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Transforming Africa

The promise of broadband

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FOREWORD

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ITU

Brahima Sanou

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Connect Africa Summit – An update

Since the Connect Africa Summit held in Kigali, Rwanda, in October 2007, African nations have made tremendous progress in rolling out broadband infrastructure and in developing information and communication technology (ICT) applications to serve their populations. At the same time, they have developed the human resources to sustain this fast-growing dynamic ICT sector.

As a result of private-sector investment and public broadband projects, much has been achieved towards meeting Goal 1 of the Connect Africa Summit, which aimed at interconnecting all African capitals and major cities with broadband infrastructure, and strengthening connectivity to the rest of the world by 2012.

The long-awaited landing of submarine cables (TEAMS, EASSy and SEACOM) on the east coast of Africa has finally happened, closing the access gap and bringing high-capacity broadband to the African countries on the shores of the Indian Ocean. On the west coast of Africa, other submarine cables (such as SAT3, Main One, ACE, Glo 1 and WACS) were added to the existing cables. Africa now has more than 10 terabytes of submarine connectivity. The challenge of extending infrastructure to the interior has been gradually overcome, especially successfully by countries that have adopted national broadband plans.

We are witnessing enhanced cooperation among coastal and landlocked countries – and this will certainly facilitate access to the landing points and bring down prices to a more affordable range for the ordinary consumer.


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Regional organizations – such as the African Union Commission with its Programme for Infrastructure Development in Africa (PIDA) – together with regional economic communities have played an important role in catalysing regional cooperation in order to extend the benefits of broadband to as many people as possible. This fourth Volume of Connect Africa presents some of the initiatives in this area.

At its headquarters and through its Regional and Area Offices, ITU has initiated a number of projects with partners in response to the commitments made at the Connect Africa Summit. For example, a project on the harmonization of ICT policies and regulations in sub-Saharan Africa (HIPSSA) was successfully implemented from 2008 to 2013 in partnership with the European Union. Other examples include the Broadband Wireless Network project implemented in partnership with the Craig and Susan McCaw Foundation, and the Connect a School, Connect a Community initiative.

We soon realized that, while connecting Africa with the appropriate infrastructure, it was also time to innovate using the available ICT infrastructure to create services and applications that transform people's lives. It was in this context that the Transform Africa Summit was held in October 2013 in Kigali, Rwanda, hosted by Paul Kagame, President of Rwanda and Dr Hamadoun I. Touré, Secretary-General of ITU. The summit offered a platform for dialogue between policy-makers and industry players on leveraging broadband for the socio-economic transformation of Africa. The outcomes of this summit are summarized in a brief article in this Volume of Connect Africa.

Andrew Rugege

ITU Regional Director for Africa

Broadband deployment in sub-Saharan Africa

Role of the ITU Regional Office for Africa

A vision of connecting Africa to broadband networks was the dream of Africa's leaders at the Connect Africa Summit, held in Kigali, Rwanda, in 2007. Today, this vision has to a large extent been realized, connecting most of the capitals and major cities across Africa, connecting villages in many countries in the region, creating conducive regulatory environments, developing capacity and rolling out e-services.

Connect Africa

The Connect Africa summit called for investments and partnerships, rather than charity or donations. In response, USD 55 billion was pledged at that time. Now the pledges have been more than fulfilled. It is estimated that investments and government expenditure implementing Connect Africa goals currently exceed USD 70 billion.

In support of the Connect Africa goals, the ITU Regional Office for Africa has concentrated on assuring an enabling environment for telecommunication and information and communication technologies (ICT), particularly through the Harmonization of ICT Policies in Sub-Saharan Africa (HIPSSA) project. Emphasis has also been put on more effective and efficient spectrum management, including the use of ITU's Spectrum Management System for Developing Countries (SMS4DC) and assisting countries in the region to migrate from analogue to digital broadcasting.

Working with ITU's cybersecurity partner, the International Multilateral Partnership Against Cyber Threats (IMPACT), the ITU Regional Office for Africa has helped countries to make sure that their online experience is safe and secure. It has approached this challenge through the establishment of national computer incident response teams.

ITU has put significant efforts into enhancing the capacities of its African membership in various technical areas through assistance to the eight centres of excellence in Africa and through online courses provided via the ITU Academy. ITU continues to assist countries in developing ICT infrastructure, for example by implementing the ITU/Craig and Susan McCaw Foundation Broadband Wireless Network project for Africa and through the "Connect a School Connect a Community" project.

Transform Africa

Following the success of the Connect Africa initiative, African leaders are now seeking to transform their national economies and the livelihoods of their people through telecommunications and ICT. At the Transform Africa Summit, co-organized by the Government of Rwanda and ITU in Kigali and attended by seven Heads of State, the Smart Africa Manifesto and its implementation framework, the Smart Africa Alliance, were adopted. Subsequently, the outcomes of Transform Africa – including the Manifesto and the Alliance – were endorsed by the Heads of State at the African Union Assembly in January 2014.

The inaugural meeting of the Smart Africa Alliance took place in Addis Ababa, Ethiopia, on 10–11 March 2014, co-chaired by Dr Hamadoun I. Touré, ITU Secretary-General and Jean Philbert Nsengimana, Rwanda's Minister of Youth and ICT. The meeting was attended by representatives of the African Development Bank, the World Bank, the African Union, the United Nations Economic Commission for Africa, the New Partnership for Africa's Development (NEPAD), The Internet Corporation for Assigned Names and Numbers (ICANN), the African Telecommunications Union, the Government of Rwanda and ITU.

The meeting agreed on priority areas that will lead to Smart Africa. The meeting also agreed, among other things, on the Smart Africa governance structure, which includes the Smart Africa Board (consisting of the Heads of State of Rwanda, Kenya, Mali, Gabon, Burkina Faso, Uganda, South Sudan and Senegal, the Secretary-General of ITU and the African Union Commissioner for Infrastructure) and a Steering Committee (consisting of representatives of the organizations at the meeting).

The ITU Regional Office for Africa will continue to work with ITU members and others to forge partnerships with the shared vision of faster and sustainable development of Africa through telecommunications and ICT. ■

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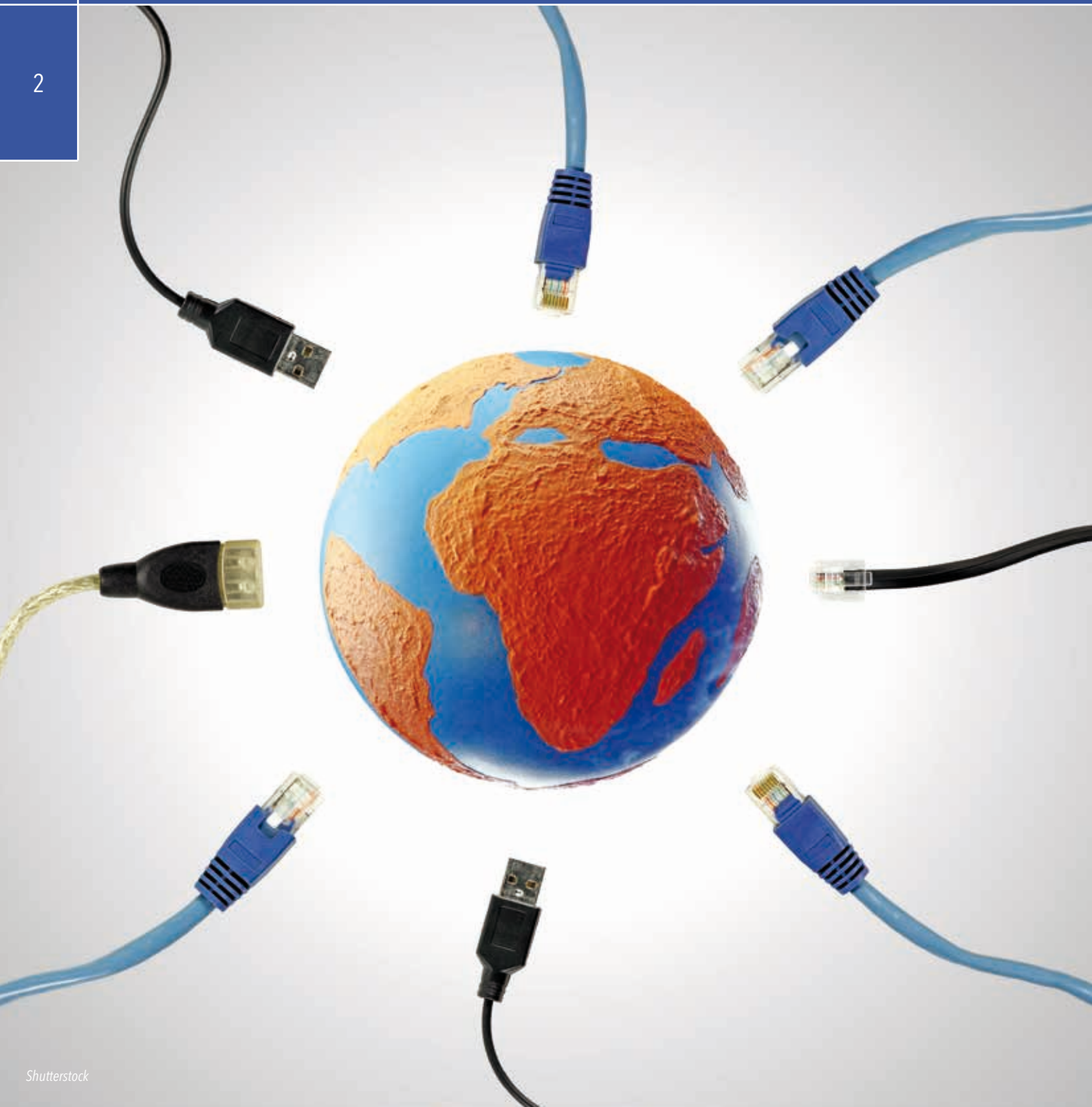

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ICT trends in Africa

Governments in Africa, and indeed worldwide, find themselves at a challenging juncture. Data traffic is growing exponentially, consumers call for anytime and anywhere secure access to innovative applications and services, thus putting pressure on network operators who are in turn facing massive investment requirements to deploy the needed broadband infrastructure, at a time of economic uncertainty and slow recovery.

In this context, funding alternatives are required to meet connectivity and access demands and goals, in addition to strategies for reducing and sharing costs. Governmental intervention is therefore needed at various levels to address the emerging economic and social imperatives of a digital world.

Targeted policies and effective regulation are key to ensuring that investment continues to drive growth and innovation in information and communication technologies (ICT). How are African countries reforming their information and communication technology sectors to adapt to the changes taking place in a vibrant and dynamic digital ecosystem?

This article takes a closer look at ICT developments and the regulatory landscape in the Africa region. The article is adapted from an ITU paper entitled "ICT Trends in the Africa Region", which was presented to the Regional Preparatory Meeting for Africa, held from 2 to 4 October in Accra, Ghana, in preparation for the World Telecommunication Development Conference 2014, taking place in Dubai, United Arab Emirates, from 30 March to 10 April 2014. Africa region as used here refers to the 44 African countries that are served by the ITU Regional Office for Africa. These countries are: Angola, Benin, Botswana Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Republic of the Congo, Democratic Republic of the Congo, Côte d'Ivoire, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, South Africa, South Sudan, Swaziland, Tanzania, Togo, Uganda, Zambia and Zimbabwe.

The mobile miracle

Africa has experienced strong growth in mobile cellular network and service developments since 2008, allowing an increasing number of the almost 850 million people in the region to get connected and join the information society.

While the Africa region has limited fixed (wired) ICT infrastructure, the progress that has been made in terms of mobile cellular uptake and growth is remarkable. Within five years, the region's mobile cellular penetration rate has doubled from 32 to 64 per cent, while active mobile broadband penetration, which was practically non-existent in 2008, has grown to almost 11 per cent. At the same time, the number of Internet users has grown steadily, from 6 per cent in 2008 to 16 per cent in 2013. Close to 7 per cent of households in Africa now have Internet access at home, compared to only 2 per cent in 2008.

Despite this progress and the impact that mobile cellular services have had in Africa, the region's ICT penetration levels remain below both the global and the developing country averages. The region continues to lag behind, particularly in expanding access to the fixed-telephone network and to high-speed fixed-broadband services. Fixed-telephone penetration has remained notoriously low (at less than 1.5 per cent) and the number of fixed (wired)-broadband subscriptions per 100 inhabitants stood at 0.3 in 2013, well below the global average of 9.8 per cent (Figure 1).

Although ICT penetration rates in Africa are well below the global average, ICT uptake in the region has been growing faster than other regions, with the 2008–2013 growth rates of key ICT services above the global average. The strongest growth took place in the area of active mobile broadband subscriptions, with a compound annual growth rate of over 50 per cent between 2011 and 2013, compared to around 30 per cent globally. Between 2008 and 2013, the Africa region recorded a compound annual growth rate in mobile cellular subscriptions of 14.5 per cent, twice as high as the global average. At the same time, growth in mobile cellular penetration (at 6.1 per cent in 2012/2013) was at its lowest level in the past five years, suggesting that countries need to make additional reforms, bring down prices further, and invest more in mobile cellular networks and services to continue to expand uptake.

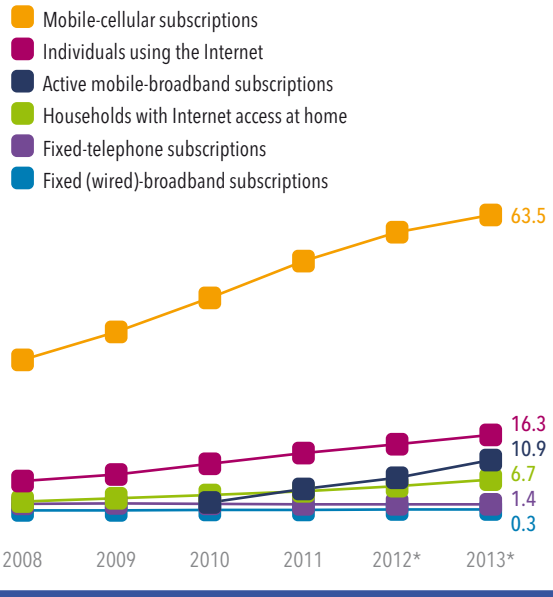
ICT penetration

The percentage of the population using the Internet and the proportion of households with Internet access have been growing since 2008, at 27.4 and 20.8 per cent compound annual growth rates, respectively. Despite strong growth in the number of active mobile broadband subscriptions, a recent slowdown in growth in Internet user penetration levels (which had reached 16.3 per cent by the end of 2013) suggests that access and infrastructure may not be the key barriers to being online in the African region.

Although fixed-broadband penetration is growing faster in Africa than in other regions, penetration levels remain low. In addition, growth in fixed-broadband penetration has decreased, from almost 40 per cent in 2009/2010, to less than 30 per cent in 2012/2013, suggesting that the already very low penetration rate (of well below one per cent in the region) is not going to change substantially. An already limited fixed-telephone network that has been showing negative to no growth is part of the challenge in bringing fixed (wired) broadband services to more people and areas (Figure 2).

Mobile cellular telephone penetration in Africa was estimated to be 63.5 per cent by the end of 2013, compared to 88.7 per cent in the Asia Pacific region, 105.1 per cent in the Arab States, and much higher penetration rates in the Americas, Europe and the Commonwealth of Independent States (CIS) (Figure 3, top chart). Although Africa's mobile cellular penetration is below both the global average (96.2 per

Figure 1 – ICT developments in Africa, 2008–2013

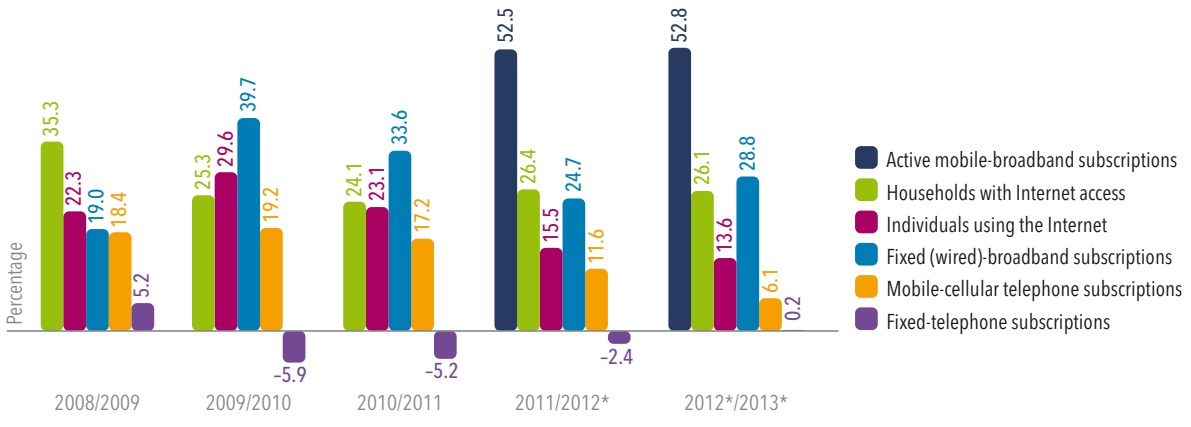


** Estimates.*
Source: ITU World Telecommunication/ICT Indicators database.

cent) and the developing country average (89.4 per cent), penetration has grown rapidly, extending basic ICT services to rural and remote areas, and connecting millions of Africans. By the end of 2012, eight of the region's 44 countries had mobile cellular penetration rates of above 100 per cent. Gabon, Seychelles, Botswana and South Africa had reached penetration levels of over 120 per cent. On the other hand, a number of least developed countries in Africa, including the Central African Republic, the Democratic Republic of the Congo and Burundi, continue to have very low mobile-cellular penetration rates (below 30 per cent). Eritrea has the region's lowest penetration rate, at 5.5 per cent (Figure 3, bottom chart).

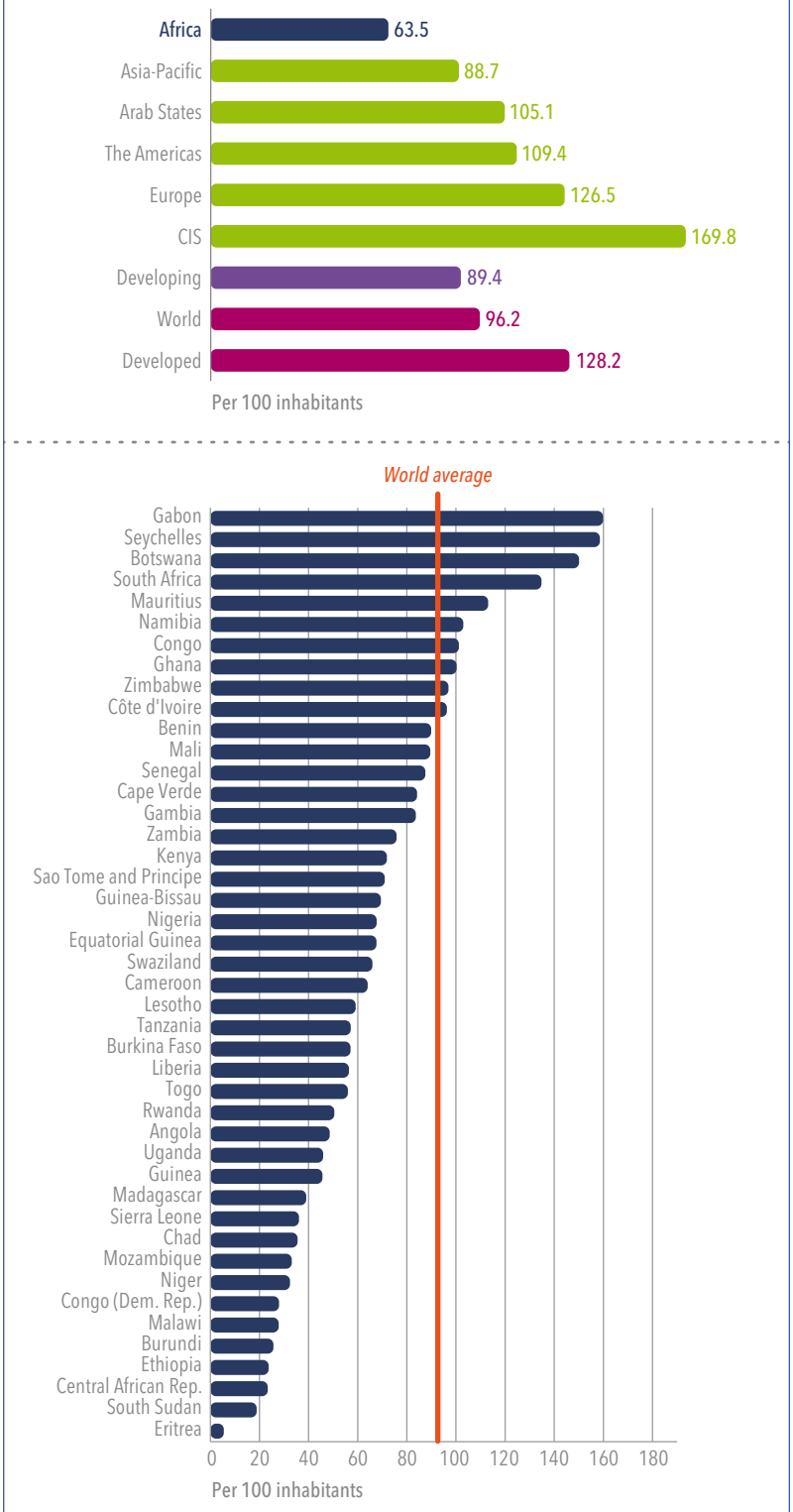
ITU estimates that the Africa region had a total of 93 million mobile broadband subscriptions by the end of 2013, some 33 million more than the year before. At 10.9 per cent, regional mobile broadband penetration is below both the global average (29.5 per cent) and the developing country

Figure 2 – ICT developments in Africa, annual change, 2008–2013



** Estimates.*
Source: ITU World Telecommunication/ICT Indicators database.

Figure 3 – Mobile-cellular subscriptions by region and level of development, 2013 estimates (top chart); and in Africa by country in 2012 (bottom chart)



Note – The red line in the bottom chart shows the 2012 world average.
Source: ITU World Telecommunication/ICT Indicators database.

average (19.8 per cent), and there is still much room for growth (Figure 4, top chart).

In 2012, Ghana, Zimbabwe, Namibia and South Africa had the region's highest mobile broadband penetration rates, of above 25 per cent. The island States of Cape Verde and Mauritius had also made good progress, reaching 21.5 per cent and 22.5 per cent mobile broadband penetration, respectively. At the same time, a large number of African countries were late in launching mobile broadband networks, or had yet to launch 3G high-speed networks. Thus, wireless broadband penetration is marginal in many countries, with more than half of the African countries having a penetration of less than 5 per cent by the end of 2012. For some countries, including the Democratic Republic of the Congo, Lesotho, Liberia and Niger, data on active mobile-broadband subscriptions were not available (Figure 4, bottom chart).

The number of fixed (wired)-broadband subscriptions in Africa remains very low, at an estimated 3 million by the end of 2013. The region's fixed-broadband penetration rate of 0.3 per cent lies well below both the world average (9.8 per cent) and developing country average (6.1 per cent). It is also low compared to penetration rates in the other developing regions of the Arab States (3.3 per

Figure 4 – Active mobile broadband subscriptions by region and level of development, 2013 estimates (top chart); and in Africa by country in 2012 (bottom chart)

Note – The red line in the bottom chart shows the 2012 world average. In the bottom chart, data for the Democratic Republic of Congo, Côte d'Ivoire, Lesotho, Liberia, Madagascar, Niger, Sao Tome and Principe, and Sierra Leone are not available.
Source: ITU World Telecommunication/ICT Indicators database.

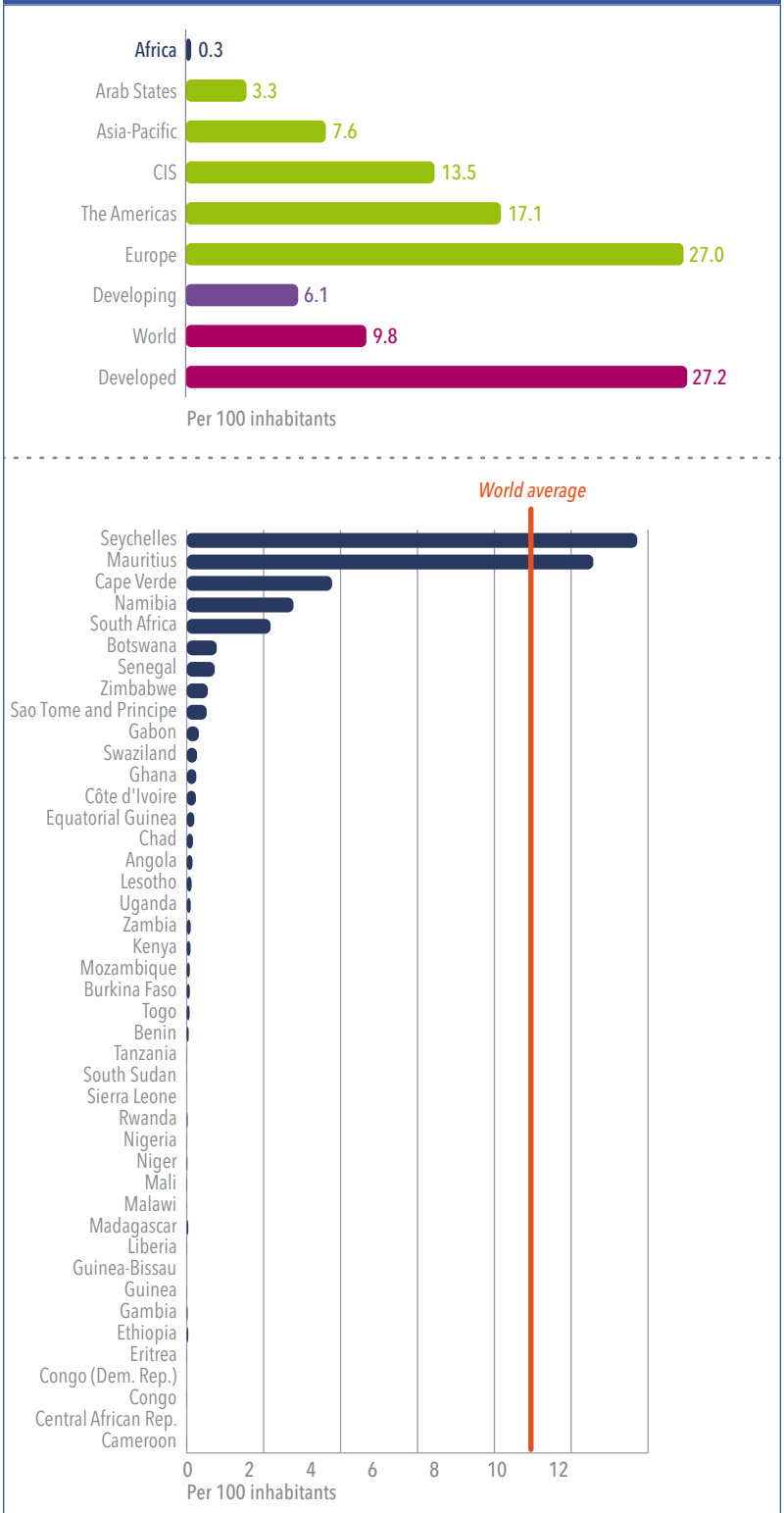
cent), Asia and the Pacific (7.6 per cent), the Commonwealth of Independent States (13.5 per cent) and the Americas (17.1 per cent), as shown in Figure 5 (top chart).

Within Africa, a handful of countries have fixed broadband penetration rates of above 2 per cent and only the Seychelles and Mauritius have penetration rates that exceed the global average (Figure 5, bottom chart). Key barriers to higher fixed-broadband penetration are the limited availability of fixed-telephone networks and the high cost of fixed-broadband services. In a number of developing countries, an insufficient backbone infrastructure and lack of access to international Internet bandwidth are also limiting the delivery of high-speed Internet access.

ITU estimates that 16.3 per cent of Africans were using the Internet by the end of 2013. This compares to an estimated 30.7 per cent Internet penetration in the developing countries and 38.8 per cent globally (Figure 6, top chart).

The three countries with the highest percentage of Internet users in 2012 (above the global 2012 average) are the Seychelles (47.1 per cent), Mauritius (41.4 per cent) and South Africa (41.0 per cent). South Africa, where the number of active mobile broadband subscriptions

Figure 5 – Fixed (wired)-broadband subscriptions by region and level of development, 2013 estimates (top chart); and in Africa by country in 2012 (bottom chart)



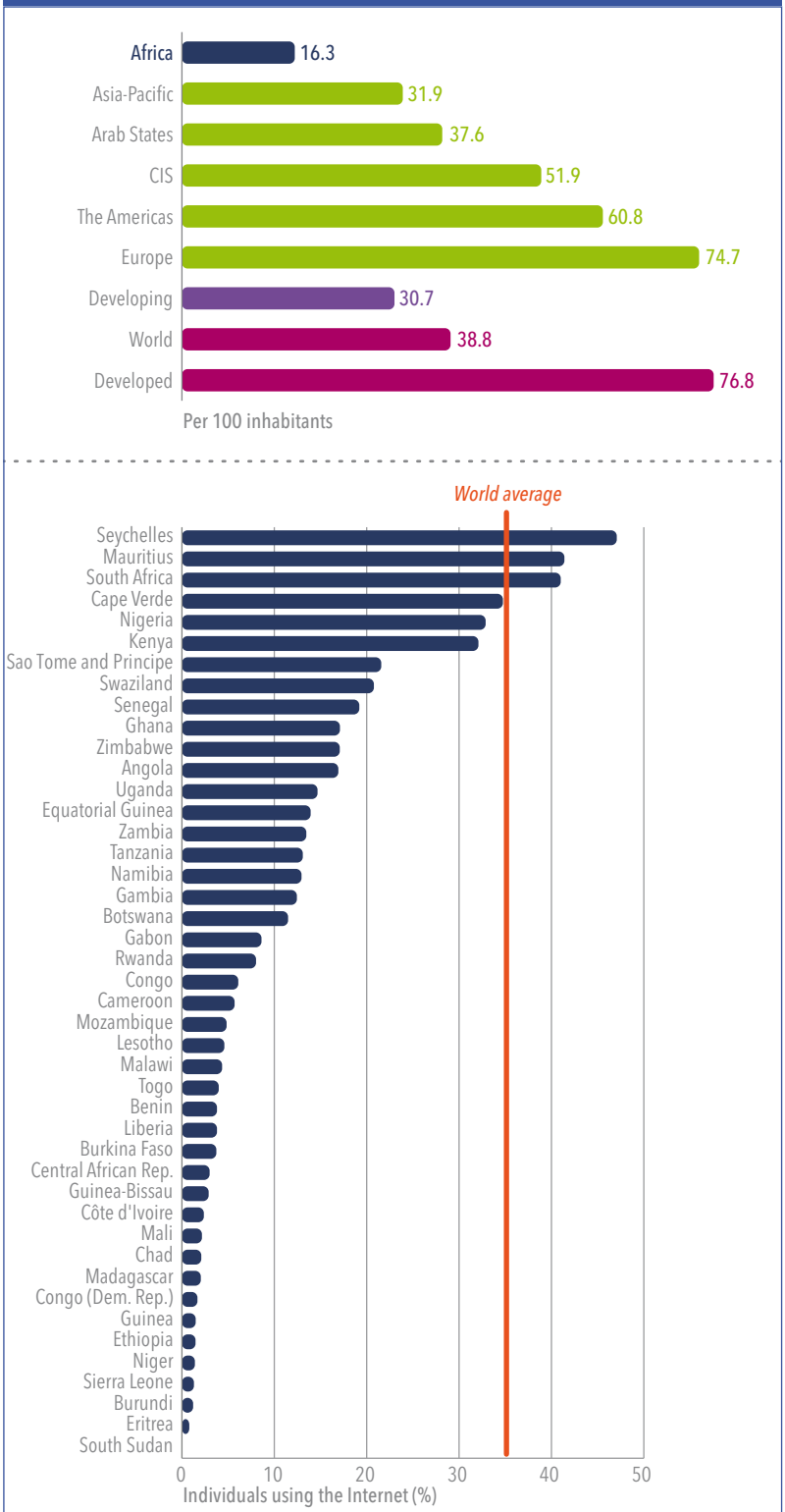
Note – The red line in the bottom chart shows the 2012 world average.
Source: ITU World Telecommunication/ICT Indicators database.

has grown rapidly, has seen one of the highest increases in the proportion of Internet users in the region, from 34 per cent in 2011 to 41 per cent in 2012. Cape Verde (34.7 per cent), Nigeria (32.9 per cent) and Kenya (32.1 per cent) have also reached a relatively high Internet user penetration. In many other African countries, and particularly the least developed countries, only a very small proportion of the population is online. In Eritrea, Ethiopia, Guinea and Niger, for instance, penetration stood at less than 2 per cent by the end of 2012 (Figure 6, bottom chart).

The percentage of households with Internet access is relatively low in Africa. ITU estimates that the proportion of households with Internet access in the Africa region reached 6.7 per cent by end 2013, which is well below the penetration reached in the other regions, and compares to 28.0 per cent in the developing countries and 41.3 per cent globally (Figure 7, top chart).

The Seychelles and Mauritius are the only two countries that lie above the global average in terms of the number of households with Internet access. In the majority of countries in Africa, less than 5 per cent of households are connected (Figure 7, bottom chart).

Figure 6 – Percentage of individuals using the Internet by region and level of development, 2013 estimates (top chart); and in Africa by country in 2012 (bottom chart)



Note – The red line in the bottom chart shows the 2012 world average.
Source: ITU World Telecommunication/ICT Indicators database.

ICT Development Index and ICT Price Basket

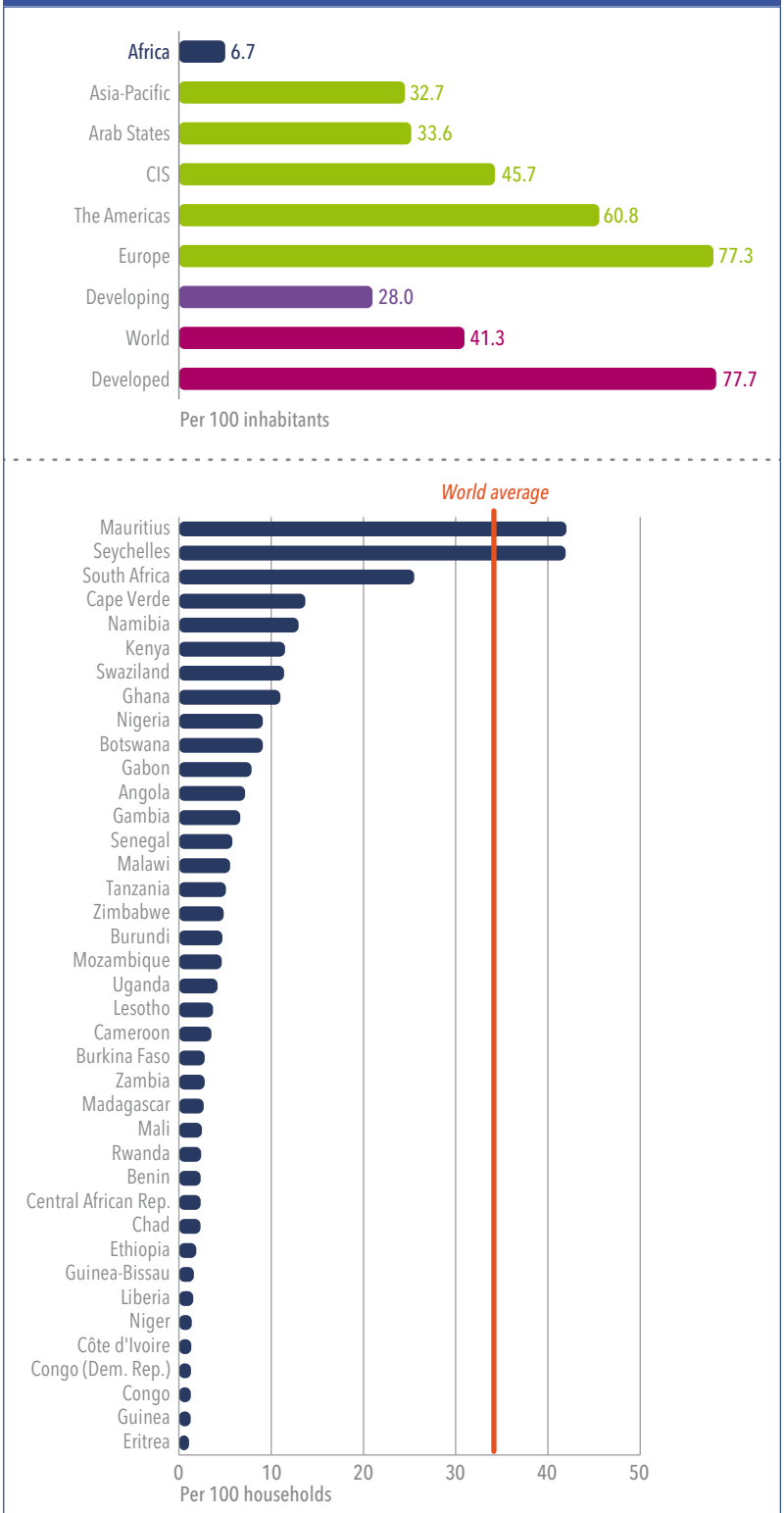
ITU's ICT Development Index (IDI) and ICT Price Basket (IPB) are ICT benchmarking tools published by ITU in 2012.

The IDI is a composite index combining 11 indicators in one benchmark measure that serves to monitor and compare developments in ICT across countries. The IDI is divided into the following three sub-indices and is measured on a scale from a minimum of 0 to a maximum of 10:

- Access sub-index: This sub-index captures ICT readiness, and includes five infrastructure and access indicators (fixed telephone subscriptions, mobile cellular telephone subscriptions, international Internet bandwidth per Internet user, percentage of households with a computer, and percentage of households with Internet access).

- Use sub-index: This sub-index captures ICT intensity, and includes three ICT intensity and usage indicators – percentage of Internet users, fixed (wired) broadband subscriptions, and active mobile broadband subscriptions.

Figure 7 – Households with Internet access by region and level of development, 2013 estimates (top chart); and in Africa by country in 2012 (bottom chart)



Note – The red line in the bottom chart shows the 2012 world average. Data for Togo, South Sudan, Sierra Leone, Sao Tome and Principe, and Equatorial Guinea are not available.
Source: ITU World Telecommunication/ICT Indicators database.

- Skills sub-index: This sub-index captures ICT capability or skills as indispensable input indicators. It includes three proxy indicators (adult literacy, gross secondary enrolment and gross tertiary enrolment).

An analysis of the IDI highlights differences in ICT development globally and regionally. By comparing regions, it is possible to highlight trends and identify reasons why some countries are doing better than others or are lagging behind. Among the six regions, the Africa region ranks last in the IDI, with an average 2011 IDI value of 1.88, compared to the world average IDI value of 4.15 (Chart 1).

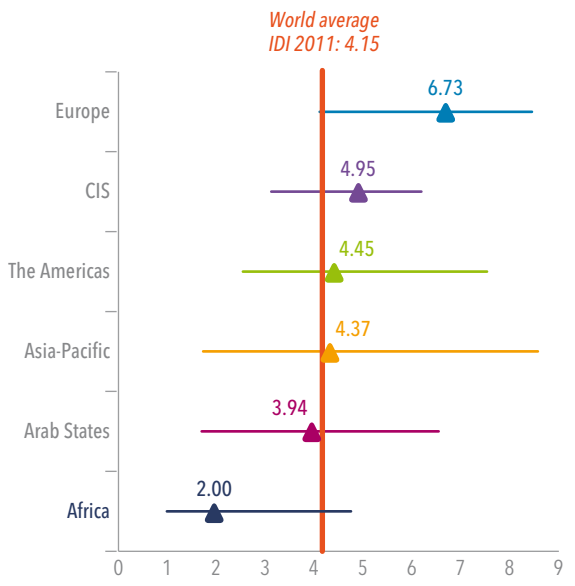
An analysis of regional IDI ranges – calculated by deducting the lowest value from the highest value – and coefficients of variation provides additional insights into differences in ICT level within each region. Africa has a coefficient of variation value of 44.15, which is the second highest in the world, after Asia and the Pacific, where differences in ICT development are the greatest. The range of IDI values in Africa is relatively low (at 3.49), with most countries having low IDI values and none having very high IDI values. Indeed, in the 2011 IDI, the highest ranked African country (Seychelles) ranked 70th globally, with an IDI value of 4.37 (see table).

ICT Development Index (IDI) by region, 2010 and 2011

Region	IDI 2011						IDI 2010						Difference 2010–2011		
	Max.	Min.	Range	Average value*	SD	CV	Max.	Min.	Range	Average value*	SD	CV	Range	Average value*	CV
Europe	8.34	3.78	4.56	6.49	1.15	17.72	8.21	3.48	4.74	6.26	1.16	18.53	–0.18	0.23	–0.81
CIS	6	2.49	3.51	4.43	1.13	25.51	5.61	2.44	3.16	4.06	1.02	25.12	0.34	0.37	0.38
The Americas	7.48	2.44	5.04	4.26	1.28	30.05	7.11	2.31	4.8	4.04	1.22	30.2	0.24	0.22	–0.15
Asia-Pacific	8.56	1.44	7.12	4.02	2.24	55.72	8.45	1.36	7.1	3.83	2.21	57.7	0.02	0.19	–1.98
Arab States	6.24	1.64	4.59	3.77	1.57	41.64	5.94	1.53	4.41	3.52	1.44	40.91	0.18	0.25	0.74
Africa	4.37	0.88	3.49	1.88	0.83	44.15	4	0.88	3.12	1.75	0.76	43.43	0.37	0.13	0.72

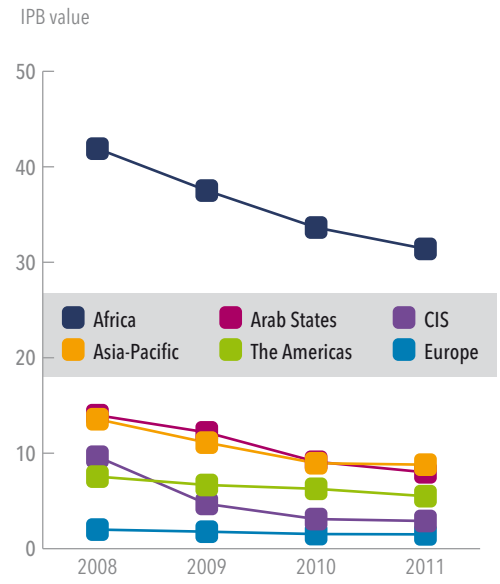
*Note – * Simple average. SD = Standard deviation; CV = Coefficient of variation.*
Source: ITU.

Chart 1 – ICT Development Index (IDI) by region, ranges and averages, 2012



Source: ITU World Telecommunication/ICT Indicators database.

Chart 2 – ICT Price Basket (IPB) by region, 2008–2011



Note – The regional averages in this chart are based on prices for the 144 countries for which prices are available for 2008, 2009, 2010 and 2011.
Source: ITU.

Results from the 2008–2011 ITU ICT Price Basket (IPB) provide insightful information on the cost and affordability of ICT services, and suggest that one of the reasons that ICT levels in Africa remain low is the relatively high cost of these services.

The IPB is composed of three distinct prices – for fixed telephone, mobile cellular, and fixed broadband services – computed as a percentage of each country's average gross national income (GNI) per capita. This puts prices into perspective, and makes it possible to monitor the affordability of ICT services.

A regional comparison of the IPB between 2008 and 2011 shows that, while the price of ICT services fell in all regions of the world over this four-year period, they remain much more affordable in some regions than in others. With an average 2011 IPB value of 31.4, ICT services in Africa are

the least affordable (Chart 2). In particular, broadband access remains very expensive in Africa, which helps explain why penetration rates remain low. Although the cost for fixed-broadband services decreased significantly between 2008 and 2011, access to both mobile and fixed high-speed Internet is unaffordable for most Africans.

To sum up

ICT penetration in Africa remains very low compared to other global regions. Only the Seychelles and Mauritius record penetration rates above the global average for key technologies. Increased efforts must be made to help Africa's least developed countries, in particular, to join and reap the benefits of the global information society.

At the same time, Africa has witnessed remarkable growth in terms of mobile cellular uptake, and mobile networks have extended basic ICT services to rural and remote areas, connecting millions of Africans. Mobile broadband services have shown strong growth and are helping to address the region's need for high-speed Internet access. The deployment of high-speed and affordable mobile networks is particularly important in a region where fixed broadband access remains limited, and where average incomes are low.

Countries can leverage existing mobile cellular networks and sustain the development of mobile markets by expanding mobile broadband growth. Policy-makers and regulators can play a major role in accelerating the transition from traditional mobile cellular services to mobile broadband services. Countries that have not yet launched 3G (or higher) mobile broadband networks should do so immediately. To this end, they should provide a regulatory environment and licensing regulation – in particular, spectrum licensing – that is conducive to investment in 3G and advanced wireless-broadband networks, including Long-Term Evolution (LTE). ■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Policy and regulation

Regulatory developments in Africa

Many countries in Africa have completed the initial stages of reforming their telecommunication sector by establishing a separate regulator for telecommunication and ICT, privatizing the incumbent, and liberalizing selected markets. Other countries have initiated the process in recent years. The pace of reform in the Africa region has followed a similar pattern to that in other parts of the developing world.

Some 57 per cent of African countries have at least partially privatized their incumbent operator. Privatization sends the signal that policy decisions and regulations will be fair to all players. However, more than 60 per cent of African countries have restrictions on foreign ownership, maintaining barriers to foreign direct investment and to expansion of competition in some market segments. Removing these barriers will help boost both investment and competition in the region, and thus speed up the development of vital broadband networks and services.

A total of 40 countries in Africa (91 per cent) have established a telecommunication/ICT regulatory authority (Figure 1). Today, virtually all of these regulators have the power to enforce pro-competitive regulatory decisions, compared to 75 per cent of them five years ago. This positive trend bears witness to the ever more important role of regulators in the digital era. Regulators are expected to juggle competing interests, ensure a level playing field, promote transparency, and create an environment that nurtures technological and service innovation.

From the outset, the mainstay of African regulators, like in other parts of the world, has been regulating access to telecommunication networks (in particular through interconnection, licensing and quality of service monitoring) and prices of services (Figure 2). Furthermore, regulators are often tasked to pursue public policy objectives, such as

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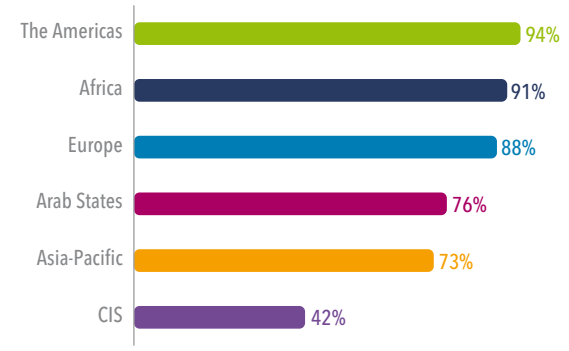
This article takes a closer look at the ICT regulatory landscape in the Africa region. It is adapted from an ITU paper entitled "ICT Trends in the Africa Region", which was presented to the Regional Preparatory Meeting for Africa, held from 2 to 4 October in Accra, Ghana, in preparation for the World Telecommunication Development Conference 2014, taking place in Dubai, United Arab Emirates, from 30 March to 10 April 2014. The Africa region as used here refers to the 44 African countries that are served by the ITU Regional Office for Africa. These countries are: Angola, Benin, Botswana Burkina Faso, Burundi, Cameroon, Cape Verde, the Central African Republic, Chad, the Republic of the Congo, the Democratic Republic of the Congo, Côte d'Ivoire, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, South Africa, South Sudan, Swaziland, Tanzania, Togo, Uganda, Zambia and Zimbabwe.

Figure 1 – Separate regulators by region, 2012



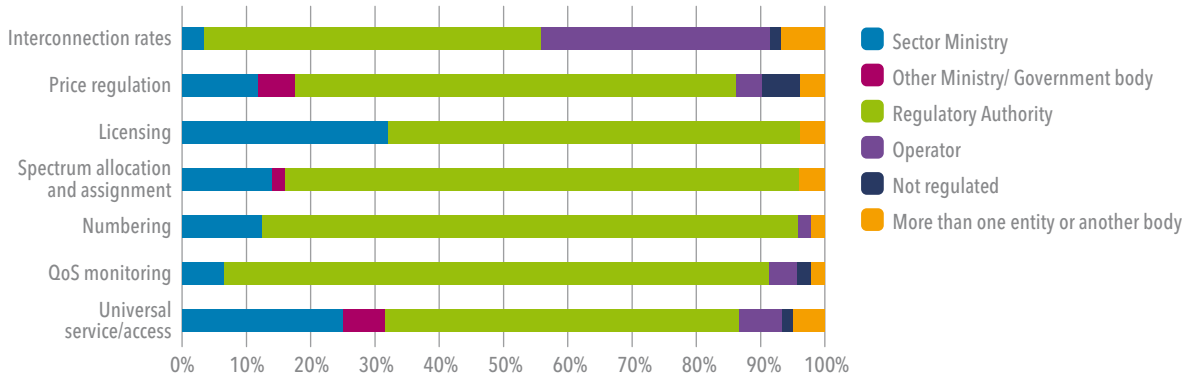
Source: ITU Telecommunications/ICT Regulatory Database.

universal ICT access or service. Many African regulators have also been empowered to deal with spectrum issues, such as allocation and assignment.

In recent years, however, there has been a marked trend towards expanding and diversifying the mandate of the regulator. This is very much linked to the technological transformation that has taken place in the sector with the move towards Internet protocol (IP)-based networks, and the opportunities as well as the complexity it brings about.

Rather than being dumb pipes, broadband networks are today considered to deliver the lifeblood of the digital economy – and society as a whole – in the form of services, applications and content. Matters related to electronic content, security and data protection, as well as fully fledged consumer protection, have become key challenges for the healthy development of both networks and services, and require regulatory attention. The mandate of African regulators has thus significantly evolved over the past five years or so (Figure 3).

Figure 2 – Who regulates what in Africa, 2012

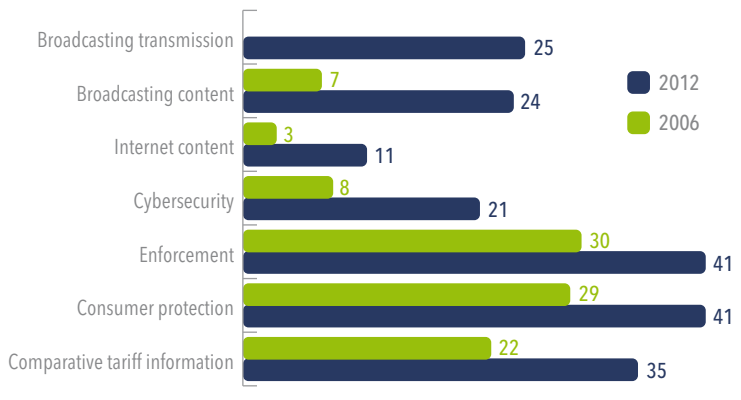


Source: ITU Telecommunications/ICT Regulatory Database.

Adapting to the changes taking place in the sector, some countries – such as Botswana, Ghana, Togo, Rwanda and Uganda – have further reformed their regulatory institutions by moving from sector-specific regulators to establishing a single converged regulator. In addition to telecommunication and ICT concerns, the mandate may cover spectrum matters, information technology (IT), broadcasting and, in some instances, electronic content. More than half of African regulators, – including those in Kenya, Mauritius and Zimbabwe – have seen their mandate further expanded to include cybersecurity matters. In some instances, countries (for example, Gambia and Sao Tome and Principe) have created a single multisector regulator to oversee ICT markets as well as other utilities, such as electricity, water and gas. Since their establishment, the majority of African regulators have also regulated the postal sector.

Regulators across Africa share the belief that enhanced competition will allow for more abundant investment and boost ICT development in the region. Although some form of competition is authorized for most ICT services, competition in basic services (including local, long-distance and international services) lags behind, and monopolies for local services still exist in almost half of African countries (Figure 4). Also, what is legally permissible is not always reflected in the actual market situation or in giving consumers a meaningful choice among service providers. Attracting investment is further linked to the control incumbents maintain in essential markets, such as the international gateway and the development of effective regulatory frameworks for interconnection. One key challenge for many regulators in Africa is to develop interconnection frameworks that enhance competition and investment.

Figure 3 – Evolving mandate of the regulator, Africa, 2006–2012



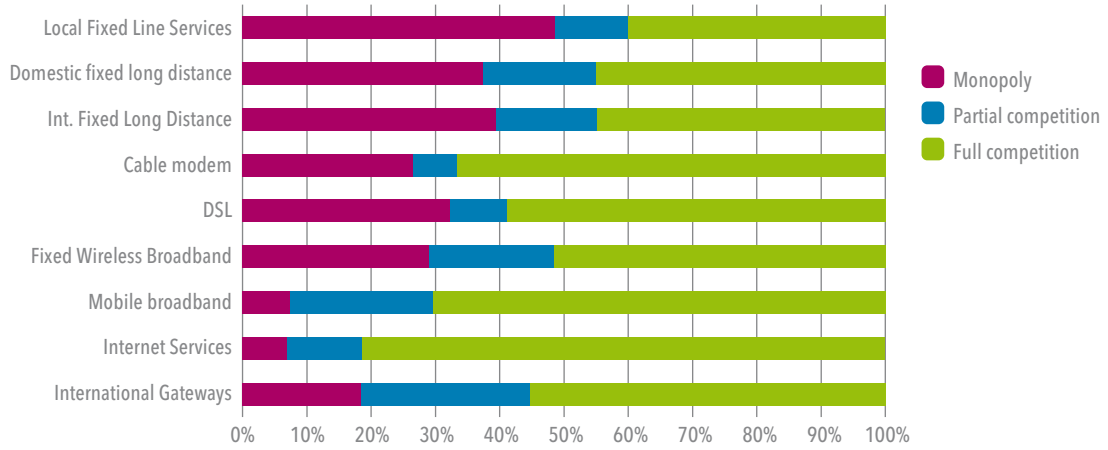
Source: ITU Telecommunications/ICT Regulatory Database.

International gateways

While efforts have been made over the past five years to liberalize international gateways in a majority of African countries, around one-fifth of these gateways remain largely under a *de facto* monopoly controlled by the fixed-line incumbent (Figure 4). The result is that the incumbent maintains exclusive control over all legal international traffic, both incoming and outgoing, sets monopoly prices and keeps all international traffic revenue.

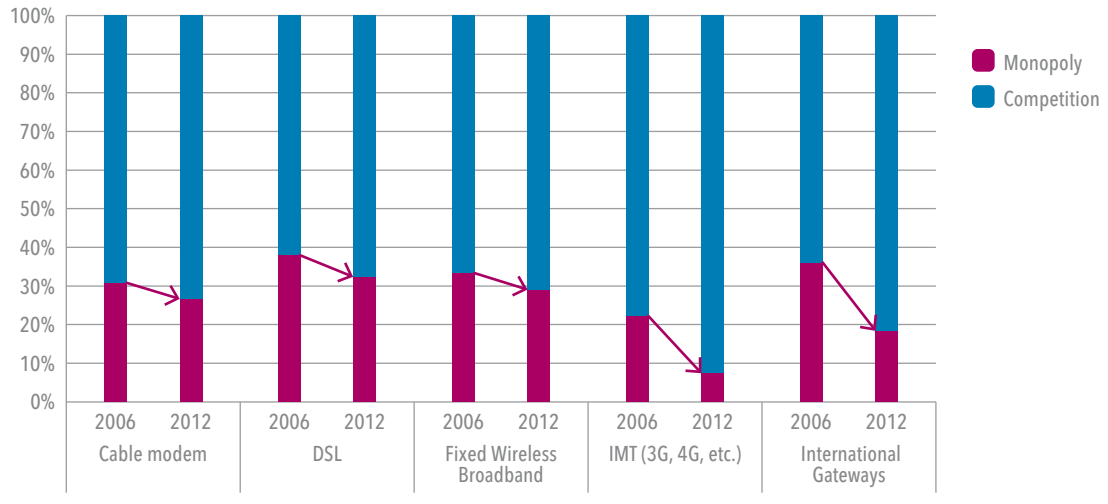
Where incumbents follow a low volume and high price model, the diffusion of ICT and the intensity of their use is likely to remain limited because services are too expensive for consumers. The result is stifled ICT growth, lack of choice of service provider, and lack of innovative services, especially broadband services. Limiting

Figure 4 – Competitiveness of African countries, selected market segments, 2012



Source: ITU Telecommunications/ICT Regulatory Database.

Figure 5 – Evolution of competition in Internet services, Africa, 2006–2012



Source: ITU Telecommunications/ICT Regulatory Database.

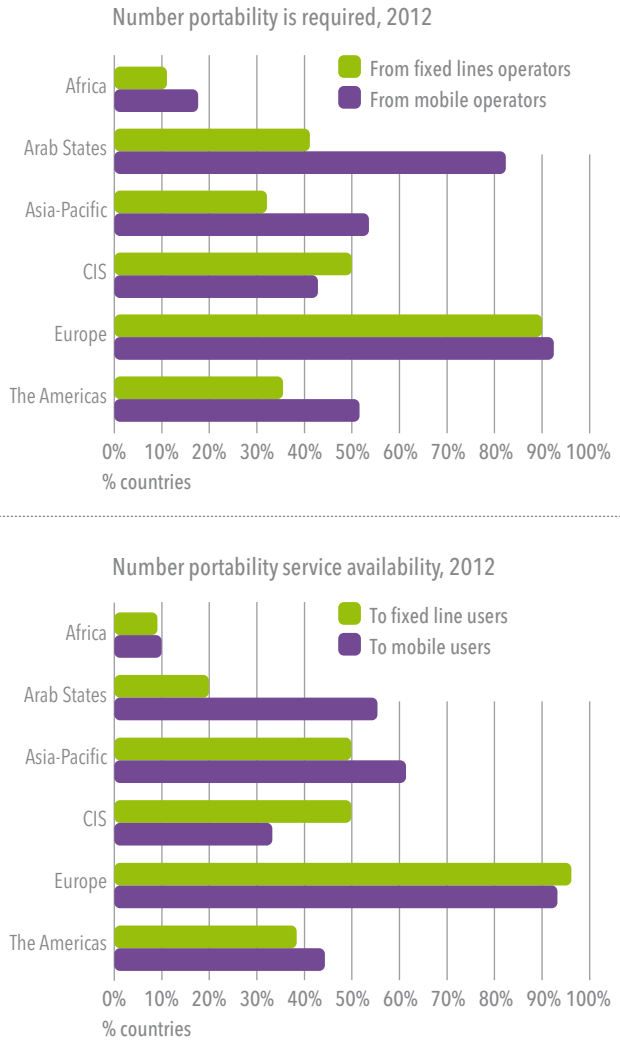
broadband growth in turn can also negatively affect the ability of developing countries to create new employment opportunities. The challenges faced by new entrants may also limit the interest of foreigners to invest in a country.

Internet services

Internet services in the African region, as in other regions, have traditionally been more competitive than virtually all other ICT market segments. The level of competition in digital subscriber line (DSL), cable modem and fixed-wireless broadband is however relatively low (around 70 per cent), and little progress has been achieved in recent years (Figure 5). In contrast, 15 per cent of the countries in the region opened up competition in mobile broadband between 2006 and 2012, which significantly contributed to the fast growth of mobile broadband subscriptions over that period.

Ensuring that consumers can benefit from greater competitiveness may be achieved by requiring number portability from fixed and mobile operators. In comparison with the global average and the other regions, Africa lags significantly behind in this regard (Figure 6). Currently, number portability is required and available from fixed-line operators in only 9 per cent of the countries in the region while 18 per cent of countries require portability of mobile numbers. Number portability is available to only 10 per cent of mobile users in the region as compared to more than 90 per cent of users in Europe and over 60 per cent in Asia-Pacific.

Figure 6 – Number portability, by region, 2012



Source: ITU Telecommunications/ICT Regulatory Database.

Licensing

The adoption of a simplified licensing regime encompasses further regulatory and institutional measures undertaken by governments to reform the sector. Some countries have eased their market entry processes by simplifying their licensing regimes. Tanzania has introduced a converged licensing framework and Uganda has developed a streamlined technology-neutral licensing regime introducing multiservice individual licences. Botswana and Kenya have introduced a unified licence system, in which a single licence covers an extensive range of services, although service-specific individual licences remain the norm in most African countries. Building up a sound licensing framework in Africa is essential to support the development of convergent services and the expansion of markets and competition. The objectives are to promote the provision of new and innovative services, the reduction of prices, and an increase in the efficiency of providing services, as well as in the variety of offerings for subscribers.

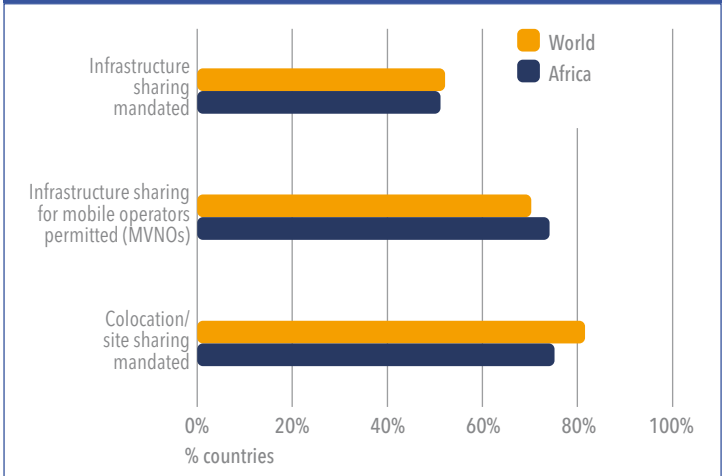
In 2012, Voice-over-Internet Protocol (VoIP) regulations were in place in at least 36 per cent of African countries and individual users were allowed to use VoIP services in 55 per cent of the countries, compared to 93 per cent in the Americas, 100 per cent in Europe and 95 per cent of the countries in the Asia-Pacific region.

To remedy this situation, regulators in Africa may want to ensure a level playing field between existing operators and new VoIP market entrants in the areas of universal service, access to emergency services, and number portability. At the same time, disproportionate regulatory interventions have to be avoided, because they could stifle innovation, dissuade new competitors from entering the market, or dampen investment in new services and networks.

Over the past five years, additional international submarine cables have been deployed on the east and west coasts of Africa, increasing the options for international high-speed connectivity between Africa and the rest of the world, and for reducing the costs of international bandwidth through the availability of competitive offers. The challenge now is to ensure that these cable landing stations are further connected to domestic broadband networks in a competitive manner.

The cost of network deployment at the national level, and in particular next-generation networks, remains a big challenge. To bring these costs down and to capitalize on the investments made, 52 per cent of the countries in Africa have mandated passive infrastructure sharing and 82 per

Figure 7 – Infrastructure sharing, Africa and the world, 2012



Source: ITU Telecommunications/ICT Regulatory Database.

cent require colocation, in line with the world average level of regulation in these areas (Figure 7). In 71 per cent of countries, mobile virtual network operators (MVNOs) are allowed to operate, because infrastructure sharing for these operators is permitted.

Spectrum

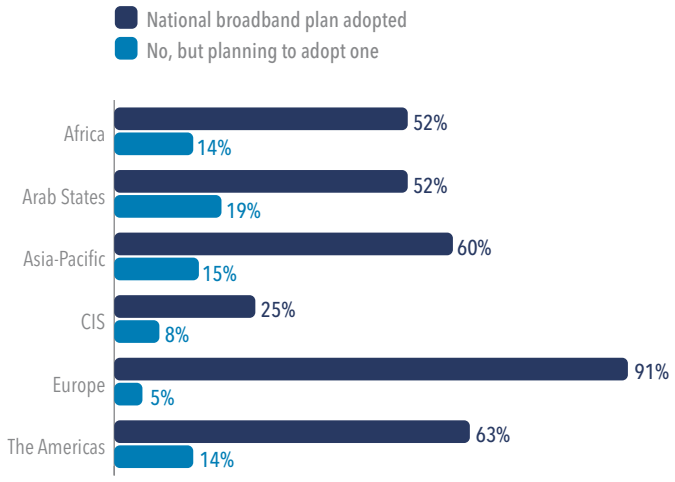
To respond to the growing demand for spectrum, at least 53 per cent of the countries in Africa have adopted some form of market based mechanisms by allowing in-band migration. None of the countries in the region had by end of 2012 allowed spectrum trading. Operators were assigned spectrum for Wi-MAX services in at least 72 per cent of the countries in the region and the service was commercially available in 70 per cent of them. Spectrum for LTE services was assigned and made available in a handful of countries.

Promoting broadband

Acknowledging the key role that broadband plays in today's digital economy, 29 countries in the region have adopted, or are planning to adopt, a national policy, strategy or plan to promote broadband. Nationwide broadband infrastructure build-out ranks high as a goal within these plans, along with demand stimulation through the adoption of online services and applications, and the provision of public services using broadband. Although at least 10 countries in Africa include broadband as part of their universal service definition, none of the six countries that do not yet have a plan (but are planning to adopt such a policy instrument) have included broadband as part of their universal service definition. While 19 countries in the region have an operational universal service fund, only four of these funds are either partly or wholly used to finance the national broadband band plan. In addition to government funding, public-private partnerships have been identified as of the main means of financing these plans.

For African citizens to benefit from participating in the digital society, more needs to be done to develop and extend national broadband backbones, and to increase broadband access at the local level (likely through wireless) in order to connect the unconnected and reduce connectivity costs. Further sector reforms are indeed needed to increase penetration levels, in particular in terms of broadband and Internet uptake.

Figure 8 – Broadband plans by region, and goals of the plans in Africa, 2012



Source: ITU World Telecommunication/ICT Regulatory Database.

ITU's work on statistics

The data presented in this article are primarily based on ITU's World Telecommunication/ICT Indicators (WTI) Database. The WTI Database includes more than 100 statistical indicators from over 200 economies worldwide and covers over 50 years. The WTI Database includes three sets of data: (i) telecommunication/ ICT infrastructure and access data; (ii) price data for key ICT services; and (iii) data on access to and use of ICT by households and individuals. As a United Nations Agency, ITU is the official source for global ICT statistics. Data are collected annually from national ICT ministries, telecommunication regulatory authorities and national statistical offices (see http://www.itu.int/ITU-D/ict/datacollection/).

ITU revises and defines new indicators through its expert groups, which are open to the ITU membership and experts in the field of ICT statistics. The Expert Group on Telecommunication/ICT Indicators (EGTI) and the Expert Group on ICT Household Indicators (EGH) work through online discussion forums and report back to the World Telecommunication/ICT Indicators Symposium (WTIS). WTIS is the key global forum to discuss ICT measurement issues. The symposium takes place annually and is targeted to those responsible for ICT statistics in relevant ministries, regulatory agencies, national statistical offices, telecommunication operating companies and experts in the subject of information society measurements. WTIS 2013 was held in Mexico City from 4 to 6 December 2013.

For more information or to join one of the expert groups, see: http:// www.itu.int/en/ITU-D/Statistics/Pages/default.aspx. ■

PROJECTS

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Brikama secondary school in Banjul, Gambia

Connect a School, Connect a Community projects in Africa

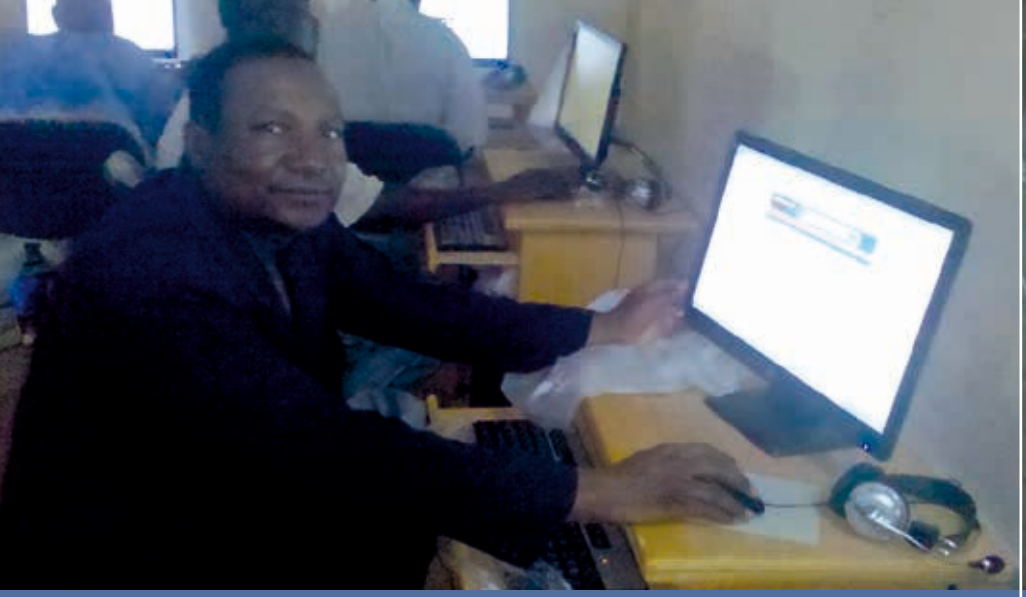
ITU rolled out Connect a School, Connect a Community projects in Gambia, Lesotho, Sierra Leone, Niger and Tanzania in the period between 2011 and 2013. As well as achieving connectivity, special attention was paid to ensuring a sustainable supply of electricity in remote areas. These were not the only projects in Africa seeking to connect schools and communities during this period.

Agreements were signed with the Governments of Niger, Gambia and Tanzania to develop national plans for Connect a School, Connect a Community projects, to be funded by France.

All of these projects will improve ICT access, and the facilities can be used by schoolchildren and members of the local community, including disadvantaged and vulnerable groups such as women and girls, indigenous and rural people, older people and persons with disabilities.

The projects provide individual or shared computing devices to schoolchildren, while the community ICT centres established in the connected schools can be used both for the socio-economic development of community members and to provide fee-paying services to foster sustainability for the centres. The projects also provide relevant training for teachers, managers of the ICT centres, and the trainers who provide relevant training for community members to enable them to use ICT in their day-to-day social and economic activities.

Through the Connect a School, Connect a Community projects, 75 secondary and primary schools in five countries have been equipped with information technology equipment, generator sets and in some cases also with photovoltaic solar panels. The schools concerned – 49 in Tanzania, 10 in Lesotho, 10 in Sierra Leone, 3 in Gambia and 3 in Niger – are already operational and able to deliver a wide and diversified range of ICT training on site.



Internet room in Birni Nkoni secondary school in Niger

Installing HP equipment

New site being prepared, Sierra Leone

IT equipment available in Sierra Leone

Stakeholder meeting to evaluate the project, Sierra Leone

Some project sites and training materials, Tanzania

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Harmonizing telecommunications legislation in sub-Saharan Africa

The HIPSSA project in context

Based on a shared view that information and communication technologies (ICT) can be used to contribute to political, social, economic and environmental development, ITU and the European Commission (EC) signed an agreement on support for the establishment of harmonized policies for the ICT market in African, Caribbean and Pacific (ACP) countries.

The resulting ITU EC-ACP programme provided major support for ICT, spending a total of EUR 8 347 000, of which 95 per cent was funded by EC and 5 per cent by ITU. The programme started on 1 January 2008 and ran for two years. In July 2011, the programme was extended for 21 months subject to there being no budgetary increase.

The ITU EC-ACP programme grew out of a smaller related project funded by EC and ITU, which was successfully implemented in west Africa. The beneficiary countries requested help in facing ICT regulatory challenges, and wanted to build their own capacity to develop both their ICT policies and regulations and their e-readiness.

ITU implemented the ITU EC-ACP programme through three separate projects, customized to meet the specific needs of each region: ICB4PAC for the Pacific Island countries; HIPCAR for the Caribbean; and HIPSSA for sub-Saharan Africa.

The ITU EC-ACP programme was probably one of the largest global initiatives ever undertaken to both harmonize (see Box) and update legislation. It focused on two main areas – cybersecurity and telecommunications – and worked together with the participating countries to help them to make the required changes in a way that fitted their particular circumstances.

The concept behind the ITU EC-ACP programme was to directly involve host countries in making positive changes to their legislation. The programme allowed host countries to identify best practice – internationally and regionally – in a chosen topic area and make use of those parts of best practice that were relevant to them.

What is harmonization?

Harmonization is about creating common standards in national law so that a law in one country contains many of the same provisions as might be found in the law of a neighbouring country, whatever the cultural history of the different countries.

Harmonization seeks to balance widely accepted definitions of best practice in many areas with the specific needs of particular countries.

Countries often sign international treaties and conventions but are slow in transposing their contents into national law.

Harmonization is not about having the same law in each country. Rather, it aims to ensure that however the law is drafted it will serve broadly similar purposes.

The importance of active harmonization of laws can perhaps best be illustrated by the need to combat cybercrime, which may happen across several jurisdictions.

HIPSSA, which covered sub-Saharan Africa (but not the Arab countries in northern Africa), provides a prime example of an all-inclusive project that also went a long way towards assisting integration on the continent, a key goal of the African Union Commission. This is seen in the way the management of the project was structured in Africa, with ITU and the African Union Commission co-chairing the project's steering committee. The other members of the steering committee were the regional economic organizations and the regional regulatory authorities.

The inclusive process also extended to the drafting of regulations and legislation. Not only did the private sector get to sit at the drafting table, but also they learned about the possible legal implications, and the processes and procedures for compliance.

Specific HIPSSA activities

Two examples of the HIPSSA project's activities are worth highlighting. First, the work on ensuring open access to submarine cable landing stations has played a significant role in lowering the price at which wholesale fibre capacity is sold on the newer cables landed in Africa. This has been shown to be a driver for lower retail prices that allow many more citizens to take advantage of broadband access.

The second example is the work done on guidelines for universal access and service, which include access to broadband as a universal service obligation. This guidance was developed by the project with the active participation of the Southern African Development Community (SADC) and the Communication Regulators' Association of Southern Africa (CRASA), and was later shared with the whole continent at a workshop following the FTRA held in Gabon in 2012.

The HIPSSA project has responded positively, within its timeframe and its scope, to each and every request for assistance from its beneficiary countries in Africa. The areas covered by the project have been varied and wide-ranging within the telecommunications industry. They include guidelines on access to submarine cables, both for countries that have landed a cable on their shores and for landlocked countries that get their access from neighbouring countries.

Another set of guidelines produced by the project deals with universal access and service. These guidelines are accompanied by a toolkit and have already enabled a lot of African countries to take a critical look at their current structures with a view to making them more responsive and relevant to today's markets.

The project has worked on the development of policy and legislation in telecommunications, with the aim of ensuring that they remain effective and able to drive the industry. One of the priority topics has been the development of cybersecurity laws in regard to electronic transactions, cybercrime and data protection.

Model legislation produced by the project has been adopted by the ICT Ministers in the Southern African Development Community (SADC) region. Furthermore, efforts have been made by several countries to transpose this legislation into their domestic law. ITU has responded positively to each and every request for technical assistance from countries in this transposition drive. Even countries outside the region were so impressed with the model legislation that they requested assistance in bringing their own laws in these areas into line with the model texts. Again, all such requests received a positive response.

With regard to direct assistance to countries, the project has assisted Liberia with the Economic Community of West African States (ECOWAS) Supplementary Acts, and Gambia in regard to universal access and submarine cables. The project also assisted Côte d'Ivoire, Guinea Conakry, Niger and Guinea Bissau with the ECOWAS Supplementary Acts and West African Economic and Monetary Union (UEMOA) Directives.

In southern and east Africa, the project has assisted Namibia, Tanzania, Swaziland, Zimbabwe, Lesotho, Zambia and Burundi with cybersecurity or interconnection. The project has assisted Seychelles in the area of universal access and submarine cables.


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The activities listed above in no way represent the full spectrum of assistance to the project's beneficiary countries in sub-Saharan Africa. For example, they do not include the support provided by granting full fellowships to representatives of both the ICT ministry and the regulator in participating countries, to enable them to attend important meetings and events related to the telecommunications industry.

Given the positive reaction to the project by African countries, the relevance and effectiveness of the project in the African context, and the efficient way the project was managed by the implementing agency, it is no surprise that attempts are now being made to get new funding to replicate the project, both in the same sector and in different areas.

Sustainability

There is a danger at the end of a major programme like the ITU EC-ACP programme that when the funding stops all the work will slowly sink without trace. However, there are causes for optimism regarding the ITU EC-ACP programme. A number of countries have already talked about a spillover effect and have taken up the programme's methodology to tackle other legislative areas.

Furthermore, since this is the kind of work that ITU does in many different ways, the learning from the programme will be picked up and re-used by the Union. ■

THE SMART AFRICA MANIFESTO

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Smart Africa Manifesto

Putting broadband and ICT at the heart of development

The Transform Africa summit, held on 28–31 October 2013 in Kigali, Rwanda, closed with the adoption of the Smart Africa Manifesto.

Smart Africa is a bold and innovative approach to accelerate sustainable socio-economic development in Africa through affordable access to broadband and appropriate use of information and communication technologies (ICT).

The initiative will help Africa realign its agenda to address contemporary challenges by harnessing emerging mobile and broadband technologies.

New approach

As a matter of principle, African leaders committed themselves to putting ICT at the centre of their national socio-economic development agendas. For the first time, African leaders rightfully acknowledged the transformative power of ICT to increase productivity of other sectors such as education, healthcare, business and agriculture.

Introducing the manifesto, Paul Kagame, President of Rwanda, challenged African leaders to check their understanding of the power of ICT. "Do we believe that ICT are a central part of the things we need to consider in overall transformation, and not just a single entity? Do we understand the full dimension of ICT and the importance of ICT in supporting and driving progress and success in other sectors?" he asked.

Stressing the importance of giving the right place to ICT when planning budgets and when engaged in other processes, and of understanding the urgency of the transformation that is needed to take Africa from where we are to where we want to be, President Kagame said "I think it is important to understand ICT as a central element in the whole transformation and development process."

A novelty of the manifesto is the prominence given to the private sector. African leaders agreed to put the private sector first. They reaffirmed the unique ability of the private sector to increase investment, drive job creation, increase productivity and foster innovation. Up to now, Africa has largely been a passive consumer of ICT. The African leaders

resolved to sustain efforts to turn Africa into a producer of ICT by increasing the number of local innovation hubs.

E-government and open data were also given due prominence, with African countries pledging to develop and implement national e-government plans and open data initiatives.

The Smart Africa Manifesto emphasizes the need to promote sustainable ICT, and tackles challenges such as e-waste and the empowerment of previously marginalized groups through ICT. The manifesto also places emphasis on cybersecurity and the need to embrace more cost-effective innovations such as cloud computing, mobility, shared infrastructure and shared services.

Rwanda's Minister of Youth and ICT, Jean Philbert Nsengimana noted that "We need to accept that there has to be some shift in our mindsets and in the way we talk about the role of ICT, what we do, where we invest, where we focus our energies. Many people used to think about ICT as a toolkit, which means that you can go ahead and make all your plans and then go back and find among the different tools that are available on the shelf the one that you want to use. Today, I think of ICT as more than a toolkit – I think of ICT as an environment."

Meeting the Connect Africa goals

The Smart Africa initiative will also help the continent fulfill the unfinished business of Connect Africa. That is why the Smart Africa Manifesto carries forward the unmet objectives of the Connect Africa Summit, to be achieved by 2015 and beyond.

Goals 1 and 2 of Connect Africa were dedicated to one of the most enduring challenges facing the continent – broadband connectivity. Principle 2 of the Smart Africa Manifesto addresses connectivity and goes a step further to discuss the importance of private sector participation and policy harmonization as enablers of universal access.

Goal 5 of Connect Africa was about adoption of national e-strategies, a cybersecurity framework, and the deployment of e-government, e-education, e-commerce and e-health services. The Smart Africa Alliance, an implementation framework of the manifesto, will provide technical support to countries in the development and implementation of smart country programmes. Deployment of e-applications is provided for in Principle 1 of the Smart Africa Manifesto. Countries will deploy context-appropriate, development-oriented and scalable applications that will deliver social and economic benefits in education, health care, business, agriculture and other key sectors.

An actionable manifesto

To make the Smart Africa Manifesto more actionable, an implementation framework – the Smart Africa Alliance – is annexed to the manifesto. This envisages a partnership between each African country that adheres to the manifesto, the African Development Bank, the World Bank, ITU and the private sector.

The alliance will develop continent-wide goals and best practices for the implementation of Smart Africa. In turn, each adhering country will develop and implement its own smart country programmes aligned to the five principles of the initiative. The alliance will help mobilize funds from

development partners and the private sector to implement country programmes.

Lastly, the alliance will put in place a framework to evaluate and document progress and lessons learnt in the implementation of the Smart Africa initiative.

Support for the manifesto

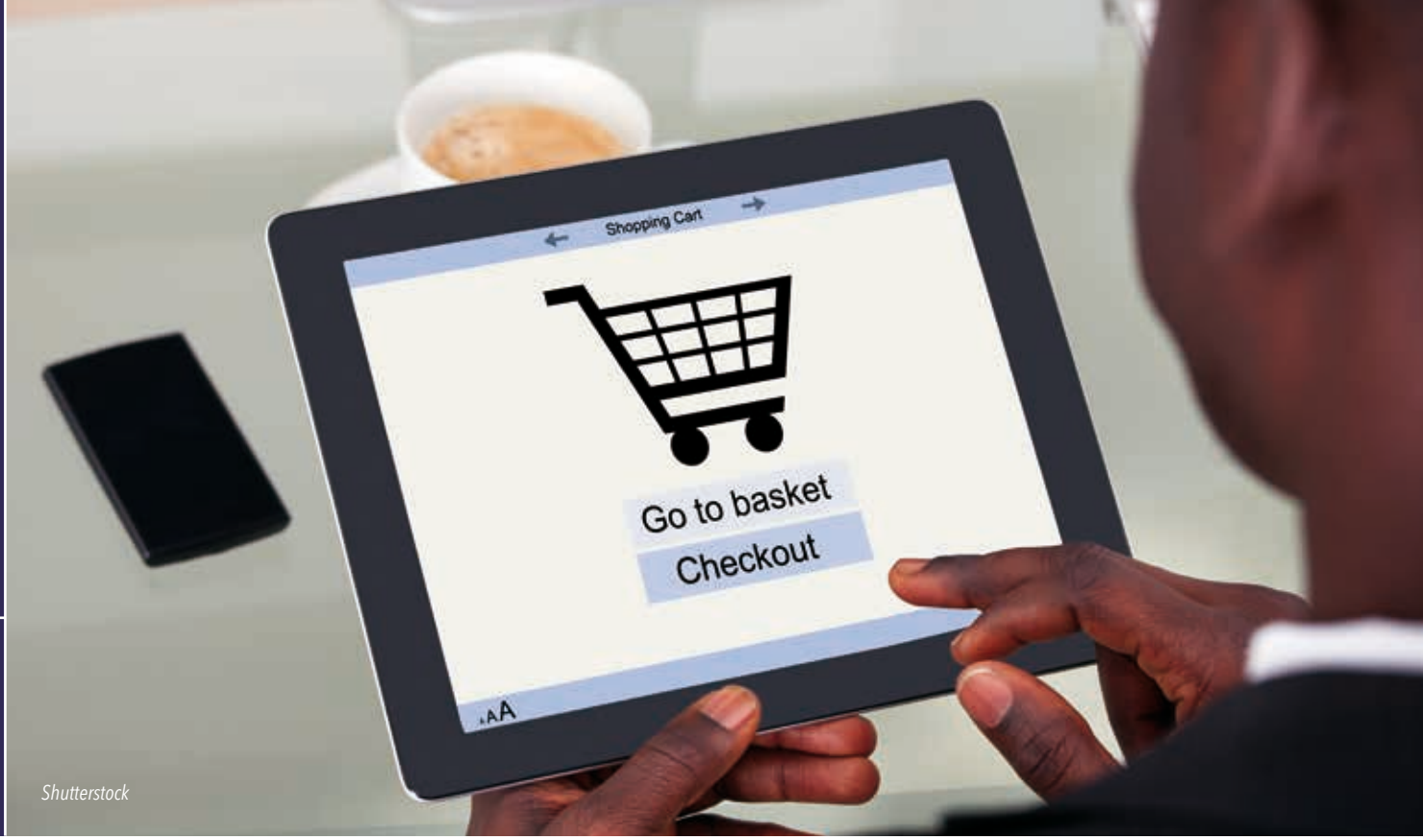
The Transform Africa Summit was hosted by Paul Kagame, President of Rwanda, and Dr Hamadoun I. Touré, ITU Secretary-General. The summit was attended by more than 1200 delegates, including Heads of State from Burkina Faso, Gabon, Kenya, Mali, Rwanda, South Sudan and Uganda, senior representatives of more than 100 governments, top executives of major global brands such as Facebook, Google, Microsoft, HP, Samsung, SAP and Korea Telcom, as well as policy-makers, academia and civil society.

Under the theme, "The Future Delivered. Today", Transform Africa offered a platform for dialogue between policy-makers and industry players on leveraging broadband for the socio-economic transformation of Africa. The summit also offered a networking opportunity to participants.

The Transform Africa Summit was held at a time when the continent was registering significant development in ICT. In particular, Africa has witnessed unprecedented increases in mobile penetration and broadband connectivity. During the past six years, the continent has received a number of submarine cables – including SEACOM, EASSy, TEAMS, West African Cable System (WACS) and Africa Coast to Europe (ACE) – on its shores. Governments or private operators in more than 33 countries have rolled out or are in the process of rolling out national terrestrial fibre-optic cables.

Sub-Saharan Africa has continued to witness the fastest growth in mobile penetration. Over the past five years, the unique mobile subscriber base has grown by 18 per cent annually. Mobile has emerged as the main medium for accessing the Internet across Sub-Saharan Africa, and smartphone ownership is expected to reach 20 per cent by 2017. Mobile contributes more than 6 per cent of sub-Saharan Africa's gross domestic product (GDP), higher than that of any other comparable region globally, and this is expected to rise to more than 8 per cent of regional GDP by 2020, according to the GSMA *Mobile Economy 2013* report.

It is against this background that participants at the Transform Africa Summit sought to set the new agenda for Africa – an agenda that seeks to harness current and future developments in connectivity to address the continent's pressing developmental challenges. Specifically, the summit focused on ways the powers of ICT can be employed to transform agriculture, health, education, government service delivery, business, financial inclusion, environment and economic infrastructure.



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At the end of the Transform Africa Summit, the Heads of State and Government present adopted the Smart Africa Manifesto, in which they committed themselves to providing leadership in accelerating sustainable socio-economic development through affordable access to broadband and ICT.

Subsequently, on 30–31 January 2014, the Smart Africa Manifesto was endorsed by all Heads of State and Government of the African Union at the 22nd Ordinary Session of the Assembly of the African Union in Addis Ababa, Ethiopia. This places the manifesto at the heart of the ICT agenda in Africa. Beyond the seven original signatories at the Transform Africa Summit (Burkina Faso, Kenya, Uganda, Rwanda, South Sudan, Gabon and Mali), the Smart Africa Manifesto is now supported by all the 53 African countries.

As Mr Nsengimana said, "ICT is doing amazing things here in Africa and all over the world. In Rwanda, ICT are saving lives. We have got very simple sms applications that people use to get emergency assistance, to get an ambulance, to help mothers deliver safely. Let us start talking about ICT with confidence because we have seen what ICT have done. These technologies are changing our lives." ■

FINANCING

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African Development Bank

Support for Connect Africa goals

To speed up the achievement of the Connect Africa goals, the African Development Bank has funded a series of activities to develop broadband infrastructure (Goals 1 and 2), strengthen policy and regulatory approaches (Goal 3), build capacity (Goal 4), and foster information and communication technologies (ICT) applications and services (Goal 5).

Broadband Infrastructure development

The bank has financed three feasibility studies on regional backbone infrastructure, relating to: the Eastern African Backbone Infrastructure Network (EAC-BIN); the ECOWAS Wide Area Network (ECOWAN); and the SATA backhaul link. The African Development Bank also works jointly with the World Bank: a feasibility study on the Central Africa Backbone (CAB) has been conducted and a similar study on the North Africa Backbone is being completed.

At the national level, the African Development Bank has provided financial support to the Government of Egypt for a feasibility study concerning a navigation satellite aimed at improving communications, navigation and surveillance, and overall air traffic management services. The bank has also provided financial support to the Government of Seychelles for a feasibility study on a landing station to connect to the submarine cable, in order to advance broadband communications to boost economic growth on the island.

The bank has just agreed to make a grant to the Government of Lesotho to modernize Lesotho's e-government infrastructure, including provision of a new data centre and of a virtual landing station for international connectivity to undersea cables.

Private lending to finance major infrastructure has included support for the Main One submarine cable project, sponsored by the African Finance Corporation, and for the New Dawn satellite project, which aims to construct and launch a satellite system ideally positioned to serve the African continent. The bank has also approved a loan to Helios Shared Telecommunications Infrastructure, for the construction of shared telecommunication towers.

The bank has provided a senior loan to the consortium of the East African Submarine Cable System (EASSy). The EASSy submarine cable came into service at the end of 2010. Further, the bank has provided a senior loan to the Regional African Satellite Communication Organisation (RASCOM) to support its satellite project. RASCOM's first satellite, launched in December 2007, experienced a problem.

Policy and regulatory support

In its support to policy and regulatory activities, the focus of the bank has been on matters that promote connectivity. The bank and the Government of the Republic of Korea co-sponsored a regional digital opportunity forum, which

was held in Morocco in 2009 to addresses policy concerns. The bank also supported a policy and regulatory dialogue workshop for eastern African countries in 2009, in which ten countries participated.

At the national level, the bank has supported a policy consultation between the Governments of Tunisia and the Republic of Korea in the communication sector. It has also provided support to the Mauritian Government for the implementation of its ICT strategy to increase competitiveness.

It should be noted that the funding of feasibility studies on regional backbone connectivity include a significant amount of resources dedicated to policy and regulatory work. Further debate on these aspects is therefore to be expected in the future.

Capacity building

In regard to capacity building, the bank has enthusiastically supported the development of regional ICT centres of excellence, fulfilling its commitment to the Connect Africa Summit.

The bank approved a loan in December 2010 to support the establishment of the Kigali regional ICT centre of excellence. The bank also provided, through the French Trust Fund, a grant to carry out feasibility studies on two centres of excellence – in Mali and Tunisia. The feasibility study on the ICT centre of excellence in Mali has been completed and has resulted in the Bamako Digital Complex Support Project, which was approved in September 2011. The centre of excellence in Tunisia is positioned to provide capacity building for senior policy-makers and to act as a research hub on public sector ICT services for Africa.

ICT applications and services

In regard to applications and services, the bank in collaboration with the World Bank has conducted a study on "e-transformation" to support the development and implementation of e-services. The focus areas for this "e-transformation" programme include e-procurement, e-government, and e-post and information security.

Earlier this year, the bank agreed a loan to the Government of Cape Verde for the construction and operation of a new technology park, to support the Cape Verde Government's efforts to modernize and expand its economy. Not only will the technology park itself enable Cape Verde to become a major regional ICT hub, but also the large element of training and development built into the project will ensure that the local population can obtain internationally accredited training and certificates to support the development of new applications and services.

Africa's development bank

The African Development Bank is the development bank owned by African countries. Its activities foster the achievement of the goals of Connect Africa and are in line with the actions that other development partners – such as the World Bank, the Islamic Development Bank, the regional economic communities, ITU and the United Nations system generally, and many others – have also pursued during the Connect Africa development period. The support that the African Development Bank has provided to make the Connect Africa vision a reality indicate the sort of interventions that development partners can undertake to support goals at an individual country and regional level. ■

SPECTRUM

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Abdoulkarim Soumaila

Secretary General of the African Telecommunications Union

The spectrum factor

Mobile broadband connectivity in Africa

While fixed broadband is good, mobile broadband is better. Mobile broadband amplifies the potential for maximizing broadband access by offering users continuous connectivity everywhere, 24 hours every day of the week. Also, mobile broadband connectivity is far less costly to access than its fixed counterpart. Even more important perhaps are the ease and speed at which mobile broadband can be accessed, in comparison to fixed broadband.

Why choose mobile broadband?

With mobile broadband connectivity, the purchase of a smartphone and on-the-spot SIM registration is normally enough to get a user connected. The user can then commence exploiting the mobile broadband offering in a matter of moments. In contrast, fast initial access is usually not feasible in the case of fixed broadband, particularly in Africa where fibre to the street cabinet or home is non-existent in many places.

On the supply side, mobile broadband is far less demanding in terms of initial capital outlays. This is a significant factor in Africa, where capital costs remain high. More significantly, mobile broadband can be offered as an add-on to current mobile network infrastructure, thereby exploiting existing and already amortized auxiliary infrastructure such as road access, power supply, masts and equipment shelters. Such auxiliary infrastructure accounts for a significant portion of initial capital outlay.

In the short-to-medium term, therefore, the way to achieve inclusive broadband connectivity in Africa is obviously through the mobile option – particularly as an add-on to existing mobile network infrastructure.

How to deliver mobile broadband?

Wireless communication allows for mobile access and use via appropriate receiving and transmission devices – smartphones in the case of mobile broadband. Finding the most cost effective and efficient way of delivering mobile broadband access in Africa therefore involves looking at the radio frequency spectrum. Radiocommunication is robust, but not all spectrum will deliver cost-effective mobile broadband in

Africa because of the low population densities characteristic of much of the continent.

What then is the most suitable spectrum? This question can only be answered in the context of mobile access technologies – the limiting factor in the use of the various spectrum bands.

Resolution 232 adopted by the World Radiocommunication Conference in 2012 (WRC-12) gives guidance in this matter. The resolution deals with spectrum in the ultra high frequency (UHF) band for international mobile telecommunications (IMT) – an umbrella term for all manner of mobile access technologies, including mobile broadband. According to Resolution 232, where cost considerations warrant the installation of fewer base stations, such as in rural or sparsely populated areas, bands below 1 GHz are generally suitable for implementing mobile systems including IMT. The resolution makes it clear that bands below 1 GHz are important for some developing countries and for large countries where economic solutions for low population density areas are necessary. The basic idea here is that fewer base stations result in lower capital outlay, making it economically viable for service providers to charge less and hence offer more affordable services.

WRC-12 allocated the frequency band 694–790 MHz in Region 1 to the mobile, except aeronautical mobile, service (on a co-primary basis with other services to which this band is allocated on a primary basis) and identified the band for IMT. But the allocation was only to become effective immediately after WRC-15. The adjacent band 790–960 MHz is already allocated to IMT systems, although much of this band is being used for second generation mobile systems that have limited capability for delivering mobile broadband. The new band 694–790 MHz is planned for long term evolution (LTE) technologies, which are fully fledged and optimized mobile broadband systems.

Television broadcasting and mobile broadband?

The African region conceptualized and sponsored Resolution 232 in order to have a suitable band allocated and identified for IMT – with the objective of fostering inclusive mobile broadband, particularly in rural and remote areas. But if we take a closer look at the allocation and use of the 694–790 MHz band, we see that the band is already allocated to and used for terrestrial television broadcasting. So the question arises of what is the best way of introducing mobile broadband into the 694–790 MHz band alongside terrestrial television broadcasting.

Resolution 232 sets out an approach to resolving the problem. First, it calls for a study of spectrum requirements for the mobile service and for the broadcasting service in this frequency band in order to confirm the band segmentation at the 694 MHz boundary between terrestrial television broadcasting in the 470–694 MHz band and IMT in the 694–790 MHz band. Second, it calls for a study of the compatibility between the mobile service and other services currently allocated in the 694–790 MHz band, principally terrestrial television broadcasting. Third, it envisages modification of the Geneva 2006 digital terrestrial television frequency plan to retain sufficient capacity for broadcasting in the 470–694 MHz portion of the band, after the 694–790 MHz portion has been allocated to IMT.

More decisions to be taken

Up to now, the focus has been on planning. It will be up to WRC-15, scheduled for November 2015, to specify the technical and regulatory conditions applicable to the mobile service allocation in the 694–790 MHz band. Work on the studies called for by Resolution 232 has progressed well.

Most importantly – thanks to the Geneva 2006 digital terrestrial television frequency plan modification and coordination exercise in the African region, completed in July 2013 – the viability of the new allocation for terrestrial television broadcasting has been demonstrated. The exercise showed that the 470–694 MHz band is sufficient for digital terrestrial television.

The view of the Africa region is that the 694 MHz boundary tentatively set by WRC-12 should be confirmed by WRC-15. The quality of the results obtained during the exercise compare favourably with those achieved by the 2006 Regional Radiocommunication Conference (RRC-06), which adopted the GE06 Plan, with 97.37 per cent of the frequency assignments requirements satisfied in the exercise, compared to 97.17 per cent satisfied by RRC-06 for the whole UHF band (470–862 MHz).

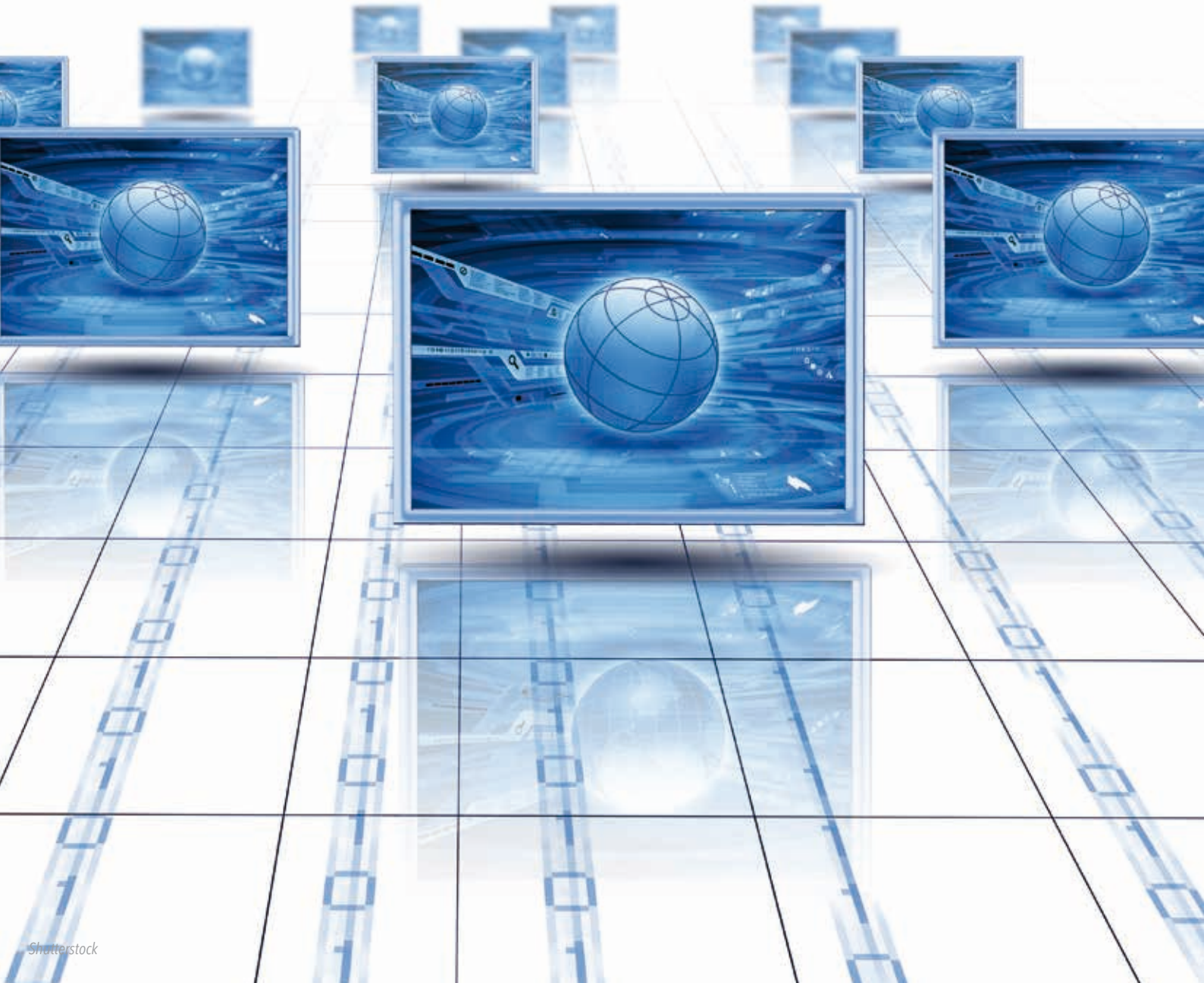
The working documents of the ITU Radiocommunication Sector (ITU–R) joint study group (known as JTG 4-5-6-7) responsible for studies under Resolution 232 propose a modification of the Radio Regulations (RR No. 5.317A) to extend the identification of IMT in Region 1 down to 694 MHz as one of the methods to address WRC-15 Agenda Item 1.2 on Resolution 232. This implies setting the boundary at 694 MHz – which is currently the recommendation of the study group, and is supported by the regional telecommunications organizations concerned, namely CEPT, RCC, ASMG and of course ATU.

Resolution 232 sees the 694–790 MHz band as the second digital dividend, and Africa has done well in making progress towards realizing the allocation. But with mobile broadband in pole position as the future of communications, it is important to find a sustainable way of addressing the ever increasing demand for spectrum for IMT. WRC-12 Resolution 233 – on studies on frequency-related matters concerning IMT and other terrestrial mobile broadband applications – seeks to address both the short-term and long-term needs for additional spectrum for IMT by calling for efforts to examine possibilities that would lead to an allocation or identification of additional spectrum for IMT, preferably in a globally harmonized manner. It will then be up to WRC-15 to find a sustainable way of addressing the spectrum needs of IMT.

Africa is participating in studies to identify the much needed spectrum for IMT, in line with Goal 3 of the Connect Africa Summit (held in Kigali, Rwanda, in 2007), which calls among other things for allocating spectrum for multiple, competitive broadband wireless service providers. This is one of the crucial elements to attaining Goal 2 of the Connect Africa Summit, which is to connect African villages to broadband ICT services by 2015 and implement shared access initiatives, such as community telecentres and village phones.

Clearly, the spectrum factor is central to achieving inclusive mobile broadband connectivity in Africa. ■

INFRASTRUCTURE DEVELOPMENT



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The African Internet Exchange System (AXIS)

Internet use has been growing steadily in Africa over the past few years and is now beginning to play a significant role in Africa's development by creating employment, providing opportunities for innovation and entrepreneurship, as well as acting as an enabler in the digital delivery of government services – education and health care among others. But we in Africa currently pay overseas carriers to exchange "local" (intra-continental) traffic on our behalf. This is both a costly as well as an inefficient way of handling the intra-continental exchange of Internet traffic.

African Union gets to grips with Internet traffic

Recognizing that the exchange of African inter-country traffic via overseas hubs is both slow and expensive, and that nothing was being done to address the problem, the African Union decided to create a project to increase the efficiency of national and regional traffic. This is the origin of the African Internet Exchange System (AXIS) project.

The aim of the AXIS project is to support the establishment of both national and regional Internet exchange points (IXPs) in order to promote the exchange of intra-Africa Internet traffic within the continent.

The first step was the signing of an agreement between the African Union Commission and the lead financier (Luxembourg Development Agency) for the implementation of the AXIS project. Funding for the project comes from the European Union's Africa Infrastructure Trust Fund and the Government of Luxembourg.

Capacity building for Internet exchange points

Two series of workshops are being conducted in each of the Member States of the African Union. The first series focuses on best practice and Internet community mobilization. The outcomes of the first 20 workshops (held in Algeria, Benin, Burkina Faso, Burundi, Cameroon, Cape Verde, Chad, Republic of Congo, Gabon, Gambia, Guinea, Liberia, Mali, Mauritania, Namibia, Niger, Senegal, Seychelles, Sierra Leone and Swaziland) include a consensus to establish Internet exchange points in participating Member States. A committee has been formed to decide (on the basis of

shortlisted proposals) on the name, location, organizational structure and constitution of the IXPs.

The second series of workshops each offer five days of technical training. So far, these technical training workshops have been successfully conducted in Algeria, Benin, Burkina Faso, Burundi, Cameroun, Côte d'Ivoire, Gambia, Guinea, Mali, Mauritania, Namibia, Niger, Senegal, Swaziland and Togo. More than 300 participants have been awarded certificates on technical aspects of setting up, operating and administering IXPs.

National Internet service providers go regional

As part of the AXIS project, the African Union Commission in partnership with the Southern African Development Community organized an interactive workshop on regional Internet exchange points and regional Internet carriers. The workshop was held in Gaborone, Botswana, on 3–7 February 2014.

The workshop served to empower the region to work towards keeping regional Internet traffic within the region instead of transiting intra-regional traffic through overseas carriers. It also provided specific recommendations on the support and guidance that national Internet service providers and IXPs need in order to become regional players.

The overall objectives of the discussions were to enhance interconnectivity within the region, encourage the development of local content, and promote the efficient flow of information through accurate data localization, data hosting infrastructures and centres, as well as cost-saving peering and content distribution mechanisms.

During the workshop, national and regional stakeholders discussed operational and technical best practices, applicable policy and regulatory frameworks, regional interconnection strategies, and existing business development models that are relevant to the region. From this discussion emerged an outline of the benefits of establishing regional Internet carriers and regional Internet exchange points.

As a way forward, the workshop participants agreed to set up a regional policy and regulatory committee to develop a regional interconnection policy and regulatory framework, start a capacity building programme to empower Internet service providers to take advantage of regional interconnections, and initiate a technical assistance programme to support IXPs to grow into regional IXPs. ■

Hodge Semakula

Executive Secretary/CEO
East African Communications Organisation

East Africa Internet exchange project

Inadequate interconnection between Internet service providers (ISPs) and Internet exchange points (IXPs) in the East Africa region often results in the routing of local traffic over expensive international links to reach destinations within the region. Communication providers incur costs because they have to pay for the use of international circuits outside East Africa, resulting in capital losses for the region.

In response to this problem, the East African Communications Organisation (EACO) has set up a working group to examine possible ways of interconnecting all national IXPs in the five East African countries (Burundi, Kenya, Rwanda, Tanzania and Uganda). This is the first step in designing and implementing an East Africa Internet exchange, with the objective of keeping regional traffic local within East Africa. The goals of the East Africa Internet exchange project are to make Internet use more affordable, create awareness among regulators and operators about the role of national IXPs, help member countries to benchmark with other regions, facilitate the establishment of national IXPs, and harmonize relevant policies and approaches.

Feasibility study

A feasibility study on the status of national IXPs in the East African countries was carried out in November 2013 by EACO in collaboration with ITU. The feasibility study involved carrying out a detailed situational analysis in order to get a good understanding of the current status of IXPs and ISPs in the region. The aim is to build on what is currently in place in designing and implementing the proposed regional IXP.

As well as ascertaining the number of national IXPs in each of the countries in the region, the study looked at the current bandwidth available in each country, the volume of IP traffic per national IXP, the operations of the national IXPs, and the existing connectivity between countries (cross-border connectivity). The study also examined the policy and regulatory frameworks for IXPs in the region, the current – generally private – arrangements by ISPs that are already in place to route local traffic within the region, and the market needs.

The analysis was done by Internet research, phone interviews, literature review, and visits to regulators and major operators in the East Africa region. Care was taken to involve key stakeholders in the study to make them aware of the project and ensure their support for it.

IXP ecosystem in East Africa

Table 1 illustrates the level of development of the IXP ecosystem in the East Africa region, based on the feasibility study. It is clear that the level of development is vastly different from country to country, and therefore that it is necessary to take specific national challenges into account when considering how to implement an East Africa Internet exchange system.

Table 1 – Overview of the IXP ecosystem in East Africa

Parameter	Related issues
National IXP operations	All countries have a national IXP apart from Burundi where an IXP is to be implemented shortly with support of the World Bank and African Union Commission under a project known as the African Internet Exchange System (AXIS) http://pages.au.int/axis. Kenya's KIXP is the oldest IXP in East Africa, established in 2002. Since then, Tanzania has implemented three IXPs, while Kenya has added one and licensed an additional IXP since 2003, but it is not operational, while a government IXP is planned for government-to-government traffic.
IP traffic exchanged at national IXPs	In the countries with an IXP, current monthly traffic into the IXP at the date of this report ranges from 49 mbps to 256 mbps as below Tanzania (TIX) 49 mbps UIXP 54 mbps RINEX 209 mbps Kenya (KIXP) 256 mbps Traffic more than trebled for RINEX in September 2013. Traffic in TIX is low as a result of lack of caching.
Ownership and governance	The national Internet service provider (ISP) associations own the IXPs. Some associations (such as Tanzania and Kenya) are vibrant but others need a reorganization to strengthen them. This is the case for UISPA, which needs to be reorganized to be the entry point for the EAIX. RICTA is being reorganized to manage RINEX in addition to managing the .rw ccTLD. In all cases, the national IXP is a project of the national ISP association.
Management and operations	Volunteers run IXP operations for UIXP, RINEX, while KIXP and TIX have dedicated full time staff. Note that the placing of RINEX under RICTA implies that dedicated staff are to be assigned. TIX has one full time staff member who also doubles up working for TISPA to provide office support.
Peering members	Peering members at the time of this report are: RINEX – 5 UIXP – 15 TIX – 25 KIXP – 28 Some network operators transit their traffic into the national IXP through other operators and are therefore excluded in these figures.
Types of peering members	Peering members are exclusively telecoms in Rwanda and Uganda, but banks, educational institutions, as well as ccTLd membership are peering members in Tanzania and Kenya, and soon will be in Rwanda. Tanzania Port Authority is a peering member at TIX.

Cost to connect, sustainability and value added of the IXP	Free entry for UIXP and a flat rate fee in Kenya and Tanzania and annual fee and usage based fee. Investment of upgrades based on voluntary donations by members in the case of UIXP root servers, government information.
Potential barriers to market entry for new members	Physical access to the IXP is a potential barrier. New operators find it costly to build fibre to the IXP. In certain cases, the rooftop space to install radio is crowded and amenable to high levels of interference. This is the case for UIXP.
Cross-border operations by network operators	Cross-border interest, as expressed by cross-border network operation, is high. Currently, nine operators have cross-border operations in the region, and have explored and implemented some elements of optimizing their investments for cross-border traffic or access to caches across the border. SEACOM and EASSY both land submarine fibre in the coastal towns of Dar es Salaam and Mombasa.
Supporting national infrastructure	The capital cities hosting the national IXPs have optical fibre competitively supplied by multiple operators, complemented in all the countries (except Burundi) by a nationwide backbone. A national backbone is now under construction in Burundi. The national backbones – largely built by government or government supported funding – include: NICTBB in Tanzania NOFBI in Kenya BSC in Rwanda BBS in Burundi NBI in Uganda All backbones are terrestrial and are in competition with the private sector, which uses the terrestrial and electricity infrastructure. BBS commenced construction in 2013. Liquid Telecom has built cross-border fibre linking Kenya, Uganda and Rwanda, and operates in Tanzania through a partner.
International connectivity through submarine cables for the region	Kenya and Tanzania have optical fibre submarine cables landing international bandwidth, as follows: Kenya – TEAMS, SEACOM, EASSY and LION2 Tanzania – SEACOM and EASSY
Active cross-border points on fibre	Cross-border traffic exchange points among neighbouring countries are live on optical fibre, as follows: Tanzania – Kenya – Silari , Namanga and Horohoro Uganda – Mutukula Rwanda – Rusumo Burundi – Kabanga , Manyavu Uganda – Kenya – Malaba, Busia, Tororo Rwanda – Katuna Rwanda – Burundi – Nemba, Akanyaru Multiple operators in Kenya and Uganda have implemented multiple cross-border points. Connectivity on the Burundi side is not yet complete on fibre to both Tanzania (Manyavu) and Rwanda (Nemba) but planned under BBS implementation launched in September 2013. The fibre link from the Kenya side to Horohoro, Tanzania, is not yet implemented.
Policy oversight	IXPs are recognized in policy documents in Tanzania. In Uganda, the government, though NITA-U, aims to interconnect IXPs. In Kenya, the national broadband strategy supports redundancy. Explicit recognition of the critical role of IXPs is, however, missing in all countries.
Regulatory oversight and enabling legal framework	Only Kenya has licensed IXPs. Indeed, the regulatory environment in Kenya envisages multiple licensees. Two have been licensed but only one licensee is operational. Peering policy is mandated in law in Tanzania and Rwanda, while in Kenya and Uganda peering is determined by the national ISPA.
Government intervention	Government intervention ranges from high regulator engagement in RINEX, where RURA commissioned a study on RINEX and is providing overarching support to reorganize the IXP, to Tanzania where TCRA has invested in inter- IXP connectivity and is building new regional IXPs. Government takes a hands-off approach in Uganda, where UCC has limited interaction with UIXP. UCC has, however, provided free accommodation, power and security. None of the regulators seek growth indicators from the IXPs.

Phased approach to implementing the East Africa Internet exchange system

A multi-stakeholder phased approach is required to realize a thriving East Africa Internet exchange (EAIX) system. Such an approach makes it possible to address disparities such as development status, and to work towards achieving cheaper cross-border connectivity, route diversity, and common service standards and peering policies.

Achieving these goals calls for interventions at policy, regulatory and market levels. An overview of the phased approach adopted to implement the EAIX system is given in Table 2. The approach coordinates the implementation of the various components and provides a structured framework for engaging all stakeholders.

Expected benefits of the East Africa Internet exchange

Expected benefits of interconnecting the East Africa IXPs include improved quality of Internet services within East Africa – with, for example, greater network reliability, reduced latency and less packet loss. Other expected benefits of the East Africa Internet exchange (EAIX) are lower cost of connectivity, reduced exposure of data to entities located in other regions by localizing traffic (hence greater privacy), improved cybersecurity management, and enhanced content hosting within the region enabled by improved regional access speeds.

Ultimately, there is likely to be increased Internet penetration and use in the region as a result of the reduction in costs.

Table 2 – Overview of the phased approach for implementing the East Africa Internet exchange (EAIX) system

		Phase 0: 1 January – 31 March 2014	Phase 1: 1 April – 30 June 2014	Phase 2: 1 July – 30 September 2014	Phase 3: 1 October onwards
		Inward focus: Enhance integrity of national IXP switching	Outward focus: Traffic disaggregation and empowerment of national IXPs	Connectivity: Inter-IXP connectivity	Long-term view: Exploit the knowledge society
Policy space	Ministry responsible for ICT	Incorporate IXP in policy as a critical infrastructure that carries critical traffic		Policy on multipoint cross-border crossing to provide route diversity for long-term mesh network	Infrastructure and route diversity

Regulatory space	ICT regulator	Licensing regime of IXP is clarified and implemented. Develop statistical indicators of growth and reporting mechanisms. Organize a forum to engage all stakeholders in reviewing governance structure, where necessary.	Framework to enhance local content and content infrastructure. Online applications. Funding framework for inter-IXP connectivity.		
Project management	EACO secretariat / Working Group 5	Stakeholder validation of this phased approach. Notify stakeholders of their roles in EAIX implementation. Establish EAIX Steering Committee through approval by EXCOM	Review phase 0 and 1. Operationalize EAIX governance structure.	Stakeholder workshop to launch connectivity.	Workshop for regional backbone operators.
	EAIX Steering Committee		Review regional interconnection and status of the East Africa Backbone System (EABS).		
Operational	ISP Association or forum bringing together ISPs and network operators	Peering policy developed and implemented. Determine and aggregate traffic originating and terminating in the region.	Review capacity needs for increased regional traffic. Develop remote peering policies.	Establish common peering policies for regional traffic.	
	IXP management and operations	Integrity on power, redundancy, switching capacity and traffic monitoring.		Route regional traffic through the national IXP.	
	Network operators and others	Establish traffic volume and patterns concerning the individual countries in the region.	Competitively provide inter- IXP connectivity.	Implement data centres.	
	Backbone operators		Harmonize cross-border planning and operational policies.	Establish a forum for infrastructure operators.	Implement multiple cross-border fibre points.

East Africa Internet exchange project – risks and mitigation measures

The main risks for the East Africa Internet exchange (EAIX) project revolve around buy-in by stakeholders. The key stakeholders are the network operators and ISP associations. Specific risks and suggested mitigation measures are listed in Table 3.

Table 3 – Risks and mitigation measures in the East Africa Internet exchange (EAIX) project

Risks	Mitigation measures
Delay in approval of policy and regulatory framework.	Early lobbying of governments and regulatory authorities.
Failure of some regulators to invite their respective ISPs to the working group meetings.	The regulators concerned and the EACO secretariat should invite ISPs and telecommunication operators to participate.
Delayed buy-in from relevant stakeholders.	Carry out effective and timely awareness campaign.
Inadequate support by the ISPs and telecom operators.	The regulators concerned and the EACO secretariat should invite ISPs and telecommunication operators to participate.
EACO member countries are in different stages in the implementation and management of national IXPs.	Phased approach in implementation, with targeted support during phase 0.
Lack of initial funding and sustainability of the EAIX project.	Explore support options.
Delay in acquisition of the required funds for the project.	Timely request for funding with all the required documentation.
Lack of continued funding for long-term sustainability of the project (inappropriate business models).	Formulation of clear and realistic business models.

The way forward

Following the feasibility study, the East African Communications Organisation developed a detailed action plan for implementation of the different phases of the project. This action plan was circulated to the implementing agents through the national regulators in each of the countries. Country visits will subsequently be made to monitor the implementation of the first phase of the project.

The first phase (Phase 0) will involve enhancing the integrity of national IXP switching. This phase has already commenced and is intended to be completed by 31 March 2014. The action plans for the subsequent phases will be implemented once Phase 0 is completed. Before being implemented, these plans will be reviewed by the EAIX project working group taking into account the lessons learned.

Once the EAIX project is completed, we hope that the East Africa region will experience improved quality of service, increased uptake of Internet services and more affordability of these services. ■


AFP

Programme for Infrastructure Development in Africa

Infrastructure plays a determinant role in physical and economic growth, physical integration and poverty reduction. Inadequate infrastructure affects productivity, and raises production and transaction costs. The infrastructure deficit in Africa is widely recognized, and has a clear impact on African competitiveness. The Programme for Infrastructure Development in Africa (PIDA) addresses the infrastructure gap. PIDA covers four sectors: energy; transport; information and communication technologies (ICT); and trans-boundary water.

PIDA was jointly formulated by the African Union Commission, the New Partnership for Africa's Development (NEPAD) Planning and Coordinating Agency and the African Development Bank, in line with various decisions of the African Union policy organs. The implementation of PIDA started following the adoption of the programme by the 18th Ordinary Session of the Assembly of the African Union Heads of State and Government, held in Addis Ababa, Ethiopia, on 29–30 January 2012. Implementation is expected to continue steadily, thanks to commitments by political organs and Africa's partners.

PIDA in brief

PIDA is a multi-sector strategic framework up to 2040 and a priority action plan for 2020, aimed at facilitating continental integration and socio-economic development in Africa through improved regional infrastructure. PIDA is expected to establish competitiveness in niche markets and in growing multi-sectorial activities, including agriculture and manufacturing; reduce energy costs and increase access for a large number of the population; slash transport costs and, hence, boost intra-African trade; increase global connectivity in transport and ICT; and create up to 15 million new jobs.

The strategic framework was developed from a diagnosis of each of the four sectors covered (energy, transport, ICT and trans-boundary water), looking at existing plans and gaps, an African outlook for the future with projections up to 2040, and a vision for each sector articulated in objectives and strategies.

The African outlook is a key input in formulating the strategic framework. PIDA's macro and sectoral outlooks to 2040 are based on a 6.2 per cent annual overall rate of growth in African gross domestic product (GDP), driven by population

growth, education and technology absorption. This scenario is contrary to the historical situation where the key driver of Africa's growth has been its richness in natural resources. If the 6.2 per cent average GDP growth is achieved, power demand will increase at an average annual growth rate of nearly 6 per cent, transport volumes will increase 6 to 8 times, and ICT demand will swell by a factor of 20 before 2020 as Africa catches up with broadband. This increased demand will require adequate regional infrastructure, and that is what PIDA aims to provide.

The ICT component of PIDA

Analysis of the information and communication technology sector has revealed that mobile telephony and the Internet are irreversibly changing the rules of economic competiveness. ICT have become a cornerstone of successful economic development and transformation of Africa.

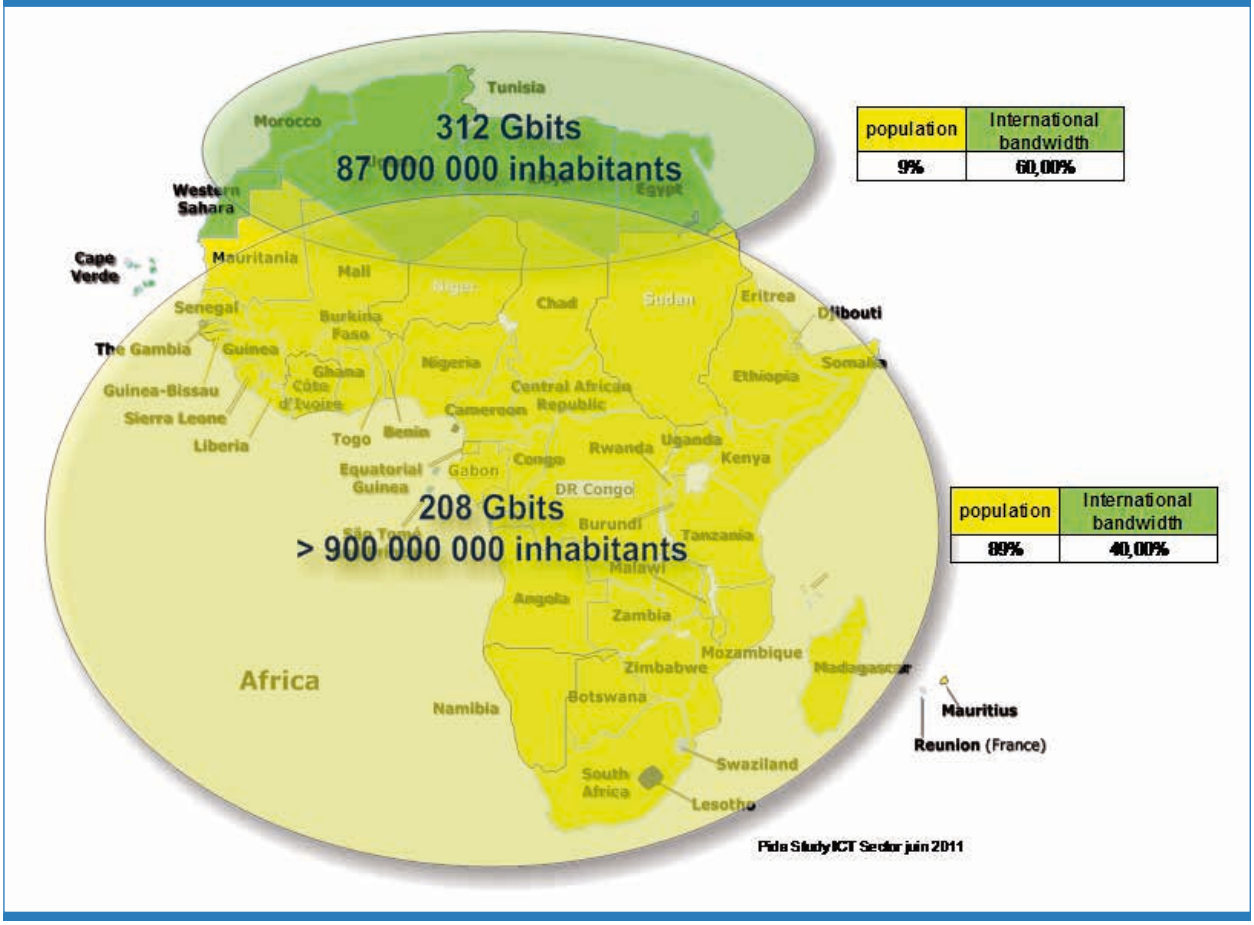
Bandwidth has moved from being a scarce and expensive resource to an overabundant commodity, and there has been a migration from satellite to submarine cables. More bandwidth is available for countries with submarine stations. While the overall availability of international and cross-continental capacity via submarine cables is sufficient and encouraging, the national and regional infrastructure is insufficient to take advantage of the submarine capacity. Only about 0.5 terabits (2.7 per cent) of the 18 terabits of submarine capacity available is currently in use on the continent (see Figure 1).

There are a range of bottlenecks hindering broadband use. The main ones are the following. African countries have fibre-optic infrastructure, but it is unequally developed and of insufficient quantity and quality. In some countries where there is a monopoly on international gateways, international connectivity is weak. Wireless infrastructure is unable to handle broadband without upgrades to fibre for backhaul. There is a lack of official data on market development and infrastructure. Accessibility and interconnection to submarine cables are available to some but not to others, and the level of competition among providers is low. From an administrative point of view, obtaining rights of way for laying fibre cable is time-consuming, costly and often difficult. Similarly, implementing cross-border links is a lengthy and complicated process. Finally, alternative passive infrastructure (transport, energy, pipeline) is undeveloped.

Objectives and strategies

While Africa is lagging behind in broadband development, the European Union has a digital strategy for Europe up to 2020. The Republic of Korea aims to establish a national 1 Gbit/s network for end users. Japan is giving priority to its e-Japan policy. Singapore and Australia envisage national broadband networks. New Zealand has embarked on an initiative to provide ultra-high speed services. Canada has a national broadband policy, while Brazil has a national broadband plan. Argentina has its *Argentina Conectada* initiative and Nigeria has set out its Vision 20:2020. Africa should have its vision too. PIDA provides this option with an outlook up to 2040 for the sector, as well as bandwidth projections for the period 2015–2020.

Figure 1 – Total bandwith in use, and the divide beween north and sub-Saharan Africa (2010)



PIDA's vision for the information and communication technology sector is simply to enable an information society and integrated digital economy in which all actors have access to reliable and affordable ICT networks. PIDA's objectives are to strengthen the contribution of the ICT sector to GDP (aiming to reach about 10 per cent by 2025), and to satisfy African broadband demand at the lowest cost, while increasing accessibility and security of access from all African countries to the rest of the world, with specific attention to landlocked or isolated countries. The more general objectives are to promote intra-African e-commerce, contribute to regional and continental physical integration, and support peace and security.

The following strategies are being adopted to meet these objectives. The first is to guarantee international access, considering that each country needs to have fibre access to at least two different submarine cables. The second strategy is to guarantee secure terrestrial routes. To do so, each country needs to have access to its choice of submarine landing stations – generally terrestrial infrastructure of at least two different types. Third, there is a charter for landlocked countries that recognizes their need to have guaranteed access to submarine cable landing stations in coastal countries. The fourth strategy is to achieve continental inter-connectivity. Each country will be interconnected by terrestrial fibre infrastructure to its neighbour (the connection will be to the capital or largest city). This is also a goal of the Connect Africa Summit, held in Kigali in 2007. The fifth strategy is to reach optimal international bandwidth use, with each country having a national Internet exchange point (IXP). The sixth strategy is to achieve competitive open markets. In particular, each country should have a competitive market in broadband services. Next, there needs to be sustainable new infrastructure. All new infrastructure should have sufficient capacity (fibres) to support the medium-term vision (looking more than 10 years ahead). In general, an effort will be made to increase connectivity, accessibility and security of access for all countries. Ultimately, the strategy will be to increase accessibility for all Africans to local, regional, continental and international content and applications.

Trends and scenarios

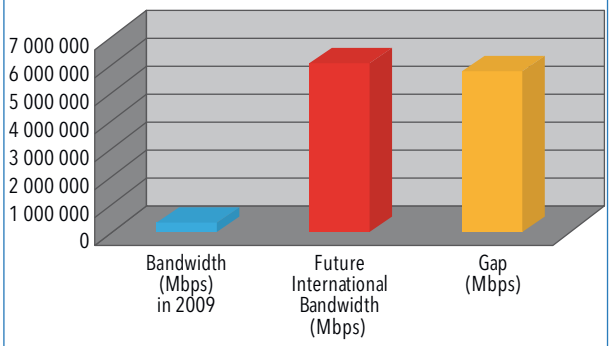
High-speed broadband has become the lifeblood of the knowledge economy and is fast becoming a human right, as well as a significant contributor to economic growth. Africa's information and communication technology sector will continue to grow rapidly over the coming decades, with the lion's share of investment coming from private enterprise.

Based on extensive international benchmarking and operator data, and drawing on detailed analysis of experiences in Europe and North Africa, a predictive model to forecast future capacity requirements has been developed to determine national and international bandwidth (traffic) requirements, the impact of broadband penetration (density) on overall bandwidth demand, and the impact of growth in end-user bandwidth demand – the increased use of new e-applications that increase bandwidth consumption (often called the "YouTube effect").

Taking these trends into account, the most likely scenario for short-term uptake in Africa is an estimated average penetration of 20 per cent of the population with high-speed broadband and 60 kbit/s per subscriber of required international capacity. It should be noted here that 20 per cent population penetration is probably close to a 60–80 per cent household penetration level.

The PIDA traffic forecast model indicates that international capacity demand will grow from the 2010 level of about 500 gigabits per second to a total of 6000 gigabits (6 terabits) per second by 2018 (likely swelling by a factor of 20). Figure 2 illustrates this expected explosion of capacity required to service Africa's broadband demand before the end of the present decade.

Figure 2 – Africa's international bandwidth requirements



In consultation with stakeholders, the actions required to meet the objectives of the PIDA Africa vision have been identified as follows.

In the short term (2015–2020), there needs to be more efficient use of existing infrastructure. Increasing international demand calls for opening markets to new access providers and establishing national IXPs, as well as connecting the remaining missing links – both between countries (Kigali goals included) and to submarine landing stations where needed. A more conducive environment for future fibre deployment is required. Also, there is a need for support for local and international content hosting and applications development. The overall aim is to increase connectivity, accessibility and security of access for all countries.

In the medium term (2020–2030), the key strategies proposed above should be mostly or totally implemented. National and regional routes need to be further diversified, strengthening connectivity, accessibility and security of access for all countries. Also, there needs to be more competition on existing routes, especially from access points to ducts linking up with new transborder road and energy projects.

Strategic networks

Figures 3, 4 and 5 show how the strategic networks will look once all the strategies have been implemented.

The map in Figure 3 shows the target network, which will ensure access to all stakeholders by 2020, promising high levels of quality, security and availability.

Figure 3 – Continental strategic ICT infrastructures

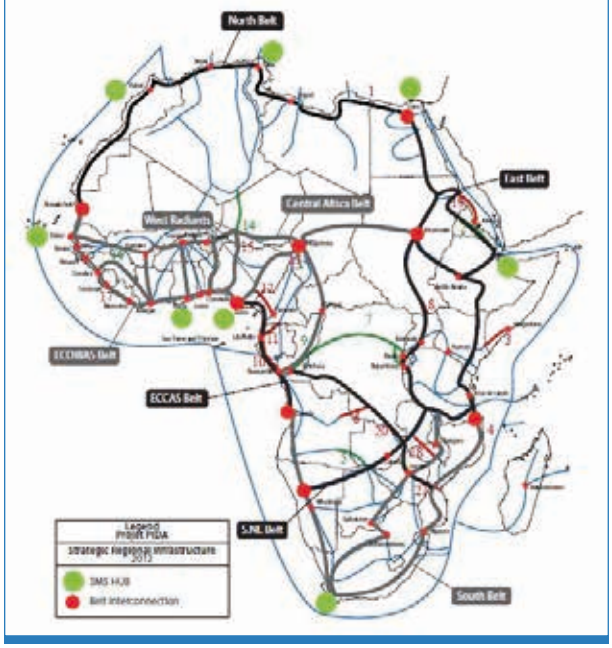


Figure 4 – Continental strategic ICT Infrastructure belt interconnection by 2020

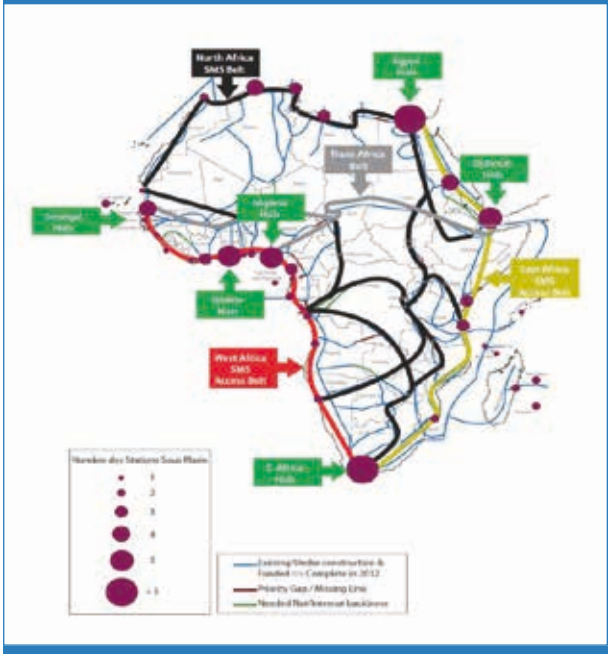
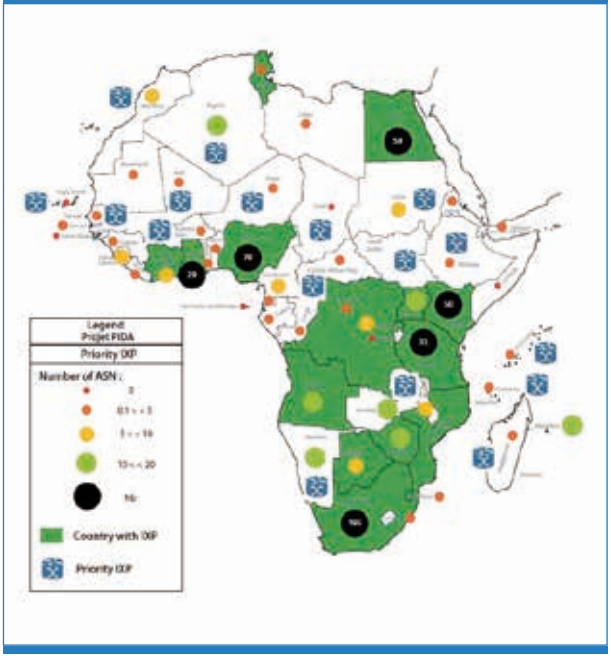


Figure 5 – Existing and needed Internet exchange points on the continent by 2020



To implement the PIDA ICT programme, stakeholders have agreed to adopt a priority action plan composed of projects selected on the basis of agreed criteria. The PIDA ICT projects seek to establish an ICT enabling environment, improve ICT infrastructure, and establish Internet exchange points.

With regard to ICT infrastructure, the projects aim to close the remaining missing links, upgrade existing infrastructure (for example to increase capacity and implement new technologies), ensure that all countries have access to at least two landing points, and promote additional submarine cable projects to ensure that each country has access to at least two different cables.

The implementation of projects related to Internet exchange points is well advanced. Projects are to be revised at least every two years, depending on their level of implementation. The African Union Commission has already secured funds and created the African Internet Exchange System (AXIS). ■


AFP

West African telecommunications and ICT

An update on progress

To promote regional integration and economic growth, the Economic Community of West African States (ECOWAS) is working to achieve two major objectives: first, to develop a regional reliable and modern telecommunications infrastructure by implementing a terrestrial broadband programme, alternative broadband infrastructures and submarine cables; and second, to harmonize policies, and legal and regulatory frameworks in the telecommunications and information and communication technologies (ICT) sector, in order to establish a common liberalized market within the Community. The following article outlines what has been done to date.

Terrestrial broadband infrastructure

To meet the telecommunication infrastructure needs of ECOWAS Member States, the ECOWAS Commission, in partnership with ITU, launched two dedicated programmes.

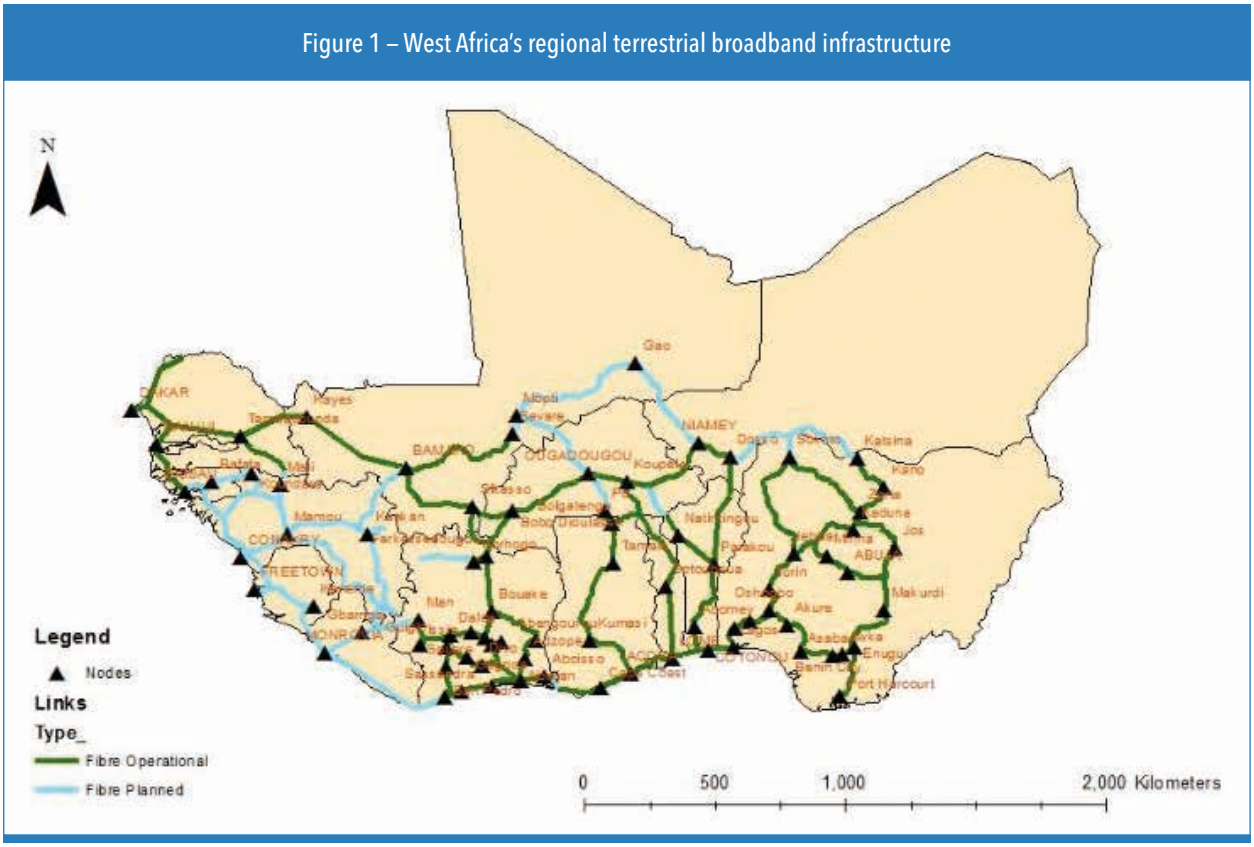
Starting in 1982 and now completed, the INTELCOM I programme has connected west African capitals by direct automatic telephone, telex and fax.

The INTELCOM II programme, launched in 1998, identified 32 inter-State telecommunication links. Following a status review in 2005, existing and possible links were designated as forming the ECOWAS regional terrestrial broadband backbone to be connected to the international global network via submarine cables. These inter-State links are gradually being built. The Burkina Faso – Niger and Burkina Faso – Ghana links have been operational since 2012 and 2013, respectively. By the end of December 2013, an estimated of 60 per cent of the links were already built and operational (see Figure 1).

Studies have been completed, with ITU assistance, for the Burkina Faso – Benin and Burkina Faso – Ghana missing links. Both the Burkina Faso – Ghana link through Po and the Burkina Faso – Benin link through Fada are planned to be built by the end of 2014.

With the operational terrestrial connections and submarine landing stations, the three ECOWAS landlocked countries (Burkina Faso, Mali and Niger) now each have at least two access routes to submarine cables. Having secured the access by landlocked countries, competition is growing.

Figure 1 – West Africa's regional terrestrial broadband infrastructure



A detailed feasibility study including a business plan is now under way on the missing inter-State links in the ECOWAS region, with a focus on the interconnection of Mano River countries (Côte d'Ivoire, Liberia, Sierra Leone and Guinea), as well as Senegal, Mali and Guinea Bissau. The work is being conducted by ECOWAS, with the support of the New Partnership for Africa's Development (NEPAD) Programme Coordinating Agency.

Work on constructing the Mali – Niger link has had to be suspended because of the crisis in Mali.

West African submarine cables

Several submarine cable projects have been completed by various private telecommunication operators, with ECOWAS playing a facilitation role. Since 2012, a total of four submarine cables (ACE, Main One, WASC and GLO 1) have been built and now connect the ECOWAS region to the worldwide broadband network.

There are 18 landing points in the region, and all coastal countries except Guinea Bissau have at least one landing point (see Figure 2). At present, Cape Verde, Guinea, Gambia, Liberia, Sierra Leone and Togo each have one landing point, Côte d'Ivoire and Senegal each have two, while Ghana and Nigeria each have four. Benin is planning a second landing point, while Guinea Bissau will get its first landing point with ACE.

The ECOWAS Commission has been working closely with the West African Telecommunications Regulatory Assembly (WATRA) to put in place an appropriate regulatory environment for the exploitation of the submarine cables, in order to ensure that the West African region is connected to the rest of the world at a competitive price.

A regulation was adopted by the ECOWAS Council of Ministers in June 2012. A further draft regulation has been elaborated with the assistance of ITU, with a view to facilitating the access of landlocked countries to the landing points of the submarine cables. This regulation will be submitted to the next ECOWAS Telecom/ICT Experts and Ministerial meeting for consideration, after review by an ad hoc committee set up in Banjul, Gambia, in September 2013.

E-governance platform

An e-governance platform, the ECOWAS Wide Area Network (ECOWAN), with a gateway to the Internet, aims to link all ECOWAS institutions and government offices in all Member State capitals in the region. A feasibility and environmental impact assessment study for this project was funded by the African Development Bank, the Development Bank of Southern Africa and the ECOWAS Commission. The network is expected to use existing fibre-optic infrastructure complemented by very small aperture terminals (VSAT) for backbone connectivity, and wireless technology for last-mile deployment.

The core applications to be deployed include connectivity of Heads of State and Government, foreign affairs ministries and ECOWAS institutions. The feasibility study and environmental impact assessment have been completed. The project implementation cost is estimated at USD 98 678 500.

The ECOWAS ICT Ministers have approved the ECOWAN project and set up an ECOWAN project implementation committee. The ECOWAS Commission is now in the process of recruiting a consultant to conduct a market analysis and develop an ECOWAN business model, as a basis for raising funds to implement the project.

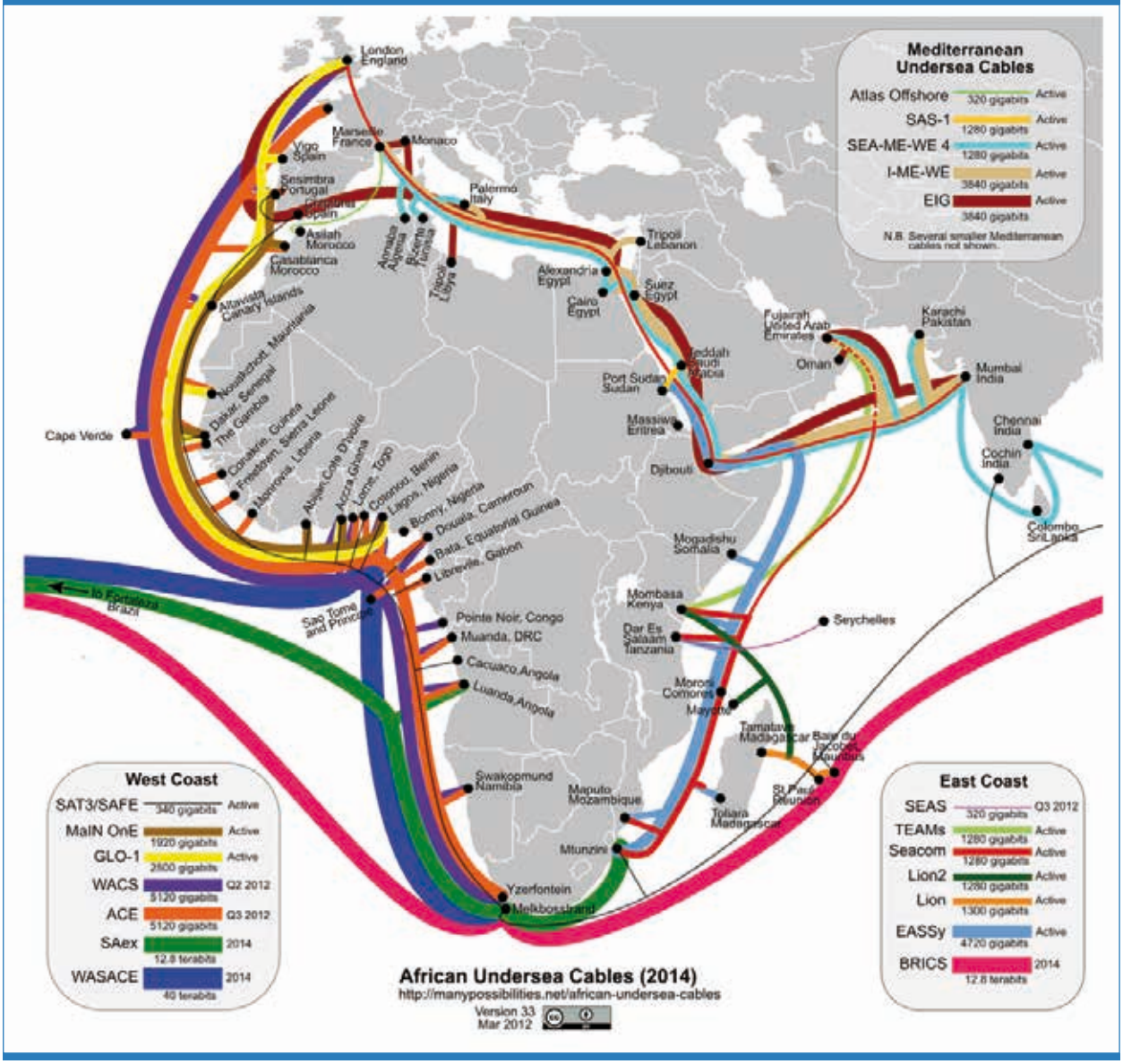
Internet exchange points

The overall impact of the Internet as an enabler in Africa and in particular in the ECOWAS region has unfortunately been curtailed by a number of factors, including the lack of efficient pathways to carry growing local and regional traffic between Internet service providers. This problem occurs both at national and regional level.

In the context of the African Internet Exchange System (AXIS) project, ECOWAS is a member of the AXIS Steering Committee, which is responsible for overseeing the implementation of the project.

As well as setting up national and regional Internet exchange points (IXPs), another objective of the AXIS project is to build capacity. In the ECOWAS region, many workshops have been held since the launch of the project. Some of

Figure 2– West African submarine cables



these workshops have been devoted to identifying best practices to set up an IXP, while other workshops have offered technical training.

Harmonized policy and regulatory framework

Telecommunications and ICT form a cross-cutting sector that has an impact on all economic and social areas: education, health, trade, agriculture, governance and so on. Recognizing this, the ECOWAS Heads of State and Government decided on a policy and regulatory framework that is more favourable to the development of the sector. This ECOWAS framework was put in place through Supplementary Acts adopted in Ouagadougou, Burkina Faso, in January 2007.

The new policy and regulatory environment comprises an Act on the harmonization of policies concerning the sector, complemented by specific Acts on the various aspects of the sector (access and interconnection of networks and services, a legal regime applicable to network operators and service providers, management of numbering plans and radio-frequency spectrum, universal access and service). These Acts seek to promote competition and efficiently regulate the telecommunications and ICT market, in order to attract further investment for faster and more harmonious development of the sector. In addition, the Acts promote access and universal service to bridge the digital divide in the region, with a view to ushering the entire ECOWAS membership in to an inclusive information society.

In February 2009, a regional monitoring committee was launched and an action plan was elaborated to support Member States technically and financially in order to fast-track the transposition process of the ECOWAS Acts. The committee is made up of the ECOWAS Commission, the West African Economic and Monetary Union, WATRA, and parliamentarians in the region.

By the end of December 2013, thirteen ECOWAS member States had completed the transposition of the Community Acts into their national laws, while two others were at different stages of the transposition process.

Cybersecurity agenda

The growing use of ICT, the popularity of social networks and the emergence of the Internet, with all the innovative and useful services that they provide for users, pose the challenge of maintaining privacy and building confidence and trust in the reliability and security of telecommunications and ICT applications.

In response to this challenge, the ECOWAS Commission, with the assistance of the United Nations Economic Commission for Africa, has developed supplementary Acts on electronic transactions and personal data protection, and a Directive on fighting against cybercrime. The two supplementary Acts – on electronic transactions and personal data protection – were adopted in February 2010 by the Heads of State and Government. The Directive on fighting against cybercrime was adopted in August 2011. As a further response, ECOWAS, with the support of the United Nations Conference on Trade and Development (UNCTAD), is conducting a capacity building programme for ECOWAS stakeholders on the harmonization of cyber legislation in the ECOWAS space, particularly in regard to e-commerce.

Regional database

The need for well-structured statistical data and information on telecommunications and ICT is evident, given the importance of the sector. In particular, investors and development partners always require comprehensive and up-to-date information on the existing state of the sector in the region.

In response, the ECOWAS Commission, within the framework of technical cooperation with ITU, has embarked on an initiative to establish a computerized telecommunications management information system. The system is known as SIGTEL.

SIGTEL will be the primary Internet portal for information on the telecommunications and ICT sector in the ECOWAS region. It is designed to cater for the information needs of ECOWAS policy-makers, development partners and investors. The SIGTEL site will be continually updated to respond to the evolving information requirements of users. In order to provide relevant indicators via the SIGTEL site, a national correspondent will be nominated by each Member State and will have the responsibility of forwarding the required data regularly to the Commission.

Training workshops are being conducted annually for the national correspondents responsible for providing the data related to indicators. This is an opportunity not only for the national correspondents to share their experiences on how they operate the system and talk about the difficulties they encounter, but also to build capacity for the upgrading of the SIGTEL site.

The ECOWAS/ITU interactive terrestrial transmission maps are being finalized. These maps will show policy-makers and investors where the missing links in terrestrial transmission are across the region.

Mobile roaming

Telecommunications and ICT services – particularly mobile services – facilitate trade between countries and are essential to the successful economic integration of the region. In this context, the ECOWAS Heads of State and Government have appealed to mobile operators to sign roaming agreements in order to facilitate communications in the region.

Despite the competitive tariffs for "group roaming", mobile roaming tariffs are still high and there is not enough transparency in regard to the rates or the terms and conditions for roaming that are provided to users. To deal with such problems, in 2005 the ECOWAS Heads of State and Government set up the ECOWAS Technical Group on Roaming.

Digital terrestrial broadcasting

The 2006 Geneva Agreement set 17 June 2015 as the international deadline for transition from analogue to digital television broadcasting in the UHF band. Among the measures taken to comply with the deadline, the ECOWAS Member States adopted a technical road map scheduling digital terrestrial television transition in the region for 31 December 2014.

To take advantage of economies of scale to reduce the cost of acquiring equipment, the transmission norm DVB-T2 and the compression standard MPEG-4 AVC have been adopted for the ECOWAS region. Also, to make digital terrestrial television receivers more affordable, common minimum technical specifications have been adopted for receivers.

Challenges and opportunities

In carrying out its mandate, the ECOWAS Commission has faced a range of difficulties, the main ones being the lack of staff to implement and follow up regional activities, insufficient capacity building (training, seminars, conferences and so on) to keep abreast of new technologies and trends, lack of political will in the transposition of Community Acts (along with lack of enforcement of laws at the national level), and slow administrative processes that delay the implementation of approved activities.

There are, however, many opportunities and strengths that augur well for the future. Among the most important are the following. ECOWAS can call on the assistance and collaboration of an impressive range of partners (see box) to develop and implement Community programmes. Regional policy and regulatory frameworks already exist. ECOWAS member States have adopted telecommunications and ICT policies and strategies, with components to treat cybersecurity and cybercrime. There is already a regional framework that allows ECOWAS member States to share data on cross-border cybercrime.

ECOWAS partners in the implementation of programmes, projects and activities include:

- *ITU*
- *African Telecommunications Union*
- *United Nations Economic Commission for Africa*
- *United Nations Conference on Trade and Development*
- *African Union Commission*
- *World Bank*
- *European Union*
- *African Development Bank*
- *West African Economic and Monetary Union*
- *WATRA*
- *Universal Postal Union*
- *Pan African Postal Union*
- *West African Postal Conference*

The mobile boom has created an awareness of telecommunications and ICT, and the advantages of their use. Postal networks are now being used to provide e-commerce. The analogue to digital transition will provide a digital dividend that can be used for other services. So, all in all, the West African market is attractive.

Much progress has been made over the past decade in West Africa in terms of developing broadband infrastructure and setting up an enabling environment. There is enough international capacity with the terrestrial broadband networks and the operational submarine cables. Many ECOWAS countries are now in a position to leverage broadband Internet connectivity, and most of them have adopted new telecommunications and ICT legislation in compliance with the ECOWAS Community Acts.

The boom in mobile is introducing new ways of accessing information and doing business, such as m-banking, m-government, m-health and m-commerce.

Meanwhile, it is important to remember that, in the rapidly evolving telecommunications and ICT sector, institutional and human capacity building need to be continuously maintained. ■

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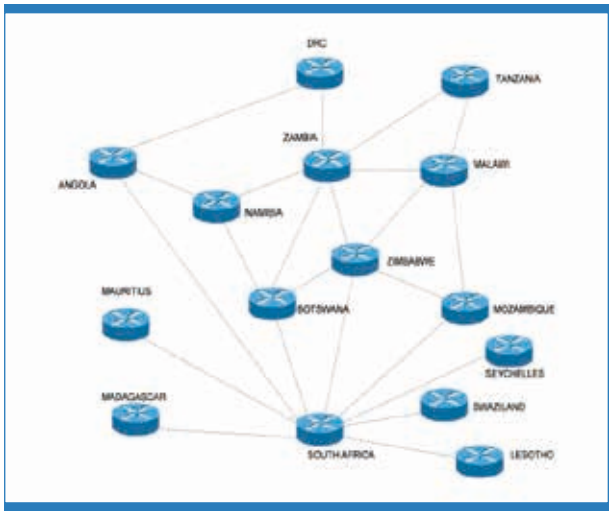
Information infrastructure in Southern Africa

Role of the Southern Africa Telecommunications Association

The Southern Africa Telecommunications Association (SATA) is working to implement a regional information infrastructure for the Southern African Development Community (SADC). This project has been programmed in two phases. Phase I, which is now successfully completed, aimed to implement regional digital transmission links. Phase II involves the migration of fixed and mobile networks to a purely Internet protocol (IP) environment, with a view to providing broadband services.

Digital transmission links

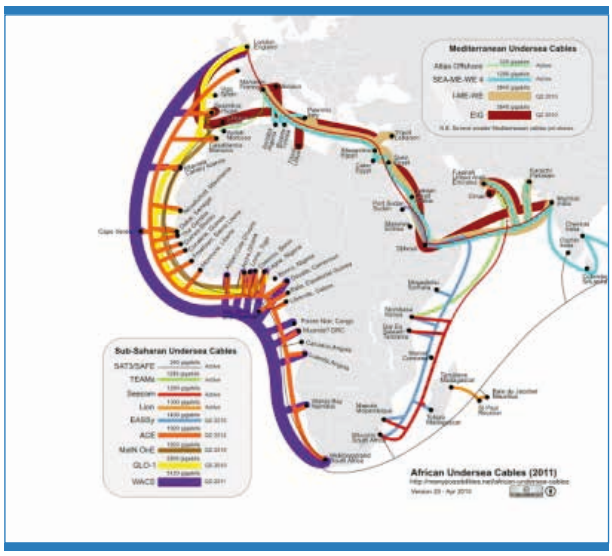
The feasibility study for Phase I of the SADC regional information infrastructure project was funded by ITU. Starting in 2000, the short-term objective was to digitize transmission links, while the medium-term objective was to extend these links. The long-term objective included achieving all-fibre regional transmission broadband networks, as well as backhaul links to submarine cable landing stations. The feasibility study relating to the long-term objective was funded by



the African Development Bank through the New Partnership for Africa's Development (NEPAD) Infrastructure Project Preparation Facility (IPPF) and was completed in September 2009. The consultants were PricewaterhouseCoopers of the United Kingdom.

As a result of Phase I of the project, all the SADC Member States (Angola, Botswana, the Democratic Republic of the Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe) are now all connected to submarine cables.

Thanks to the project, most of the SADC member States have completed implementing optical fibre backbones covering their respective territories. The SATA working group responsible for implementing the infrastructure is the Backhaul Working Group, which meets every year to discuss and review progress on regional connectivity.



Upgrading connectivity

The SADC regional information infrastructure project takes into account the connectivity goals of the Connect Africa summit, which were adopted to accelerate the implementation of the targets set by the World Summit on the Information Society.

During the 10th SADC telecommunication operators bilateral meeting, held in Gaborone, Botswana, in February 2010, SATA members agreed to upgrade regional cross-border links to at least STM 64, with a view to further upgrading them to dense wavelength division multiplexing – an optical technology used to increase bandwidth over existing fibre-optic backbones.

What SATA does

SATA participated in the Connect Africa Summit, held in Kigali, Rwanda, from 29 to 30 October 2007. SATA is a SADC specialized institution and implementing agency for telecommunications and information and communication technologies (ICT) infrastructure and services in the region.

Headquartered in Maputo, Mozambique, SATA has a permanent secretariat under the leadership of its Executive Secretary and Chief Executive Officer, Jacob Munodawafa. SATA members are telecommunication operators from SADC member States, and some associate members and partners from other parts of the world.

SATA implements infrastructure projects and initiatives through its members. ■

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Connecting Burkina Faso

Infrastructure challenges and prospects

Background

It is now generally acknowledged that the level of penetration of electronic communication services has a direct impact on a country's economic growth. Like any other essential economic infrastructure (roads, ports, airports, and so on), telecommunication infrastructure contributes to social and economic development by helping to create jobs, stimulate trade and improve public well-being.

In order to ensure that information and communication technologies (ICT) contribute significantly to achieving the Millennium Development Goals (MDGs), and in particular MDG 8, a number of African leaders and their international partners in the sector in October 2007 launched the "Connect Africa" initiative in Kigali. The aim of this initiative is to create a global partnership to improve ICT infrastructure within Africa and improve the continent's connectivity with the rest of the world.

This reflects the findings of the UN Millennium Development Goal Report 2009, which noted that at the end of 2007 more than one fifth of the world's population was connected to the Internet, but also observed that enormous regional disparities exist. The rate of Internet use had reached 64 per cent of the population in developed regions, but only 13 per cent in developing regions and 1.5 per cent in the least developed countries. Reducing these disparities has thus become an urgent necessity, since secure Internet access, especially high-speed and very high-speed Internet, would contribute much to achieving the MDGs and accelerating development in areas such as health, education and vocational training.

True to their commitment to achieving the MDGs, and aware of the driving role that ICT can play in speeding up the attainment of these goals, the African Union Heads of State in January 2010 met at the 14th ordinary session of their Assembly in Addis Ababa, Ethiopia, which focused on the main theme "Information and Communication Technologies in Africa: Challenges and Prospects for Development". The conference adopted the Addis Ababa Declaration in which the Heads of State committed themselves to:

- reinforcing national programmes and regional cooperation for the development and interconnection of national and pan-African broadband infrastructure; and

- promoting a regulatory environment conducive to the implementation of innovative models of public private partnerships and financing for telecommunication/ICT infrastructure.

They also called on development partners and financial institutions to provide finance for telecommunication/ICT infrastructure projects on the same terms as for other basic public infrastructure such as roads.

Infrastructure challenges and opportunities

The international level

Submarine cable laying projects undertaken up to the end of 2013 on the west coast of Africa have multiplied the capacity available on the first cable (SAT3) by a factor of at least 30. Burkina Faso thus has a unique opportunity and a major incentive to develop its own national fibre-optic backbone infrastructure in order to boost its access to the capacity offered by these international submarine cables and take advantage of the very low tariffs offered by the operators of this international infrastructure.

Burkina Faso's access to capacity at the submarine cable landing points in Abidjan (via Banfora – Bobo), Cotonou (via Lomé – Cinkance) and Dakar (via Bamako – Bobo) will need to be reinforced and made secure by the completion of direct fibre-optic connections between Burkina Faso and all the neighbouring countries (Ghana, Benin and Niger). Completion of these links will enable us to reinforce and diversify direct access routes to the existing landing points in Ghana and Benin.

Burkina Faso's geographical situation in the heart of West Africa means that it must have broadband backbone infrastructure and high-speed and very high-speed national networks interconnected with those of its neighbours, if it is to play its full part as a crossroads for integration and take full advantage of its strategic position.

At the national level

If Burkina Faso is to be integrated into the global information society, it must have on its territory communication infrastructure with the capacity and quality required of a link in the global information highway. The construction of fibre-optic backbone infrastructure is crucial to Burkina Faso's economic, social and cultural development; such infrastructure is essential to the provision of high-speed and very high-speed access throughout national territory and will allow the use of electronic communication services that can make a real contribution to development. Without that infrastructure, major government initiatives in e-government, e-education and e-health may well remain just fine words.

Prospects

In order to meet all these challenges in the context described above, Burkina has begun construction of national fibre-optic backbone infrastructure. This reflects recognition of the crucial importance of such infrastructure to the development of the electronic communication sector, a cross-cutting sector that underpins the entire economy and thus also all the other economic and social sectors.

Effectively implementing this national backbone – a fundamental pillar of national development policy – will enable Burkina Faso to optimize its attainment of the MDGs and the principal strategic goals of the Programme put forward by President Blaise Compaoré.

In the light of the conclusions of the feasibility study conducted between 2008 and 2010, the Government of Burkina Faso has included the construction of the national fibre-optic backbone in its sectoral policy for 2011–2015. The backbone project is given a prominent place in the programme as one of the flagship initiatives of the country's telecommunication/ICT sector development programme.

Based on the goals of the "Connect Africa" Summit, which include broadband interconnection of the principal African capitals and cities, the national backbone has the following technical characteristics:

- It uses fibre-optic technology with optical fibre of sufficient quality to allow the use of the most recent optical transmission technology (DWDM). Optical fibre is deployed along roads linking the main provincial centres starting with the political capital Ouagadougou, and/or those connecting Burkina Faso with its neighbours.

- The network architecture comprises main links and loops connecting the main urban centres as well as links with neighbouring countries. These are based on high-capacity fibre-optic cable (72 or 36 fibre pairs). Secondary links and loops use lower-capacity fibre-optic cables (24 or 12 fibre pairs). The backbone comprises a number of redundant optical links, ensuring high reliability and a near 99.00 per cent availability rate. The estimated total length of the backbone, in the initial phase to connect Ouagadougou with 45 provincial centres, is 4 763 km.

Following completion of phase 1 of the project:

- 145 major centres at the district level are covered, including:
  - 45 major provincial centres;
  - Six urban district centres;
  - 94 rural district centres.

- Ten international interconnection points (six main and four secondary) have been established.

Phase 2 involves the extension of the national backbone to district centres not covered in Phase 1. Fibre-optic access branches (underground or above ground) using radio-relay or Wi-MAX will enable us to connect these centres. The final choice of technology will be based on traffic forecasts.

Conclusion

Construction of the national fibre-optic backbone infrastructure is one of the major framework projects which Burkina Faso must implement successfully if it is to achieve the development goals it has set itself. The strategic nature of this infrastructure derives from its role as both an essential platform supporting all the other economic and social sectors at the national level and as a vehicle for integrating the country into the global digital economy. For these reasons the project is led at the highest level of the State. ■

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Phases of activity in the CAB-Cameroon Programme and national broadband network

(Implemented, in progress or planned)

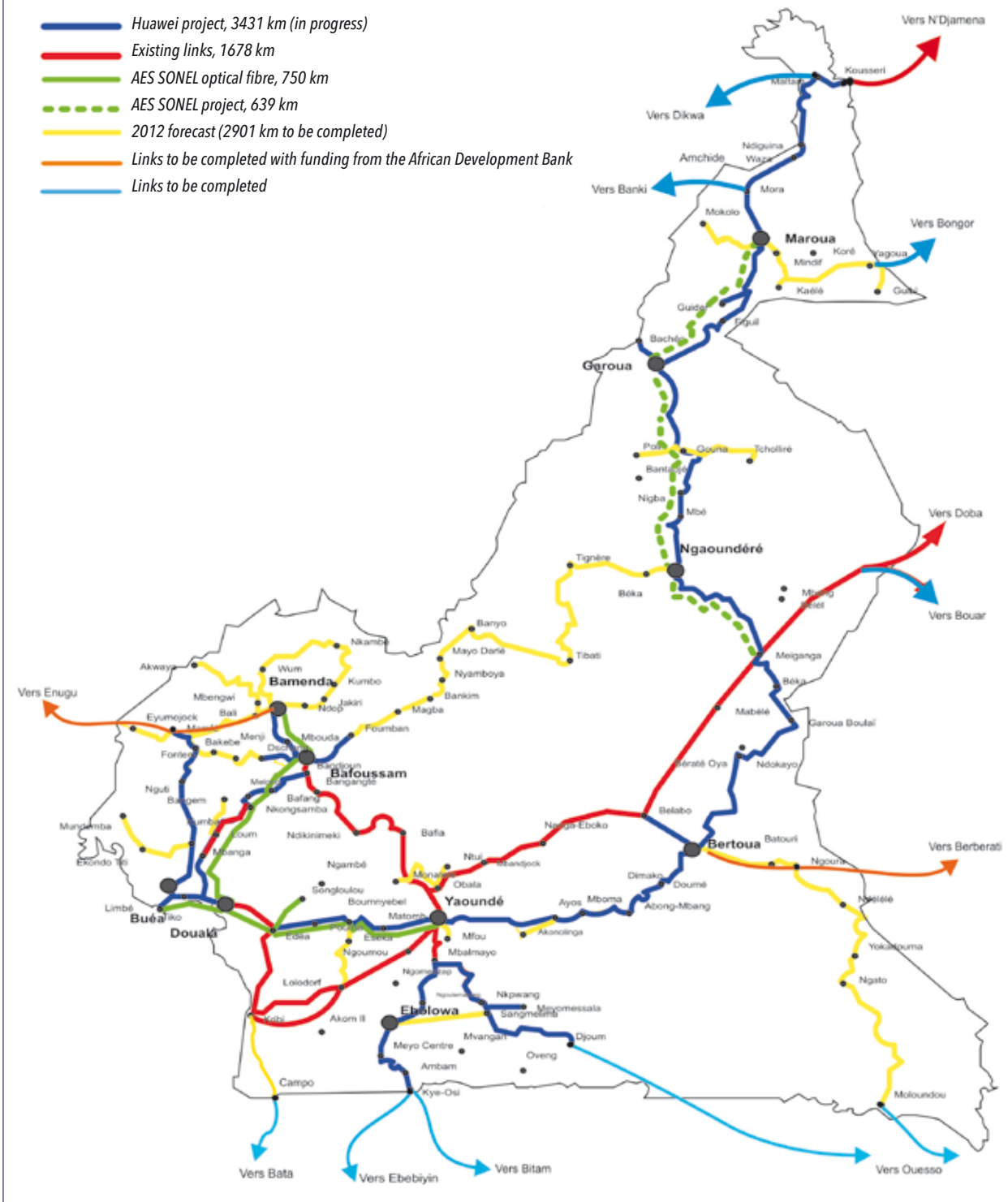
Component 1: Promoting the sectoral environment

- Fostering the development of the legal and regulatory framework for telecommunication/ICT by transposing CEEAC directives
- Study for frequency management, provision and installation of radio-frequency monitoring equipment
- Design and implementation of regulatory instruments for wholesale and retail markets, promotional offers of telecommunication services
- Fiscal and tariff study of the telecommunication/ICT sector
- Use of solar power for fibre-optic network equipment
- Study regarding evolutionary scenarios for the incumbent operator
- Measures to support DSO, digital dividend and establishment of e-waste (WEEE) management centre(s) in Cameroon
- Creation of a technology and digital economy innovation centre
- Creation of a regional Internet exchange point (IXP) in Cameroon.

Component 2: Enhancing connectivity

- Synopsis of Cameroon's national broadband network and cross-border connections with neighbouring countries (existing, under development or planned) (see box and network plan).

National broadband network (NBN) project
Cameroon's solution for bringing broadband to the home…



Component 3: Promoting transparency and good governance through flagship e-government initiatives

- Promotion of the Cameroon domain name (.cm)
- Development of the government website
- Digitization of Cameroon's tourist assets and cultural heritage
- Study and implementation of hybrid mail in the Cameroon Postal Services (CAMPOST)

Metropolitan network

- *Network based entirely on optical fibre on account of its high capacity and renowned reliability.*
- *35 areas to be covered by a total of 595 km of optical fibre.*
- *High capacity – 20G for the cities of Yaoundé and Douala, 10G for other cities.*
- *70 per cent of the population covered.*

FTTX for VIPs
FTTX very high-speed network

- *An FTTX network to meet the huge demand from major institutional bodies (public institutions, banks, embassies, universities, NGOs, and so on) and VIP users (diplomats, members of the Government, the business community).*
- *6300 km of optical fibre covering 35 areas of major importance including 13 between Yaoundé and Douala.*
- *Speed for residential users to increase from 512 kbit/s to 10 Mbit/s (20 times the current speed), up to 100 Mbit/s and above later on, serving more than 30 000 individuals.*
- *Speed available to businesses will be 20 times higher.* ■

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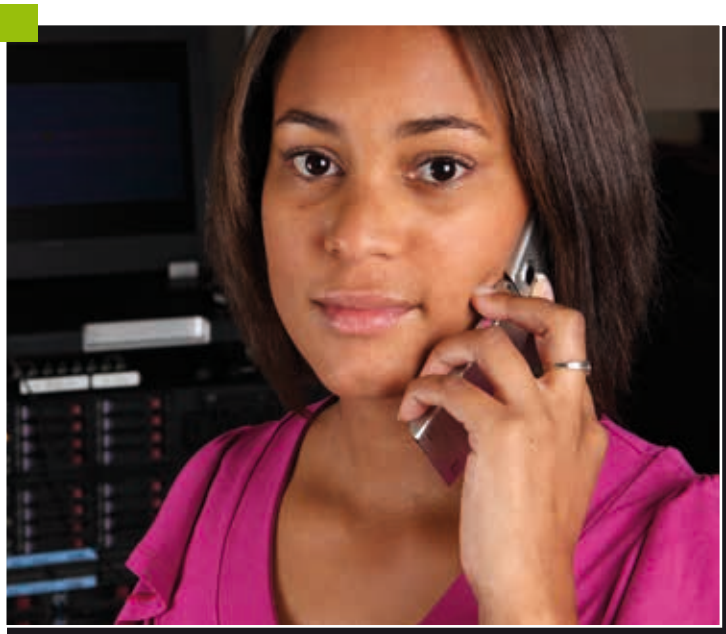

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