Internet development and Internet governance in Africa

By Towela Nyirenda-Jere & Tesfaye Biru

22 MAY 2015

Internet Society™

Internet development and Internet governance in Africa

Executive summary

The global Internet continues to grow at an exponential rate, bringing with it new ways of transacting, communicating, learning, socializing, and transforming just about every aspect of daily life. But the benefits of the Internet are not yet evenly distributed. In Africa, despite a slow start, Internet use is now rapidly accelerating, and its transformative effects are increasingly accessible.

The Internet in Africa is growing fast. Internet penetration levels are about 20% and rising. Mobile subscriptions are just shy of 70%, and mobile broadband access accounts for more than 90% of Internet subscriptions. But the aggregate indicators mask glaring disparities. At the high end of the spectrum, countries such as Morocco enjoy penetration rates above 50%, but at the other end are countries with penetration rates below 2%, and the majority of countries have Internet penetration of less than 10% (well below the 20% threshold that has been found to be critical for countries to reap the economic benefits of broadband investment).

Nevertheless, recent years have seen the accumulated efforts of dedicated technologists, businesses, policy makers, civil society, and individuals bear fruit, pointing to improved outcomes and laying the ground for the social and economic benefits that the Internet can bring.

In the past five years, submarine cables have brought a twenty-fold increase in international bandwidth. In the same period, the terrestrial infrastructure also doubled. These developments have brought dramatic improvements in many areas. But to make the most of this capacity, more investment is needed in national backbones and cross-border connectivity.

Considerable work is now underway to improve the conditions that currently mean users in Africa pay up to 30 or 40 times more for Internet access than their peers in developed countries. One example is the establishment of Internet exchange points (IXPs) at the local level. Africa now has more than 30 IXPs and is well on the way to achieving the goal of at least one IXP per country. Efforts to establish at least one regional IXP in each of the five geographic regions are also well underway. IXPs can catalyse the build-out of terrestrial infrastructure, which in turn makes access to the Internet cheaper and faster.

Migrating from analogue to digital broadcasting offers more opportunities to increase Internet access by freeing up unused spectrum. However, this opportunity is not yet being grasped – by June 2014, only 19 countries had started their digital transition and by December 2014 only three (Tanzania, Rwanda, Mauritius) had switched off their analogue signals.

Another transition that Africa is not implementing fast enough is that to the new Internet addressing protocol, IPv6. IPv6 is necessary for long term Internet expansion, especially as the Internet of Things (IoT) becomes a reality. To date, South Africa and Egypt registered 97% of the African IPv6 addresses, which means adoption in all the other countries is lagging.

Most national ICT policies and strategies mention capacity building as a priority; however, most countries fall short on implementation. This translates into significant capacity gaps – especially at the level of specialists able to build and maintain infrastructure and services – making Africa overly reliant on external expertise. Africa needs a coherent strategy for capacity development at all levels, and this strategy needs to look first at ICTs as a discipline and secondly as a cross-cutting enabler of other disciplines.

The benefits of increased connectivity and Internet access come with the attendant challenges of cybercrime and privacy concerns. The African Union has developed a Convention on Cybersecurity and Personal Data Protection that would, among other things, commit member states to establish legal frameworks for e-transactions, protection of data, and punishment of violations. But, achieving a secure environment and protecting privacy requires collaboration from all Internet governance actors.

The Arab Spring of 2011, the Snowden revelations of 2013, and other events at the intersection of human rights and cyberspace have galvanized the global community – mainly through the United Nations – to seek common understanding and solutions that ensure respect of fundamental rights

Quick facts: Growth, expansion, opportunities, and challenges

- Rapid growth – In 2005, Internet penetration in Europe was almost 20 times that of Africa. By 2014, it was less than 4 times greater.
- In just 5 years – from 2009 to 2014 – Africa's international bandwidth increased 20-fold and its terrestrial network more than doubled.
- There are now more than 30 IXPs across Africa.
- EABS (the East African Backhaul System) will connect Kenya, Tanzania, Uganda, Rwanda, and Burundi
- Landlocked Uganda, Rwanda and Burundi have backbone access to submarine fibre at close to the same price as coastal countries.
- Mobile Internet devices are forecast to rise to 23% of the African mobile market in 2015 then 40% by 2017.
- Africa has the highest growth in mobile subscriptions year-on-year since the turn of the century. Mobile revenues are about 3.7% of GDP, three times as much as in developed economies.
- 10% increase in broadband access correlates to 1.35% increase in GDP growth. 10% in mobile penetration can bring 4% increase in productivity.
- Africa leads the world in the use of mobile phones for money transfer

online. In 2014, addressing concerns of human rights online, a coalition of organizations launched the African Declaration on Internet Rights and Freedoms, which is aimed at promoting human rights and openness in policy-making and implementation as they relate to Internet development in Africa.

And 2015 holds several significant milestones for Internet governance and development. First, this year marks the end of the Millennium Development Goals, which will now be replaced by Sustainable Development Goals. The African Union has also launched its Agenda 2063, spelling out development aspirations for the next 50 years. Second, it is now ten years since the World Summit on the Information Society (WSIS) Tunis phase and is thus a time for reflection on progress made, opportunities missed, challenges faced, and the road ahead. And this year, the UN General Assembly will make a determination on whether or not to extend the mandate of the IGF.

As Africa's infrastructure and user base grows, the need to coordinate and manage Internet growth and development becomes increasingly important. Several institutions and processes have emerged over the last 15 years, each playing a role in strengthening Africa's Internet ecosystem. Africa has embraced the multistakeholder model of Internet governance which enables policymakers to draw from the expertise of the relevant stakeholders to develop sustainable Internet public policy approaches that can meet the policy challenges of the digital age. Internet governance fora have emerged at continental, regional and national levels and are proving to be an essential part of Africa's Internet ecosystem.

- M-Pesa allows users to transfer money directly through a mobile device. M-Pesa has 15 million customers and accounts for 12% of Kenya's GDP. A further 31% of GDP is now transacted through the service.
- Hackathons and competitions are popular ways to stimulate locally-developed Internet and mobile apps and innovations.
- Almost 15% of publicly visible networks in Africa use IPv6, but most of those are concentrated in South Africa and Egypt.
- Internet access in Africa can cost 30 or 40 times more than in developed countries.
- Africa's proportion of the global population is 15%; its share of global Internet users is only 6%.
- Failure to prioritize human capacity building means a lack of infrastructure specialists, leaving Africa overly reliant on external expertise.
- 2015 marks the end of the Millennium Development Goals and the start of the Sustainable Development Goals.
- The African Union recognizes ICT as a major sector that can help achieve its Agenda 2063 aspirations.

Africa's significant growth in mobile communications and steady growth in Internet penetration are in large part attributable to efforts by African governments working in partnership with other stakeholders to create an enabling environment, fostering the development of Internet infrastructure. Africa's Internet Institutions are driving this development and putting the multistakeholder model of Internet governance into practice. The high growth in Internet and mobile access since 2005 can be attributed in part to the strengthening of existing institutions, the emergence of regional and national IGFs, and the increased commitment of African governments to ICT development. As Africa continues to make further strides in building its Internet economy, the multistakeholder model will continue to be an important element helping Africa to reach a critical mass of access and usage translating into sustained economic benefit

The growth and status of the Internet in Africa

Origins and early years

While the origins of the global Internet can be traced to the US-based ARPANET in the 1960s, the first network in sub-Saharan Africa came nearly three decades later, in 1988 at Rhodes University in Grahamstown, South Africa. In 1991 the first data packet transmitted from sub-Saharan Africa was sent from South Africa to Portland, Oregon. This heralded the arrival of the Internet to Africa. The technology employed was a dialup system with the Fidonet[1] mailing system as a transport mechanism; then followed dial-up systems based on the UUCP[2] gateway, which were replaced with an Internet connection across a leased line at 9600bps. This led to the advent of Internet Service Providers providing both dial-up and leased line (ISDN) connections on a commercial basis. The pioneering countries were Tunisia and South Africa (1991), Egypt (1993), and Algeria and Zambia (1994). By the end of 1997, 47 of the then 53 countries in Africa had some sort of Internet access, either a local dial-up store-and-forward e-mail service with a gateway to the Internet, or a full leased line service[3,4].

Internet speed increased gradually, ranging from 56 kbps dialup connections to 128 kbps ISDN connections. ADSL broadband boosted download speeds to 512 kbps by around 2002. Then, wireless broadband emerged in 2004 with 3G mobile plans offering speeds up to 1 Mbps. The decade since then has seen many new broadband services offering much higher speeds.

At a policy level, a unified approach for developing the ICT sector in Africa may be traced back to the twenty-first meeting of the United Nations Economic Commission for Africa (UNECA) conference of ministers in May 1995, where fifty-three African Social and Economic Development and Planning ministers adopted a resolution entitled “Building Africa’s Information Highway”. This led to the drafting of the African Information Society Initiative (AISI), an action framework to build and use ICTs to accelerate the socio-economic development of Africa and its people. AISI catalysed African governments into action and led to the development of national ICT strategies and policies, regional frameworks, and various ICT for development (ICT4D) programmes and initiatives.

[1] FidoNet is a point-to-point and store-and-forward wide area network that uses modems over normal switched telephone line to exchange messages and data (in the form of private mail exchange, public conferencing, file transfer, etc.).

[2] UUCP is the protocol that was developed to allow two unix computers to interchange files using dialup modem. In these networking services, messages flow in both directions when the telephone call connects.

[3] Mike Jensen, Internet Connectivity for Africa: The Status of the Internet and Related Developments. Available at https://www.isoc.org/oti/articles/0997/jensen.html

[4] See also http://mybroadband.co.za/news/internet/114645-the-history-of-internet-access-in-south-africa.html

Some of Africa's Internet pioneers[5]

- **Mike Lawrie** (South Africa) – Led establishment of the first Internet networking system in South Africa in 1988 and transmission of first data packet out of sub-Saharan Africa in 1991.
- **Nii Narku Quaynor** (Ghana) – Established the first Internet Service in West Africa, Ghana in 1993; awarded the Jonathan B. Postel Service Award in 2007 for his leadership in advancing Internet technology in Africa.
- **Tarek Kamel** (Egypt) – Considered the father of the Internet in Egypt. Kamel also served as Minister of Communication and Information Technology of Egypt, and is currently senior advisor to the president of ICANN.
- **Nancy Hafkin** (USA) – Among the first to enter the field of electronic communications in Africa; a pioneer and innovator in networking, development information, and electronic communications, working primarily with the UN Economic Commission for Africa (UNECA) in Addis Ababa.
- **Pierre Dandjinou** (Benin) – Organized the first African conference on Internet governance in Cotonou in 1998, coordinated UNDP's "Internet initiative for Africa", which helped provide the first national Internet gateway in many African countries; currently the ICANN Vice President for Stakeholder Engagement for Africa**.**
- **Pierre Ouedraogo** (Burkina Faso) – Instrumental in Internet development in Francophone Africa, received the Jonathan B. Postel Service Award in 2012; currently Director of Digital Francophonie at *Organisation Internationale de la Francophonie* (OIF).
- **Abdelaziz Hilali** (Morocco) – Founding member and long-serving chair of the first Internet Society chartered chapter in Africa.
- **Farouk Kamoun** (Tunisia) – Contributed to significant ARPANET research and pioneered development of the Internet in Tunisia in the early 1990s.
- **Alan Barrett** (South Africa) – Co-founder of first commercial ISP in Africa; currently CEO of AfriNIC.
- **Mouhamet Diop** (Senegal) – CEO of Kheuwel, the first ICANN-accredited registrar in Africa; noted for pioneering Internet development in Senegal.

[5] Extracted from http://www.internetsociety.org/history-internet-africa-some-african-pioneers

Access and usage

Since the start of this millennium, African countries have experienced a steady growth in Internet penetration from 0.78% in 2000 to 20.71% in 2014 as shown in Figure 1.

While Africa still lags the rest of the world in Internet penetration (see Table 1), it is bridging the gap very quickly. For example, in 2005, Internet penetration in Europe was 19.6 times greater than that of Africa, but by 2014, it was only 3.9 times greater.

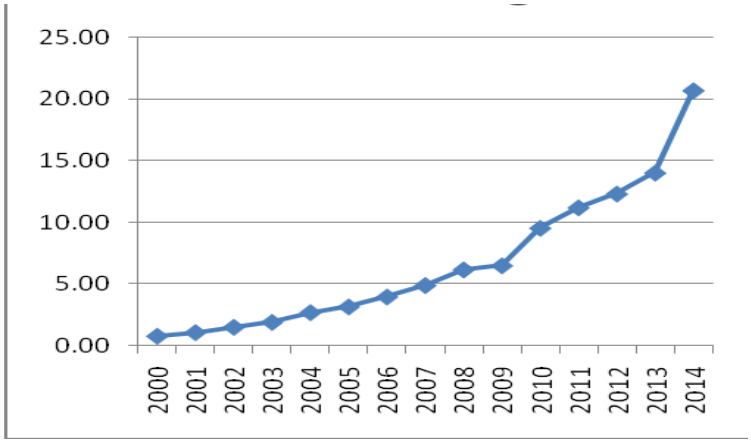


Figure 1 Internet penetration in Africa (Sources: http://www.internetworldstats.com/stats1.htm; ITU (2014), the World in 2014: ICT Facts and Figures)

Indicator	Africa	World average
Internet penetration	20%	40%
Fixed telephone subscriptions	1.3%	15.8%
Fixed broadband	0.4%	9.8%
Mobile cellular subscriptions	69%	96%
Mobile broadband subscriptions	19%	32%

Table 1 Comparison of ICT and Internet penetration indicators (Source: The World in 2014: ICT facts and figures, ITU World Telecommunications/ICT Indicators database)

A decade of rapid expansion bridging the gap in Internet penetration

*In 2005, Internet in Europe was almost **20** times that of Africa. By 2014, it was less than **4** times greater.*

Furthermore, review of the African Internet penetration statistics per country indicates that all member countries have experienced growth, albeit at different rates. Figure 2 and Figure 3 show these trends by comparing the penetration for the bottom ten and top ten countries[6] respectively, at three-year intervals between 2001 and 2013.

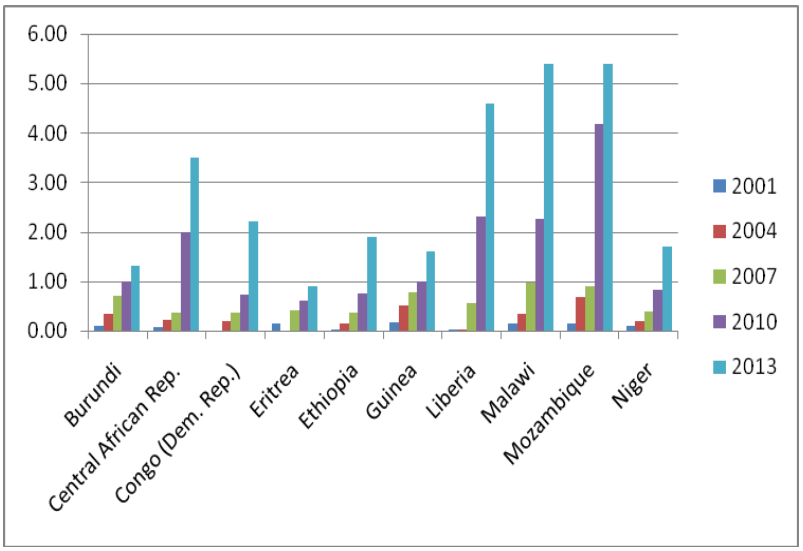


Figure 2 Percentage of Internet users: bottom 10 countries based on GDP per capita (Source: ITU – the World in 2014: ICT Facts and Figures; 2014 World Bank Indicators on GDP per capita)

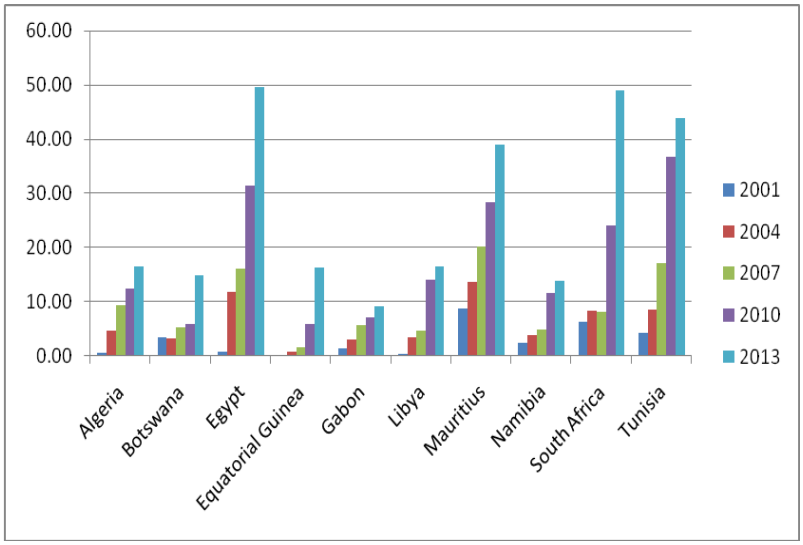


Figure 3 Percentage of Internet users: top 10 countries based on GDP per capita (Source: ITU – the World in 2014: ICT Facts and Figures; 2014 World Bank Indicators on GDP per capita)

Regional diversity reflected in penetration and usage

Africa is characterized by extraordinary diversity across linguistic, cultural, environmental, economic, and other dimensions. Not surprisingly, with so many different challenges and opportunities, deployment, access, and usage of the Internet across Africa is far from monolithic.

[6] Based on data from various sources: ITU(2014), the World in 2014: ICT Facts and Figures; World Bank Indicators (2014), GDP per capita, PPP (current international $); http://www.internetworldstats.com/stats1.htm

As is common in developing countries, wireless broadband and mobile Internet are the key drivers of rapid Internet uptake across the continent. Africa's mobile subscription rate is now over 70%[7] and rapidly growing. But while new technologies continue to spur Internet growth across the continent, we still see significant disparities across countries and regions. This reflects both the size and the diversity of Africa. For example, the subscription rate is only 30% in West Africa and below 20% in Central Africa. Nigeria, South Africa and Northern Africa continue to lead the region in terms of Internet subscriptions, but many Sub-Saharan countries (such as Kenya, Sudan, and Zimbabwe) are also increasing their Internet penetration rates.

If we consider the percentage of individuals using the Internet, Morocco stands first at 56%, followed by Egypt at 50%, and South Africa at 49%[8]. On the other hand, several sub-Saharan African nations are still below 2% Internet penetration.

Fixed broadband penetration tends to be significantly lower than mobile access in Africa, with Seychelles and Mauritius leading with just under 13%, followed by Tunisia, just below 5%.

Where smartphones are present, the general patterns in the usage behaviours are similar to international patterns. Among those who access the Internet on their mobile phone, 57% visit social networks, 39% use email, 38% listen to music or watch video, and 31% read news. Instant messaging is highly popular, used by 41% of consumers[9]. Facebook is the application that continues to drive the majority of communication traffic, now at 62%.

However, unlike other parts of the world where smart phone penetration is well above 50%, Africa – particularly its western and central regions – still has a large number of subscribers using feature phones. For this and other reasons, prevalent activities in more developed markets of the West – such as gaming and online shopping – are less advanced in African markets, used by only 19% and 10% respectively of mobile phone owners in Africa[10].

[7] This figure is a measure of total subscriptions and not unique subscriptions (in Africa, people are likely to have more than one subscription). According to the GSMA's Mobile Economy 2015 report, unique subscriptions in sub-Saharan Africa are 39%.

[8] See: (i) African highlights from 'State of Broadband 2014' report, January 27, 2015, at http://www.oafrica.com/broadband/african-highlights-from-state-of-broadband-2014-report/ and (ii) Broadband Commission Report (2015), The state of broadband 2014: broadband for all, at http://www.broadbandcommission.org/documents/reports/bb-annualreport2014.pdf

[9] Sandvine IBN(2013). Global Internet Phenomena Report: 2H. Available at https://www.sandvine.com/downloads/general/global-internet-phenomena/2013/2h-2013-global-internet-phenomena-report.pdf

[10] M&C Saatchi Mobile (2013). Inside Mobile Africa, An in-depth look at the rise of mobile and opportunities for advertisers in Africa), at http://www.mcsaatchimobile.com/wp-content/uploads/2013/06/Inside-Mobile-Africa.pdf

Infrastructure

In this section, we highlight the current status of Internet infrastructure in Africa from the perspectives of the progress made along the elements of the Internet access value chain as shown in Figure 4, with special emphasis on international connectivity, cross-border or regional connectivity, and national backbone networks.

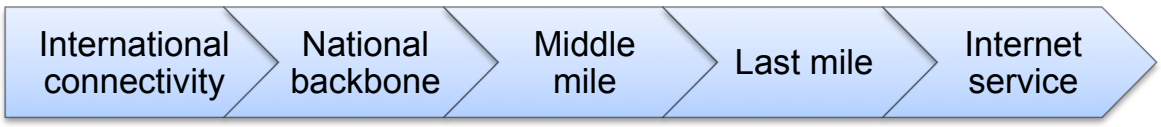


Figure 4 Elements of the Internet access value chain[11]

International connectivity

International Internet connectivity is one of the most critical requirements for the development of the Internet in any country, particularly for developing countries that access significant amounts of content from more developed regions. Users in countries with more international bandwidth and national coverage are better able to access and enjoy a wide range of online services, while those in countries that lack adequate international bandwidth are significantly restrained in their Internet access and usage.

But not only does insufficient bandwidth choke Internet access, it also keeps prices high and the quality of services low. Even where access is available, relatively high prices for international connectivity can be very discouraging, often leading to a lack of user interest in Internet services. Where this is the case, Internet traffic volumes and related revenues dwindle, reducing the attractiveness of investment in international bandwidth. As such, problems of access, affordability, and quality of service in the country may persist.

Bandwidth, which is critical to the access and use of the Internet, is scarce and thus expensive in developing countries in general and in Africa in particular. Users in Africa have to pay many times more for Internet access than their peers in developed countries. For instance, some studies show that bandwidth costs for broadband in Sub-Saharan Africa are 30-40 times those in the US; with the difference in earnings, what takes perhaps 15% of US Gross National Income (GNI) per capita will take over 800% of a Sub-Saharan GNI per capita. Within the continent, for instance, 15.7% of Kenya's average GDP per capita is required for broadband access, compared to 6.1% in South Africa and less than 2% in most of Europe. In Ethiopia, the figure rises to 60.4% while it is 31% in Uganda and 7.4% in Sudan.

But the bandwidth situation is improving. In recent years, significantly increased investment has resulted in much more capacity in general, and more countries with their own landing stations. Table 2 below summarizes international and regional submarine cables serving Africa. The corresponding map depicting the various undersea fibre cables circling the continent is shown in Figure 5.

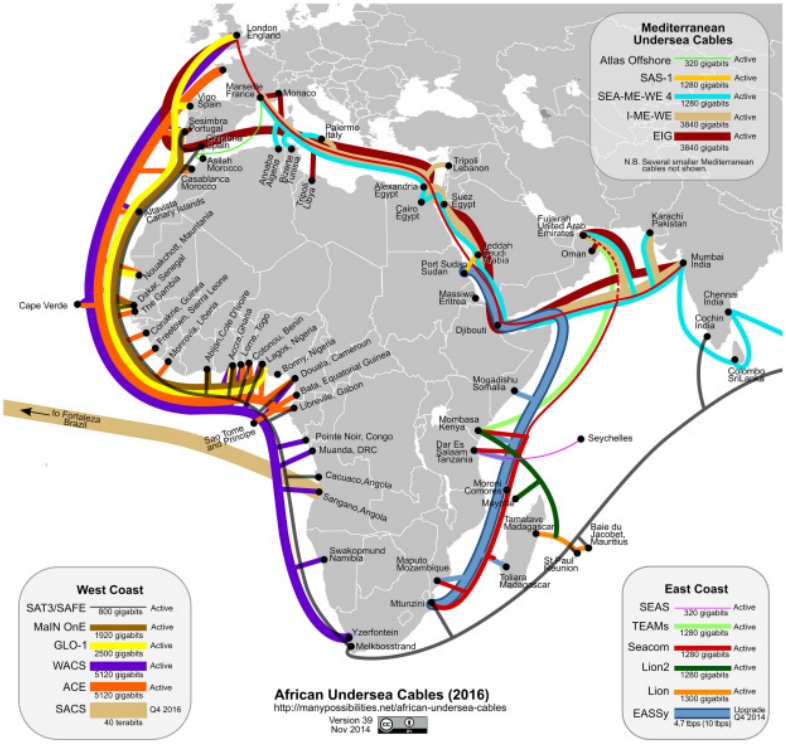
[11] Schumann R. and Kende M. Lifting barriers to Internet development in Africa: suggestions for improving connectivity, May 2013, at http://www.Internetsociety.org/sites/default/files/Barriers%20to%20Internet%20in%20Africa%20Internet%20Society_0.pdf

Table 2 International and regional submarine cables serving Africa (Source http://manypossibilities.net/african-undersea-cables)

	Seacom	EASSy	TEAMs	WACS	MainOne	GLO1	ACE	SAex	WASACE	BRICS
Cost (millions of USD)	650	265	130	600	240	800	700	500	(unknown)	(unknown)
Length (km)	13,700	10,000	4,500	14,000	7,000	9,500	14,000	9,000	9,000	34,000
Capacity	1.28 Tb/s	4.72 Tb/s	1.28 Tb/s	5.12 Tb/s	1.92 Tb/s	2.5 Tb/s	5.12 Tb/s	12.8 Tb/s	40 Tb/s	12.8 Tb/s
Completion	July 2009	July 2010	Sept 2009	Q3 2011	Q2 2010	Q3 2010	Q2 2012	Q2 2013		

Figure 5 African Undersea Cables (Source: http://manypossibilities.net/african-undersea-cables)

The developments have created consistent growth in international Internet bandwidth on the continent. From 2009 to 2014, Africa's international Internet bandwidth increased twenty-fold and has now passed 2 Tbps. And in the same period, Africa's terrestrial network has more than doubled. In general, developing countries' share of international bandwidth has jumped from only 9% in 2004 to 30% now. Similar growth figures are reported for terrestrial networks: from a total of 465,659 km in 2009; to 676,739 km in 2011; 732, 662 in 2012; and 958,901 km by June 2014[12].



*In just **5 years** – from 2009 to 2014 – Africa's international bandwidth increased **20-fold** and its terrestrial network **more than doubled**.*

While undersea cables have reduced international transit costs, prices remain significantly higher than those for developed countries. Also, there are concerns that landlocked countries and those without submarine cable landing stations do not seem to have benefited enough from the international submarine cables. These countries either purchase international bandwidth from neighbouring countries or still depend on connections over satellite. Therefore, the gains of expanded connectivity in recent years should be used as motivation for the considerable work that remains to more effectively connect the rest of the continent and reduce the constraints of limited bandwidth.

[12] See http://www.africabandwidthmaps.com

National and cross-border connectivity

While there is vital growth in international bandwidth and capacity reaching Africa, submarine infrastructure alone is not sufficient to substantially improve Internet access and use. Bottlenecks remain, on the one hand in the insufficient quantities of cables that are lit and competitively priced and, on the other in the limited national fibre backbones used to distribute the international capacity locally.

Weak national infrastructures mean disparities in available bandwidth within countries, and there are serious concerns that most of the available bandwidth is concentrated in urban and major metropolitan areas. Rural and remote communities in Africa continue to suffer from a serious lack of connectivity and the benefits of Internet access.

The increasing trend in most African countries is to substitute mobile for fixed Internet connections (which we discuss in the section below). But mobile Internet is not a panacea for connectivity bottlenecks, as it too relies on national fibre backbone networks and cross-border connections to link cities and provinces and handle long-haul traffic. As such, national and cross-border connectivity remains the bedrock upon which the full promise of fixed and mobile deployments will depend.

Unfortunately, review of various deliberations in the continental Internet fora[13] indicates that cross-border infrastructure in the region remains the least developed element. But encouraging developments are emerging. For example, work has started on an East African Backhaul System (EABS) to serve Kenya, Tanzania, Uganda, Rwanda, and Burundi. Also, the landlocked countries of East Africa (Uganda, Rwanda and Burundi) have already established backbones that give them access to international bandwidth via submarine fibre at almost the same price as the coastal countries. And now, this cross-border terrestrial infrastructure is being further extended to the DRC, Ethiopia, and Somalia, with creation of regional backhaul rings to increase reliability also underway.

Establishing cross-border links involves overcoming a variety of challenges. One that can arise is the problem of crossing large, unpopulated areas between countries where it can be hard to agree on who should dig across the border to lay the fibre. Another challenge is a lack of exchange points. Currently, most of the traffic between African countries (and very often within the same country) still passes over expensive international links via Europe and the US, rather than taking more direct connections. Fortunately, in recent years, active movements have emerged to create IXPs that provide secure and affordable direct connections within and between African countries, mainly through the AXIS project[14].

Infrastructure development has also been boosted with the creation of National Research and Education Networks (NRENs) in the region[15]. The AfricaConnect project of the UbuntuNet Alliance is a good example. The project has established a high-capacity Internet network for research and education in southern and eastern Africa, providing the region with a gateway to global research collaboration and enabling the NRENs to peer with the GEANT network in Europe.

[13] See for instance, African Peering and Interconnection Forum AfPIF), Inaugural Meeting, 11-12 August 2010, Nairobi, Kenya.

[14] http://www.internetsociety.org/events/workshops/axis-project-and-axis-workshops and http://pages.au.int/axis

[15] http://edutechdebate.org/research-and-education-networks/the-state-of-research-and-education-networking-in-africa/

Rise of mobile communications

As noted above in the section "National and Cross-border Connectivity", across African countries, especially the lower-income economies, the primary means of Internet access is increasingly shifting towards wireless. Wireless broadband connections can take several forms, including:

- paid subscriptions for a USB dongle or modem, providing Internet access to laptops and other wireless devices
- 3G/4G mobile data plans for tablet or smartphones
- free or paid Wi-Fi services offered by businesses, hotels, Internet cafés, and others

However, many users continue to use fixed access via cyber cafés for activities such as viewing video, or downloading large files.

As the fastest growing mobile market in the world, Africa's economic growth is being positively influenced by mobile. Currently, the majority of mobiles in use are feature phones. However, smartphones are also entering the market, which we can see in the growing percentages of mobile users who own such devices in several countries, such as: Nigeria (25%), Egypt (22%), Ghana (18%), Cameroon (17%), Kenya (13%) and Senegal (11%). The industry is likely to grow, with smartphones becoming more affordable for consumers. Such devices made up 15% of the African mobile market in 2014 and are forecast to rise from 23% in 2015, and 40% by 2017[16].

Furthermore, the growth of smartphones within Africa spurs local developers to offer more region-specific apps for consumers, also resulting in the expansion of app stores. For example, by January 2013, in Nigeria, 146 developers offered a total of 419 apps specifically for African Blackberry consumers.[17]

In Kenya, cell phones give consumers the opportunity to set up, manage, and access their own bank accounts via their mobile operator, using a payment system called M-Pesa. The service allows users to transfer money directly through a mobile device, without the need for a fixed bank account. With over 15 million customers, the service accounts for 12% of Kenya's GDP, with a further 31% of GDP now being transacted through the service. In a related development, Intel is investing in iHub in Kenya to build a thriving community of local developers by providing training and resources. It is also partnering with 10 Kenyan universities to increase the number of local developers working on localized app contents.

As we noted in previous section, mobile broadband is still dependent on fixed backbone infrastructure. Nevertheless, mobile devices show every sign of remaining a dominant factor in African Internet expansion and Internet-enabled innovation.

[16] M&C Saatchi Mobile (2013). Inside Mobile Africa, An in-depth look at the rise of mobile and opportunities for advertisers in Africa), at http://www.mcsaatchimobile.com/wp-content/uploads/2013/06/Inside-Mobile-Africa.pdf

[17] *ibid.*

Africa's Internet economy

The Internet is increasingly a private-sector-led communications medium, where businesses and entrepreneurs realize new economic opportunities. An Internet economy, as commonly understood, refers to the economic activities directly associated with the use of the Internet – comprising access to and use of the Internet, investment in infrastructure, and expenditure in Internet activity in a country[18]. This may involve businesses both on the supply side (those that make the Internet available to others) and the demand side (those that make use of it) as well as other Internet-enabled and Internet-dependent businesses.

Specific businesses that play critical roles in the Internet economy can be clustered into several groups, including:

- Internet service providers (ISPs) and cybercafés
- businesses that supply access devices such as handsets
- businesses that provide content, including: platforms such as search engines (e.g., Google), social networks (e.g., Facebook, Twitter, and LinkedIn), shared content resources (e.g., YouTube and Wikipedia); newspaper groups; entertainment; online shopping services; media and advertising
- Internet registrars (which sell domain names)
- web and application designers (including designers of mobile apps)
- data centre businesses

Internet business communities are growing in Africa, albeit not as extensively as those in high-income markets such as Europe or North America. As such, Africa's Internet economy as a proportion of GDP still lags leading industrialized nations. As some studies indicate, the average contribution of the Internet economy to GDP in the most advanced economies in 2010 was 4.1%, expected to grow to 5.3% by 2016; the average for developed markets was 4.3%, growing to 5.5% by 2016; and for all developing markets it was 3.6% expected to grow to 4.9% by 2016. By comparison, the average contribution for South Africa, for instance, was 1.9% in 2010, 2% in 2011 and is expected to be 2.5% by 2016[19].

Substantial investments and efforts are underway in Africa to improve basic Internet connectivity and related services. However, for Africa to progress towards a digital economy and reap the full benefits of the Internet, it needs to transition from basic connectivity to interconnectivity of networks (including telecom networks, IXPs, banking payment networks, and more) and interoperability of systems and enable the development of applications and services and drive economic and social well-being.

[18] Goldstuck, Arthur (2012). Internet Matters: The Quiet Engine of the South African Economy, World Wide Worx , http://www.worldwideworx.com/Internet-2-of-sa-economy/

[19] *Ibid.*

Internet governance and multistakeholder approaches for Internet public policy in Africa

The Internet has grown from a simple network of a few computers in one country to the network of networks that spans across the globe, connecting billions of devices and billions of users. But even in its early years, the Internet needed some form of administration to keep track of how many computers were connected, the location of the computers, and who administered them. This was done using simple tabulations, initially with pen and paper then, as software evolved, with spreadsheets and databases[20].

Definition of Internet governance (Tunis Agenda, Paragraph 34):

...the development and application by governments, the private sector, and civil society, in their respective roles, of shared principles, norms, rules, decision-making procedures, and programmes that shape the evolution and use of the Internet.

As the Internet grew in size, keeping track of the various connections and devices became more complicated and required more effort. Further, there was a need to define standards and protocols that would allow for inter-operability and seamlessness between networks and devices. Over many years, several institutions and communities were established to take on different aspects related to the administration and functioning of the Internet from technical, business, and user community perspectives.

As these shifts were happening across the technical community, other sectors were also undergoing changes in how they addressed Internet issues. Many governments established or re-ordered their departments and regulatory agencies to respond to the ever-changing needs that came with the Internet, while the academic sector continued to carry-out research to improve Internet operations. Taken together, all these activities related to the evolution, administration and functioning of the Internet make up what is known as Internet governance.

In short, over the past several decades, an Internet ecosystem that is tailored to the requirements of the Internet itself has emerged and draws its strength from the involvement of a broad range of actors working through open, transparent, and collaborative processes to innovate, address common challenges, and build the Internet. From a public policy perspective, the multistakeholder model of Internet governance enables policymakers to draw from the expertise of relevant stakeholders to develop sustainable Internet public policy approaches that can meet the policy challenges of the digital age. Topics such as online privacy, affordability, cybersecurity, and net neutrality, among others, will not be solved by a single treaty or piece of legislation, a single technical fix, nor the actions of a single company or sector of the economy.

The organizations and processes that shape the Internet have proven to be resilient and adaptable, in large part because they are based on an understanding that the Internet is constantly evolving and a realization that the best solutions to new issues stem from willing collaboration between engaged and informed stakeholders. At its heart, the Internet is a decentralized system that allows policies to be defined by those

[20] In the early days, one person, Jon Postel, carried out this task.

who require them for their operations, and it ensures that issues can be resolved at a level closest to their origin.

In Africa, since the 1990s, the Internet ecosystem has been growing steadily and organically with new institutions and processes emerging to address the needs and aspirations of the continent. Unique Internet development challenges exist that require regional or local solutions. But the multistakeholder model applies at the local, regional, as well as the global levels, and developing public policy in a highly interconnected ecosystem like the Internet requires different players to work together to find solutions.

Going forward, Africa needs to continue developing and strengthening its Internet ecosystem to ensure that policies and solutions can be localized and that all stakeholders can have a say in how the Internet continues to develop and evolve.

This section provides brief descriptions of some key global and African institutions and processes associated with Internet development and governance.

The Internet ecosystem in Africa – Af* institutions and processes

Af* (pronounced *af-star*) is used within the technical community in Africa to refer to organizations and fora that constitute the African Internet ecosystem[21]. As a concept, Af* dates back to the 1990s when the African Internet Group (AIG) was formed to discuss Internet issues in Africa. The first documented meeting that addressed Internet governance in particular was held in 1998, following the formation of ICANN. The meeting in question was a workshop themed "Internet Governance in Africa", and it was during this workshop that Dr. Nii Quaynor prescribed the need to set up institutions to support the growth of the Internet in Africa. This section describes the Af* organizations and forums in brief.[22]

- **The African Network Information Center (AfriNIC)** is the Regional Internet Registry (RIR) responsible for distributing and managing Internet number resources, such as IP addresses and Autonomous System Numbers for Africa[23]. Established in 2005, AfriNIC is a non-government, not-for-profit, membership-based organization, with headquarters in Mauritius. AfriNIC Public Policy Meetings are held twice each year and provide stakeholders the opportunity to discuss Internet policies that affect the region, in addition to training opportunities, workshops, tutorials, and peer exchanges.
- **The AfriNIC Government Working Group (AfGWG)** was set up in 2010 on the initiative of AfriNIC to work with African governments and regulators addressing general Internet governance and the challenges of building an effective Internet economy in Africa.
- **African Network Operators' Group (AfNOG)** is a forum established in 2000, which brings together operators of Internet-connected networks to exchange technical information and discuss issues requiring cooperation for development of Africa's network and Internet infrastructure[24].

[21] The use of the * is in reference to wildcards as used in computing where * signifies a string of characters.

[22] Although the Africa IGF and the regional IGFs are also considered as part of the Af* they will be discussed separately.

[23] http://www.afrinic.net

[24] http://www.afnog.org

- **Africa Research and Education Networks (AfREN)** is a grouping of Research and Education Networks (RENs) established in 2007. AfREN holds annual meetings that provide a platform for RENs to discuss and coordinate activities and share best practices on implementing networks for the research and education community. AfREN serves as the umbrella body incorporating regional alliances of RENs: UbuntuNet Alliance serving east and southern Africa, WACREN serving West and Central Africa and ASREN serving North Africa and the Middle East.
- **African Top-Level Domain Association (AfTLD)** was established in 2002 and brings together managers of country-code Top-Level domains (ccTLDs) to coordinate and collaborate on issues pertaining to Africa's Domain Name System (DNS) and ccTLD management. In 2013, AfTLD joined forces with ICANN and the Internet Society to launch the Africa DNS Forum. AfTLD also participates actively in ICANN's country code names supporting organization (ccNSO). The secretariat of AfTLD is in Kenya and 43% of African ccTLDs are members.
- **The Internet Society (ISOC)** through its Africa Bureau and chapters is an active participant in Africa's Internet development, and Internet Society chapters in Africa are counted as being part of Af*. There are currently chapters in 31 African countries.
- **The African Peering and Interconnection Forum (AfPIF)** was started in 2012 as an annual multistakeholder forum for interconnection and peering with the goal of improving the efficiency and cost-effectiveness of cross-border Internet infrastructure and services in Africa. AfPIF provides the space to discuss opportunities and challenges and drive regulatory and policy issues affecting interconnection. AfPIF was established and is led by the Internet Society.
- **Africa Computer Emergency Response Team (AfricaCERT)** is an umbrella body for CERTs or CSIRTs (Computer Security Incidence Response Team) in Africa, which aims to promote establishment of CERTs and their cooperation and coordination to maintain the health of Africa's Internet systems. Nine countries have CERTs (Burkina Faso, Cote d'Ivoire, Egypt, Kenya, Mauritius, Morocco, South Africa, Sudan, and Tunisia) while two (Cameroon and Ghana) are in the process of establishing theirs. AfricaCERT was conceptualized in 2010 and launched in 2012.
- **Africa ICANN Community (AfrICANN)** brings together stakeholders involved or interested in ICANN processes to discuss issues of common interest. It also provides the space to engage more actively with ICANN in developing and implementing ICANN's strategy for Africa, which was launched in 2012.
- **The Africa Internet Summit (AIS)** was launched in 2012 as "a pinnacle multistakeholder event combining, workshops, conferences and networking for the Internet Industry". AIS is held annually, bringing together all the Af* organizations and forums to discuss and exchange ideas and information on the Internet and ICT industry in Africa, blending technical aspects with the business world and the real-world needs of users.

- **The Africa DNS Forum** was launched in 2012 as a joint collaboration between the Internet Society, AfTLD and ICANN to provide a platform for the advancement of the DNS industry in Africa. This annual Forum is intended to foster collaboration between key stakeholders (registries, registrars, registrants, DNS experts, Government representatives, and policy makers) to find ways of growing and sustaining Africa's ccTLDs and explore new opportunities in the DNS industry.
- **The African IXP Operators Association (Af-IX)** is an umbrella body for IXP operators that seeks to maximize the collective benefits of interconnectivity for IXPs and provides a platform for capacity building, peer learning and exchange of best practices.

Africa IGF and regional IGFs

The Internet Governance Forum (IGF) is an outcome of the two-phase World Summit on the Information Society (WSIS), which took place in Geneva in 2003 and in Tunis in 2005. In addition to the annual global IGF, Paragraph 80 of the Tunis Agenda encourages the establishment of national and regional IGFs, and this has been echoed in ministerial declarations at regional and continental level (see sidebar). There are currently five regional IGFs, for each of the geographic regions in Africa, and a continental IGF. The regional IGFs will be discussed in chronological order of establishment.

- The **East African IGF (EAIGF)** was launched in 2008 as part of joint project between the Association for Progressive Communication (APC) and the Kenya ICT Action Network (KICTANet)[25]. From its inception, all members of EAIGF established national IGFs and an operational model was defined that included national online consultations followed by a face-to-face meeting ahead of the regional forum.
- The first regional **West African IGF (WAIGF)** event was held in 2008. WAIGF was then strengthened in 2009 through a joint project managed by APC and involving a consortium of various stakeholders. The project followed the approach used for the EAIGF, with national IGFs launched in five of the 15 countries. Since then, national IGFs have been held in 10 of the 15 ECOWAS member states.
- The **Southern Africa IGF (SAIGF)** was launched in 2012 in Johannesburg, South Africa and co-convened by the NEPAD Agency, APC, and the southern Africa NGO Network (SANGONet). There was no meeting

Mandates for the establishment of national and regional IGFs

Tunis Agenda, Paragraph 80

We encourage the development of multi-stakeholder processes at the national, regional and international levels to discuss and collaborate on the expansion and diffusion of the Internet as a means to support development efforts to achieve internationally agreed development goals and objectives, including the Millennium Development Goals.

Dakar Ministerial Roundtable, 2011 (ICANN 42)

***Welcoming** the Launch of the African Internet Governance Forum (AfIGF)*
HEREBY COMMIT TO:

- *Support and promote regional and local forum on IGF to stimulate multi-stakeholder and participatory approach to Internet Development issues in Africa using the spirit of the IGF.*
- *Setup national and regional Internet Governance Forums to actively participate in AfIGF.*

AU ICT Ministers 2012 Khartoum Declaration

***HEREBY REQUEST MEMBER STATES TO PROMOTE** the organization of national Internet Governance Forums (IGF) aimed at facilitating dialogue between all stakeholders on ICT for development issues and facilitate the participation of their respective countries in regional and African IGF (AfIGF) activities as well as in the global IGF.*

[25] The project was called CICEWA – The communication for influence in Central, East and West Africa project funded by IDRC. (http://www.apc.org/en/projects/communication-influence-central-east-and-west-afri)

in 2012 and subsequent meetings in 2013 and 2014 were held in Angola and Malawi respectively. The SAIGF did not follow the approach of the EAIGF and WAIGF of establishing national IGFs at inception.

- The **Central African IGF (CAIGF)** was launched in 2012 in the Democratic Republic of Congo, although preparatory processes had started as early as 2007. Like SAIGF, the CAIGF did not start with national IGFs as part of its inception, although the DRC had already established a national IGF at the time CAIGF was being launched.
- The **North African IGF (NAIGF)** was launched in 2012, alongside the ICT4All meeting. Tunisia was identified to host the secretariat and a process was put in place for to establish a multistakeholder advisory group to steer the NAIGF. However, since 2013, NAIGF has been replaced by the wider Arab IGF that covers all the Arabic speaking countries in North Africa and the Middle East.
- The **Africa Internet Governance Forum (Af-IGF)** was conceptualized in 2010, launched at the global IGF in 2011, and held its inaugural meeting in Cairo, Egypt in September 2012. The second and third Af-IGFs were held in Nairobi and Abuja in September 2013 and August 2014, respectively. Af-IGF's secretariat is hosted by the African Union Commission, with the support of the UN Economic Commission for Africa (UNECA).

Status of national IGFs in Africa

While the African Union categorizes countries into five geographic regions (Central, Eastern, Northern, Southern, Western) and currently all five regions have a regional IGF, they have been established mostly in association with Regional Economic Communities (RECs). Table 3 presents the status of national IGFs based on the respective REC; it shows that the EAIGF and WAIFGF are more advanced in terms of national coverage, with all members of EAC having established national IGFs, while ECOWAS has national IGFs in 70% of its member states.

Table 3 Status of national IGFs based on the respective Regional Economic Communities

REC	ECOWAS	EAC	SADC	ECCAS	UMA	(Unassigned)[26]
Regional IGF	**WAIGF**	**EAIGF**	**SAIGF**	**CAIGF**	**NAIGF**	
Countries with national IGF established or in the process of being established	Benin Burkina Faso Cote d'Ivoire Gambia Ghana Liberia Nigeria Senegal Sierra Leone Togo	Burundi Kenya Rwanda Tanzania Uganda	Congo DRC Malawi Mozambique South Africa Tanzania	Burundi Cameroon Congo (DRC)	Tunisia	Egypt
Countries without a national IGF	Cape Verde Guinea Guinea Bissau Mali Niger	(South Sudan Somalia)[27]	Angola Botswana Lesotho Madagascar Mauritius Namibia Seychelles Swaziland Zambia Zimbabwe	Angola Central African Republic Chad Congo Equatorial Guinea Gabon Sao Tome & Principe	Algeria Libya Mauritania Morocco	Comoros Djibouti Eritrea Ethiopia Saharawi Arab Democratic Republic (SADR), Sudan

[26] The countries listed in this column belong to other Regional Economic Communities.

[27] South Sudan participated in EAIG 2009 as an observer, while Somalia participated in the 2012 EAIGF, signalling that perhaps they will align to this regional IGF.

Other regional and international institutions

The following organizations all play a major role in Internet activities in Africa, but this list is not intended to be exhaustive. Interested readers are also encouraged to refer to W3C, IEEE, GSMA, UNESCO, and other international organizations.

ICANN

The Internet Corporation for Assigned Names and Numbers (ICANN) was established in 1998 and is responsible for managing and administering the DNS and coordinating registries for the Internet's unique identifiers: IP addresses (and related resources), protocol-parameters, and top-level domains. ICANN holds public policy meetings three times each year on a rotational basis in different regions of the world; the meetings embody a bottom-up, multistakeholder, consensus-based process for dealing with policies and processes related to the Internet's naming and numbers system. Africa has hosted eight of the 51 meetings thus far and is scheduled to host ICANN 55 in 2016.

A ministerial round-table, organized as a pre-event to the ICANN 41 meeting in Dakar in 2011, resulted in a communiqué, which called for, among other things, greater presence of ICANN in Africa and support for increased participation of Africans in ICANN and the DNS industry. In response, in 2012, ICANN announced the launch of an ICANN Africa Strategy and subsequently a Vice-President for Africa was appointed, supported by two officers recruited in 2014.

Internet Society

The Internet Society works to promote openness and transparency in the development, evolution, and use of the Internet. It has more than 70,000 members and 100 chapters spread across 80 countries, as well as 145 organization members. The Internet Society's work is guided by causes that seek to ensure that the Internet continues to develop as an open platform that empowers people to share ideas and connect in new and innovative ways and serves their economic, social, and educational needs.

Globally, the Internet Society works with and through a variety of partnerships, programs, and processes, including presenting its views in forums such as the IGF and the ITU; supporting community efforts to improve access to and use of the Internet; promoting best practices and issuing policy guidelines; and conducting research in support of its activities. The Internet Society has been instrumental in several initiatives in Africa, such as:

- technical capacity building for network and ccTLD registry operators
- establishing IXPs through the implementation of the African Internet exchange System (AXIS) project, of the African Union
- promoting Internet interconnection through AfPIF
- supporting the DNS industry through the Africa DNS Forum
- supporting national and regional IGFs

IETF

The Internet Engineering Task Force (IETF) produces standards – referred to as RFCs – and technical documents that have been used for the design, use, and management of the Internet since 1986. These standards are critically important, since the Internet would not work without them. The IETF is an open organization, in which work is done by volunteers from around the world, working in an individual capacity. The next billion users that come online are expected to live in developing countries, so it is critical that engineers from developing countries participate in the work of the IETF to shape the future Internet.

ITU

The International Telecommunications Union (ITU) is the oldest institution of the United Nations, founded in 1865 as the International Telegraph Union. In 1947, it became a specialized agency of the United Nations. An a UN agency, the primary members of the ITU are governments, and there are currently 193 members. The ITU also has sector members from the private sector and academia, as well as associate members from mostly non-governmental and civil society organizations.

Internet Standards

Internet standards enable computers, networking equipment, and applications to cooperate seamlessly to transfer data from one end of a network to the other. Thanks to the Internet standards – made available to anyone without any fee or restrictions – different companies' products can work together on the Internet, giving considerable choice for users.

The IETF standardizes general transmission protocols (such as TCP/IP) and application protocols (such as email and HTTP); it does not standardize transmission hardware (which is the work of the ITU and the IEEE) nor specialized application layer protocols, such as HTML (which are the work of the World-Wide Web Consortium).

The ITU is responsible for allocating global radio spectrum and satellite orbital slots, developing the technical standards that ensure networks and telecommunication technologies seamlessly interconnect, and improving access to telecommunications and information and communication technologies (ICTs) for underserved communities worldwide. There are three sectors of the ITU: the Radiocommunication Sector (ITU-R), the Standardization Sector (ITU-T), and the Telecommunication Development Sector (ITU-D). The current director of ITU-D is Mr. Brahima Sanou of Burkina Faso.

The ITU has a regional office in Addis Ababa and area offices in Dakar, Harare, and Yaoundé. It also has its Arab region office in Cairo.

The African Union

The African Union (AU) is the union of 54 countries in Africa. The AU was established on 26 May 2001 in Addis Ababa and launched on 9 July 2002 in South Africa, with the aim of replacing the Organisation of African Unity (OAU). The African Union is becoming increasingly involved in Internet governance issues by encouraging the development of IXPs through the AXIS project, establishing the Convention on Cybersecurity and Personal Data Protection, and spearheading the application for the .africa TLD.

The Internet Governance Forum (IGF)

The IGF is an outcome of the World Summit on the Information Society (WSIS), a global summit convened by the UN at the turn of the millennium to focus on the use of the transformative capabilities of the Internet to advance socio-economic development. The Tunis Agenda for the Information Society, which encapsulates the results of WSIS phase II (2003-2005), called for the establishment of the IGF as a "neutral, non-duplicative and non-binding process", with "multi-lateral, multi-stakeholder, democratic and transparent" operations and with no involvement in the technical aspects of the Internet. Instead, the mandate of the IGF focuses on discussing and awareness-raising (about Internet public policy issues), facilitating engagement between stakeholders, identifying emergent issues, and building capacity. The original mandate of the IGF was five years, from 2005-2010, but this was renewed for a further five years. Discussions are underway to seek renewal of the mandate beyond 2015.

Africa has been host to two IGFs: 2009 in Sharm el-Sheikh and 2011 in Nairobi. African stakeholders contribute to the work of the IGF through the Multistakeholder Advisory Group (MAG), through workshops and sessions organized at the IGF and through the establishment of national and regional IGFs. As Figure 6 shows, on average Africans make up 10% of participants to the IGF, with notable exceptions being the two cases where the meetings were hosted in Africa where there were considerably higher African participations. It is to be noted that these figures do not show remote participations by African stakeholders.

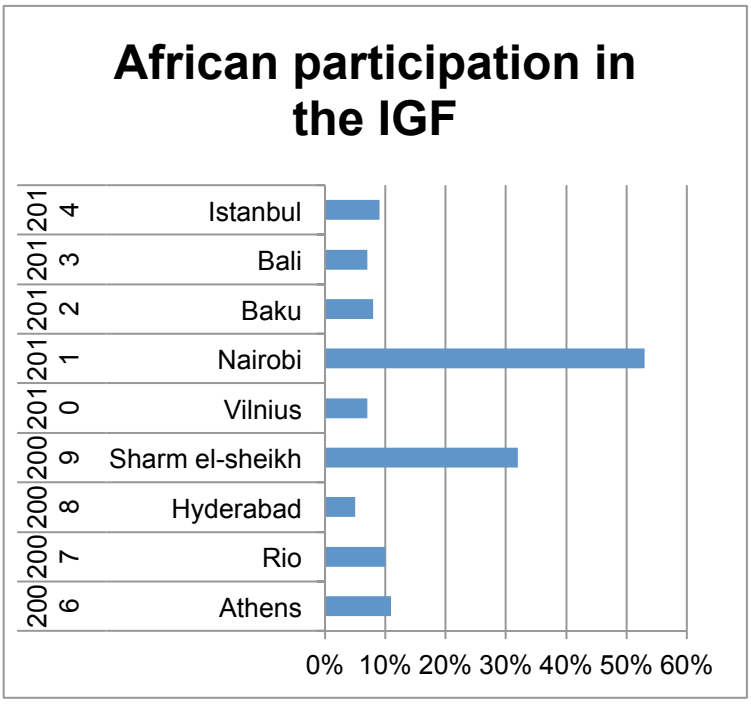


Figure 6 African participation in the global IGF (2006-2014)

Current issues in Africa's Internet development

Much has been achieved in African Internet development to date. From now, to take the next steps in building a robust Internet economy, many issues remain, some of which Africa shares with other developing regions (such as interconnection and cross-border connectivity, economic opportunity, local content and multilingualism, and human capacity building), some have a specifically regional dimension (such as digital migration) and others are global concerns (such as cyber security, IPv6 transition, and human rights and freedom of expression).

Interconnection and cross-border connectivity

There are now many undersea cables passing along the African coast that bring the promise of competitive interconnection rates at the major global exchange points in Europe, Asia, and North America. However, it would appear that, for the most part, African Internet users are not yet enjoying the cost reductions that were expected from this abundance of international bandwidth. As discussed earlier in this report, this may be partly due to limited interconnection arrangements at national and regional levels. In the Internet business model, when ISPs sell access to the Internet, they are effectively selling access to other networks. So ISPs need to cooperate with each other, even while competing. In a way, this is similar to airline companies that need to cooperate while competing, since none of them can go to every airport of the world nor satisfy the needs of every passenger.

In this setting, an IXP becomes a critical piece of Internet infrastructure where ISPs cooperate to exchange traffic, much like the way airline companies exchange passengers at airports. The AXIS Project, an African Union project whose first two phases were implemented by the Internet Society, seeks to ensure that network and service providers in the region are interconnected through national IXPs and that there is interconnection at regional level through regional IXPs. In this way, traffic originating in and destined for the same country does not have to use expensive cross-border links. In the same way, traffic originating in and destined for Africa does not have to use costly international transit – this is the concept of "keeping local traffic local". Significant progress has been made by AXIS and there are now more than 30 IXP locations in Africa as shown in Figure 7.

Figure 7 Internet exchange Points (IXPs) in Africa. The purple markers indicate more than 1 IXP at that location (Source: http://www.af-ix.net/)

As the digital economy grows, so will the number and type of parties connecting to IXPs. The aggregation of traffic at IXPs may also positively influence international providers to connect to local exchanges, further reducing off-shore capital flows. For developing countries, these are trends to take note of, as IXPs have an important role in triggering and accelerating the local digital economy, so even if an IXP initially requires some form of subsidy, if successful, it will generate sufficient volume of traffic to make it self-sustainable. Case studies in Kenya and Nigeria have shown annual savings of over USD 1 million in international transit costs after the introduction of IXPs[28].

Worth noting in this connection, particularly in the context of the developing economies of Africa, is the influence from some dominant incumbent operators in the markets. It has been observed that dominant incumbents in such environments, by virtue of their position, are often opposed to liberalization efforts and the creation of IXPs for peering. Concerned regulators and stakeholders need to consider this tendency as they seek to create liberalized, open, and competitive market environments, and develop a strong interconnection ecosystem at the local and regional level.

One emerging trend in the exchange landscape, which helps tackle monopoly power and control is to share the costs of landing stations and backhaul equipment with multiple carriers in an independent co-location data centre. Apart from mitigating the control issue, this practice can also improve the economics of running an international gateway.

A recent undertaking, worth citing in this connection, is the Djibouti Data Center (DDC), which was set up to serve as a gateway hub and Internet exchange to the many millions of customers in East Africa. DDC is planned to be connected to eight fibre optic cables that form part of the main Internet route from Europe to Asia. These connections are expected to reduce latency (the time it takes for Internet data to travel from source to destination; the closer the two points the lower the latency), increase connectivity speeds, and lower costs for network operators and Internet users in the region. Needless to say, access to more cables will give customers more options, increase competition among the cable owners, and allow for redundancy and load-balancing.

Increasingly, peering is becoming critical across borders to fully realize the benefits in terms of savings in both speed and cost. For instance, Paratus Telecom (a Namibian ISP) reported a monthly saving of 200 Mbps on international bandwidth by peering at NAPAfrica (an IXP in neighbouring South Africa); this is an indication of the reduction on bandwidth costs gained from offloading international and regional traffic at the exchange.

Although such signs of improvement are evident at the national level for exchanging Internet traffic being routed to and from destinations within the country, much still needs to be done to fully realize the benefits of peering in Africa at regional and continental levels. For instance, peering at a foreign IXP raises the problem of obtaining carrier services across the border, which may need to be obtained separately from each side, as there may be different IXP membership rules and peering agreements and possibly different licensing issues. For carriers to lay fibre across borders may require harmonization of regulations between

[28] Assessment of the impact of Internet Exchange Points (IXPs) – empirical study of Kenya and Nigeria, Internet Society, 2012, http://www.Internetsociety.org/ixpimpact

neighbouring countries, which is very costly and raises the challenges highlighted in the earlier section, “National and cross-border connectivity”.

There is a strong case to be made for extending existing national practices to the regional level. This can involve providing support to national Internet exchange points (NIXPs) and ISPs to grow and evolve into regional IXPs (where traffic between at least two other countries, in the same region, is exchanged via public or private peering) and regional Internet carriers (ISPs that span more than one IXP in different countries or at least one national border).

Other ongoing issues for regulators to consider are:

- establishing working relationships with Internet service providers so that the regulators understand the market and the relationships that exist related to interconnection and peering
- promoting neutral industry formation and management of IXPs
- establishing dispute resolution regulations to handle market issues in a timely manner
- establishing industry working-groups that meet publicly to inform government and others about market conditions and encourage more consistent and transparent government industry interaction

Innovation and economic opportunity

In the 30 years, since the first Internet domain was registered, in 1985, the Internet has grown into a trillion dollar industry and now boasts over 400 million registered domain names. The growth of the Internet has been enabled by faster, ubiquitous access, the exponential growth of technology, declining prices in the cost of electronics and devices, and exponential growth in the user base, all underpinned by an environment that fosters open innovation in developing applications, services, and devices.

With close to 3 billion Internet users globally, the size of the Internet economy is estimated at about USD 20.4 trillion; Africa’s share of the business-to-consumer market is estimated at about 2%. While Africa leads in the use of mobile phones for money transfers (14% of people receive money using their mobile phones, compared to world average of 3%, while 11% use mobile phones to send money compared to 2% worldwide[29]), the use of credit cards and other forms of electronic payments is the lowest globally. This is in part due to the low numbers of people with bank accounts (2.4%) and low penetration of credit cards (3%).

The DNS Industry in Africa

- 5 ICANN accredited Registrars operating in Africa
- 54 ccTLDs offering name spaces of African countries
- launch of dotAfrica (.africa) expected to boost the industry

Africans also access and use the Internet differently from many other parts of the world. About 40% of African Internet users access the Internet with their mobile phones. With regards to applications, social

[29] UNCTAD Information Economy Report 2015

media are the most used applications for African Internet users, accounting for about 30% of all Internet uses.

Economically, Internet contributes USD 18 billion (1.1%) to the African GDP, which is low compared to global averages of 4%[30]. The McKinsey Institute measures Internet contribution using iGDP, which encompasses use of networks and services across 4 major areas: private consumption, public expenditure, private investment, and trade balance. The iGDP reveals disparities across the continent, with top performers being Senegal at 3.3% and Kenya at 2.9%, while larger economies such as South Africa and Nigeria register at 1.4% and 0.8% respectively. This points to untapped opportunities that are yet to be realized across the majority of African countries in leveraging the Internet for economic gains.

> **10%** increase in broadband access correlates to **1.35%** increase in GDP growth

> **10%** in mobile penetration can bring **4%** increase in productivity

> Entry-level fixed broadband costs as much as **25%** of average income in developing countries

While a much-cited World Bank report suggests that a 10% increase in broadband access correlates to a 1.35% increase in GDP growth[31] in developing countries, research indicates that the cost of access is a major factor hampering growth of Africa's Internet economy. The ITU[32] reports that entry-level fixed broadband can cost as much as 25% of average incomes in developing countries. As such, while Africa's proportion of the global population is 15%, the percentage of global Internet users from Africa is only 6%; indicating that the high cost of access is preventing Africa from reaching the critical mass needed to realize significant economic gains from the Internet. Research carried out in Europe in 2009[33] indicated that a critical mass of 20% broadband penetration is needed to realize positive returns from investment in broadband. While the regional average for broadband penetration (99% of which is due to mobile broadband) in Africa is close to this tipping point of 20%, the reality is that this average is buoyed by a handful of countries (including Kenya, Egypt, South Africa, Nigeria) and the majority of countries have low penetration rates.

The picture is much more rosy in the case of mobile telephony. In the mobile industry, Africa has recorded the highest growth in mobile subscriptions year-on-year since the turn of the century. Mobile revenues account for about 3.7% of GDP, three times as much as in developed economies. Research from the GSMA indicates that a 10% increase in mobile penetration in developing economies can lead to 4% increase in productivity, and they find strong correlations between mobile broadband penetration and GDP per capita; other research suggests that doubling mobile broadband data use leads to a 0.5% increase in GDP per capita growth rate. While mobile subscriptions are high and mobile penetration is currently above 70% in Africa, mobile broadband subscriptions are at 17%. One of the bigger challenges facing Africa with regard to mobile broadband is the cost of access: in 2013 the cost of an entry-level mobile-broadband plan in

[30] McKinsey 2013 report Lions go Digital – the transformative impact of the Internet in Africa

[31] Qiang, C. Z. W. World Bank. "IC4D: Extending Reach and Increasing Impact," Economic Impacts of Broadband, 2009. Chapter 3

[32] Measuring the Information Society Report 2014, http://www.itu.int/en/ITU-D/Statistics/Documents/publications/mis2014/MIS2014_without_Annex_4.pdf

[33] Koutroumpis P., The Economic Impact of Broadband on Growth: A Simultaneous Approach. Telecommunications Policy, 2009, vol. 33, issue 9, pages 471-485

developing countries represented between 8 and 11% of monthly gross national income (GNI) per capita versus less than 2% for the developed world (based on ITU data). This is corroborated by the 2015 WEF Global Information Technology Report, which found ranges of 11% to 27% of household earnings spent on communications in low-income households. The paradox is that research indicates that among low-income households, access to the Internet increases incomes significantly[34]; yet with cost of access so high, the economic impact is not as much as it could be.

With the phenomenal growth of mobile access, most African users access the Internet using their mobile phones. They also tend to use their phones for social media and networking. This presents an opportunity for local innovation and entrepreneurship – developers can create apps aimed at their local markets and can monetize social media interactions. Corporate institutions can use social media for advertising and as retail channels.

Hackathons and competitions have become a popular way of stimulating the development of Internet and mobile apps and innovations. Some examples are the Fund for Internet Research and Education (FIRE[35]) implemented by AfriNIC, which provides grants and awards supporting and recognizing local innovators and innovations; Google's Africa Connected[36] competition in 2013/2014 which highlighted success stories of Africans using the Internet in different ways; CTA's ICT for agriculture (ICT4Ag) hackathon[37] launched in 2013, aimed at young innovators, which has spawned a number of locally developed apps.

Innovation hubs serve as useful spaces to connect young developers and entrepreneurs, allowing them to innovate freely and develop local products and services. There are currently more than 90 ICT/technology hubs in Africa, with the iHub in Kenya and Bongohive in Zambia being notable examples. While some hubs have recorded success in incubating startups, young entrepreneurs still face challenges in packaging their innovations and securing funding to take them to market.

Most interventions by governments and their development partners in local innovations focus on user-oriented applications based on mobile communications. This may be attributed to the fast-paced growth of the mobile sector in Africa. Apart from the phenomenal success with mobile money and mobile payments, most programs do not scale beyond pilot implementation and according to a 2012 study by Dahlberg & Associates it is only in the agricultural sector where some initiatives have managed to scale.

The success of mobile communications in Africa has in part been due to innovative business models aimed at making services more accessible for low income earners. Pre-paid services in denominations of USD 1 or less, please-call-me services, and phone sharing are examples of some of these innovations. Increasing penetration levels in mobile communications and Internet access notwithstanding, Africa is yet to reach the critical mass needed to make the economic impact of the Internet attain more significant levels.

---

[34] ICT Pathways to Poverty Reduction – Empirical evidence from East and Southern Africa. IDRC (2014) http://www.idrc.ca/EN/Resources/Publications/openebooks/539-7/index.html and Connecting ICTs to Development – the IDRC Experience. IDRC (2013) http://idl-bnc.idrc.ca/dspace/bitstream/10625/52228/1/IDL-52228.pdf

[35] http://www.fireafrica.org/

[36] http://www.africaconnected.com/

[37] http://hackathon.ict4ag.org/

Local content and multilingualism

Development of local content is an integral part of a country's digital economy, ensuring that users are able to access content and information in a language and context that is suited to them. For most people, the most relevant content is local content. In offline life, we are more interested to know about the local whether or the local news, rather than the weather or the news at the other end of the world. Thus, for many people, the Internet becomes relevant only if it has local content.

Local content also has great importance in Internet interconnection. While IXPs help to facilitate information flows quickly and more cost effectively, content traffic is the lifeblood that makes IXPs sustainable at national and regional levels. Without local content, IXPs may fail to attain the necessary scale to make them viable. There is thus a need to promote local content development and to build both the technical and user capacity to manage, develop, and consume this content.

Furthermore, many people around the world today cannot use the Internet – even if they have physical access to it – simply because content and applications are not adequately available in their native languages. Perhaps more concerted efforts to resolve still-outstanding technical issues and the increase in the availability and use of social media may influence things for the better, as users may no more be on the receiving end of such content only, they may become sources of local content.

There is also recognition that multilingualism on the Internet is just as important as multilingualism in real life. The multilingual Internet, because of its very nature, promotes culturally and linguistically diverse content on the Internet. As a result, online content that is created in users' native languages and reflects their local culture and heritage is an essential part of a country's digital economy.

The introduction of Internationalised Domain Names (IDNs), allowing for domain names in scripts other than the reduced Latin alphabet[38], the availability of search engines in multiple languages, and the development of devices capable of accepting and displaying non-Latin scripts have all contributed to promoting multilingualism on the Internet. However, progress to build linguistic and cultural presence online is not significant or sufficient for African countries. For example, in 2009, while some languages such as Chinese and Spanish are increasing their presence on the Internet at an encouraging rate, the situation with African languages is alarming: in sub-Saharan Africa, only 2.75% of the web pages targeting the African population use indigenous African languages; the rest of the content is almost exclusively in English or French, which are spoken by less than 10% of the population, even in the countries where they are the official languages[39].

Digital migration and the digital dividend

In 2006, member states of the ITU from Europe, the Middle East, and Africa agreed to transition to digital broadcasting, with targets of June 2015 for the majority of countries and June 2020 for others. This digital migration is aimed at making better use of transmission spectrum, which would free up spectrum for other purposes – known as the "digital dividend".

[38] Referred as ASCII (American Standard Code for Information Interchange) character set

[39] Bekele, Dawit (2009) Building a multilingual Internet: stakes, challenges and enablers, Presentation made at Bamako International Forum on Multilingualism

Analogue TV signals occupy the frequency range from 174MHz to 850MhZ while digital TV signals are expected to occupy the range from 470 to 790MHz; the digital dividend is thus in the band 790 to 850MHz. According to research from Balancing Act, 43% of countries in Africa only have 1 or 2 TV channels and are characterized as low frequency users, so it is expected that 60% of countries will decrease their spectrum occupancy when they transition to digital broadcasting, illustrated in Figure 8.

By June 2014, only 19 countries had started on the digital transition, and by December 2014 only three (Tanzania, Rwanda, Mauritius) had switched off their analogue signals. As of January 2015, the majority of countries in Africa (close to 80%) will not meet the ITU 2015 deadline.

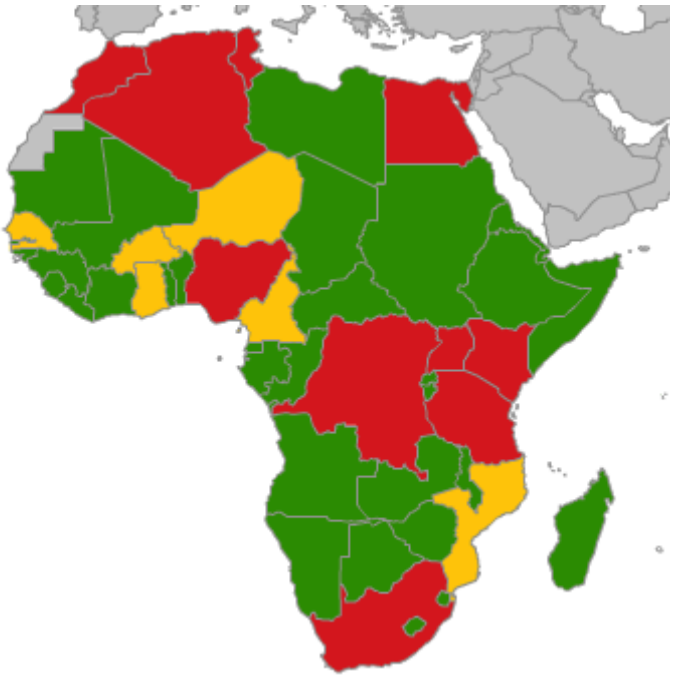


Figure 8 Spectrum Usage in Africa: Red - high, yellow - medium, green - low (Source: Balancing Act www.balancingact.com)

Some of the issues that are hampering the digital transition are:

- the cost of building new terrestrial digital transmission networks or upgrading existing infrastructure and studio equipment
- the cost of digital TVs
- the cost of decoders and set-top boxes to enable users with analogue TVs to receive digital transmissions
- a lack of consensus on regional standards for set-top boxes
- delays in cross-border coordination and harmonization of frequency allocation
- weak regulatory environments

Currently, about 100 million households in Africa own a TV, but only 5% have access to digital terrestrial television (DTT). As such, digital migration presents opportunities, which include:

- opening up the TV industry as has been done with telecommunications, leading to more locally produced content
- industrial development and job creation from manufacturing of devices and maintenance of infrastructure
- promoting universal access to reach under-served areas both for TV and voice and data services; digital signals can reach remote areas currently not serviced by analogue transmission and excess spectrum can be allocated at low cost for voice and data communications
- reduced costs of transmission, translating into more services available for consumers at lower cost.

The delays in transitioning to digital broadcasting are costly because broadcasters have to simulcast (transmit both analogue and digital signals) until more than 90% of consumers have switched to digital TV. This is why initiatives to make digital TV sets or set-top boxes available at reduced (subsidized) costs are important adoption strategies. In addition, investments have to be made in consumer awareness and capacity building for digital broadcasting and content production. With the 17 June 2015 deadline looming, countries that have not completed their migration to digital broadcasting will not be protected from cross-border spectrum interference.

Skills and expertise

All indicators of ICT development and e-readiness include a measure of skills and capacity, which is captured either through basic education levels or through higher education and professional training. This is because, in addition to affordability, education levels, skills, and expertise are contributing factors to ICT adoption.

The spectrum of capacity needs for ICT adoption ranges from basic ICT literacy to specialist skills, as depicted in Figure 9.

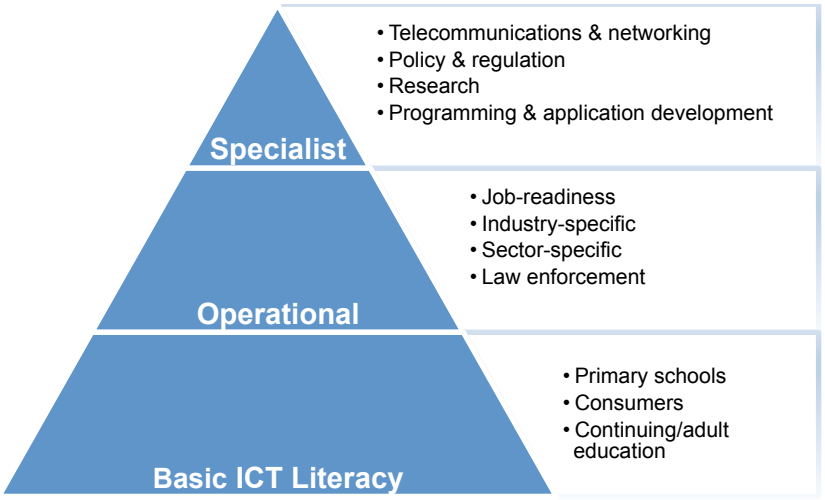


Figure 9 Capacity Development Levels

The diagram also illustrates that the numbers at the base of the pyramid are higher and that this base also forms the foundation for attaining significant impact in ICT adoption. There are numerous interventions that are being carried out in Africa to address capacity needs across this spectrum some of which are illustrated in Figure 10.

Network operators & service providers

- AfNOG training
- Internet Society capacity building for network operators and IXPs
- AFTLD Registry operators training

Policy makers

- African Leadership in ICT (ALICT)
- Internet Society, Next Generation Leaders program

Schools & communities

- NEPAD e-Schools
- Global e-Schools & Communities Initiative (GeSCI)
- SchoolNet
- Industry sponsored initiatives: Microsoft, Intel Teach

Vocational training

- Cisco Networking Academy
- Google Barcamp

Multistakeholder

- Africa Peering and Interconnection Forum
- Africa School on Internet Governance
- Africa DNS Forum

Figure 10 Examples of capacity-building initiatives

Most national ICT policies and strategies mention capacity building as a priority; however, most countries fall short when it comes to implementation. This translates into significant capacity gaps, especially at the level of specialists who can build and maintain infrastructure and services, leaving Africa overly reliant on external expertise. When this is not countered with adequate investment in building local capacity, a vicious cycle of dependency arises. Africa needs a coherent strategy for capacity development at all levels and this strategy needs to look first at ICTs as a discipline and secondly at ICTs as a cross-cutting enabler of other disciplines. As such, capacity building interventions should aim to produce pure ICT specialists and cross-functional specialists referred to as "tribrids"[40] by some and "T-shaped professionals" by others.

Cyber security

Along with economic benefits, the Internet and digital economy brings with it the attendant challenges of cybercrime and breaches in cybersecurity. As more and more people use the Internet, there are increasing incidents of security breaches targeting corporate interests, national governments, and consumers.

Given that the Internet permeates every facet of daily life, securing cyberspace against crime and security breaches becomes an issue not only of socio-economic concern but one of national security as well. Cyber-threats can result in direct financial losses, indirect losses from stolen intellectual property, lost productivity, threats to national security when key infrastructure or services are breached, and diminished economic opportunities due to lack of consumer trust. Estimates place the negative economic impact of cybercrime globally at between 15 to 20% of the net value derived from the Internet; in monetary terms this translates

[40] Richard Heeks (2009), The ICT4D 2.0 Manifesto: Where Next for ICTs and International Development?, http://www.sed.manchester.ac.uk/idpm/research/publications/wp/di/documents/di_wp42.pdf

into costs or losses of between USD 300 to 600 billion annually. Africa is not immune to cybercrime and cyber-threats and as more people get connected and start using the Internet, the problems will only increase.

In recent years, increasing number of businesses, individuals, and governments have started to take measures to counter cyber threats. Businesses and individuals users are spending increasing amounts of money to install solutions that protect their systems from threats coming through the Internet. And governments are enacting laws to protect their country from increasing cyberattacks.

At the continental level, in 2010, the African Union embarked on a process of defining a framework for cybersecurity, culminating in the endorsement at the AU Summit in June 2014 of the African Union Convention on Cybersecurity and the Personal Data Protection. The broad objective of the Convention is to harmonize legislation related to e-transactions, personal data protection, and combating cybercrime.

The Convention commits member states to establish legal frameworks to protect data and punish violations and to establish an independent authority to oversee this process; it will enter into force once ratified by at least 15 member states.

Some of the enabling processes required for the Convention to be effective include developing national cybersecurity legislation, establishing national CERTs or CSIRTs, and promoting general consumer awareness on privacy and cybersecurity. Currently, only 14 countries have or are planning to enact privacy frameworks and less than 10 have cybersecurity policies or strategies.

However, cybercrime cannot be defeated by any law or convention alone. In fact, it has become increasingly clear that the collaboration of all stakeholders in the governance and operation of the Internet is required to preserve the security and privacy of the Internet users.

Human rights online and freedom of expression

As more people in Africa get access to the Internet, the boundaries and limits of free expression are tested, and questions emerge of what rights people have online and how those rights can be protected. The Arab Spring, which started in Tunisia and spread to several North African countries (including Algeria, Egypt, Libya, Morocco) and the Middle East demonstrated the power of the Internet to mobilise social activism; activists used social media to communicate both internally and with the outside world. The Arab Spring also demonstrated attempts by some governments to control the Internet in the same way that they control state-owned media: Internet censorship was used to restrict access, shut down some websites, and control what could be disseminated online. For example, the government of former president Hosni Mubarak of Egypt went so far as to totally shutdown Internet access for a few days.

The Arab Spring of 2011, the Edward Snowden revelations of 2013, and other events at the intersection of human rights and cyberspace have galvanized the global community to seek common understanding and solutions to ensure the respect of fundamental rights online. The UN General Assembly passed a resolution in December 2013 on the right to privacy in the digital age, which affirmed that human rights applied online in the same way as they do offline, including the right to privacy[41]. In mid-2014 the UN High Commissioner for

[41] http://www.ohchr.org/EN/HRBodies/HRC/RegularSessions/Session27/Documents/A.HRC.27.37_en.pdf

Human Rights released a report on the protection and promotion of the right to privacy in the digital age, which called for greater transparency on surveillance laws and policies and recommended that member states should ensure that national laws on surveillance complied with international human rights laws. The report further recommended the use of multistakeholder engagement to address issues of privacy and human rights.

A study published by Freedom House found a general decline in Internet freedom worldwide. The study assessed 16 African countries of which two were classified as free, 11 as partly free, and three as not free[42]. Major issues cited with regard to Internet freedoms and human rights in Africa include:

- repressive laws
- state-sponsored surveillance
- regulation to control online media
- detention and arrests of bloggers and social-media activists and users

In May 2014, a group of global civil society organizations released the final version of the International Principles on the Application of Human Rights to Communications Surveillance which focus on ensuring that governments respect international human rights laws in any surveillance policies, legislation, and activities[43].

At the global IGF in 2014, a coalition of organizations launched the African Declaration on Internet Rights and Freedoms[44] which is aimed at promoting human rights and openness in policy-making and implementation as they relate to Internet development in Africa. The Declaration is framed in three parts – the first outlining key principles, the second identifying requirements for effective realization of the principles, and the third making a call to action and specific recommendations aimed at different stakeholder groupings.

The International Principles and the African Declaration are open for endorsement by both individuals and institutions.

[42] Freedom on the Net 2014 – Tightening the Net: Governments Expand Online Controls. Freedom House, https://freedomhouse.org/sites/default/files/FOTN_2014_Full_Report_compressedv2_0.pdf

[43] https://en.necessaryandproportionate.org

[44] http://africanInternetrights.org/declaration-container/declaration/

IPv6 Transition

IP addresses are used to identify unique end points, devices, and destinations on the Internet. The IP address is a sequence of numbers that contains information to identify where a device (PC, server, tablet or anything connected to the Internet) is located. Domain names and URLs such as www.xyz.com are mappings from machine-friendly IP addresses to forms that people can easily remember.

When the Internet Protocol (IP) was first developed, IP addresses were defined using 32 binary digits (bits) arranged in four groups of eight (an octet). This is what is commonly referred to as IPv4 and the total number of addresses available was over 4 billion. As the number of network connections increased, and as more and more devices, gadgets and things got connected to the Internet, it became apparent that there would not be enough addresses to uniquely identify all the things that needed to be connected. This is what led to the development of a new IP protocol using 128 bits or 16 octets capable of uniquely specifying 340 undecillion (340 trillion, trillion, trillion) addresses. This new protocol is called IPv6.

By ensuring that there are enough IP addresses to cater for current and future expansion of the Internet, IPv6 will enable the Internet of Things (IoT) – or the Internet of Everything (IoE) – which refers to the ability to connect to the Internet anything capable of having an IP address associated with it. Estimates from Gartner[45] are that by 2020, there will be 25 billion things connected to the Internet, while Cisco puts this estimate at 50 billion[46]. The number of addresses provided by IPv6 caters to this growth many times over.

Figure 11 shows the allocation of IPv6 addresses in Africa (note that allocation does not mean that the addresses are in actual use).

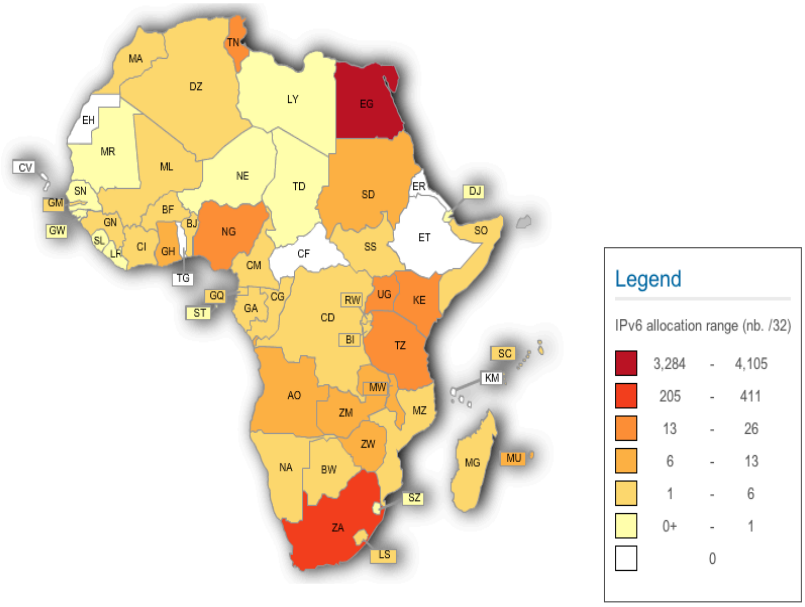


Figure 11 IPv6 allocation in Africa (Source: AfriNIC http://6spots.afrinic.net/)

[45] http://www.gartner.com/newsroom/id/2905717

[46] http://www.cisco.com/web/solutions/trends/iot/portfolio.html

In Africa, close to 15% of publicly visible networks are using IPv6, which is an improvement from the 2011 figure of 6.2%. However, this number might be misleading since current statistics also indicate that South Africa and Egypt registered 97% of the African IPv6 addresses, which means adoption in all the other countries is lagging.

Unlike some other regions of the world, Africa's allocation of IPv4 addresses has not yet been depleted, but this should not diminish the imperative to transition to IPv6 for the following reasons:

- The Internet works on point-to-point peering and network operators advertise or announce their networks (IP addresses) in order for their customers to be reachable. As more networks transition to IPv6, service levels for IPv4 may degrade and eventually become unavailable.
- Network devices and equipment that are being manufactured now are IPv6 ready. Transitional measures include equipment that is capable of handling both IPv4 and IPv6 (dual stack).
- Upgrading network infrastructure must be matched by upgrading of skills and expertise to manage the network; as such governments and companies in Africa need to start investing in skills development in anticipation of the transition to IPv6.

The future of the Internet and Internet governance

Over the past 15 years in particular, Internet governance has expanded in complexity and importance, reflecting the expanding importance of the Internet. At the same time, many Africans have become increasingly active in all facets of Internet development, administration, and operation contributing to shaping the future of the Internet.

The following section discusses the Internet Governance issues that will be at the top of the International agenda in the near future and what will be Africa's expected role.

ICANN and IANA stewardship transition

In March 2014, the government of the United States, via the National Telecommunications and Information Administration (NTIA), announced that it intended to transfer its stewardship role over IANA to the international multistakeholder community and requested ICANN to "convene global stakeholders to develop a proposal to transition the current role played by the NTIA in the coordination of the Internet's domain name system."[47] The development of a proposal should meet the following conditions and guidelines:

- support and enhance the multistakeholder model and be broadly supported by the community
- maintain the security, stability, and resiliency of the Internet DNS
- meet the needs and expectation of the global customers and partners of the IANA services, and
- maintain the openness of the Internet

In addition, the US government clarified that "…a transition proposal that replaces the NTIA role with a government-led or intergovernmental organization solution" will not be accepted.[48] It is important to note that it is not the IANA functions that are under consideration for transfer, rather the stewardship role that is currently performed by one single government, the United States of America. Currently, the 'affected communities' discuss how best to arrange such a stewardship model.

The African Union Commission (AUC) released a statement welcoming the US government's decision to transition stewardship of the IANA functions. The AUC further emphasized the need to "work together with the US and other stakeholders to ensure that IANA functions will be well governed and efficiently operated for the benefits of all citizens of the world."[49]

The Global Multistakeholder Meeting on the Future of Internet Governance (NETmundial), held in April 2014, resulted in an expectation that the IANA stewardship transition should occur "thoughtfully with a focus on

[47] http://www.ntia.doc.gov/press-release/2014/ntia-announces-intent-transition-key-internet-domain-name-functions

[48] NTIA. 'Remarks by Assistant Secretary Strickling at the PLI/FCBA Telecommunications Policy & Regulation Institute'. http://www.ntia.doc.gov/speechtestimony/2014/remarks-assistant-secretary-strickling-plifcba-telecommunications-policy-regula December 04, 2014. Accessed: 10/12/14

[49] Dr Elham M. Ibrahim. African Union Commissioner for Infrastructure and Energy with the ICT Portfolio. Press Release. https://www.icann.org/en/system/files/files/globalization-endorsements-1015-15apr14-en.pdf. Accessed 03/02/2015

maintaining the security and stability of the Internet, empowering the principle of equal participation among all stakeholder groups and striving towards a completed transition by September 2015."[50]

An IANA Stewardship Transition Coordination Group (ICG) was formed in mid-2014 to facilitate this process with the responsibility and aim of submitting a consolidated proposal to the NTIA. The ICG is made up of 30 individuals from 13 communities who were selected by the stakeholders in their respective communities.[51]

Three groups were also formed to facilitate discussions and consultations based on the three core IANA functions and representing the various communities and stakeholders, namely:

- the Internet Engineering Task Force (IETF) for the protocol parameters community
- the Consolidated RIR IANA Stewardship Proposal (CRISP) Team for the numbers community
- the Cross Community Working Group (CWG) for the naming community

African stakeholder communities are represented in all three core functions, see . And the IANA transition has been discussed by African stakeholders in various forums such as the regional IGFs, AfIGF, and public policy meetings of AfriNIC.

Table 4 African representation in the IANA stewardship transition discussions

ICG	CRISP	CWG
Mohamed El Bashir (ALAC) Mary Uduma (ccNSO) Manal Ismail (GAC) Alan Barrett[52] (NRO)	Alan Barrett (AfriNIC CEO)	Seun Ojedeji (representing AFRALO – the Africa At-Large Organizations) Vika Mpisane (Africa representative on ccNSO) Mary Uduma (member ICG)

Finally, given that accountability considerations are core components in the operation of IANA, a parallel process has been employed to address accountability issues that need to be in place post-transition. An ICANN Cross-Community Working Group (CCWG) on Accountability has been created and it is currently working on producing accountability recommendations that will create a robust and transparent system after the NTIA steps down from its oversight role. The model the CCWG is currently working on is meant to complement the existing accountability mechanisms identified in the context of the IETF and the RIR communities.

[50] NETmundial Multistakeholder Statement. http://netmundial.br/wp-content/uploads/2014/04/NETmundial-Multistakeholder-Document.pdf. 24 April 2014. Accessed 16/02/2015

[51] The 13 communities, each tasked with specific objectives in the Internet space are: ALAC, ASO, ccNSO, GAC, GNSO, gTLD Registries, ICC/BASIS, IAB, IEFT, Internet Society, NRO, RSSAC, and SSAC. https://www.icann.org/resources/pages/coordination-group-2014-06-17-en.

[52] Adiel A. Akplogan in his former capacity as CEO of AFRINIC also served as a member of the ICG and CRISP representing the NRO community from June 2014 – January 2015 before being replaced by Alan Barrett

Representation of the African region in the CCWG includes the following individuals:

- Eberhard Lisse (ccNSO)
- Tijani Ben Jemaa (ALAC)
- Fiona Asonga (ASO)
- Alice Munyua (GAC)

WSIS+10

The World Summit on the Information Society (WSIS)[53] had two phases, the Geneva Phase in 2003, which produced the Geneva Declaration of Principles, and the Geneva Plan of Action and the Tunis Phase in 2005, resulting in the Tunis Commitment and the Tunis Agenda for the Information Society. The Tunis Agenda set out thematic areas (action lines[54]) with specific targets to 2015 and UN agencies were designated as key focal points for implementation in partnership with other actors.

The WSIS+10 review process was launched in 2011 to start the process of stock-taking the progress made in the implementation of the Tunis Agenda, identifying new challenges and opportunities, and proposing a way forward. Member states were encouraged to submit 10-year country reports documenting their progress in implementing WSIS and the Tunis Agenda; information on the ITU website indicates that only 15 reports were received, four from Africa.[55]

In early 2015, over 75 organizations and individuals joined together to call on the UN General Assembly to open up the WSIS+10 Review process to more than just governments. Of the 75 signatories as of May 19, 2015, fifteen were from Africa.[56]

The WSIS Forum in late May 2015 will result in recommendations on WSIS for consideration by the UN General Assembly.[57]

The future of the IGF

The current mandate of the IGF ends in 2015, and its future will be decided by the UN General Assembly at its December meeting in the context of the WSIS review (bearing in mind that the IGF is a direct outcome of WSIS). Support and calls for the renewal of the IGF mandate have been made by various stakeholders including:

[53] http://www.internetsociety.org/wsis/

[54] http://www.itu.int/wsis/docs2/tunis/off/6rev1.html

[55] http://www.itu.int/wsis/review/reports/

[56] http://www.openwsis2015.org/signatories/

[57] https://www.itu.int/net4/wsis/forum/2015/About/

- the NetMundial participants in the Outcome Document in 2014[58]
- the Internet Society in its position statement of November 2014[59]
- ICANN at the IGF in 2014
- individuals and organizations in 2014 through the IGF Continuation website[60]
- the US government in statements to the UN General Assembly in October 2014
- the Council of the European Union Conclusions on Internet Governance in November 2014[61]
- the European Parliament with the resolution adopted in February 2015 calling on the UN General Assembly "to renew the mandate of the IGF, strengthen its resources and maintain the multi-stakeholder model of Internet governance"[62]
- Participants of the 2015 Global Conference on Cyberspace[63]

Some proponents are calling for a longer mandate[64,65] or an open-ended mandate[66] for the IGF to replace the current five-year cycle, while others propose that the five-year cycle should include more specified expectations of the IGF.

There are notably few submissions from Africa regarding the renewal of the IGF mandate and the issue appears to be absent from the 2014 national and regional IGFs. It is hoped that the issue will be tabled in 2015 forums ahead of the UN General Assembly's December meeting.

The Sustainable Development Goals

The Millennium Development Goals (MDGs) were framed in 2000 with targets to 2015. In 2012, discussions started on a post-2015 development agenda to take stock of progress towards the MDGs and determine a global agenda to succeed the MDGs. The Sustainable Development Goals (SDGs) are an outcome of this process. The SDGs specify targets to 2030 and the UN Secretary General has emphasized that transformation, focus on youth and meaningful participation by all should underpin implementation. There

[58] http://netmundial.br/wp-content/uploads/2014/04/NETmundial-Multistakeholder-Document.pdf

[59] http://www.Internetsociety.org/doc/Internet-society-positions-renewal-igf-mandate-and-wsis-2015-review

[60] http://igfcontinuation.org

[61] http://italia2014.eu/media/3769/council-conclusions-on-Internet-governance.pdf

[62] http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+MOTION+B8-2015-0099+0+DOC+XML+V0//EN&language=en

[63] https://www.gccs2015.com/

[64] ICC Basis Statement on Improvements to the IGF (2014) http://www.iccwbo.org/Data/Documents/Basis/Archives/Statement-of-ICC-BASIS-on-Improvements-to-the-Internet-Governance-Forum-(IGF),-August-2014/

[65] Beyond NETmundial: The Roadmap for Institutional Improvements to the Global Internet Governance (2014), http://www.global.asc.upenn.edu/app/uploads/2014/08/BeyondNETmundial_FINAL.pdf

[66] http://igfcontinuation.org

are 17 proposed SDGs based on the UN Conference on Sustainable Development, Rio+20, and some elements from the MDGs.

While the SDGs do not have specific goals related to ICTs, there is recognition that ICTs are cross-cutting and that open data and big data initiatives will be critical to ensuring access to data and information necessary for implementation and monitoring of the 169 targets and 304 indicators of the SDGs.

The UN will convene a high level plenary meeting of its General Assembly from 25-27 September 2015 to adopt the SDGs.

The African Union Agenda 2063

In 2013, the African Union celebrated its 50-year anniversary, and in their solemn declaration of 25 May 2013, African leaders presented their aspirations for the next 50 years. Since 2013, the AUC has been consulting and engaging with stakeholders across the continent to articulate these aspirations into Agenda 2063[67] – "a global strategy to optimize use of Africa's resources for the benefits of all Africans" – which was adopted by the AU Summit in January 2015. The seven aspirations of Agenda 2063 are:

- a prosperous Africa based on inclusive growth and sustainable development
- an integrated continent, politically united and based on the ideals of Pan-Africanism and the vision of Africa's Renaissance
- an Africa of good governance, democracy, respect for human rights, justice, and the rule of law
- a peaceful and secure Africa
- an Africa with a strong cultural identity, common heritage, values, and ethics
- an Africa where development is people-driven, unleashing the potential of its women and youth
- Africa as a strong, united, and influential global player and partner

For each of these aspirations, targets, indicators, and implementation strategies will be developed by the African Union in consultation with its specialized agencies and institutions, Regional Economic Communities and stakeholders at large. ICT has been recognized as a major sector that can help achieve these aspirations. The ICT sector agenda is being coordinated by the AUC's Information Society Division.

[67] http://agenda2063.au.int

Conclusion

The Internet has the potential to transform societies, with benefits for education, health, agriculture, transportation, governance, culture, business, economies – in fact the benefits of the Internet can reach into every aspect of modern human society.

But a certain threshold of Internet development – including penetration, access, awareness, and human capacity – is required before countries and regions are able to realize the Internet's full transformative potential. After a slow start, the Internet in Africa is now rapidly improving and developing. Much has been achieved, yet much more remains to be done.

The challenges of investment, infrastructure, regulation, capacity building, and governance are deeply interlinked, requiring the commitment and cooperation of stakeholders from across sectors, nations, and regions. But Africa has a strong and thriving Internet community which, in partnership with the global community, clearly has the ability to continue and accelerate the progress made to date.

Over the past decade, Africa has experienced significant growth in mobile communications and steady growth in Internet penetration. This can, in large part, be attributed to efforts by African governments working in partnership with other stakeholders to create an enabling environment that fosters innovation. Furthermore, important institutions have emerged in Africa's Internet ecosystem that are driving development and putting the multistakeholder model of Internet Governance into practice. The high growth in Internet and mobile access since 2005 also reflects the strengthening of existing Af* institutions, the emergence of regional and national IGFs, and the increased commitment of African governments to ICT development.

Just as we must celebrate the success stories, we must also acknowledge the shortcomings. Averaged figures, even those that depict strong progress, can mask the disparities in distribution of benefits across and within countries. Certainly more work is needed to ensure that people in all parts of the continent – urban or rural, coastal or landlocked – benefit from Internet development. IPv6 deployment is dominated by only two countries – this is becoming a critical issue as IPv4 resources are rapidly diminishing. And the coming failure of most countries to meet the deadline for the digital broadcasting transition sends a stark reminder of the need to grasp opportunities that arise.

As Africa continues to make further strides in building its Internet economy, the multistakeholder model will continue to be vital for success, helping African countries reach the critical mass of access and usage that can translate into sustained economic and social benefits.

Internet Society
Galerie Jean-Malbuisson, 15
CH-1204 Geneva
Switzerland
Tel: +41 22 807 1444
Fax: +41 22 807 1445
www.internetsociety.org

1775 Wiehle Ave.
Suite 201
Reston, VA 20190
USA
Tel: +1 703 439 2120
Fax: +1 703 326 9881
Email: info@isoc.org

Report-InternetDevelopmentInAfrica-20150522-english