# AFRICA IN GLOBAL COMMUNICATION NETWORKS†:
# FROM NETWORKS TO CONCRETE USES

## Chéneau-Loquay A. (CNRS)

*Unité mixte de recherche CNRS-IRD REGARDS, B.P. 200, Domaine universitaire de Bordeaux, 33405 Talence cedex. tel: 05 56 84 68 32, fax: 05 56 84 68 55, courriel : loquay@regards.cnrs.fr.*

## INTRODUCTION

Although Africa may still be relatively poorly equipped in the field of new information and communications technology (NICT) or in other words *"all the major computerised systems for telecommunications, data management and control, public or private, aimed at both industry and the individual"*(Gene Roechlin 1995), nevertheless this sector is developing more and more rapidly and is giving rise to a "war of the networks" between American and European operators[1] and recently to a price war between the various services providers. By the end of 1999, only Somalia, has no access to Internet, but excluding South Africa, there are fewer than 100 000 dialup internet accounts for over 700 000 millions people and Internet services are confined to the capitals and major towns. In about fifteen countries already connected, service activities are growing at a rate never before seen on this continent for any other economic activity. As is happening in Asia, the better off are acquiring cell phones, the ultimate symbol of wealth, but in fact an extremely useful piece of equipment when there is a shortage of traditional telephone lines. This integration into the world-wide information system is giving rise to tremendous hopes that the continent will achieve a technological leap which will help resolve the problems linked with development. Is this a myth of all-powerful technology or a magic spell to enable Africa to emerge from its state of under-development?

At present Africa appears to be slipping through the net somewhat in the global and globalising system that exists today, based on a liberal economy, on connections between major technical systems, where information control has a vital role to play : computerisation, which represents the hold that a series of interconnected networks have over individuals and countries, is growing apace in the countries of the North while in Africa, the networks that form a country's basic structures are usually poorly maintained and poorly controlled. The result is a territorial divide, with on the one hand the urban areas, connected up to modern networks, with tarmac roads, electricity and telephone lines, and on the other, areas which are completely remote, where the roads are simple tracks and where activities depend on local energy, on man and his environment. And yet this duality, a fundamental obstacle to development, is very rarely taken into account when projects are prepared. The essential role of interconnected infrastructure and equipment is not understood, although it forms the central nervous system of an area, which without it cannot function as an organic whole.[2]

In the developed countries, being removed from the various registration systems is tantamount to social exclusion (one loses one's home, electricity is cut off, credit card is withdrawn), yet in Africa the vast majority of the population lives in this way, outside the registered sector, in what is called the "informal" sector. This exclusion from the world of legality can also have its advantages, as it enables individuals to escape the clutches of States which are too often predatory. At the same time, it does not prevent, far

---

[1]internet reporter no. 5 December 1995.

[2] This is the case in the industrialised countries, where, on the contrary, electrification and the interconnection of physical networks are now so well established that they seem to be more or less autonomous and we almost cease to notice them, and yet these complex systems are in fact very fragile. Annie CH…NEAU-LOQUAY, 1996 "Les relations entre l'…tat, le droit et les rÈseaux techniques sont elles obligatoires dans le processus de modernisation ? RÈflexion ‡ partir du cas africain".

from it, a relative degree of dynamism [3] in activities which here are based much more on social networks than on government policies for regional development (ChEneau-Loquay A. 1998).

In this context, in order to check the gradual deterioration of public services and create and maintain infrastructure and amenities (roads, telecommunications, various networks) which will provide the link into the "world system"[4], funding has to be brought in from outside, through projects. For the last fifteen years, structural adjustment policies have required State disengagement and the privatisation of the economy. In the transition from a controlled economy to a free market economy the interaction between public and private actors lies at the heart of the telecommunications debate.

While the liberalisation of economies would seem to favour the establishment of new technologies, another essential feature may be of particular advantage in Africa : the dematerialisation of wireless technology systems, their consumption is low, plus the fact that they can reduce their dependence on a centralised electricity supply by relying more on solar power. This is not a new phenomenon. Remember the hopes that were raised when educational radio was introduced in the 1970s and the independent radio stations that are emerging now, with the freeing of the air waves. Today it is possible to run a telephone, a satellite dish and receive television programmes from just one small solar panel. We have the paradox of villages that have satellite link-ups yet no proper roads and where the women still carry the firewood on their heads. It is significant that cellular phones first developed in those countries which were poorly structured and inefficiently controlled by the State, such as Zaire, first among the better off strata of society and next among the major entrepreneurs and international businessmen who control powerful, and often illegal, economic and social cross-border networks.

This "paradoxical" modernisation, these signs of a "reinvention of capitalism", (Bayart 1994) this "easing of restrictions" in regions of Africa better suited to relational contacts than to production (Durand, Levy, RetaillE 1993) are these factors indeed an asset, or a handicap for the establishment of NICT?

From this perspective, the question of relations between the State and its territory is crucial. The traditional conception of territory as a defined area over which the power of control and development is exerted is already being challenged by cross-State regionalism and the dynamism of social networks (Bach 1994) is there not a danger that this notion will now be demolished totally with the introduction of these innovative ICTs which partly ignore the geographical and political constraints of nationhood. If we take things to their ultimate conclusion, could we not do away with the State altogether in this globalisation process where communication techniques are the driving force? What form of socio-spatial organisation would we then be left with?

In a first part maps[5] give a global view of basis services, the fixed phone; they reveal both the diversity of situations in the different countries but also bring out similarities across wider areas; thus the importance of international telecommunications in a region is an indicator of the degree of that region's integration or extraversion. A second part shows the evolution of new networks, in the context of deregulation : while the traditional operators are debating whether to abandon a sector which is extremely profitable for the State, the new IT developments and Internet in particular are often used as

---

[3] Insofar as physical obstacles still remain; the cost of running a vehicle in Africa is two to three times higher than elsewhere and formal exchanges between Africa and the rest of the world are in decline, currently less than 2% of worldwide exchanges.

[4] This is an idea developed by geographers, in particular by Olivier Dolfus in the first volume of the universal geography, Mondes nouveaux, Hachette Reclus, 1990 and in "Le Monde espace et systÉmes" published by La Fondation Nationale des Sciences Politiques and Dalloz, by Marie FranÁoise DURAND, Jacques LEVY, Denis RETAILL…, 2nd edition 1993.

[5] Our geographical approach at the continental level, represent the initial stage of a more far-reaching study into the penetration and use of communication technologies in Africa. See AFRICANTI on <http://www.regards.cnrs.fr>

an argument to speed up reforms. South of the Sahara, in all areas of technology, in long-established networks or new networks, South Africa's facilities are superior to all others.

From future prospect, the establishment of world-wide Low Earth Orbit telecommunication systems, such as Iridium or Globalstar, will complete the destabilisation of the traditional telecommunication operators, bypassing State territory altogether. The consequences cannot only be positive : free access to global data networks and the possibility that the State will relinquish control of technology and production content.

## I - THE BASIC SERVICE†: INADEQUATE NETWORK INFRASTRUCTURE

The traditional wired telephone networks in Africa have for the most part suffered the same problems as all other physical networks: they are poorly located, often intermittent, with a very mediocre level of service at a very high price. Over the last years, however, governments seem to have realised what is at stake in the communications issue.

According to statistics produced by the International Telecommunication Union (*ITU report 1998*), Africa, with 12% of the world's population, has only 2% of the global telephone network, with a very low density of coverage of less than 2 lines per 1,000 inhabitants on average (compared with 48 in Asia, 280 in America, 314 in Europe - east and west - and 520 in high income countries). There are as many telephones in Tokyo or Manhattan as in the whole of Sub-Saharan Africa.

### II - 1- Inequality in teledensity and disproportionate provision in urban areas (map 1)

Looking at the continent as a whole, there are four distinct areas:
- the Maghreb and South Africa and her neighbours, with about 45 lines per 1,000 inhabitants; 51 for Egypt, 101 for South Africa, 48 in Botswana.
- the countries along the west and east coasts which, except for Guinea, Liberia and Somalia, have between 2.5 and 10 lines; Only Senegal and Gabon being above with 13 and 32 lines.
- the seven countries in the empty interior of the Sahel and the Congo basin which are very poorly served with less than 2,5 lines per 1,000 inhabitants.

The growth in infrastructure provision is in fact higher than in European countries (5.7% against 4.1%), but this figure refers mainly to the better equipped countries (especially north Africa). The countries where the number of lines has sometimes decreased between 1990 and 1996 are those where the State is not truly in control: countries at war, Sierra Leone, Liberia; countries which are becoming destructured, Zaire, or undergoing a difficult reconstruction, Guinea and Madagascar -1,5.

At national level, the proportion of lines in the capital city compared with population reveals the disproportionate provision in the urban areas and the extent to which the rural areas are under-equipped. But here again, south of the Sahara southern Africa distinguishes herself with the best population and infrastructure distribution, with fewer than 50% of lines in the capital, which represents less than 10% of the population. In the poorest countries, however, this distortion is very much accentuated : Asmara and Bissau with 97%, Bangui 91%, Freetown 88%.

The number of telephone faults in the continent as a whole was much greater than in other continents: for more than 100 faults per year and per line in Africa, there are only 47.9 in America, 26.7 in Asia, 18.7 in Europe and 42.2 in Oceania. It is also difficult in Africa to obtain a new line: on average, there is a waiting period of 4.6 years, though in some countries this can be as long as ten years (Ethiopia, Chad, Ghana, Malawi, Mozambique, Zimbabwe). The lines carry the least traffic in the world, and companies are often badly run and overmanned.
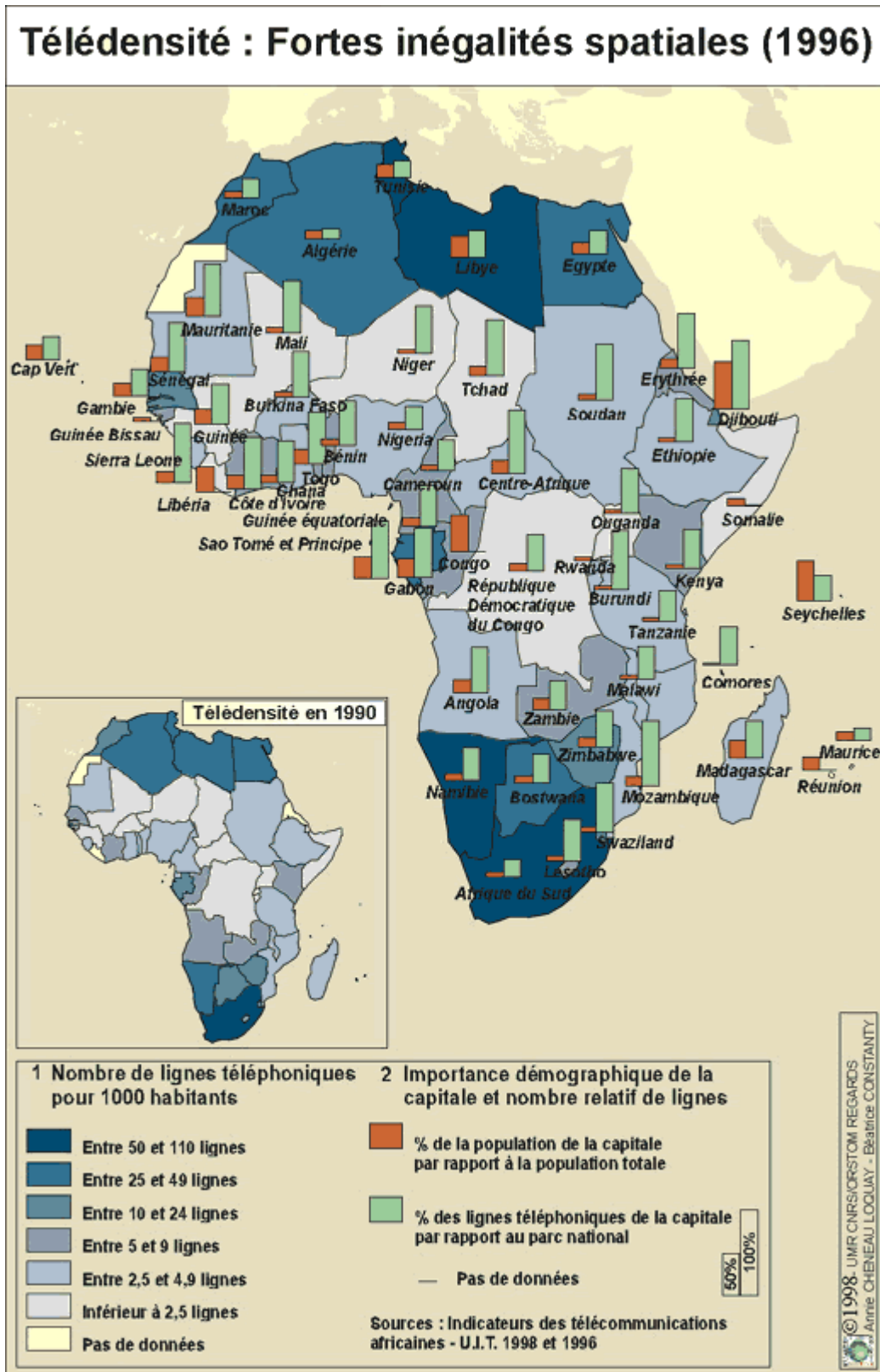
There are, however, some remarkable exceptions and some countries which are very well equipped with infrastructure have also improved service management and regional coverage. Botswana and Senegal, for example, use digital fibre optic networks.

Senegal has is quite totally equipped with fibre optic cables, and has reached a total of 100,000 lines, with 105,000 main lines, thus increasing its teledensity to more than 13 main lines per 1,000 inhabitants in 1998. This country has the greatest number of public lines, 6,17%, for 2,60 in South Africa and 2,90 in Swaziland. In Senegal 70% of the inhabitants have access to a telephone. Concessions have been granted to private individuals by the national telephone operator and this has generated a proliferation of telecentres, anywhere where there is an electricity supply. In march 1998 there was 7000 public lines with 5800 telecenters, of which 40% outside Dakar, and they have provided more than 6000 jobs†; more and more of these centres are equipped with fax and, in Dakar, with Internet. According to a representative of the Ministry of Communication, Senegal is now aiming to meet the challenge of making the telephone a development tool, and to ensure that no citizen is more than 5 km away from a phone, one hour's walk. However, will this promise of a universal service, which is in the five years contract, of the new private SONATEL, be respected after this period by the new operator, who seek to equip the most profitable regions, in other words those areas which are most densely populated, and wherever possible with the cellular system?

How can the basic service develop in the poorest countries, when the size of the GDP and teledensity are so closely related ? There is a high correlation between the wealth a country produces and the state of the basic telecommunication service in that country : for both indicators, we find at the lower end of the scale the four land-locked countries of the Sahel, Mali, Niger, Chad, Sudan and the former Zaire and also Somalia ; for the anglophone countries in the east, the correlation is less marked.

In fact, teledensity, the international criterion, is not a good indicator in the case of Africa to express service produced ; here, for most of the population, who live in the underprivileged areas of the major cities and especially in the rural areas (more than 70% of the population of Africa), it is also necessary to consider the areas served, the accessibility of the populations in relation to the distance they are from a telephone. It is also the case that use patterns are very different from those in the developed countries; a domestic line serves a wider group than the subscribing family. Considerable effort is put into public payphone provision in Morocco, South Africa, Senegal. The question remains of telephone provision in the rural areas. The stakeholders are divided on this issue : should it be left to the market to decide, this is the position held by the World Bank; should the principle of universal access and a public service be upheld, but who will pay and what will be the role of those most directly involved?

**Map 1- Inequality in teledensity and disproportionate provision in urban areas**



Télédensité : Fortes inégalités spatiales (1996)

Télédensité en 1990

1 Nombre de lignes téléphoniques pour 1000 habitants

Entre 50 et 110 lignes
Entre 25 et 49 lignes
Entre 10 et 24 lignes
Entre 5 et 9 lignes
Entre 2,5 et 4,9 lignes
Inférieur à 2,5 lignes
Pas de données

2 Importance démographique de la capitale et nombre relatif de lignes

% de la population de la capitale par rapport à la population totale

% des lignes téléphoniques de la capitale par rapport au parc national

— Pas de données

Sources : Indicateurs des télécommunications africaines - U.I.T. 1998 et 1996

© 1998 UMR CNRS/ORSTOM REGARDS Annie CHÉNEAU LOQUAY - Béatrice CONSTANTY

# I 3 Strength of international traffic and weakness of inter African one (map 2)

The weakness of inter-african traffic shows the poor integration between economies, at least from a formal point of view and also the extraversion of the continent. This situation is the same as it was in 1994. It is significant to notice that telecommunications flows between countries are the weakest in West Africa, where cross-borders trade exchanges are considered to realise a ´†bottom integration†ª.

The average level of outgoing international calls in Africa is one of the highest in the world, (200 min per subscriber, 79 min in France) though with some major disparities throughout the continent. This phenomenon can be interpreted in several different ways. It expresses:
- the scale of unsatisfied demand, with the shortage of lines leading to intensive use of those which do exist;
- the fact that a decision has been taken to give priority to equipping a solvent clientele who make more calls abroad, with influence from international bodies, foreign NGOs, but also:
- the importance of international migrations and the opening up, one might even say extraversion, of national economies.
It is not easy to determine which of these factors is most important, however by studying the map it is possible to note differences or similarities between countries which may be of significance.
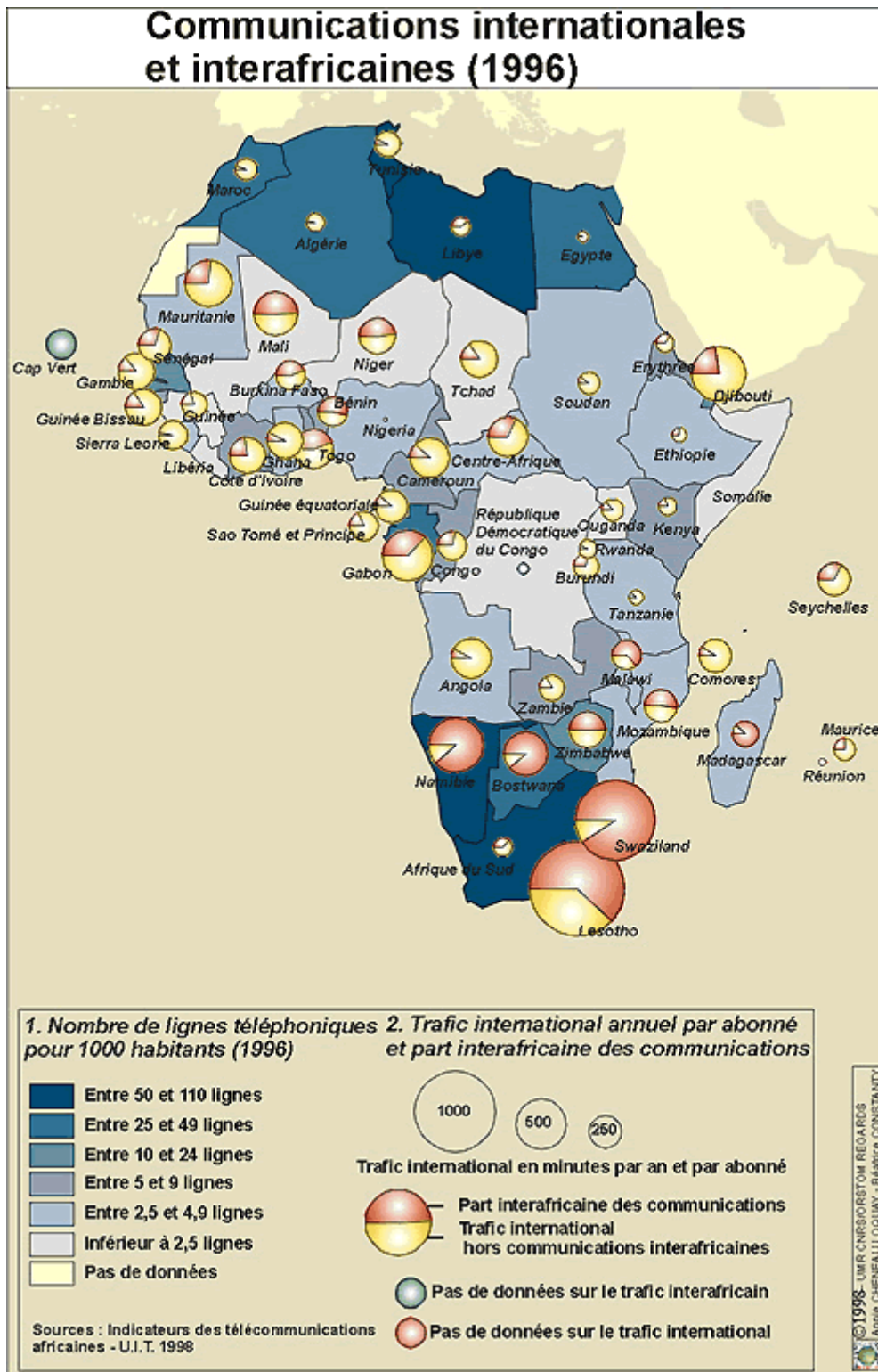
Apart from the Maghreb, the map shows once again four groups of countries, with a split between Anglophone and Francophone.

In southern Africa, there is clearly a preponderance of inter-African traffic within the international traffic, which is an indicator of regional interaction around South Africa and may also reflect this countryís long isolation from the international community. There is a particularly striking contrast between South Africa and Namibia where there is a relatively low level of international calls (45 min compared with 79 in France). The particularly high levels in Swaziland (a record level of 1,240 min per inhabitant) and in Lesotho (945 man), two countries where teledensity is fairly high, can be explained by the fact that the major proportion of these calls are within the continent (more than 80%). Such calls are in fact fairly local calls for these land-locked countries which are very much dependent, economically, on South Africa. Zambia, Zimbabwe, Malawi and even Portuguese-speaking Mozambique also fall within South Africaís orbit, though to a lesser extent, with only a small proportion of inter-African calls being in excess of 50% of the international calls. Note that Portuguese-speaking Angola, which has been in a latent state of war for the last thirty years, is exceptional in this region as it has very little contact with other African countries.

A second group of countries includes seven east African countries and the former Zaire, where international traffic is the lowest on the continent. Tanzania, Burundi, Rwanda, Uganda, Ethiopia, Eritrea and Kenya are the poorest countries of Africa, with a GDP of less than $250 per year in 1995. These are therefore the countries which have least contact with the outside world. For the Democratic Republic of the Congo, installations are so obsolete that the wire system has been abandoned in favour of the cellular system, of which this country has been one of the pioneers.

The international traffic of the countries of western Africa is between 200 and 600 minutes. In the land-locked countries, Mali, Niger, Burkina Faso, about 50% of communications are within Africa while in the countries of the west coast, Guinea, Senegal and Gambia, inter-African communication represents less than one quarter of total international communications.

**Map 2- Strength of international traffic and weakness of inter African one**



Communications internationales
et interafricaines (1996)

1. Nombre de lignes téléphoniques pour 1000 habitants (1996)

- Entre 50 et 110 lignes
- Entre 25 et 49 lignes
- Entre 10 et 24 lignes
- Entre 5 et 9 lignes
- Entre 2,5 et 4,9 lignes
- Inférieur à 2,5 lignes
- Pas de données

Sources : Indicateurs des télécommunications africaines - U.I.T. 1998

2. Trafic international annuel par abonné et part interafricaine des communications

1000    500    250

Trafic international en minutes par an et par abonné

Part interafricaine des communications
Trafic international hors communications interafricaines

Pas de données sur le trafic interafricain
Pas de données sur le trafic international

©1998 - UMR CNRS/ORSTOM REGARDS Annie CHENEAU LOQUAY - Béatrice CONSTANTY

In Burkina Faso (75% of international traffic was inter-African in 1994 and 55% in 1995) communications with the CÙte d'Ivoire predominate, a phenomenon linked with the presence of many migrants. Mauritania and Mali have the highest levels of international traffic per subscriber in west Africa, comparable with levels in Gabon and Cameroon. In Mali, however, and in Niger too there is a high proportion of inter-African traffic, which is associated with the migration of workers attracted towards the poles of Nigeria and Côte d'Ivoire. Benin and Togo have a much greater proportion of inter-African communications than Nigeria and also than Ghana, a country which is similar in size.

The western facing countries from Gambia to Liberia have the lowest levels of communication both amongst themselves and with the rest of Africa, while their level of international communications is on average 300 minutes per subscriber. What is the reason for this? The poor quality of the telephone networks does play a part, except for Senegal, yet cross-border exchanges are active, though organised for the most part on informal lines.

One of the paradoxes that we find in Africa is that telecommunication tariffs are very high, while the population overall is very poor. In Africa, 60% of telecommunications income is from international calls and the telecommunication sector's share of GDP is much greater than elsewhere. It costs more to telephone between two towns in Burkina Faso than from Paris to Los Angeles (2.93 francs per minute in April 1997 via the France Telecom operator). It is easy to understand the State's reticence with regard to the privatisation of companies, which would deprive it of essential income. The excessively high cost of the service is an obstacle to the development of the communication sector, but recent openings up to competition indicate that a gap is appearing which may enable new operators in the sector to move into the market.

## II - NEW NETS, NEW MARKETS, A NEW KEY TO DEVELOPMENT†?

The world of telecommunications is currently in a state of total upheaval and infrastructure is a massive problem which continues to relegate Africa to a marginal position. Rapid technological change, low budgets, globalisation and fierce competition will force African governments into drastic action. If they are to improve international communication networks, should they invest in undersea fibre optic cables, or should they focus their efforts on satellites ? Should they improve services by introducing competition into the sector, and how should this be done ? By associating the traditional telecommunications operator with a strategic partner, or by offering lic[1]ences to private cellular system companies? What is the best way to meet the needs of the majority of the population, who are poor, uneducated and living in rural areas ? Should it be left to the market to decide, as the World Bank believes should happen, or should the principle of universal access and public service provision be upheld, but who will pay and what will be the role of those directly involved ?

In the case of Africa, the official discourse on development from international bodies finds a new youth with NICTs, neo-classical ideology base on a linear growth exploits the concept to coax reluctant governments towards more free-trade. The myth of a powerful technology bringing social and economic change which escorts every technological step forward[6] currently strengthened by the transparency and the ubiquity attributed to new information technologies[7].
According to most international agencies, G7, World Bank INFODEV, UE, IUT, these technologies are considered as a new universal key to development thanks to the very virtue of their introduction in the global market. According to World Bank experts who support deregulation, the growth if the informal sector would help discovering new profits fields and raising private capital funds in all kinds of

---

[6] *Cahiers Sciences Humaines*, March 1997. Mainly Marie-Claude CASSE, ´†RÈseaux de tÈlÈcommunication et production de territoire†ª.

[7] See journal *Tiers-Monde*, tome XXXV, no. 138, April-June 1994 and in particular the introductory article by Yvonne MIGNOT-LEFEBVRE "Technologies de communication et d'information, une nouvelle donne internationale", pp. 245-277, which shows how development and information technology which used to go hand in hand seem to have become disjointed.

domains, even for basic facilities.[8] In order to induce governments into more reform, they profess an utopian third millennium revolution, following some popular authors, among whom the first is US vice-president Al Gore, on a global information infrastructure.[9] According to the UNO World Co-ordinator for Trade Points Centres, ìthe very possibility of a ìhuge forward leapî is within reach of African marketsî (Bruno Lanvin, 1996). Pulling on the same string, the World Bank emphasises somewhat dramatically: if African countries do not succeed in taking advantage of the information revolution and in surfing the mighty wave of technological change, they will sink below. Then, they might be even more marginalised, with stagnant economies in the future. (World Bank, report on INTERNET development, march 1995).

The International Union for Telecommunications 1998 report is a hymn to privatisation. Their main motive for satisfaction is the partial privatisation of fixed telephone ìhistorical operatorsî in Ivory Coast, Senegal, Guinea, Ghana and South Africa, which have all made some room in their capital funds for strategic foreign investors and have planned some 20% of annual growth rate for phone density. Countries such as Ghana or Uganda have licensed another operator, and some stress potential profits in international communications. Nonetheless, most of major international operators do not include sub-Saharan Africa in their strategic plans.

## II 1- Competition, deregulation, the major manoeuvres

If international networks are to be extended, they need also to be digitalized. This will mean a better quality of service, less maintenance and probably result in a lower unit cost per line. There are several schemes in contention, including a project to lay an undersea network of fibre optic cables which will form a ring around the entire continent. This cable network, Africa ONE, will be more than 39,000 kilometres long and will be able to be integrated into other technologies so that every country in Africa will be linked up, including those in the interior. Africa ONE will also create a direct link between the continent and non-African countries such as Italy, Portugal, Greece, Saudi Arabia and Spain, and will provide total interconnection with the rest of the world via intercontinental cables.
The problem will then remain, however, of how to find users for these connections. Cables are highly suitable for the densely populated coastal areas, but would simply reinforce existing geographic structures, and accentuate the relative deficiencies of the rest of the country. Communication satellites, on the other hand, are more egalitarian geographically speaking. The choice between cable or satellite would therefore need to be made. The Africa ONE network is supported by the Regional Africa Satellite Communications Organisation (RASCOM) and the Pan-African Telecommunications Union (PATU), but funding poses a problem as the former leader AT&T is providing only 20% of the cost of the project[10].

Whereas only five years ago, large-scale investment was necessary in order to set up a telecommunications network, and they were obviously produced under some form of monopoly, either public or private, now a very small-scale group can become a telecommunications network operator with limited capital. Physical networks are becoming commonplace, they are no longer the responsibility of the traditional telecommunications operators and service providers who manage the contact with the client but are handing over responsibility for the physical and accounting aspects of infrastructure

---

[8] *†Concurrence mondialel et NTIC, la chance de líAfrique.†ª* Colloque *líAfrique et les NIT*. Private Sector Foundation, World Bank, Washington. ìWorld competition in NICTs leads to lower costs of information transmission and computer hardware. This evolution could be an opportunity for Africa, given that it abides to deregulation and free-trade. The World Bank wants to foster the growth of NICTs by ranking information society among its priorities.î (http://www.anais.org)

[9] Among the most well-known†: Alvin TOFFLER (The third wave, and ìguerre contre guerreî); Nicolas NEGROPONTE (*líhomme numÈrique*); and vice-president Al GORE, speech on global information infrastructure, IUT, Buenos Aires, march 21 1994; seconded in France by JoÎl de ROSNAY (*Líhomme symbiotique*)

[10] See Internet, Michiel HEGENER, mh@nrc.nl

management[11]. This new situation is linked with the evolution of technologies, which will enable costs to go down.

Transmission costs have fallen dramatically, due to constant improvements in the capacity of new fibre optic lines or developments in compressing signals received via satellite. There has also been a drop in the costs of switching, though this has been less dramatic, and has been affected by competition between manufacturers of switching equipment.

Basing their argument on prevarications that are occurring in this sector, which is providing a golden opportunity for the States, the World Bank is pushing for a total opening up of the telecommunications market in Africa; however, private enterprise is more interested in installing cellular phones than in taking over national companies which are often inefficient and obsolete. World-wide mobile personal communication systems are helping to accelerate the deregulation of telecommunications. Telecommunications companies are making GSM the focal point of the services they offer. The costs of cell phone systems are still very high compared with traditional wire technology, but they will decrease as the market expands in the cities and as more competition emerges.

According to a confidential Telex study (December 1996) "with its 400 million consumers, the African market is a very interesting prospect. The giants in the sector, like the Americans, AT&T and Motorola; the French group, Alcatel; the Japanese with Nec Corporation; the Canadian, Bell; the Swedes with Ericsson or the Chinese company CTS, all have a foothold on the continent but there is little interest in privatisation deals". Asia and Eastern Europe offer incomparably better rates of turnover for future operators.

In Côte d'Ivoire, the long-standing operator, Citelcom, was privatised in January 1997 when 51% of its shares were bought up for 1.06 billion French francs, with France Telecom's offer being accepted. An ambitious plan to overhaul the country's stock of main lines was developed, to increase the number of main lines from 120,000 to 410,000 in 4 years. Three private operators, including SIM, a subsidiary of France Telecom, are managing the GSM networks, which had 15 000 subscribers in September 1997 and till 150 000 in April 1999, the same number than the fixed system.

In Senegal, France Telecom now holds one third of the shares of SONATEL, which has a mobile phone network of the GSM type with 3,900 subscribers in June 1997, 23,000 in December 1998 and 30,000 in April 1999, a spreading out which bypass all the expectations. The second operator SENTEL would have reached 10 000 subscribers since April to November 1999.

Other operators have also joined the market, like Telecom Malaysia in Guinea. Since they arrived in March 1996, SOTELGUI had increased its stock of main lines from 10,000 to almost 21,000 by September 1997, with a large increase in cell phone use. On June 7, Alcatel signed an $11 million contract with SOTELGUI to install a GSM standard telephone network between September and November 1997 for 25,000 subscribers in Conakry and Kamsar.

---

[11] Any company which has rail or road infrastructure, any company running physical networks of some kind, can embark on the provision of telecommunications infrastructure to complement their own structures with every reasonable chance of success. There are many examples in France (SNCF, RATP, Lyonnaise des Eaux, Compagnie GÈnÈrale des Eaux, SociÈtÈs des Autoroutes, etc.) In the United States, 1,800 structures (ranging from a few salaried workers to more than 100,000 employees) offer a telephone service on the internal market. Jean MARCHAL, "Connective physique ‡ Internet en Afrique francophone: les meilleurs moyens de la faire progresser". Conference "L'Afrique, la France, les Etats Unis", 22-24 May, Bordeaux, organised by the Centre d'…tude d'Afrique Noire (Institut d'…tudes Politiques / UniversitÈ Montesquieu Bordeaux IV) and the University of Boston.

## II - 2 - Success for cellular telephone[12]

Thus following the example of the developed countries, though the scale may be different, cellular networks in Africa are enjoying spectacular growth and subscriptions have overtaken the operators' forecasts. In fact, saturation point will soon be reached and urgent measures will have to be employed to extend coverage, and this is despite a fairly timid political approach to commercial enterprise.

In 1990, only the three countries of the Maghreb, Egypt, South Africa, Zaire and Gabon had a cellular telephone system and now, ten years later, only countries on the Sahelian fringe (Mauritania, Niger, Chad, Eritrea, Somalia) and Sierra Leone are not yet involved. The table shows the rapid progression of installations by 1994-95 with the implantation of the digital system, GSM, the world-wide land-based network for mobile communication, which enables callers to telephone anywhere in the world using the same terminal and to record voice messages.

---

The introduction of the cellular telephone system in Africa:

| | |
|---|---|
| 1985 | Tunisia |
| 1986 | South Africa - Zaire - Gabon |
| 1987 | Egypt |
| 1989 | Mauritius - Algeria - Morocco |
| 1992 | Nigeria - Senegal - Ghana |
| 1993 | Burundi - Kenya |
| 1994 | Angola - Cameroon - Gambia - Ghana - Madagascar - Tanzania - (Morocco) * - (South Africa) - (Zaire) |
| 1995 | Benin - CAR - Lesotho - Namibia ñ (Nigeria) - Tanzania - Uganda ñ Zambia |
| 1996 | CÙte d'Ivoire - Malawi - Mali - (Senegal) -Congo |
| 1997 | Mozambique - Zimbabwe -Burkina Faso -Guinea |
| 1998 | Botswana- Cape Verde, - Ethiopia - Rwanda - Sudan - Swaziland |
| 1999 | (Algeria) - Liberia - Congo |

*according to data from African cellular system (http://www.cellular.co.za./africa-cellsystems.html) () year of the introduction of GSM into a country which was already equipped with a cellular system.*

---

Zaire is typical in that the traditional infrastructure had long deteriorated and become unusable; this country then became a pioneer in the use of the cellular system. In 1986, the private African operator Telecel installed the first cellular phones in Kinshasa; the network was then extended to Lulumbashi in 1992, to Goma in 1993, then Bukavu in 1996, and the country is now one of the best equipped in Africa, with more than 10,000 subscribers[13]. The company then extended its activities into several other countries: Burundi in 1993, Madagascar in 1994, the Central African Republic in 1995, Zambia in 1996, then to CÙte d'Ivoire where it appears now to have cornered 85% of this telephone market[14].

South Africa was in 1997 one of the ten best equipped countries in the world. With one million subscribers in 1998 the cellular network was covering the entire country, thanks in particular to the use of fixed installation radio telephones. which has the advantage of costing less to install, though the service itself is more expensive. This system requires relay points every 50 or 100 kilometres and will need subsidies for community payphones. In Ghana, Capital Telecom has installed stationary hertzian subscriber systems which should supply up to 50,000 subscribers in rural areas by 1998. CÙte d'Ivoire also has a land-based network which covers the entire coast; the Motorola network serves Abidjan over a radius of 80 km and covers the largest and most popular districts, which also contain many

---

[12]according to data from African cellular system (http:// cellular.co.za./africa-cellsystems.html)

[13] M. Kabila's troops found it difficult to move through a country with no proper roads; their leaders, however, communicated by telephone.

[14] According to a confidential Telex study (no. 298, December 1996).

businesses[15]. In Guinea, 1,000 public GSM callboxes should be put into service by September 1997 by ALCATEL, in Conakry and Kamsar in the coastal region.

The case of Guinea is very representative of the particular advantage in Africa of wireless technology systems but also of the fundamental role of a State.

In Guinea today, where the State is largely incapable of controlling the economy, the private company that has taken over the national electricity company has proved unable to rebuild the electricity network in Conakry, because of the proliferation of pirate connections (3 to 400 km, 64% of connections illegal) and most inhabitants never think of paying an electricity bill. On the other hand, the Malaysian operator which took over the telecommunications company has managed to reorganise the network by cutting off debtors, putting in digitalised keys and installing Hertzian systems while they are busy putting in the cell system which will provide 92% coverage. 300 public telephone have been installed in Conakry and Kamsar in the coastal area by Alcatel Small towns and then the rural villages should be equipped with cell phone callboxes. It had proved impossible to reorganise this sector since the opening up of the country in 1984, but now the installation of the most modern equipment would enable the country to make a real leap into the technological future. However, will maintenance and upkeep also be carried out in future ? The success was amazing with 10 000 subscribers, but two years after in April 1999, the situation was going wrong†: relations are bad between Malaysian and Guinean people inside the SOTELGUI. ALCATEL left the country and cellular phones are too numerous for the installed capacity. SOTELGUI always shows a deficit and Internet is in very bad running. A coarse privatisation, the non-existence of a civil society and law state in this country is going on compromising the re-building.

---

[15] Confidential Telex, op cit.

**Map 3 : Cellular Phones**



Téléphones cellulaires
Evolution des abonnements
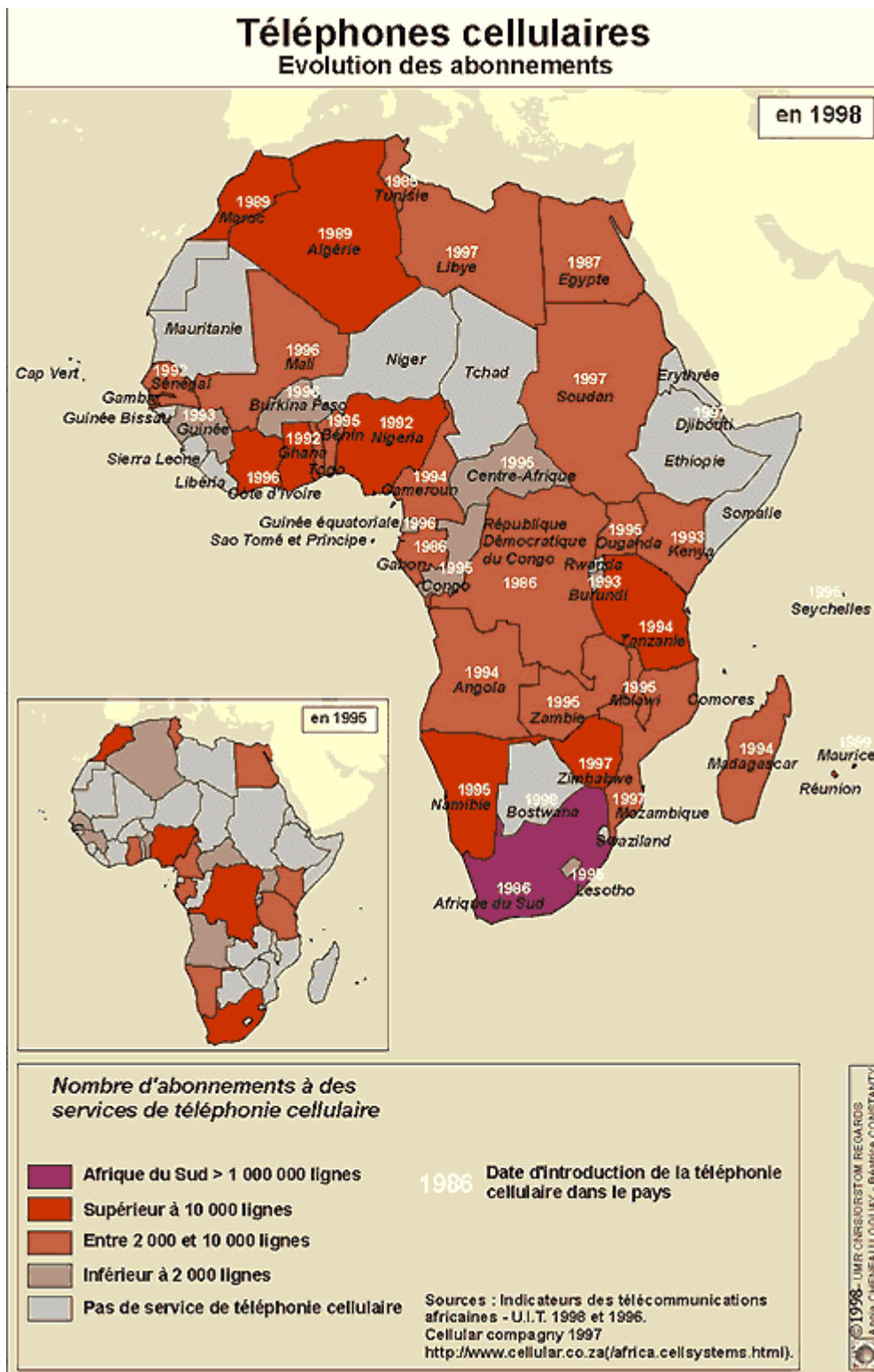
### II 3 - Internet†: a quick growth

The best source about connectivity in Africa is the work of Mike Jensen[16]†:
In August 1996, only four African countries, South Africa, Kenya, Egypt and Tunisia, had international circuits larger than 64Kb. Two years later, by the end of 1998, only three countries remained without local access - Eritrea, Libya and Somalia. Both Eritrea and Libya have established Internet facilities in early 1999, leaving Somalia and Congo (Brazzaville) to be the very last nations on earth without local coverage. (Map 4)
In few years, Internet connections have progressed considerably, first through external and national initiatives. The REseau Intertropical d'Ordinateurs (RIO), created by ORSTOM initially to link its research centres in the northern countries via electronic mail, was one of the first to provide access to the Web. AUPELF UREF has popularised the use of Minitel to develop Francophony and build a network for teachers in universities. The Network start up Resource centre from US worked in South Africa to provide the first connection with the Fidonet UUCP system and the first TCP/IP link (9,6kbps) in the region. Some NGOS also worked in this way. From 1996, exists the Leland initiative by US, a $15†million programme to implement the idea of global information infrastructure, launched by the American vice-president Al Gore, and which has awarded $500,000 to provide twenty countries with connections of up to 128kb, without reference to the national operator. The epitome of liberal ideology, the programme provides assistance with materials, expertise, training and free access for one year, provided that the country commits itself to liberalising their market. The Leland initiative was initially concentrated in east Africa and was extended to the Francophone countries. But just a few countries have finally agreed with this deal and the project story is very complicated. Leland was obliged to modified its program and work with national operators.

"The rapidity with which most African public telecom operators (PTOs), have established Internet services is noteworthy. In the last three years PTOs have brought full Internet services on stream in 33 countries. This follows trends in the developed countries where almost all of the PTOs have established Internet services. In many Francophone countries the PTO operates the major value added service provider as a joint venture with France Cable and Radio, usually called Telecom-Plus†ᵃ. (Jensen M.1999)†.

" Internet services are still largely confined to the capitals and major towns, and in contrast to more developed regions, this does not provide local access for most of the population, 70-80% of which reside in rural areas in Africa. To address this situation some countries have made the decision to provide local call Internet access across the whole country. So far 11 countries have adopted this policy - Burkina Faso, Gabon, Malawi, Mauritius, Mauritania, Niger, Senegal, Chad, Togo, Tunisia and Zimbabwe. The service is supplied by the local telecom operator which sets up a special area-code for Internet access providers that is charged at local call tariffs, allowing the Internet providers to immediately roll out a network with national coverage.
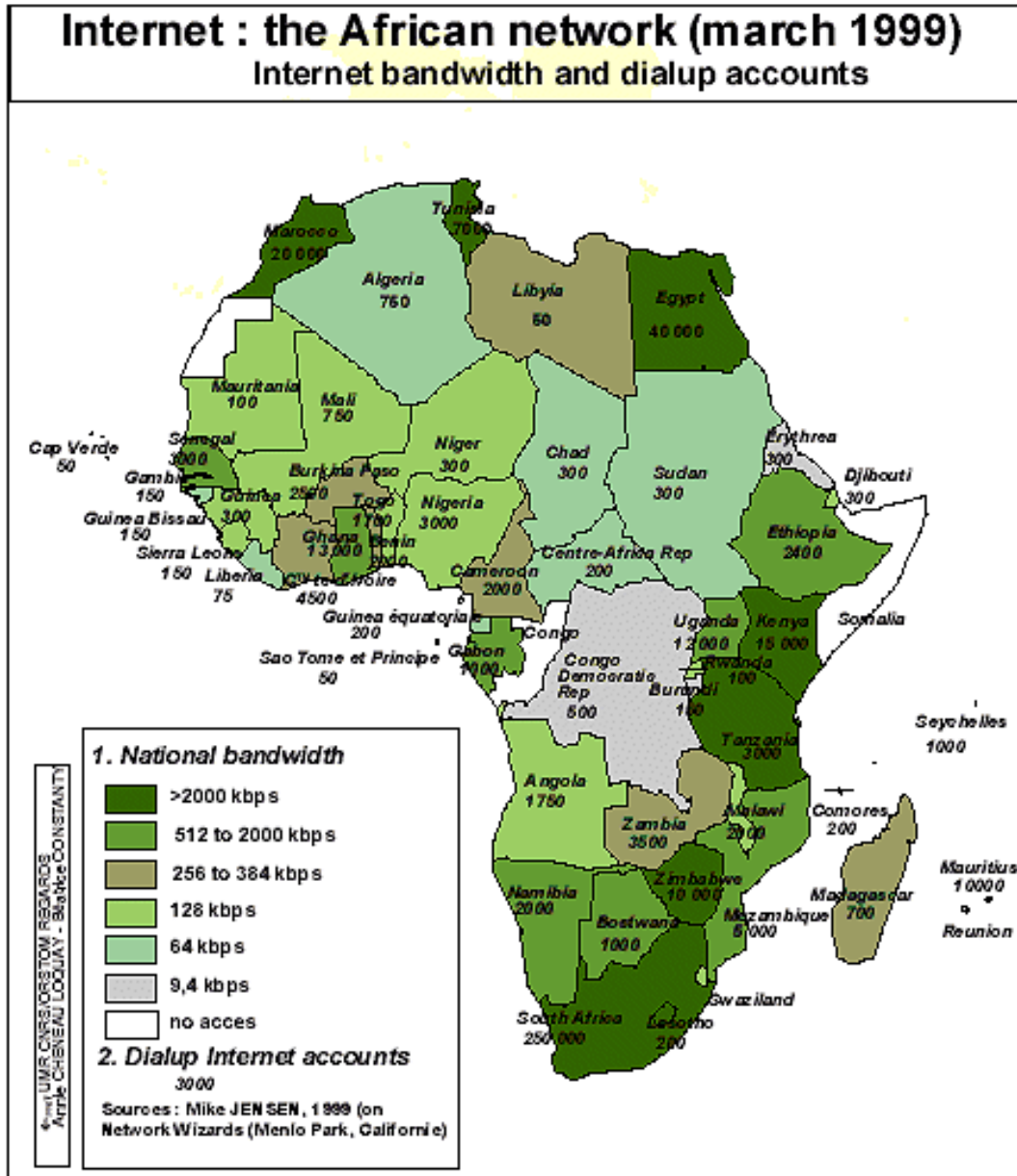Reflecting the increasing numbers of subscribers outside the capital cities, a growing number of countries (Angola, Benin, Botswana, Egypt, Ghana, Kenya, Morocco, Namibia, Senegal, Tanzania, Tunisia, Zambia and Zimbabwe) have POPs in some of the secondary towns, and South Africa has POPs in about 70 locations. Nevertheless, limited coverage still means that for most people it is prohibitively expensive to use the network for anything but important email, especially where local calls cost over US$10 an hour.
 Most African capitals have more than one ISP and in late 1998 there were almost 400 ISPs across the region (300 excluding South Africa). Six countries had more than 10 ISPs (see table) but 14 countries still have only one ISP.

---

[16] For all information about Internet in Africa, refer to the very meticulous work of Mike Jensen, who updates his information constantly, globally and by country, and suggests other sites dealing with the question. His address : http://demiurge.wn.apc.org/africa/partial.html

**Map 4 : Internet development**



Internet : the African network (march 1999)
Internet bandwidth and dialup accounts

In just a few years, the Internet network has become the largest computer network in the world, but it is very difficult to evaluate the extend of its incoming first because statistics are incomplete: in the present state of public Internet statistics only sites belonging to geographic domains can be localised ; the growing importance of non geographical domain addresses which makes it more difficult to associate a site address with its country of origin : in January 1998, 47% of the hosts counted in the Network Wizards survey are in one of the ".com", ".net" or ".org" domain, compared to 36% one year before. Non geographical domains represent 60% of the Internet number of hosts growth between January 1997 and January 1998. The new Internet naming scheme will of course accelerate this tendency to mask the country of origin of the host.( Michel Elie 1998).

We can refer to three indicators :
        -Internet hosts refer to the number of computers directly linked to the Internet
"The total number of hosts in the region, excluding South Africa, was estimated by Network Wizards (http://www.nw.com) at around 10 000 at the beginning of 1999 (up from 290 in 1995), but Mike Jensen estimates that the figure may be closer to 12 000 or 15 000 due to the measurement  technique which does not count hosts which are not fully referenced in domain name servers. In any event this represents about one host for 75 000 people or 0,0024 % of the world. Nevertheless, the six monthly african host growth rate almost doubled the world average( 18%) a significant increase on the earlier figure of 0,021 in July 1998. The opening up of the Nigerian Internet market will likely change the picture as the national telecom operator (Nitel) has big plans to  provide Internet countrywide" (Mike Jensen 1999).

        -the definition of a 'user' or 'subscriber' may vary.
The number of dialup accounts provided by ISPs is estimated now over 400 000 subscribers in Africa (see the table). Each computer with an Internet or email connection supports an average of three users,[17]. This puts current estimates of the number of African Internet users at somewhere around 1.2 million. Most of these are in South Africa (about 700-800 000) leaving only about 400-500 000 amongst the remaining the 734 million people on the continent. This works out at about one Internet user for every 1500 people, compared to a world average of about one user for every 38 people, and a North American and European average of about one in every 4 people.

There are now about 24 countries in the sub-continent with over 1000 users but only about 11 countries with over 3000 (Egypt, Morocco, Kenya, Ghana, Mozambique, South Africa, Tunisia, Uganda, Zambia and  Zimbabwe), plus Ivory Coast and Senegal. South Africa's Internet community is 30 times larger than any  other in Africa, being among the top 20 countries in the world when  ranked by number of Internet nodes.

The French speaking countries have a far higher profile on the Web and greater institutional connectivity  than the non-French speaking countries. As a result, the Anglophone and Lusophone countries have considerable 'catching up' to do to reach the same levels  of connectivity and representation on the Web. ACCT's BIEF and  AUPELF-UREF/REFER's Syfed Centres, which are building Web sites of local  information as well as providing access, are the two dominant content developers.†ª (Mike Jensen)

In Africa the average total cost of using a local dialup Internet account for 5 hours a month is about $60/month (usage fees, telephone time included, but not telephone line rental). According to the Organisation for Economic Co-operation and Development, 20 hours of Internet access in the U.S. costs $29, including telephone charges. Although European costs are higher ($74 in Germany, $52 in France,

---

[17] from a recent study by the UN Economic Commission for Africa (ECA)

$65 in Britain, and $53 in Italy) these figures are for 4 times the amount of access, and all of these countries have per capita incomes which are at least 10 times greater than the African average.

**African Internet Populations. March '99**

| Country | dialup Internet accounts | internet. bandwidth (Kbps) | Public access ISPs | Monopole ISP | Call cost ($/hr) | Est 1998 Population (1000s) | Internet Density (Pop/user) | 96 GDP /Person |
|---|---|---|---|---|---|---|---|---|
| Total | 428075 | 114454 | 319 | | 2.7 | 778456 | 1,819 | |
| Afr. du Sud exclude | 178075 | 34454 | 249 | | | 734160 | 4,123 | |
| South Africa | 250,000 | 80000 | 70 | No | 1.60 | 44296 | 177 | 3230 |
| Egypt | 40,000 | 2048 | 40 | No | 1.20 | 65675 | 1,642 | 973 |
| Morocco | 20,000 | 8192 | 70 | No | 0.85 | 28012 | 1,401 | 1265 |
| Kenya | 15,000 | 4000 | 10 | No | 1.36 | 29020 | 1,935 | 330 |
| Ghana | 13,000 | 512 | 3 | No | 1.34 | 18857 | 1,451 | 397 |
| Uganda | 12,000 | 512 | 3 | No | 8.40 | 21318 | 1,777 | 305 |
| Zimbabwe | 10,000 | 2048 | 13 | No | 4.00 | 11924 | 1,192 | 786 |
| Maurice | 12,000 | 1024 | 1 | Yes | 1.00 | 1154 | 96 | 3508 |
| Tunisia | 7,000 | 5120 | 2 | No | | 9497 | 1,357 | 2030 |
| Mozambique | 5,000 | 572 | 8 | No | 0.80 | 18691 | 3,738 | 77 |
| Côte d'Ivoire | 4,500 | 384 | 5 | No | 4.80 | 11350 | 2,522 | 1310 |
| Zambia | 3,500 | 256 | 2 | No | 1.60 | 8690 | 2,483 | 382 |
| Senegal | 3,000 | 1000 | 6 | No | 1.90 | 9001 | 3,000 | 572 |
| Nigeria | 3,000 | 1152 | 12 | No | 0.40 | 121773 | 40,591 | 587 |
| Tanzania | 3,000 | 1098 | 10 | No | 1.94 | 32189 | 10,730 | 139 |
| Burkina | 2,500 | 256 | 3 | No | 1.10 | 11402 | 4,561 | 165 |
| Ethiopia | 2,400 | 512 | 1 | Yes | 2.60 | 62111 | 25,880 | 96 |
| Cameroon | 2,000 | 256 | 1 | No | 1.55 | 14323 | 7,162 | 627 |
| Malawi | 2,000 | 128 | 1 | Yes | 1.56 | 10377 | 5,189 | 142 |
| Namibia | 2,000 | 1000 | 5 | No | 1.00 | 1653 | 827 | 2059 |
| Benin | 2,000 | 128 | 6 | No | 4.80 | 5881 | 2,941 | 391 |
| Angola | 1,750 | 192 | 2 | No | 6.00 | 11967 | 6,838 | 355 |
| Togo | 1,700 | 384 | 7 | No | | 4434 | 2,608 | 322 |
| Botswana | 1,000 | 640 | 3 | No | 0.60 | 1551 | 1,551 | 3640 |
| Gabon | 1,000 | 512 | 2 | No | 13.90 | 1171 | 1,171 | 5007 |
| Seychelles | 1,000 | 128 | 1 | Yes | | 76 | 76 | 7272 |
| Swaziland | 900 | 64 | 2 | No | 0.95 | 932 | 1,036 | 1389 |
| Algeria | 750 | 64 | 1 | Yes | | 30175 | 40,233 | 1531 |
| Mali | 750 | 128 | 4 | No | 2.80 | 11831 | 15,775 | 223 |
| Madagascar | 700 | 256 | 3 | No | 0.43 | 16348 | 23,354 | 215 |
| Rep du Congo | 500 | 64 | 1 | No | | 49208 | 98,416 | 117 |
| Sudan | 300 | 128 | 1 | No | | 28527 | 95,090 | 36 |
| Djibouti | 300 | 64 | 1 | Yes | 1.00 | 651 | 2,170 | 893 |
| Eritrea | 300 | 29 | 0 | N/A | 0.60 | 3548 | 11,827 | 96 |
| Guinea | 300 | 128 | 4 | No | 2.00 | 14567 | 48,557 | 736 |
| Niger | 300 | 192 | 1 | Yes | 1.31 | 10119 | 33,730 | 207 |
| Chad | 300 | 64 | 1 | Yes | 10.50 | 6892 | 22,973 | 187 |
| Comoros | 200 | 64 | 0 | Yes | 0.20 | 672 | 3,360 | 367 |
| Guinea Equat | 200 | 64 | 1 | Yes | | 430 | 2,150 | 388 |
| Lesotho | 200 | 10 | 0 | No | 1.60 | 2184 | 10,920 | 486 |
| Cent Afr.Rep | 200 | 64 | 1 | Yes | 6.90 | 3489 | 17,445 | 379 |
| Burundi | 150 | 19 | 1 | No | 0.75 | 6589 | 43,927 | 205 |
| Gambia | 150 | 128 | 1 | No | 1.20 | 1194 | 7,960 | 321 |
| Guinea Bissau. | 150 | 64 | 1 | Yes | | 7673 | 51,153 | 442 |
| Sierra Leone | 150 | 128 | 2 | No | 1.50 | 4576 | 30,507 | 293 |
| Rwanda | 100 | 128 | 1 | Yes | | 6527 | 65,270 | 238 |
| Mauritania | 100 | 128 | 1 | No | 6.60 | 2454 | 24,540 | 401 |
| Liberia | 75 | 64 | 0 | No | | 2748 | 36,640 | 1124 |
| Cap Verde | 50 | 19 | 1 | Yes | | 417 | 8,340 | 994 |
| Sao Tome | 50 | 19 | 1 | Yes | | 117 | | 49 |
| Libya | 50 | 256 | 1 | Yes | | 5980 | 119,600 | 5498 |
| Somalia | 0 | 0 | 0 | n/a | | 10653 | | 119 |
| Congo | 0 | 0 | 0 | n/a | | 2822 | | 1008 |

"Population / User" is the number of people in the country per Internet User
"Call Cost" is converted to US$/hour

Mike Jensen mikej@sn.apc.org

**III - WHAT KIND OF USES ? WHAT KIND OF RISKS ?**

There is a strong need for a better knowledge of the Internet development process in order to anticipate its technical infrastructure extension, to anticipate its impact on people and society, and study corrections to the negative effects of a loosely controlled development process. We will try to understand why people need to use the Internet, what are the factors which generate the demand, which uses, generic or specific to a population of users, are developing, which are the factors of resistance to the Internet progression. But now, in the exploratory stage of our research on uses we can just put out some main features we observed.

### III - 1 - Severe constraints

With this insertion into the global information system, great hopes are being raised that this technological leap will help resolve regional problems. However, if opinions at international level are enthusiastic, at local level Africans are much more realistic about the risks involved, given the constraints linked with under development.

The cost of providing equipment is very high, power failures occur frequently, special conditions are required to cope with the dust and heat.
In Benin, for example, the equipment needed for access to Internet (computer, modem, telephone) costs about 1,800,000 CFA francs, in other words, 9 years' salary for the average Beninese (average adult income is 190,955 CFA francs per annum). Operating a mailbox costs the operator, Telecom national, 12,000 CFA francs, and the average monthly income is about 16,000 CFA francs. The 4,000 CFA francs that remain pays for barely 1 hour 20 minutes of connection time (communication via Internet)[18].

In order that this type of equipment (solar panels, telephones, televisions, satellite dishes, computers) can be installed and maintained there needs to be already in place the necessary technical standards, networks of installers, of distributors of spare parts and materials, a continuous technical network is required. Individuals who hope to make use of this technology must be legally registered in some form or other to be able to benefit from loans or to have some redress should their equipment break down. Creating decentralised installations, maintaining them, guaranteeing their running and financing them requires technical and legal standards, which are scarcely compatible with the informal economy. If adequate legal conditions cannot be put in place, what happens today will simply continue to happen, equipment breaks down, it is left and is and is not repaired, and individuals wait until a new source of funding turns up with which to replace the goods, for all too often in matters of material provision Africa is simply a bottomless pit.

At first, Internet requires a good capacity in writing and reading. But it would be unrealistic to conceive big programs to teach so many people to read and write and being able to use the net. Trades men we met in Saint Louis (Senegal) have seen very well this problem : they are asking for modern publics writers who could teach them about the interest of new technologies, use it for them and train the ones more interested ; internet mediators are needed.

### III - 2 - but a real craze for e-mail

At the end of 1996, the ratio of 3% (600 electronic mail accounts for 20,000 main lines in Mali, not including the ORSTOM addresses, which number about 300 and the l'AUPELF UREF addresses) was double the present ratio in France (1.5% with 500,000 electronic mailboxes for 33 million France Telecom lines) and full access to Internet in Mali dates only from July 1997.

---

[18] Source: Forum du Monde Diplomatique, internet nord sud

The growth of this value added service is very much higher than the growth in the stock of main lines (12% per month, compared with growth in the number of main lines of between 3 and 12% per year). The increase in traffic via electronic mailbox was even greater: the average consumption of each mailbox is constantly increasing, indicating that use is also increasing.

The Internet link in Senegal dates from March 1996 with an MCI 64 kbit/s link, with 2 64 kbits added in June 1997. Telecom Plus had 520 clients in December 1996, 612 in January 1997, and 960 by 15 July 1997. Growth is presently more than 10% per month. Problems have emerged associated with the quality of the service, as this rate of growth was more than the network could cope with.
A recent work by olivier Sagna shows that the number of internet users in Senegal was in early 1999 more than said by Mike Jensen, 5500 instead of 3000. Is there not a tendency to over evaluate the number of subscribers from the Providers to get more customers ?:

An analysis of Telecom Plus customers shows that Internet is of interest not only to foreigners and public institutions, but also to private African customers, 1/3 in 1997. One last point, telecentre owners now market access to the Internet, and the many telecentres in Senegal (4,500) is a very positive argument for web-sharing.

Metissacana, the first African cybercafe is enjoying great success. It offers the whole range of services associated with electronic mail and the Web at affordable prices. The customers are young and the Web is used mainly for practical purposes especially by the Senegalese. They come to look up information for school projects, for example. The expatriates are mostly interested in the press from their own country, it is an international information centre, in fact. Companies are mainly interested in the commercial aspect. They are looking to carry out business deals via Internet. In turnover, the expatriates and the Lebanese are the biggest users, but this is due to the fact that they come regularly. There are more Senegalese who come, in fact, but much less often, as it is a question of cost. As a service provider, Metissicana had 300 customers of which 80% are Senegalese, using Internet for private business. Many companies use the modem hire purchase scheme. Between Friday evening and Sunday night, a waiting list has to be set up to cope with the heavy demand (The Metissicana offers twelve computers for public use)".

In Senegal, we are now witnessing a price war between suppliers, and at present the monthly subscription, giving unlimited use, stands at 10,000 CFA francs, in other words, equal to a number of service providers in France. Moreover, the telecentres are also waging their own price war on telephone calls, so a fixed profit margin on telephone calls by retailers is no longer appropriate practice. The Trade Point Centre in Dakar is now e real Start-up company with high level trained employees.and 300 subscribers.

In his study of Internet in Benin Ken Lohentho describes the African paradox, the mixing between tradition and modernity, a quick growth despite of severe constraints; Costs are yet very high but about fifteen cybercentres opened in Cotonou, ten in one year .

So, although prices are still too high and access limited, and the specialist "back-bone" connections can be found only in South Africa, in the African continent as a whole, electronic mail is at present the least onerous method of international communication. In Ghana, for example, transmission of a 2,000-word message between the Hague and Accra via Internet costs 174 times less than by traditional vocal method. Africa on line is providing internet access for mail to the Ghanaian public operator ; every body can come to the post office and give his letter to the employee who put it on computer; Cost is 1,5 FF or 2,5 FF . During only two months 3000 letters would have been sent in a country where there was only 20 000 computers with less than ten per cent connected to Internet.

In African countries, electronic mail meets a real need on the part of a solvent clientele for message transmission, a need greater than that of a developed country where other means are available. These new tools are helping to free countries from isolation; they bring with them equality and ubiquity by enabling people to ignore constraints of distance and location in order to participate in global knowledge. Pascal Renaud compares the Internet to a gigantic encyclopedia which should be accessible to all, in the same spirit as the 18th century French EncyclopEdistes[19].

### III - 3 - One of the main discriminating factors between rich and poor

According to surveys conducted in Senegal[20], technology and particularly ICT are seen as central to a major scheme to control markets, ideas and value systems and will in future be one of the main discriminating factors between rich and poor, both at international level and individual level. Africans need to take care not to be submerged by information from the developed countries and to ´†put their own cars on the high way†ª. But, globally African people think that they have to be present on the big web. Rapid access to economic information can help trade and boost productivity; exchanges of scientific information will help strengthen internal scientific capacity.. (Seck MT. 1999)

## IV - FUTURE PROSPECTS, THE AGE OF THE DECODER, EXTREME MEASURES WHICH BYPASS THE TERRITORY ENTIRELY

There are now techniques which no longer depend on a land-based service. These are digital technologies, accessible via decoders and where relations between client and service provider become very tenuous. They provide access to any part of a territory and may be a chance for rural telecommunications but in which conditions ? The notion of territory is bypassed completely in the case of telecommunication projects via satellite : projects such as IRIDIUM or Global Star are completely deterritorialised, with no links whatsoever with national regulatory structures, competing with infrastructure already in place and ignoring local technological potential and skills (Renaud P 1999). The latest project to date, Bill Gates' Teledisc, which would monopolise certain orbits, has been challenged by the Europeans who have a rival project, but the American hegemony tends to assert itself in this highly strategic and profitable sector.

Whatever solutions are adopted, African countries will be unable to control either technology or costs and there is a risk that they will be submerged by input from the north; the real challenge is the appropriation of information content and control over technology.

In matters of territory, the State and the nation may find they are overwhelmed both from above and below:
          - from above by the power of the satellite networks controlled by the northern countries.
The 1990s opened symbolically with the Gulf war, a gigantic real life video game where the performance of communication technologies was tested and where remote sensing played a major role in the conduct of the war in a real sense, pinpointing targets and troops. In less dramatic areas, observation satellites around the earth can offset the widespread shortcomings of statistical services in Africa relating to land use, resources and their limitations.
          - from below by the proliferation of bodies functioning in isolation in local territories, yet linked up to the outside world. If the State, the territory and local culture were to be called into question, this would be particularly advantageous for NICT.

---

[19] Pascal Renaud, see site "initiative Diderot, pour le Développement de l'Internet", http://www.rio.net/diderot/ID.html

[20] Personal surveys carried out in February 1996 in Dakar and CRDI study in preparation for ACACIA initiative, January 1997 (http://www.idrc.ca/acacia/outputs/op-seng.htm)

Freed as they are from the physical limitations of territory boundaries, will these technologies not accentuate even further the tendency for wide empty spaces to develop, containing just the occasional well-equipped oasis of technology, capital cities which are the shop front and the reflection of modernity, with better links with the outside world than with their own region, set in the middle of deserts of poverty where most activity is still based on human labour and fuelled by firewood, a system compatible with economies like those of the war lords of Liberia or the former Zaire?

The question of socio-spatial equity is here a fundamental issue.

<center>***</center>

# BIBLIOGRAPHY

BA A.1995. *Paraboles et démocratie*, L'Harmattan.

BAKIS H. 1996. Cultures électroniques et territoires. In *Netcom,* vol 10, n°2, International Geographical Union, Université Paul Valery, Montpellier III.

BAYART J.F. (dir), 1994. *La réinvention du capitalisme*, Les trajectoires du politique. Paris, Karthala.

CASSE M.C. 1995. Réseaux de télécommunications et production de territoire. In *Sciences de la Société*, n° 35, Territoire Société et Communication, Presses Universitaires du Mirail.

CHÉNEAU-LOQUAY A.. 1988. Les relations entre l'espace et l'énergie en Casamance. In *Les relations entre l'espace et l'énergie au Sénégal*, Tome 2, Travaux et documents de géographie tropicale.

CHÉNEAU-LOQUAY A. 1992. La Guinée en reconstruction, six ans après, redressement ou dérapages? In Jorg Mayer éditeur : *Neue Herausforderrungen im Nord-Sud- Verhaltnis ; Sozio-okonomische und okologische Krisenfaktoren in Guinea*, Loccumer Protokolle 54/91, Evangelische Akademie-Loccum, p 69-107.

CHÉNEAU-LOQUAY A. 1996 *Les relations entre l'État, le droit et les réseaux techniques sont elles obligatoires dans le processus de modernisation ? Réflexion à partir du cas africain.* Paper presented at the conference "Universalisme Technique et Mondialisation", november 1996, Bordeaux-Talence, to be published by Economica.

CHENEAU-LOQUAY A. 1998, Do socio-territorial configurations in Africa favour the insertion of new information and communication technologies ? in NETCOM Vol. 12, n _ 1 1998 25p.

.CHENEAU-LOQUAY A. DIOUF P. 1999, Les usages des nouvelles technologies de l'information et de la communication pour les besoins de l'échange au Sénégal, rapport d'une mission en avril 1998, 60 pages juin 1998, in Enjeux pour le développement, textes rassemblés par Annie CHENEAU-LOQUAY in "Internet au Sud" CD ROM (RENAUD P. (ed), col Publica UNESCO.

COUTARD O. et OFFNER J.M. 1995 (eds). *Les technologies du territoire*., Actes du colloque international, Groupement de Recherche 903, Réseaux du CNRS, Paris.

DE ROSNAY J.1995. *L'Homme symbiotique*, Le Seuil, Paris.

DOLFUS O. 1990. Le Système monde. In *Mondes nouveaux*, tome 1, Géographie Universelle, Hachette-RECLUS, Paris.

DURAND M.F. ; LEVY J. et RETAILLE D. 1993. *Le Monde espace et systèmes*. Presse de la fondation nationale des sciences politiques et Dalloz.

ELIE M. 1999, Internet et développement global, ELIE M. 1999, in Chéneau-Loquay A. (edit) *Enjeux des technologies de la communication en Afrique, du téléphone à Internet*, Paris Karthala, dec 1999, 400p..

EVENO E., LEFEVRE (eds). 1995. *Territoire Société et Communication*. Sciences de la Société, n° 35, Presses universitaires du Mirail, Toulouse.

GRAS A. 1993. *Grandeur et dépendance, sociologie des macro-systèmes techniques*. Paris, PUF, sociologie d'aujourd'hui.

HEGENER M. 1996. *Telecommunications in Africa* - via Internet in Particular,<http://som.csudh.edu/cis/lpress/devnat/general/africa.htm> e-mail-mh@nrc.nl

JENSEN M. 1996. *A Guide to Improving Internet Access in Africa with Wireless Technologies.* IDRC Study - <http://www.idrc.ca/acacia/studies/ir-jens.htm>.

JENSEN M. 1998.and 1999 *African internet connectivity*. <http://demiurge.wn.apc.org/africa/partial.html>

LANVIN B.1996. L'Afrique qui gagne. Presentation at the conference L'Afrique et les nouvelles technologies de la communication, Geneva, 15-17 octobre, Fondation du Devenir.

LOHENTO K. 1997. *Radioscopie de la connexion du Benin à l'Internet*. Mémoire de fin d'études du premier cycle, filière documentation, Centre de formation aux carrières de l'information, Ecole Nationale d'Administration, Université Nationale du Bénin. 150 p.

MARCHAL J. 1997. *Connective physique à Internet en Afrique francophone : les meilleurs moyens de la faire progresser*. Conference "L'Afrique, la France, les Etats Unis", 22-24 May, Bordeaux, organised by the Centre d'Étude d'Afrique Noire (Institut d'Études Politiques/Université Montesquieu Bordeaux IV) and the University of Boston.

MIGNOT-LEFEBVRE Y. 1994. (dir) Technologies de communication et d'information, une nouvelle donne internationale. introduction in*Tiers-Monde*, tome XXXV, n° 138.

NEGROPONTE N. 1995. *L'Homme numérique*. Robert Laffont, Paris,1995.

PANOS INSTITUTE 1996. The Internet and the South : Superhighway or Dirt-track?.

PUMAIN D. et OFFNER J.M. 1996. *Réseaux et Territoire*. Editions de l'Aube Territoire, Paris.

QUEAU P. 1997. Identité culturelle et éthique de l'universel. Forum CREPAC. _Société de l'Information. <crepac com>.

RENAUD P. 1997. Vers une désertification technologique du Sud. Conference L'Afrique, la France, les Etats Unis, 22-24 May, Bordeaux, organised by the Centre d'Étude d'Afrique Noire (Institut d'Études Politiques/Université Montesquieu Bordeaux IV) and the University of Boston.

RENAUD P. et TORRES A. 1996. Internet : une chance pour le Sud. In Internet l'extase et l'effroi, *Manière de voir*. Le Monde Diplomatique hors série, p. 46-51.

ROCHLIN G.I. 1995. *Pris dans la toile : réseaux, mutations et conformité à l'ère de l'informatique*. In Flux, n° 22, p. 17-29.

TOFFLER A. 1980. Future Shock, Random House, New York et Third Wave, William Murrow, New York.

TUDESQ A.J. 1994. Les technologies de l'information, facteur d'inégalité en Afrique Sub-Saharienne. In Technologies de communication et d'information, une nouvelle donne internationale. in *Tiers-Monde*, tome XXXV, n° 138, p. 245-277.

VINCENS DE CAUSANS F. 1997. (under the direction of Jean MARCHAL) *Apport des nouvelles technologies de l'information et de la communication au secteur du Bâtiment et des Travaux Publics pour le développement économique en Afrique francophone.* Document produced at the end of the study, March, École Spéciale des Travaux Publics du Bâtiment et de l'Industrie, Coopération française.

VIRILIO P. 1996. *Cybermonde, la politique du pire*. Textuel, Paris, 112 p.

WORLD BANK 1995. Report on the development of Internet.

ZONGO G. *L'impact socio-économique et financier des télécentres privés : le cas du Sénégal.* L'Observatoire des télécommunications en Afrique. In <http://www.esmt.sn>.

---

.