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Focus on access to infrastructure

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Editor
Alan Finlay

Assistant editor
Lori Nordstrom

Publication production
Karen Higgs

Graphic design
MONOCROMO
Myriam Bustos, Leticia da Fonte, Pablo Uribe
info@monocromo.com.uy
Phone: +598 (2) 400 1685

Cover illustration
Matias Bervejillo

Proofreading
Lori Nordstrom
Lisa Cyr

Website
www.GISWatch.org
Andrea Antelo
Ximena Pucciarelli
Monocromo

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Africa

Abiodun Jagun
Department of Management Science, Strathclyde Business School
www.strath.ac.uk/mansci/staff/abijagun

Introduction

Communications in Africa have made significant gains in a relatively short space of time. For example, thanks largely to spectacular growth in mobile cellular communications, it is now no longer credible to compare the number of telephones on the continent to what pertains in a single city elsewhere in the world.[1]

Problems of accessibility still persist, however, and the financial cost of access in African countries ranks amongst the highest in the world. Various factors contribute to such high cost, including slow implementation of regulatory reform and inconsistent government policies and legislation, which impact on the level of investment in the sector and reduce the robustness of competition in the telecoms market. The level of development of related sectors, in particular the energy sector (electrification), also has a significant influence on the cost of access, as do socioeconomic conditions including political stability, human capital indicators like literacy and educational levels, and the economic well-being of the population.

However, the dominant contributor to low and expensive access to communications infrastructure in Africa remains the lack of adequate basic telecommunications infrastructure.

M-volution

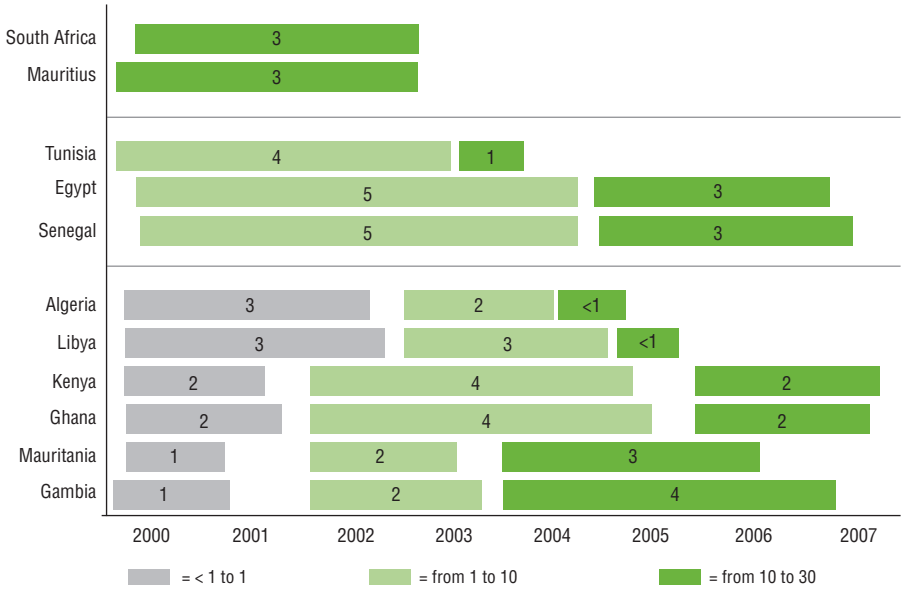
The International Telecommunication Union (ITU) calls the period when a country moves from having a teledensity[2] of ten lines per 100 inhabitants to 30 per 100 the "teledensity transition" (ITU, 1998). This transition is significant because it is when teledensity is above 30 per 100 inhabitants that economic and developmental prospects are greatly improved.[3] In the past, teledensity was measured according to fixed lines,

1 As was once the case in the frequently cited statistic of the Maitland Report which compared the number of telephones in Tokyo to teledensity in Africa: "Tokyo has more telephones than the whole of the African continent, with its population of over 500 million people" (ITU, 1985, p.13).

2 Teledensity is measured as the number of phones per 100 inhabitants. It is taken as one of the key measures of a country's ICT infrastructure.

3 At this level of teledensity, the majority of households and virtually all businesses have access to telecoms.

Figure 1: **Approximate number of years to achieve "teledensity transition" for mobile cellular networks in selected countries**



Source: **Constructed with data from the ITU ICT Statistics Database.**

and the time it took some developed countries to make the teledensity transition ranged from eight to 35 years (ITU, 1998).[4] This has changed with the introduction of mobile cellular networks, which are easier to deploy by operators and adopt by consumers. Figure 1 highlights this in a sample of African countries. It shows that in just seven years, six countries have been able to grow their number of mobile subscribers from less than one to over 30 subscribers per 100 inhabitants.

In fact, for Africa as a whole, "effective teledensity"[5] increased from 1.61 per 100 inhabitants to 28.11 in just under fourteen years (1993 to 2007) – i.e., from the "tipping point" to the "transition point" of teledensity. Such momentum and growth generates optimism and enthusiasm about what can be achieved in terms of communications and development in Africa.

Such optimism, however, takes for granted the existence of national backhaul and international communication infrastructure in Africa – specifically regarding reach and (bandwidth) capacities, as well as accessibility and affordability. Assumptions are also made about prerequisite supporting technologies and infrastructure (in particular energy) as well as "softer" issues such as the information needs of the continent's population, their patterns of knowledge creation, accumulation and sharing, and how these fit into global laws and policies that increasingly determine how information and knowledge are consumed.

How then does Africa build on the success of mobile cellular while maintaining a realistic and pragmatic approach to the significant gaps currently limiting the future of its application?

Acting on the convictions of policy dialogue

ọ̀nà kan ò wọ ọjà

More roads than one lead into the market.
Yoruba proverb

The manner in which telecom networks can be developed and reformed to deliver economic and social benefits has been the subject of numerous reports, committees, fora and summits. This has resulted in a high level of familiarity with issues regarding infrastructure development amongst relevant decision-makers and an appreciable amount of cross-national evidence and recommendations on how such issues can be resolved.

Perhaps the most familiar and accepted learning experience is the importance of liberalisation[6] – the success of mobile cellular is an example of how liberalisation, and the competitiveness that ensues, can be effective in increasing the availability of telecom services (OECD, 2008). African countries need to apply the principles of competition consistently and evenly in all areas of their telecom sectors. This would involve removing barriers that inhibit private sector participation in telecom sectors, and putting into effect regulations that on the one hand help ensure competition in the market while also addressing areas of market failure – that is, occasions where market mechanisms alone are insufficient in delivering desired policy outcomes (ITU, 2007a).

The point on *delivering desired policy outcomes* is worth expanding upon. Liberalisation is usually adopted based on the premise that it will ultimately create an environment in which consumers are able to select, from a range of providers, the product that best matches their needs at a price they feel is acceptable. It might still be early days, but experience of mobile cellular markets in Africa shows that affordability remains a key constraint for consumers. Research by LIRNE.NET conducted in a cross-section of developing regions indicates that the role mobile cellular plays amongst financially constrained groups remains limited (Samarajiva, 2006; Galperin & Mariscal, 2007; Gillwald, 2008). The emerging environment is therefore one of persisting (although lessening) divides – between income groups and geographic areas – even within a liberalised environment.

Desired policy outcomes are therefore not being achieved, and this has led to calls for the opening up of markets to not just multiple operators but also *diverse* types of players. African countries need to review policies and regulations that limit or place barriers on who can provide various types of telecom services, and establish incentives to facilitate a diversity of service providers – such as microtelcos, community operators, cooperatives, municipal governments, etc.

The Yoruba proverb, "More roads than one lead into the market," holds literal application where the liberalisation ethos is to be pursued. African countries should allow both operators and consumers to pursue the different routes into their communication markets. How does this differ from what currently occurs on the continent?

Facilitating diversity and choice in communications infrastructure

The first inch/last mile

Access to communications can be delivered via wired or wireless connections, and through a variety of devices: phones, televisions and personal computers. In Africa, growth in wired connections is progressing, but from a very low and almost non-existent base. In some cases, growth in fixed lines is reversing as incumbents, adopting a more profit-orientated approach, drop debtors, and customers abandon undependable fixed lines. Connectivity through fibre cables – fibre to the home (FTTH) – whether by telecommunications operators, cable television, or utility providers, is low to the extent of being practically non-existent in many African countries. Last-mile connectivity delivered via broadcasting channels such as satellite or cable television suffers from prohibitively high costs, and television penetration remains low on the continent (ITU, 2007b).

4 Figure refers to developed economies in Asia-Pacific.

5 Measured as "fixed lines or mobile users – whichever is higher – per 100 inhabitants" (Kelly, 2005).

6 Defined as the opening up of markets to multiple players.

However, low levels of wired connections pose little threat to connecting users given the capability to connect the last mile using wireless technologies. Other regions of the world (e.g., South Asia and South America) provide examples of how such technologies – notably code division multiple access (CDMA) – are being used to expand wired networks. But the extent to which these wireless technologies have developed in African countries, and the investment required in making them viable contributors to providing communication services (including the internet), are causes for concern.

CDMA Development Group estimates that only 26 African countries have commercial CDMA networks. In addition to the high cost of deployment and end-user devices, growth in wireless networks in Africa is also constrained by the dominance of the global system for mobile (GSM) standard. This calls for greater care in ensuring that regulatory frameworks remain flexible (especially in terms of spectrum allocation) and policies are technology-neutral (e.g., removing constraints that impact on the types of equipment that can be used for deploying networks). Efforts also need to be made at reducing the ambiguities over licensing faced by wireless operators – especially at the community or small-scale level (FMFI, 2008).

National backhaul networks

Advocating for last-mile wireless networks presupposes that a viable and extensive wired national backhaul network exists. Such wired networks – also referred to as backbone networks – facilitate the adoption of services requiring large bandwidth and speeds (such as the internet). Where they exist they are often the cheapest means by which such services can be delivered. Research by APC shows that service providers migrate from satellite (wireless) to fibre (wired) networks when they are available (Jagun, 2008).

However, few African countries, for various reasons – ranging from geographic topology to underinvestment to destruction during conflict – have extensive nationwide networks. Even with universal service obligations written into most GSM and (where applicable) second national operator (SNO) licences, profit-orientated models of network development have resulted in silos of urban infrastructure with operators looking to the incumbent to interconnect regions. So it is often the incumbent operator – operating as a monopoly and predominantly state-owned – that has the most extensive national network. Yet such networks suffer from underinvestment and threat from vandals, while at the same time having to service a broad range of operators and often bearing public service obligations themselves.

It is not surprising then that feasibility studies carried out by the ITU in 2005 concluded that Africa required as a minimum an additional 52,000 route kilometres of backbone infrastructure for intra- and inter-country connectivity (ITU, 2007c). Table 1 shows this breakdown per region.

Delivering this level of infrastructure improvement requires not only an upgrade of the incumbent's network, but also restructuring of the telecom sector to make it attractive for (private) investment so as to increase the number and types of players in this segment of the market. Licensing an SNO and encouraging participation by non-telco actors, in particular utility and transportation companies (electricity, road, rail, water, and where they exist, pipelines), holds the key for much-needed backbone infrastructure and competition. The result is likely to be a diverse mix of players and networks connecting nationwide through a variety of technologies – radio waves, microwaves, copper, and increasingly, fibre. Interconnection and interoperability will therefore remain key issues going into the future, and present critical areas in which the capacities of regulators should be improved upon.

Regional and international backbone infrastructure

Improving the reach and depth of last-mile access and nationwide networks will significantly increase connectivity within a country. However, communications also take place outside national boundaries, and the high cost yet poor quality of international communications is another area requiring the attention of African countries. Two key interrelated issues are worth emphasising here: the first is the availability of physical connections to international networks, and the second is the determination of who can legally build or gain direct access to such networks and what services they can legally provide.

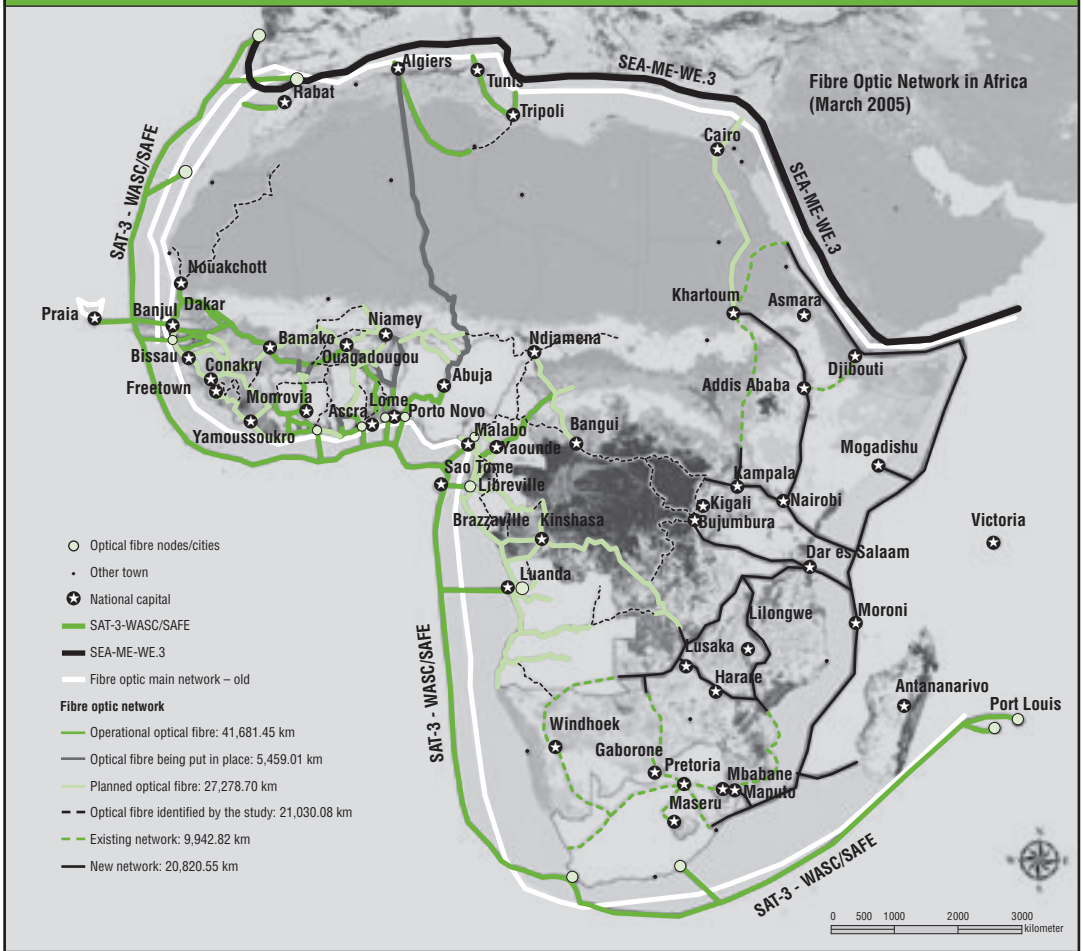
In terms of physical infrastructure, compared with other regions of the world there is a dearth of international communications infrastructure in Africa. Although "every square inch of Africa is covered by satellite bandwidth" (IDRC, 2005) satellite markets in most countries remain under monopoly or duopoly control, and are subject to high licensing fees and restrictive operating conditions. In addition to satellite, Africa is also looking to submarine fibre-optic cables. These cable networks face similar challenges to those experienced by satellite, but also intersect with several national boundaries and must meet the operating conditions of each one. A lack of harmonisation in policies and regulations means that what is permissible in one country might be disallowed in another, and is a major disincentive to their development.

Table 1: **Backbone infrastructure required (in route kilometres)**

Central Africa	Northern Africa	Western Africa	Eastern and Southern Africa	Total
15,950	2,200	19,330	14,560	52,040

Source: ***Connectivity in Africa*** **(ITU, 2007c, p. 4)**

Figure 2: **Planned regional and international fibre projects in Africa**



Source: ***Connectivity in Africa*** **(ITU, 2007c, p. 18)**

There is currently only one submarine cable providing international access in Africa: the much criticised[7] South Atlantic 3/West Africa Submarine Cable (SAT-3/WASC). However, more cable projects are planned (see Figure 2). The contributions these would make in alleviating Africa's connectivity problems will be hindered if recurring issues are not addressed, such as anti-competitive and monopolistic behaviour by operators, regulatory (particularly licensing) barriers that restrict participation in infrastructure projects, and a lack of harmony in laws and policies across countries.

There is much at stake in an increasingly information-driven global society. A review of the amount of international internet bandwidth available to African countries serves to illustrate the severity of the situation. In 2006, the availability of bandwidth to Africa as a total stood at 28,177 megabits per second (Mbps), less than one percent of the amount available globally. In comparison, in the same year, Norway had 43,019 Mbps bandwidth – approximately one and a half times more bandwidth than all of Africa (ITU, 2007b). Here is one scenario where the continent versus country comparison remains uncomfortably credible. ■

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GLOBAL INFORMATION SOCIETY WATCH 2008

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- **Surveying** the state of information and communication technology (ICT) policy at the local and global levels
- **Encouraging** critical debate
- **Strengthening** networking and advocacy for a just, inclusive information society.

Each year the report focuses on a particular theme. **GISWatch 2008** *focuses on access to infrastructure* and includes several thematic reports dealing with key access issues, an analysis of where global institutions stand on the access debate, a report looking at the state of indicators and access, six regional reports and 38 country reports.

GISWatch 2008 is a joint initiative of the Association for Progressive Communications (APC), the Humanist Institute for Cooperation with Developing Countries (Hivos) and the Third World Institute (ITeM).

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