White Paper

Broadband Across Africa

Accelerating Benefits

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September 2009

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Governments around the world are encouraging broadband deployment and use as part of their national economic and social development strategies. Broadband is the underlying infrastructure not only for major improvements in productivity, but also to connect small and medium-sized businesses with their customers; farmers to their markets; students to quality education; villagers to modern healthcare; and communities to each other to address a vast array of interests. The same infrastructure is being used to deliver modern, effective government services to citizens. Accelerating the deployment and use of affordable broadband remains an important element in government plans, including the plans of several African countries, even in the face of many competing priorities. This is because broadband is widely understood to be the key infrastructure underpinning and enabling participation of individuals and businesses in the 21st century knowledge economy.

African countries—and their citizens and businesses—risk being permanently left behind. While governments across Africa face many huge challenges, this paper outlines three reasons government leadership should make the development and adoption of broadband a high priority in their respective countries:

1. Broadband is the underlying platform through which many other fundamental challenges can be addressed, at least in part. Better health and education services, for example, will increasingly rely on the ability to exchange data, voice, and video between citizens and their service providers.
2. Because leaving broadband entirely to the marketplace won't work, or will take much too long, especially outside urban areas. The most successful jurisdictions have developed strategies that include complementary and mutually reinforcing roles for the private and public sectors.
3. It ensures that countries can take advantage of the opportunities that technology offers to enhance national competitiveness, instead of allowing the gap with more advanced countries to widen.

This paper is broken into three parts: **1.** why broadband matters and why it should be a government priority in countries across Africa; **2.** the current situation with information and communications technology (ICT) and broadband in Africa; and **3.** how governments can accelerate broadband deployment and use. The paper concludes with a short section on next steps for leaders to consider for their jurisdictions.[1]

1. This paper has been written through a collaborative effort involving Emerging Markets (Strategy and Business Development), Internet Business Solutions Group (Global Public Sector Team), and Global Policy Government Affairs, Cisco Systems, Inc. The authors wish to thank their many colleagues and partners from across the organization who have provided input and helpful advice throughout the development of this paper.

PART ONE

Why Broadband?

Broadband—which simply means a fixed-line and/or wireless connection that enables the delivery of voice, video, and data at high speed to any node with a similar connection, whether around the corner or around the world—has changed the way the world works.[2] Internet services and information delivered over broadband networks provide the means by which entrepreneurs and small businesses are finding new markets; farmers are finding the best price for their produce; students are seeing and talking to skilled teachers who may be thousands of miles away; businesses are increasing productivity by giving new collaboration tools to employees, suppliers, and clients; medical practitioners in small towns are sharing images and talking to doctors in larger centers about complex cases; citizens are accessing government services conveniently from their own home or from a computer-equipped government service center quickly, efficiently, and without having to pay a fee to move up the queue; and police are viewing high-risk sites through modern surveillance systems, thereby increasing public safety.

These are just a few examples of the uses of broadband. Fundamentally, broadband is revolutionizing the way we solve problems at the individual, community, business, and societal level. Never before has collaboration across multiple locations and multiple individuals and organizations, without regard to time and place, brought together the diversity of people, ideas, and experiences to deliver the best solutions to our most pressing problems. Moreover, these uses—and many more—can all be undertaken over the same broadband infrastructure, without governments and service providers having to invest in separate networks for different services.

Of course, these benefits do not come from the infrastructure alone. It is the **ability to access information and services that brings value**. Once they have the capacity—including a basic understanding of the possibilities, affordable access, and localized content—individuals and businesses connect to broadband networks to reach experts, teachers, and other professionals; to access healthcare and education; to find employers, employees, markets, and suppliers; to enjoy entertainment; and to participate in government programs and services. In many cases, people are looking for access not so much for content and services from government or the private sector, but to have their voices heard in new human networks of social connection and interaction. Increasingly, under the heading of web 2.0, it is the ability to **participate** that is driving people to use broadband networks, for example to collaborate with others in developing a new business opportunity; or in finding a solution to a community problem; or providing input to the government on local priorities. It changes with whom we work,

2. In this paper, we consider broadband to be "always on" at a minimum of 2 Mbps in order to meet the needs for voice, data, and video, and many simultaneous users. Increasingly in many countries, the minimum speed is set at 5 Mbps with voice and video especially driving the demand for even higher speeds of 50 Mbps and beyond. Broadband networks are usually a mixture of fixed and wireless technologies. While the model varies, in most African countries, the network is usually a mixture of fixed line (e.g., fiber backbone; copper local loop) in urban areas, with extensive use of wireless even in the backbone in rural areas. Wireless is the most common means of access. See Appendix 1 for a further description of broadband operating models.

what we do, and how we do it. In short, access to web-based information and services delivered over broadband networks means the difference between inclusion in or exclusion from important activities and opportunities that are available to citizens and businesses only via broadband networks.

"Broadband is not simply a consumer service or good, like cable television or an XBox. Rather, it is also a distribution system, a personal tool for interacting with the world, and a catalyst and enabler of an endless array of other products, processes, and services. Broadband will increasingly become integrated into virtually everything that we do at work, at home, and at play. From economic development to entertainment, from education to healthcare, from environmental sustainability to public safety and homeland security, from our smallest hamlets to our largest cities, from our young people to our senior citizens, almost everything and everyone will come to depend directly or indirectly on affordable and ubiquitous access to broadband."[3]

In Brazil, Cisco and the government cooperated to bring wireless broadband to the town of Tiradentes, 150 miles away from Rio de Janeiro, to assess the benefits of being a "digital city," including benefits to health and education. The local high school now has 20 workstations so students are now included in the many opportunities of the digital world. A local doctor, Dr. Josemar, established telemedicine labs at two sites in town, which enable patients to avoid daylong trips over the mountain to get to a larger, more advanced facility and allow Dr. Josemar to consult with other doctors on his diagnoses.[4]

In addition to the economic and social benefits of broadband, there are direct benefits to the government and citizens in using broadband networks as a foundation for delivering improved government services, for increasing public program effectiveness, and for increasing transparency and accountability of government to citizens.[5]

Broadband is an increasingly inescapable 21st century foundation of economic transformation, growth, and social inclusion. There is a new digital divide taking shape globally based on whether or not residents and businesses have access to broadband. Without access to broadband, many Africans will be blocked from access to and participation in many of the opportunities that those in other countries take for granted. On the other hand, African countries also have the opportunity to learn from the experiences of countries that are further ahead, including accelerating progress by moving straight to broadband and skipping the "narrowband" stage.

3. Capturing the Promise of Broadband for North Carolina and America, The Baller Herbst Law Group, June 2008.
4. Source: Cisco Case Study: Brazil Extends Broadband Technology to Tiny Municipality to Promote Benefits of a Digital City, IBSG 2007.
5. Transparency is one of the key drivers behind the Africa Regional Communications Infrastructure Program (RCIP) where The World Bank and many other development partners are investing funds to leverage private sector investment to improve telecommunications infrastructure in eastern and southern Africa. http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/0,,contentMDK:21156458~pagePK:210058~piPK:210062~theSitePK:282823~isCURL:Y,00.html

Broadband is less than 10 years old, so it is still early in terms of measuring impact, but there is a growing body of evidence demonstrating the importance of broadband deployment and use to job creation, productivity, economic growth, and social inclusion, among other factors. Such research is inevitably context-specific, and the statistics not directly transferable to other contexts. Still, the results are compelling, and the overall positive direction of impact is clear. The examples in Figure 1 illustrate the strong correlation between the availability and use of broadband and economic growth, as do the job-creation examples in Figure 3 below.

Figure 1. Broadband Can Contribute to Economic Growth

Each US$1 invested in broadband infrastructure increases local GDP by US$10.[6]

A U.K. study found that businesses with access to broadband were 31 percent more productive than businesses without.[7]

In the U.S., economic studies have shown that the increase in a local economy was 10 times the cost of installing broadband.[8]

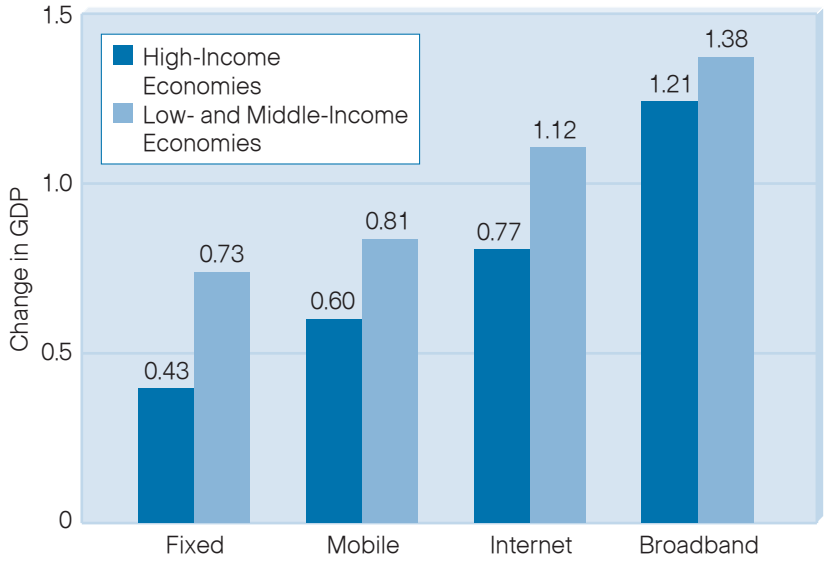
The Brazilian Ministry of Planning estimated that a network-enabled development agenda would improve efficiency in the economy at 1.5 percent of GDP, consisting of 0.5 percent of GDP efficiency gains on citizen and business interactions with government and back-office efficiency gains of 1 percent of GDP.[9]

In addition to its overall economic impact, broadband also has an important effect on local economic clusters. It not only supports the establishment and growth of ICT-intensive businesses such as business process outsourcing (BPO) and new media, but also supports the productivity, competitiveness, and growth of traditional local clusters such as tourism, agriculture, and manufacturing.

Research on the relationship between economic growth and various types of ICT already points to positive impact that is even greater than other technologies. Figure 2 below shows the incremental annual GDP growth from every 10 percentage-point difference in penetration of various technologies in high-income and middle- and low-income economies.

6. "Importance of FTTP to Business Location," Strategic Networks Group, 2007.
7. "Pipe Dreams? Prospects for Next Generation Broadband Deployment in the UK," Broadband Stakeholder Group, 2007.
8. Data analysis by Strategic Networks Group based on three communities in the U.S. (2007).
9. Brazilian Ministry of Planning Networked Economic Development Agenda Framework, 2006.

Figure 2. Broadband Has an Even Greater Impact on GDP than Other Forms of ICT



The World Bank

"Current differences in broadband penetration among countries may generate significant long-run growth benefits for early adopters. Moreover, the significant and stronger growth effects of other technologies in developing countries than in developed countries suggest that the growth benefit of broadband in developing countries could be on the same path."

—The World Bank[10]

Broadband is not only a means toward long-term growth; it can be put in place very quickly to address today's challenges, including economic stimulus and jobs. In addition to jobs created in the design, construction, and management of broadband networks, there are many jobs involved in the development of digital content (including content in local languages) and new applications, as well as in the new types of economic activity that broadband enables (see Figure 3).

10. C. Qiang and C. Rosotto with K. Kimura, "Information and Communications for Development 2009: Extending Reach and Increasing Impact," The World Bank, May 2009. http://publications.worldbank.org/ecommerce/catalog/product?item_id=8610514

Figure 3. Broadband Has Been Shown to Create Jobs

A US$5 billion increase in broadband investment directly creates 100,000 new jobs in telecom and IT in the year in which spending occurs.[11]

Injecting US$30 billion into U.S. infrastructure in 2009 would create 949,000 jobs, 525,000 in businesses with fewer than 500 employees.[12]

For every 1 percent increase in a state's broadband penetration, employment is projected to increase by 0.2 to 0.3 percent. That increase is associated with 300,000 more jobs.[13]

In South Africa, Gauteng province estimates that deployments of high-speed broadband will contribute to a 5.5 percent increase in GDP, creating 650,000 jobs.[14]

Why Government Leadership is Essential

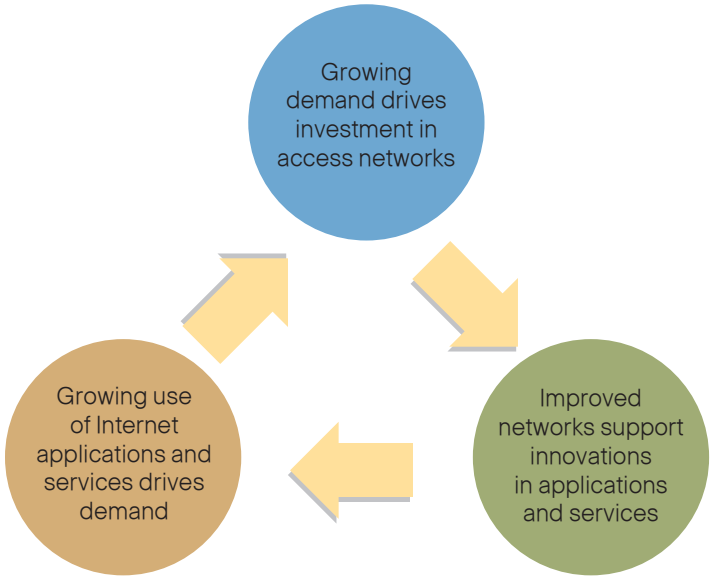
Broadband already exists to some degree in virtually all countries in Africa. So what is the problem? In our view, there are two issues:

1. Broadband is not being deployed far or fast enough.
2. Broadband is generally very expensive, putting it out of reach for many people and businesses.

As we've learned since the early days of the telephone, the value of networking increases with the number of people connected to the network. If there are limited broadband connections available in a country, then it can't be used for services that are designed to reach many people (for example, health, education, and government services, which by their very nature are intended for everyone). If it is too expensive for businesses and individuals to use, then there is no reason for businesses to develop and provide their services over the network, therefore further dampening demand. Without this demand, there is no incentive for broadband suppliers to invest in more networks, creating a demand/supply dilemma (see Figure 4).

11. Communications Workers of America, citing Department of Commerce and Brookings Institution models.
12. Information Technology and Innovation Foundation, January 2009.
13. "The Effects of Broadband Deployment on Output and Employment: A Cross-Sectional Analysis of U.S. Data," Robert Crandall, William Lehr and Robert Eitan, Brookings Instititution, July 2007. http://www.brookings.edu/papers/2007/06labor_crandall.aspx or http://www3.brookings.edu/views/papers/crandall/200706litan.pdf
14. BlueIQ GPG provincial business plan, 2008.

Figure 4. The Ideal Broadband Virtuous Cycle



Source: Broadband Working Group, MIT Communications Futures Programs, and Cambridge University Communications Research Network, September 2005.

Governments face many urgent and immediate challenges for basic services and human needs, especially in the countries in sub-Saharan Africa. That makes it difficult for leaders to place a priority on broadband and to use limited resources on what may be seen by many citizens as "nice to have" compared to their more pressing needs for schools, healthcare, government services, and the essentials of daily life. Also, given that most citizens don't have easy access to computers and many don't have the basic literacy allowing them to benefit from access to the Internet over broadband networks, why should governments focus on this topic?

We think that governments in Africa cannot afford not to address broadband. Like governments everywhere, African governments should understand that investing in broadband capability, even if it is initially modest, represents a down payment on the future. Government is in a unique position and must play a leadership role in accelerating broadband supply and usage or risk falling permanently behind developed countries in the global economy. As we will describe in a later section, many of the government intervention measures that support broadband are affordable, and much can be done through a redesign of existing programs.

It should also be noted that broadband networks are an important part of the toolkit to address many other pressing challenges that governments are facing. As well as job creation, broadband can also extend the availability of quality education, healthcare, and government services, and improve the safety of citizens, much more cost-effectively than through extensive expansion of physical infrastructure. The same underlying broadband infrastructure can be used and reused by all sectors, thereby taking advantage of economies of scale. In addition, providing opportunities for businesses to grow on the Internet and/or reduce their costs increases both their success and tax revenues to the government.

It is important to act now. As will be shown in the next section, the gap between countries—and therefore the gap in opportunities for citizens and businesses—is wide and growing wider. In addition, with new international submarine cables being completed to connect to countries in both western and eastern Africa in the next few years, there is a real opportunity for sub-Saharan African countries in particular to be ready to take advantage of these new connections by putting a broadband policy and regulatory environment in place that supports competition and lower prices. If there is a bottleneck created in accessing these new cables, the lower prices and wider deployment of broadband and its related benefits will not be realized.

On the important question of affordability, while there may be some impact on existing broadband suppliers if broadband rates are reduced, the overall size of the market will increase with lower prices, with this larger market being shared by the incumbent carriers and any new competitors. In Vietnam, for example, where broadband prices are amongst the lowest in the world, compound annual growth rate for broadband has been 300 percent from 2002 to 2007.[15]

Cisco's position as a global leader in networking and communications allows us to see the value of more affordable broadband in practical terms with stronger economies, new businesses, better public services, and other benefits. Countries in Africa have an opportunity to observe and learn from the strategies adopted by many countries that have taken an active role in encouraging broadband deployment and affordable use in their jurisdictions. We believe that many of these lessons are transferable.

In the next section, we will take a look at ICT, including broadband, in Africa before examining steps that governments can take to bridge the existing gap in broadband deployment and use.

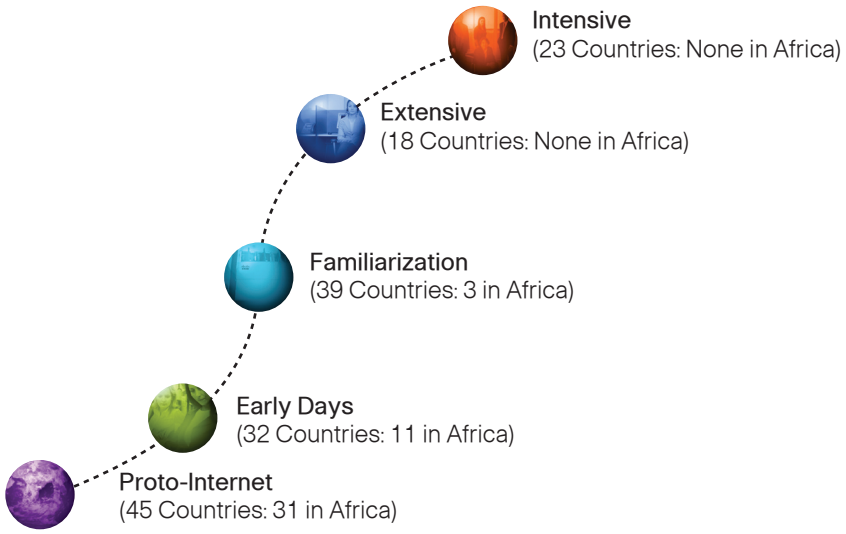
15 "Broadband as a Platform for Economic, Social and Cultural Development: Lessons from Asia," Valery D'Costa and Tim Kelly, *info*Dev/World Bank, November 2008.

PART TWO

Africa's Broadband Divide

Placing African countries in perspective using a model of "Internet stages" (see Figure 5) confirms that the region has a long way to go to get to a position where the benefits of broadband connection—including providing future employment for the relatively young African populations—can be fully realized.[16] These stages reflect current usage levels and Internet line penetration. Most countries in Africa are a long way from the more desirable stages (extensive and intensive broadband). The most advanced countries in Africa are Mauritius, Morocco, and Tunisia, and they are only in the "familiarization" stage.

Figure 5. Countries by Internet Stage (157 worldwide, 45 of which are in Africa)



Source: Authors' calculations, based on data from the 2008–2009 Global IT Report & Network Readiness Index (WEF) and the International Telecommunications Union

The stages, however, represent an important goal that is reachable with strategic investment in infrastructure, farsighted reforms of the policy and regulatory regime for ICT in general and networks in particular, plus adoption of other measures.

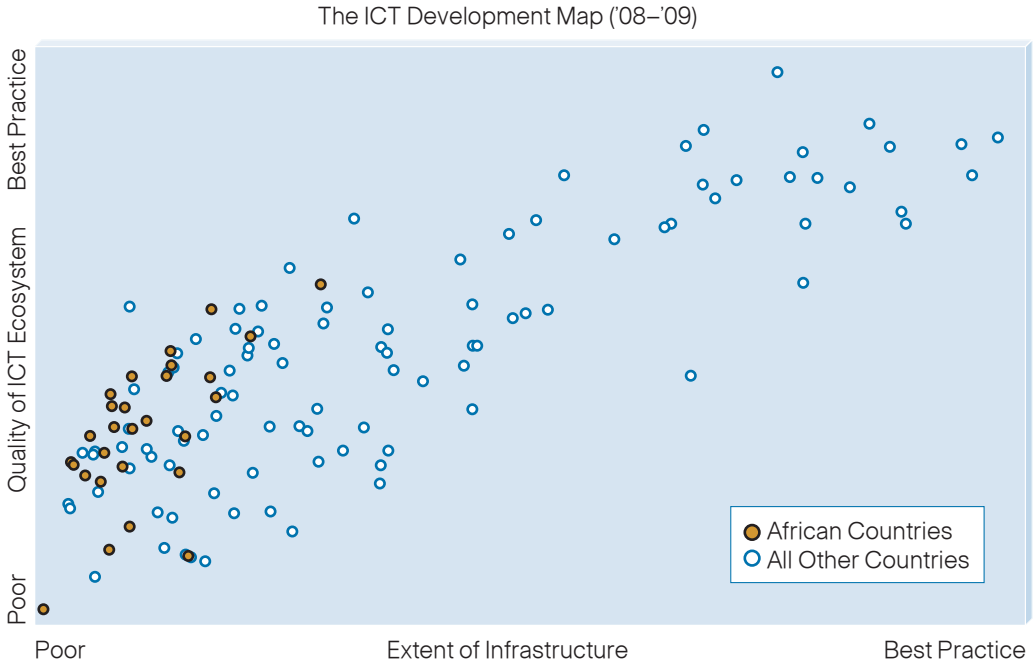
Out of the 11 countries in the "early-days" stage, there are five (Egypt, Kenya, Nigeria, Senegal, and South Africa) that seem poised for rapid progress in addition to Mauritius, Morocco, and Tunisia—if the right investments are made while the regulatory environment continues to improve. Other African countries face higher hurdles, although individual situations, in terms of the nature of the hurdles and strengths on which to build, vary considerably by country.

16. The stages and ICT map are explained in the 2008/2009 Global IT Report (WEF). Data for the ICT map comes from the Network Readiness Index components from that report. The source for additional data used for the stages is ITU. See Appendix for details on country coverage.

We can consider the starting positions of different countries through the lens of the "ICT map" and use this to chart a course forward appropriate to each country (see Figure 6). The two dimensions of the map (ecosystem and infrastructure) relate to the broad ICT environment but are also key foundations for broadband development and use:

- ICT infrastructure includes "harder" or more permanent assets, such as hardware and telecommunications infrastructure, as well as national capabilities behind the supply of other key factors of production, including qualified labor.
- ICT ecosystem comprises "softer" elements, such as the quality of regulations in a country, the ease of doing business, the level of competition, and the degree of innovative capacity.
- To summarize ICT map positions, we grouped 127 countries for which data are available into three categories:
  - 33 are in territory that ranges from "good" to "best practice," where connectivity is most prevalent and the positive impact of ICT in productivity is greatest. Most are high-income countries (Estonia being an exception), and none of them is in Africa.
  - 50 countries have at least one of the dimensions in "poor" territory (of which 22 are African countries).
  - 44 other countries are in the middle.

Figure 6. The ICT Development Map



Source: Authors' calculations, based on data from the 2008–2009 Global IT Report & Network Readiness Index (WEF) and the International Telecommunications Union

Zooming in on the part of the ICT map where most African countries are to be found highlights the challenge. Relatively few countries in the region have even moderate ecosystem and infrastructure foundations for ICT development, and quite a number are firmly in poor ecosystem and infrastructure territory—pointing to the need for urgent attention to the formulation of remedial action plans.

It is worth noting that while the connectivity challenge for many countries in Africa reflects in part the income levels, experience elsewhere shows that connectivity is not solely determined by income. Policies and regulations that promote technology adoption, private investment, and competition also play a major role and position countries to take advantage of the leapfrog opportunity that ICT could represent.

Two dimensions—infrastructure and ecosystem—provide the basis for a diagnostic tool that can place countries, and regions, in context. The 2007–2008 Global IT Report elaborates on this methodology and shows how "network readiness indicator" (NRI) components can be used to generate the coordinates for this ICT development map. Using data behind the latest NRI (2008–2009), each of the two dimensions can be used to classify countries along four simple categories: poor, moderate, good, and "best practice." While the 2008–09 NRI covers only 29 of the 45 African countries, and the detailed data permits us to map only these countries, it still provides a representative picture of the continent's situation and its network readiness challenge.

The implications of a country's position in the ICT map are very significant. Not only is connectivity much lower and costs higher among countries with poor environments, but the increase in broadband penetration is also lower, meaning **the gap is wide and getting wider.** Between 2005 and 2007, the increase in broadband penetration was greater among countries with better ICT environments—and greatest for countries on a diagonal path balancing progress on both infrastructure and ecosystem, as the table summarizing the results for 127 countries worldwide shows.

Figure 7. Broadband Penetration Growth

Broadband Penetration Growth
(Percentage Point Increase over Two Years)

Ecosystem	Poor	Moderate	Good	Best Practice	
			4.7	8.8	Best Practice
	N/A	1.2	6.6	6.7	Good
	0.3	1.5	5.5		Moderate
	0.4	1.2	N/A		Poor
	Infrastructure				

Source: Authors' calculations, based on data from the 2008–2009 Global IT Report & Network Readiness Index (WEF) and the International Telecommunications Union

There is, of course, a range of situations—with Tunisia near the middle (reflecting moderate ecosystem and infrastructure) and Cameroon, Ethiopia, and Zimbabwe facing major challenges on both fronts. Comparing the regional average with the average of countries that represent good or best practices in ICT development (those in the upper right corner of the ICT map) illustrates the challenge. The Internet usage gap (6/60) is large, but not as large in relative terms as the gap that emerges when considering Internet connections and broadband subscriptions (1/28 and less than 1/22). Internet usage is a key first step as the population of a country becomes exposed to the Internet, but the greatest benefits flow when connections and broadband reach a critical mass. In addition, as suggested by the distributions of countries across the Internet stages, the African average masks the deep gap faced by most sub-Saharan countries, while countries in North Africa are further along in connectivity (see Appendix).

Figure 8. Connectivity c. 2007 (Africa vs. Good/BP Countries)

	Internet Users	Internet Subscribers	Broadband Subscribers
	Average (per 100 Inhabitants)		
Africa	6	1	<1
Good/Best Practice	60	28	22

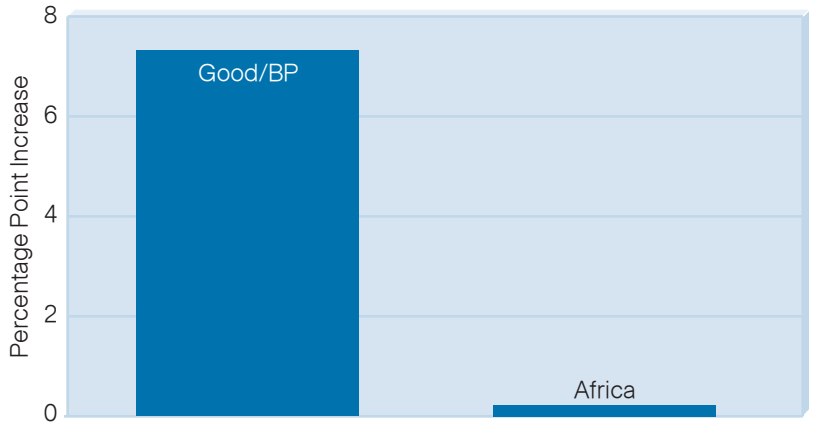
Source: Authors' calculations, based on data from the 2008–2009 Global IT Report & Network Readiness Index (WEF) and the International Telecommunications Union

The growth in broadband penetration shows a widening gap between the average African countries and the more advanced countries in terms of ICT (those with ICT map positions in the Good and Best Practice areas). While the more advanced countries added about 7 percentage points to their broadband penetration (from 15 percent in 2005 to 22 percent in 2007), African countries on average still remained below 1 percent penetration in 2007, as the bar chart illustrates.

The growth in broadband connections is clearly not anywhere near fast enough to reduce the gap in broadband penetration—hence the need to focus specific attention on possible ways to accelerate the deployment and use of broadband networks.

Technology, fortunately, is expanding the range of options available to countries that want to promote high-speed connectivity. In addition, the good news is that—contrary to infrastructure hurdles at earlier stages in history—the solution is not one that most countries will find unaffordable. A balanced combination of reforms can produce quick results and very high returns (both economic and social) on investment.

Figure 9. Broadband Penetration Change (2005–2007)



Source: Authors' calculations, based on data from the 2008–2009 Global IT Report & Network Readiness Index (WEF) and the International Telecommunications

PART THREE

Formulating Intervention Plans

Generally, the private sector is the predominant supplier of broadband networks and services around the world, but government has always played an important role. Governments, of course, have established the overall "ecosystem" within which the private sector operates, both generally through policy and specifically through regulations that govern the telecommunications marketplace, including establishing the ground rules for spectrum usage and pricing. Governments are often (or have been in the past) the owners of the predominant telecommunications carrier; governments often provide the rights-of-way or establish the rules of access; they are often the largest single customer for telecommunications services, including broadband; and they are responsible for significant functions that are, or can be, enabled by broadband such as health, education, and general government services to citizens and businesses.

Clearly, every government is already playing an important role. Given the role that explicit "pro-broadband" policies can play to accelerate deployment,[17] and given the evidence outlined in the previous section on how far behind virtually all African countries are in the provision of broadband, it is our view that government leadership is essential to accelerate broadband deployment and use across Africa. Of course, this is to enable, rather than replace, the role of the private sector and to ensure that the many private and public sector actions that influence broadband are complementary and working in concert to increase the rate at which broadband is deployed and used.

17. South Korea is an example of a country that has adopted a comprehensive broadband strategy with the result being broadband penetration that leads the world. For a description of the South Korean strategy, see the 2007 Informatization White Paper: Republic of Korea National Information Society Agency, September 2007. http://www.nia.or.kr/special_content/eng/

The chart below identifies a set of underlying broadband principles that we suggest every government use as the foundation of an explicit broadband strategy or plan that is, in turn, closely linked to the national economic and social plan.

Broadband Principles

- Broadband is an essential infrastructure and a critical enabler of economic growth, social inclusiveness, and effective government
- Broadband is technology-neutral
- A market-driven, competitive approach accelerates broadband deployment and use
- There are a number of models for a competitive broadband marketplace
- Private and public sector roles are complementary and mutually reinforcing
- Overall objectives for government:
  - Eliminate barriers and bottlenecks
  - Facilitate entry
  - Drive down costs
- Government roles:
  - Orchestrate
  - Enable
  - Facilitate
  - Stimulate
  - Provide

Building on these principles, the diagnostic framework of the ICT map, and drawing from the fast-developing best practices of leading countries, we have identified five major action areas for an effective broadband strategy. These provide the basic structure of our framework for identifying priorities and establishing avenues for action.

Government Measures to Support Broadband Deployment and Use

1. Policies and regulations affecting network market structures
   - Encourage competition and technology diversity in access to and provision of telecommunications services
2. Policies and regulations affecting content development and applications
   - Encourage multiple voice, data, and video content and service providers
   - Encourage open access to networks by content and service providers
3. Government operations and services, including spending power
   - Use broadband to support effective and efficient delivery of programs and services, including quality healthcare and education
   - Aggregate government requirements to create "demand pull" for broadband
4. Skills for information and communications technology
   - Increase number of university graduates in engineering and IT
   - Increase ICT technical training in colleges
   - Train new graduates and unemployed in basic ICT skills
   - Increase computer literacy of small-business owners, not-for-profits, teachers, and community groups
5. Direct and indirect investment in infrastructure and access
   - Offer tax incentives
   - Award grants to community groups to develop plans for broadband usage and localized content
   - Provide computers to schools, community centers, students
   - Provide access to rights-of-way, ductwork, towers
   - Subsidize network providers to extend networks into unserved areas ahead of market demand
   - Invest in underlying core network in unserved areas

A sound strategy needs to ensure that all areas are solid and reinforce each other's effect. Areas where remedial action is needed will depend on the stage at which a country finds itself and on the strengths and weaknesses of its ICT environment. To reach the "intensive" stage—and exploit the full potential of networks to serve a country's economic and social goals—it is important to ensure robustness on all five fronts.

These action areas can be defined through a series of questions that can guide the assessment of a country's strengths and weaknesses. In addition, we are proposing a range of possible answers that revolve around interventions designed (and in many cases proven) to address weaknesses in each of the areas.

Q. **Policies and Regulations Affecting Network Market Structures.** Are the number of players, their technology platforms, and market shares such that they foster competition, service innovation, and responsiveness to potential demand for managed network services?

A. Best-practice countries have found various ways to promote competition and diversity in telecommunications services and access (the part of the network model that provides managed network services to other service providers and end users). This category of intervention includes both fixed and wireless networks (the competitive environment with respect to radio spectrum as well as wire-based networks). Government policy on which uses are allowed for which bands of spectrum, how spectrum is allocated, as well as associated terms and conditions of access have a major impact in defining the market, as do policies and regulations for fixed networks.

While some or all may share the same underlying "passive" core network of dark fiber, communications towers, or ductwork, having multiple managed network service providers is the most powerful means for expanding the reach of networks, promoting usage, and ensuring affordability. A balanced market environment will consider the needs and investments already made by incumbent players, yet still provide incentives for newcomers. Competition doesn't work if regulation becomes confiscatory for incumbents or prohibitive for competitors. The mobile-telephone experience demonstrates the benefits of competition: It promotes innovation and expands markets rapidly while providing healthy profit margins for vendors. Competition in the service provider market also plays a vital role in ensuring a broad reach of networks, consumer choice, and efficient response to emerging demand, including addressing regional or niche market needs. Needless to say, it's a delicate balance, as regulatory frameworks must also be mindful of the impact on incentives for service providers to invest. The goal is for markets, not regulators, incumbents, or ongoing subsidies, to define service and business models. It is our view that incumbent service providers can continue to be very successful with more users accessing their networks with a reasonable fee established by the regulator or the marketplace.

"In hindsight, KPN made a mistake back in 1996. We were not too enthusiastic to be forced to allow competitors on our old wireline network. That turned out not to be very wise. If you allow all your competitors on your network, all services will run on your network, and that results in the lowest cost possible per service, which in turn attracts more customers for those services. So your network grows much faster. An open network is not charity from us; in the long run it simply works best for everybody."

—Ad Scheepbouwer, CEO, KPN, February 2009

Q. Policies and Regulations Affecting Applications Development and Content. Has the institutional framework evolved from the traditional fixed telephony-based model to one that enables convergence around IP and permits entry and efficient use of assets?

A. In addition to the role of regulation in shaping the competitive network environment, regulations, both ICT-specific and more generic, can have the unintended effect of discouraging the establishment of content service providers and innovation in the development and deployment of useful content and applications. As seen with telephony, outdated regulation can generate barriers and constrain access to existing assets by inhibiting opportunities for reduced entry costs and technology promotion.

Much of the thinking in the regulatory arena is based on the legacy of the telephone industry and the historical regulatory environment in virtually every country around the globe. Very different conditions, however, surround IP-based content on broadband networks. Distance, duration and, to a large degree, usage (e.g., voice, data, and/or video) are no longer relevant, making the minute-by-minute billing increment of little value. Voice is but one of a plethora of applications available to the end user. Countries that have made great strides in broadband connectivity have evolved from a regulatory framework designed for a telephone monopoly to recognizing telecommunications as a platform for voice, data, and video convergence and treating networks as critical infrastructure to be used by a vast array of content and service providers.

It is important that rules are established to ensure that there is open access by application and content providers to the network, that is, that there are no bottlenecks where one provider can effectively block competition or hold another provider for "ransom" in order to get access to the network. Such bottlenecks would, of course, delay or even block development of new broadband services and drive up prices. In our view, any qualified service provider should be able to access the broadband network under substantially the same terms and conditions as other service providers. This provides the greatest potential for innovation and the development of content that people will want to use, including localized services and information. Regulators may also have some discretion in promoting broadband services that are viewed as being in the public interest. For example, in many jurisdictions, reduced rates have been approved for research, education, and other desirable and noncommercial uses.

Q. **Government Operations and Services, including Spending Power.** Are eGovernment practices contributing to both operational efficiency and citizen interaction online, and is government procurement used to promote national ICT development?

A. Government can also have a direct impact on the rate of deployment and use of broadband through the design of its own programs and services. eGovernment has been a priority of many governments for many years. eGovernment is about improving client services and the outcome of government programs through the effective and efficient use of technology. By redesigning services and making them available electronically; by making government information readily accessible on the World Wide Web; and by giving government managers information they can use to support decisions, there can be a significant increase in service quality with real benefits to clients and the government. This may include encouraging small business start-ups and increasing their competitiveness by making it much easier to register, get the necessary licenses and permits, and pay taxes. It may include eliminating the need for citizens to travel to the nearest city to meet with a government official in order to receive a necessary permit. It may include providing employees with the ability to collaborate across traditional government silos to achieve better results. Or it may include creating a government-controlled online property registry to strengthen data quality and spur the private sector to link to this database.

Governments are also reallocating existing expenditures or providing new funding in health and education to connect schools, colleges, universities, hospitals, clinics, and other health facilities to broadband networks in order to deliver high-value-added programs such as distance education and remote diagnostics to a much larger share of the population than can currently access these important services face-to-face. Allowing children from many schools to access curriculum materials online, or to participate in classes with qualified teachers and ask or answer questions via a real-time video link, may cost much less than providing textbooks and libraries in every school or trying to find and hire scarce teachers. Broadband, in that sense, lifts choice and opportunity.

Enabling patients and nurse practitioners in a small town to discuss symptoms and share medical data with a doctor over a video connection can significantly extend the reach of scarce health services cost-effectively. More importantly, these programs are making it possible for previously excluded individuals and communities to participate in the economy and society. There are many examples of such initiatives from governments around the world.

Most governments, including those in Africa, are taking steps to implement these types of improvements. Lack of broadband capacity across the country, however, is a barrier to the rollout of such programs, meaning that government

must maintain parallel service-delivery channels. Lack of capacity also denies convenient and equitable access to citizens and businesses that cannot access these services electronically. This is why many governments have used their own purchasing power—and the aggregation of the government's own use of networks—as a means of "pulling" network providers to extend broadband coverage. Combining the requirements for network capacity of all government departments, as well as the locations to be served, into one purchase can have a dramatic "demand-pull" effect on broadband supply. Governments may go even further by requiring the underlying network provider to provide service to a wider geography than they currently serve in order to bid on or receive the government's business. Extending the length of the typical contract is one way of providing an incentive to the private sector to respond to this demand, guaranteeing revenue for a period of time to cover their increased costs.

Q. **Skills for ICT.** Are ICT user skill levels (including those of schoolteachers) supporting the use of the Internet by businesses and individuals, and are specialist ICT skills to support the development, operations, and use of broadband in line with technology and potential?

A. Best-practice countries have a solid base of technical skills in the area of ICT and a good level of broader science and math education. The range of targets for interventions to improve ICT-relevant skills goes from sharply focused training and certification, to pipelines of university graduates in engineering and IT fields, to awareness-building of the general population. By funding ICT training in colleges, and establishing programs to train new graduates and/or the unemployed in ICT skills, governments are creating a skilled workforce to support the existing and growing network infrastructure as well as businesses that use technology. Programs can also be established to increase computer literacy among small-business owners, not-for-profits, teachers, and community groups to give individuals and businesses the tools they need to increase their self-reliance in the information economy. Awareness of opportunities through ICT and broadband can be part of broader community development programs. For example, in Sri Lanka and the state of Andhra Pradesh, India, The World Bank is working with local partners to build the capacity of rural communities to become more self-sufficient and alleviate poverty.[18] Orientation and access to network-based technologies are now an important part of these programs. Both the ICT training and more ICT awareness and literacy programs will help drive demand for broadband services. The key to an effective strategy is ensuring that lack of ICT user skills is not keeping individuals, teachers, and businesses from making the most of the opportunity technology has to offer.

18. Adolfo Brizzi, "Community-Driven Innovation: The Power of Voice and Scale," World Bank, December 2008.

Q. **Direct and Indirect Investment in Infrastructure and Access.** Are there ICT infrastructure bottlenecks that critically affect the breadth, depth, and speed of ICT adoption?

A. This category of government intervention includes direct and indirect funding by government to encourage access to broadband or new broadband infrastructure. This may include tax incentives for the purchase of computers and/or content development by small businesses; grants to communities for the development of plans and localized broadband content to support local priorities and needs; or time-limited subsidies to support network providers going into smaller communities or rural areas ahead of market demand. It may include direct investment in building the underlying broadband networks. For example, the government of India is investing US$850 million to establish State Wide Area Networks with 2-Mbps connectivity up to the block level with provision for wireless connectivity from the block level to the village level.[19] This infrastructure, part of the National eGovernance Plan (NeGP), is being used for internal government operations and the delivery of government programs and services to 100,000 common service centers, and is pushing broadband farther and faster across India than would otherwise happen.

Strategic investments may be required to establish a national infrastructure foundation on which private investments and local initiatives can be built. Unlike trunk roads and interstate highways, which have usually been 100 percent government-funded, the required investments in broadband may be addressed through various forms of public and private investment. Private investment in networks and broadband service development is critical and has propelled the development of networks and the growth of connectivity in many countries. In general, government involvement should be focused on filling gaps through such measures as direct investment, time-limited subsidy, tax incentives (or, as noted above, commitment of government services in a long-term contract).

The underlying core (passive) networks should be seen as basic infrastructure. Depending on the starting situation, this may entail greenfield development, expansion, or upgrades. In the case of "greenfield" development where no network currently exists, such as remote or hard-to-reach areas, governments may wish to adopt a model for a single underlying passive network provider in order to capture the benefits of economies of scale. This could be publicly funded, or done through a PPP or purely private-sector model, with investments recovered through fees charged to multiple competitive service providers who use the underlying core network.

It should also be noted that constraints on foreign investment or rigidities in the financial system can have a disproportionately negative effect on the capital-intensive ICT sector—placing a country at competitive disadvantage.

19. Government of India National eGovernance Plan, http://india.gov.in/govt/national_egov_plan.php
A block is an administrative region between the district and village levels.

Governments can also provide significant indirect support for the extension of broadband through measures such as the provision of rights-of-way at little or no cost, or including the costs of necessary ductwork to enable future broadband deployment as part of other infrastructure investments. Given that rights-of-way acquisition and construction represent a large portion of broadband costs, it could be a requirement that the design and construction of new or expanded buildings, roads, bridges, railways, and power grids include broadband-ready capabilities. This would not only reduce the costs of future broadband deployment, but would also enable future capability for the "smart" operation and management of the infrastructure to reduce traffic congestion, reduce energy consumption, reduce ongoing management costs, and/or improve other outcomes. This is a current priority in many developed countries and another leapfrog opportunity for those building Africa's new infrastructure, whether roads, railways, airports, or electricity.

There is a strong correlation between personal computer (PC) penetration and broadband use. The sequence in emerging markets is markedly different from that of advanced economies, where connectivity is advancing quickly in large measure due to the large pool of PCs already in use. Therefore, emerging countries also need to consider options for assuring commercially viable and socially minded access. Tariffs and taxes on PCs and constraints on the emergence of other Internet-ready devices can represent hurdles to the spread of connectivity. Conversely, programs that spread computers and other access devices will accelerate progress. Governments, not-for-profits, and/or the private sector may establish programs to provide access to disadvantaged segments, for example through computers in schools, libraries, and community access centers.

Two Possible Paths Forward

Given the costs involved, it may not be possible for governments or the private sector to extend broadband networks to all communities at the same time. Two paths forward are suggested. These models are not mutually exclusive and could proceed in parallel to achieve broadband benefits for citizens and businesses at the same time.

If broadband is not already in place, one model is to start with the higher-density areas. For example, the strategy could be to focus first on targeted development regions, likely in or near urban areas, where there is the potential to establish a "cluster" of broadband service providers, ICT-related businesses, businesses that are intensive users of ICT, and other users (e.g., colleges, universities, and researchers). The World Bank confirmed in a recent study that setting up geographical pockets of advanced broadband capabilities enhances export market share growth by promoting clustering and new businesses whereby networking and specialization can improve these firms' competitiveness.[20]

20. Growing Industrial Clusters in Asia, Serendipity and Science, World Bank, 2008.

Another path forward is to deliver broadband capability to regional centers and establish community access points at these centers. Mediated access through one central point in a community simultaneously addresses the lack of broadband in every community as well as the lack of computers and general lack of readiness of many individuals and businesses—especially those in smaller centers—to receive electronic services. The access centers, which may be provided by the private sector, the government, a public-private partnership, or in a not-for-profit or NGO model, create a "demand pull" for broadband by aggregating services as well as users to regional centers. Operators of the centers also can provide mediated access for individuals and small businesses and help them to find and access information, programs, and services that they need, regardless of who provides these services (for example, government, the private sector, or the not-for-profit sector). Typically, international studies tend to measure broadband readiness by such factors as penetration of PCs, broadband availability to the home, and Internet usage. These measures are less relevant in developing countries that are significantly underserved. Community access centers can be an alternative model to significantly increase both readiness and actual access

As part of the NeGP, the government of India is investing US$215 million through a public-private partnership model (government funds are supplemented by additional funds from the state governments and the private sector) to establish 100,000 common service centers (CSCs) across rural India—one for every six villages, putting the CSCs within walking distance of every villager. The government of Kenya (ICT Board) is supporting "Pasha Centers" as part of its digital village program.

Pasha Centers in Kenya Will Provide Access

Pasha Centers, run by private entrepreneurs, will allow rural villagers to access information and services, including government services. The overall purpose of the program is to "ensure that the people living around the digital villages fully understand how and why they should take advantage of the services available. In this way, the digital villages will become a relevant and essential part of their daily lives, adding value and creating opportunities. It is expected that this will result in wealth creation, employment, and poverty reduction."[21]

21. See http://www.ict.go.ke/index.php?option=com_content&task=view&id=68&Itemid=272

Immediate Next Steps

The diagnostic models (ICT map and Internet stages) and the intervention measures outlined in the two previous sections provide a good basis for understanding a country's starting position and roadmap for progress. We suggest the next step is to assess a country's specific strengths and weaknesses and to identify priority action areas as part of an overall strategy to improve ICT adoption (broadband networks, in particular) for enhanced productivity, accelerated economic growth, and extended social inclusion. This could start by posing the series of questions related to the strategies presented in the previous section.

Cisco is uniquely positioned to assist in this process. Through our strategic advisory services, Cisco has worked around the world with many governments and service providers to understand the challenges related to broadband and how these challenges can be addressed. Based on the clear-cut benefits of broadband, we recommend that every government should have a goal and a plan for broadband that draws upon the complementary skills and resources of the private and public sectors. Mapping out and fully understanding the current environment according to the readiness indicators and identifying the targeted intervention measures through facilitated workshops would be a good first step forward. We can assist you through detailed analysis of the current situation in specific countries, identification of possible options, provision of further details on international best practices, and lessons learned based on the experiences of other countries, as well as providing ongoing strategic advice. There also is strong expertise available to advise on technology options.

Moving forward with implementation, Cisco can also assist in getting maximum benefit from the broadband networks once in place by designing training programs for your small businesses through the Cisco Entrepreneur Institute. The Cisco Network Academy Program can also assist by delivering ICT skills to help meet the growing demand for ICT professionals while improving career and educational opportunities for young people. As of April 30, 2009, Cisco has 350 Networking Academies operating in Africa with more than 40,000 students and 760 instructors in 41 countries. There are also two Cisco Academy Training Centers, one in Nairobi, Kenya, and one in Port Elizabeth, Republic of South Africa.

Conclusion

Broadband is a key and growing infrastructure of the 21st century knowledge economy. Its benefits to economic growth, to businesses and entrepreneurs, to communities, to governments, and to individuals are clear and growing every day. The gap is widening as broadband deployment and usage take off in some countries and lag in others. This further exacerbates the opportunity gap between countries that are well-equipped to participate in the new economy and those that are not; it denies businesses and citizens in lagging countries the ability to take full advantage of the economic, social, educational, health, entertainment, public service, and other opportunities available only over broadband networks.

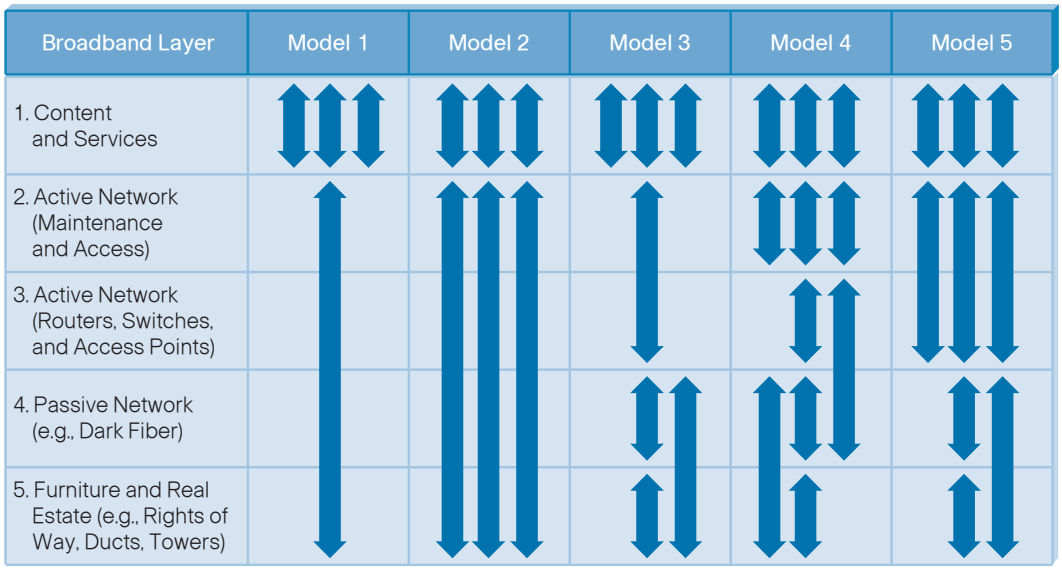
Different countries will inevitably progress at different rates, but we believe that all countries should include broadband as part of their national economic and social development strategies and create a plan to move forward. The result will be a broadband strategy and implementation plan that will provide the underlying platform for economic and social development and inclusiveness, including modern and effective government. In short, this strategy will position you as a leader of a win-win-win strategy for the future: win for economic growth; win for social development and inclusiveness; and win for improved government services.

APPENDIX

1. Alternative Broadband Operating Models

   - There are many operating models for broadband based on various combinations of:
     - Wire/wireless (including various underlying technologies, such as fiber, copper, mobile, Wi-Fi, WiMAX, etc.)
     - Multiple layers of service
     - Multiple ownership (public–government or government agency/SPV, private, not-for-profit)
   - These models may vary at national, regional, or local levels and in different countries, depending upon circumstances.
   - Figure 10 illustrates the different combinations of competition (multiple arrows) and regulation or public provision (single arrow) that can be considered for the provision of broadband services. While different models will be appropriate under different circumstances, considering the models in this "layered" form helps clarify the choices that policymakers face and provides a context for the business model choices of private operators.

Figure 10. Alternative Broadband Operating Models



2. Net Readiness of Countries in Africa (2008)[22]

Given the scope of the paper, most of the discussion has been necessarily at a broad level covering the whole of Africa. Although most of the countries in the region are in the poor/moderate part of the ICT map, it is useful to identify where individual countries fall along the two axes of the ICT map as shown in Figure 11. In addition, we also provide a spotlight on a few individual countries, using material from the NRI and the analytical models used in section 2 (and in the GITR). The countries for which the full analysis is presented are Algeria, Egypt, Kenya, Morocco, Nigeria, South Africa, and Tunisia, with more limited analysis presented for Angola and Libya.

Figure 11. African Countries Along the Dimensions of the ICT Map

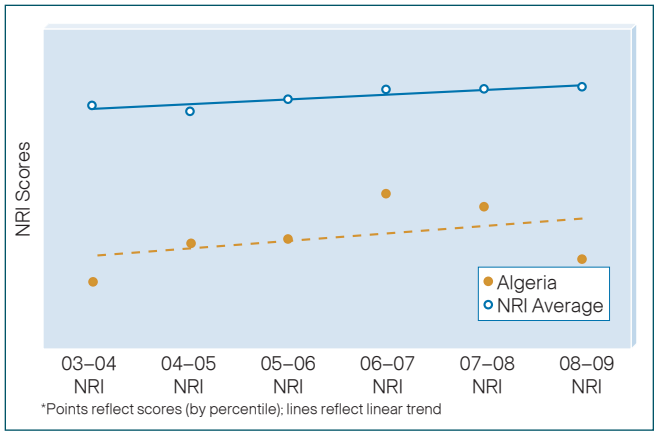
	Poor	Moderate	Good
Ecosystem	Algeria, Cameroon, Chad, Ivory Coast, Ethiopia, Mauritania, Mozambique, Tanzania, Uganda, Zimbabwe	Benin, Botswana, Burkina Faso, Egypt, Ghana, Kenya, Lesotho, Madagascar, Malawi, Mali, Morocco, Namibia, Nigeria, Senegal, Zambia	Mauritius, South Africa, Tunisia
Infrastructure	Benin, Botswana, Burkina Faso, Cameroon, Chad, Egypt, Ethiopia, Ghana, Lesotho, Madagascar, Malawi, Mali, Mauritania, Mozambique, Namibia, Tanzania, Uganda, Zambia, Zimbabwe	Algeria, Ivory Coast, Kenya, Mauritius, Morocco, Nigeria, Senegal, South Africa, Tunisia	

We have tried to present a picture of the full region as well as a sense of the range of situations within Africa, but the analysis of net readiness is most meaningful at the level of individual countries. In the following pages, we illustrate this by looking at individual country data for South Africa, Egypt, Morocco, Tunisia, Algeria, Kenya, Nigeria, Angola, and Libya.

22. The Stages and ICT Map are explained in the 2008/2009 Global IT Report (WEF). Data for the ICT Map comes from the Network Readiness Index components from that report. The source for additional data used for the Stages is ITU.

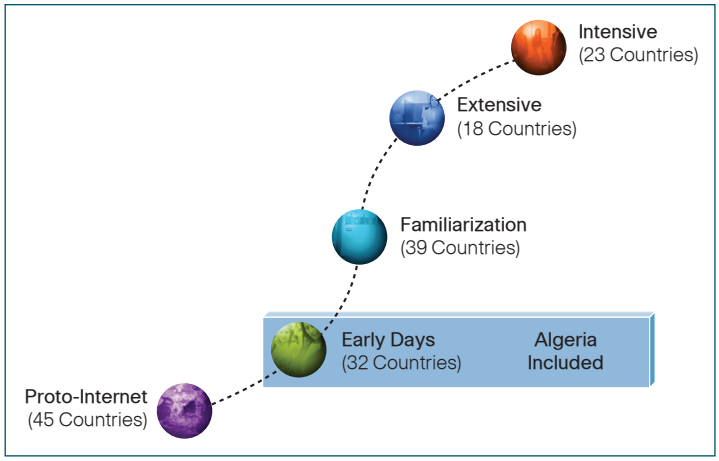
Algeria

The "league table" based on the Net Readiness Index (NRI) usually gets the headlines (Algeria this year ranks 108th out of 134 countries). But NRI scores and their trend convey even more information. As the chart illustrates, over the past six years, the trend in Algeria's NRI score had been increasing, though in the last year there has been a large drop. This should be a source of concern, as it affects the country's competitiveness and its ability to benefit from the potential of ICT in general and from broadband specifically.



Internet stages

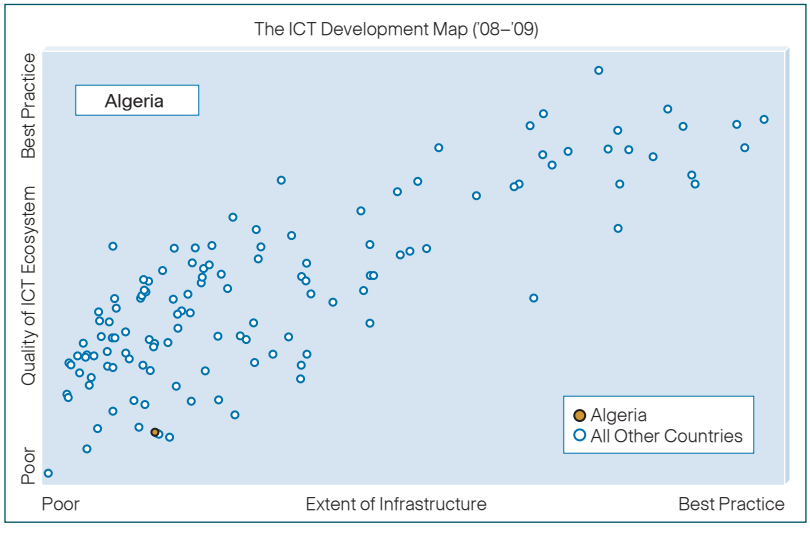
Algeria falls in the "early days" stage of Internet connectivity. These are countries that have Internet usage rates between 5 percent—or slightly below but growing fast—and 15 percent, but the large majority of the population has yet to experience the Internet directly. Algeria is one of the 32 countries at this stage, out of 157 countries that we have been able to classify in the stages. Countries in "early days" generally have significant urban populations (on average, about half of the country's total population), and Internet use averages mask major differences between urban and rural areas. Many people in these countries use the Internet through shared-access connections (cybercafés or community centers), so that the number of Internet users is a multiple of about five times the number of Internet connections in the country.



ICT map: Infrastructure investment and a supportive ecosystem are key

Revisiting the ICT development map with information from the 2008-09 NRI, we can position the 127 economies for which data are available, including Algeria, against the two dimensions of ICT infrastructure and ecosystem. Algeria's position shows the challenge ahead and the need to maintain a dual focus on improving the country's ICT infrastructure and its ecosystem to foster technology adoption. Infrastructure investments are key, but the payoff from those investments is much greater when they take place in the context of a propitious ecosystem.

The ICT environment in Algeria points to the need for greater ICT infrastructure investment in order to achieve economic and social goals.

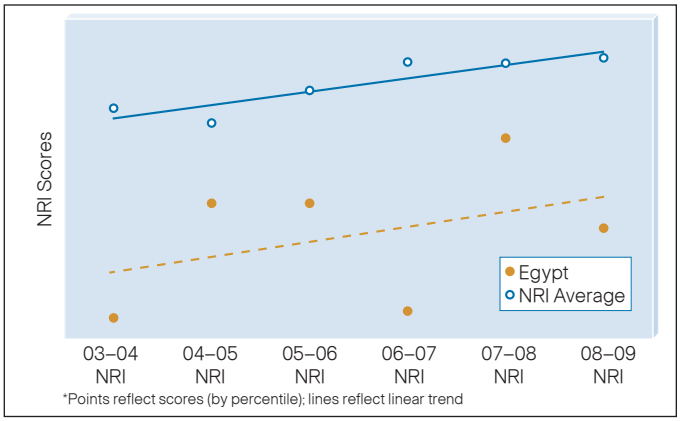


Source: Authors' calculations, based on data from the 2008–2009 Global IT Report & Network Readiness Index (WEF) and the International Telecommunications Union

This analysis is based on the latest available data—from 2007 in many cases—and thus does not reflect changes due to policy improvements or investments made since.

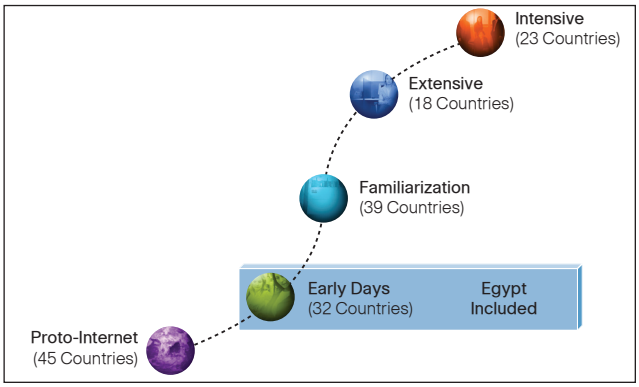
Egypt

The "league table" based on the NRI usually gets the headlines (Egypt this year ranks 76th out of 134 countries). But NRI scores and their trend convey even more information. As the chart illustrates, over the past six years, the trend in Egypt's NRI score has been increasing, though only in pace with (and still significantly below) the NRI average. This should be a source of concern, as it affects the country's competitiveness and its ability to benefit from the potential of ICT in general and from broadband specifically.



Internet stages

Egypt falls in the "early days" stage of Internet connectivity. These are countries that have Internet usage rates between 5 percent—or slightly below but growing fast—and 15 percent, but the large majority of the population has yet to experience the Internet directly. Egypt is one of the 32 countries at this stage, out of 157 countries that we have been able to classify in the stages. Countries in "early days" generally have significant urban populations (on average, about half of the country's total population), and Internet use averages mask major differences between urban and rural areas. Many people in these countries use the Internet through shared-access connections (cybercafés or community centers), so that the number of Internet users is a multiple of about five times the number of Internet connections in the country.



ICT map: Infrastructure investment and a supportive ecosystem are key

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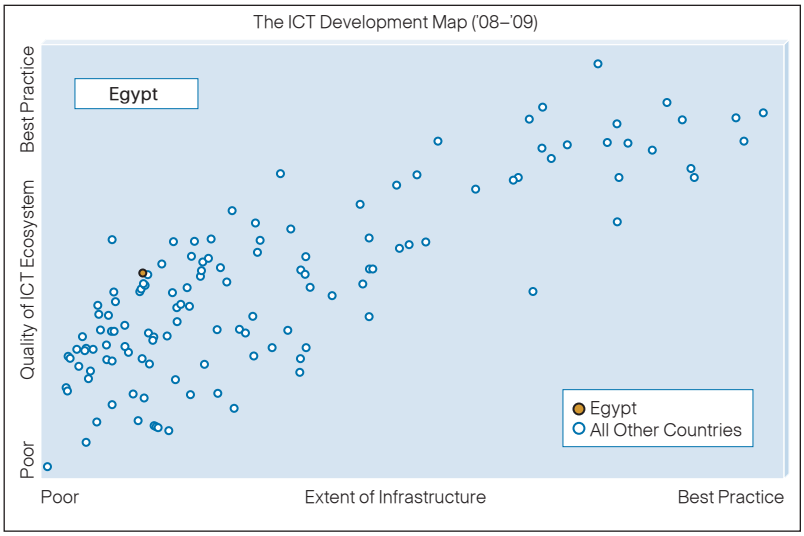
The ICT environment in Egypt points to the need for greater ICT infrastructure investment in order to achieve economic and social goals.

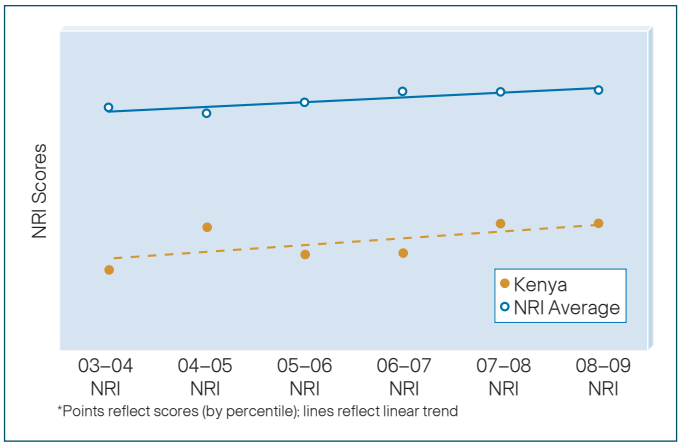


Source: Authors' calculations, based on data from the 2008–2009 Global IT Report & Network Readiness Index (WEF) and the International Telecommunications Union

This analysis is based on the latest available data—from 2007 in many cases—and thus does not reflect changes due to policy improvements or investments made since.

Kenya

The "league table" based on the NRI usually gets the headlines (Kenya this year ranks 97th out of 134 countries). But NRI scores and their trend convey even more information. As the chart illustrates, over the past six years, the trend in Kenya's NRI score has been slightly increasing, though it is still significantly below the average and the gap shows no sign of closing. This should be a source of concern, as it affects the country's competitiveness and its ability to benefit from the potential of ICT in general and from broadband specifically.



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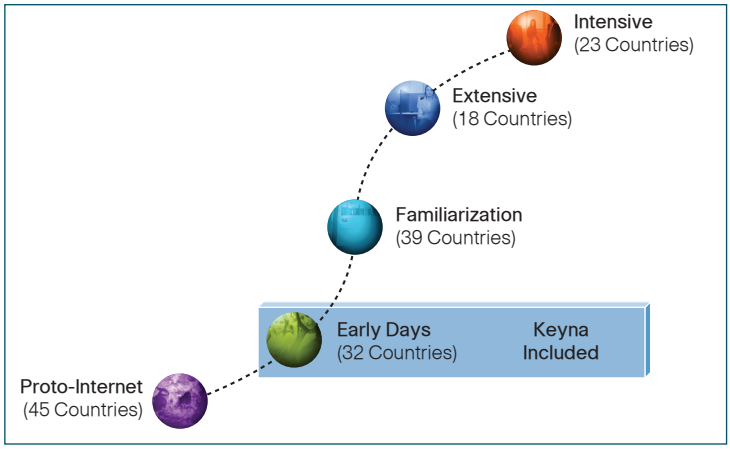

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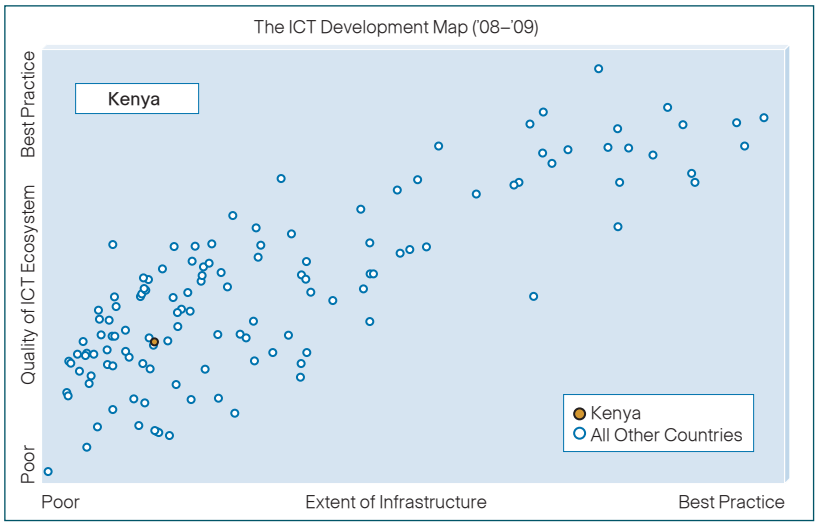
The ICT environment in Kenya points to the need for greater ICT infrastructure investment in order to achieve economic and social goals.

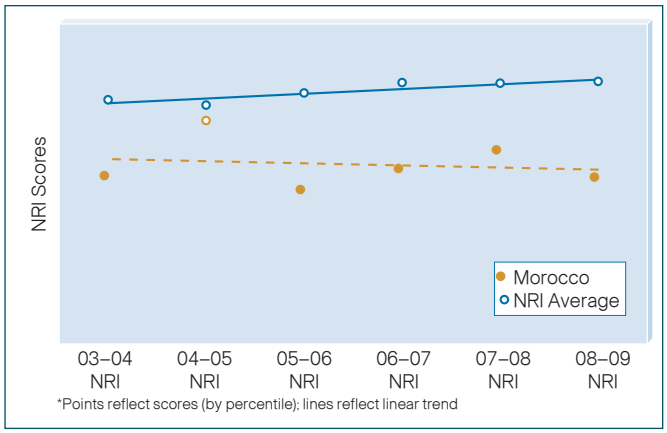


Source: Authors' calculations, based on data from the 2008–2009 Global IT Report & Network Readiness Index (WEF) and the International Telecommunications Union

This analysis is based on the latest available data—from 2007 in many cases—and thus does not reflect changes due to policy improvements or investments made since.

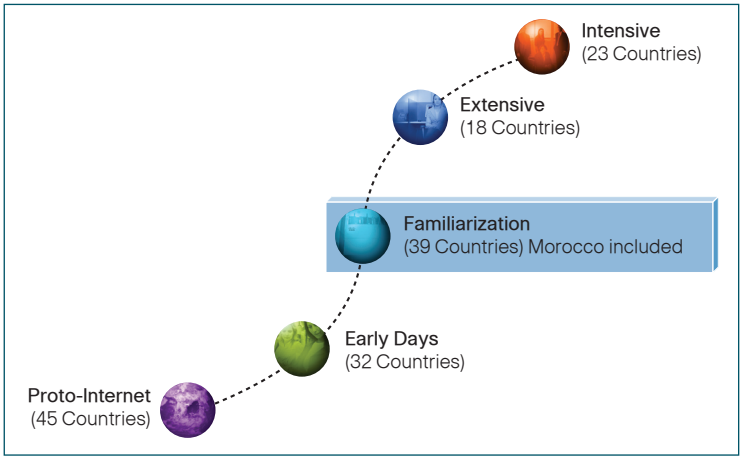
Morocco

The "league table" based on the NRI usually gets the headlines (Morocco this year ranks 86th out of 134 countries). But NRI scores and their trend convey even more information. While Morocco is among the top-ranked countries within Africa for Internet connectivity, as the chart illustrates, over the past six years, the trend in Morocco's NRI has been decreasing and is below the NRI average. The Government of Morocco has recognized this as a concern and has a number of initiatives under way to support the country's competitiveness and its ability to benefit from the potential of ICT in general and from broadband specifically.



Internet stages

Morocco falls in the "familiarization" stage of Internet connectivity, one of only three African countries at this mid-level stage of readiness. To reach this stage, a country must have Internet usage (the proportion of people who have experienced it) of at least 15 percent, but less than one-quarter of its households have their own connections at home. There are 39 countries worldwide in this stage—out of 157 countries that we have been able to classify in the stages. At this stage, virtually all businesses (beyond micro-enterprises) have Internet connections, as do many urban households. Familiarization with the Internet breeds high expectations, and the pent-up demand for online services and greater connectivity is a considerable factor behind Internet momentum.



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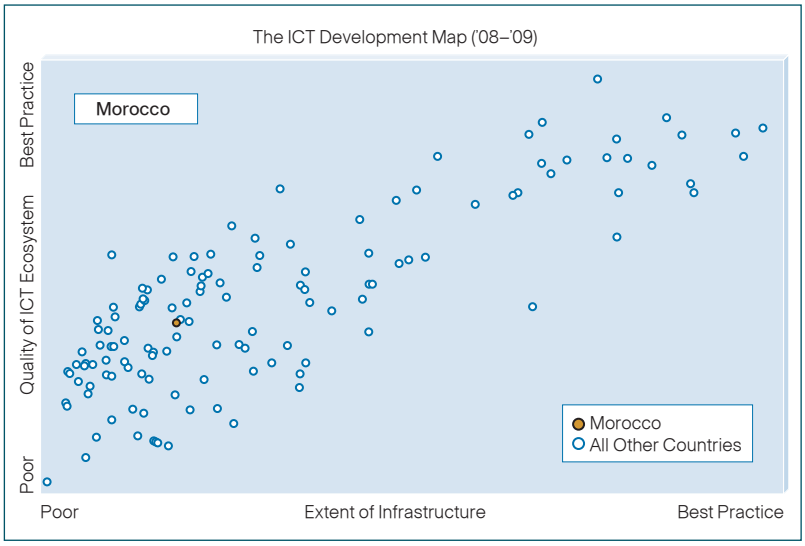
Revisiting the ICT development map with information from the 2008-09 NRI, we can position the 127 economies for which data are available, including Morocco, against the two dimensions of ICT infrastructure and ecosystem. Morocco's position shows the challenge ahead and the need to maintain a dual focus on improving the country's ICT infrastructure and its ecosystem to foster technology adoption. Infrastructure investments are key, but the payoff from those investments is much greater when they take place in the context of a propitious ecosystem.

The ICT environment in Morocco points to the need for greater ICT infrastructure investment in order to achieve economic and social goals.



Source: Authors' calculations, based on data from the 2008–2009 Global IT Report & Network Readiness Index (WEF) and the International Telecommunications Union

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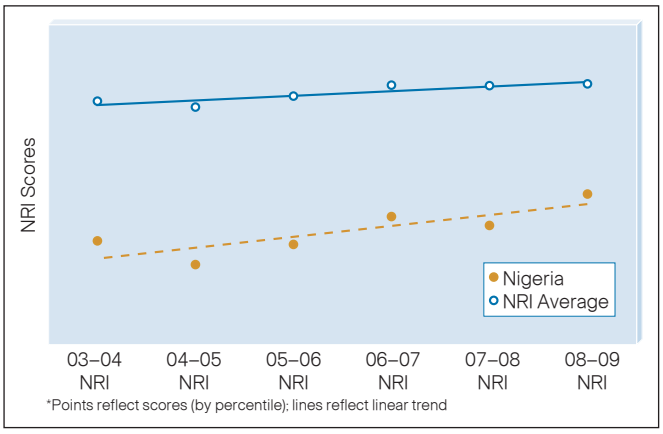
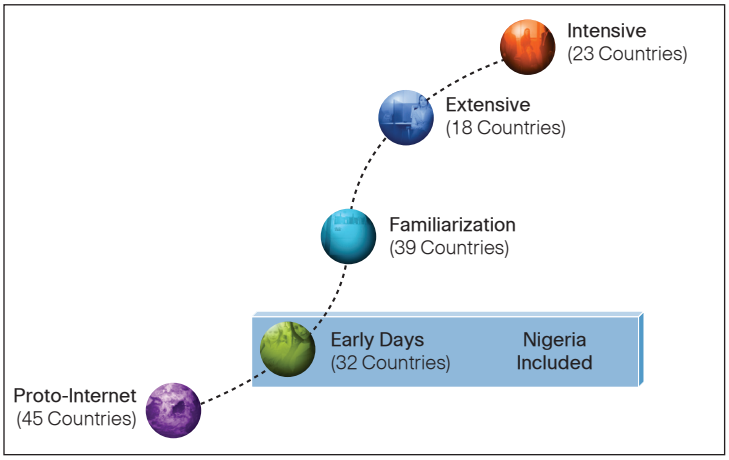
Nigeria

The "league table" based on the NRI usually gets the headlines (Nigeria this year ranks 90th out of 134 countries). But NRI scores and their trend convey even more information. As the chart illustrates, over the past six years, the trend in Nigeria's NRI score has been increasing, though still significantly below the NRI average. This should be a source of concern, as it affects the country's competitiveness and its ability to benefit from the potential of ICT in general and from broadband specifically.



Internet stages

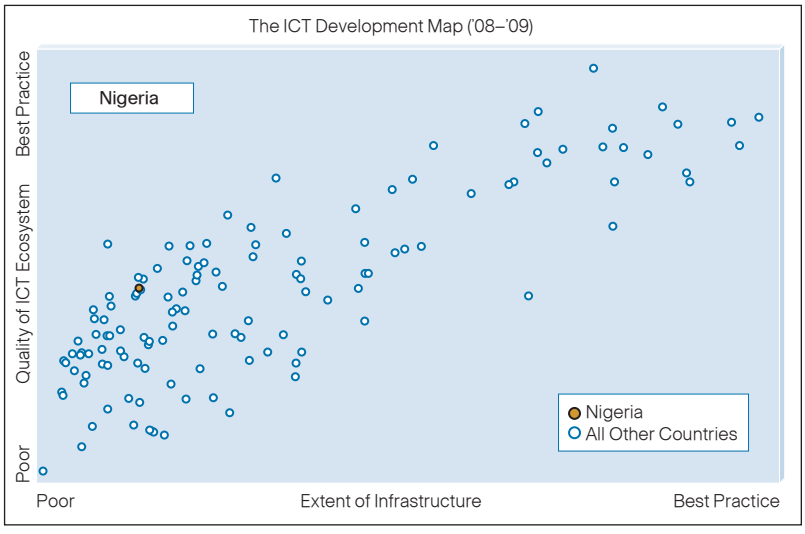
Nigeria falls in the "early days" stage of Internet connectivity. These are countries that have Internet usage rates between 5 percent—or slightly below but growing fast—and 15 percent, but the large majority of the population has yet to experience the Internet directly. Nigeria is one of the 32 countries at this stage, out of 157 countries that we have been able to classify in the stages. Countries in "early days" generally have significant urban populations (on average, about half of the country's total population), and Internet use averages mask major differences between urban and rural areas. Many people in these countries use the Internet through shared-access connections (cybercafés or community centers), so that the number of Internet users is a multiple of about five times the number of Internet connections in the country.



ICT map: Infrastructure investment and a supportive ecosystem are key

Revisiting the ICT development map with information from the 2008-09 NRI, we can position the 127 economies for which data are available, including Nigeria, against the two dimensions of ICT infrastructure and ecosystem. Nigeria's position shows the challenge ahead and the need to maintain a dual focus on improving the country's ICT infrastructure and its ecosystem to foster technology adoption. Infrastructure investments are key, but the payoff from those investments is much greater when they take place in the context of a propitious ecosystem.

The ICT environment in Nigeria points to the need for greater ICT infrastructure investment in order to achieve economic and social goals.



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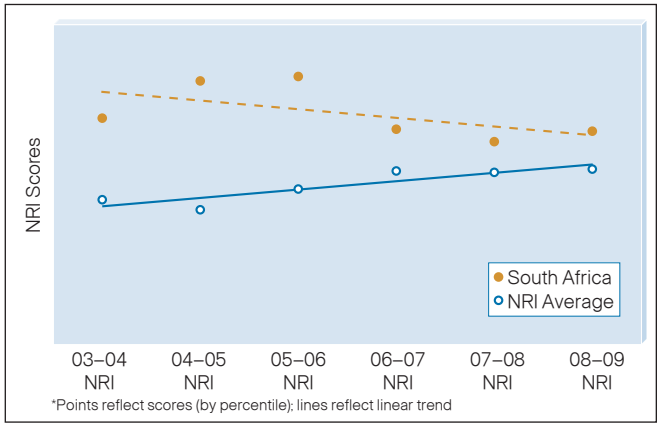
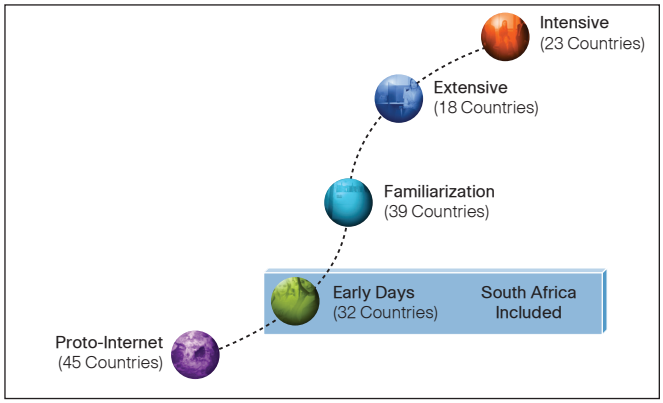
South Africa

The "league table" based on the NRI usually gets the headlines (South Africa this year ranks 52nd out of 134 countries). But NRI scores and their trend convey even more information. As the chart illustrates, over the past six years, the trend in South Africa's NRI score has been flat (and has been losing ground over the last four years). This should be a source of concern, as it affects the country's competitiveness and its ability to benefit from the potential of ICT in general and from broadband specifically.



Internet stages

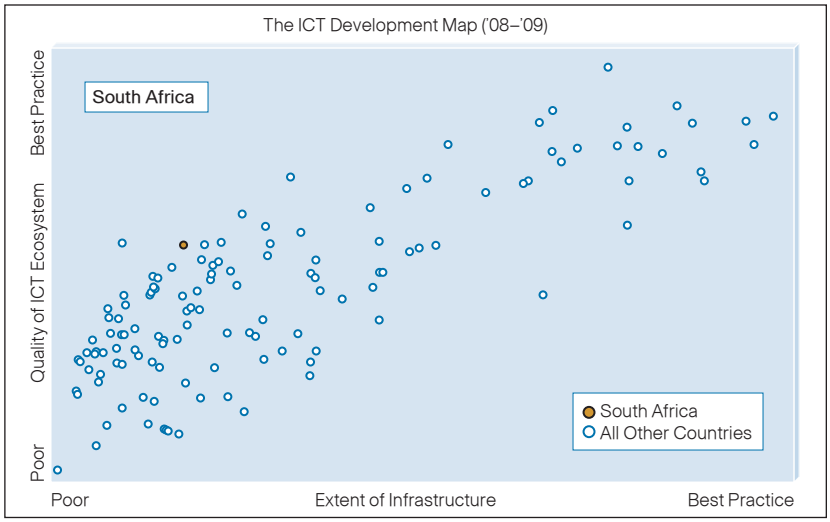
South Africa falls in the "early days" stage of Internet connectivity. These are countries that have Internet usage rates between 5 percent—or slightly below but growing fast—and 15 percent, but the large majority of the population has yet to experience the Internet directly. South Africa is one of the 32 countries at this stage, out of 157 countries that we have been able to classify in the stages. Countries in "early days" generally have significant urban populations (on average, about half of the country's total population), and Internet use averages mask major differences between urban and rural areas. Many people in these countries use the Internet through shared-access connections (cybercafés or community centers), so that the number of Internet users is a multiple of about five times the number of Internet connections in the country.



ICT map: Infrastructure investment and a supportive ecosystem are key

Revisiting the ICT development map with information from the 2008-09 NRI, we can position the 127 economies for which data are available, including South Africa, against the two dimensions of ICT infrastructure and ecosystem. South Africa's position shows the challenge ahead and the need to maintain a dual focus on improving the country's ICT infrastructure and ecosystem to foster technology adoption. Infrastructure investments are key, but the payoff from those investments is much greater when they take place in the context of a propitious ecosystem.

The ICT environment in South Africa calls for a renewed commitment to infrastructure hurdles to reverse the trend of declining network readiness and facilitate Internet connectivity for economic and social progress.



Source: Authors' calculations, based on data from the 2008–2009 Global IT Report & Network Readiness Index (WEF) and the International Telecommunications Union

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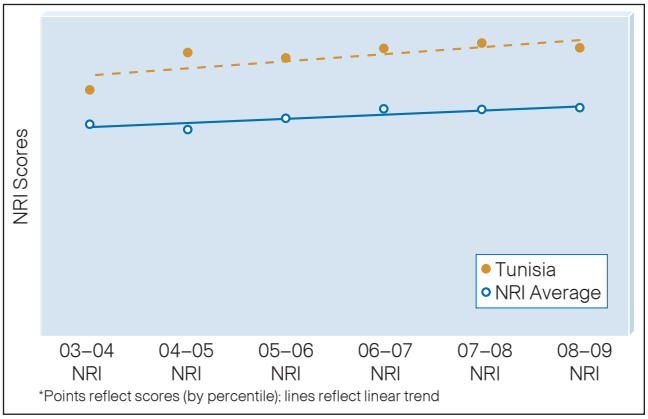
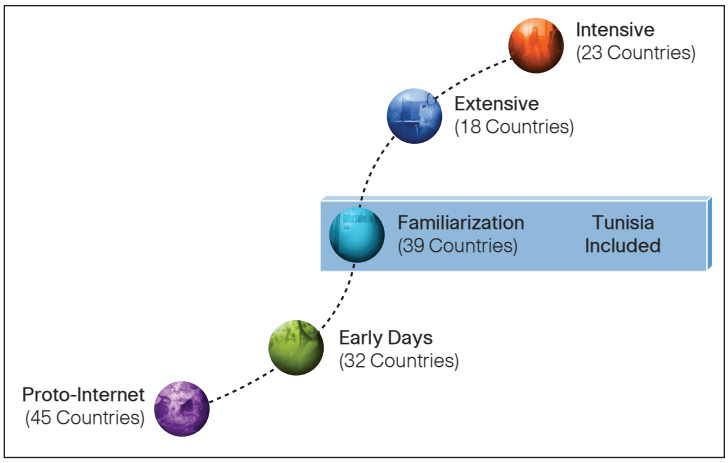
Tunisia

The "league table" based on the NRI usually gets the headlines (Tunisia this year ranks 38th out of 134 countries). But NRI scores and their trend convey even more information. As the chart illustrates, over the past six years, the trend in Tunisia's NRI score has been slightly increasing, and is above the NRI average. This positive movement should be monitored closely as it affects the country's competitiveness, and its ability to benefit from the potential of ICT in general and from broadband specifically.



Internet stages

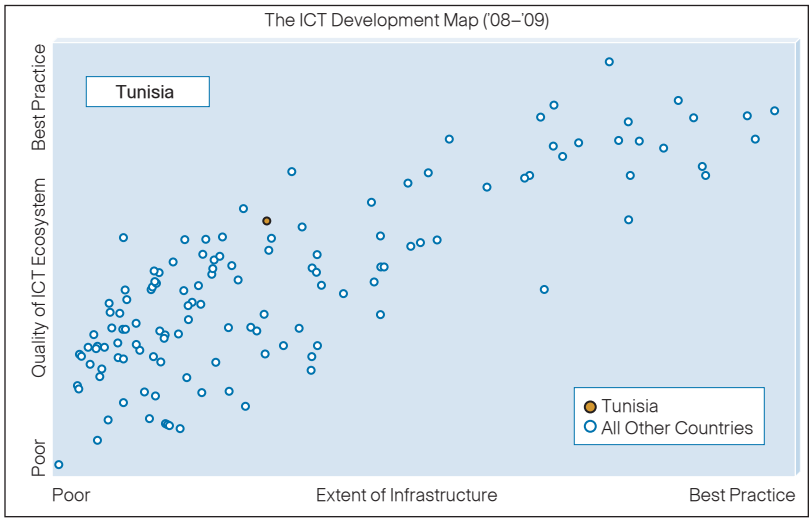
Tunisia falls in the "familiarization" stage of Internet connectivity. To reach this stage, a country must have Internet usage (the proportion of people who have experienced it) of at least 15 percent, but less than one-quarter of its households have their own connections at home. There are 39 countries worldwide in this stage, out of 157 countries that we have been able to classify in the stages. At this stage, virtually all businesses (beyond micro-enterprises) have Internet connections, as do many urban households. Familiarization with the Internet breeds high expectations, and the pent-up demand for online services and greater connectivity is a considerable factor behind Internet momentum.



ICT map: Infrastructure investment and a supportive ecosystem are key

Revisiting the ICT development map with information from the 2008-09 NRI, we can position the 127 economies for which data are available, including Tunisia, against the two dimensions of ICT infrastructure and ecosystem. Tunisia's position shows the challenge ahead and the need to maintain a dual focus on improving the country's ICT infrastructure and its ecosystem to foster technology adoption. Infrastructure investments are key, but the payoff from those investments is much greater when they take place in the context of a propitious ecosystem.

The ICT environment in Tunisia points to the need for greater ICT infrastructure investment in order to achieve economic and social goals.



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Angola and Libya

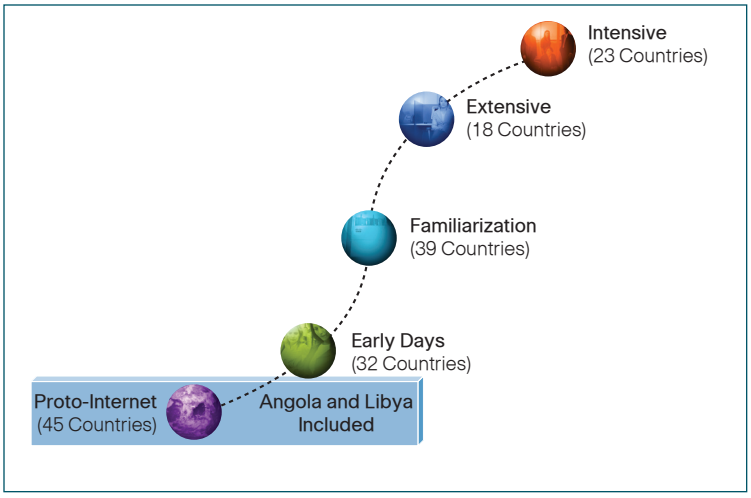
Angola and Libya are two countries with more limited network readiness. Angola is not in the Network Readiness Index, while Libya has only been ranked in the last two indexes (ranking 105th out of 127 countries last year and 101st out of 134 countries this year). This limited coverage should be a source of concern, as it affects the country's competitiveness and its ability to benefit from the potential of ICT in general and from broadband specifically.

Internet stages

Angola and Libya both fall in the "proto-Internet" stage of Internet connectivity.

A country is considered to be in this stage when less than 5 percent of its population has had experience with the Internet. There are 45 countries in this stage. They typically have low-income, rural economies (only 35 percent of the population on average lives in urban areas), with Internet connectivity largely available only to larger businesses, universities, the government, and small, elite groups in the cities. In these countries, less than 1 in 20 had experienced the Internet by 2007.

The ICT environments in Angola and Libya point to the need for greater ICT infrastructure investment in order to achieve economic and social goals.



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