



CUBA *GOES*

DIGITAL

by Philip Peters • November 2001

 Lexington
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■ (below) In a Havana youth computer club, neighborhood children pass a Saturday afternoon mainly playing computer games. During the week the club is filled with students taking courses.

On the spectrum of telecommunications and information technology development, Cuba is found at both extremes. In terms of the reach of its basic residential telephone network, Cuba ranks near the bottom among Latin American countries. Yet Cuba is incubating a group of enterprises that design and export advanced business and medical software products. And Cuba's government, fully aware of this sector's importance in economic development, is working to make the population computer-literate even as it limits Internet access.

This paper examines the state of Cuba's telecommunications services and the impact of foreign investment – \$473 million between 1995 and 2000 – on the modernization of this sector; describes Cuba's "cyber-education" efforts; reports on ways Cubans gain access to the Internet, legally and surreptitiously; and looks at several examples of businesses that are using up-to-date technology and commercial practices.



Modernizing the basic phone network

In the early 1990's, Cuba's communications ministry organized a briefing for senior officials to provide "a comparison of where the world was going in telecommunications with where Cuba was at the time," according to one of the briefers. The result? "We scared a lot of people," he said, and Cuba decided to develop its telecommunications and information technology capacity as a high priority, and to make telecommunications a major part of Cuba's new foreign investment policy.

Cuba used its own model of telecom development, however. Like other Latin American countries, Cuba decided to take advantage of foreign investment and new technology. Unlike

nearly every other country in the region, Cuba did not use competition among multiple service providers to maximize investment and technological innovation and to drive down consumer costs.

Most notably, Cuba did not privatize its phone company. It retained a state monopoly and attempted to create conditions that would attract the participation of foreign investors in that monopoly.

Foreign partners. The first major foreign investor was Mexico's Grupo Domos, a Monterrey-based consortium. In June 1994, Domos agreed to purchase a 49% stake in the company, ETECSA, a major joint venture under Cuba's new 1993 foreign investment law. Domos promptly sold one fourth of that stake, or one eighth of the company, to STET, the international venture of Telecom Italia. The deal was completed April 1995. Domos promised to invest \$700 million in the first seven years of the venture, and Mexico forgave \$300 million in Cuban debt as part of the deal. Mexican President Carlos Salinas traveled to Havana to celebrate the agreement.

The joint venture followed a model similar in structure to Mexico's privatization of its own phone company, Telmex. ETECSA retained its monopoly status, and the investors were committed to reach numerical targets for expansion and modernization of the phone network, and to achieve specific improvements in the network's quality of operation. By January 2007, 1.6 million lines were to be in service, the number of lines per hundred inhabitants was to increase to 10 nationwide and 20 in Havana, and at least one telephone was to be installed in each town of 500 or more population.

However, Domos soon encountered financial difficulties either because of Mexico's economic crisis, or because it made commitments that exceeded its financial capabilities. By late 1995, the deal began to unravel as Domos was unable to meet its schedule of payments. Reportedly, Domos chief Javier Garza was in Havana in December 1995, barely eight months after

the joint venture was finalized, pleading unsuccessfully for rescheduling of an overdue \$200 million payment.

By June 1997 Domos confirmed it had no more shares in the company, and its participation ended. Telecom Italia, through its STET venture, took over Domos' role as the leading foreign investor. ETECSA is now owned 51 percent by the Cuban government, 29 percent by Telecom Italia, 12 percent by a Panamanian consortium and eight percent by Cuba's Central Bank.

An antiquated network. ETECSA faced a huge task. Cuba's telecom industry had received only minimal investment since the beginning of the socialist government in 1959. Nearly the entire phone network operated on analog systems instead of modern digital technology; it was comprised of equipment of many nationalities. Phone calls were transferred on switchboards over 60 years old; switching centers were antiquated and made domestic long distance service difficult, and wiring to homes was similarly precarious. Foreign visitors still encounter machines they have never seen before, such as a wall-mounted box in a small Havana office building that clicks and rattles in rhythm as it handles calls on the building's dozen phone lines.

However, ETECSA now had funds to invest, and its investment has had a noticeable impact.

The first step was to create a modern network for government and enterprise data, and for the business and tourism sectors. An early measure of this investment came during Pope John Paul II's January 1998 visit to Cuba. Foreign press centers were established in Havana and in the provinces for the media covering the Pope's visit; the voice and data links were reliable and of high quality, a resident journalist said, an achievement "unimaginable a few years ago."

Investment in the basic residential network also began to produce changes. Cuba's "teledensity" (phone lines per hundred population) is among the lowest in the hemisphere. But it has increased from 3.2 in

Cuban telecom by the numbers

A half-billion invested...

Telecom investment (\$ million)

1995.....	15
1996.....	30
1997.....	98
1998.....	123
1999.....	100
2000.....	107
TOTAL	
1995-2000.....	\$473 million

...has added new lines...

Expansion of the basic phone network

	1994	2000	2004 (projected)
Lines in service (thousands).....	350	482	1,064
Teledensity (lines per hundred inhabitants).....	3.2	4.4	9.4
Call interruption rate, daily average.....	4.2%	0.18%	
International calls completed on first attempt.....	17%	43%	

...improving quality...

Digitalization of the network

	1996	2000	2004 (projected)
Havana.....	16%	60%	
Rest of country.....	4%	41%	
Total.....	10%	50%	84%

...and access for residential users...

Teledensity

	1996	2000	2004 (projected)
Havana.....	7.1	20	
Rest of country.....	2.3	2.9	
National.....	3.2	4.4	9.4

...and for the public at large...

Public pay phones

	1996	2000	2004 (projected)
Havana.....	2,994	6,846	
Rest of country.....	3,286	7,770	
National total.....	6,280	14,616	50,000

1996 to 4.4 in 2000 (and from 7.1 to 20 in Havana), and is projected to reach 9.0 in 2004, just short of Mexico's current level.

Modern digital switches have been installed in many areas of Havana and in six provinces. About half of all lines are digital now, compared to one percent when ETECSA's program started. Digital service allows calls to be completed faster and more reliably, and with a quality that begins to make dial-up Internet service possible. It also enables ETECSA to offer call waiting, call forwarding, conferencing, wake-up calls, and other supplemental services.

As digital switches are installed and decades-old trunk lines are replaced, announcements appear in newspapers telling residents where to apply for installation of residential lines. On January 24, 1999, ETECSA announced that 41,000 new residential lines would be installed in Havana. Within four days, 54,438 applications were received. Some claim that political factors determine who can receive new phone service, since applications are reviewed both by ETECSA and by local government and "mass organizations" who examine applicants' "revolutionary merits."

Consumers pay very little for basic residential phone service. In areas not yet served by digital switches, consumers pay 5.35 pesos monthly (about \$0.27) for unlimited local service. (According to official data, the average Cuban salary is 243 pesos per month, but many Cubans earn far more.) In areas with digital lines, consumers pay 6.25 pesos per month (\$0.31); after 300 minutes of use, their local calls are billed at a rate of 5 cents (of the Cuban peso) per minute, or one fourth of a U.S. cent per minute. A long distance call from Havana to the eastern tip of the island costs 3.30 pesos for three minutes, or about \$0.17. The average Cuban household spends 10-12 pesos monthly (\$0.50-\$0.60) on domestic long distance service.

...yet Cuba's neighbors advance much more rapidly.

Cuba in regional context

	Teledensity 1998	Teledensity growth 1993-1998	Telecom sector investment per capita	International traffic: growth in volume of minutes 1993-8
Cuba	3.5	9%	\$6.65	454%
Costa Rica	17.2	47%	\$9.03	83%
Mexico	10.4	36%	\$153	97%
Argentina.....	19.7	68%	\$38	151%
Trinidad and Tobago	20.6	30%	\$168	58%
Peru	6.3	89%	\$87	96%
Brazil	12.0	62%	\$47	150%

Source: International Telecommunications Union



■ (above and right) In Central Havana, near the intersection of Salud and Infanta streets, ETECSA workers install new lines following installation of a digital switching center nearby. They are replacing lines that are more than 50 years old. The modernization increases network capacity, allowing residential lines to serve the entire building instead of the handful of apartments served before. ETECSA is considering the use of wireless technology to expand local service in urban areas – an innovation that would avoid the expense of laying lines to each block and each residence.

Cubans generally report that ETECSA's modernization is improving service. They say that repairs are made in days, not months. Repairmen arrive "knowing what to do and having all the equipment they need, instead of carrying parts of old phones that they might be able to use to fix your problem," a Havana resident said. The first Havana phone directory published in over a decade was issued by ETECSA in 1996 and has since been updated.

Wireless services. ETECSA was granted a monopoly over basic services – wireline telephone service, data transmission, telex, and international long distance – until 2006. However, other services such as cellular and paging are available for the participation of other companies, and are in theory open to competition.

Cellular phone service is one such sector. Since 1994, the company Cubacel has offered this service and now has more than 6,500 permanent subscribers – business executives, officials, foreign executives, and in at least one case, a successful Cuban entrepreneur. The service covers about 41% of Cuba's population area. In February 1998, Sherritt International, a Canadian company that is Cuba's largest foreign investor, bought a 37.5 percent stake in Cubacel for \$38.25 million.

Cubacel's service is expensive: a subscriber pays a one-time activation fee of \$120 and a monthly charge of \$40. For airtime, one pays \$0.30 per minute for off-peak hours and \$0.40 per minute for peak hours. (Visitors can rent phones by the day and pay higher rates.) International calls carry an additional charge: \$2.45 per minute to the United States, for example.

Cubacel operates in the TDMA format, which is not compatible with European cellular phones. A second cellular company, C-Com, is preparing to operate a GSM-format system that will give European visitors "roaming" capability;

U.S. financing for Cuba's telecom development

In the early 1990's Cuban policymakers faced the question: How to attract foreign investment in Cuba's phone company?

With dozens of countries privatizing and opening to competition, there was a rush of investment capital flowing into the modernization of developing countries' phone networks. But Cuba was neither privatizing nor allowing competition.

Some investors might be attracted by an opportunity to gain a concession in a public utility shielded from competition, and investors in many sectors in Cuba are known to think not only of their immediate balance sheet but of the valuable foothold they have in a market that will expand when the U.S. embargo ends.

But any investor would have to doubt the profitability of renovating and expanding Cuba's telephone network when Cuban consumers only pay 6.25 pesos per month – the equivalent of \$0.31 – for basic residential service.

The finances of ETECSA, Cuba's phone monopoly, are unknown, but one can reasonably speculate that the low revenues from local service are compensated by the two business sectors where ETECSA collects dollar revenues – the business and tourism sectors, and international service.

In international service, ETECSA enjoys an advantage perhaps unique in the world.

From the beginning of international phone service until the 1980's, national monopolies charged artificially high rates for international traffic, using the revenue to subsidize domestic service. In the 1990's, as competition became possible, the system of monopoly rates has eroded severely, as competing companies attempted to increase their revenues by charging rates based on their actual costs. Cuba, however, continues to have a monopoly handle its international phone service, and this monopoly charges a wholesale rate (a "settlement rate" in industry parlance) of \$0.60 per minute for traffic to and from the United States, and higher rates, according to U.S. industry sources, for traffic to and from other countries.

The net revenue impact of high international rates would not be significant if U.S.-Cuba phone traffic was balanced, with roughly equal numbers of minutes flowing in each direction. However, the ratio of the U.S.-Cuba traffic is more skewed than on any Latin American route – more than 20 minutes of phone traffic originate in the United States for every minute that originates in Cuba.

From the 1960's until the early 1990's, phone service was available between Cuba and the United States, but Cuba received no revenues. Because of the U.S. trade embargo, payments owed to Cuba by U.S. companies were paid into a blocked account and held for future payment pending a change in U.S. embargo policy.

This situation changed when the Cuban Democracy Act of 1992 allowed American companies to pay Cuba, instead of depositing Cuba's revenues in the blocked account. This change took effect in late 1994, and the impact began to be seen the following year. The volume of Cuba's international traffic grew more than seven-fold between 1993 and 1998, when it reached 174 million minutes, and because nearly all these minutes flow to Cuba, they represent a large revenue stream for ETECSA. By 2000, American companies were paying Cuba about \$84 million annually to handle this traffic.

Ironically, while American policy bars American companies from investing in the improvement of Cuba's domestic telecommunications system, revenues from phone calls originating in the United States seem to provide a large share of the capital that Cuba's phone company and its foreign partner are using for that same purpose.



initial installation will be in Havana, Varadero, and the coastal zone in between. Unlike ETECSA and Cubacel, C-Com is funded entirely from Cuban capital. Movicom, a company that provides trunking and paging services, is also funded from Cuban sources only.

America is calling

Cuba's incoming international phone traffic, millions of minutes

1993.....	23.6
1994.....	36.9
1995.....	114.3
1996.....	104.5
1997.....	133.4
1998.....	174.0

These figures are conservative estimates of Cuba's net inbound international phone traffic – the excess of incoming calls over outgoing – which determines how much Cuba collects from foreign phone companies. Traffic increased dramatically after 1994, when the United States began to permit normal payments to Cuba's phone company to terminate calls from the United States. U.S. industry sources estimate that about two thirds of Cuba's overseas calls come from the United States. Source: International Telecommunications Union.



Internet development

Cuba's admirers and detractors agree that broad popular use of the Internet has barely developed in Cuba. They would disagree as to the reason why – lack of resources, or a deliberate policy of restricting information – and to a degree, both would be right. Yet it is also the case that in spite of the difficulties, more Cubans use the Web than are officially accounted for.

Cuba began to use computers in the 1960's, established satellite links with Soviet databases in the early 1980's, and by the 1990's had dozens of computer networks in operation, each serving a field such as science, medicine, education, tourism, or banking and commerce. Connection with the Internet came haltingly; at first, it was through a nightly phone call to an Internet node in Canada where a day's accumulation of e-mail was transmitted in each direction; today, it is through normal commercial links that give Cuban Internet users access to e-mail and the Web.

However, Cuban Internet users are relatively few. Part of the explanation is rooted in government policy, for four reasons. First is the Cuban government's general policy of

controlling information flows of all kinds. Second is the Cuban leadership's skepticism toward globalization. Third, the Internet's information resources and communications capabilities represent significant changes in Cuba, and Cuba tends to absorb major changes only gradually. Finally, Cubans can perceive a national security issue: "It is not paranoid to think carefully about how to use the Internet without giving additional tools to the people who want to trip up the Cuban economy," Cuban official Juan Fernandez Gonzalez told *Industry Standard* magazine last year.

Yet even if none of these four factors were present, there would still be obstacles – the first of which is the Cuban phone network itself, over which Internet traffic must travel.

Only half of Cuba's phone lines are served by digital switches capable of handling Internet traffic. On the lines served by digital switching centers, Vice Minister of Communications Roberto de la Puerta says, "theoretically, you can get [dial-up] Internet. At the most, the speed will be 9.6 or 14 kbps [kilobytes per second]. The copper wire is 40 years old, at least. It has probably been cut four times by hurricanes, and it gets wet every time it rains. The local switch may be new but the cable may still be 40 years old." A Cuban technician who says that lack of infrastructure is a "pretext" for restricted Internet access nonetheless agrees that dial-up access is only practical where new switches and lines have been installed; the old lines may reach a speed of 14 kbps, "with horrible noise on the line."

The task of modernizing Cuba's telecommunications network and extending it to a larger segment of the population – a prerequisite for expanded Internet use – is daunting. Yet the network has improved tangibly in recent years, the installation of digital switches continues, and a nationwide fiber optic ring is being installed. Technical obstacles, therefore, are being addressed.

As a result, full Internet service is now available to businesses and official institutions only; individuals are not permitted to



■ (above, right, and left) ETECSA's modernization includes expansion of public telephone service. Thousands of public pay phones have been installed nationwide, their number more than doubling to 14,616. Users pay Cuban pesos for domestic service on some public phones, and dollars for international service on others. Some accept prepaid cards; one shown here has a streetside operator accepting payment for domestic long distance calls.

purchase dial-up service. A look at Cuban portals (cubaweb.cu or islagrande.cu) shows how Cuba is using the Internet to project its image and point of view, and to use electronic commerce to sell tourism packages and services.

Cubaweb lists dozens of official sites, including Cuban news media, the tourism sector, businesses, scientific and technical institutions, a directory of e-mail networks and domains – and links to electronic commerce opportunities such as gift deliveries, money transfers, airline reservations, and car rental.

Some individuals have home Internet connections, however, because their employer authorizes them to have it. Five Cuban companies provide Internet service, at high cost: an individual account costs \$75 for 100 hours monthly.

Estimates of the number of e-mail accounts in Cuba are in the 35,000 – 40,000 range. A Cuban official says a study is under way regarding the possibility of allowing individuals to purchase dial-up service. It is a safe bet that Cuba will proceed slowly toward the point where the Internet serves as a domestic and international personal communications tool for the majority of the population.

Who uses the Internet. The following vignettes illustrate the varied ways in which Cubans use the Internet:

■ **Post office e-mail facilities.** In the summer of 2001, Cuba's post offices began to feature a new service: e-mail and Intranet access moderately priced in dollars. For \$4.50, one can purchase a magnetic card that grants three hours of access to a computer where a user can establish an e-mail account and use a Cuban Intranet based on the portal islagrande.cu. (The screen where these users create their accounts can be found at correos-decuba.cu; click on the "tu correo" icon on the right side of the screen.) The e-mail account allows the user to communicate with any e-mail user worldwide. While \$4.50 is a significant purchase for a Cuban earning an average peso salary, it represents large savings over international telephone rates; for example, calls to the United States are billed at \$2.30 per minute. Thirty of these facilities are in operation. In a Havana post office, six terminals were available for use, and they were full on a Saturday afternoon with five people waiting in line. Customers included young people using chat rooms, a Cuban sending e-mails to friends in Spain,

and an Asian visitor to Cuba. The room is “always full,” the sales clerk said.

■ **Other Internet cafés.** Hotels have also begun to offer Internet service with full Web access, but at prices up to \$12.00 per hour. An Internet café in the *Capitolio* building in Central Havana charges \$5.00 per hour.

■ **Workplaces.** Employees of some ministries and enterprises are using the Internet in their work. A 25-year old who works in a government office explains that he and his colleagues take advantage of this opportunity to establish free e-mail accounts on Yahoo or Hotmail, and to communicate with friends in Cuba and abroad.

■ **Writers’ union.** Off the *Plaza de Armas* in Old Havana is a small cybercafé established by the union of writers, artists, and composers. The café, called *El Aleph*, is open to union members, members of the book institute, and a few artists. It opened in November 2000 and charges a monthly fee of 10 pesos (\$0.50) for the use of its seven computers. An administrator explained that the café has acquired a rooftop dish that will, once connected, provide a direct link to the server of the Ministry of Culture, with higher speed and greater bandwidth – and full Internet access. Users correspond via e-mail and take courses in the basics of

personal computer operation.

■ **University access.** Students’ ability to gain Internet access seems to depend on the department in which they study. Students of international economics and mathematics say they have access to terminals with Internet service and use the Web in their research. Two undergraduate accounting

students said they have no such access in their department. Students use these terminals to establish free e-mail accounts.

■ **Friendly loan.** Earlier this year, an entrepreneur who rents rooms in his home greeted an American guest and asked a series of surprisingly detailed questions about Senator Jim Jeffords’ decision to switch parties. His questions were up to date because he regularly reads CNN.com on his friend’s home computer; his friend is a journalist and is authorized to have Internet in his home. The entrepreneur has a free e-mail account that guests use to make reservations in his home.

■ **Black market dial-up service.** A Cuban professional has full Internet access in his home because his ministry’s network administrator gave him the server’s passwords. He reads foreign news sites regularly and has a free e-mail account on Hotmail. Others buy passwords for monthly fees of \$20-\$30 on the condition that they log in between 7:00 p.m. and 6:00 a.m. and on weekends. One Cuban told of a company in his neighborhood that closed for the month of August, resumed operations in September, and received an \$1,100 bill for August Internet service because its access codes were apparently stolen and sold on black market.

■ **Internet entrepreneurs.** A 26-year-old Cuban who works in a state enterprise has no Internet access at his work, but he earns more from Internet-related work than from his salary. He has learned webpage design and html on his own and occasionally by paying for instruction. In turn, he gives lessons to beginners for \$1 per hour. For a fee of \$50, he designs and places webpages for entrepreneurs who rent lodging and wish to use the Internet to advertise their service and make reservations. His cost for page placement is zero, because he places them on free sites such as Yahoo or LatinChat. A cursory search can yield many pages advertising rooms in private homes in Cuba; some pages are for individual homes, others resemble real estate agency pages because they group dozens of homes, displaying photos, descriptions, and floor plans.

■ (below and right) *The Palacio de Computación in central Havana, a former Sears Roebuck store where Cubans learn computing skills. Inside on the ground floor, students sign up for practice time on a bank of computer terminals.*





Information technology education

Regardless of Cuba's restrictive policy toward the Internet, it is clear that a budding program of information technology education – called the “*informatización* of Cuban society” – is increasing Cubans' awareness of information technology and the Internet, and will create greater demand for Internet access in the future.

The program operates in schools, youth clubs, and special centers for computer learning (*Palacios de Computación*) that are teaching computer basics to a wide variety of Cubans.

Havana's *Palacio de Computación* was inaugurated by President Fidel Castro on March 7, 1991. Near the *Capitolio* building in central Havana, it is housed in a former Sears Roebuck store – a cavernous, air conditioned building that bustles with students and construction noise from interior renovations under way. It receives 250-300 students daily. Children from nearby schools attend classes during the daytime. On a weekday afternoon, scores of older students were present – young professionals, nurses, military and police officers, a painter wearing his work-clothes, a 23-year-old secretary hoping that a three-month course would improve her job skills and qualify her for a new job; a 12-year-old computer fanatic whose mother drove him from his home across the bay.

The facility has 51 personal computers. On the ground floor are workstations on which students can practice; upstairs are classrooms where they learn the basics of Windows, Excel, Word, Outlook, Powerpoint, and related programs. Advanced courses include programming and Web design. The *Palacio* has a web page (www.pal.jcce.org.cu) that explains its programs.

A network of 174 youth computer clubs gives young Cubans a chance to learn computer basics. The network, which began operation in 1987, is expanding and is expected to double in the coming years. They feature a Cuban-designed course (*Cipni 3.0*) that takes students through a progression including Windows, Word, Powerpoint, Paint, e-mail, Internet and use of web pages. According to a June 2001 Cuba press report, 300,000 students have completed courses in these clubs.

One such club in Havana's Vedado neighborhood offered an air-conditioned refuge from a summer Saturday afternoon's extreme heat. About 15 10-to-15-year-old youths were inside experimenting on banks of personal computers. One was using Microsoft's Encarta program to learn about China and Nepal; another was drawing pictures in the Paint program; others played a variety of games. During the week, the club hosts schoolchildren for formal instruction in basic software programs and games. “Saturdays are for fun,” the director said, and “we have to push them out of here.” The computers are not connected to the Internet – “not yet,” the director said.

Cubans are not able to buy personal computers for private use. Computers are sold at dollar stores, but only to commercial customers. At a Havana store that sells appliances and electronic goods priced in dollars, customers can buy computer components – Logitech keyboards, chassis, Intel motherboards for Celeron processor, fans, microphones, monitors. Microprocessors were not available, but sales clerks said that another store sells them. And as is the case with many other goods, Cubans can resort to the black market to get parts or entire computers, many assembled from collections of parts obtained from myriad sources and made to work as a unit.



■ *The Ministry of Informatics (information technology) and Communications, near the Plaza de la Revolución. The Ministry was created in January 2000 to manage telecommunications investments, telecommunications policy, and to promote information technology education. The Ministry also has jurisdiction over the postal service; inside this building is a postal facility where Cubans can open e-mail accounts and use computers to communicate worldwide; the computers have access to Cuba's Intranet, organized around the islagrande.cu portal.*

Information technology in business

The most concentrated use of information technology in Cuba occurs in the commercial and government sectors to increase efficiency, access to information, and profitability.

Perhaps the most advanced endeavor in this field is the Information Technology Group (GTI, for *Grupo de Tecnología de Información*), a collection of 25 companies that perform programming, software design, and other IT services. Two of GTI's companies, a software designer and an advertising and graphic design agency, are joint ventures with foreign partners.

GTI's companies are located in every province of Cuba. They include 4,000 employees, of which 2,500 are professionals. Clients contract with member companies, or they may bring a project to GTI's central management, which will find a member company, or a team assembled from various member companies, to carry out the job.

GTI's mission is to foster leadership in information technology, telecommunications technology, and systems automation. Its main function is commercial, serving the Cuban market and making export sales to countries such as Spain, Guatemala, Panama, Costa Rica, Chile, and Peru. GTI had export sales of \$14 million in 2000, compared to under \$7 million in 1999.

GTI also has a social function; it designs programs and installs infrastructure for educational programs in youth centers, it installs e-mail/Intranet centers in post offices, and participates in other parts of Cuba's information technology education programs.

In an interview, a GTI executive displayed a typical businessman's interest in achieving efficiency, finding customers and increasing sales. Like many of his colleagues, this executive has worked abroad in Cuban businesses. His main challenge is finding a competitive niche in Spanish-language software markets. Unlike American executives in this sector, he did not complain of a shortage of skilled technical labor – "What I need is project managers," he said. Cuba is training information technology professionals at eight universities and 14 technical high schools, he said, and some professionals in other sectors are retraining to work at GTI companies. For example, a retrained nuclear physicist designed the *Patris* telemedicine program, which transports photographs, x-ray, sonogram images, and other data between medical facilities. This software has been exported to Peru, Spain, and Ghana.

As is increasingly common in the Cuban workplace, GTI workers receive a base

salary in pesos and have an opportunity to receive bonuses, paid in dollars and tied to completion of a project, quality, or speed of delivery. A typical GTI programmer, the executive explains, earns a monthly base pay of 400 pesos, and a good work record can add 400 pesos and \$30 to \$50 to that amount, quadrupling the base pay.

Desoft is a GTI member company, a joint venture with Italian investors, whose 50 employees produce software for business applications. Its flagship product is *Zun*, a software package for hotel management that includes applications for front office, inventory, point-of-sale, supply, accounting, and other management tasks. *Zun* is used in Cuban hotels – 12 of the foreign chains operating in Cuba have purchased it – and has been exported to Latin America. Desoft has also produced:

- software that manages traffic on Cuba's pay telephones, solving incompatibility problems in a network of equipment imported from many countries;
- flight information display systems at airports;
- *Vigil*, a security and authentication program for Cuban cigars that works by embedding a chip in cigar boxes; at the point of sale abroad, a reader can determine when the box of cigars was shipped, when it cleared customs, and other information.

An American information technology executive recently evaluated GTI's capabilities – the languages its programmers use, the technology it employs, the applications its companies are creating – and was pleasantly surprised. "I expected them to be a step or two behind the industry," he said, "but they are right on the cutting edge."

GTI's companies are housed separately, mainly in residential neighborhoods scattered across western Havana. Planning is under way for a new GTI facility on the coast east of Havana near Guanabo, a place some call a future "Silicon Beach."

Other companies provide examples of the ways information technology is being used in Cuban business, and is changing Cuba's commercial culture.

- A 262-employee Matanzas architecture and engineering firm is revamping its operations as part of Cuba's state enterprise reform. It has invested heavily in information technology, and an executive complains of the premium he pays for American equipment by importing it through Panama. In five years the firm increased its stock of personal computers from four to 112 and created a local area network for internal communication, management systems, and to facilitate project teamwork. All architectural designs are on the network. In early 2001, the network had external e-mail capability, and executives said they were waiting for full Internet access.
- An executive in a Cuban foreign trade company seeks a better way to track projects and transactions carried out by her team of 15 employees. She is in discussions with three Cuban companies who were competing to design business software to monitor projects, create a database of past transactions, and make that database available to her purchasing agents so they will have a record of vendors' price histories each time they discuss a new transaction.
- *GIGA* is a glossy magazine dedicated to computing and information technology. A recent issue included articles on viruses and cyber-attacks, microprocessor technology, database creation, and training for network administrators.
- K-Gen Ltd., a Scottish software producer, entered a partnership with the Cuban software design firm Softel, a member of GTI. A K-Gen executive says the agreement makes his firm a "front door" for foreign companies seeking to use Softel's services and to contract with Cuban software designers generally. He said it will address his country's main bottleneck in information technology development, the "chronic lack of trained staff."

- *Opciones*, a business newspaper, includes classified advertisements for Cuban firms offering network security services; all-around information technology training; business software, either off-the-shelf or specially designed; computer repair; and consulting services for companies wishing to make greater use of information technology in management, databases, accounting, and other functions.
- Tour and Marketing Ltd., a tourism company now engaged in e-commerce, reached \$700,000 in revenues in 2000. The use of a web page to sell tours and travel-related services has contributed to a tripling of revenue over the firm's 1995 level. The company's president, Steven Marshall of Yorkshire, England, has developed other ventures: a company that designs and hosts web pages; Cubagiftstore.com, an on-line retail and delivery service that enables people abroad to send gifts to Cuba; and most recently, a wireless broadband service for private networks, to be used mainly by hotel chains for internal communication, data management and public information kiosks. Marshall says he finds "qualified people very, very easily. These are some of the most qualified people I have seen in my life. We provide training in meeting deadlines and teamwork, and our Cuban staff are very punctual, precise in what they do, and very good at sales."
- In December 2000, Cuba's Central Bank reports that 15,000 banking sector employees had been trained in Cuba and abroad in computing and information technology. The sector used 750 computers in 1994 and 13,000 by the end of 2000.
- An October 2001 press report tells of a GTI member company that automated the processes of a propane gas plant and as a result expanded capacity by 16 percent while reducing electricity consumption by 16 percent. The company also uses "smart building" technology to reduce water and energy consumption in hotels.

Conclusion

Cuba's telecommunications and information technology development is similar to other developments in the Cuban economy: the change has been significant compared to Cuba's position a decade ago, but it is not comparable to the rapid change this industry has seen in other developing countries.

One may argue that a different strategy, or a more open economic system, would bring more rapid progress. Yet it is clear that in spite of the limitations, this sector's development has brought clear public welfare benefits. Greater numbers of Cubans have access to affordable phone service. Quality of service improves step by step as the phone network incorporates modern technology. Computer literacy is expanding. A small software design industry is getting started. The Internet has come into use as an informational and commercial tool, to the benefit of official institutions and enterprises and, unintentionally, thousands of citizens who find ways to gain access for their private uses.

Some observers say that Cuba has the potential to become a Latin American leader in information technology, and Cuba certainly has assets to realize this status: an educated workforce, government commitment to technology development, a demonstrated capacity to attract foreign investment and partnership. But Cuba faces considerable foreign competition in software development and other sectors, and it lacks the culture of open access and competition that has driven technological innovation elsewhere. Continued progress therefore seems likely, while regional leadership does not.

Continued progress is also likely in basic telephone service and Internet development, due to the increasing use of modern technology and the renovation of the public telephone network. Such progress would be accelerated by economic developments that allow greater resources to be dedicated to this sector, and by government policies that would promote greater competition and investment and public access to these services.

The United States is relevant to these developments only by its absence. American law limits U.S. companies to the delivery of international long distance traffic and prohibits them from engaging in any business “beyond the gateway,” i.e. any development that would contribute to the development of Cuba’s domestic telecommunications network. The assumption behind this policy is that if Americans engaged in this business, the Cuban people would not benefit. The story of Cuba’s continued telecommunications and Internet development – and Cubans’ access to these services – will therefore be written by Cubans themselves and the foreign partners who are slowly bringing the island into a digital future. ■

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Photos by Philip Peters

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Further reading

The Cuban Way: Capitalism, Communism and Confrontation, by Ana Julia Jatar-Hausmann, Kumarian Press, 1999.

An ample listing of Cuban websites with Cuban media, speeches, announcements, decrees, other official information, and news on Cuba's economy, is found at www.cubaweb.cu.

"Cuba, the Internet, and U.S. Policy," Briefing Paper #13 in the Georgetown University Cuba Briefing Paper Series, by Nelson P. Valdes, March 1997. The series of papers on economic, social, and political topics, is found at: www.georgetown.edu/sfs/programs/clas/Caribe/cbps.htm.

Information on the *Palacio de Computación* and the youth clubs, including organization, history, programming languages, and curriculum, is found at www.pal.jcce.org.cu.

Lexington Institute studies on Cuba's economy and U.S.-Cuba relations, and other materials are found at www.lexingtoninstitute.org/cuba.

Studies by the author published by the Alexis de Tocqueville Institution: "Cuban Agriculture: Slow Road to Recovery," March 1999; "Cuba's New Entrepreneurs: Five Years of Small-Scale Capitalism," August 1998 (text available at www.adti.net; authored by Philip Peters and Joseph L. Scarpaci); "Cubans in Transition: The People of Cuba's New Economy," March 1999; and "A Different Kind of Workplace: Foreign Investment in Cuba," March 1999 (a study that includes discussion of the ETECSA telecommunications joint venture); all available for sale at the Alexis de Tocqueville Institution (www.adti.net).