

Chapter 13

Sub-Saharan Africa

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GEOGRAPHY

This chapter covers the 47 countries and territories of sub-Saharan Africa (SSA), but not the five North African countries even though they are aligned with the rest of Africa through the Organization for African Unity (OAU). The sub-Saharan countries are often divided into the socio-geographic groups of East, West, Central and Southern Africa, of which West Africa is the most populous. There are also many other country groupings around areas of common interest. The most important of these are the Economic Community of West African States (ECOWAS), Common Market for Eastern and Southern Africa (COMESA), Southern African Development Corporation (SADC), Central African Customs and Economic Union (UDEAC), East African Co-operation, the Customs Union of the Southern Africa (Botswana, Lesotho and Swaziland (SA-BLS) states), L'Agence de la Francophonie, the Commonwealth and the Lomé Convention African Caribbean and Pacific (ACP) countries.

The region's population was estimated at 636 million people for 1998 – about 9% of the total world population of 5.7 billion. Nigeria has by far the largest number of people at 122 million. Ten countries have populations above 15 million, with the five largest countries comprising 50% of the subcontinent's total population. Growing at 3% annually, an additional 20 million people a year are being added to the subcontinent. Population density is relatively low – only 24 people per square kilometer – compared to a world average of 43 and an Asian average of 110. At the same time, the degree of urbanization is low – only 32% of the region's people live in cities, as compared with 78% for high-income countries.

There is a high level of ethnic and linguistic diversity: several thousand identifiable ethnic groups and about 1,300 distinct spoken languages characterize this region. The national boundaries of most of the countries were imposed by the colonial powers and as a result language groups overflow them. This has partly contributed to the high degree of civil strife

from which the region still suffers. Christianity, Islam and Animism are the most common religions. The proportion of actively practicing worshippers is substantially higher than in most developed countries.

DEVELOPMENT LEVELS AND ICTs IN SUB-SAHARAN AFRICA: THE BACKGROUND

Access to information and use of communication tools in SSA have until very recently been almost entirely in the hands of state monopolies. Now that the trend towards democracy and more liberal market-oriented policies has become established on the continent, there has been a marked improvement in the availability and diversity of information and communication channels. Rates of telephone line growth are at their highest levels ever, hundreds of new media outlets in print, radio and television have emerged in the last couple of years and in 1998 the Internet was locally available in the capital of every country in Africa (see Figure 13.1 and Statistical Annex, Table A.9).

These changes coincide with an estimated average 4.7% growth in Gross Domestic Product (GDP) in 1998. After years of stagnation, these growth levels are close to those in Asia, and in the wake of the Asian financial turmoil, it is likely that Africa may even surpass Asia as the fastest growing region in the world. The information revolution is often said to be Africa's 'last chance to catch up' and it is already clear that a number of African countries have committed themselves to joining the Global Information Society.

Most of the advances have taken place only in the latter half of this decade and are not yet reflected in many of the official statistics available, for which 1995 is the latest year published. As a result, the degree of change is not been as evident as it should be. This has in part given rise to efforts by progressive African leaders such as Presidents Museveni and Mandela to declare an 'African Renaissance' which, if present trends continue, suggests a degree of optimism

for the future of the African public that is unsurpassed in recent history.

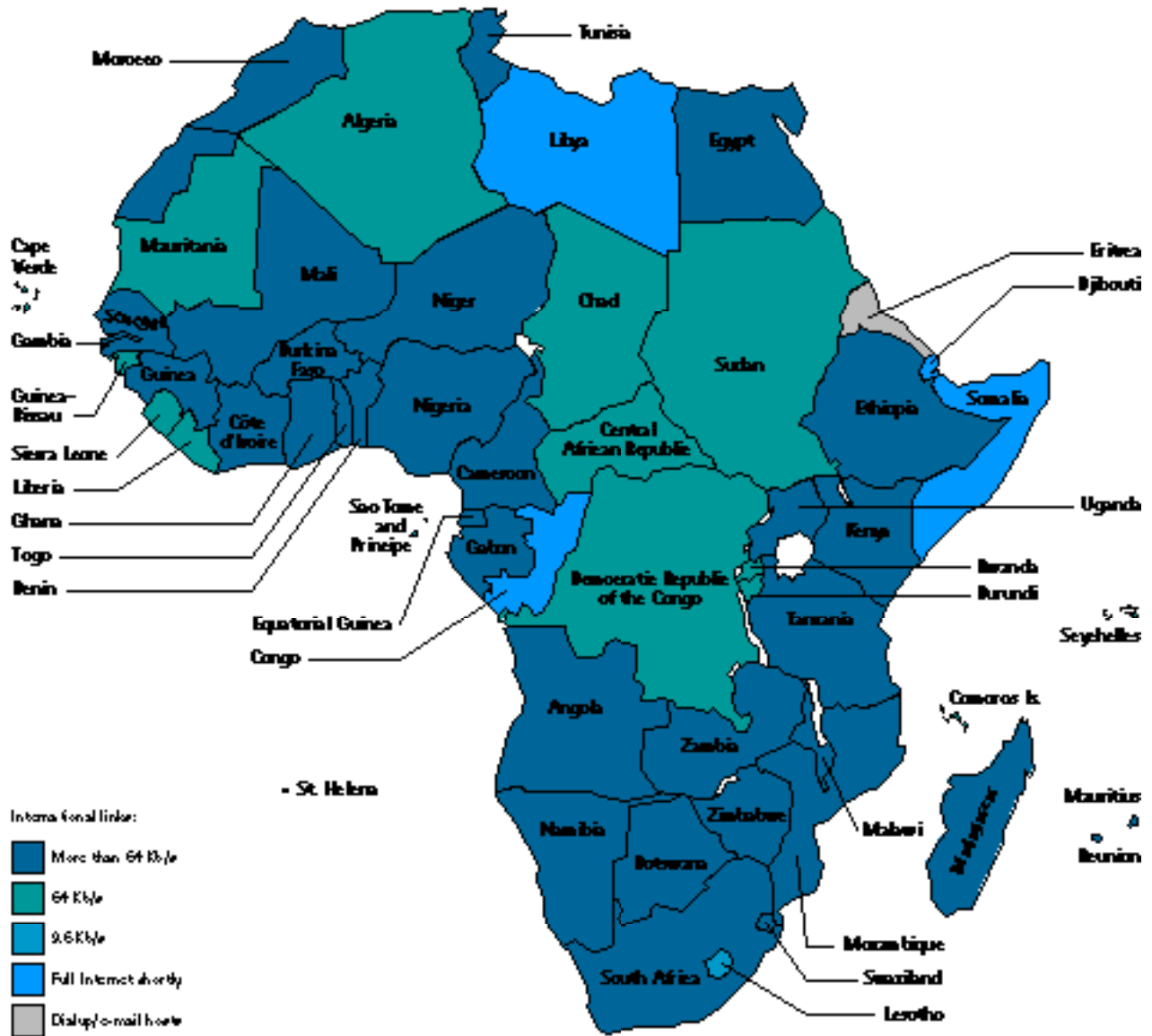
Nevertheless, change is occurring from an extremely low base, and the subcontinent has a daunting degree of transformation to effect before living standards come even close to world averages. The region has 33 of the 48 countries classified as 'least developed'. There are no 'high-income' countries and the only countries classified as 'upper-middle income' are Gabon, Mauritius, Reunion, Seychelles, and South Africa. There are six lower-middle income countries (Botswana, Cap Verde, Djibouti, Namibia, Senegal, and Swaziland) and by far the majority of countries in the region – 39 of the 48 nations – are classified by the World Bank as 'low income'.

Development statistics for the region often include South Africa and North Africa and as these are much more developed areas, their inclusion can obscure the true extent of the development gap. The average 1995 per capita GDP for SSA excluding South Africa was \$386 per year, which is over thirteen times lower than the world average of \$5,104 and an astonishing 66 times lower than the high-income country average of \$25,809. It is not surprising, then, that child mortality is particularly high and that average life expectancy is low. A third of the population is unlikely to reach the age of 40. In 1995 almost a quarter of the population (24%) was classified by UNESCO as technically illiterate and about 40% of the population lived on less than \$1 a day. The region's share of world trade has fallen from 5% in 1980 to less than 2% in 1997. UNDP's 1995 Human Development Index integrated these and other factors and put 34 of the sub-Saharan countries in the 'low human development' category. African countries occupy 18 of the bottom 20 positions of the index.

ICT INFRASTRUCTURE

Although encouraging trends have emerged in the last few years, the differences between the development levels of SSA and the rest of the world are even wider

Figure 13.1 → Internet in Africa: international links



Source: Mike Jensen.

in the area of ICTs than they are when more traditional measures of development are used. The majority of the population has never even made a telephone call, only 2.5% of the world's televisions are on the subcontinent, and just one person in 9,000 has access to the Internet (excluding South Africa) compared to a world average of one in 38.

Irregular or non-existent electricity supplies are a common feature of the sub-Saharan landscape and a major barrier to an increased use of ICTs, especially

outside the major towns. Many countries have extremely limited power distribution networks, which do not penetrate significantly into rural areas, and power sharing (regular power outages for many hours) is a regular occurrence, even in some capital cities such as Accra and Dar es Salaam. Furthermore, most tax regimes still treat ICTs as luxury items, which makes these almost exclusively imported commodities all the more expensive, and thus unobtainable by the majority.

Radio and television

It is not therefore surprising that radio is still by far the most dominant mass medium in Africa with ownership of radio sets being far higher than for any other electronic device. In 1995, radio ownership was estimated by UNESCO at close to 18% of the population (3.5% owns a television and only 0.3% a personal computer). Comparisons with world averages are shown in Table 13.1.

It should also be noted that many people listen to the same radio or watch a television at the same time. In fact, large scale sharing of information resources is a dominant feature of the African media landscape – readership of newspapers is often above 10 and it is not uncommon to find most of a small village crowded around the only TV set, often powered by a car-battery or small generator. It has been estimated that over 60% of the population of the subcontinent are reached by existing radio transmitter networks, while national television coverage is largely confined to major towns. Some countries still do not have their own national television service.

Following liberalization of the sector in many countries, an increasing number of commercial stations are being established. However, the news and information output of these commercial stations is usually either a re-broadcast of the national (state-controlled) news, or that of an international broadcasting service or news agency. Local news and current affairs, especially that focusing on events outside the capital, is rarely broadcast. Community radio has been slow to take off in the region. Genuine community radios are often seen by governments as a threat. Pressure is also being put on community radios – usually by the donor organizations which helped to create them in the first place – to become financially sustainable.

Among the multinational broadcasters, the BBC World Service radio programming is the most wide-

Table 13.1 → ICT density in Africa as compared with world averages in percentage of population owning the device

	Sub-Saharan Africa	World
Radio (1996)	17	36
Television (1996)	3.5	23
PCs (1996)	0.3 ¹	4.4
Fax (1995)	0.02	na

1. This figure is an independent estimate, and should be used with caution.

Sources: UNESCO Statistical Yearbook 1998, UNESCO, Paris, 1998.
International Telecommunication Indicators, ITU, Geneva, 1998

spread, redistributing its signal locally on FM and AM bands in 25 countries and 46 towns in the sub-Sahara. The BBC's coverage is followed by that of Radio France International (RFI) and the Voice of America, all three of which are actively competing for the African radio listener via terrestrial re-broadcasting.

The battle is being carried to the satellite television market as well, with the BBC and Canal+ focussing an Anglophone and Francophone audiences respectively. Portuguese colonial history is similarly reflected in services of the national television, RTP, being re-broadcast in the Lusophone countries.

For many years the South African company MultiChoice has been distributing its South African subscriber channels (M-Net) through local terrestrial broadcasters in 39 countries in SSA. Its recently launched music channel, Channel O, claims to be the most watched television station in Africa. In 1995 M-Net launched the world's first digital direct-to-home subscriber satellite service called DSTV which carries over 30 video channels and 40 audio programmes on C-band to the whole of Africa and on low-cost KU-band to Southern Africa south of Lusaka. This year the South Africa public broadcasting Corporation (SABC) launched Channel Africa, a new

satellite-based news and entertainment channel aimed at the subcontinent. However, the audience for satellite broadcasts are confined to the elite who can afford the equipment and subscription fees. In 1998 some parts of northern sub-Sahara started receiving DTH Television broadcasts from Nilesat, the continent's first locally owned geostationary satellite, operated by the Egyptian Radio and Television Union (ERTU). World-Space has finalized its digital radio service, which began broadcasts in early 1999 and will make a suite of five audio channels available to anyone on the continent who can afford \$200 for the special digital radio that has been manufactured.

Telecommunications

In most sub-Saharan countries the telecommunication networks are being expanded and modified, with the number of main lines growing at about 10% a year. Nevertheless, the overall teledensity in 1996 was still only about one telephone line per 100 inhabitants (1.4 per 100). In addition, much of the telecommunication network is analogue and many sections are operating at saturated capacity or are highly unreliable, especially during rainy seasons. Furthermore, 50% of the available lines are concentrated in the capital cities, where only 10% of the population live.

On a worldwide basis, the sub-Saharan countries can be seen to have by far the least developed infrastructure. In 1996 the region contained almost 10% of the world's population, but only 0.4% of the world's telephone lines (2.9 million lines). The penetration of phone lines on the subcontinent is five times worse than for the average low-income country.

However, there is a high level of variability among countries in the state of their existing telephone networks. Some such as Botswana and Rwanda have made telecommunications a priority and are installing digital switches with fibre optic inter-city backbones and the newest cellular and mobile technology. At the other end of the scale, countries like Madagascar and Uganda have largely unreliable

analogue telephone systems and poor national links between urban centres. Surprisingly, the proportion of digital lines on the subcontinent in 1996 was 69%, close to the world average of 79%.

On a sub-regional level, the countries of the Sahel and Central Africa, such as Mali, the Niger and the Democratic Republic of the Congo have less than 2 telephone lines for every 1,000 people. North Africa and South Africa have a teledensity of around 35 per 1,000, West and East African coastal countries have densities of between 2.5 and 10 per 1,000.

Telephone

A much smaller proportion of the population can actually afford their own telephone: the cost of renting a connection averaged almost 20% of the 1995 GDP per capita, as compared with a world average of 9% and only 1% in high income countries. It should be noted, however, that there is wide variation among countries in the charges for installation, line rental and call tariffs. In 1996 the average sub-Saharan business connection cost \$112 to install, \$6 a month to rent and \$0.11 per 3-minute local call. But installation charges were above \$200 in some countries (Benin, Mauritania, Nigeria and Togo), line rentals ranged from \$0.8 to \$20 a month, and call charges varied from \$0.60 an hour to over \$5 an hour. Local call tariffs in some countries have increased even further, to over \$10 an hour, making extensive residential use of the World Wide Web (WWW) in these countries unaffordable to all but a tiny elite. Because of high tariffs and the large number of international calls, telecommunications operators enjoy above-average profits on their lines.

Mobile cellular telephony has experienced very rapid growth in the SSA. As well as providing an alternative to the limited public telecommunications networks, the cellular market has usually involved the private sector which has been able to institute more aggressive start-up plans. Cellular services are now available in 38 countries, supplied by over 65 oper-

ators who provide access mainly in the capital cities but also in some secondary towns and along major trunk routes. The number of cellular subscribers in 1997 was estimated by the International Telecommunications Union (ITU) at over 225,000 outside of South Africa, where the cellular market outpaced all expectations, reaching over 2 million in 1998.

Data communication

Traditional data communication services based on X.25 are available in half the countries (27), most prevalently among those which are francophone where the use of the Minitel was adopted before the Internet became available. SITA, the airline co-operative, has by far the largest X.25 network in Africa. SITA's commercial division, SCITOR (recently renamed Equant), which was formed to service the non-airline market, now operates dialup points of presence in 39 SSA countries. These are used by a variety of multinational organizations. Subscribers to Internet service providers (ISP) in Europe and North America who are members of IPASS (a group of ISPs, including SITA, who share their points of presence, or POPs) can also access their home ISPs via these points of presence for about \$0.22 a minute (see www.ipass.com).

X.25 packet-switched based services were in the past the most popular method of establishing wide-area data networks in Africa, but because of their high-cost, traffic-based tariffs, they are now mainly used by banks and other large corporations requiring secure real-time low-volume data transactions such as credit-card verification.

The only country in the region with an X.400 service is South Africa. Other advanced services such as Integrated Services Digital Networks (ISDN) and video conferencing are generally not available.

Internet

By contrast, the Internet has spread rapidly through the region over the last two years: at the end of 1996

only eleven countries had local access; but by the end of 1998, according to ITU (1998), all African countries had some access to the Internet. But Internet services are still largely confined to the capitals and major towns. To address this situation ten countries have made the decision to provide local call Internet access across the whole country using a specific area code. A few countries (Angola, Benin, Botswana, Ghana, Kenya, Namibia and the United Republic of Tanzania) do have POPs in some of the secondary towns, and South Africa has POPs in about 70 locations.

Most African capitals have more than one Internet Service Provider (ISP), and in mid-1998 there were over 265 ISPs across the region (192 excluding South Africa). The total number of computers connected to the Internet in the sub-Sahara excluding South Africa was estimated at just over 5,000 in mid-1998 (up from 290 in 1995), but the figure may be closer to 6,000 or 7,000 due to the measurement technique, which does not count hosts which are not fully referenced in domain name servers. Africa's share of Internet host sites worldwide was only 0.025% in 1997, and this had fallen to 0.022% by the beginning of 1998 due to Internet growth worldwide.

The opening up of the Nigerian Internet market will probably change the picture as the national telecommunications operator (Nitel) has big plans to provide Internet countrywide. With a fifth of sub-Sahara's population, until mid 1998 Nigeria, which has been one of the slumbering giants of the African Internet world, had only a few dialup e-mail providers and a couple of full ISPs operating on very low bandwidth links.

The rapidity with which most African public telecommunication operators (PTOs), have established Internet services is noteworthy. In the last three years PTOs have brought full Internet services on stream in 31 countries, and similar moves are afoot in three others. In many francophone countries the PTO operates the major value-added service provider as a joint venture with France Cable and Radio, called

Box 13.1 → Mauritius

The Mauritian government has a strong commitment to increase the use of ICTs and has made a number of efforts in addressing the regulatory and legal framework for ICTs. Several bills have already been drafted, and with the passing of the Copyright Bill at the National Assembly in July 1997, the legal challenges posed by the use of ICTs will be reduced significantly.

The National Computer Board (NCB) was established by government in late 1996 as a para-statal institution whose aim is to assist in the diffusion of ICTs in the various socio-economic sectors of the country. One of the NCB's major areas of activity is the use of the Internet in government, as well as the more general issues of privacy, security and intellectual property. The NCB has established an extensive web site which acts as the home site for information on other government ministries (ncb.intnet.mu).

NCB is the programme manager for the National IT Strategy Plan (NITSP) which is currently under active development as part of the Mauritian government's strategic objectives to move the country toward an information-age economy.

Hon. Sarat Lallah, appointed Minister of the newly created Ministry of Telecommunications and Information Technology (MITI) in July 1997 (<http://ncb.intnet.mu/mtit.htm> and it@intnet.mu), declared: 'Government is determined to ensure the widest participation in the formulation of any policy bearing in mind the nation's interest and the will to push Mauritius forward as an info-communications hub in the region'. <http://ncb.intnet.mu/mtit/whitepap.htm>

Two flagship practical projects proposed in January 1998 are a Government Information Infrastructure (GII), and a Population Database & National Identity Card. The first initiative will improve the communication capability of the government and improve awareness among the civil service in the use of ICTs. The GII will provide the electronic mail and publishing facilities for the Government to create a responsive and 'paperless' environment. It will also aim to provide information and services to the public round-the-clock via the Internet. Over time, the GII is also expected to evolve into an electronic backbone and infrastructure to meet the future public sector connectivity needs.

The purpose of the second project is to create a central repository of data on the citizens of Mauritius. It was felt by the task team that without this foundation, it would be extremely difficult to identify an individual, and offer and co-ordinate services across the board. The Identity Card will be

upgradable to become more secure and useful in a wider range of applications, facilitating transactions and movements of people. As this project will affect the majority of the population, it was felt that it offers the best means to alter the public's perception about ICTs.

The Information Technology (Miscellaneous Provisions) Bill and Copyright Act promulgated by MITI were passed in 1997 to modify existing legislation to take into account ICTs, such as the use of electronic documents in court (<http://ncb.intnet.mu/mtit/itbill.htm> and <http://ncb.intnet.mu/ncb/copyrite.htm>).

The telecommunications sector is regulated by the Mauritius Telecommunications Authority (MTA) and will be advised by a newly-created Telecommunications Advisory Council (TAC).

The Public Telecommunication Operator (PTO), Mauritel/MTS, is currently a monopoly but is engaged in a slow process of liberalization and tariff rebalancing which is expected to be completed by the end of 2004 when the entire sector will be opened up for competition as outlined in the recently published Telecommunications White Paper. Congruent with the NITSP, the more interesting policy objectives of the white paper are:

- A revised legislative mandate so that Mauritius can fulfil its commitments under the WTO Agreement on telecommunications.
- Access to an affordable universal service for the whole community (in Mauritius, Rodrigues and the Outer Islands) with
- The creation of an environment conducive for Mauritius to become the information, financial and services hub in the region.

Mauritius has a far better telecommunications infrastructure than most other countries in Africa. As part of its national strategy to become the 'Singapore of Africa', it has made telecommunications and data services a high national priority for some time now, and this is reflected in the availability of ISDN services in some areas, relatively short waiting times for the installation of new telephone lines (especially for businesses) and a rapidly emerging range of data communications services such as Internet, X.25 and EDI. Three SDH fibre optic rings have been built in Mauritius to improve the local telecom infrastructure and to provide a high-bandwidth connection to the main ground station in Port Louis. Mauritius will be connected by fibre optic cable to the global backbone in 1999 when South Africa's Far-East (SAFE) project links Cape Town to Kuala Lumpur and Singapore via submarine cable.

(AT&T), British Telecom (BT), Global One/Sprint, UUNET/AlterNet, MCI, NSN, BBN, Teleglobe, Verio and France Telecom/FCR. A number of other links are provided by PanamSat and Intelsat direct to private and PTO ground stations in the United States and the United Kingdom, circumventing local PTO infrastructure.

Generally, ISPs must pay the entire cost of the connection to Europe or the US, which effectively gives the developed country ISPs free access to the continent's network and further increases the costs of ISPs in Africa. Fifty African countries met in Cotonou (15–17 December 1999) with the assistance of The United Nations Development Programme (UNDP) and the Agence de la Francophonie. They adopted a project to install a regional register for Internet addresses, AFRINIC, similar to those existing in other regions. Reflecting the high telecommunication costs and the small markets, often supplied by a single operator, ISP charges for dialup access are generally higher in Africa than elsewhere: the average cost of using the Internet for five hours a month in Africa comes to about \$60 per month.

In response to the high cost of full Internet-based services, and also because of the overriding importance of electronic mail, the e-mail-only store and forward services with dialup connections to the Internet are generally continuing to attract subscribers. There is also growing interest in telecentres, kiosks, cybercafes and other forms of public Internet access, such as adding PCs to community phone-shops, schools, police stations and clinics, which can share the cost of equipment and access among a larger number of users.

Computers and data processing

Demand for various services on the Internet is expected to increase only when there is a broader penetration of computers and data processing equipment on the subcontinent. Although the limited levels of equipment penetration are readily apparent,

accurate estimates of the quantity of this equipment in use are notoriously hard to gather. There have been few effective centralized systems of monitoring, and high duties and sales taxes in many countries discourage the declaration of imports and other transactions. In addition, convergence and rapid change in the technologies makes the categorization of equipment types even more difficult.

Most recent estimates for the number of PCs in the sub-Sahara put the average at about 3 per 1,000 people in 1996. However some studies, such as the 1995 survey carried out by the Agence de coopération culturelle et technique (ACCT), indicate that this figure may be between 3 and 6 times too high, making the average closer to less than 1 per 1,000. Some countries such as Botswana, Mauritius and South Africa have significantly higher levels of penetration, at least 5 per 1,000, perhaps to 20 per 1,000. At the same time, account should also be taken of the number of users sharing a single computer, which is much greater than in more developed regions.

Generally, the penetration of computers is much lower in the public sector, with by far the majority of PC equipment being used by the private sector for accounting and word processing. Spreadsheets are used to some extent for forecasting or as a simple database application. The small number of database systems often use Microsoft Access, but many national documentation centres and archives, as well as small university and NGO libraries, use the UNESCO-developed micro CDS/ISIS package for bibliographic data, or the functionally similar package of International Development Research Center (IDRC). Geographic Information Systems (GIS) and digitization facilities are beginning to be installed by planning departments and municipalities.

Outside of South Africa, there are only a handful of mini- and mainframe computers, and most of these are confined to Ministries of Finance for government payroll, and a few of the larger para-statal organizations, telecom operators, banks and insurance

companies. The Millennium Bug, or 'Y2K problem', has gained significant attention across the subcontinent, especially because there are large numbers of older machines in use and very limited resources or skills to ensure their compliance.

USE OF ICTs

The vast majority of people in the sub-region rely almost exclusively on radio for information, with smaller and more elite groups in the cities and towns also making use of television and newspapers. There were about 175 daily papers and 300 weekly or monthly general news journals in the SSA in 1996, but this number is thought to have increased substantially in the last two years.

As mentioned earlier, the majority of Africans have not yet made a phone call. But interestingly, the use of international lines is much higher than the world average, partly reflecting the large size of the African Diaspora and the arbitrary borders within the region. In 1996 the SSA average for international outgoing calls was 233 minutes per line per year, compared to a world average of 93, and 113 for high-income countries.

Current estimates put the number of sub-Saharan Internet users at about 870,000. Most of these are in South Africa (about 800,000) leaving only about 70,000 among the remaining the 638 million people on the subcontinent. This works out at about one Internet user for every 9,200 people, while the world average is about one user for every 38 people, and in North America and Europe, the figure for Internet use is about one in every 4 to 6 people, depending on the country. There are now about 20 countries in the subcontinent with over 1,000 users, but only about 7 countries with over 3,000 (Ghana, Kenya, Mozambique, South Africa, Uganda, Zambia and Zimbabwe). 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 the number of Internet nodes.

The definition of a 'user' or 'subscriber' may vary, however, since the number of accounts being shared in Africa may be much greater than in more developed regions. A recent study by the UN Economic Commission for Africa (UNECA) found on average that there were 3 users for each computer with an Internet or e-mail connection. This could mean that the number of e-mail users outside South Africa is over 200,000.

Evidence gathered by UNECA suggests the average level of Internet use in the SSA is about one incoming and one outgoing e-mail per day averaging three to four pages, in communications which are almost always with people outside the continent. Surveys indicated that 25% of the e-mails replace faxes, while 10% replace phone calls and the other 65% are communications that would not have been made in the absence of an e-mail system.

Surprisingly, it can be observed that the French-speaking SSA countries have a far higher profile on the World Wide Web and greater institutional connectivity than the non-French speaking countries. This is due to the strong assistance provided by the various francophone support agencies and the Canadian and French governments, which are concerned about the dominance of English on the Internet. As a result, the anglophone and lusophone countries have considerable 'catching up' to do to reach the same levels of connectivity and representation. ACCT's BIEF (Banque Internationale d'Information sur les États Francophones) and AUPELF-UREF/REFER (Association des Universités partiellement ou entièrement d'expression française—Universités des réseaux d'expression française/Réseau électronique francophone pour l'enseignement supérieur et la recherche), which are building Web sites of local information as well as providing access, are the two dominant content developers.

On a sub-regional basis, Southern Africa is the most advanced region in terms of use of ICTs, followed by East and West Africa, with Central Africa lagging furthest behind. Universities were initially at the

Box 13.2 → Ghana

A draft national communications policy has been developed by the Ghanaian National Information and Communications Committee (GNICC), which comprises representatives from the academic, research, government and private sectors and is co-ordinated by the University of Ghana, Legon, Balme Library (www.ug.edu.gh).

The Library was chosen in part for its long standing experience with e-mail access and CD-ROM use, the latter which has in part been assisted by the sub-Saharan African Program of the American Association for the Advancement of Science (AAAS) (www.ug.edu.gh).

Support for the GNICC has been widespread, including from government, with participation from the ministries of environment, science and technology, education, information, transport and communication. The Ghana Government has indicated its support for promoting access to ICTs in all segments of society, particularly in the educational system. The Minister of Finance in his 1997 budget statement made the following declaration: 'In view of the positive effects of the application of information technology on development, Government will ensure that key institutions of state machinery are linked to the Internet. All the science resource centres will be connected to the network as and when they are commissioned. The program to link the Universities together and to the Internet will also be pursued.'

UNESCO has since agreed to fund the \$250,000 project, with the primary local partners being the Ministry of Environment, Science and Technology and the Ministry of Transport and Communication. One of the initial goals will be the establishment of the Ghana Academic and Research Network (GARNET).

The government has requested the Bank for Institutional Development Fund to implement a network to connect the Office of the President, Parliament, the Ministry of Information and some other key ministries.

The technical sub-committee of the GNCIC has been charged with designing the specifications of a national networking backbone. Within the context of the GNICC/GARNET project it was originally envisaged that the University of Ghana would form the hub for GARNET's Internet links to the other Universities and research centres. The university is installing a fibre optic campus network with support from

the Danish International Development Agency (DANIDA). It is located about 12 km from the centre of Accra, using a wireless link to the local Internet hub operated by NCS. With the emergence of NCS's national Internet backbone with POPs in three cities, along with its active support for academic networking, and furthermore Gilat's interest, a joint private/public sector networking project may emerge.

The Ministry of Transport and Communications (MOTC) established the Accelerated Development Programme (ADP) for telecommunications in 1995 to address the stagnant growth in the sector. The ADP is a reform program involving the establishment of a centralized regulatory body, the National Communications Authority (NCA), as the agency responsible for regulation of the telecommunications sector (www.communication.gov.gh).

At the same time Ghana Telecom (GT) was separated as a commercial entity from the Ministry of Posts and Telecommunications, with a 30% stake sold to a Malaysian consortium for \$38 million and the availability of a second national operator's license was announced. The license was subsequently awarded to a consortium proposing a \$10 million investment headed by the Ghana National Petroleum Corporation (GNPC), with the African Communications Group and Western Wireless (Cambridge, Mass, US). GNPC is working with the Israeli company Gilat to deploy a VSAT-based telephone network around the country. Both GT and GNPC have 20-year exclusivity licenses (www.gnpc.com.gh and gnpc@ncs.com.gh).

The MOTC plans to divest a further 21% of Ghana Telecom. It also hopes to exploit Ghana's strategic location at the centre of the ECOWAS region and intends to position the country as a hub for trade and commerce-driven telecommunications services.

Currently, Ghana's telephone network still reflects a poor state of development, but it is undergoing a process of rapid modernization. Many of the exchanges in Accra are now digitized, providing advanced services such as password, abbreviated dialing, call transfer, three-way conference, wake-up and call waiting. Motorola was awarded a contract in 1996 to expand GT's wireless local loop system to 13,000 subscribers.

vanguard of Internet developments in the sub-Sahara, and at the very least, most countries have e-mail connectivity. In late 1998, fifteen countries had universities with full Internet connectivity. However, Internet facilities are mostly restricted to staff. Although there are a few notable government Web sites, such as those of Angola, Mauritius, Mozambique, Senegal and Zambia, there is as yet relatively little government use of the Internet for existing administrative purposes. In the UNECA study mentioned above, it was found that the highest number of users surveyed belonged to nongovernmental organizations (NGOs), private companies, and universities. The ratio of nationals to non-nationals varied between countries. Most users were male and well educated.

E-mail is used for general correspondence and document exchange, technical advice, managing projects, arranging meetings, and exchanging research ideas, although its use is still limited for accessing formal information resources. Across the continent, users report that e-mail has increased efficiency and reduced the cost of communication, but as yet is used almost exclusively for contacting individuals in other regions, and the Web is still a relatively under-utilized resource.

In the area of local content development, the SSA Web-space is expanding rapidly, and almost all countries have some form of local or internationally-hosted Web server unofficially or officially representing the country with varying degrees of comprehensiveness. However, still relatively few institutions are well represented on the Web. While increasing numbers of organizations have a Web site with basic content and descriptive information, many are hosted by international development agency sites and very few sites actually use the Web for their activities.

There are about 120 electronic mailing lists and UseNet newsgroups on the Internet (almost entirely hosted off-continent) which discuss issues related to

SSA. There is a list for almost every country as well as others on more general topics ranging from African Cinema to Post Colonialism.

Two web search engines specializing on Africa have emerged over the last year: Woyaa (www.woyaa.com) and Orientation Africa (af.orientation.com). As with other similar services elsewhere, these are run by commercial companies which generate revenue through advertising.

The news media are now relatively well represented on the Web. The African Studies department of Columbia University in the United States has identified over 115 different newspapers and news magazines in the region that are now available on the Internet, of which over 60% are published on the subcontinent, in about half of the countries. Also of note are the efforts of the ISP AfricaOnline to host daily newspapers on their web sites.

There are two major continent-wide African news agencies, both of which extensively use electronic media: Inter Press Service (IPS) and the Pan African News Agency (PANA). Sub-regionally, Southern Africa has the only active news agencies using ICTs, the Southern African Broadcasters Association (SABA) and the Media Institute of Southern Africa (MISA). In other regions use of ICTs among the media is much lower, but in West Africa, WANAD (West African News Media and Development Centre) is assisting journalists and media outlets to adopt the use of ICTs.

Of course international news correspondents in SSA are heavily dependant on ICTs to deliver material to their operations in the United States and Europe. Cable News Network (CNN) and the other international television news companies regularly rent temporary space segments all over Africa with the local representatives of IntelSat and PanamSat to deliver reports and live coverage. Radio journalists (even freelancers) are now sending edited sound files by e-mail to agencies such as the BBC World Service.

Across the subcontinent, there are as yet few

locally-developed electronic information repositories of national or sub-regional significance, and none of the existing ones are currently available on the Internet. This is partly because national archive and library systems are extremely poorly resourced and many have had little opportunity to obtain ICT skills or equipment.

Although statistics-gathering operations are also at a very low level due to insufficient support, many statistical offices are now using common standards and new tools. With the help of e-mail and fax, the collection of statistical information is no longer confined to the largest urban centres. The number of studies aiming at better knowledge of the structure and functioning of the socio-economic sectors is growing and price indices now cover rural areas.

RESTRUCTURING AND PRIVATIZATION OF THE TELECOMMUNICATION AND MEDIA SECTORS

There has been a gradual wave of restructuring in telecommunication and broadcasting sectors in sub-Saharan Africa over the past five years. Ten countries, including Côte d'Ivoire, Ghana, Guinea, Senegal, South Africa and Uganda have partially privatized national telecommunications operators and fifteen more, including Cameroon, Madagascar, Malawi and the United Republic of Tanzania, intend to do so shortly. The cellular sector, which is almost completely private, already comprises about 20% of the market. World Trade Organization (WTO) Multilateral Trade Negotiation commitments have been made by Côte d'Ivoire, Ghana, Mauritius, Senegal and South Africa. By the beginning of 1998, twenty African countries had established independent or quasi-independent regulatory bodies for the telecommunication sector.

Telecommunications

The liberalization of the sectors in some of the countries will undoubtedly improve the prospects for

increased investment in ICTs over the next few years. However, many governments still see the media as an organ of the state and the telecommunications sector as an important part of their general revenue base. This means that public network operators are not free to re-invest their profits in network development. Furthermore, much of the existing revenue for telecommunication operators comes as a result of the existing accounting rate system, which currently channels significant sums of international telecommunication revenue to African PTOs. The pending reform of the accounting rate system could deprive PTOs and/or their governments of vital investment capital just when they most need it.

However, the international telecommunication industry is waking up to the fact that Africa is the world's largest untapped market, and with governments desperate for ways to radically modernize telecommunications systems, new alliances are being forged between the private and public sectors. There are nevertheless concerns that little consideration is being given to the medium- and long-term implications, more particularly because when it comes to deregulation of the telecommunication sector, the assumption of many governments is that liberalization models, which have worked in the North, can simply be applied wholesale to the South.

Broadcasting

In the broadcasting sector, emerging legislation is often silent about the control of the public broadcasting service; in some cases their licences may not even be under the authority of the regulator, but of the Minister of Information. Moreover, commercialization of broadcasting, without adequate reform of the public broadcasting sector, has done little to promote plurality and diversity on the airwaves. Given the extent of rural poverty, profit-driven entrepreneurs have little or no interest in broadcasting to these more marginalized communities.

The establishment of commercial broadcasting

in eastern and southern Africa has shown that, in the absence of properly constituted independent regulators, licences have by and large been given to urban-based broadcasters. More often than not, these broadcasters have then been granted re-broadcast licences to other heavily-populated areas, which increases the stations' appeal to advertisers, but contributes little to the diversification of broadcasting in the country. These new commercial broadcasters have tended to be either owned by the ruling party or by staunch supporters of that party. These public broadcasters are also increasingly under pressure to make a profit in order to save on already over-stretched national budgets. In order to compete with newly-established commercial stations, public broadcasters have little choice but to act and think commercially. This inevitably puts pressure on national broadcasters which leads them to neglect their less commercially viable public service mission, which usually includes a duty to inform, as well as to educate and entertain.

Sub-regional collaboration between countries in the development of strong regulators and legislation may be one important means of addressing some of these issues. To this end the Southern African grouping of thirteen SADC countries have agreed to a legally binding Protocol on Communications which includes commitments to Universal Service and adopting the model policy and telecommunications legislation that has been developed.

PROSPECTS OF THE REGION FOR THE MOVE TOWARDS THE INFORMATION SOCIETY

ICTs are at a critical strategic entry point for development in SSA. Innovations in this area could help accelerate SSA's economic growth and alleviate poverty, but these tools make large demands on an underlying infrastructure that is currently incapable of servicing them. The infrastructure is steadily improving, but not fast enough to accommodate the growth in demand for the multitude of services now available. In par-

ticular, the need for high bandwidth infrastructure for the Internet creates serious pressures on the telecommunications networks in Africa. But the Internet is just one of a number of forces that will have an impact on telecommunications operators in the region. There are many others, such as international pressures on regulating accounting rates charges, and the growing presence of callback technology.

The challenges in this area focus on issues such as expansion of the local network and tariff rebalancing (for national operators); the erosion of international revenues (through, for example, callback systems, the Internet and the breakdown of the accounting-rate system); regulatory weaknesses that need to be addressed to ensure a level playing field and to attract investment; the need to provide rural services; the shortage of skilled personnel; and the need for customer focus in terms of quality, service coverage and price. In telecommunications alone, investments totaling at least \$6,000–8,000 million would be required in SSA (excluding South Africa) over the next four years to add an additional 4.5 million lines. This would improve the teledensity in a significant way, even though it will remain the lowest in the world. There have nevertheless been an increasing number of indications that the sub-region's decision-makers are committed to achieving substantial change.

One of the most important events, which helped to accelerate moves toward increased adoption of ICTs in Africa, was the Addis Abeba Symposium on Telematics for Development, organized by UNESCO in April 1995. This meeting brought together almost all of the major forces in international computer networking development projects. One of the results of this Conference was the development of a framework document entitled the **African Information Society Initiative (AISI)**, which was adopted at the subsequent meeting of the Conference of African Ministers in May 1996. AISI calls for the formulation and development of a National Information and Com-

munication Infrastructure (NICI) plan in every African country, driven by national development priorities, and proposes co-operation, linkage and partnership among African countries to share successful experiences. The countries that have so far begun the process for developing in-depth national information infrastructure and communication development plans are Benin, Burkina Faso, Cameroon, Comoros, Ethiopia, Lesotho, Namibia, Mozambique, Rwanda, South Africa and Uganda.

Combined with the Abidjan African Regional Telecommunications Development Conference, AISI has created significant internally-generated pressure from ministries to urge their administrations to adopt appropriate regulatory, tariff and service provision policies. Since then, communications ministers from over forty African countries have provided high-level endorsement for the telecommunications development policies encapsulated in the common vision document they have produced called the *African Connection*, whose target is to lay 50 million lines in Africa over the next five years (see www.telecom98.co.za for details).

In conjunction with efforts to built new infrastructures and improve the existing facilities, there are innovative efforts to improve accessibility to services through the use of shared public access facilities, which exploit the convergence of technologies to provide cost effective services in under-serviced and isolated areas. Commonly called community telecentres, the concept has received considerable support from the ITU and other members of the international community, as well as a number of national governments and PTOs. This has resulted in over 20 pilot telecentres across the subcontinent set up to test different models, means of implementation and mechanisms for sustainability.

The region's links to the rest of the world are also due to undergo substantial change, with a large number of international telecommunication-infrastructure building initiatives having been

announced in the last 2-3 years: AT&T's Africa One, the SAFE project (South Africa–Far East) in collaboration with Malaysia Telecom, the SAT-3/WASC (South Atlantic Telephony/West African Submarine Cable), a West African coastal marine fibre cable and the East African Co-operation (EAC) project. In addition, the African satellite consortium owned by the African PTOs, RASCOM, has advanced plans to launch its own satellite before the year 2000.

LEO satellite networks, namely Iridium and Globalstar, hold particular promise for the subcontinent's widely dispersed population. One reason for this is that these services will derive most of their income when passing over developed countries, but will still have to pass over the developing regions such as Africa, where tariffs will be reduced to encourage demand.

INTERNATIONAL AND REGIONAL CO-OPERATION AND DEVELOPMENT ASSISTANCE RELATED TO ICT

With the worldwide recognition of the importance of ICTs in accelerating development, a number of recent international development assistance initiatives have improved the prospects for wider access to information and communication networks on the continent. In relation to the AISI initiative described above, a study on future information infrastructure-building activities in Africa was conducted through a collaboration between IDRC, BellaNet, UNECA, UNESCO and the ITU, called the African Network Initiative (ANI). It identified almost 100 ICT related development projects being planned or in process in Africa. To address the growing need for co-ordination, donors and implementing agencies involved in ICTs in Africa have agreed to establish an ongoing forum for information exchange on such projects called Partnerships for ICTs in Africa (Picta). A summarized list of projects in Africa continues to be updated at their Web site (www3.sn.apc.org/africa/projects.htm).

Many of these initiatives are part of the AISI Framework Sub-programme on Connectivity and, of the projects identified, among the potentially most influential are:

- The UN Secretary-General's System-Wide Initiative on Africa, which includes ICTs as one of the major components in a \$11.5 million programme called 'Harnessing Information Technology for Development' (HITD/SiA), and is supported by the various UN partners.
- The United States Agency for International Development (USAID)/Leland Initiative which is assisting with developing Internet connectivity in 20 African countries in return for agreements to liberalize the market to third-party Internet service providers and to adopt policies which allow for the unrestricted flow of information. New initiatives for Leland announced by US Vice President Al Gore recently include a programme for 1 million PCs for Africa, 1,000 schools connected and 100 Universities connected.
- The ITU's programme for Africa which involves various rural, community telecentre, health and satellite projects emanating from the Buenos Aires Action Plan, is being conducted in co-operation with UNESCO, IDRC, World Health Organization (WHO) and others.
- The World Bank which has activities to assist in telecommunication and ICT development in about 25 countries in Sub-Saharan Africa. Initiatives include the African Virtual University (AVU), Economic Toolkit and Workshops for Internet Connectivity in Africa, the Rural Telecommunications Field Trial and Commercialization Pilot in Kenya, and the Global Connectivity in Africa Conference.
- IDRC's Acacia programme which has allocated 60 million Canadian dollars over the next five years to developing the use of ICTs in communities in Africa.
- The commerce-oriented TradePoint initiative of

the United Nations Conference on Trade and Development (UNCTAD) which has made Africa the priority region for the next two years. UNCTAD has obtained a commitment from the European Union for 30 million euros for the regional development of local trade efficiency networks in Africa.

- The multi-donor InfoDev fund established by the World Bank, which has supported the South African Telematics for African Development Consortium and the \$1 million African Virtual University Project.
- UNESCO is according a high priority to telematics and informatics initiatives in Africa through support for the Regional Informatics Network for Africa (RINAF), which has already received more than \$2 million in extrabudgetary and regular funds and is developing into a self-governing programme. UNESCO has also recently established the Creating Learning Networks for African Teachers project to assist teacher training colleges develop literacy in ICTs and their use for education, and to connect them to the Internet. The project, already being implemented in Zimbabwe, is being initiated in Senegal, and is intended to be extended to twenty countries with extrabudgetary support.
- UNDP's Africa Bureau has agreed to a \$6 million fund to improve Internet connectivity in Africa in a project called the Internet Initiative for Africa (IIA). The countries currently participating are Angola, Burkina Faso, Cape Verde, Chad, the Democratic Republic of Congo, the Gambia, Mauritania, Namibia, Nigeria, Saõ Tomé et Príncipe, Swaziland and Togo. UNDP's Sustainable Development Networking Programme (SDNP) has 10 operational nodes in Africa in Angola, Benin, Cameroon, Chad, Gabon, Malawi, Morocco, Mozambique, Togo and Tunisia. National SDNP projects are funded for two to three years and are expected to provide seed money towards

sustainability, either through sale of services or adoption within government budget.

- The United Nations Environment Programme's (UNEP) Mercure project which uses VSAT technology to establish an environmental information exchange network in Africa. UNEP is co-operating with the ITU to examine the possibility of using the spare bandwidth of the network for other functions.
- The UN Office for Outer Space Affairs is proposing through the COPINE project to donate groundstations and transponder time to African research institutions.
- The various activities of Agence de la Francophonie and related international organizations such as the Office de la Recherche Scientifique des Territoires d'Outre-Mer (ORSTOM), AUPELF, UREF, REFER, which are providing support for ICTs in Francophone countries, most of which are in Africa. Recently the AFRINET project was launched which is providing web servers and related support at a ministerial level to Benin, Burkina Faso, Cameroon, Côte d'Ivoire, Madagascar, Mali, Mauritius, Mauritania and Senegal.

CONCLUSION

The overall funding coming from international and regional co-operation and related to ICT shows the importance that the international community attributes to this sector. But in Africa as in the rest of the world, the development of adequate infrastructure is only the first step in the right direction. Adequate policies should ensure that such progress will not widen the gap between the information-rich and the information-poor. The risk may be greater in Africa than in other parts of the world, since the initial situation is more critical than anywhere else. As pointed out at the beginning of this chapter, indicators such as literacy rate, life expectancy and other factors related to human development are very low. It is to be hoped that the commitment of the international

community combined with the efforts of the national authorities will assist the continent which witnessed the birth of the human species to reach an adequate level of development through the use of the appropriate ICTs.

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