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Broadband in Africa

*A selection of recent
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Rural Connectivity in Africa: providing ICT access to rural areas



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The race is on to connect Africa. Goals set out by the Connect Africa Summit are in place to interconnect African capitals and major cities with broadband infrastructure, to connect African villages to broadband services, to adopt regulatory measures so as to promote affordable and widespread access to broadband services, to support the development of ICT skills and to adopt national e-strategies.

Why are these goals set out at the Connect Africa Summit in 2007 still so important? The support of affordable and widespread connectivity to broadband services will help stimulate economic growth, employment and development throughout the continent.

How rapid has progress been in connecting Africa? If the first decade of the 21st Century represented the mobile revolution – SIM penetration in Africa will reach 60% by the end of 2011 – the second decade is set to be the age when the Internet reaches the people, be it via a nomadic service or a more traditional fixed-line connection.

By 2015, a fifth of Internet traffic in Africa will be carried by cellular networks, compared with a global equivalent of just 3%.

Infrastructure investment on 3G networks has been rampant in recent years making mobile operators the main providers of Internet services in Africa. Informa expects the broadband experience in Africa to become increasingly nomadic with the number of broadband connections over cellular networks exceeding 250 million by the end of 2015, compared with 15 million fixed connections, of which 70% will be DSL.

To share our thoughts on the state of broadband access in Africa, we have produced this short report for Africa Com.

In the first piece, Matthew Reed evaluates the progress made in connecting Africa and suggests that a combination of investment, regulatory action, competition and technological innovation has made telecoms services much more widely available. However, devices and services are still too often prohibitively expensive for the poorest, terrestrial cabling is under-developed and mobile network coverage is often sparse or non-existent in rural areas.

In the second piece, I analyse the results of a survey conducted in June and July 2011, which tested the market sentiment on the state of Africa's broadband market. Kalyan Medapati in the third piece considers the role of the regulator in encouraging broadband connectivity and assesses the importance of licensing liberalization, national backbone development, spectrum availability and fair retail broadband pricing.

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Connect Africa – a program with a purpose



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In October 2007, an array of dignitaries met in the Rwandan capital Kigali to talk about telecoms. They included heads of state from six African countries, politicians, technology industry representatives and policy-makers from development organizations.

They were in Rwanda for the Connect Africa Summit, a conference that was organized by the ITU, the African Union and the World Bank, along with a number of UN agencies and other intergovernmental agencies, and which set out a number of weighty objectives for improving the continent's ICT infrastructure.

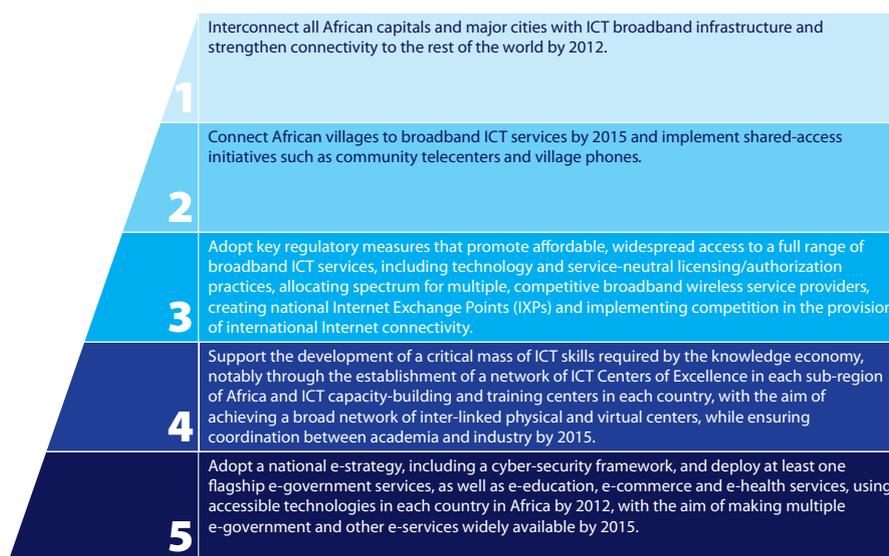
The aim of the Connect Africa conference and initiative was not only to correct Africa's deficit in ICT infrastructure; rather, it was explicitly linked to the pursuit of wider economic and social objectives that would be aided by improved access to ICT.

Connect Africa was the first of a series of ITU initiatives that are designed to tackle the problem of low access to ICT in a number of world regions: It was followed by a Connect CIS Summit that was held in Belarus in 2009 and Connect summits for the Arab states and the Americas are scheduled for 2012. The Connect summits form part of the ITU's development-related activities that are managed by the agency's ITU-D unit.

The objectives agreed at the summit included improving broadband infrastructure at urban, rural and international levels; implementing regulation that would increase access to ICT services; encourage training in ICT skills; and the adoption of e-government strategies (see fig. 1 for full text of the Connect Africa goals).

Implementing these practical plans would, the summit organizers said, stimulate economic growth, employment and development across Africa, which would

Fig 1
Connect Africa summit goals



Source: Connect Africa Summit Outcomes Report

in turn help the achievement of the UN's Millennium Development Goals for the continent. The MDG initiative, which was launched in 2000, has a number of targets that are to be achieved by 2015 including that of halving the proportion of the world's population that is living in extreme poverty. Goal 8 of the MDG included making the benefits of ICT more widely available.

With 2012 being the earliest specified date by which a Connect Africa target was scheduled to be achieved, now is a good point at which to assess progress. The four further Connect Africa goals were to be achieved by 2015, which is not so far away.

The way things were

The telecom-market indicators for Africa in 2007 illustrate why the Connect Africa initiative was thought necessary.

In terms of access technologies, wireless systems have been – and continue to be – the primary means for connecting Africans. But the average rate of mobile penetration for Africa at end-2007 was just 28.46%.

At end-2007, 3G was still quite new in Africa and there were few 3G networks or subscribers. Emtel of Mauritius launched Africa's first 3G (WCDMA) service in November 2004. It was followed by Vodacom South Africa, which launched its 3G service in December 2004, and MTN South Africa launched 3G in June 2005. By end-2007, there were WCDMA networks in nine African countries, and there were 3.26 million WCDMA subscribers, of which about 1.98 million were in South Africa; Egypt was the next-biggest market in terms of WCDMA subscribers. MTN and Vodacom launched Africa's first mobile-broadband HSPA networks, in South Africa, in 3Q06.

The reach of Africa's fixed-line networks was far more limited than mobile. Fixed-broadband household penetration in Africa was just 1.3% at end-2007, compared with 57.74% in North America (US and Canada).

Additionally, in 2007, Africa's telecommunications links to the rest of the world were very limited, with only one intercontinental submarine cable in operation – the SAT-3 cable along the west coast of the continent. There were no submarine cables at all on Africa's east coast. As a result, Africa had to rely heavily on scarce and expensive satellite capacity for international connectivity.

In terms of e-government, the United Nations E-government Survey 2008, which assessed e-government development across the world, placed Africa as the lowest-ranked world region, describing the continent as lagging far behind the world average in terms of e-government readiness.

Measuring the changes

What has changed since 2007? Africa's mobile market has continued to grow apace. The number of mobile subscriptions in Africa crossed the 500 million mark during 2010 and was 584.7 million at end-June 2011. The average rate of mobile penetration for Africa at end-June 2011 was 55.34%.

At end-June 2011, 32 African countries had WCDMA networks and there were 30.63 million WCDMA subscriptions on the continent, including 8.43 million HSPA subscriptions.

The deployment of mobile data networks has had a profound effect. For example, GPRS/EDGE and 3G networks accounted

Fig 2
Sub-Saharan Africa undersea cables, Oct-11

Cable name	Coast	Capacity (Gbps)	Status/planned launch date
SAT3/SAFE	West	340	Active
Main One	West	1,920	Active
Glo-1	West	2,500	Active
WACS	West	5,120	4Q11
ACE	West	5,120	3Q12
Saex	West	12,800	2Q13
SEAS	East	320	3Q12
TEAMS	East	1,280	Active
Seacom	East	1,280	Active
Lion2	East	1,280	2Q12
Lion	East	1,300	Active
EASSy	East	4,720	Active

Source: Africa Undersea Cables, manypossibilities.net

for 99% of the 4.7 million data and Internet subscriptions in Kenya at end-June 2011, according to a report published by the Communications Commission of Kenya, the country's telecoms regulator.

However, while fixed-broadband household penetration in Africa has increased – in fact, it has more than doubled since end-2007 – it is still very low at 3.46% at end-2Q11, compared with 67.46% for North America (US and Canada). Much of Africa's fixed-line-access infrastructure is in South Africa and North Africa; elsewhere on the continent it is very sparse. The CCK's study found that Kenya had only 84,276 broadband (256Kbps or above) subscriptions at end-June 2011, for example.

Since 2007, at least five major submarine cables have come into operation, including EASSy, Seacom and TEAMS on Africa's east coast and MainOne and Glo-1 on the west coast, bringing a huge increase in Africa's international bandwidth/capacity (see fig. 2).

That increase in submarine capacity has spurred the expansion and improvement of terrestrial cabling in Africa, as well as the rollout of broadband access networks. Additionally, the increase in capacity has contributed to declines in the retail prices of Internet access services, although prices have not come down as much as many had hoped.

The average price of fixed-broadband services in Sub-Saharan Africa fell by more than 50% between 2008 and 2010, according to the ITU's Measuring the Information Society 2011 report. But services remain far too expensive for many, with prices in 2010 equivalent to almost three times average incomes.

Also, even though the average price of mobile services in Sub-Saharan Africa fell by 25% between 2008 and 2010, mobile services are much more costly as a proportion of income than in any other world region, according to the ITU. Africans pay an average of as much as 24.6% of

Fig 3
IXPs in Africa, 2011

IXP name	Location	Launch date
JINX	Johannesburg, South Africa	Dec-96
KIXP	Nairobi, Kenya	Nov-00
ZINX	Harare, Zimbabwe	Jul-01
Moz-IX	Maputo, Mozambique	May-02
KINIX	Kinshasa, DRC	Sep-02
CRIX	Cairo, Egypt	Dec-02
UIXP	Kampala, Uganda	May-03
TIX	Dar es Salaam, Tanzania	Jan-04
SZIXP	Mbabane, Swaziland	Jun-04
RINEX	Kigali, Rwanda	Jul-04
GINX	Grahamstown, South Africa	Mar-05
GIXP	Accra, Ghana	May-05
AIXP	Arusha, Tanzania	Jun-05
AngolaIXP	Luanda, Angola	Jun-05
BINX	Gaborone, Botswana	Jun-05
IXPN	Lagos, Nigeria	Jun-05
MIXP	Mauritius	Jun-06
MEIX	Cairo, Egypt	2007
CI-IXP	Abidjan, Cote D'Ivoire	Jun-07
MIX	Blantyre, Malawi	Dec-08
MombasalXP	Mombasa, Kenya	Aug-10

Source: Network Startup Resource Center, Informa Telecoms & Media

their monthly income for mobile services, compared with less than 10% in all other regions and only 1.6% in Europe, the ITU found.

Assessing progress

In 2010, the ITU published its own assessment of progress towards achieving the Connect Africa goals, saying that the achievement of Goal 1 of Connect Africa – to connect all African capitals and major cities with broadband infrastructure by 2012 – is “imminent”, but a lot remains to be done in order to achieve the other four goals.

The ITU’s 2010 progress report said that all of the major population centers in the five countries of the East African Community would have fiber-optic cable connectivity by end-2010.

The view that there has been good progress towards achieving Goal 1 is borne out by a survey that Informa Telecoms & Media conducted into industry views on the development of broadband in Africa: 66% of respondents to the survey said that more than 50% of cities and towns in their country were connected to a national terrestrial backbone, while 27% said that more than 90% of cities and towns were connected.

The achievement of Goal 2 of Connect Africa – to connect African villages to broadband by 2015 – is clearly seen as being more distant: 61% of the respondents to Informa’s survey said that less than half of all villages in their country were connected to a national terrestrial backbone, while 30% said that less than 20% of villages were connected.

The CCK’s report on ICT access gaps in Kenya said that only 893 of the country’s 7,149 sub-locations had access to broadband data services at end-June 2011, suggesting that broadband access is largely restricted to the main urban areas and is often absent elsewhere.

Although there are numerous village-phone schemes across Africa – some of which include Internet access as well as voice services – the scale of these projects tends to be fairly limited. Many African countries have extensive or difficult terrain, which makes the task of improving rural coverage that much harder.

In regulation – the subject of Goal 3 of Connect Africa – there are encouraging trends such as a movement towards technology-neutral licensing. Some countries, such as Rwanda, are notable for having drawn up and implemented national cabling plans. But many other have yet to devise such strategies.

In too many cases, lack of competition in the backhaul market creates bottlenecks that constrain efforts to extend connectivity. Additionally, delays or other problems in spectrum allocation are holding up the deployment of 3G and other data networks.

There are about 21 IXPs in Africa in 2011 (see fig. 3), but about 17 of these were in operation by mid-2006, so there has not been a substantial change in recent years.

IXPs allow Internet traffic to be exchanged locally, which should keep costs down and improve the standard of services.

Respondents to Informa's survey said it was important to take further action in a number of key regulatory areas, including: the easing of technology and service licensing; increasing spectrum allocation; increasing competition in wholesale Internet backbone network; and the creation of national IXPs.

There are a wide range of initiatives to improve ICT skills in Africa, variously involving the industry, national governments, NGOs, academia and other organizations. Despite this, the development of Africa's ICT skills base, which is the subject of Goal 4 of Connect Africa, still lags.

The ITU's Measuring the Information Society 2011 report found that Sub-Saharan Africa was the region with the lowest ICT development index (IDI) values in 2010, with the highest-ranked African country – Mauritius – ranked only 69th globally. However, the IDI is based on three broad indicators – ICT access, use and skills – and so gives an inexact guide to skills development.

On e-government – the subject of Goal 5 of Connect Africa – the United Nations E-government Survey 2010 said that Africa still fell below the world average for e-government development.

However, the UN report also said that there had been some improvement in e-government development, particularly in Middle, North and West Africa, since the publication of the 2008 survey. Tunisia, Mauritius, Egypt, South Africa and the Seychelles were the five highest-ranked countries in Africa in terms of e-government development, according to the 2010 report. But Tunisia, the highest-ranked country in

Africa, was only ranked 66th in the world.

In a separate e-participation survey, six of the 13 countries for which the UN was unable to identify e-participation data are in Africa.

Informa viewpoint

Over the past few years, a combination of investment, regulatory action and market factors such as competition, technological innovation and economies of scale, has made telecoms services of increasing sophistication much more widely available and affordable in Africa.

However, there are no grounds for complacency. Devices and services are still expensive – sometimes prohibitively so – for the poorest. Terrestrial cabling is under-developed and fixed-access networks are very limited. Even mobile network coverage is often sparse or non-existent in rural areas.

Governments, regulators, multilateral organizations and the ICT industry could and should do more to facilitate the benefits of competition, remedy instances of market failure and introduce new technologies and skills.

If the Connect Africa goals are to be achieved then steps must be taken to:

- encourage continued investment in terrestrial cabling
- improve access to backhaul networks, perhaps by issuing "backhaul-only" licenses
- draw up national ICT strategies, where these do not already exist
- facilitate infrastructure sharing
- develop m-government services in order to achieve broader e-government objectives

This is an extract from Informa research into Africa's telecoms market and is available to clients through the Middle East and Africa channel of the Intelligence Centre.

State of Broadband in Africa Survey, 2011



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Methodology

The Informa Telecoms & Media State of Broadband in Africa Survey was conducted online in June and July 2011. An e-mail link was sent to a targeted list of C-level industry professionals from Informa's databases who had previously expressed an interest in and knowledge of the telecoms services industry in Africa.

Nearly half (46%) of the 250+ respondents were mobile, fixed or converged operators. The next largest respondent groupings were ISPs (16%), equipment vendors (14%) and content providers (7%).

Results and analysis

Importance of broadband services to business strategies and macroeconomic growth

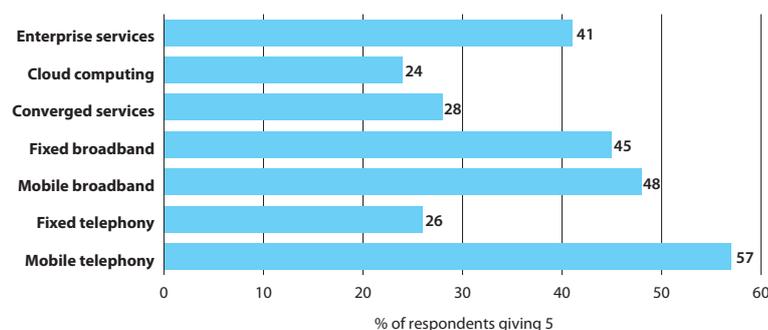
When asked to rank the most important types of communications services to telecoms company strategies, mobile telephony is seen by most of the survey's respondents as a highly important service type. But mobile and fixed broadband services score highly, as do enterprise services (see fig. 1).

Africa's communications market is mainly consumer-facing, but, at a time when operators need to find new revenue streams, it is noteworthy that enterprise services are seen as highly important to so many of the respondents' business strategies. Enterprise mobility services will play an important part in the future strategies of many operators, and especially in the region's more developed markets.

When asked how important different communications service types are in

Fig 1

Rank the importance of the following areas to your company's business



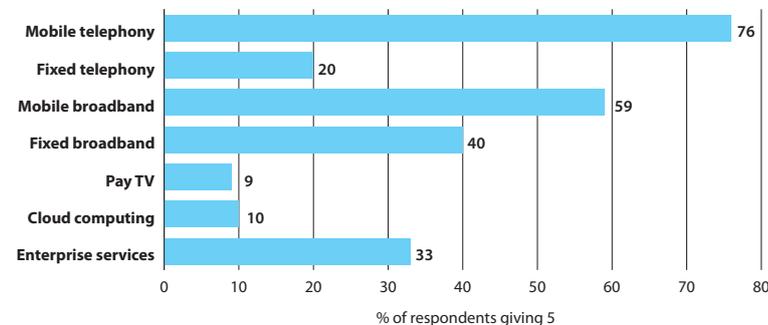
n=269

NOTE: Using a scale of 1-5, where 5 is most important and 1 is least important, multiple responses allowed

Source: Informa Telecoms & Media

Fig 2

Rank the importance of the following communication services to the economic development of Africa



n=259

NOTE: Using a scale of 1-5, where 5 is most important and 1 is least important

Source: Informa Telecoms & Media

influencing Africa's economic development, the overriding response was that mobile telephony and broadband services are making the most positive impact on economic growth (see fig. 2).

When asked to segment the importance of communications service types by urban and rural usage, three quarters of respondents

answered that mobile telephony is a very important service type, regardless of the urban/rural split. However, whereas over half of the respondents ranked mobile broadband as very important to urban users, this fell to 29% for rural, and the 40% who replied that fixed broadband is very important to urban users plummeted to just 16% for rural users.

Growth drivers and inhibitors of broadband services

According to our survey, the most important driver of broadband rollout is customer acquisition with 45% of respondents ranking this as very important (see fig. 3), ahead of revenues/earnings expansion (41%) and the offer of converged services (37%).

In a competitive marketplace – and there are few more competitive telecoms markets in the world than those in Nigeria, Tanzania and South Africa – it is important that carriers can differentiate either in terms of network quality or products. The ability to offer broadband services, be it fixed or mobile, is crucial to such differentiation.

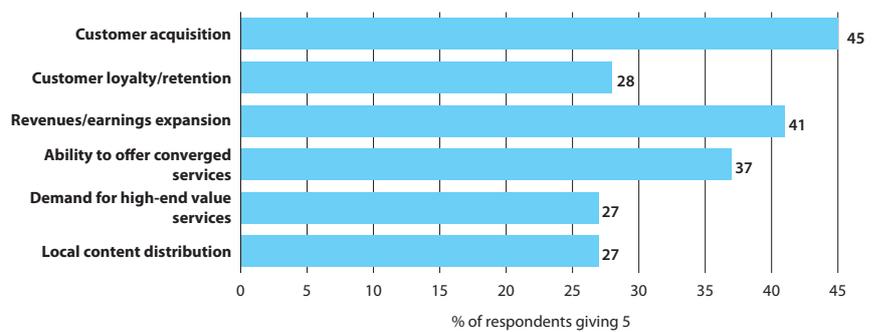
Just over one quarter of respondents ranked local content distribution as a very important driver of broadband services. Informa believes that the digitization of Africa can only become a reality if the customer experience of Internet services is good. A supply of local content is pivotal to this customer experience: The demand for highly-valued and relevant content is a major driver for Internet take-up. But the primary sources of content in Africa remain international, and there is a paucity of local content available.

For the continued growth of broadband in Africa, it is important that this changes. Without enough relevant local content, international content alone will not maintain usage at the levels required by the operator. But the most popular Internet sites accessed across the continent are still the likes of Facebook, Google, BBC and YouTube.

Proving a business case for expansion is the main inhibitor to new broadband growth with 55% of respondents claiming the infrastructure costs are the most significant

Fig 3

Rank the importance of the following factors as drivers for broadband rollout and expansion in Africa



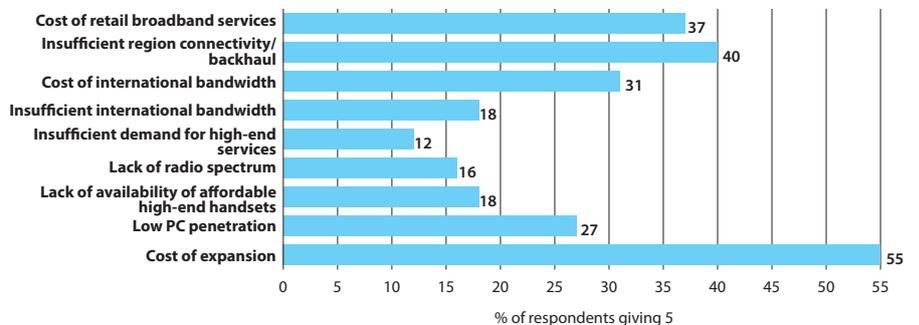
n=260

NOTE: Using a scale of 1-5, where 5 is most important and 1 is least important, multiple responses allowed

Source: Informa Telecoms & Media

Fig 4

Rank the significance of the following challenges facing operators attempting to expand broadband rollout in Africa



n=260

NOTE: Using a scale of 1-5, where 5 is most important and 1 is least important, multiple responses allowed

Source: Informa Telecoms & Media

impediment to expanding broadband rollout (see fig. 4). On a similar theme, 40% point to insufficient connectivity and backhaul as providing an obstacle to broadband growth. The third-largest factor noted is the cost of retail broadband services with 37% ranking this as a very important factor.

The arrival of new submarine cables should help to rectify the retail broadband service issue and there is some evidence that the EASSY and Seacom cable systems are having some impact on retail broadband markets on the east coast of Africa.

Certainly, the associated declines in bandwidth pricing in wholesale data

markets have been significant, but this has not always crossed over to the retail market. Nevertheless, customers in retail broadband markets do enjoy more affordable broadband packages and greater data usage limits so pricing should become less of a factor.

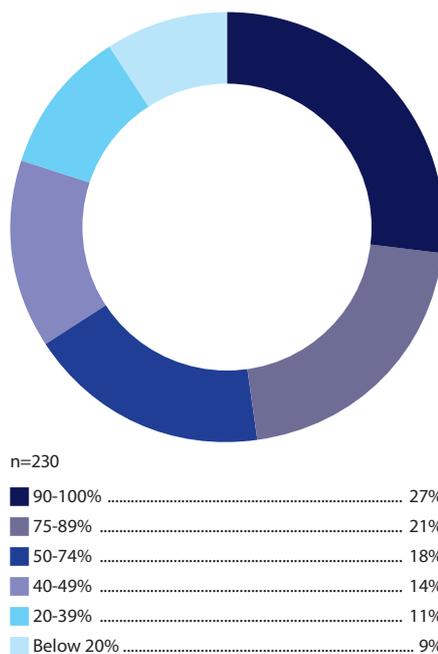
According to the survey, improved international capacity (34%) has been the single biggest impact of the landing of new submarine cables since 2007, just ahead of lower international bandwidth pricing (32%). Back at the time of the Africa Connect Summit, SAT-3 was the only submarine cable serving Africa's west coast. Four years later, there are five additional operational cables, two of which serve East Africa. These cables provide a potential 15 Tbps of international bandwidth – in 2007, Africa had access to an estimated 0.04Tbps. Little wonder then that a third of the survey's respondents said that additional international capacity has been the biggest impact from submarine cable investment.

The availability of sufficient international capacity is important in that it influences telecom operators in making investments into broadband access networks – wireless and cable. There is a notable increase in demand for radio spectrum for mobile broadband networks, and activity in the FTTH/B space is also picking up, reflecting an increased focus on data services. Of the 57 operating 3G networks, 38 were deployed after mid-2008, coinciding with the arrival of more submarine cables. Nearly all FTTH/B network deployments have occurred since 2008.

Connecting via a national terrestrial backbone

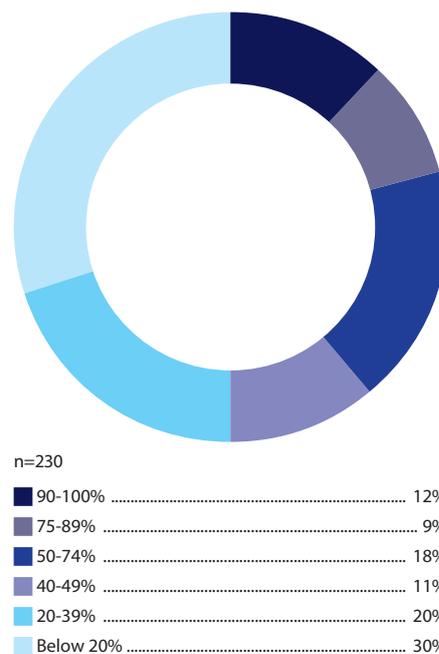
Fewer than half of the respondents to the survey thought that 75% or more of the capitals and cities in Africa were

Fig 5
Approximately, what percentage of the cities and towns in your country is connected to a national terrestrial backbone?



Source: Informa Telecoms & Media

Fig 6
Approximately, what percentage of the villages in your country is connected to a national terrestrial backbone?



Source: Informa Telecoms & Media

interconnected to broadband services (see fig. 5) and almost a third said that fewer than 20% of villages in Africa are connected to a national terrestrial backbone (see fig. 6).

Important though the right regulations and the impact of competition are in ensuring greater levels of connectivity, there is no substitute for investment. While it is easier for governments in smaller countries such as Rwanda and Burundi to build national backbones, it is encouraging to see a number of larger fiber backbone projects planned.

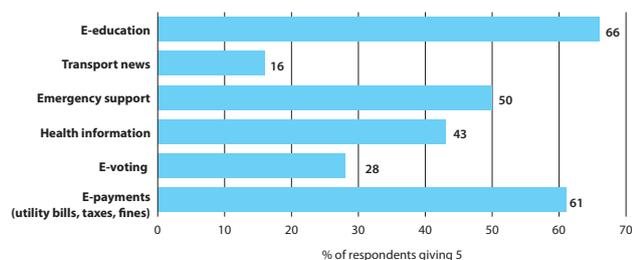
In September 2011, the first phase of Tanzania's National ICT Broadband Backbone linking 14 regions was completed. In the same month, Angola Telecom announced the completion of 10,000km of national

fiber backbone linking every province in the country. Zambia too will benefit from the construction of a national fiber backbone, funded by CITIC Bank of China, and with large infrastructure contracts awarded to ZTE and Huawei. Investment from China is a feature of Africa's fiber backbone market with Exim Bank of China involved with the funding of a national backbone in Democratic Republic of Congo; Chinese vendors have also recently won large infrastructure contracts in South Africa and Burundi.

To encourage investment, it is necessary that the right regulations are in place. Just short of half of the survey respondents referred to the easing of technology/service licensing as a very urgent regulatory measure required for the promotion of broadband access.

Fig 7

Rank the importance of the following factors as drivers for broadband rollout and expansion in Africa



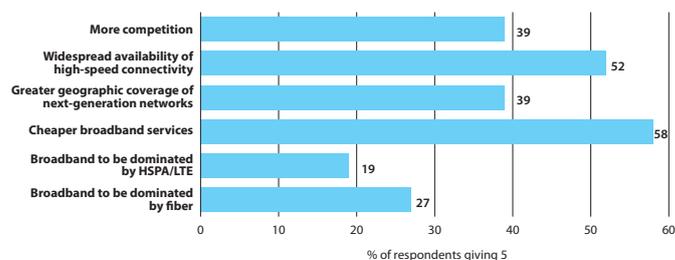
n=188

NOTE: Using a scale of 1-5, where 5 is most important and 1 is least important, multiple responses allowed

Source: Informa Telecoms & Media

Fig 8

Rank the significance of the following changes to the broadband market landscape over the next five years



n=190

NOTE: Using a scale of 1-5, where 5 is most important and 1 is least important, multiple responses allowed

Source: Informa Telecoms & Media

Other very urgent measures cited were a requirement for more spectrum allocation and improving competition in the wholesale international bandwidth market.

Broadband as an aid to e-government services

When asked to rank those government departments that would benefit from a fast and reliable government broadband infrastructure, two-thirds responded education would benefit very much, and 43% answered health and public administration (see fig. 7). Given that one of the Connect Africa goals for states is to adopt e-government strategies, this gives an important steer to the departments where e-government implementation will be most useful.

This becomes even clearer when two-thirds of respondents named education services as being very important in any e-government strategy, ahead of e-payments (payment of utility bills, taxes, etc.) and emergency support.

Strategy is one thing and implementation

quite another. When asked to comment on how developed various e-services are, only one third thought e-payments were either quite well developed or very well developed and only one in five felt that e-education services were either quite well developed or very well developed.

Looking to the future

The question over which there was the least common ground in responses was when executives were asked to assess what the very significant changes would be in the broadband market over the next five years.

Well over half the respondents thought cheaper broadband services would be a very significant change allowing broadband to become available to a wider market. Just over half thought the widespread availability of high-speed connectivity would also be a very significant change for the broadband market (see fig. 8). More investment in national terrestrial backbones is needed to help such an increase in availability.

From a technology perspective, it is interesting to note that a greater number

of respondents answered that a more significant change to the broadband market would be brought about by fiber than HSPA/LTE. It is unclear from this as to whether HSPA/LTE is just not seen as a significant issue in the short-to-medium term, and will only become more relevant as a growth driver for broadband in 5+ years, or whether there is no business case in the long-term.

Informa viewpoint

The success of Africa Connect lies not in achieving deliberately aggressively-set goals but in encouraging public and private investment, urging regulators to be more proactive in creating regimes that will allow widespread broadband access and tempting governments to engage closer with their citizens and transform their own internal processes with the help of e-services. Progress towards more universal use of broadband infrastructure in Africa may be variable but it is underway.

This is an extract from Informa research into Africa's telecoms market and is available to clients through the Middle East and Africa channel of the Intelligence Centre.

Regulators must encourage greater broadband connectivity



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While ICT international connectivity in many African countries has substantially improved since the start of this decade, interconnectivity between African towns and villages remains limited. The amount of investment in submarine cables has not been matched by progress on terrestrial backhaul infrastructure. This is a major concern given that broadband access and rural connectivity are emerging as two key new growth drivers for telecoms operators.

Broadband access in Africa is predominantly based on mobile platforms, as opposed to fixed line networks – a trend driven by both the relative ease of deployments and low capital expenditures associated with mobile networks. This trend is expected to persist over the next five years.

What factors have driven mobile connectivity so far and what factors do regulators need to focus on specifically going forward to enhance broadband connectivity?

Competition is vital factor in improving connectivity

Income levels have played a significant role in mobile penetration. But so has competition.

Those markets with the highest mobile penetration rates will generally be home to populations with higher income levels. Most of these markets are also competitive in terms of the number of active mobile networks available.

There are, however, cases where relatively low income markets have high mobile penetration rates. Mauritania, for example, has an average per-capita GDP of below US\$2,000 in terms of GDP on purchasing

power and yet its mobile penetration is approximately 90%; this high penetration rate was driven by Mauritania's competitive mobile market.

High-income countries where markets are not that competitive show signs of relatively weak penetration rates. Equatorial Guinea, for example, has an average per capita GDP of above US\$18,000 but its mobile penetration is approximately 80%. Equatorial Guinea's mobile market functions as a duopoly. South Africa, meanwhile, has an average per capita GDP of just over US\$10,000, but is a market with five operators and it has a SIM mobile penetration of over 100%.

National backbones make growth inclusive where markets are largely rural

In most African countries, populations are still heavily concentrated in rural areas. But the connectivity revolution remains a largely urban phenomenon in Africa.

However, saturating urban markets, universal service obligations and high levels of competition have placed rural connectivity as the next frontier for growth for operators. Current mobile penetration in rural areas in Africa tends to be between 5% and 15%.

A comprehensive national backbone covering rural areas would assist in creating a connectivity revolution but this is rarely commercially viable. While some routes covering urban centers are viable for operators to fund on their own, rural areas are usually not large enough for operators to roll out their own backbones. These connectivity projects, therefore, need to be modeled on operator consortia, public

private partnerships or, in some cases, entirely on public funds.

The lack of national fiber backbones leaves many regions disconnected; where there is connectivity, it is dependent on expensive and low-bandwidth wireless backhaul networks. The respondents of an industry survey on the state of Africa's broadband market conducted by Informa Telecoms & Media in March 2011 suggested that the technology composition of backhaul infrastructure is over 60% microwave, and approximately 10% satellite. This pushes up the costs associated with access connectivity on the segment of the market where people have the lowest income levels.

Approximately one third of the survey respondents believe that fewer than 20% of Africa's villages are connected to the backbone. The lack of terrestrial backhaul connectivity was high on the list of the key factors hindering broadband rollout in Africa after the cost of broadband-access-network rollout.

Take, for instance, the Democratic Republic of Congo, which has large land mass and sparsely-populated villages spread across the country. Despite having a very competitive marketplace, mobile penetration remains very low. While affordability for telecoms services is an issue, it is the domestic terrestrial backhaul that is a larger bottleneck for growth in connectivity. The same can be said for Burundi, Central African Republic and Niger.

It is interesting then to assess the pipeline of planned/proposed fiber projects for a selection of African markets (see fig. 1). Markets such as DRC, Tanzania and Mozambique are set to see significant investment.

Despite legacy infrastructure, there are segmented growth opportunities in urbanized areas

The average PSTN household penetration in Africa is just over 10%, and if the relatively developed North African markets are discounted, then the average penetration rate falls to about 5%. There are several countries in Africa, such as Nigeria, Uganda or Central African Republic, where PSTN penetration is below 1% (see fig. 2). With such dismal presence of copper infrastructure in these countries, it is hard to provide broadband with meaningful coverage without widespread 3G networks.

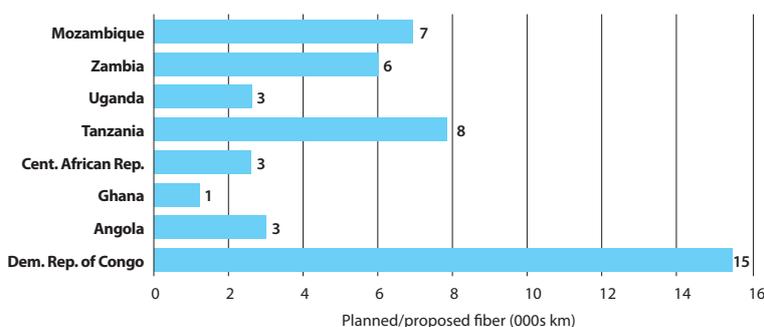
Even within the existing copper infrastructure, the poor quality of the metal and widespread theft of the cables mean that only a very small part of the existing infrastructure can be used to deploy broadband using DSL technologies.

On the other hand, expanding the copper or fiber access networks is not an option in the short term, given the prohibitive costs. The commercial viability of nationwide fiber rollouts is even being questioned in developed markets, so it hardly has a case in the underdeveloped markets in Africa.

However, fixed-line networks are feasible in certain urban centers. There is some private sector activity in East Africa, Angola and Nigeria, where companies are actively – albeit slowly and cautiously – rolling out hybrid coaxial networks (HFC).

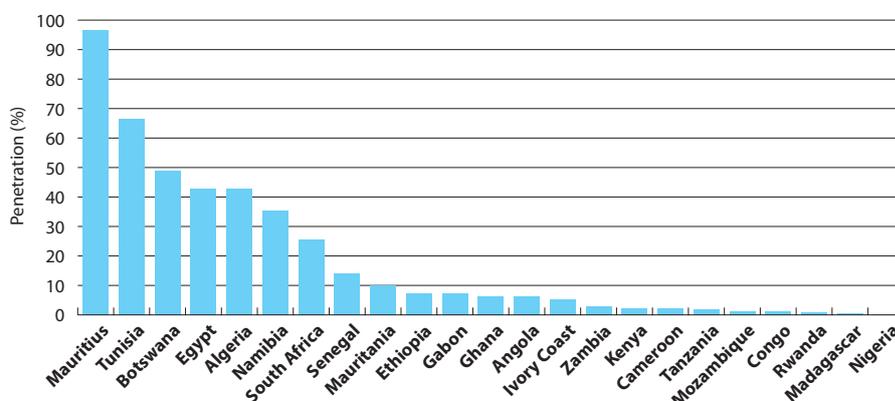
Wananchi in Kenya is one notable example. The operator rolled out a HFC-based network offering triple-play bundles in a market where demand was untested. It had around 23,000 active subscriptions on its network by the end of 2Q11. Initially these networks are taking advantage of

Fig 1
Africa, geographic coverage by planned fiber projects, May 2011



Source: Informa Telecoms & Media, Hamilton Research

Fig 2
Africa, PSTN household penetration, by selected country, 1Q11



Source: Informa Telecoms & Media

existing demand for pay TV and expanding into multi-play TV, broadband and voice offerings. The conditions for such networks to emerge are the growth of middle classes in urban Africa and the lack of competition across Africa's pay-TV market, where many markets reside within a monopoly of a single satellite operator.

Mobile broadband is the solution for widespread broadband

Selective fixed-line deployments in urban areas will not suffice to ensure widespread access to broadband. Therefore, mobile technologies should be the short-to-medium term drivers of broadband access in Africa. In market conditions where 3G connectivity is to drive broadband take-up,

technology-neutral licensing and spectrum availability take center stage as major regulatory concerns.

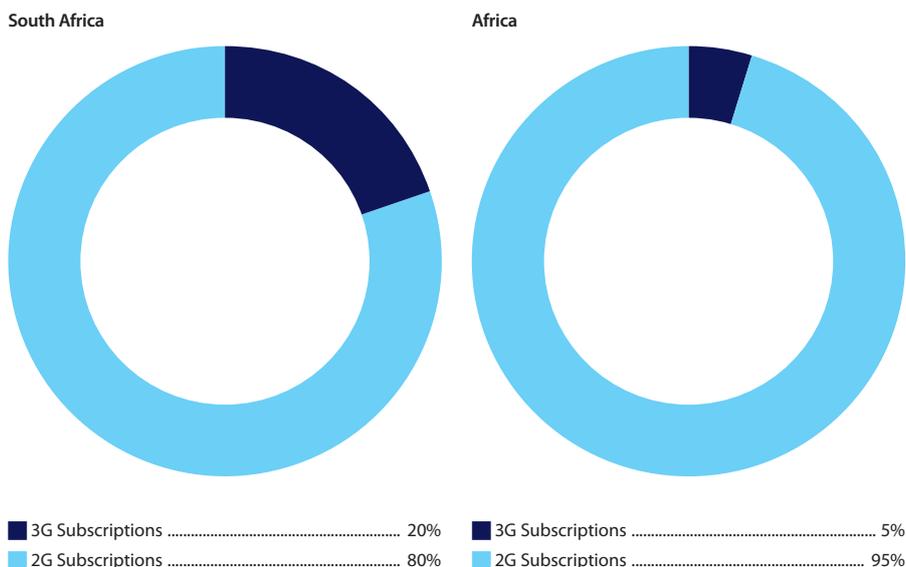
A decade after the first 3G network launch, only half of Africa's countries have adopted this technology. There are 32 countries in Africa with active WCDMA networks, with 29.4 million 3G subscriptions at the end of 1Q11. In other words, 3G subscriptions in Africa as a whole represent about 5% of the total mobile subscriptions, compared with 21% in South Africa in isolation (see fig. 3).

While there is general realization amongst regulators of the need for technology-neutral licensing, spectrum availability remains an issue, as illustrated by the way that the large-population countries, such as Algeria and DRC, are still to issue 3G spectrum. In another survey conducted by Informa Telecoms & Media, respondents identified streamlining of licensing and spectrum availability as the two major issues in Africa (see fig. 4).

Better spectrum regulation is necessary to make efficient use of this resource. In some cases, operators with capital to invest in 3G/4G expansion are suffering from a shortage of spectrum while other carriers sit idle on issued spectrum. There are cases of operators trialing LTE on 1800 MHz, but withholding commercial launch until spectrum for 2100MHz or 700MHz becomes available. Elsewhere, mobile network operators actually have spectrum allocation but have been unable or unwilling to deploy active networks. Regulators need to police this issue more stringently.

Most frustrating of all, however, is that, in most cases where there are licensing delays, it is bureaucratic red tape preventing the progress rather than real issues such as spectrum shortage.

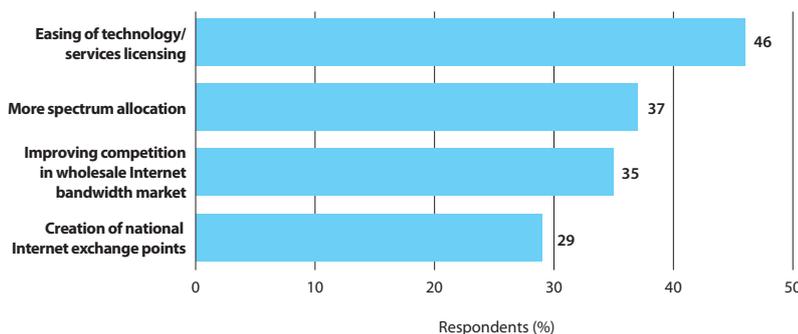
Fig 3
Africa, subscriptions by technology, regional total vs. South Africa, 1Q11



NOTE: 2G calculations include 1G, and 4G is included in 3G figures.

Source: Informa Telecoms & Media

Fig 4
Priorities for African regulators



Source: Informa Telecoms & Media, Hamilton Research

Competition is a core prerequisite for growth

There are several factors that will set the pace of growth and result in more complete connectivity: greater levels of infrastructure investment; a strong regulator; and continued economic growth. However, it is a competitive landscape that will ensure continued growth in the access of communications services.

A lack of competition only serves to restrict service usage, even in cases where the markets are relatively wealthy.

The Angolan market is a case in point. Its mobile market is a duopoly – split between Unitel Angola and Movitel – where Unitel is much the stronger (its market share was over 70% at the end of 2Q11). The fixed-broadband market is overwhelmingly dominated by incumbent Angola Telecom with alternative operator Mundo Startel barely scratching the market.

Angola is one of the wealthiest markets in Sub-Saharan Africa. With a GDP of over US\$85 billion, it is the second-largest economy in the region and has an average income of nearly US\$5,000. It is strange then that its mobile penetration was just 45% in mid-2011, below the regional average. Lack of competition is certainly an inhibitor to growth but so too is insufficient national terrestrial bandwidth. The national fiber backbone covers less than one third of the population, leaving the rest to depend on patchy microwave and satellite links, creating a terrestrial backhaul bottleneck.

In comparison, Gambia, with much lower income levels (its average is around US\$2,000), has a more competitive landscape and over 85% of the country's population has access to mobile. Of course,

market forces alone cannot drive higher penetration levels. In the DRC, there are six mobile operators, and yet mobile penetration is still very low.

Informa's viewpoint

Despite all the socioeconomic and political problems that bedevil many African countries and hinder industrial development, telecoms is one sector which has excelled. Since the first mobile networks appeared a little over a decade ago, progress towards connectivity has been rapid, especially across Africa's major towns and cities.

Progress in the evolution of licensing structures, greater availability of radio spectrum, and the encouragement of competition have all played a part in the growth of ICT connectivity. The evolution of narrow technology or service-specific licensing towards a universal license structure is laudable.

However, it is a concern that public initiatives fall short in areas where they are most needed. Market failures are apparent when it comes to rural connectivity. Although some mobile operators may see rural markets as the next growth frontier, it remains very hard for them to find commercial viability in connecting remote connectivity to national backbones. There are several cases where competing operators are forging unlikely partnerships to build backhaul networks to rural communities to make them commercially viable. But such shared networks are subject to too many vagaries and are not happening fast enough. This problem calls for either publicly-owned backbones connecting rural communities or networks funded by public-private partnerships. Either way, some amount of public financing is required.

The national fiber optic backbone project funded by the Rwandan government, which was completed earlier this year, is a good example. In addition, several countries need to reshape their approach to competition regulations: Markets such as Ethiopia, Eritrea, Angola, Namibia and Cameroon are crying out for greater liberalization.

Regulators play an important part in the licensing liberalization process, as they do in building comprehensive national backbones, improving the availability of spectrum, and ensuring retail broadband prices are fair and competitive.

This is an extract from Informa research into Africa's telecoms market and is available to clients through the Middle East and Africa channel of the Intelligence Centre.

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