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Nigeria: After a Century of Telecommunications Development, What Next?

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Since its inception a little over a century ago, Nigeria's telecommunications system has progressed through various stages of development from the primitive communications equipment in its colonial days to the great variety of technologies available today. In this chapter, the processes of Nigeria's telecommunications development and its progress, problems, and prospects are examined and discussed from its emergence to the expansion and modernization efforts of the 1990s.

9.1 The Past

Preindependence Era

The development of telecommunications in Nigeria began in 1886 when a cable connection was established between Lagos and the colonial office in London. By 1893, government offices in Lagos were provided with telephone service, which was later extended to Ilorin and Jebba in the hinterland. A slow but steady process of development in the years that followed led to the gradual formation of the nucleus of a national telecommunications network.

In 1923, the first commercial trunk telephone service between Itu and Calabar was established. Between 1946 and 1952, a three-channel line carrier system was commissioned between Lagos and Ibadan and was later extended to Oshogbo, Kaduna, Kano, Benin, and Enugu, thus connecting the colonial office in London with Lagos and the commercial centers in the country with local authority offices.

The main transmission medium during the preindependence era was unshielded twisted pairs of copper wire. This evolved later from rural carrier systems on high gauge lines to line carrier systems of twelve-channel capacity. Small- to medium-capacity systems employing VHF and UHF radio were introduced around 1955. The first serious attempt at planning telecommunications services in the country was the 1955–62 Development Program. It provided for the expansion of the

trunk using a VHF Multichannel Radio System on a nationwide basis and a short microwave link between Lagos and Ibadan.

In the early days, the primitive coordinate pegboard switching system was used. This progressed through manual switchboards of different sizes, shapes, and capacities until Strowger exchanges were installed into the national network at Lagos Island, Ikeja, Ebute Metta, Apapa, and Port Harcourt between 1955 and 1960, along with 116 manual exchanges. The installation of the Strowger exchanges marked the beginning of automatic telephone switching in Nigeria. By the time of independence, automatic exchanges were established at the main centers and a subscriber trunk dialing system (STD) was introduced between Lagos and Ibadan.

The telegraph service also witnessed a parallel development, from telegraph delivery by way of manual coordinate pegboard switching to the use of Morse code for telex switching. By about 1960, a manual telex exchange of sixty subscriber lines was in service in Lagos. While all the efforts just described were essentially aimed at improving internal telephone services in Nigeria, external telephone services in the preindependence period were wholly owned by Cable & Wireless of the United Kingdom, which was a colonial private company.

9.1.2 The Postcolonial Era

With the attainment of independence in 1960, Nigeria embarked on a periodic national development plan. Telecommunications development was featured in each of these plans, which were usually of a five-year duration. It is more meaningful, however, to discuss the development of Nigeria's telecommunications since independence—its objectives, achievements, and features—on a decade-by-decade basis.

9.1.2.1 The 1960s

The focus of attention in this period was the expansion of the network to meet the needs of the fledgling commercial and industrial sectors. The specific objectives included:

- Installation of an additional 60,000 telephone lines to bring the total number of lines to 90,000 by the end of the decade.
- Expansion of trunk dialing facilities to link the major urban centers that were then springing up.
- Establishment of the Nigerian External Telecommunications (NET) Limited.

Unfortunately, these objectives could not be completely realized by the end of the plan period. For example, only about 26,000 lines (just over 40 percent of the planned target) were added to the existing network, partly because of underfunding and partly because of the disruption caused to the economy by the Nigerian Civil War (1967–70). Nevertheless, some the decade's major achievements included the installation of a microwave radio transmission system to link the cities of Lagos, Ibadan, Enugu, Benin, and Port Harcourt, all of which are in the southern part of Nigeria's transmission system. Preparatory work toward the establishment of NET as a limited liability company started during this period as well.

9.2.1.2 *The 1970s*

The second decade of independence incorporated two five-year plan periods—Nigeria's second and third development plans.

The 1970–1975 Plan Period. During the first half of the decade efforts were concentrated on the reconstruction and rehabilitation of the telephone equipment and other infrastructure damaged during the civil war. In order to achieve the objectives of the second plan period, developments in five major areas were considered. In telephony, new automatic exchanges were to be constructed and existing automatic exchanges expanded. New manual telephone exchanges were considered for construction as well. In telegraph communication, the torn-tape system was to be replaced with teleprinter automatic switching systems, and key and sounder circuits were to be converted to teleprinters.

For Nigeria's transmission system, the plan considered construction of subsidiary radio routes to provide trunk services from toll centers to end offices, construction of twisted pair carrier systems to provide links to rural areas, and provision of additional coaxial routes for Lagos-Ibadan-Ilorin-Kaduna. The plans for Nigeria's external line plant included construction of a local line plant network for new subscribers and an increase in existing line plant to achieve the objectives of the expansion. Finally, the 1970–75 plan stipulated the establishment of a Nigerian Satellite Communications earth station at Lanlate in the southwestern part of Nigeria.

Due to underfunding, however, the only objective of the 1970–75 plan period that was completed was the national telex network.

The 1975–1980 Plan Period. The third National Development Plan Period (1975–80) was the most ambitious. It aimed at increasing the telephone facilities from 50,000 lines to 750,000 lines—an increase of about 1,400 percent. In the area of switching, three contracts were awarded to add over 340,000 lines to Nigeria's networks. In the first contract—for the contingency plan—forty-five locations were to receive exchanges with a total installation capacity of 162,000 lines, and twelve other exchanges were to be expanded by 48,000 lines. In the second contract, covering turnkey projects, 147 locations were to receive external line plant and switching equipment to add 121,000 lines. The third contract, covering mobile exchange, provided for installation of twenty-nine mobile exchanges with 11,300 lines.

In the area of transmission, the following projects were considered: introduction of the Nigerian Domestic Satellite (DOMSAT) to provide television and sound broadcasting (later modified to accommodate telephony and teletype services between the states); introduction of the aerostat (balloon) system, which was intended for television and sound broadcasting and telex and telephone services; provision of coaxial cable between Lagos and Kaduna; expansion of the existing microwave radio link system intended for telephone services as part of the contingency plan exchanges; and provision of new transmission links for the exchanges in the contingency plan not covered by existing radio links.

There were at least six achievements associated with the 1975–80 plan. First,

177 locations were provided with telephone exchanges, as well as twenty-nine mobile exchanges, increasing the number of lines in the network from 52,000 to 241,000 and the number of telex lines from 874 to 4,950. Second, the DOMSAT earth station project was completed. Third, work started on the aerostat balloon (which turned out to be a disaster). Fourth, a second satellite antenna was built at Lanlate, which increased the global coverage of the external services. Fifth, an International Telephone Switching Center (ITSC) was installed at the Nigerian External Communications (NECOM) house in Lagos. And finally, a new microwave link was provided between Lagos and Cotonou (Benin Republic) and computerized telex, telegraph, and data switching centers were provided at NECOM house.

The 1975–80 plan period was not a complete success, however. The aerostat balloon project, which was abandoned, was a colossal waste of money. The proliferation of different technologies in the network made spare parts procurement difficult and complicated manpower training by limiting the number of personnel who could be switched from one part of the network to another. There was also a shortage of technical manpower to operate and maintain the additional facilities and a lack of adequate levels of finance to execute the projects.

The most serious problem, however, was bad planning. There was not adequate coordination between project management and implementation. Buildings were not available for the installation of purchased equipment, and vital links—such as external line plants—were omitted in the contract awarded.

9.1.2.3 The 1980s

The first half of the decade covered the fourth National Development Plan period (1980–85), which was essentially aimed at completing all outstanding projects from the previous plans. In addition to the primary objective, the development plan was designed to provide a total of 370,550 additional telephone lines, a terrestrial toll and trunk transmission network to link all switching centers throughout the country, and Telex/Gentex exchanges for about 9,000 telex lines with external line plant and teleprinter machines. It was envisaged that the total number of installed telephone lines in Nigeria at the end of the plan period would increase to 612,000.

During this period, the telecommunications arm of the Department of Posts and Telecommunications was merged with the Nigerian External Telecommunications to form, in 1985, the Nigerian Telecommunications Ltd. (NITEL), a limited liability company that today administers both internal and external telecommunications services in Nigeria.

9.2 The Present

9.2.1 The Existing Network

The Nigerian national telecommunications network of the 1990s is made up of the following elements:

1. Telephone services
 - a. Total capacity has risen to over 800,000 lines.
 - b. Other services include: over 10,000 cellular mobile telephones and 15,000 voice mail lines.
2. Telex services: Fourteen telex exchanges with a total installed capacity of 12,800 lines.
3. Transmission systems
 - a. Microwave.

There are 264 terminal stations and 172 unmanned repeater stations. The channel capacities range from 300 to 1,800 channels with capability to accommodate one color television on the 960- and 1,800-channel systems.
 - b. Coaxial.

This system provides 960 channels between Lagos and Kaduna.
 - c. Optical fiber cable.

Optical fiber cables were developed to link primary/secondary exchanges in the Lagos zone.
 - d. DOMSAT.

This system consists of nineteen standard B earth stations and operates on the leased transponders from Intelsat. The 36 MHz bandwidth transponders were initially grossly underutilized. They were originally used mainly for television transmission for only a few hours daily. However, they are now utilized for both television and telephone.
4. International services
 - a. International satellite system.

This originally had two gateways at Lanlate and Kujama, which were linked to switching centers at Lagos (NECOM) and Kaduna, respectively. In 1992, two additional gateways were commissioned—one at Victoria Island, Lagos, to cater to the ever-increasing traffic in the Southwest, and the other in Enugu to cater to the traffic in the eastern part of the country.
 - b. Submarine cable.

This provides a transmission system from Lagos through Abidjan, Dakar, Casablanca, and on to Europe.

9.2.1.1 Extent of Services

The services offered by NITEL are telephony, telex and telex delivery services, telegraphy and registered telegraphic addresses, pay phones and public coin telephones, transmission and reception of real-time television for network services, private leased telephone and telex service, private wire, leased telephone and telegraph services, alternate voice data (AVD) circuits, voice-cast and press reception, international public counter services, facsimile service, switched data, electronic mail, and cellular.

Maritime Services. Nigeria's shore-to-shore and ship-to-shore maritime communications services are provided via the high frequency radio. Its limitations are poor

transmission quality, low reliability, and lack of automatic access to the national telecommunications network. In 1988, Nigeria joined the International Maritime Satellite Organization (Inmarsat), which operates a system of satellites to provide mobile communications for the world's shipping and offshore industries. Through the Inmarsat system, NITEL offers Maritime Mobile Service (MMS) as well as satellite mobile communications.

The Scope of National Service. Nigeria's telephone penetration rate was still low, in 1994, at about 0.8 direct exchange lines (DELs) per hundred inhabitants. Its major challenge in extending its facilities continued to be the provision of telecommunications services in the rural areas, where there is little or no penetration. In the mid-1990s, however, the telecommunications facilities in the urban areas continued to be inadequate as well. Nigeria's telecommunications services—especially telephony—are not sufficient to meet the needs of all those who require them, especially in the big cities like Lagos, Ibadan, Enugu, Kano, and so on. This has led to long waiting periods for obtaining facilities (which was above ten years in 1993) and congestion of existing exchanges. Finally, new telecommunications facilities such as facsimile, international business services, and high-rate data transmission are not readily available.

Nevertheless, in recent years, attempts were made by the Nigerian authorities to spread the telecommunications facilities throughout the country, and in the mid-1990s all the twenty-one state capitals, as well as Abuja and many of the 589 local government headquarters, were connected to the national network. The government attempted to ease the wait for phone lines by increasing the penetration of public telephones. In recent years, the government licensed seven companies to provision and operate public pay phones in different regions of the country. The major obstacle hampering the extension of the system was lack of funds and an absence of the engineering infrastructure needed for the development and production of spares and components.

Cellular Telephony. Cellular telephony was first introduced in 1992 with the formation of Mobile Telecommunications Service (MTS). This company is a joint venture between NITEL and Digital telecommunications of Atlanta; in 1994, MTS had a nationwide monopoly over cellular service. It began with a capacity of 10,000 lines, and due to the high level of unmet telecommunications demand, the system was filled to capacity within one year. Subsequently, in 1994, MTS added 20,000 lines, with plans to add 25,000 more lines. Even with this additional capacity, it is common to receive a fast busy signal during peak hours due to network congestion.

Recognizing the need to meet the growing demand for cellular services, the government licensed four additional companies: M-Tel, Wireless Systems Nigeria, Ltd., Tele-Africa Nigeria Ltd., and Motophone Nigeria Ltd. Additionally, fourteen companies were awarded licenses to operate paging services.

Nigeria's cellular market is expected to grow at a rate of 25 percent annually through the 1990s. The major markets are in Lagos (among the young urban elite), the oil-based communities of Port Harcourt and Warri, and the cities of

Kano and Abuja. Over half of the cellular equipment was supplied by U.S. companies, mostly Motorola.

9.2.2 Institutional Structure

In May 1992, NITEL, which was fully owned by the Nigerian government, was corporatized, with the ultimate objective being full privatization. The present system seeks to protect the sovereignty and security of the country by keeping NITEL under government control while, at the same time, making the telecommunications service less dependent on the government. The motivating force behind the decision to corporatize rather than privatize was the fear that control of the national network might be lost to foreign companies.

Although the Nigerian government still provides funds for major capital projects, the conditions of service of telecommunications workers have been moved out of the civil service structure. The corporatization has also brought about increases in the cost of telecommunications services in the country.

The administrative and policy matters of telecommunications remain with the Ministry of Communications, which represents the country at the International Telecommunications Union (ITU) and other international telecommunications organizations.

9.2.2.1 Management Structure of NITEL

In the mid-1990s, NITEL continued to operate under a board appointed by the government to serve various interests. The structure of the company is based on the three-tier system of territorial administration, zonal administration, and headquarters in order to decentralize functions and optimize operational efficiency. Abuja, the federal capital, and each of Nigeria's twenty-one states constitute a single territory, while Lagos constitutes two territories. There are five zones: the northwest, northeast, southwest, southeast, and Lagos, and each zone is made up of between four and six states or territories. The zones are semiautonomous in their operations; however, the functions of the zones are coordinated at the center through the office of the managing director, who is the chief executive. The headquarters operates as six divisions.

9.2.3 Telecommunications Regulation

The Cable and Wireless Act of 1962 established the Ministry of Communications as the regulatory body for telecommunications in Nigeria. The ministry regulated NITEL until a decree in 1992 established the Nigerian Communication Commission (NCC), which was charged with the duty of regulating the telecommunications sector. The NCC became operational in September 1993. It is responsible for the following:

1. Licensing telecommunications operators.
2. Facilitating private-sector participation and investment in the telecommunications sector.

3. Ensuring the improvement of Nigerian telecommunications penetration.
4. Establishing and supervising technical and operational standards and practices for network operators.
5. Overseeing the quality of service provided by operators.
6. Setting terms for the interconnection of carrier networks.
7. Ensuring that the interests of telecommunications consumers are protected by promoting competitive pricing and guarding against abuse of market power.

Since becoming operational, the NCC has taken aggressive steps to open the telecommunications sector to private investment and enterprise. In June 1994, the following services were open to private-sector participation:

1. Customer premises equipment (CPE).
2. The provision and operation of public pay phones.
3. The provision and operation of private network links.
4. The provision and operation of community telephones for rural areas and industrial parks.
5. The provision and operation of value-added network services for the banking and airline sectors, including packet-switched networks.
6. The repair and maintenance of telecommunications facilities.
7. Telephone cabling.

In 1995, NITEL still maintained a monopoly over the following services: (1) the provision and operation of public switches and trunks and their associated infrastructure; and (2) the provision and operation of international network links.

To participate in Nigeria's telecommunications sector, a company must be either owned by a Nigerian citizen or be registered in Nigeria; the NCC hoped that this requirement would encourage joint ventures between foreign companies and Nigerian companies. The NCC also required that a licensee submit technical and organizational plans that demonstrate a commitment to sustained service and that the equipment be compatible with the existing infrastructure. Since the NCC was inaugurated, over one hundred licenses have been granted:

1. Twenty-one companies in sales and installation of CPE.
2. Seven companies in the provision and operation of pay phones.
3. Ten companies in private network links—including domestic satellite links.
4. Eighteen companies in mobile communications—including cellular telephony and paging.
5. Two companies in local community telephony.
6. Thirteen companies in value-added network services.
7. Two cabling companies.
8. Seventeen companies in fixed telephony services.
9. Twenty-two companies in Internet services.
10. Four companies in equipment repair and maintenance.

Telecommunications concerns have to pay 5 percent of the capital value of a system as a license fee and 2.5 percent of the turnover as an annual concession fee. Additionally, there is a 2.5 percent surcharge for special licenses; for example,

companies with extensive networks that use over five pairs of frequencies and are not willing to share their infrastructure.

In 1997, the NCC made a landmark decision by authorizing a second national carrier to compete with NITEL in all services, effectively ending NITEL's monopoly and creating a duopoly. While the second national carrier is currently concentrating on offering domestic and international satellite-based services for business telephony services for the general population.

The National Broadcasting Commission (NBC) was established in 1992 to regulate and control radio and television broadcasting in the country. The NBC is vested with powers to handle matters connected with mass communication and technical aspects as they relate to the broadcast bands for radio and television. The NBC has licensed many radio and television stations, including the first international satellite television broadcasters. Minaj, based in Obosi, and Daar communications, based in Lagos, were authorized to transmit their programming internationally via their own satellite teleports. Many companies seized the opportunity to enter into the fixed satellite services (VSAT) sector once the NCC authorized competition in value added network services and private network links. The primary customers for such services are in the banking and oil industries.

9.2.4 Telecommunications Financing

Almost all of Nigeria's telecommunications development plans since independence have suffered from underfunding. For example, during the first National Development Plan (1962–68), only 35 percent of the expected expenditure was provided, and consequently only 40 percent of the expected 60,000 lines were added to the network. Similarly, most of the objectives of the ambitious program under the third National Development Plan (1975–80) could not be achieved, partly because of underfunding.

Inadequate funding has continued to inhibit the rapid development of Nigeria's telecommunications since the creation of NITEL in 1985. The situation has worsened in recent years because of the large-scale devaluation of the national currency and the shortage of foreign exchange with which to prosecute many projects. Worldwide inflation has also led to high prices for telecommunications equipment.

Nigeria's revenue from the provision of telecommunications is also still comparatively low because telecommunications service is inexpensive there compared to the United States and other parts of the world. The initial telephone charge, for example, is about U.S.\$0.10 for the first three minutes for local calls. Similarly, for international calls, the first three minutes cost about U.S.\$6.00.

9.2.5 Manufacturing

The basic support industries for telecommunications manufacture and assembly in Nigeria belong mainly to the private sector. The country's telecommunications and electronics industries include electronic rewinding factories; teleprinter machine and telephone set assembling factories; radio, television, cassette, and cartridge and record player assembly plants; intercom, mini-EPBX (private

branch exchange), and key telephone assembly plants; telecommunications components factories; TVRO (TeleVision Receive Only) earth station assembly plants; cable and wire factories; and plastic extrusion and injection industries. Production levels for some of these products in 1991 were: telephone handsets, 5,000 units per year; intercoms, 30,000 units per year; key telephones, 500 units per year; and mini-PABX (private automatic branch exchange), 500 units per year.

Both Nigeria's telecommunications and electronics subsectors are in their infancy stages. Because domestic manufacturing input to telecommunications development is very small, large amounts of foreign funds are required for telecommunications projects. Export of electronic and telecommunications products is virtually nonexistent in Nigeria, and importation still continues on a large scale in sophisticated consumer electronics; telecommunications; and defense, computer, medical, and industrial electronics. Domestic assembly also cannot fulfill the demand for simple consumer items, and importation is used to supplement the local production. It is worth noting that in Nigeria there is no industry in the electronic components manufacturing subsector.

9.2.6 Trends in Technology Adoption

In recognition of the fact that telecommunications is an infrastructure that may aid a country's economic development, many African countries, including Nigeria, have embarked on programs of modernization and rehabilitation of their outdated and failing national telecommunications network. For example, in Kenya, the telecommunications administration has put into service a digital microwave system to service the eastern and southeastern parts of the country using solar technology as its power supply. Malawi, Zambia, and Tanzania also began constructing microwave links and satellite earth stations some years ago to ensure efficient and reliable telecommunications services.

The telecommunications administration in Nigeria decided to adopt digital technology for the national network with a view to improving services for the existing customers as well as meeting new demands. At the time of this decision, the network was experiencing three categories of problems that hindered the provision of fast and reliable telecommunications service and inhibited the desired rate of telecommunications development in the country:

- *Inadequate capacity.* This hindered considerably the rapid and cost-effective expansion of telephone service. Considering the size of the population and the level of economic development in the country, the number of installed telephone lines was seen to be grossly inadequate to meet demand, and the resulting inadequate capacity was responsible for poor call completion rates, subscriber dissatisfaction, and hence loss of revenue.
- *Poor maintenance.* This had contributed in no small way to the inefficient utilization of Nigeria's existing network. The maintenance problem itself was attributed to such factors as lack of or inadequate supply of tools, test equipment, and materials for maintenance; government policy on procurement of spare parts; poor maintenance organization; and the poor work attitude of maintenance personnel.

- *Low revenue generation.* The revenue being generated from the existing public telephone service was rather low in comparison to the cost of providing the service. This was attributed partly to inefficiencies in management, partly to unproductive use of capital, and partly to an inefficient billing system.

NITEL's management believed that by adopting appropriate technology, most of the technical aspects of these three problem areas could be solved. Accordingly, the administration opted for digital technology and sought suitable strategies for its introduction and implementation in the existing national network, even though the vast majority of the network was analog, personnel requirements for the new technology were significant, and methods of financing the digitalization projects had to be found.

NITEL decided that the digitalization of the network would commence with the switches, to be followed later by the transmission aspects. Due to financing issues, the implementation of the digitalization was divided into three phases with the priority areas—mostly multiexchange areas and the international gateways—being digitalized during the first phase. It was also decided that Abuja, the nation's new capital, should be made a “digital island”; that all existing analog switches should be gradually phased out, to be replaced at the end of their lifetime by a digital switch; and that all new exchanges would be digital. In addition, all further telecommunications expansion and development in Nigeria was to be digitalized in order to (1) surmount the problems associated with maintaining the old analog network and (2) meet the increasing demand by customers for such services as facsimile, telex, data transmission, and the like. Most of these decisions were being implemented in the mid-1990s.

In addition to the existing telecommunications network administered by NITEL, the Nigerian National Petroleum Corporation (NNPC) has also installed a cross-country high-capacity digital communications system for its pipeline operations. This system combines two advanced or high-level technologies—microwave digital radio and optical fiber—in a complementary rather than competing manner. The system consists of terrestrial microwave links in the riverine areas, like the delta region of the country, and densely populated areas such as Lagos, and fiber-optic links in the larger part of the network. In the mid-1990s, the system was highly underutilized given the low level of traffic being generated for the pipeline operations. It was therefore suggested that NITEL could use part of the system to supplement its own backbone system. In 1995, the major foreign oil companies—Shell, Chevron, AGIP, and ELF—were leasing fiber-optic lines from NNPC in order to connect their oil fields with regional bases and computer centers.

9.2.7 Regional and Continental Collaboration

As a member of the Economic Community of West African States (ECOWAS) and the Organization of African Unity (OAU), Nigeria has been collaborating with the member nations of these organizations to develop telecommunications services at the subregional as well as continental levels. This collaboration has taken the form of meetings among the telecommunications engineers and planners of the various member countries to discuss the technical issues involved in

planning, operating, and designing telecommunications systems suitable for use in Africa's environment.

The segment of the Pan-African Telecommunications Network (Panaftel) linking the eastern part of the continent with the western part passes through Nigeria and uses portions of its domestic network. The objective of the Panaftel is to provide the African continent with reliable and effective telecommunications systems that will enable telephone and telex circuits to be set up readily between any two African countries without the need to transmit through extra-African centers.

Convinced that the development of telecommunications is one of the essential requirements for the building of a meaningful ECOWAS organization, this subregional group has made the intertelecommunications (INTERCOM) program one of its priority actions since it was initiated in 1979. The objective of the program is to link the capital towns of the member states through earth networks and microwaves and provide them all with an international transit center to facilitate automatic telephone communication among them. Nigeria continued to be an active participant in this endeavor in the mid-1990s.

The feasibility study of the Regional African Satellite Communications System (RASCOM) addressed the need for developing an African satellite for a comprehensive telecommunications network that would ensure reliable communication between African countries. The findings of the study complemented the objectives of Panaftel and provided a viable option for achieving an effective and efficient telecommunications interlink within the continent. Nigeria embraced the study and has continued to participate actively and fully in the work.

One effect of these regional collaborative activities was demand for a high level of performance on the part of the domestic network. Beyond that, however, the "big brother" role that Nigeria plays in African affairs makes it even more imperative that she develop her telecommunications infrastructure for an efficient and reliable domestic service.

9.2.8 The Pattern of Traffic between Nigeria and Other Countries

One study of Nigeria's international traffic indicated that Nigeria generates significant traffic volume (in engineering terms, as much as 290 erlangs). Forty percent of this large traffic volume terminates in the United Kingdom, which has had a long-standing historical and economic bond with Nigeria. About 30 percent of the traffic from Nigeria is now directed toward North America, a reflection of the growing trade relations between the two. The increasing flow of traffic into North America can also be attributed to the rising number of Internet connections from Nigeria to major Internet backbones located in the United States.

Nigeria is geographically bounded in the south by the Atlantic Ocean and in the north, east, and west by French-speaking countries. By virtue of their different colonial experience, these Francophone neighbors have a trade and social outlook that is quite different from that of Nigeria. Although there are terrestrial networks linking Nigeria with neighbors, most of these networks are either not operational or rarely available.

9.3. The Process of Change

The emergence of an electronics industry in Nigeria is gradually introducing new dimensions into the system. Now data transmission and electronic mail delivery are possible, although few have been added to the services. Computer communication has also been introduced, and most establishments have now computerized their services and systems. The banking sector especially is now partially computerized. There is a move to have intrabank computer communications services for the clearance of checks, but that has not yet taken off.

9.4 Future Trends

In the mid-1990s, NITEL continued to hold a monopoly over basic telecommunications services. And in 1997, the NCC licensed a second national carrier, creating a duopoly. It was hoped that an additional national carrier would improve telecommunications penetration and hasten the expansion of service. Possibly spurred by the imminent licensing of a second carrier, NITEL in 1994 announced plans to invest naira 40 billion over a five-year period. The money is to come from both internal and external (unilateral lending institutions and the private sector) sources.

The NCC planned to expand the telecommunications services in the country, increasing penetration to about 8.5 per 100 inhabitants by the turn of the century. To that purpose, it planned to provide 1.2 million new lines. It also intended to license several new cellular operators in order to reach a goal of 100,000 cellular lines by the year 2000.

To accomplish this expansion, the government planned to have manufacturers set up plants in Nigeria, consequently requiring the selection of technologies for adoption in the country. However, this plan was not finalized. The government also decided that for security reasons the telecommunications industry should be corporatized rather than privatized.

The present structure of thirty states and 589 local government areas in Nigeria has increased the pressure to provide telecommunications services to the many administrative headquarters. Since about 70 percent of Nigerians reside in the rural areas, there is an urgent need for these areas to have telecommunications facilities.

The digitalization of both the exchanges and transmission systems will continue at a rate determined by the availability of funds. In effect, the analog systems will be gradually phased out. Several new technologies (e.g., the wireless system) are available for the rapid development of telecommunications in Nigeria and developing countries in general. The wired conventional system has led to long waiting periods for telecommunications to be made available to both urban areas such as Lagos and the rural areas. The use of wireless communications systems, both land based and satellite based, will continue to play an increasing role in future telecommunications development. For example, the Celluphone (CELLular telePHONE),

making use of a cellular terminal with the necessary interface, has been adopted for the provision of rural telecommunications.

Nigeria may also take advantage of the introduction of Low Earth Orbit (LEO) and Medium Earth Orbit (MEO) mobile satellite systems such as IRIDIUM, Globalstar, and so on, to provide wireless telecommunications services in the country for both urban and rural areas.

9.5 Conclusion

This chapter has considered the development of telecommunications in Nigeria for a period of over one hundred years following the introduction of the technology into the country. The discussion has covered the state of telecommunications during the colonial era (before 1960) and the postindependence period. The objectives, achievements, and failures of telecommunications during the five National Development Plans of these three decades have been highlighted, as have other aspects of the telecommunications sector: regional collaboration in telecommunications, local manufacturing facilities, telecommunications policy, adoption of new technology, the financing of facilities, and the future prospects of the sector's development.

Currently telephone penetration in Nigeria is low (about 0.8 DELs per 100 inhabitants) and the available facilities exist mainly in the urban centers. The government is consequently now focusing on expanding telecommunications facilities to the rural areas.

There has been a gradual introduction of digital switches, digital radio, and optical fiber transmission into the network. The local manufacturing of telecommunications components and equipment is at present low; however, the government has started to take the necessary actions to correct this imbalance by entering into joint ventures with foreign companies to establish telecommunications industries in Nigeria.

In order to achieve the target of 8.5 DEL per 100 inhabitants by the turn of the century, the country needs a large amount of investment, including foreign financing. Options for this funding include subventions from the government to NITEL, contractor financing, and foreign loans from international agencies such as the World Bank, the African Development Bank, and so on.

The telecommunications scenario in Nigeria is not likely to be much different from what exists in many developing countries. Nigeria must give the utmost priority to the development of telecommunications because of its multiplying effects on industrial and economic growth.

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