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

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Abstract

Since the introduction of telecommunications into Nigeria a little over a hundred years ago, it has progressed through various stages of development. In this paper, the processes of development, the progress, problems and prospects of telecommunications in Nigeria are examined and discussed from its emergence, through the various phases of development to the current expansion and modernization efforts.

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1. PRE-INDEPENDENCE ERA

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

The establishment of the first commercial trunk telephone service between Itu and Calabar in 1923 marked a significant stage in the development of telecommunications in Nigeria. Between 1946 and 1952, a three channel line carrier system was commissioned between Lagos and Ibadan and was extended to Oshogbo, Kaduna, Kano, Benin and Enugu. Thus the facility was provided between the colonial office in London and Lagos and the centres in the country where there were local authority offices. These centres also formed the centres of commercial activities.

The main transmission medium during the pre-independence era consisted of open copper wire lines on poles. This progressed through 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 into the network around 1955. The first serious attempt at planning telecommunication services in the country was the 1955-62 Development

Programme. It provided for the expansion of the trunk services using VHF Multi-Channel Radio System on a nation wide basis and a short microwave link between Lagos and Ibadan.

The switching system in the early days of telephone in Nigeria was the primitive coordinate peg-board type. This progressed through manual switch boards of different sizes, shapes and capacities until Strowger exchanges were installed at Lagos Island, Ikeja, Ebute Metta, Apapa and Port Harcourt along with 116 manual exchanges into the national network between 1955 and 1960. The installation of the Strowger exchanges at the five locations in the country marked the beginning of automatic telephone switching in Nigeria. By the time of independence automatic exchanges were established at the main centres and a Subscriber Trunk Dialing System (STD) was introduced between Lagos and Ibadan.

The telegraph service also witnessed a parallel development from telegraph delivery through manual coordinate peg-board switching to the use of Morse Code for telex switching. A manual telex exchange of sixty subscriber lines was in service in Lagos around 1960.

It is to be noted that while the above efforts were essentially aimed at improving internal telephone services, the external telephone services at that time were wholly owned by Cables and Wireless of the United Kingdom (UK), which was a colonial private company.

2. POST COLONIAL ERA

With the attainment of independence in 1960, Nigeria embarked on a periodic national development plan and telecommunication development featured in each of these plans, which were usually of five-year duration. It is however more meaningful to discuss the development of telecommunications in Nigeria since independence on a decade by decade basis. Accordingly, the objectives, achievements and features of the telecommunication development plans in the last three decades (1960-1990) will now be presented.

2.1 The 1960-70 Decade

The focus of attention in this development plan period was the expansion of the network to take care of the telecommunication needs of the growing commercial and industrial sectors of the national economy that was being envisaged. The specific objectives included

(i) the installation of additional 60,000 telephone lines to bring the total number of lines to 90,000 by the end of the decade,

(ii) the expansion of trunk dialing facilities to link the major urban centres that were then springing up

(iii) the 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% of the planned target) could be added to the existing network. This was due partly

to underfunding and partly to the disruption caused to the economy by the Nigerian Civil War which lasted from 1967 to 1970. The major achievements recorded during the decade include the installation of 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 the country but the war caused extensive damage to this transmission system. Preparatory work towards the establishment of NET as a limited liability company started during this period.

2.2 The 1970-1980 Decade

This decade covered two development plan periods - the second and third plans.

2.2.1 1970-1975 Plan Period

Efforts were concentrated, during the first half of the decade, on the reconstruction and rehabilitation of the telephone equipment and other infrastructures that were damaged during the war.

In order to achieve the objectives of the second plan period, the following areas were considered:

A. Telephone

(i) Construction of new automatic exchanges
(ii) Expansion of existing automatic exchanges
(iii) Construction of new manual exhanges.

B. Telegraphs

(i) Replacement of torntape system with teleprinter automatic switching system.
(ii) Conversion of key and sounder circuits to teleprinters

C. Transmission

(i) Construction of subsidiary radio route to provide trunk services from toll centres to end offices.
(ii) Construction of open wire carrier to provide link services to rural areas.
(iii) Provision of additional coaxial route for Lagos-Ibadan-Ilorin-Kaduna.

D. External line plant

(i) Construction of local line plant network in line with the new subscribers.
(ii) Increase in existing line plant to achieve the objectives of the expansion.

E. Satellite Communication

The establishment of Nigerian Satellite Communications earth staton at Lanlate, in the South Western part of Nigeria.

Due to under funding, the objectives of the plan period were not realised, only the national telex network was completed.

2.2.2 1975-1980 Plan Period

The second half of the decade covering the third plan period - (1975-1980) is the most ambitious. It aimed at increasing the telephone facilities in the country from 50,000 lines to 750,000 lines - an increase of about 1,400%. The projects covered under this plan include

A. Switching

Three contracts awarded to add over 340,000 lines to network are as follows:

(i) Contingency plan (1973-75)
Under this plan 45 locations were to have exchanges with total installation capacity of 162,000 lines while 12 other exchanges were to be expanded by 48,000 lines.

(ii) Turnkey projects

Provision of external line plant and switching equipment in 147 locations to provide additional 121,000 lines.

(iii) Mobile Exchange

Provision of 29 mobile exchanges with 11,300 lines

B. Transmission

The following areas were considered

(i) The introduction of the Nigerian Domestic Satellite (DOMSAT) to provide television and sound broadcasting (later modified to accommodate telephony and teletype services between the states).

(ii) Introduction of the aerostat (balloon) system which was intended for television and sound broadcasting, telex and telephone services.

(iii) Provision of coaxial cable between Lagos and Kaduna.

(iv) Expansion of existing microwave radio link system intended for telephone services for part of the contingency plan exchanges.

(v) Provision of new transmission links for the exchanges in the contingency plan, not covered by existing radio links.

2.2.3 Achievements

(i) 177 locations were provided with telephone exchanges and 29 mobile exchanges were also supplied. This increased the number of lines in the network from 52000 to 241,000 and telex lines increased from 874 to

4,950.

(ii) Domsat earth station project was completed.

(iii) Work started on the aerostat balloon which turned out to be a disaster.

(iv) A second satellite antenna was built at Lanlate and this increased the global coverage of the external services.

(v) International telephone Switching Centre (ITSC) was installed at Nigerian External Communications (NECOM) house in Lagos.

(vi) New microwave link was provided between Lagos and Cotonou (Benin Republic) and provision of computerised telex, telegraph and data switching centres at NECOM House.

2.2.4 Failures

(i) The aerostat balloon was a collosal waste of money as it proved to be a disaster and was abandoned.

(ii) There was proliferation of different technologies in the network, at one time there were 12 different equipment suppliers which made spare parts procurement difficult. This also made manpower training problematic as personnel could not be switched around.

(iii) There was shortage of technical manpower to operate and maintain the additional facilities.

(iv) Lack of adequate finance to execute the projects

(v) The most serious problem was bad planning. There was no adequate coordination between projects management and implementation. Buildings were not available for the installation of purchased equipment and vital links such as external line plants, main

distribution frame, etc were omitted in the contract awarded.

2.3 The 1980-90 Decade

The first half of the decade covered the fourth National Development Plan period (1980-1985), which was essentially aimed at completion of all outstanding projects from the previous plans. In addition to the primary objective, the development plan was designed to provide the following facilities:

(i) A total of 370,550 additional telephone lines

(ii) Terrestrial toll and trunk transmission network to link all switching centres throughout the country.

(iii) Telex/Gentex exchanges for about 9,000 telex lines with external line plant and teleprinter machines.

It was envisaged that at the end of the plan period, the total installed telephone lines in the country 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 (NET) to form the Nigerian Telecommunications Ltd. (NITEL) which is a limited liability company and which now administers both internal and external telecommunication services in Nigeria.

3. EXISTING NETWORK

The current national telecommunication network depicted in figure 1 is made up of the following:

(i) Telephone Services

There are 227 exchanges with a total capacity of 400,000 lines.

(ii) Telex Services

There are 14 Telex exchanges with total installed capacity of 12,800 and 20 voice frequency telegraph terminals.

(iii) Transmission Systems

(a) Microwave

There are 264 terminal stations and 172 unmanned repeater stations. The channel capacities range from 300 to 1800 channels with capability to accommodate one colour TV on the 960 and 1800 channel systems.

(b) Coaxial

This was to provide 960 channels between Lagos and Kaduna but the system has problems due to lightning along some parts of the route.

(c) DOMSAT

This system consists of 19 standard 'B' earth stations and operates on the three leased transponders from INTELSAT. The transponders are however grossly underutilised. They are mainly used for TV transmission for only a few hours daily.

(iv) International Services

(a) International Satellite System

This has two gateways at Lanlate and Kujama linked to switching centres at Lagos (NECOM) and Kaduna respectively as shown in figure 2.

(b) Submarine Cable

This provides a transmission system from Lagos through Abidjan, Dakar, Casablanca to Europe as shown in figure 3.

3.1 Extent of the Current Services

The existing services offered by the Nigerian Telecommunications Ltd are:

(i) Telephony

(ii) Telex and telex delivery services
(iii) Telegraphy and registered telegraphic addresses
(iv) Payphones and public coin telephone
(v) Transmission and reception of real time television for network services.
(vi) Private leased telephone and telex service
(vii) Private wire
(viii) Leased telephone and telegraph services
(ix) Alternate voice data (AVD) circuits
(x) Voice cast and press reception
(xi) International Public counter services
(xii) NIFAX Service (Facsimile)
(xiii) Data switching System
(xiv) Electronic mail (National Service only).

3.1.1 Maritime Services

The shore-to-shore and ship-to-shore maritime communication services are provided via High Frequency Radio System. The limitations of the present system are poor transmission quality, low reliability and lack of automatic access to the national telecommunication network.

In 1988, Nigeria joined the International Maritime Satellite Organisation (INMARSAT), which operates a system of satellites to provide mobile communications for the world shipping and off-shore industries. Through the INMARSAT system, NITEL offers Maritime Mobile Service (MMS) as well as satellite mobile communication.

3.1.2 International Services

The international services provided include the following: Telephony with international direct dialing in some cities, telex and telex delivery, telegraph and registered telegraphic addresses, leased telephone and telegraph services, television transmission and reception with system conversion facilities, alternate voice and data, voice-cast, press reception, high speed data transmission

and fascimile transmission facilities.

The international-national network inter-connection is as shown in figure 2.

3.1.3 Scope of national service

The present telephone penetration is still low, being about 4 Direct Exchange Lines (DEL) per thousand. The major challenge in the extension of facilities is the provision of telecommunication services in the rural areas, where there is little or no penetration at present. In the urban areas the telecommunication facilities are still inadequate. The telecommunications especially telephony is not enough for all those who require the facility especially in the big cities like Lagos, Ibadan, Enugu, Kano, etc. This has led to long waiting periods for obtaining facilities, congestion of exchanges and in addition new telecommunication facilities such as facsimile, International Business Service, high rate data transmission are not readily available.

In recent years attempts have been made by the authorities to spread the facilities throughout the country. Presently all the twenty-one state capitals and Abuja and many of the 583 local government headquarters are connected by the facility. However, the major challenge in extending the system is lack of funds and absence of engineering infrastructure for the development and production of spares and components.

4. THE PRESENT

4.1 Institutional structure

NITEL, which is fully owned by government has been partially commercialised, with the ultimate objective of

full commercialisation. The present system seeks to protect the sovereignty and security of the country by keeping it under government control. The partial commercialisation is an attempt by government to make the telecommunication service less dependent on government. This decision was taken in the national interest. Otherwise the system could have been completely privatised and hijacked by foreign companies. The government still provides funds for major capital projects. The conditions of service of the workers have been moved out of the civil service structure. The commercialisation has brought about increases in the cost of telecommunication services in the country.

The regulatory and administrative matters of telecommunications remain with the Technical Services Department of the Ministry of Communications. This department is responsible for administration of regulations, manufacturing, frequency allocation and management, etc.

4.2 Management Structure of NITEL

Presently, NITEL is under a Board appointed by Government to cater for various interests. The structure of the company is based on a 3-tier system of Headquarters, Zonal and Territorial Administrations for proper decentralization of functions for operational efficiency. Each of the 21 states constitutes a territory except Lagos that has two territories. The Federal Capital in Abuja operates as a territory. There are five zones, viz: the North West, North East, South West, South East and Lagos,

each zone made up of between four to six states or territories. The zones are semi-autnonomous in their operations. However the functions of the zones are coordinated at the centre through the office of the Managing Director, who is the Chief Executive. The Headquarters operate as 6 divisions.

4.3 Telecommunication Regulation

The Ministry of Communications is the regulatory body for telecommunications in Nigeria. The regulation is still basically based on the Cables and Wireless Act of 1962. It is pertinent to mention that throughout the various stages of telecommunication development in Nigeria, no national policy has yet evolved to define long term strategies in both administration and development. A seminar was held a few years ago on the telecommunication policy for the country and there is every hope that a policy would emerge soon. The envisaged telecommunication policy is expected to give broad guidelines in areas such as control of telecommunications, monopoly, privatisation and deregulation, geopolitical structure and policy, local manufacture and technological development as well as international relations.

4.4 Telecommunication Financing

Almost all the development plans in the three decades 1960-1990 suffered from under funding. For example during the first national development plan (1962-68), 35% of the expected expenditure was provided and consequently 40% of the expected 60,000 lines were added to the network.

Similarly most of the objectives of the ambitious programme under the third National Development Plan period (1975-1980) could not be achieved due partly to underfunding.

Since the creation of NITEL in 1985, inadequate funding has been equally inhibiting the rapid telecommunication development in Nigeria. The situation has worsened in recent years because of the large scale devaluation of the national currency and the shortage of foreign exchange to prosecute many projects. The world-wide inflation has also led to high prices of telecommunication equipment.

The revenue from the provision of telecommunications is still comparable low because the facility is cheap compared with the U.S. or other parts of the world. The initial telephone charge is about 10 U.S. cents for the first three minutes for local calls. Similarly for international calls, the first three minutes cost about US $6.00.

4.5 Manufacturing

The basic support industries for telecommunication manufacture and assembly are carried out mainly by the private sector. The following telecommunications and electronics industries are available:

(i) electrical rewinding factories
(ii) teleprinter machines and telephone sets assembling factories.
(iii) assembly plant for radio and TV sets, cassettes, cartridge players, record player.
(iv) assembly of intercoms, mini-EPBX and key telephone systems.
(v) telecommunication components factories
(vi) TVRO (television receive only) earth stations

assembly plant.
(vii) cable and wire factories
(viii) Plastic extrusion and injection industries.

The present production level is as follows:
(i) Telephone handsets - 5,000 units per year
(ii) Intercoms -30,000 units per year
(iii) Key telephones - 500 units per year
(iv) Mini - PABX - 500 units per year

Both the telecommunications and electronics sub-sectors are in their infancy stages. The local manufacturing input to the telecommunication development is very small, hence large amounts of foreign fund is required for telecommunication projects.

Export of electronic and telecommunication products is virtualy nonexistent and importation still continues on a large scale in sophisticated consumer electronics, telecommunications, defence, computer, medical and industrial electronics. The local assembly cannot also meet up the demand of simple consumer items and importation is used to supplement the local production. It is worth noting that there is no industry in the electronics components manufacturing sub-sector.

A large market for telecommunication and electronics components and equipment exist in the Economic Community of West African States (ECOWAS) sub-region and Africa.

5. TRENDS IN TECHNOLOGY ADOPTION

In recognition of telecommunications as an infrastructure which may aid the economic development of a country, many African countries (including Nigeria) have embarked on programmes of modernization and rehab ilitation of their outdated and failing national telecommunication

network. For example, in Kenya, the telecommunication administration has put into service a digital microwave system to service the eastern and south-eastern parts of the country using solar technology to provide power supply. Malawi, Zambia and Tanzania also embarked on constructing microwave links and satellite earth stations some years ago to ensure an efficient and reliable telecommunication service to the populace. Here in Nigeria, the telecommunication administration has decided to adopt digital technology in the national network with a view to improving services to the existing customers as well as meeting new demands. At the time of this decision, the network was experiencing certain problems which hindered the provision of fast and reliable telecommunication service and inhibited the desired rate of telecommunication development in the country. The major problems of the network were identified then under three categories as follows:

(i) inadequate capacity - this hindered considerably the rapid expansion of telephone service in a cost-effective manner. Considering the size of the population and the level of economic development in the country, it was realized that the number of telephone lines installed was grossly inadequate to meet demand, and such inadequate capacity was responsible for poor call completion rate, subscriber dissatisfaction and hence loss of revenue.

(ii) poor maintenance - this had contributed in no small way to the inefficient utilization of the existing network.

The maintenance problem itself was attributed to factors such as lack or inadequate supply of tools, test equipment and materials for maintenance, government policy on procurement of spare parts, poor maintenance organisation and poor attitude of maintenance personnel to work.

(iii) low revenue generation - the revenue being generated from existing public telephone service was rather low in comparison with the cost of providing the service and this was attributed in part to inefficiencies in management, in part to unproductive use of capital and in part to inefficient billing system.

It was believed that by adopting an appropriate technology, most of the technical aspects of the above-listed problems could be solved. Accordingly, the administration opted for digital technology and sought suitable strategies for its introduction and implementatiion in the existing national network taking into account the vast and analogue nature of the network, personnel requirements for the new technology and methods of financing the digitalization projects.

It was decided that the digitalization of the network would commence with the switches, to be followed later by the transmission aspects. For reasons of funding, the implementation of the digitalization could be carried out in three phases with the priority areas, mostly multiexchange areas, and the international gateways being digitalized during the first phase.

It was also decided that

(i) Abuja, the nation's new capital, should be made a "digital island"

(ii) all existing analogue switches should be gradually phased out, replacing each with a digital switch at the end of its lifetime

(iii) all new exchanges would be digital. Most of these decisions are currently being implemented. Furthermore, it was recently reported that all further telecommunication expansion and development in the country would be digitalized in a bid to get over the problems associated with maintaining the old analogue network, as well as to meet the increasing demand by customers for such services as FAX, TELEX, data transmission etc.

In addition to the existing telecommunication network administered by NITEL, the Nigerian National Petroleum Corporation (NNPC) has also installed a cross country high-capacity digital communication system for her pipeline operations. This system combines two advanced or high level technologies - microwave digital radio and optical fibre - 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 optical fibre links in the larger part of the network. The system is at present being highly underutilized, considering the low level of traffic being generated for the pipeline operations and it is being suggested that NITEL, the telecommunication agency in the

country, could utilize a part of the system to supplement its own backbone system.

6. REGIONAL AND CONTINENTAL COLLABORATION

As a member of the Economic Community of West African States (ECOWAS) and of the Organisation of African Unity (OAU), Nigeria has been collaborating with the member nations of these organisations in the development of telecommunication services at the subregional as well as continental levels. This collaboration has taken the form of meetings among the telecommunication engineers and planners from the various member countries to discuss the technical issues involved in planning, operating and designing telecommunication systems suitable for use in our environment. The exchange of ideas at the international level has in turn had its impact on the development of domestic telecommunication services.

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 the domestic network (fig. 3). Considering the fact that the objective of PANAFTEL is to provide the African continent with reliable and effective telecommunication 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 centres, it is not difficult to see why Nigeria must develop and maintain a properly functioning domestic network.

Otherwise, the country could constitute the weakest link in the chains constituting the PANAFTEL.

Convinced that the development of telecommunications is one of the essential requirements for the building of a meaningful Economic Community of West African States (ECOWAS), this sub regional group has made the intertelecommunication (INTERCOM) programme one of its priority actions initiated in 1979. The objective of the programme is to link the capital towns of the member states through earth networks and microwaves and provide all of them with an international transit centre to facilitate automatic telephone communication among them. Nigeria is an active participant in this endeavour.

The Regional African Satellite Communications System (RASCOM) feasibility study has addressed the need for an African satellite for a comprehensive telecommunication network that would ensure reliable communication between African countries. The findings of the study have complemented the objectives of PANAFTEL and provided a viable option for achieving effective and efficient telecommunication interlink within the continent. Nigeria embraces this study and has been participating actively and fully in the work till date. The first implementation phase of RASCOM is in progress.

One effect of all the collaboration discussed above is to demand for a high level of performance on the part of the domestic network. Besides, the "big brother' role that Nigeria plays in African affairs further makes it imperative

for her to develop her telecommunication infrastructure for an efficient and reliable domestic service.

7. PATTERN OF TRAFFIC BETWEEN NIGERIA AND OTHER COUNTRIES

A recent study has revealed that Nigeria generates as much as 290 erlargs of international traffic, but about 45% of this is directed towards continents other than Africa (Fig.4). 40% of this large traffic volume terminates in the United Kingdom (U.K), which has had a long standing historical and economic bond with Nigeria. About 30% of the traffic from Nigeria is now directed towards North America, a reflection of the growing trade relations between the two. There are very few direct circuits to other Africa countries.

Nigeria is geographically bounded in the South by the Atlantic Ocean and in the North, East and West by French-speaking countries. By virture of their different colonial experience, these Franco-phone neighbours have a trade and social outlook that is quite different from that of Nigeria. Although there are terrestrial networks linking Nigeria with neighbours as shown in Fig. 3 , most of these networks are either not operational or have poor availability.

8. PROCESS OF CHANGE

The emergence of electronic industry is gradually introducing new dimensions into the system. Now data transmission and electronic mail delivery although few have been added to the services. Computer communication has also been introduced and most establishments have now computerized their services and systems. Banking sector

especially is now partially computerised. There is move to have intra-bank computer communication services for the clearance of cheques, but that has not yet taken off. There are officially no exception to the telecommunications monopoly in the country. The government plans to increase the telecommunications services in the country. It is planned to increase the penetration to about 8.5 per hundred by the turn of the century. The government plans to achieve this by having manufacturers setting up manufacturing plants in the country. This requires rationalisation and selection of a number of technologies to be adopted in the country. This has not been decided on yet. For security reasons, government has decided that as of now it is best to commercialise and not privatise the industry yet.

9. CONCLUSION

The paper 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 the telecommunications during the colonial era (before 1960) and the post independence period covering three decades (1960-1990). The objectives, achievements and failures of telecommunications during the five National Development Plans in the three decades have been highlighted. Other aspects of the telecommunications sector considered are regional collaboration in telecommunications, local manufacturing facilities, telecommunication policy, adoption

of new technology, financing facilities and the future propsects of the development of the telecommunication sector.

It has been observed that the telephone penetration is low (about 0.4 DEL per hundred of population) and the available facilities exist mainly in the urban centres. The expansion of telecommunication facilities to the rural areas is receiving government attention.

A gradual introduction of digital switches, digital radio as well as optical fibre transmission into the network has started. The local manufacturing of telecommunication components and equipment is at present low; however, government has started to take necessary actions to correct this imbalance by entering into joint ventures with foreign companies for the establishment of telecommunication industries in Nigeria.

In order to achieve the target of 8.5 DEL per hundred by the turn of the century a large amount of investment including foreign financing will be required. Options for sources of funding include subvention from the government to NITEL, contractor financing and foreign loans from international Agencies such as the World Bank; African Development Bank etc.

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

REFERENCES.

1. Attah M.E. : Current trends and future development in Telecommunications in Nigeria. -presented at the 1988 Annual Conference of the Nigerian Association of Radio Science, Lagos.

2. Ayuba, A.T. : Address by the Minister of Communications on the occasion of the 18th World Telecommunication Day, Lagos, May 1986.

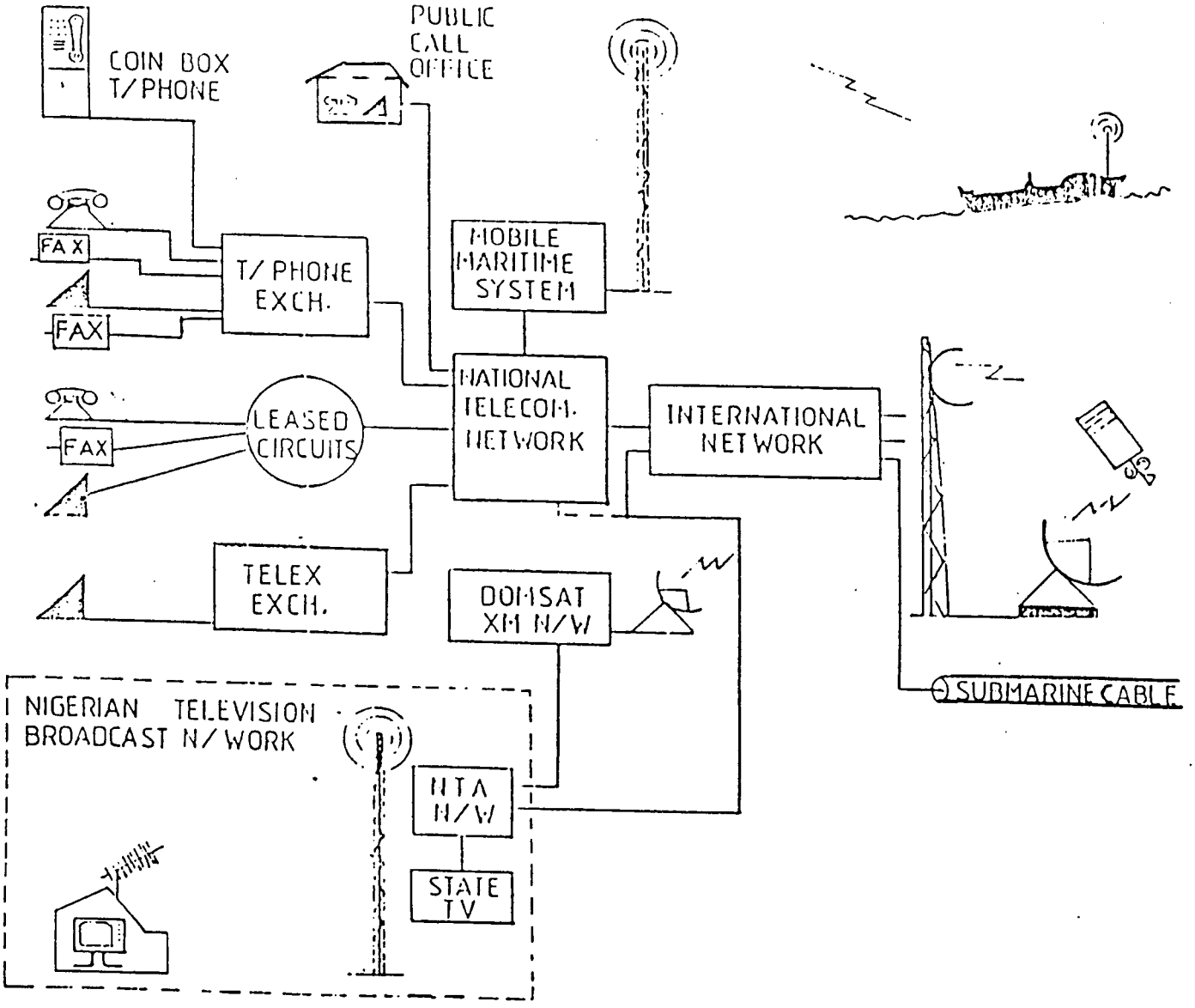
3. Bitature, C. : Development of an effective Pan-African Teleccommunications (PANAFTEL) Network. M.sc Thesis, Obafemi Awolowo University, Ile-Ife. 1989.

4. I.T.U. PANAFTEL the Pan African Telecommunication Network, Geneva, 1987.

5. Mark, D.A.B. : Address by the Minister of Communications on occasion of the 22nd World Telecommunication Day, Lagos, May, 1990.

6. Salawu, R.I.: Telecommunications in Focus, 10th Anniversary Lecture for 2-Way Communications Ltd, Lagos, Nov. 1991.

FIG. 1 NATIONAL TELECOMMUNICATIONS NETWORK
[PRESENT]



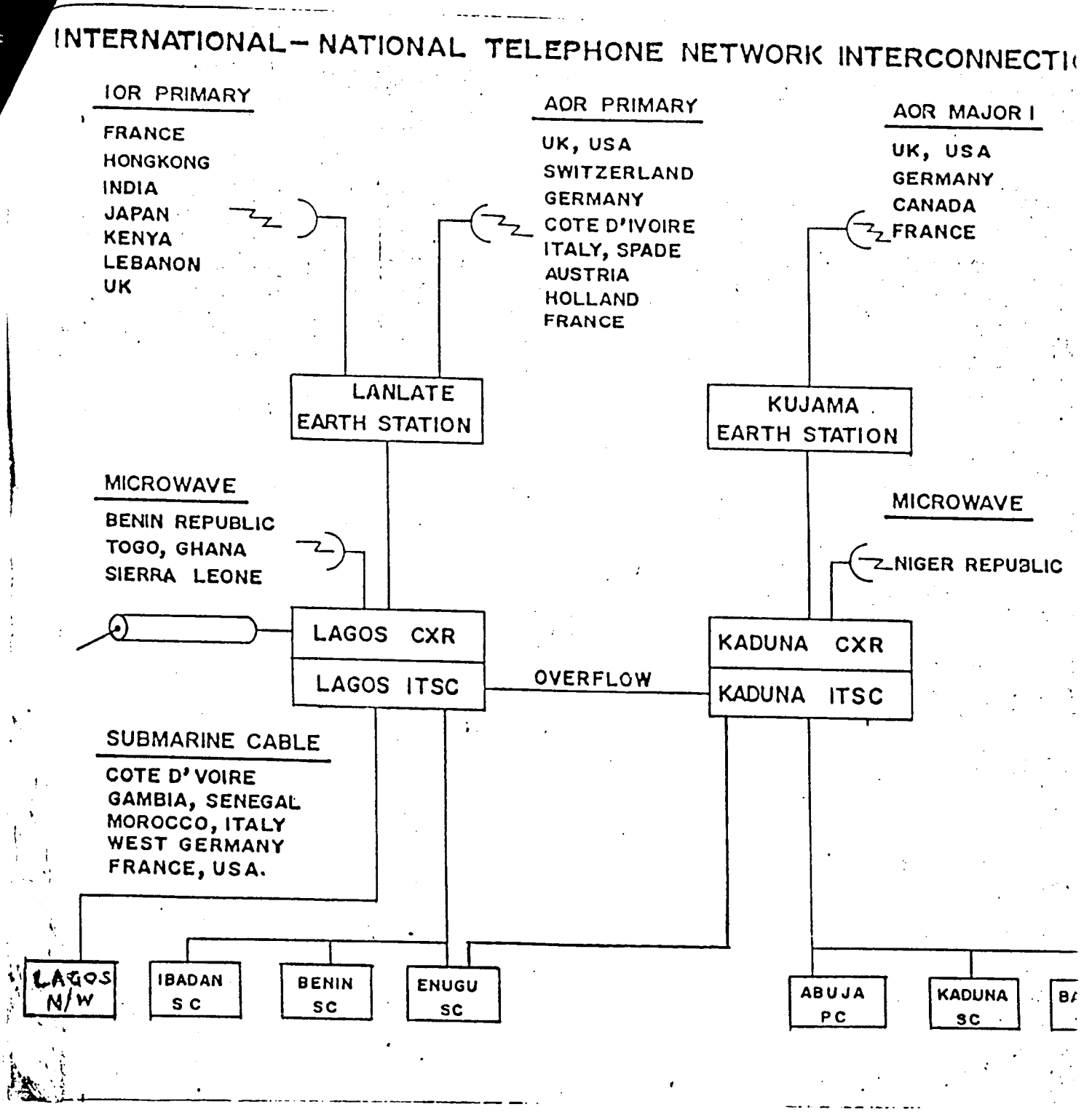
LEGEND

TELEPHONE.

FACSIMILE.

DATA TERMINAL.

FIG.2


INTERNATIONAL– NATIONAL TELEPHONE NETWORK INTERCONNECTI
IOR PRIMARY
FRANCE
HONGKONG
INDIA
JAPAN
KENYA
LEBANON
UK
AOR PRIMARY
UK, USA
SWITZERLAND
GERMANY
COTE D'IVOIRE
ITALY, SPADE
AUSTRIA
HOLLAND
FRANCE
AOR MAJOR I
UK, USA
GERMANY
CANADA
FRANCE
LANLATE EARTH STATION
KUJAMA EARTH STATION
MICROWAVE
BENIN REPUBLIC
TOGO, GHANA
SIERRA LEONE
MICROWAVE
NIGER REPUBLIC
LAGOS CXR
LAGOS ITSC
OVERFLOW
KADUNA CXR
KADUNA ITSC
SUBMARINE CABLE
COTE D' VOIRE
GAMBIA, SENEGAL
MOROCCO, ITALY
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BENIN SC
ENUGU SC
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KADUNA SC

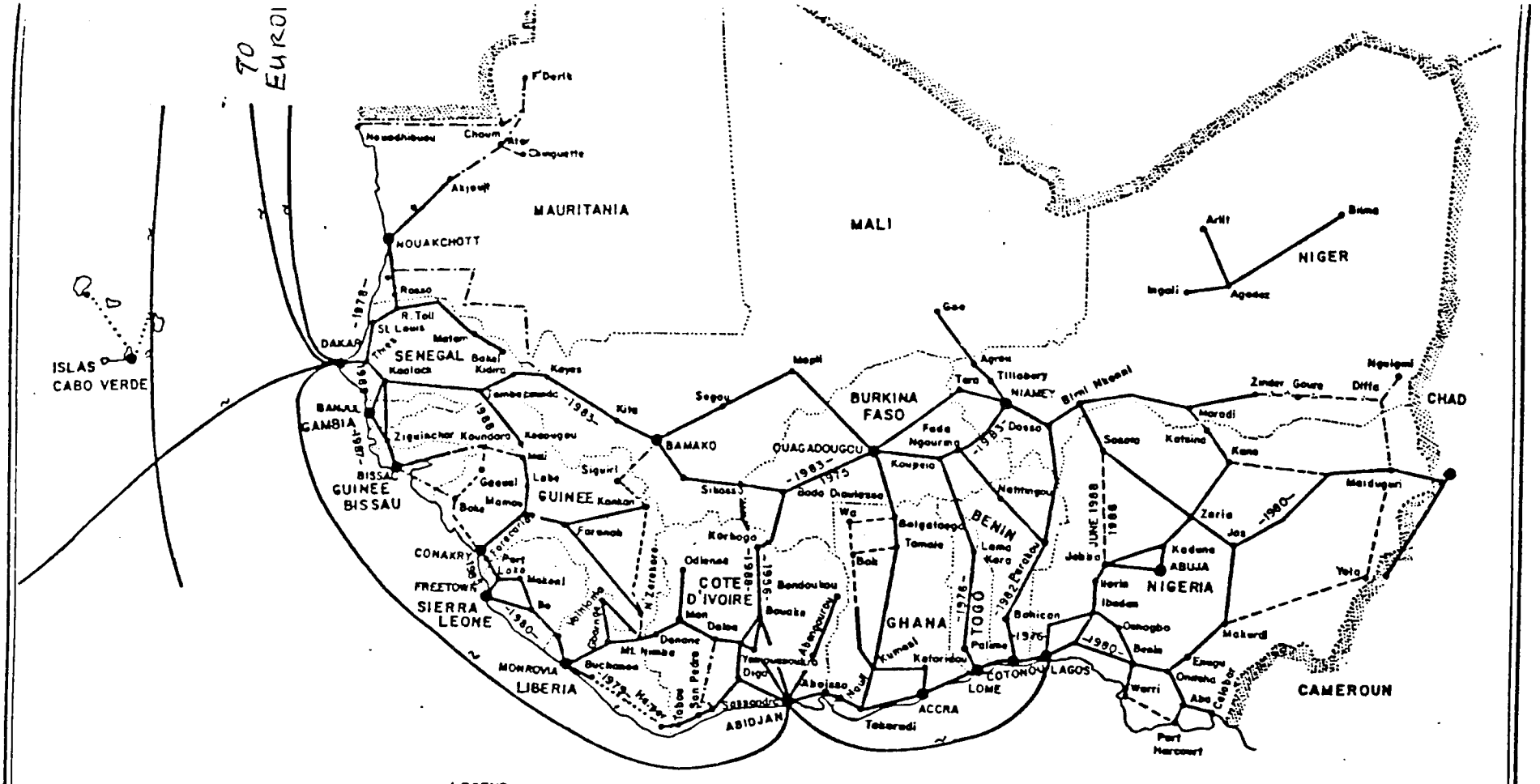

Fig.3 :- Panaftel Transmission Routes WEST AFRICA

ITU 1987

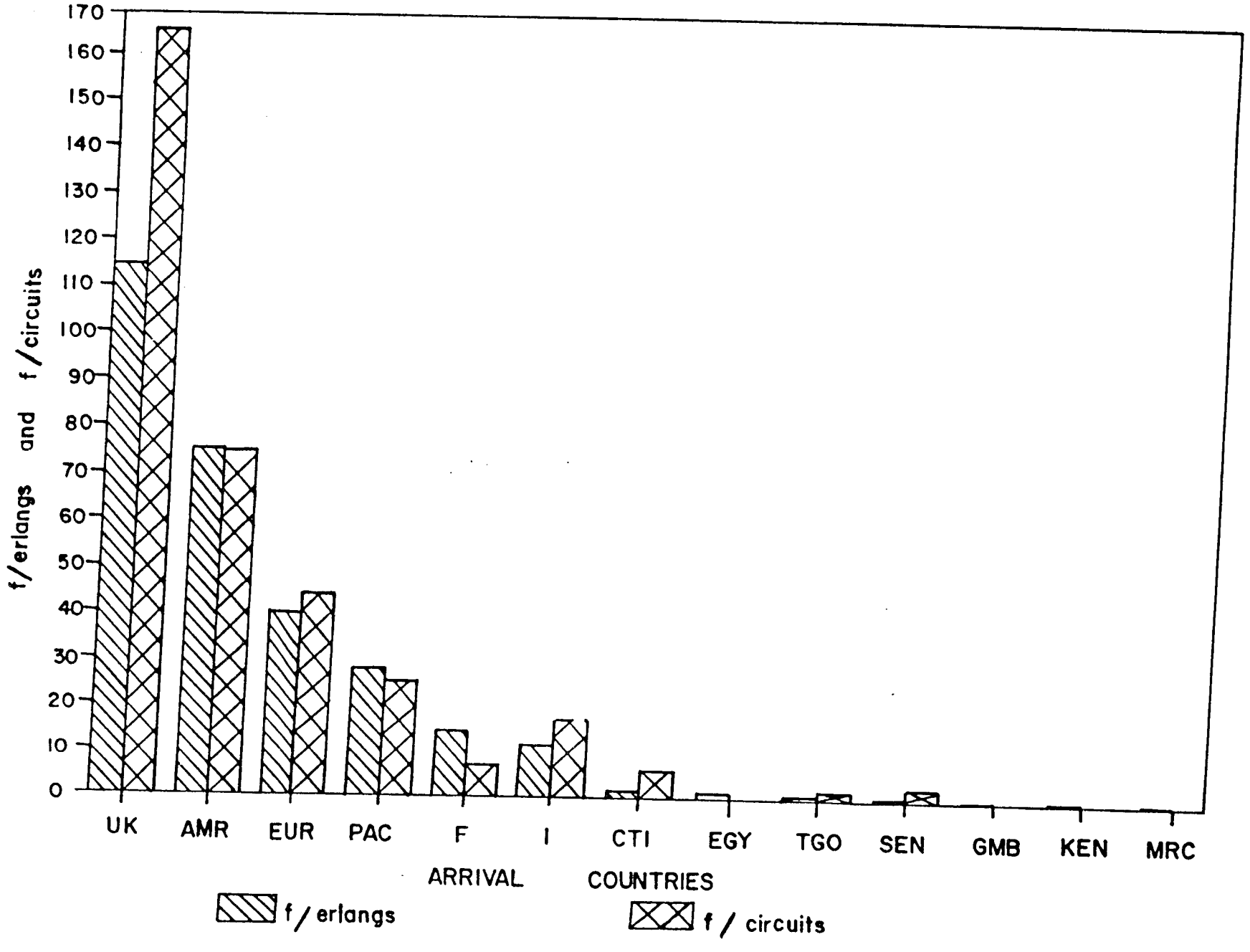

FIG. 4 : Telephone traffic from Nigeria (Ref. 3)

ABBREVIATIONS FOR NAMES IN FIGURE 4

U.K	United Kingdom
AMR	America
EUR	Europe
PAC	Pacific region
F	France
I	India
CTI	Cote D'Ivoire
EGY	Egypt
TGO	Togo
SEN	Senegal
GMB	Gambia
KEN	Kenya
MRC	Morocco