10
Ghana

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The Republic of Ghana is a West African nation on the Gulf of Guinea with an area of about 92,000 square miles and a population of about 16 million (1995). Its topography consists of forest and savannah, and the country is divided into ten regions, with the national capital located at Accra. Ghana's six largest ethnic groups are the Akans (44 percent of the population), Ewe (13 percent), Ga-Adangbe (8 percent), Mole Dagbane (16 percent), Guans (4 percent), and Grume (3 percent). The official language is English. The Volta is Ghana's largest river and the location of the Volta Lake on which are built two hydro dams, Akosombo and Kpong, with a total capacity of about 1.12 gigawatts.

Ghana's main export products are cocoa, gold, and timber; other exports include diamonds, bauxite, and manganese. The fluctuation of world market prices and the absence of processing industries for these products have historically affected Ghana's revenues. Ghana imports oil for energy consumption, and exports hydroelectricity to Togo, Benin, and Burkina Faso.

In 1987, Ghana's per capita gross national product (GNP) was U.S.$390. The World Bank's estimate of Ghana's GNP in 1991 was about U.S.$440 per capita. Since 1984, Ghana has been implementing an Economic Recovery Program, which gives the country easier access to International Monetary Fund (IMF) and World Bank loans. In 1988, Ghana's exports, which amounted to U.S.$1.014 billion, exceeded imports (U.S.$907 million) by over U.S.$4 million.

Since 1981, Ghana has been a unitary republic ruled by decree. In November 1992, however, an election was held to select a president for the next democratically elected parliamentary government. In January 1993, following parliamentary elections, Ghana returned to a parliamentary form of government.

10.1 History

10.1.1 The Precolonial Era

The first telegraph line in Ghana (then known as the Gold Coast) was a 10-mile link installed in 1881 between the castle of the colony's then governor in Cape Coast and Elimina. The line was then extended to Christianborg Castle near

Accra, which became the seat of government, and later extended still further to Aburi, 26 miles outside Accra.

In 1882, the first public telegraph line, stretching over a distance of 2.5 miles, was erected between Christianborg and Accra. Between 1887 and 1889, these telegraph lines were extended to cover Accra, Prampram, Winneba, Saltpond, Sekondi, Ankobra, Dixcove, and Shama—all colonial castles or fort towns, as well as commercial ports and fishing centers. In 1886, telegraph lines were extended to the middle and northern parts of Ghana into the territory of the Ashantis. Between 1900 and 1901, this new communications technology was used to subdue the Ashantis in the Yaa Asantewa war.

Because Ghana's telegraph lines were often cut down by superstitious locals convinced that the cables were "magic" lines being used by the Europeans to win wars, Ghana's colonial governor entrusted the safety and security of the lines to the tribal chiefs in 1886. The colonial governors offered the chiefs handsome rewards for reporting any damage done to the lines.

In order to improve communications in the southern part of the country, the first manual telephone exchange (seventy lines) was installed in Accra in 1892. Twelve years later, in 1904, a second manual exchange consisting of thirteen lines was installed in Cape Coast.

10.1.2 Under English Colonial Rule

Ghana's telecommunications infrastructure was laid down and expanded by the colonial administration mainly to facilitate the economic, social, and political management of the colony. In 1901, for example, the Ashantis were brought under British colonial rule, and telegraph lines were accordingly extended from Accra to the capital of the Ashanti Kingdom and beyond. By the end of 1912, 1,492 miles of telegraph lines had been constructed to link forty-eight telegraph offices spread throughout the country.

Before the beginning of World War I in 1914, 170 telephone subscribers had been served in Ghana, but it was between World War I and 1920 that the backbone of the main trunk telephone routes—Accra-Takoradi, Accra-Kumasi, Kumasi-Takoradi, and Kumasi-Tamale—was built using unshielded copper wires. By 1930, the number of telephone exchange lines in Ghana had grown to 1,560, linking the coastal region with the central and northern parts of the country.

Due to the depressed global economy of the 1940s, there was little or no growth in telecommunications in Ghana during and immediately after the Second World War. Nevertheless, during that period 1+1 carrier equipment was installed on the Accra-Takoradi, Accra-Kumasi, Kumasi-Takoradi, and Kumasi-Tamale physical trunks. These were later augmented with 1+3 carrier equipment, thus increasing the trunks connecting these towns threefold.

In 1953, the first automatic telephone exchange with 200 lines was installed in Accra to replace the manual one erected sixty-three years earlier. Three years later, in 1956, the trunk lines connecting Accra, Kumasi, Takoradi, and Tamale were upgraded through the installation of a forty-eight- and twelve-channel VHF network.

10.1.3 The Postcolonial Period

The attainment of independence by Ghana in 1957 brought new dynamism to the country's telecommunications development. A seven-year development plan launched just after independence hastened the completion of a second new automatic exchange in Accra in 1957. By the end of 1963, Ghana had more than 16,000 telephone subscribers, and 32,000 rotary-type telephones were in use.

Due to the rapid growth in commercial activities in mining, timber, cocoa, shear butter, and the like in outlying parts of the country, new manual exchanges were installed at Cantoments, Accra, Swedru, Koforidua, Ho, Tamale, Sunyani, and Kumasi during the postindependence years. The installed switches were Strowger (step-by-step) and Philip UR 49 types.

The management of Ghana's telecommunications institutions was initially assigned to the Public Works Department but was transferred to the post office following the enactment of the Post Office Ordinance in 1886. Telecommunications was later administered by the government's Post and Telecommunications Department until the early 1970s.

10.2 The Present Era

10.2.1 The Post and Telecommunication Corporation

A new chapter in the development of Ghana's telecommunications system began in 1974, when the Post and Telecommunication Department was declared a public corporation by National Redemption Council Decree No. 311. The department was placed under the authority of the Ministry of Transport and Communication, which is still responsible today for policy formulation and the control of Ghana's telecommunications sector.

Under the instrument of incorporation, the Post and Telecommunication Corporation (P & T) is administered by a board of directors that functions as the corporation's governing body. There is a director general, who is the chief executive accountable to the board of directors and responsible for the organization, maintenance, and development of all the corporation's services (domestic and international), as well as the determination of financial policies. The director general also ensures that government policies on telecommunications are implemented and that rules and regulations governing the various services, as well as international conventions, are correctly interpreted and acted upon. He is assisted by two deputies—the deputy director general for engineering and the deputy director general for posts.

10.2.2 Quality of Service

In the present era, Ghana's telecommunications system has been plagued by significant service quality problems. According to *Missing Link* (the 1984 report of the International Telecommunication Union's [ITU] Independent Commission for World Telecommunication), penetration of telephones in Ghana in 1992 was only 0.32 per 100 inhabitants. Moreover, according to the published report of Ghana's 1990–92

Public Investment Programmes, the quality of service—measured by call completion rate, time required to obtain dialing tone, number of faults per line per year, availability of the link, mean time between failures (MTBF), and signal-to-noise (S/N) ratio—on a number of microwave and UHF routes in many exchange areas of the country is below the acceptable international standards for Africa as defined by the ITU.

10.2.2.1 Principal Causes of Low Service Quality

Analyses of Ghana's low quality of telecommunications service identified the following factors as the principal contributory causes:

- Extremely high exchange fill. Delays in the implementation of projects renders future service projections invalid after a project is completed. As a result, the estimated capacities of exchanges do not meet the needs of subscribers.
- Unsatisfactory state of the external plant network (including underground cables and overhead line system). Ghana's underground cables are not only old but their manufacture, predominantly lead-sheathed and paper-insulated, makes them susceptible to acts of vandalism and sensitive to moisture. Both Ghana's overhead systems and its underground cables are also susceptible to theft, with the metal contained in them highly prized by jewelry dealers. Moreover, the overhead systems are often rendered inoperative by bush fires and violent storms and rains.
- Rampant breakdown of a large proportion of power and air-conditioning equipment. Such failures have rendered most of Ghana's nontropicalized telecommunications equipment unreliable.
- Poor maintenance of service. Due to the very limited number of service vehicles and the unreliability of available vehicles, Ghana's telecommunications network has historically experienced delays in needed maintenance.

Another factor contributing to the low quality of Ghana's telecommunications service has been inadequate manpower resources. Most of Ghana's trained telecommunications manpower, for example, is attracted away from the public sector by private companies offering higher salaries and better working conditions. Other factors hampering the majority of Ghana's telecommunications links include interference from local broadcasting stations; signal fading, which occurs most often during "harmattan"—the months of Ghana's dry season (November to February); and cross talk and signal noise.

10.2.3 Ghana Frequency Registration and Control Board (GFRCB)

10.2.3.1 Establishment and Function of GFRCB

Up until the late 1970s, the P & T was responsible for assigning and issuing radio frequencies to private, public, and government institutions for the operation of radio equipment. In 1977, however, the Ghana Frequency Registration and Control Board (GFRCB) was established by the Frequency Registration Decree of 1977, and these responsibilities were transferred to it. Membership to the GFRCB is determined by Ghana's head of state with the advice of the National Security Council.

The functions of the GFRCB are as follows:

- Approve and issue licenses to commercial and amateur radio operators.
- Monitor the training of commercial and amateur radio operators.
- Perform tasks that the GFRCB deems to be incidental or conducive to the exercise of its function.

In order to approve and issue licenses for the sale, manufacture, and assembly of telecommunications equipment, a GFRCB 1984–92 Manpower Requirement Programme proposed to the government of Ghana that four interdepartmental technical committees be formed to advise the GFRCB: a frequency assignment subcommittee to be supported by the military assignment group, aeronautical assignment group, and maritime assignment group; a science and technology analysis committee consisting of a technical analysis group, a spectrum management group, and an authorization and standards group; a spectrum planning subcommittee consisting of a spectrum planning branch, a frequency liaison branch, and a spectrum utilization branch; and an international notification group.

The GFRCB proposed that the membership of these committees be composed of specialists drawn from the P & T, the Ministry of Defense, the Civil Aviation Authority, and the Maritime Assignment Group. Their duties were to respond to ITU questionnaires and other correspondence related to the notification and coordination of Ghana's frequency assignments. As of 1992, these interdepartmental advisory committees had yet to be formed.

10.2.3.2 Licensing of Telecommunications Apparatus and Stations

The GFRCB is responsible for performing the local registration and licensing of frequencies. Obtaining permits for the establishment, installation, and use of any telecommunications in Ghana is governed by the following decrees:

- No one may establish, install, or use any station apparatus for telecommunications unless he or she has obtained a license issued by the GFRCB to do so.
- No one may sell any telecommunications apparatus unless that person holds a valid dealer's license issued by the GFRCB.
- No one may begin manufacturing or assembling any telecommunications apparatus unless he or she has been registered by the GFRCB. Anyone who intends to begin manufacturing or assembling a telecommunications apparatus must notify the GFRCB of the date on which he or she intends to commence business and the name and address of the business.
- Anyone found to contravene any of these provisions is guilty of an offense and liable on summary conviction to a fine or imprisonment not exceeding twelve months, or both.

In order to enforce these decrees, the GFRCB undertook the following control measures:

- Anyone who in the course of business deals in the sale of any manufacturing and assembling telecommunications apparatus must submit to the GFRCB a monthly return stating the number of telecommunications apparatuses sold, imported, manufactured, or assembled by him or her during that month.

- Any authorized dealer or manufacturer who fails or refuses to comply with these regulations or who gives false information in any return shall be guilty of an offense and liable on summary conviction to a fine or imprisonment not exceeding six months, or both.

10.2.3.3 Operations of Telecommunications Services

By law, individuals or establishments can operate telecommunications services in Ghana only after they have been issued a license by the GFRCB. The telecommunications services covered by this regulation include aeronautical mobile services for stations on land or aboard aircraft, amateur radio services, broadcasting services, citizen radio services, experimental radio service other than broadcasting, fixed radio services including telecommunications services for diplomatic missions, land mobile radio services, and maritime mobile services for stations on land or aboard vessels twelve meters in length.

10.2.4 Manpower Training

10.2.4.1 Post and Telecommunication Engineering Training School

Programs for training manpower for the telecommunications industry in Ghana began as far back as 1948—when the then Post and Telecommunication Department established the Telecommunication Engineering School. This school was charged with the responsibility of training linesmen and technicians to operate and maintain telecommunications equipment and plants. The school's principal and teaching staff were drawn from the British Post Office, and as it was the only school of its kind in Ghana at that time, it catered to the needs of other institutions such as civil aviation, broadcasting, the police, and the military. In 1951, the first batch of twenty-one technical assistants with school certificate backgrounds was recruited to undergo a three-year training course in telephony.

In 1974, when the Post and Telecommunication Department was declared a public corporation, the Telecommunication Engineering School was renamed the Post and Telecommunication Engineering Training School and recharged with the responsibility to train personnel to operate, modify, and maintain telecommunications equipment, with an emphasis on job training.

In the 1990s, Ghana's P & T embarked on a program to modernize and expand telecommunications services, including human as well as material resources. In order to execute this commitment successfully, the ITU was approached to do the following:

- Propose and assist in the implementation of an organizational structure for the Post and Telecommunication Engineering Training School, including: handling all training functions; providing full documentation of its efforts; and promoting the awareness and importance of training within the P & T.
- Propose and assist in the implementation of appropriate training systems and procedures that apply ITU standard methodology to the management of training centers. The goal was the optimum utilization of training resources and the introduction of modern administrative and management tools—including both hardware and software where necessary.

- Train Ghana's telecommunications professionals in managing and updating the telecommunications training systems. As a result, P & T staff began to be sent for training to the United Kingdom, the United States, Japan, France, Sweden, and the Netherlands, among other countries.

In addition to the P & T Engineering Training School, the department of electrical and electronic engineering of the University of Science and Technology, Kumasi, Ghana, offers courses to students in telecommunications.

10.2.4.2 Involvement of the University of Science and Technology

The number of trained Ghanaian, high-caliber engineers produced by the United Kingdom, the United States, Japan, and other countries cannot meet the manpower needs of the P & T. Because of the sophisticated technologies used in the telecommunications field, many of the complex engineering problems encountered cannot be solved by P & T engineers alone. It thus became necessary to seek assistance from other institutions. In 1992, a collaboration agreement was signed between Ghana's P & T and the department of electrical and electronic engineering of the University of Science and Technology, Kumasi, Ghana.

The collaboration agreement was expected not only to benefit the P & T in fulfilling their need for high-caliber manpower, but also to provide university lecturers with interaction with Ghana's telecommunications industry, thus helping them solve their problems while saving the country foreign exchange funds used for foreign expatriate consultants.

10.3 Telecommunications Projects

10.3.1 The First Telecommunication Project

In 1975, the P & T began negotiating loans from many multilateral and bilateral financial institutions in order to undertake a number of development projects to modernize and expand both national and international telecommunications services in Ghana. The objective of these projects, known collectively as the First Telecommunication Project (FTP), was the rehabilitation, modernization, and expansion of Ghana's national telecommunications network. The project, which was planned to last from 1975 to 1979, involved financial commitments totaling U.S.$76 million, which came from the government of Ghana, the World Bank, Japan, the African Development Bank, and Canada.

The specific accomplishments of the FTP include:

- The installation of twelve new electronic exchanges to replace old and obsolete automatic and manual telephone exchanges, which increased Ghana's telephone line capacity by about 50 percent.
- Increasing the number of subscriber trunk dialing centers from eighteen to twenty-four.
- The construction of tertiary exchange, a telex, a message switch in the capital, and an earth station in the country.

- The installation of microwave radio links for telephone and television transmission from the capital to the northern part of Ghana and initiation of a second new microwave radio link.
- The construction of a third 500-kilometer microwave radio link joining Ghana to the two bordering nations of Togo and the Ivory Coast. This part of the FTP was intended to eliminate the transit of African telecommunications traffic through Europe and was popularly known as the Panaftel (Pan-African Telecommunications) project.

Although the FTP was delayed as a result of changes in government, economic recession, and other social factors, it was eventually completed in 1985.

10.3.2 The Second Telecommunication Project

As part of Ghana's long-term telecommunications development program, a Second Telecommunication Project (STP) with an eight-year time frame was initiated in 1987. This project was intended to provide further rehabilitation, modernization, and expansion of the telecommunications facilities not covered by the FTP, as well as the restructuring of the P & T.

The components of the STP were as follows:

- Expansion of the microwave transmission network and provision of coast station facilities at Tema for maritime telecommunications services.
- Rehabilitation and expansion of Ghana's switching network in thirteen urban centers and twenty-six rural communities.
- Rehabilitation and expansion of the external cable network to match the switching component just described above.
- Rehabilitation of Ghana's satellite earth station.
- Provision of a 330-line international telephone switch and a 1,000-line telex switch.
- Procurement of subscriber terminal equipment, spare parts, vehicles, and personal computers.
- Provision of in-house electronic data processing systems for improving billing systems, payroll, inventory, and the like.
- Acquisition of materials to provide 100 housing units located throughout the country for telecommunications staff.
- Updating and upgrading of P & T training school facilities.
- Creation of fellowship and training programs for manpower development.
- Separation and restructuring of the P & T into two entities.

By 1992, about U.S.$50 million, representing 30 percent of the loan, had been disbursed, and, as a result, the following elements of the STP had been completed: the international telephone switch, the rehabilitation of the satellite earth station, the rehabilitation of cable networks in parts of Accra, the rural radiotelephone facilities at thirty-six rural and isolated locations, the 1000-line telex switch, the Telecommunications Master Plan, and the Telecommunications Corporate Plan. Table 10.1 shows the projects that had been completed in the 1980s.

Table 10.1. Telecommunications Projects/Tasks Completed

Project/Task Description	Funding	Amount (m = millions)	Date Started	Date Completed	Contractor
NTC consultancy/master plan study	IDA	Y 40m	1986	1986	NTC
300 electronic teleprinters	CCCE (France)	FF 5,340,145	Aug. 1987	May 1988	Sagem
Accra international telephone switch	CCCE (France)	FF 33m	Dec. 1986	Oct. 1988	Alcatel-CIT (France)
29 facsimile and accessories	CCCE (France)	FF 604,500	Mar. 1988	Feb. 1989	Sagem
JICA 1	JICA (Japan)	Y 683m	Nov. 1987	Feb. 1989	
a. Provision of 17,400 cable pairs within castle ministries, state house, Korlebu, Ridge, Rangoon, Accra Central Exchange					
b. PABX at ministries			July 1988	Feb. 1989	NEC
c. HDX 10 telephone training equipment					Hitachi
Rehabilitation of Nkuntunse earth station	Exim Bank (Japan)	Y 979,477m	May 1987	Mar. 1989	Marubeni/NEC
Supply of cables and accessories	CCCE (France)	FF 25m	Feb. 1989	Oct. 1989	Acome
Supplementary supply of materials	CCCE (France)	FF 11m			Sagem
Accra North Cable Works	Dutch Govt./NKF	Del 37m	June 1987	Dec. 1987	NKF Holland
34 rural telephone systems	Ireland	2	June 1986	Jan. 1987	Telectron

Source: GPT Publication, Accra.

Note: See the section on abbreviations at the end of this chapter for definitions of the abbreviations used here.

Table 10.2. STP Financing Sources

Source	Foreign (millions of U.S.$)	Local (millions of U.S.$)	Total (millions of U.S.$)
Government of Ghana	1.5	9.8	11.3
CCCE (France)	21.7	—	21.7
Holland (NKF)	18.8	—	18.8
Japanese grant/JICA	9.2	—	9.2
Japan (EXIM)	7.0	—	7.0
Japan (OECF)	69.5	6.7	76.2
Ireland	1.7	—	1.7
IDA	18.3	0.7	19.0
Post and Telecommunication	2.3	5.5	7.8
Total	**150.0**	**22.7**	**172.7**

Source: GPT Publication, Accra.

Note: See the section on abbreviations at the end of this chapter for definitions of the abbreviations used here.

As a result of Ghana's economic growth, the cost of the STP, which was originally estimated at U.S.$140.7 million, was adjusted upward to U.S.$173 million. Table 10.2 shows the details of the project's funding sources.

The following factors hampered the P & T's ability to achieve the stated goals of the STP: delays in approving projects, due to administrative controls; poor conditions of employee service, resulting in high staff turnover and the inability of the P & T's to attract and retain qualified personnel; shortage of skilled and qualified managerial, professional, and technical staff; lack of funds to reduce excess unproductive workforce; and the absence of sufficient in-house facilities to process bills promptly.

10.3.2.1 Impact of the STP

The impact of the completed portion of the STP on telecommunications services in Ghana was modest but appreciable. Table 10.3 shows the changes in some telecommunications service data between 1986 and 1990. One result of the completion of the STP was that subscriber circuits in the rehabilitated areas were improved and the fault rate significantly reduced. Because the rehabilitation program involved the expansion of the cable network, more subscribers were also connected to the network, resulting in a 20 percent growth in subscriptions. In addition, the number of direct exchange lines in working order increased from 60 percent in 1987 to 89 percent in 1992. Also the availability since 1988 of international direct dial service in twelve exchange areas resulted in the promotion of international business and trade. The number of international satellite circuits also grew—from 41 satellite circuits in 1988 to 193 satellite circuits and 84 terrestrial circuits in 1992.

The STP also introduced AT&T/U.S. and U.K. direct service; airlines became capable of making reservations through SITA (Société International Télécommunication Aeronautique) facilities; a meteorological department was created to send meteorological and seismological data from various locations throughout Ghana

Table 10.3. Telecommunications Service Data

	1986	1990
DELs connected	38,046	44,834
DELs working	40%	89%
Telex lines connected	316	881
Telex lines working	62%	72%
International telephone circuits	41	254

Source: GPT Publication, Accra.
Note: DEL = direct exchange line.

to Accra; and press agencies/news houses, commodity markets, and financial institutions gained increased information and data transfer capabilities for transmission to and from the outside world.

Other benefits of the completed programs of the STP included high levels of generated revenue, significant growth in national and international telecommunications traffic, increased low-speed access to overseas data banks using telex services (particularly those in the United States), and the capability of the Ghana Broadcasting Corporation (GBC) to transmit voice cast (radio commentary) and live television telecasts via satellite and simultaneous television transmission from all GBC transmitters in the country.

The final completion of all projects in the STP in 1994 was expected to provide Ghana with sixty automatic exchanges linked by about 4,100 kilometers of microwave radio networks with 77,000 connected direct exchange lines. The P & T's turnover was projected at 25 billion in 1994 compared with 17.8 billion for 1992—a 40 percent increase—and the new business opportunities resulting from the full completion of the STP were expected to produce an economic facelift for all aspects of Ghana's commercial sector.

Despite the achievements of the STP, Ghana's telephone density, in 1994, (0.31 per 100 inhabitants), is still among the lowest in Africa. Typical telephone densities for other African nations include 9 percent for Libya, 1.3 percent for Zimbabwe, 0.5 percent for the Ivory Coast, 0.33 percent for Togo, 0.2 percent for Nigeria, and 0.1 percent for Burkina Faso. The enormity of the task facing Ghana and other African nations attempting telecommunications modernization becomes apparent when African telephone density rates are compared to those of selected nations in Europe and Asia: 62.4 telephones per 100 inhabitants in Sweden, 43 in the United Kingdom, 42 in Japan, 41 in France, and 8 in Malaysia. Massive investment in accelerated telecommunications programs is the answer to improving Ghana's telephone penetration rate.

10.4 Future Plans for Ghana's Telecommunications Infrastructure

The STP is the first phase of the Telecommunications Master Plan encompassing a twenty-year horizon (1987–2006), with each phase extended over a period of five years. It is expected that the Third and Fourth Telecommunication Projects—

involving an investment of about U.S.$400 million—will have been completed by the year 2000. This will improve Ghana's telephone density from the current level of 0.31 per 100 people to 0.534, with a corresponding increase in connected DELs of 52,000 (from 48,000).

These two projects plan to meet customer requirements through the following measures:

- Executing an accelerated program to implement district center telecommunications facilities to support the government's decentralization policy.
- Rehabilitating, expanding, and modernizing the switching, transmission, and local networks.
- Digitalizing the telecommunications network.
- Implementing a paging system.
- Instituting packet switching (data networks).
- Introducing an Integrated Service Digital Network (ISDN) and Intelligent Networks.

10.4.1 Deregulation of Telecommunications

Prior to 1980, the P & T was the sole supplier and distributor of all telecommunications terminal equipment to the public. It was also the only institution that could install and maintain telecommunications equipment and run telephone services to the public (with the exception of two-way radio telecommunications equipment, which was also being supplied and installed by a few private foreign companies). In 1987, however, the government of Ghana relaxed the regulations, and private companies began to be issued licenses and allocated frequencies enabling them to produce, install, and maintain any compatible telecommunications equipment. By 1992, about forty telephone companies were in operation, including a local cellular company and a paging company. Other companies supply, install, and maintain terminal equipment such as facsimiles, telephones, PBX, and PABX (with capacities ranging from 4 to 4,300 extensions and manufactured by such companies as Panasonic, Toshiba, AT&T, Alcatel, Philips, and British Telecom). Most of the companies now allowed to operate in Ghana are representatives of companies in Europe and the United States.

Despite the improvements that will result from the STP, telecommunications in Ghana is still extremely inadequate. In 1995, only 37 of the 110 administrative districts of the country had telephone exchange facilities, and there were only thirty-five pay phones in the entire country (with thirty-two in Accra). Also, there was an average of three faults per line per year, and the average duration of the faults was seven days. Further, the cost per line was U.S.$3,500 as compared with U.S.$1000 in developed countries. The Ministry of Communications estimated that a U.S.$450 million investment would be required between 1995 and 1999.

As a result of the dismal state of telecommunications, the high level of investment required, and the retrenchment of multilateral funding for telecommunications development, in 1995 Ghana began an ambitious telecommunications restructuring initiative. This policy has the following components:

1. The sale of the government's controlling interest in P & T through (a) the sale of a minority stake (which will have management control) to a strategic investor, such as an international telecommunications operator; (b) the sale of a stake to international financing institutions; and (c) the sale of a stake to local investors in Ghana.
2. The licensing of a second main operator, which will compete with the P & T and have the same rights and obligations as the P & T.
3. The licensing of private pay phone operators in each of the regional capitals.
4. Permission for large corporate users to develop their own networks.
5. The use of build-operate-transfer (BOT) and similar private-sector schemes as a tool for rapid expansion of service—particularly in rural communities.
6. The establishment of a regulatory body for the sector to be known as the National Communications Authority (NCA). The NCA regulates service standards and tariffs, as well as seeks to create the necessary environment to stimulate investment in the sector.

As a broader initiative to attract international investment, Ghana enacted a new Investment Code, Act 478, which has the following provisions: the unconditional transferability of dividends, loan service payments, fees and remittance; and a commitment that no enterprise shall be nationalized or expropriated by the government.

The NCA has worked hard to create more private sector participation in Ghana's telecom industry. As a result, dozens of privately owned data communications integrators and Internet service providers have been established. The NCA also authorized the licensing of the second national operator (SNO) in 1997. The SNO license was awarded to a consortium of private investors, which also includes the Ghana National Petroleum Company. The SNO's first task was the creation of a national VSAT infrastructure to offer business communications services.

Most important, the government partly privatized its telecom operations. It created Ghana Telecom and sold part of it off. The major strategic investor was Telkom Malaysia, which acquired about 30 percent. That company was also part of a consortium that bought 30 percent of Telkom South Africa.

It is clear that Ghana's telecommunications sector is at a turning point in its development. Ghana's leadership demonstrated awareness that the past structure was inadequate and that a change was needed to make the future of Ghana's telecommunications brighter than the past 100 years of inadequate and inefficient service.

10.5 Conclusion

A great deal needs to be done to improve and sustain higher quality of service in Ghana's telecommunications system. Deregulation of laws affecting telecommunications could go a long way toward encouraging individuals, universities, and research institutions to get involved in solving some of the local problems affect-

ing telecommunications in Ghana. Deregulation would also encourage private individuals and institutions, both local and foreign, to invest in telecommunications and help to expand the telecommunications network by introducing new technologies that the government and the old state-run Post and Telecommunication Corporation could not financially support. Delays in the approval and implementation of projects, caused by institutions and bureaucracies, have cost Ghana considerable time, energy, and capital that could have been invested in the telecommunications network.

Abbreviations

ADB	African Development Bank
CCCE	Caisse Centrale de Coopération Economique
CESISC	Combined Earth Station and International Switching Center
Del	Dutch currency
ECOWAS	Economic Community of West African States
EXIM	Export-Import Bank
FF	French francs
GFRCB	Ghana Frequency Registration and Control Board
GPT	Ghana Post and Telecommunication
HDX	Hitachi Digital Exchange
IDA	International Development Association
ITU	International Telecommunication Union
JICA	Japanese International Cooperation Agency
NEC	Nippon Electric Company
NKF	Netherlands Kabel Factory
NTC	Nippon Telecommunication Consultancy
OECF	Overseas Economic Cooperation Fund
PABX	Private Automatic Branch Exchange
Panaftel	Pan-African Telecommunications
PATU	Pan-African Telecommunications Union
PBX	Private Branch Exchange
P & T	Post and Telecommunication
RASCOM	Regional African Satellite Communications System
SITA	Société International Telecommunication Aeronautique
STD	Subscriber Trunk Dialing
UHF	Ultra High Frequency
VHF	Very High Frequency
Y	Japanese Yen

Note

Part of this work was done when F. K. A. Allotey was a visiting professor at the University of Michigan, Ann Arbor.

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