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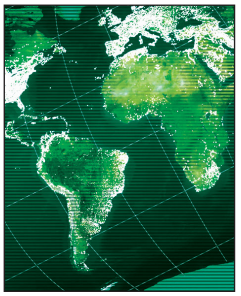

Africa Shifts Focus from Infrastructure to Interconnection

Karen Rose • *Internet Society*

Implementing the Internet across multiple countries in Africa is a complex process that requires participation, training, and collaboration at the local, national, and international level from governments, individual users, and IT providers. The author reports on some of the work happening that's allowing people to interconnect on many levels.

For two days in August, a meeting in Nairobi, Kenya, provided a unique opportunity for a diverse group of members from the African Internet community to discuss strategies for developing more robust Internet connectivity within and between African countries, and to talk about how to make more efficient use of resources through interconnection strategies. The meeting — the first-ever African Peering and Interconnection Forum (AfPIF) — was facilitated by the Internet Society with the support of local hosts the Telecommunications Service Providers Association of Kenya (TESPOK).

Improving Interconnection

Over the past decade, several undersea fiber-optic cable efforts, cross-border linkages, national fiber backbones, metro links, and last-mile connections have significantly added reach and capacity to the Internet infrastructure in Western, Eastern, and Southern Africa. However, despite an increasing amount of infrastructure within individual African countries, much data traffic destined for networks in the same country and neighboring nations is often sent to Europe to be exchanged and then returned to Africa.

With per-megabit satellite connectivity costs of US$2,000 to $5,000 in many African countries, these circuitous paths don't just contribute to high end-user access prices that dampen Internet growth. These paths also export financial resources overseas that could be used to grow local networks.

"The long-term sustainability of the Internet in any region — including Africa — relies on the ability of ISPs and other data network operators to conduct their operations efficiently, manage costs, provide reliable service to users at a reasonable price, and take advantage of growth opportunities," said Michuki Mwangi, the senior development manager in charge of Africa at the Internet Society.

Even where fiber networks exist between countries, traffic often takes circuitous international routes to return back to Africa. "A good example is to trace the path followed by an Internet packet from Nairobi to Kigali, Rwanda. The packet from Nairobi will often be sent off-shore to Europe then back around to Kigali, despite the fact that a terrestrial fiber infrastructure is present directly between Rwanda and Kenya," said Mwangi.

IXPs have been a significant focus of interest and efforts by governments and operators looking at ways to interconnect and exchange content locally. By providing peering opportunities within countries, IXPs reduce the cost of international connectivity and — in the case of outages on international links — help ensure continued local connectivity.

Complaints about high bandwidth costs also have been a motivation for governments, which have participated in many of the projects

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Editor's Note

With this issue, we begin a new department that offers insights on various aspects of the Internet in the developing world. This information comes to us from the Internet Society, a nonprofit organization that works toward the smooth expansion, operation, and use of the Internet throughout the world, and that focuses on helping with Internet adoption in areas of the world that are technologically behind in one way or another.

A few times a year, approximately every other issue, the Internet Society will update us with issues, successes, challenges, educational endeavors, and policies — and about the people who are making these changes happen. We look forward to an interesting series of columns, beginning with this look at Internet interconnection in Africa. — *Barry Leiba*

to build out Internet infrastructure. The same complaints are also spurring operators to explore ways of leveraging the existing infrastructure to bring lower costs for Internet connectivity to small businesses and individuals.

However, the idea of establishing IXPs hasn't been attractive to governments and operators in every country, and established exchange points aren't being used to their full potential. Market domination and fear of losing the competitive advantage has meant that some operators don't peer at the exchange points. In some cases, smaller ISPs have had to pay more to access content from bigger operators.

"Setting up IXPs is 90 percent social engineering – operators must trust one another to know that it's a mutual benefit more than competitive advantage to participate at an exchange point," said Mwangi.

Working Together

Discussions at the AfPIF underscored that while investments in infrastructure are a necessary first step, additional concerted action from the private sector, government, and the IT community is required to take full advantage of those investments.

Organizations from the international Internet community are working together and, in some cases, expanding their activities, to help address this challenge. In the past five years, the African Network Information Center (AfriNIC), which is Africa's regional Internet registry, has moved beyond managing the distribution of Internet addresses in the region and has worked to raise awareness on issues of interconnection and investment in critical Internet infrastructure in a variety of ways.

Recently, AfriNIC joined an Internet Society initiative to provide technical training workshops and set up IXPs with Africa. The organizations have also worked together to deploy copies of Domain Name System (DNS) root server copies. Through this joint effort, Tanzania received its first root server copy last year, Sierra Leone set up an IXP, and Kenya established a second exchange point in the coastal city of Mombasa.

"Interest continues to grow on the continent with countries such as Mozambique, Ghana, and Senegal requesting an evaluation of their readiness for root copy deployment. A number of other countries on the continent are also exploring opportunities to engage with this project," said Adiel Akplogan, AfriNIC's CEO. "Recognizing that this is a multistakeholder partnership, we will be putting more effort into the active involvement and engagement of local governments."

The involvement of governments has been vital because of the strict licensing regime in the telecommunications sector. In most Western countries, IXPs are set up by the private sector without any need for licensing. In many African countries, such as Kenya, the local IXP is licensed by the national telecommunications regulator.

"When it comes to cross-border interconnection, some regulators want license fees, and in some cases it is not clear who has the right to dig across the border. With submarine cables, regulators have set landing station fees, but this has not been addressed for land-locked countries. This is a purely regulatory issue, and that is why governments have to be involved," Mwangi added.

Lack of content has also been cited as one of the reasons for lack of interconnection. For example, ISPs argue that Kenyans don't access large amounts of content from Uganda. Thus, it isn't possible to justify interconnecting IXPs in Kenya and Uganda. And, despite being increasingly popular among African Internet users, global content providers seem to have paid little attention to Africa.

But this is changing. According to the Opera Mini Report released in July, Facebook, Google, and YouTube are increasingly popular in Africa (see www.opera.com/smw/2010/06). Facebook is the top-ranked site in six of the 12 countries surveyed, while Google is ranked first in the remaining six countries. A recent report released by the International Telecommunications Union reported that among Nigeria's online community, which at 43 million individuals is the largest of any African country, Google products were the most visited sites.

Gaining Global Attention

Recognizing the growing number of Internet users, Google announced at AfPIF that it's set to open a local cache, or point of presence (POP), in Nigeria to cater to the increasing number of users to its sites and lower

the cost of international bandwidth. This is especially important when accessing high-bandwidth sites such as YouTube.

Mike Blanche, Google's program manager of peering and content distribution for Europe, the Middle East, and Africa, announced to AfPIF participants that Google is set to open a POP in Nigeria. He also noted that South Africa was the first and that Kenya will get a POP in the second quarter of 2011. The announcement drew cheers from the meeting attendees, who saw it as a sign that the region is finally attracting global content providers' attention.

"The step taken by Google means that as a region we have come of age, that we have requisite infrastructures and facilities to host significant content. If you look at the capacity Google carries to one network, it is about 20 percent, which is significant," said Mwangi.

In addition to demonstrating that Nigeria is mature enough to host large volumes of content, Mwangi sees the POP as an opportunity to attract more local content hosting. While the desire to host African content abroad has been motivated by low hosting costs, participants at AfPIF discussed reasons why Africa hasn't attracted international ISPs to peer locally.

Mwangi commented, "We have an opportunity to create unique content, and if hosted locally, ISPs in the West will come seeking to interconnect. For example, if we had virtual tourism hosted locally, international visitors will come to our content the same way African Internet users seek content from outside Africa."

Greater Understanding and Awareness

Dealing with governments and the IT community isn't the only challenge for efforts such as those undertaken by the Internet Society and AfriNIC. Cultural issues and mindsets on where the project will be located can mean success or failure for the installation — it must be seen as neutral by all parties involved. In fact, according to Akplogan, it can be a deciding factor.

"Culture plays a major role in the uptake and at what level in the countries; the community has to be strong and stand behind these initiatives, while the governments have to be willing to let go while playing their role as a catalyst and facilitator for all aspects of these initiatives to work together. Understanding is a very important step, but translating this into a plan and project will take time and effort," said Akplogan.

Education can play a significant role as well. Lack of training and awareness about the economic benefits of peering has led some operators to argue that there's no difference in costs whether the content is exchanged locally or internationally. AfriNIC and the Internet Society have been involved in engaging governments, who often generate the highest amount of local content through e-government services. By providing a forum where governments can openly share and discuss their concerns, they're able to find ways to collaborate on solutions that benefit their countries and the growing number of citizens who rely on the Internet as they work, live, and learn.

There's still much work ahead, but high participation and collaboration are the kernels for success and continuous development. Akplogan, describing the motivation for many of the participants in meetings such as AfPIF, said, "The Internet is a powerful socioeconomic tool. To fully leverage it, we have to understand the economics of the Internet and then put in place mid- and long-term strategies, including a sustainable training plan built around an Afri-centric vision of the Internet, the development of a proper infrastructure design, and continuing engagement in global debates around the Internet."

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