Chapter 4
The State of Broadband in Africa: What's Here and What's Coming?

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Why Broadband in Africa Matters

The first decade of the twenty-first century was a remarkable period of growth for the continent of Africa (World Bank and African Development Bank 2012). The annualized level of GDP growth between 2000 and 2010, at just over 4 % per year, was more than twice what had been achieved in either the 1990s or the 1980s (Fig. 4.1). Although there are many reasons behind this—including rising commodity prices, greater political stability, and better governance—a key factor has been the success of the information and communication technologies (ICT) sector in Africa, notably the rise of mobile communication. At the start of the decade there were just 16.5 million mobile phone subscriptions in Africa, but by the start of 2012, there were some 650 million subscriptions, or two for every three Africans, and more than in the United States or the European Union. World Bank research indicates that between 2000 and 2008, Africa's early telecom reformers enjoyed an extra 1.2 % point boost to GDP compared to those that only liberalized their telecom sectors later (Williams et al. 2011, p 111).

The direct contribution of ICTs to Africa's economy and its growth is impressive. In 2011, the mobile phone ecosystem provided more than five million jobs and contributed around US$15 billion directly to government revenues in sales, import taxes, and regulatory fees (Kearney 2011, p 21). The rising demand from consumers is also spurring greater investment in the sector. In the telecommunication sector, private investment, much of it from foreign sources, contributed some US$77 billion between 2000 and 2010 for sub-Saharan Africa. Africa is now a much easier

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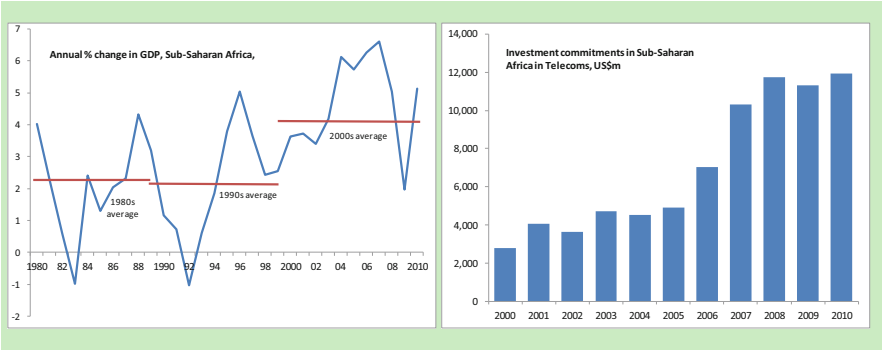

Fig. 4.1 ICT driving Africa's renaissance. Africa's economic growth, by decade, 1990–2010 *(left chart)* and private investment in telecoms, 2000–2010 *(right chart)*. *Source*: World Bank, World Development Indicators, PPI Database

place to do business, thanks to its much-improved connectivity. ICTs directly contribute up to 7 % of Africa's GDP, which is higher than the global average.

The growing popularity of mobile phones in Africa is driving the demand for bandwidth. At the start of the new millennium, the entire continent of Africa had less international Internet bandwidth than the tiny country of Luxembourg (ITU 2000). As recently as 5 years ago, the situation did not look promising, but a new generation of international cable projects has transformed the situation, at least for international connectivity, as more than a dozen submarine cable projects have connected Africa to the other rest of the world, including ACE, WACS, EASSy, and SEACOM. Some 68,000 km of submarine cables had been rolled out by 2012, and a further 92,000 km are planned.

But bringing that connectivity from the coast into the heart of Africa is a challenge that is still to be addressed. For example, take the case of South Sudan, the world's newest nation. There are no fiber-optic cables within the borders of South Sudan, and all international connectivity is provided by very small aperture terminal (VSAT) satellite dishes or by microwave. Indeed the most reliable form of communication between the ten state capitals is still the telegraph network, built a century ago. In the offices of the Ministry of Telecoms and Postal Services, in downtown Juba, the telegraph operator is the busiest man around and is happy that his skills in Morse code, learned as a freedom fighter, are still in demand (Fig. 4.2).

Even for countries with access to a coastline, Internet bandwidth can be constrained. The 800,000 citizens of Comoros have to make do, for instance, with just one 155 Mbit/s circuit. Comores Telecom, which in 2013 was still a state-owned monopoly, pays some US$2.750 per Mbit/s of international capacity, more than ten times higher than in Kenya, despite having access to the EASSy undersea cable. The monopolistic structure of the market, combined with the lack of economies of scale, makes it hard to reach critical mass in Internet use.

Fig. 4.2 The public telegraph operator at the Ministry of Telecommunications and Postal Services, Republic of South Sudan

Without fiber-based international connectivity, broadband prices in South Sudan, at over US$100 per month for a 1 Mbit/s connection, are some of the highest in Africa (Kelly and Minges 2011), but African prices generally remain well above the global average. And yet, broadband is vital to the health of modern economies. A 10 % increase in broadband is associated with a 1.4 % increase in GDP per capita in developing countries (Qiang and Rossotto 2009, World Bank, 2009). But few African countries have reached that level of penetration.

The challenge for Africa in the second decade of the twenty-first century is therefore to match, in broadband networks, the success that was achieved in narrowband mobile services in the first decade.

Where Does Africa Stand?

At the start of 2011, there were some 37 million broadband subscribers in Africa, mainly on mobile networks (Fig. 4.3). Penetration rates are high in North Africa, but raw numbers are higher in sub-Saharan Africa. At the start of 2011, approximately eight African economies had more than a million broadband subscribers, with South Africa having the most subscribers, but Libya, perhaps surprisingly, having the highest level of penetration. Prices for broadband service remain high in Africa.

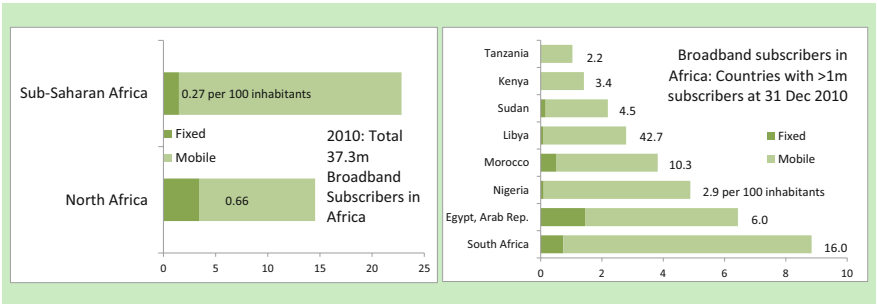

Fig. 4.3 African broadband. Broadband subscribers in Africa, and selected countries with more than one million subscribers, 2010. *Source*: ITU World Telecommunication Indicators Database

In the same way that most African's first telephone was a mobile, it is likely that their first experience of using the Internet will also be on a mobile device. Africa's adoption of broadband Internet will follow a different pattern from that of the Organization for Economic Co-operation and Development (OECD) countries, where mobile Internet came only later, after networks based on fixed-line digital subscriber line (DSL) technologies had been established. This evolution pattern has some important implications:

- Mobile broadband is likely to remain more expensive than fixed-line broadband on a per-megabit (MB) basis. Given that Africans tend to be more price sensitive than citizens of OECD countries, this suggests that usage will be lower.
- In addition, the practice of always-on, unlimited pricing, which was key to driving broadband take-up in the transition from dial-up, in the early 2000s, is much less common for mobile broadband. Although "data bundles" are common, representing a hybrid between metered pricing and data caps, mobile broadband is likely to prove expensive and unreliable for data-intensive uses, such as streaming movies or online video chat.
- This has implications for the ways in which users "learn" about broadband Internet use and information search. The best way to learn is through unrestricted use, clicking on links without much concern about price implications. By contrast, users who "learn" Internet use with one eye on the clock are likely to be more constrained in their use and hesitant to explore.
- Furthermore, most usage of mobile broadband in Africa will initially be from featurephones, with smaller screens, rather than smartphones or tablets. In consequence, Internet use is likely to be via relatively "closed" applications, rather than from "open" Internet browsers. Popular Internet uses include applications such as facebook, whatsapp, and MXit.
- Finally, because mobile devices tend to be personal rather than institutional, most first-time Internet users in Africa are likely to be paying their own way, rather than having the freedom to use the Internet at school, university, or work. This may change in time, for instance with a number of African countries

adopting laptops in schools, such as the April 2013 announcement by Kenya's new government of one laptop per child for all 7-year-olds. But in the short term, broadband use is likely to be a personal rather than a corporate expense.

Missed Opportunities in Middle-Income Countries

If broadband is to take off in Africa, and overcome these structural constraints, one would expect middle-income countries to take the lead. As might be expected, the Southern African trio of countries—Botswana, Mauritius, and South Africa—are near the top of the African league table of broadband use. But they are not performing as well as might be expected on the global stage.

The three countries represent quite distinct cases—an island state, a landlocked country, and one of Africa's largest economies. They also have similar, but nevertheless different, reasons for earmarking broadband as an important policy component in national competitiveness:

- In Botswana, the national imperative is to reduce dependence on diamonds and other mineral resources. Per capita revenues from mineral resources are already in decline since the peak they reached of around 7,000 Pula (around US$880 at 2012 exchange rates) per person. Broadband can help by improving national and enterprise competitiveness and by creating alternative and diversified sources of revenue growth in areas like financial services. Because of Botswana's landlocked position, its policies of competitiveness and development of service industries will allow it to offer lower prices and higher performance than its larger neighbor, South Africa.
- In Mauritius, broadband is part of a bigger plan to create a cyber island and to make ICT into a "fifth sector" of the national economy. In the 2013 budget speech, there is a commitment to "Embracing a technological future" and recognizing that "the Internet is a fundamental right for all our citizens" (Mauritius Ministry of Finance and Economic Development 2012). Among the measures announced to achieve this is the use of the Universal Service Fund as the tool to subsidize entry-level broadband access to bring down the price from 349 to 200 Rupees per month (i.e., US$6.35). Mauritius, in particular, wants to ensure that foreign investment is attracted to the country and that it can compete in business process offshoring (BPO) with rivals such as India or Singapore.
- In South Africa, a national broadband network is seen as a socially and geographically unifying force, with a big focus on extending the network into rural areas, even if this means the local and regional governments rather than the private sector taking the lead role. There is much admiration in South Africa for the position taken in Australia where the government has committed to underwriting a national broadband network. The plan is expected to become clearer when an updated national broadband plan is issued in 2013, superseding the current plan. The country's international broadband connectivity was seen as a critical factor in winning a share of the Square Kilometre Array radio telescope.

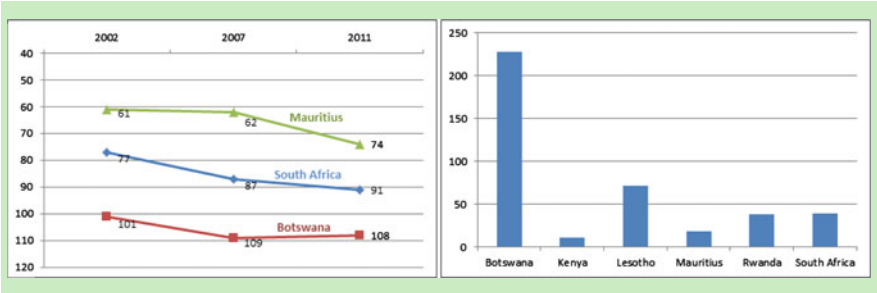

Fig. 4.4 Failure to compete. Comparative performance on the ITU ICT Development Index, and price of 1 GB of mobile broadband, Oct 2011, in US$. *Source*: ITU (2009–2011) Measuring the Information Society, and ICTdata.org

Both Mauritius and South Africa have developed national broadband plans, and Botswana is in the process of developing one. There is a strong commitment to developing broadband in each of the three countries. But, for one reason or another, success is proving elusive. All three countries are succeeding in growing their broadband networks, but they are doing so at a slower rate than their international competitors, especially in relation to the booming economies of developing nations in Asia. Indeed, Southern Africa is being outperformed even by some African nations, notably Kenya which is emerging as an ICT powerhouse with some of the lowest prices on the continent for broadband services (see Fig. 4.4).

The three economies share some key failings which have been responsible for their relative failure to develop competitive broadband offerings. Half-hearted privatization is one reason: in South Africa, Telkom was privatized relatively early (1999), but the new purchasers were then given a pronged period of exclusivity. In Mauritius, the state has still retained a controlling 60 % stake, even though France Telecom/Orange was bought in as a strategic investor. In Botswana, privatization was discussed as long ago as the early 1990s, but until now it has still not happened. The current plan is to sell a minority stake, 49 %, to local investors and the wider population, but this has been further slowed by a scheme to separate out the backbone and international cable network of the incumbent, BTC, into a state-owned entity, BOFINET.

Beyond the half-hearted privatizations, each country has also suffered from a failure to open up access to the incumbent's networks to competition through schemes such as local loop unbundling, which has proved successful in Europe. In Mauritius, which has only just over a million potential users, the competing networks of Emtel and Bharat Telecom have been obliged to construct their own backbone networks because they cannot get reasonably priced access to that of the incumbent, Mauritius Telecom. In South Africa, the fixed line network is in precipitous decline, losing more than one million subscribers between 2000 and 2011. Telkom South Africa seems to be following the strategy that if it cannot retain

access to its subscribers, its competitors should not be allowed to do so either. In Botswana, the seemingly interminable delays over the creation of BOFINET, with at least four consultancy firms advising different parts of the government, have created a paralysis in the market, and the mobile companies may be obliged to construct their own networks to guarantee customer access to high-speed broadband.

A One-Time Opportunity for African Broadband: Digital Switchover

The story of African communications over the last decade is success in mobile networks, but relative failure of fixed line networks, where governments have been slow to relinquish outdated structures of state ownership and monopoly. On the horizon, though, is a one-time opportunity to benefit from the additional spectrum freed up by the transition of radio and television broadcasting to digital standards, the so-called digital switchover (DSO). Although few African countries are likely to meet the target established by the International Telecommunication Union (ITU) of 2015, there is a growing momentum for change, and there is pressure from the mobile operators to release spectrum under the so-called digital dividend (Bezzina, 2013).

The biggest impact of the DSO transition is improved television service through better picture quality, improved national coverage, and a wider choice of channels. But improvements are also expected in broadband Internet through the efficiency gains afforded by digital broadcast technology. The spectrum that the switchover liberates presents a significant opportunity for extending Internet access (through mobile broadband). The spectrum freed up by the DSO tends to be more valuable, because it uses lower frequencies that have a greater range. This is particularly important for rural areas because the capital cost for networks using these frequencies can be lower than that of existing networks which must use the higher frequencies. In theory, by 2015, a large new swathe of prime spectrum, between 694 and 862 MHz, should become available for implementing mobile broadband in Africa, and with it, the possibility of video streaming.

Of the 55 African countries, only Mauritius is currently certain to achieve the DSO early, having started the process in 2006. By the end of 2011, some 250,000 set-top boxes had been sold for the country's 350,000 inhabitants. The analogue signal is due to be switched off at the end of 2013. In anticipation of this, the government has been undertaking a consultation process and revising legislation to allow it to use market mechanisms for the allocation of spectrum, including the use of auctions and secondary trading.

Making more high-quality spectrum available promises a supply-side boost to broadband availability in Africa. This needs to be matched by innovative approaches by suppliers to convert the spectrum into affordable services, using appropriate technologies, which might be cheaper to roll out. In Mogadishu, for

instance, a 1-year-old start-up, Somalia Wireless, is planning to use the so-called Super WiFi technology to reach users who currently pay an entry-level price of US $350 per month for a 256 kbit/s connection.

But supply-side measures also need to be matched by demand-side actions aimed at increasing the *absorptive capacity* of the country (Kelly and Rossotto 2012). In the context of broadband, it may be considered in terms of:

- The capacity of businesses to create broadband-enabled services and applications to improve productivity and efficiency
- The capacity of individual users to create and use broadband-enabled services and applications to improve their welfare
- The capacity of government departments and other institutions (for instance, schools and hospitals) to introduce and accommodate broadband-enabled services to deliver public services more efficiently to the public

In Africa, given the restrictions noted above on the unlimited use of broadband and the scope for experimentation, absorptive capacity is quite low. Nevertheless, there is a huge consumer demand for mobile broadband because of the lack of substitutive services that meet the need for information, such as newspapers, multichannel TV, or fixed line broadband. It is important therefore to plan for the one-time opportunity offered by the DSO with both regulatory measures, to make sure that the newly available spectrum ends in the hands of those best able to make use of it, and demand-side measures to ensure that the necessary local content and applications are available to make it interesting. The success of mobile communications has finally killed off the myth that Africa is not yet ready, or able to pay, for ICTs.

The stage is set, therefore, for a new digital revolution in Africa to follow the mobile revolution, in which narrowband networks will be converted to broadband over the course of the next decade or so. The preconditions are falling into place—improved international connectivity, spectrum liberated by the DSO, competitive markets, local content and applications development, and national broadband plans. The potential impacts are huge and transformational, especially in information-intensive parts of the economy, such as education, health, and government. Let it happen.

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