18)

²³ ITU, 2002

²⁴ CANTO

²⁵ Primus (1998)

²⁶ ITU 2002

²⁷ Primus (1998)

	▪ Six main ISPs serve the country and the number of Internet Connections is estimated to be about 30,000 ²⁸ The 5 other ISPs operate via the Cable & Wireless gateway for upstream with permission for V-Sat for downstream.²⁹ Main ISPs are: Carisurf [http://www.carisurf.com]; Sunbeach [http://www.sunbeach.net]; & Caribnet [http://www.caribnet.net] (In 2000 there were 19 registered ISPs³⁰) ▪ Dialup 56K lines are available at approx US \$44 per month, leased lines 64K for US\$830, 128K at US\$1520 and T-1 at US\$12,380. ³¹ ▪ Internet and leased circuit prices have decreased recently but businesses still feel cost is an issue... Stability and speed of connection remain an issue probably due to the quality of the phone connection. Cable & Wireless claim that only 45% of their Bandwidth is presently being used. ³²
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Dominica							
Basic Stats	Area: 750 sq km Population: 71,870 [2001] <table> <tr> <td>GDP per capita (PPP\$), 2000³³</td><td>\$5,880</td></tr> <tr> <td>PCs as a % of GDP per capita³⁴</td><td>17%</td></tr> <tr> <td>Internet Dialup Access – % of GDP/capita per month³⁵</td><td>12%</td></tr> </table>	GDP per capita (PPP\$), 2000 ³³	\$5,880	PCs as a % of GDP per capita ³⁴	17%	Internet Dialup Access – % of GDP/capita per month ³⁵	12%
GDP per capita (PPP\$), 2000 ³³	\$5,880						
PCs as a % of GDP per capita ³⁴	17%						
Internet Dialup Access – % of GDP/capita per month ³⁵	12%						

²⁸ Koul, Badri. (2002 October). Higher Distance/Virtual Education in the Anglophone Caribbean. Prepared for the International Institute for Higher Education in Latin America and the Caribbean (IESALC), UNESCO, Caracas, Venezuela.

²⁹ Singh (2001).

³⁰ World Fact Book 2002 <http://www.cia.gov/cia/publications/factbook/fields/2152.html>

³¹ Koul (2002)

³² Singh (2001).

³³ Henry.

³⁴ Henry.

³⁵ Koul (Pg 18)

Telecomm	Telephone subscribers [2000] -Total: 23.9(k); per 100 inhabitants: 30.98 Cellular subscribers [2000]– Total: 1.2 (k); per 100 inhabitants: 1.56³⁶ ▪ C&W Dominica Ltd. is jointly owned by Cable and Wireless (80%) and the Government of the Commonwealth of Dominica (20%). The company provides both national and international telecommunications services. They also provide internet, mobile data, messaging and VSAT services. ▪ Compania Dominica De Telefonos (CODETEL) [www.codetel.net.do] is a privately owned telecommunications network operator providing national and international communication services. They operate a cellular network and offer PCS/GMPCS along with internet and VSAT services. ³⁷ ▪ The services provided are fully digital. ISDN will be introduced shortly to provide the extra speed and bandwidth where needed. ³⁸																		
Internet	<table border="1"><thead><tr><th colspan="4">Internet³⁹</th><th colspan="2">PCs</th></tr><tr><th>Internet Hosts 2001</th><th>Hosts per 10,000 inhabs</th><th>Users (k) 2000</th><th>Users per 10,000 inhabs 2001</th><th>Total (k) PCs</th><th>Per 100 inhabs 2001</th></tr></thead><tbody><tr><td>223</td><td>27.88</td><td>6</td><td>777.77</td><td>6</td><td>7.5</td></tr></tbody></table> ▪ Besides the usual dial-up links, all populated areas are network with fibre optic lines. Dial-up 56K links are available at about US\$33. There are about 4000 Internet Connections ⁴⁰ ▪ Dominica presently has two main ISPs providing Internet access. (In 2000, there were 16 registered ISPs ⁴¹) ▪ For consumers, Internet access has fallen dramatically from EC\$120 for 20 hours by Cable & Wireless just a year ago to today when it is available at EC\$ 50 unlimited by Marpin (with call charges separate) and at EC\$69 plus session charge by C&W. Though these prices are lower than other places in the Caribbean, cost continues to be an issue as the average wage is estimated at around EC\$ 2000 per month.⁴² ▪ For businesses the lease line costs are still very expensive. (A leading IT services company reported a cost of US\$ 10,000 for the year for high-speed	Internet ³⁹				PCs		Internet Hosts 2001	Hosts per 10,000 inhabs	Users (k) 2000	Users per 10,000 inhabs 2001	Total (k) PCs	Per 100 inhabs 2001	223	27.88	6	777.77	6	7.5
Internet ³⁹				PCs															
Internet Hosts 2001	Hosts per 10,000 inhabs	Users (k) 2000	Users per 10,000 inhabs 2001	Total (k) PCs	Per 100 inhabs 2001														
223	27.88	6	777.77	6	7.5														

³⁶ ITU, 2002

³⁷ CANTO

³⁸ Primus (1998)

³⁹ ITU 2002

⁴⁰ Koul (2002)

⁴¹ World Fact Book 2002 <http://www.cia.gov/cia/publications/factbook/fields/2152.html>

⁴² Singh (2001) *Note: Such competition has actually existed since 1996 when Marpin (the local Cable TV provider) became a reseller of Cable & Wireless services. Soon however a dispute arose between them about Marpin's satellite gateway and the extension of the contract, which resulted in the case being taken to court by Marpin on constitutional grounds of the fundamental right of choice of communication being obstructed. Victory for Marpin paved the way for the OECS states renegotiating the Cable & Wireless telecom monopoly (through their Telecom Reforms initiative), which has today resulted in the phased liberalization of the telecom sector.*

	wide-band access.). Limited ADSL is being provided by Cable & Wireless at EC\$460 per month for 256/128K. ⁴³
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Grenada							
Basic Stats	Area: 340 sq km Population: 100.4 thousand [2001] <table> <tr> <td>GDP per capita (PPP\$), 2000⁴⁴</td><td>\$7580</td></tr> <tr> <td>PCs as a % of GDP per capita⁴⁵</td><td>13%</td></tr> <tr> <td>Internet Dialup Access – % of GDP/capita per month⁴⁶</td><td>16.4%</td></tr> </table>	GDP per capita (PPP\$), 2000 ⁴⁴	\$7580	PCs as a % of GDP per capita ⁴⁵	13%	Internet Dialup Access – % of GDP/capita per month ⁴⁶	16.4%
GDP per capita (PPP\$), 2000 ⁴⁴	\$7580						
PCs as a % of GDP per capita ⁴⁵	13%						
Internet Dialup Access – % of GDP/capita per month ⁴⁶	16.4%						

⁴³ Singh (2001).

⁴⁴ Henry.

⁴⁵ Henry.

⁴⁶ Koul (Pg 18)

Telecom	Telephone subscribers [2001] –Total: 39.2(k); per 100 inhabitants: 39.16 Cellular subscribers [2001]– Total: 6.4(k); per 100 inhabitants: 6.41⁴⁷ ▪ Cable & Wireless Grenada Ltd. http://www.candw.gd/ is a joint venture company between the Government of Grenada (30%) and Cable & Wireless (70%). The company provides both national and international telecommunications and offer cellular, messaging, 2-way radio and VSAT services.⁴⁸ ▪ Fibre-optic cable ring around Grenada ▪ Service is all digital since 1988 and offers telex; cellular; pager; voice mail; IDD; Internet; leased circuits; and ISDN services. ▪ Connected to the Eastern Caribbean Fibre System																		
Internet	<table border="1"><thead><tr><th colspan="4">Internet⁴⁹</th><th colspan="2">PCs</th></tr><tr><th>Internet Hosts 2001</th><th>Hosts per 10,000 inhabs</th><th>Users (k) 2001</th><th>Users per 10,000 inhabs 2001</th><th>Total (k) PCs</th><th>Per 100 inhabs 2001</th></tr></thead><tbody><tr><td>12</td><td>1.2</td><td>5.2</td><td>520</td><td>13</td><td>13</td></tr></tbody></table> ▪ C&W (Carib Surf node) main ISP in operation. Dialup 56K are available at US \$48, 256K leased lines are available at US \$30,000. Currently more than 50 leased circuits and about 4000 Internet connections are in operation. ⁵⁰ (In 2000, there were 14 registered ISPs ⁵¹) ▪ “With the Cable & Wireless monopoly still in place (as no other players have yet been approved) bandwidth continues to be a serious problem. Cable & Wireless have plans however to double their capacity soon. Internet connections at some 3% of the population are very low compared to even some of the other Island states.” ⁵²	Internet ⁴⁹				PCs		Internet Hosts 2001	Hosts per 10,000 inhabs	Users (k) 2001	Users per 10,000 inhabs 2001	Total (k) PCs	Per 100 inhabs 2001	12	1.2	5.2	520	13	13
Internet ⁴⁹				PCs															
Internet Hosts 2001	Hosts per 10,000 inhabs	Users (k) 2001	Users per 10,000 inhabs 2001	Total (k) PCs	Per 100 inhabs 2001														
12	1.2	5.2	520	13	13														

Jamaica	
Basic Stats	Area: 10,991 sq km Population: 2,680,000 [2001]

⁴⁷ ITU, 2002

⁴⁸ CANTO

⁴⁹ ITU 2002

⁵⁰ Koul (2002)

⁵¹ World Fact Book 2002 <http://www.cia.gov/cia/publications/factbook/fields/2152.html>

⁵² Singh (2001).

	<table><tr><td>GDP per capita (PPP\$), 2000⁵³</td><td>\$3,639</td></tr><tr><td>PCs as a % of GDP per capita⁵⁴</td><td>27%</td></tr><tr><td>Internet Dialup Access – % of GDP/capita per month⁵⁵</td><td>14.6%</td></tr></table>	GDP per capita (PPP\$), 2000 ⁵³	\$3,639	PCs as a % of GDP per capita ⁵⁴	27%	Internet Dialup Access – % of GDP/capita per month ⁵⁵	14.6%												
GDP per capita (PPP\$), 2000 ⁵³	\$3,639																		
PCs as a % of GDP per capita ⁵⁴	27%																		
Internet Dialup Access – % of GDP/capita per month ⁵⁵	14.6%																		
Telecomm	Telephone subscribers [2001] -Total: 1,167.1(k); per 100 inhabitants: 44.90 Cellular subscribers [2001]– Total: 700.0(k); per 100 inhabitants: 26.94⁵⁶ ▪ Cable & Wireless Jamaica provides telephone services - domestic and international, throughout the island. (100% digital) The company is privately owned - 82% by C&W (W.I.) Ltd. and 18% by members of the public. ⁵⁷ ▪ Jamaica Digiport International Ltd. Which was created to provide high quality, competitively priced telephone services to companies involved in information processing activities and located in Jamaica's Free Zone. JDI is owned by Cable & Wireless (WI) Ltd. (35%), Telecommunications of Jamaica (30%), and AT&T (35%). JDI's teleport includes a Class A, 15 metre Earth Station; an AT&T Digital Switch, and utilizes Intelsat's network. Services include: international long distance; international 800; international switched service at 56 Kbps; international SKYNET services at 56 Kbps and T-1. ⁵⁸ ▪ The main national trunk network is fibre optic, and is linked regionally with the Eastern Caribbean Fibre System. ⁵⁹ ▪ Fibre optic ring around island.																		
Internet	<table><tr><th colspan="4">Internet⁶⁰</th><th colspan="2">PCs</th></tr><tr><th>Internet Hosts 2001</th><th>Hosts per 10,000 inhabs</th><th>Users (k) 2001</th><th>Users per 10,000 inhabs 2001</th><th>Total (k) PCs</th><th>Per 100 inhabs 2001</th></tr><tr><td>1436</td><td>1.2</td><td>100</td><td>384.91</td><td>130</td><td>5</td></tr></table> ▪ 21 registered ISPs [2000]⁶¹ ▪ Most ISPs use the C&W gateway. All together they provide over 75,000 Internet Connections. Dialup 56K links are available at US \$40 per minute	Internet ⁶⁰				PCs		Internet Hosts 2001	Hosts per 10,000 inhabs	Users (k) 2001	Users per 10,000 inhabs 2001	Total (k) PCs	Per 100 inhabs 2001	1436	1.2	100	384.91	130	5
Internet ⁶⁰				PCs															
Internet Hosts 2001	Hosts per 10,000 inhabs	Users (k) 2001	Users per 10,000 inhabs 2001	Total (k) PCs	Per 100 inhabs 2001														
1436	1.2	100	384.91	130	5														

⁵³ Henry.

⁵⁴ Henry.

⁵⁵ Koul, (Pg 18)

⁵⁶ ITU, 2002

⁵⁷ CANTO

⁵⁸ Primus (1998)

⁵⁹ Primus (1998)

⁶⁰ ITU 2002

⁶¹ CIA World Factbook [2000] <http://www.cia.gov/cia/publications/factbook/geos/jm.html>

	plus phone charges. Leased circuits of 128K are available at US\$1500 and T-1 at US\$8750, which is quite expensive.⁶² - Both cable and satellite facilities provide alternative transmission modes to the rest of the world. Value added services are open to competition. Cable & Wireless, Jamaica Ltd. (TOJ) is an Internet service provider and connects service providers to the Internet via its own routers and Internet backbone.⁶³ - Other commercial service providers are InfoChannel Limited, http://www.infochan.com, Jamaica On Line http://www.jol.com.jm, COLIS (Computer on Line Information System) http://www.colis.com and N5 Systems http://www.n5.com. The Jamaica Public Service Co. Ltd. http://www.jpsco.com also offers services. - JamNet - an academic network connected to the Internet via a 64 kbps link. It has an estimated 4,000 users and plans to upgrade to a 256 kbps.⁶⁴
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St. Kitts & Nevis							
Basic Stats	Area: 360 sq km Population: 45,050 [2001] <table> <tr> <td>GDP per capita (PPP\$), 2000⁶⁵</td><td>\$12,510</td></tr> <tr> <td>PCs as a % of GDP per capita⁶⁶</td><td>8%</td></tr> <tr> <td>Internet Dialup Access – % of GDP/capita per month⁶⁷</td><td>6%</td></tr> </table>	GDP per capita (PPP\$), 2000 ⁶⁵	\$12,510	PCs as a % of GDP per capita ⁶⁶	8%	Internet Dialup Access – % of GDP/capita per month ⁶⁷	6%
GDP per capita (PPP\$), 2000 ⁶⁵	\$12,510						
PCs as a % of GDP per capita ⁶⁶	8%						
Internet Dialup Access – % of GDP/capita per month ⁶⁷	6%						
Telecomm	Telephone subscribers [2000] -Total: 23.1(k); per 100 inhabitants: 59.99 Cellular subscribers [2000]– Total: 1.2(k); per 100 inhabitants: 3.12⁶⁸ - C&W St. Kitts and Nevis (www.candw.kn) is jointly owned by C&W (W.I.) Ltd. 65%, Public 18% and Government 17%. They provide national and international communications services for the island. - C&W St. Kitts and Nevis provides digital services using fibre optic cables and operates a cellular network.						

⁶² Koul (2002)

⁶³ Primus (1998)

⁶⁴ Primus (1998)

⁶⁵ Henry.

⁶⁶ Henry.

⁶⁷ Koul (Pg 18)

⁶⁸ ITU, 2002

Internet	Internet ⁶⁹				PCs	
	Internet Hosts 2001	Hosts per 10,000 inhabs	Users (k) 1999	Users per 10,000 inhabs 2001	Total (k) PCs	Per 100 inhabs 2001
	3	0.65	2	516.1	8	17.45
	▪ C&W St. Kitts/Nevis are Internet service providers and also provide VSAT services. It provides a full range of Internet services including domain name registration and leased circuit connectivity; using Carib Surf backbone for independently named Web servers. Its pricing structure for dial-up access is time-based.⁷⁰ ▪ “Between Cable & Wireless and The CABLE (a Cable TV company now transformed into a telecom provider) the infrastructure is of high quality and very competitive in St. Kitts. This results in low prices in Nevis also, where too the TV cable company is planning to enter into the ISP arena. Competition which started just from April this year (2001) has already resulted in Internet prices for dial-up falling from EC\$120 for 50 hours to unlimited access at EC\$75.”⁷¹ ▪ “The important difference with The CABLE however is that it is neither dependant on nor linked with the phone connection and therefore there is no dial-up and no phone charge. There is of course an initial investment for a cable modem, soon to be available at EC\$400. The CABLE uses a C-Band satellite link for the Internet and is now negotiating with Worldcom of USA for an undersea broad-band fibre link. They will soon be offering an entire range of TV, Radio, Internet, Video on demand and Voice-over-IP (as soon the phased liberalisation allows that by next April).”⁷²					

St. Lucia		
Basic Stats	Area: 620 sq km	
	Population: 156.7 thousand [2001]	
	GDP per capita (PPP\$), 2000 ⁷³	\$5,703
	PCs as a % of GDP per capita ⁷⁴	18%
	Internet Dialup Access – % of GDP/capita per month ⁷⁵	15.2%

⁶⁹ ITU 2002

⁷⁰ Primus (1998)

⁷¹ Singh (2001).

⁷² Singh (2001).

Telecomm	Fixed lines and mobile telephones (per 1000 people): 329.5 [2000] ⁷⁶ ▪ Cable and Wireless St. Lucia [http://www.candw.lc] is the domestic and international franchise carrier and is 100% digital. ▪ In addition to the land-line network, they operate a cellular network. They also provide VSAT and CATV and Cable services. ⁷⁷ ▪ It has fibre linkages but there are still some issues of capacity. ⁷⁸
Internet	▪ C&W is the main ISP. It offers Internet and leased data lines to T1 capacity. Its pricing structure for dial up access is time-based and 64 kbps leased lines are available at a cost of US\$1,400.00. ⁷⁹ Dial-up 56K links (unlimited) are available at about US\$52 plus 30 cents per access, leased 64K lines at US\$960 per month and T-1 at US\$7200. ⁸⁰ ▪ Some 4500 have Internet connections and 40 companies have leased access. ⁸¹

St. Vincent & the Grenadines

⁷³ Henry.

⁷⁴ Henry.

⁷⁵ Koul (Pg 18)

⁷⁶ World Bank Group – Country Profile: St. Lucia Data Profile. Source: World Development Indicators database, April 2003.

⁷⁷ CANTO

⁷⁸ Singh (2001).

⁷⁹ Primus (1998)

⁸⁰ Koul (2002)

⁸¹ Singh (2001).

Basic Stats	Area: 390 sq km Population: 115.9 thousand [2001] <table><tr><td>GDP per capita (PPP\$), 2000⁸²</td><td>\$5,555</td></tr><tr><td>PCs as a % of GDP per capita⁸³</td><td>18%</td></tr><tr><td>Internet Dialup Access – % of GDP/capita per month⁸⁴</td><td>26%</td></tr></table>	GDP per capita (PPP\$), 2000 ⁸²	\$5,555	PCs as a % of GDP per capita ⁸³	18%	Internet Dialup Access – % of GDP/capita per month ⁸⁴	26%												
GDP per capita (PPP\$), 2000 ⁸²	\$5,555																		
PCs as a % of GDP per capita ⁸³	18%																		
Internet Dialup Access – % of GDP/capita per month ⁸⁴	26%																		
Telecomm	Telephone subscribers [2000] –Total: 27.3(k); per 100 inhabitants: 24.04 Cellular subscribers [2000]– Total: 2.4(k); per 100 inhabitants: 2.08⁸⁵ ▪ The St. Vincent digital telephone system is fully owned by Cable & Wireless (WI) Ltd. Which has the domestic and international franchise for telecommunications services. It is connected to the Eastern Caribbean Fibre System ▪ It is also the local access node for Carib Surf ▪ Besides the usual dial-up links and leased circuits, St. Vincent is serviced by a fibre optic link, which the Grenadines are connected through microwave links.⁸⁶																		
	<table><tr><th colspan="4">Internet⁸⁷</th><th colspan="2">PCs</th></tr><tr><th>Internet Hosts 2001</th><th>Hosts per 10,000 inhabs</th><th>Users (k) 2000</th><th>Users per 10,000 inhabs 2001</th><th>Total (k) PCs</th><th>Per 100 inhabs 2001</th></tr><tr><td>3</td><td>.027</td><td>3.5</td><td>308.57</td><td>13</td><td>11.61</td></tr></table> ▪ C&W has monopoly in providing ICT services ▪ Dial-up 56K links (unlimited) are available at US\$52 plus 0.4 cents per minute of use, leased 64K lines at US\$1280 per month and T-1 lines at US\$14,000. ⁸⁸ ▪ “PC and Internet penetration is low and rates for access similar to other OECS states. High speed data connectivity (eq.T-1) is just exorbitant	Internet ⁸⁷				PCs		Internet Hosts 2001	Hosts per 10,000 inhabs	Users (k) 2000	Users per 10,000 inhabs 2001	Total (k) PCs	Per 100 inhabs 2001	3	.027	3.5	308.57	13	11.61
Internet ⁸⁷				PCs															
Internet Hosts 2001	Hosts per 10,000 inhabs	Users (k) 2000	Users per 10,000 inhabs 2001	Total (k) PCs	Per 100 inhabs 2001														
3	.027	3.5	308.57	13	11.61														

⁸² Henry.

⁸³ Henry.

⁸⁴ Koul (Pg 18)

⁸⁵ ITU, 2002

⁸⁶ Koul (2002)

⁸⁷ ITU 2002

⁸⁸ Koul (2002)

	(US\$ 14,000 monthly). Both reliability of access and bandwidth remain issues.” ⁸⁹
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Trinidad & Tobago							
Basic Stats ⁹⁰	Area: 5,128 sq km Population: 1.16 thousand [2001] <table> <tr> <td>GDP per capita (PPP\$), 2000⁹¹</td><td>\$8,964</td></tr> <tr> <td>PCs as a % of GDP per capita⁹²</td><td>11%</td></tr> <tr> <td>Internet Dialup Access – % of GDP/capita per month⁹³</td><td>7.5%</td></tr> </table>	GDP per capita (PPP\$), 2000 ⁹¹	\$8,964	PCs as a % of GDP per capita ⁹²	11%	Internet Dialup Access – % of GDP/capita per month ⁹³	7.5%
GDP per capita (PPP\$), 2000 ⁹¹	\$8,964						
PCs as a % of GDP per capita ⁹²	11%						
Internet Dialup Access – % of GDP/capita per month ⁹³	7.5%						
Telecomm	Telephone subscribers [2001] -Total: 567.9(k); per 100 inhabitants: 43.69 Cellular subscribers [2001]– Total: 256.1(k); per 100 inhabitants: 19.70⁹⁴ Telecommunications Services of Trinidad and Tobago (TSTT) [http://www.tstt.net.tt] is jointly owned by the Government of Trinidad and Tobago (51%) and Cable and Wireless (W.I.) Ltd. (49%). They operate a substantial land-line network and provide cellular, wireless local loop, cable and internet services. They are also responsible for International Communications for the country.⁹⁵						

⁸⁹ Singh (2001).

⁹⁰ World Bank Group – Country Profile Table. Source: World Development Indicators Database, April 2002

⁹¹ Henry.

⁹² Henry.

⁹³ Koul (Pg 18)

⁹⁴ ITU, 2002

⁹⁵ CANTO

Internet	Internet ⁹⁶				PCs	
	Internet Hosts 2001	Hosts per 10,000 inhabs	Users (k) 2000	Users per 10,000 inhabs 2001	Total (k) PCs	Per 100 inhabs 2001
	6872	52.86	120	923.08	90	6.92

- TSTT provides Internet services to the public and dedicated leased lines to larger organizations and to Internet Service Providers.
- Value added services are demonopolized and other major Internet Service Providers are: InterServ <http://www.trinidad.net>; WowNet; OpusNet <http://www.opus.co.tt>; and Carib Link <http://www.cariblink.com>.⁹⁷
- The availability of the telcomm services and access centers is good but there are concerns with regard to the available bandwidth. For purposes of connectivity, fibre optic lines as well as satellite links are available in addition to the usual dial-up links and leased circuits. (K)
- Dialup 56K links (unlimited) are available at US\$50 per month, 64K leased lines at US\$1666 and T-1 lines at US\$34,666 per month.⁹⁸
- "Other ISPs have already started offering services by connecting directly with their own satellite links rather than using the Cable & Wireless backbone/gateway that is legally still the requirement. Some 6 ISPs are operational in the country now offering a host of alternatives. The result is that good communication links especially for Internet and data services is already available and prices are reducing, especially for satellite links. TTST prices for high-speed T-1 however continues to be a very prohibitive US\$35,000 per month. Band-width is presently not a problem as both TSTT and the other service providers have sufficient capacity and satellite alternatives. Despite a liberal regime for imports of computers PC penetration continues to be quite low by North American standards. E-literacy is however increasing and some 60,000 people now have access to the Internet."⁹⁹

⁹⁶ ITU 2002

⁹⁷ Primus (1998)

⁹⁸ Koul (2002)

⁹⁹ Singh (2001).