BROADBAND IN KENYA

BUILD IT AND THEY WILL COME

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AN *info*DEV PUBLICATION PREPARED BY:

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2011

*info*Dev

Information for
Development Program

To cite this publication:
Msimang, Mandla, 2011. Broadband in Kenya: Build it and They Will Come. Washington, D.C: *info*Dev / World Bank. Available at http://www.infodev.org/publications

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Glossary of Terms

ADSL	Asymmetric Digital Subscriber Line
ASP	Application Service Provider
BPO	Business Process Outsourcing
CCK	Communications Commission of Kenya
COMESA	Common Market for Eastern and Southern Africa
CSP	Content Service Provider
DSL	Digital Subscriber Line
EABs	East African Backhaul System
EAC	East African Community
EASSy	Eastern Africa Submarine Cable System
FONN	Fibre Optic National Network
GDP	Gross Domestic Product
HDI	Human Development Index
KENET	Kenya Education Network
KICTB	Kenya Information and Communications Technology Board
KIE	Kenya Institute for Education
KIXP	Kenya Internet Exchange Point
KNADS	Kenya National Archives and Documentation Service
KTCIP	Kenya Transparency Communication Infrastructure Programme
LLU	Local Loop Unbundling
LTE	Long Term Evolution
LION	Lower Indian Ocean Network (undersea cable)
MOIC	Ministry of Information and Communications
MTP	Multimedia Technology Park
NEPAD	New African Partnership for Development
NFP	Network Facilities Provider
NOFBI	National Optic Fibre Backbone Infrastructure
PPP	Private Public Partnership
QoS	Quality of Service
TEAMS	The East African Marine System
TESPOK	Telecommunications Service Providers Association of Kenya
USF	Universal Service Fund

Acknowledgments

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Executive Summary

This report considers the case of broadband in Kenya and the manner in which the country has tackled its capacity challenges. Kenya has a natural geographic advantage, being strategically positioned on the East Coast of Africa. Its government-led "build it and they will come" approach to broadband development has leveraged that advantage, and has played a major role in dramatically increasing fibre optic backbone capacity. Many of Kenya's milestones have been realized in less than five years – three cables had landed by the end of 2010 changing the face of the broadband market. The country has gone from relying on satellite for international capacity, to having access to almost four terabits over fibre from the three cables combined.

Although the landing of the cables is merely a first step, it has already resulted in an 80 percent decrease in wholesale bandwidth costs. Lower prices and greater availability are expected to increase access to the Internet as well as to promote the continued spread of sophisticated mobile applications and services and consequently improve opportunities for the creation of and access to information and knowledge. Affordable broadband is expected to increase Kenya's competitiveness, particularly in the Business Process Outsourcing (BPO) sector, and to encourage entrepreneurship and innovation.

What the Kenyan case demonstrates is that the promotion of broadband capacity is multifaceted and takes place on a number of different levels. This report analyses the approach that has been taken to addressing network capacity challenges (supply side), as well as human capacity considerations affecting usage and uptake (demand side) by considering:

- the wholesale market for broadband connectivity (domestic and international backbone connectivity);
- the retail market for broadband access (i.e. "last mile connectivity"); and
- the development of services, applications and content.

With an estimated fixed and mobile broadband penetration rate of 2 subscriptions per 100 people in 2010, Kenya still has significant progress to make with respect to broadband uptake. Stimulating demand and usage by Kenyan citizens and the public and private sector remains a challenge. Kenya has, largely through the government, taken an innovative and pro-active approach to putting the user at the centre and addressing the other elements of the broadband ecosystem, such as education, literacy, applications and content. This has been done through good regulation, the promotion of polices relating to ICT in education, the subsidization of relevant content and application projects, and facilitating creative Public Private Partnerships (PPPs).

This report finds that much of Kenya's success is due to four important factors:

- A clear national vision articulated in Vision 2030;

- Strong leadership and direction;

- A credible regulatory, policy and institutional framework; and

- Leveraging the strength of the public and private sectors through PPPs.

The initiatives discussed in the report possess elements of these traits across all aspects of the broadband ecosystem.

The Kenyan experience is inspiring, yet it has not been perfect. There have been a few hiccups in terms of the pace of implementation, and overlaps in the policy and institutional framework. These are discussed in this report to provide a proper context for the Kenyan broadband story and to enable countries to learn from Kenya's experiences.

1. Why Broadband Matters

The economic and social impact of broadband is well researched and documented. An increase in broadband penetration has a greater impact on economic development than a concomitant increase in access to other telecommunications services. The World Bank estimates that in low and middle-income countries such as Kenya every 10-percentage point increase in broadband penetration accelerates economic growth by 1.38 percentage points.[1]

The economic impact of broadband[2] is wide – it positively impacts innovation, job creation and employment, as well as the software and manufacturing industries. It promotes access to information – thus promoting transparency and good governance, critical in a country like Kenya with a historic reputation for corruption, with related political and social benefits. In recognition of the critical role of broadband, and in light of the Ministry of Information and Communications' objective of moving Kenya towards a *Knowledge Based Economy* by 2012,[3] policy makers, regulators and industry players alike are seeking ways to increase broadband coverage and increase usage. In light of the high costs associated with deploying broadband networks, and the fact that broadband is part of an ecosystem which includes demand side factors such as applications and content, and in which users are central, tackling the *broadband divide* is not quite the same as tackling the *digital divide* which has been primarily conquered through mobile phones with light touch regulation.

Developing country policy makers in the ICT sector have spent the last 15 to 20 years encouraging the competitive supply of networks and services through market reform processes. The same policy makers are now faced with the challenge of moving beyond networks and the need to start developing strategies to *increase demand.* They are furthermore faced with the glaring reality of the cross cutting impact of ICTs and the need to recognize that ICT access is not just a Ministry of Information and Communications issue – government agencies responsible for the ICT sector now need to work more closely with other public sector stakeholders to create content (e.g. online application forms, e-government solutions, online payment mechanisms, etc.) to drive demand in order to make broadband access meaningful. The policy response to broadband is thus changing.

The Government of Kenya recognized this relatively early and in 2006 had included a holistic approach to ICT in its national *Vision 2030*, its National ICT Policy and its approach to regulation. Although there is no separate Broadband Policy, making the Kenyan approach seem fragmented at a glance, there is a holistic ICT framework with strong dependencies on access to high-speed connectivity in Kenya. The national framework recognizes that broadband is an ecosystem and as such considers strategies, policies and regulations that address both supply and demand side considerations. The ICT framework is set against the backdrop of the *MOIC Strategic Plan* and includes the regulatory incentives provided by the Communications Commission of Kenya (CCK) relating to infrastructure sharing and spectrum licensing, as well as supply side interventions made by agencies such as the Kenya ICT Board which are discussed in section 6.2. The Kenyan framework recognizes that there are two types of broadband capacity – *network capacity,* i.e. the development of high-speed data communications networks, and *human capacity* enabling the use of the services through the development of relevant content and applications to promote the use of these networks. Building capacity in both areas is what will make broadband matter.

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[1] Qiang, Christine Zhen-Wei, and Carlo Rossotto. 2009. "Economic Impacts of Broadband." In *Information and Communications for Development 2009: Extending Reach and Increasing Impact*. World Bank Publications.

[2] The term broadband is defined differently in different countries, primarily with reference to speed. As such, the term must be understood within a country context and the particular aspects of the broadband value chain should be recognized. Broadband in Kenya is defined "as speeds greater than or equal to 256 Kbps in one or both directions."[2] In addition, there are several layers in the broadband value chain (wholesale, retail, applications and content) each of which must be treated differently.

[3] Ministry of Information and Communications *Towards a Knowledge Based Economy: Strategic Plan 2008 – 2012.* http://www.information.go.ke/index.php?option=com_content&task=view&id=239&Itemid=370

2.1 Country Background

Located in East Africa, Kenya is bordered by Ethiopia, Somalia, Sudan, Tanzania and Uganda. Kenya's coastline, along the Indian Ocean, covers over 536 km and its port, like the undersea cables that land along the coast, serves its land-locked neighbours. Kenya is divided into eight provinces and 47 semi-autonomous counties each having it own semi-autonomous government headed by an elected governor.   At present the country's population is approximately forty million, with 68 percent of Kenyans living in rural areas, and about 13 million people living in urban areas.[4] Nairobi is the capital city, and the largest city in East Africa, with a population of over three million.[5] According to the Constitution, Kenya's national language is Kiswahili, and English and Kiswahili are the official languages, with most Kenyans being bilingual.

Figure 1: Map of Kenya (Source: CIA World Factbook)

Kenya is one of the most industrialised countries in the East African region, yet industry represents only 10 percent of its Gross Domestic Product (GDP). The largest sector of the economy is the agricultural sector which employs 80 percent of the working population, accounts for 50 percent of all exports and 25 percent of the GDP. In light of the fact that the Kenyan economy is highly dependent on agriculture, periodic drought has a significant impact on the economy and has threatened GDP growth. Traditionally tourism, tea and coffee have been the largest foreign exchange earners, but horticultural products and industrial exports such as refined petroleum are also becoming important.[6]

2.2 Human Development

Inequality in Kenya is high with the distribution of income, measured by Gini coefficient, estimated at 39 percent in rural areas and 49 percent in urban areas.[7] Kenya ranks 128 out of 169 countries in the United Nations Development programme (UNDP) Human Development Index (HDI), an alternative to conventional measures of national development. The HDI looks beyond economic growth and provides a composite measure of three basic dimensions of human development namely health, education and income; it represents a push for a broader definition of well-being.[8]

According to the UNDP, over the past 30 years Kenya's HDI has remained higher than the Sub Saharan African average and has risen by 0.5 percent annually. Kenya's HDI in 1980 was 0.404 and has risen to 0.470 in 2010; this can be compared to the HDI of the region which increased from 0.293 in 1980 to 0.389 over the same period. [9] Kenya's position as 128 out of 169 makes it a developing country with low human development.

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[4] *Kenya 2009 Population and Housing Census Highlights.* Kenya National Bureau of Statistics
http://www.knbs.or.ke/Census%20Results/KNBS%20Broc hure.pdf
[5] http://www.unicef.org/kenya/overview_4616.html

[6] http://www.fco.gov.uk/en/travel-and-living-abroad/travel-advice-by-country/country-profile/sub-saharan-africa/kenya/?profile=economy
[7] Waema, Timothy, Catherine Adeya, and Margaret Nyambura Ndung'u. 2010. *Kenya ICT Sector Performance Review 2009/2010.* Cape Town, South Africa: Research ICT Africa.
http://www.researchictafrica.net/publications.php .
[8] International Human Development Indicators,
http://hdrstats.undp.org/en/countries/profiles/KEN.html
[9] International Human Development Indicators,
http://hdrstats.undp.org/en/countries/profiles/KEN.html
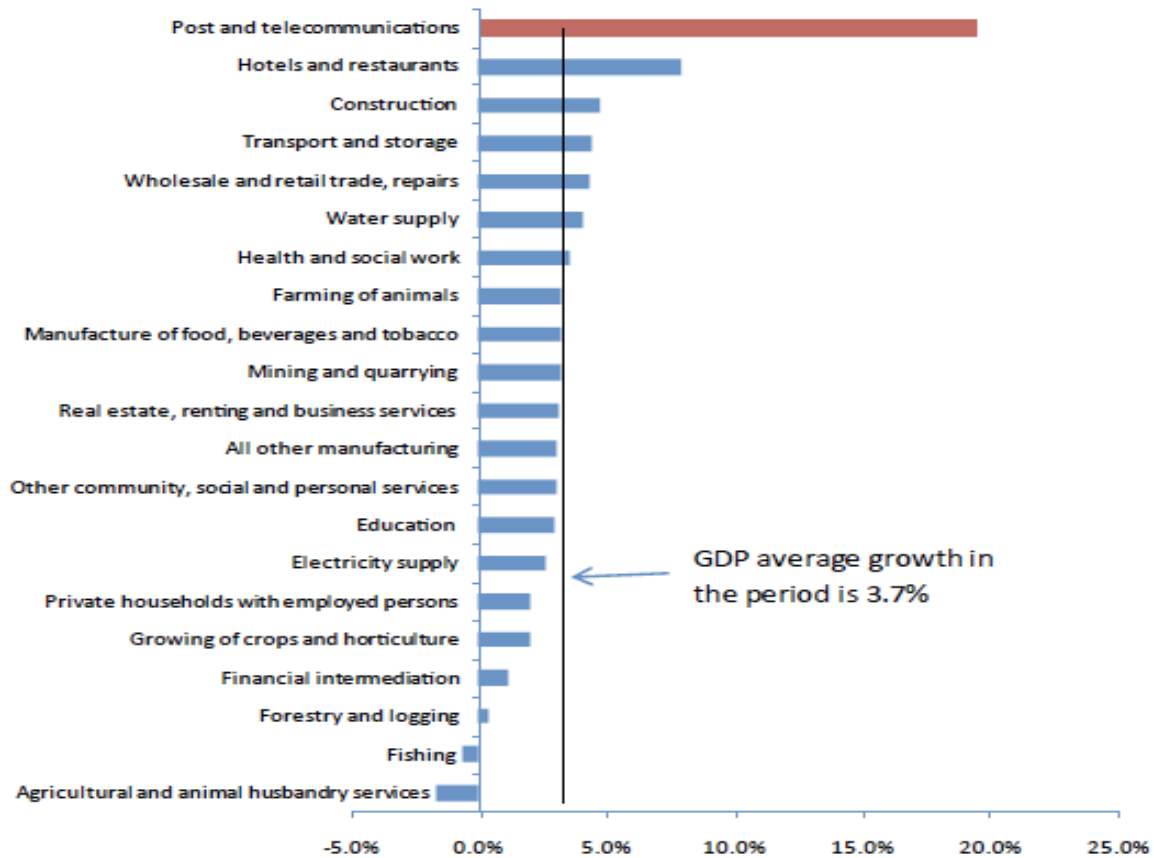
Figure 2: Annual average growth by sector, 2000-2009 (Source: Kenya National Bureau of Statistics and World Bank staff estimates)

2.3 Socio-Economic Climate

According to a report from the World Bank, over the last decade, the Kenyan economy has grown at an average of 3.7 percent.[10] In this time, the Kenyan ICT sector has grown at a rate of 20 percent per annum and has outperformed all other segments of the economy. The World Bank estimates that without ICT, economic growth would have been only 2.3 percent, and income per capita would have stagnated.

In 2010, largely due to tourism, telecommunications, transport, and construction sector growth and recovery in the agriculture sector, an estimated 4.5 percent GDP growth was achieved. A GDP growth of 5.3 percent is forecast for 2011. These improvements in the economy are supported by a large pool of

increasingly urbanized (32.2 percent[11]), highly educated (at least 61.5 percent literacy rate)[12] and bilingual professional workers who are fluent in English.[13] This positions Kenya well to use broadband to support its own internal market, as well as to participate globally.

2.4 Regional Role – Kenya as a Hub

An investor-friendly country, Kenya is generally perceived as East and Central Africa's hub for financial, communication and transportation services; and rivals South Africa as an investment

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[10] World Bank. 2010. *Kenya at the Tipping Point? Kenya Economic Update.* Nairobi, Kenya: World Bank.
http://go.worldbank.org/S743MCDPM0.

[11] Kenya 2009 *Population and Housing Census Highlights.* Kenya National Bureau of Statistics
http://www.knbs.or.ke/Census%20Results/KNBS%20Broc hure.pdf
[12] Kenya National Adult Literacy Survey, 2007 as discussed in "*The Development of Education: Kenya National Report*", the Department of Education, November 2008,
http://www.ibe.unesco.org/National_Reports/ICE_2008/ke nya_NR08.pdf
[13] English and Swahili are the official languages of Kenya; English is the language of instruction at all levels of school.

hub in Sub Saharan Africa. Political stability is key for Kenya to maintain its influential position in the region and following political instability in 2007, Kenya enacted a new Constitution in 2010 and has emerged in less than five years with a strengthened political, economic and social system. The return to political stability was enabled by the swearing in of a Grand Coalition Government in April 2008 which was established under the "National Accord and Reconciliation Agreement." The National Accord provides for a power sharing arrangement between the President's Party of National Unity (PNU) and the Prime Minister's Orange Democratic Party (ODM).

The country is well positioned as a member of the Common Market for Eastern and Southern Africa (COMESA), which has 19 member states with a combined population of 430 million (2008).[14] Kenya is also a member of the East African Community (EAC), which includes Kenya Burundi, Rwanda, Uganda and the United Republic of Tanzania. The EAC adopted a common market protocol in mid-2010 creating a single 130 million-person market with a combined GDP estimated at $72 billion (KES 5.98 trillion).[15] Kenya is the largest player in the EAC contributing 40 percent to the regional block's GDP.

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[14] COMESA Website. See: http://www.comesa.int/
[15] Ibid, Study on the Establishment of an East African Common Market: Final Report, and http://www.eac.int/advisory-opinions/cat_view/68-eac-common-market.html

One of Kenya's strengths lies in the central role that ICT in general and high-speed communications infrastructure in particular, plays in its national strategy, *Vision 2030.* A key characteristic of the Kenyan broadband space is the pervasive role of the government which is supported by the strategic, policy and regulatory framework. However, criticisms have been levelled against the heavy institutional framework that has been created to support this vision, particularly in the ICT sector. While the framework has facilitated the growth of the ICT sector in general, the impact on consumers of Internet and broadband has yet to be fully felt.

3.1 Vision 2030

The Kenyan government's recognition of the strategic role played by ICTs in the economy is an important aspect of the implementation of *Vision 2030*, the country's 'development blueprint''.[16] Vision 2030's key goal is that Kenya will be one of the top three investment destinations in Africa by 2030. This will be achieved by addressing three pillars – Economic, Social and Political (Figure 3). ICT is explicitly dealt with under the Economic Pillar, which is geared at attaining prosperity for all Kenyans through an economic development programme aimed at achieving an average GDP growth rate of 10% per annum over the next 25 years.

Importantly, one of the factors that has been identified to enable the Kenyan economy to achieve its Vision 2030 targets is the Business Process Outsourcing (BPO) industry, one of 20 flagship projects of the Vision, which includes call centres, back office operations and software development. Even where it is not explicitly stated, ICTs cut across all three pillars in light of e-governance applications and the vision *towards a knowledge based economy,* as is reflected in the Ministry of Information and Communications' (MOIC) Strategic Plan (2008 – 2012).[17] It is

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[16] Vision 2030,
http://www.communication.go.ke/documents/Vision_2030_Popular_Version.pdf

[17]Ministry of Information and Communications *Towards a Knowledge Based Economy: Strategic Plan 2008 – 2012.*

3. Strategy, Policy and Regulation

further reflected in the approach taken by the Permanent Secretary of the MOIC to implement the Strategic Plan, which is to ensure that the ICT sector is not considered in isolation and that it has an *impact* on national development.

The MOIC Strategic Plan takes the objectives articulated in Vision 2030, interprets them from an ICT sector perspective and puts timeframes and resources to them. It defines projects intended to increase ICT sector developments; discusses strategic initiatives and proposes projects such as the National Optical Fibre Backbone Infrastructure (NOFBI), the East African Marine System (TEAMS), and the Kenya Transparency Communication Infrastructure Programme (KTCIP) which includes Digital Villages and Bandwidth subsidies as sub-projects. The establishment of ICT/Business Process Outsourcing (BPO) Parks and Multimedia Technology Parks (MTP) forms part of the MOIC Strategy and these projects are specifically linked to promoting broadband infrastructure rollout and encouraging capacity uptake. The Strategy recognises that the ICT sector requires input from other sectors of the economy and suggests that despite the aggressive targets set at a national level, budgetary and financial constraints, non-ICT infrastructure such as electricity and roads, are key challenges to meeting ICT sector objectives.

3.2 Policy and Regulatory Framework

The government has liberalized the ICT sector to achieve universal service and access objectives, firstly through competition—all ICT markets are theoretically open to competition— and reliance on the market to deliver services; and where necessary through government intervention. Governments participation in the sector includes retaining equity interest in a number of ventures at various levels of the ICT value chain – as a shareholder in Safaricom (mobile, broadband), Telkom Kenya (fixed, mobile, broadband) and recently TEAMS (undersea cable) and NOFBI (terrestrial backbone network). Recent indications are the government will participate in the rollout

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http://www.information.go.ke/index.php?option=com_content&task=view&id=239&Itemid=370
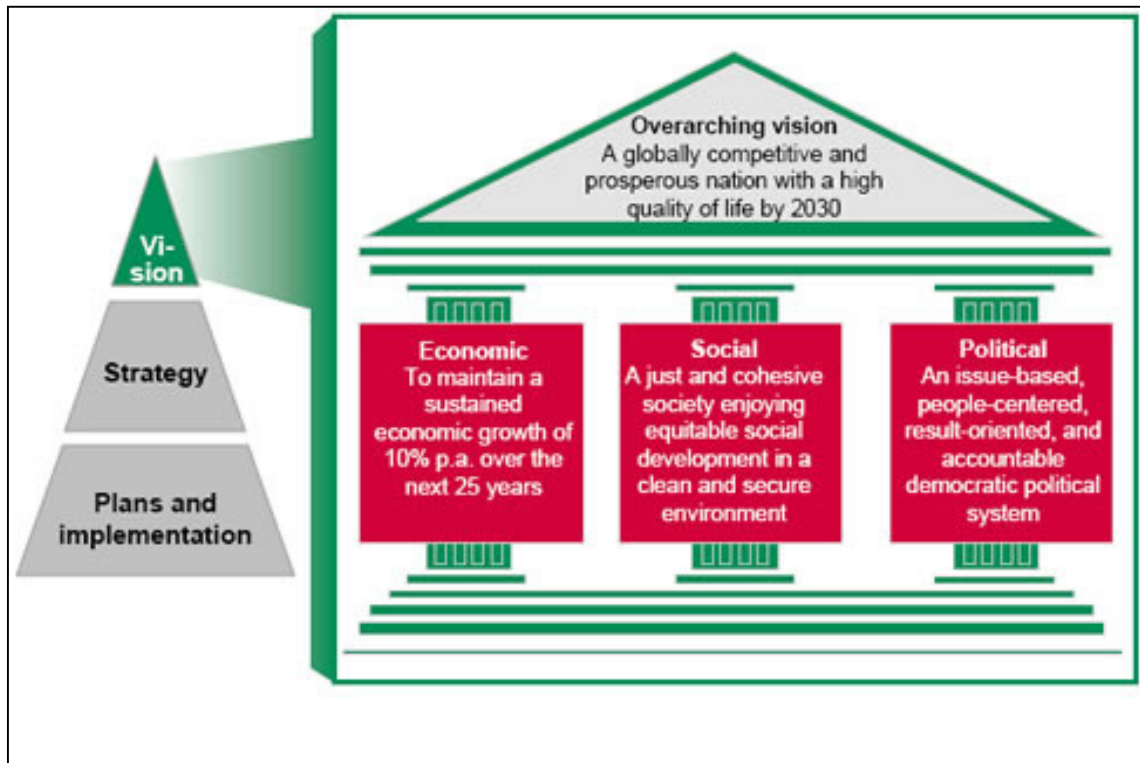
Figure 3: Kenya's Vision 2030 (Source: Kenya Investment Authority)

of a national LTE last mile network.[18] Balancing public sector participation in the ICT sector with market reform can be a challenge; the manner in which Kenya has addressed this is discussed in Section 6.1.

3.2.1 Modern ICT Policy Framework

The national policy framework that supports broadband network deployment and access includes:

- **2006 National ICT Policy[19]** which deals with convergence, ICT in health and education, e-commerce, e-governance, privacy and cybercrimes, and recognises the evolution of the ICT market;

- **2006 ICT Strategy: Collaboration and Outsourcing for Economic Growth[20]** which seeks to simultaneously target the development of the ICT sector and to use ICTs for creating employment, poverty reduction, enabling economic recovery and achieving national developmental goals. It is aligned with Vision 2030 and has a key focus on the BPO sector.

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[18] Interview with Permanent Secretary on 16 January 2011, and Osiakwan, E. "Kenya to launch an open access LTE network to help drive down prices and extend coverage." http://www.afrispa.org/index.php?option=com_content&task=view&id=96&Itemid=2 viewed on 28 February 2011
[19] See Communications Commission of Kenya website, http://www.cck.go.ke/regulations/downloads/national_ict_policy.pdf

[20] http://www.ictvillage.com/Downloads/2006_Kenya_ICT_Strategy.pdf

Box 1: Kenyan Licensing Regime

Like its regional counterparts in Rwanda, Uganda and Tanzania the CCK has adopted a technology neutral unified licensing framework (ULF). Network operators and service providers are licensed under a market structure consisting of the following broad market segments:-

Network Facilities Provider (NFP) - Licensees under this category can own and operate any form of communications infrastructure (based on satellite, terrestrial, mobile or fixed). The NFP category is further divided into National NFP and International NFP. Investors who wish to land a submarine cable in Kenya require a Submarine Cable Land license while those interested in building system for the provision of international voice/data services are required to get a license for international Systems and Services. An International NFP (Incl. submarine cables and international gateway facilities) costs KHS 15 million as an initial fee, and the higher of 0.5% of Annual Gross Turnover or KES 5 million (US$ 60,170) per annum. The spectrum fee payable is based on bandwidth and coverage.

National NFP are described based on the use of spectrum. National NFPs are further identified as Tier 1 (exclusive use of spectrum countrywide), Tier 2 (exclusive use of spectrum regionally) and Tier 3 (exclusive utilization of spectrum by Administrative District). The initial license fee for Tier 1 and Tier 2 NFP licenses is KES 15 million; the fee for Tier 3 NFP licenses is KES 200,000. (US$ 2400) In addition a spectrum fee is payable based on bandwidth and coverage.

Applications Service Provider (ASP) - Licensees under this category are permitted to provide services to end users using the network services of a facilities provider (NFP). The initial license fee is KES 100,000, and an annual fee of the higher of KES 100,000 (US$1200) and 0.5 percent of Annual Gross Turnover is payable.

Content Services Provider (CSP) - Licensees under this category can provide content services material, information services and data processing services. The initial license fee is KES 100,000 (US$1200) and an annual fee of the higher of KES 100,000(US$1200) and 0.5 percent of Annual Gross Turnover is payable.

Source: CCK Website, http://www.cck.go.ke/licensing/telecoms/telecom_marke_structure.pdf

- **1998 Kenya Communications Act, as amended in 2009** to become the **Kenya Information and Communications Act.**[21] The 1998 Act separated the roles of policy formulation, service provision and regulation and as such restructured Telkom Kenya, splitting out the regulator (Communications Commission of Kenya), and creating a policy advisory body (National Communications Secretariat) and an Appeals Tribunal. It dealt with the progression from a market monopoly to a liberalised ICT sector. The 2009 Amendment Act was aimed at aligning the 1998 legislative framework with the 2006 ICT Policy. It did this by enabling a technology neutral and converged approach to the market structure, licensing and regulation in general. It also delved for the first time in Kenya into an area that still requires more definition - electronic commerce and transactions. The 2009 Amendment Act provides a high level framework for, amongst others, the recognition of electronic signatures and records and introduces content regulation.

A gap in the Kenyan legal framework is the absence of a specific law that address electronic transactions. While a framework is provided by the Communications Act which recognizes advanced e-mail, electronic signatures and electronic records as equal to written signatures and physical records respectively, consumers, particularly first time users of the Internet, require comfort to provide documents electronically and to spend money online. A legal framework that is sufficiently detailed, practical and implementable and instils trust would play a key role in encouraging the use of the Internet by consumers and businesses for daily transactions. The CCK's regulations which seek to expand on the provisions of the Communications Act, only

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[21] See Communications Commission of Kenya website, http://www.cck.go.ke/regulations/downloads/Kenya-Information-Communications-Act-Final.pdf

provide a broad framework and are still fairly high level. For example while they define the institutional framework they have not yet licensed Certification Service Providers to authenticate electronic signatures.[22]

The legal and policy framework is complemented by recent 2010 regulations issued by CCK, all of which, while they do not explicitly deal with broadband, create an enabling environment and affect the impact of the regulatory environment on the promotion of broadband, namely:

- **Universal Service and Access Regulations[23]** which address both access to public voice and to Internet. Many African countries are still undergoing processes to amend the definitions of universal service and access to include Internet and advanced services. The regulations provide for the provision of subsidies, loans and grants for both basic and *advanced* ICTs as well as building human capacity and encouraging innovation – key areas if Kenya is to encourage Internet uptake. Operators must pay a levy not exceeding one percent of gross revenues to the newly established USF for projects and programmes which may include Internet and broadband projects for both public and private access. A report on Universal Service indicates a target for 2005 – 2010 of 1 internet point of presence per district[24]; but no formal tracking or evaluation of this is available.

- **Frequency Spectrum Regulations[25]** which deal with spectrum licensing and pricing, and provide for spectrum sharing where CCK mandates it (not yet mandated). Importantly they provide that pricing, including that for broadband

spectrum, will be arrived at "based on the economic value of the spectrum in a manner that promotes its efficient use and sector growth."[26] To date although the law provides for auctions as one of the methods of licensing, beauty contests have been used for initial licenses, and a 'first come first served' approach for requests for additional spectrum, such as 3G spectrum. A dispute is underway regarding the pricing of 3G spectrum – Airtel and Orange were granted 3G licenses in 2010 for 60 percent less than the fee paid by Safaricom in 2007. The fee reduction was motivated by a desire by the government and regulator to increase broadband penetration.

At present in Kenya 3 licensees have 1900 MHz spectrum, 3 licensees have been assigned 3G spectrum in the 2100 MHz band and 18 licensees have been assigned broadband spectrum in the 3.3 GHz – 3.5 GHz bands[27];

- **Licensing and Quality of Service Regulations[28]** provide a framework for granting, registering, transferring, and otherwise managing licenses, as well as quality of service monitoring and reporting. The CCK measures the quality of each of the mobile networks, however no specific QoS requirements have been stipulated and thus measured for broadband to assess speeds, network quality or other parameters;

- **Facilities Leasing and Interconnection Regulations[29]** and **Fair Competition**

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[22] The process is now underway, see: *CCK Plans Tough Rules to Check Electronic Signatures,* Okuttah, M. November 8, 2010. http://allafrica.com/stories/201011090245.html

[23] See CCK Website, http://www.cck.go.ke/regulations/downloads/xUniversal_Access_and_Servicesx_Regulationsx_2010.pdf

[24]http://www.cck.go.ke/services/universal_access/downloads/FinalUAreport.pdf

[25] See CCK website, http://www.cck.go.ke/regulations/sector_regulations.html

[26] See CCK website, http://www.cck.go.ke/regulations/sector_regulations.html

[27]See CCK website, http://www.cck.go.ke/licensing/downloads/List_of_access_frequencies_assigned_to_operators.pdf

[28]See CCK website, http://www.cck.go.ke/regulations/downloads/xLicensing_and_Quality_of_Servicex_Regulationsx_2010.pdf

[29] See CCK Website, http://www.cck.go.ke/regulations/downloads/xInternnection_and_Provision_of_Fixed_Linksx_Access_and_Facilitiesx_Regulationsx_2010.pdf

Regulations[30] which indicate the regulators' encouragement of co-location agreements which are to be commercially negotiated, however CCK has the right to intervene in case of a dispute. The regulations also provide for the provision of Reference Interconnection and Access Offers by dominant operators to facilitate fair competition and the entry of new players. The Fair Competition Regulations provide a framework for market reviews and determinations of dominance, and confirm the CCK's mandate over ICT competition matters. They provide that licensees must give equal access and non-preferential treatment to all customers on a first come, first served basis. This applies to all network facilities, i.e. any element that forms part of an electronic communications network including ducts, cables, antennae and masts – critical elements of a terrestrial backbone network.

The regulations also define dominance, and aspect of the regulations that proved controversial and was contested by some operators in the market, and provide for the CCK to undertake market reviews as necessary, none have been conducted in the broadband markets.

CCK regulations on Dispute Resolution, Tariffs, Type Approval, Numbering and Consumer Protection also form part of the framework. The Consumer Protection Regulations are important in an Internet context due to requirements stipulated in the regulations to protect children and for licensees to provide clear and accurate information on the pricing and capability of their services to consumers – an area, like the monitoring of QoS, that becomes increasingly important in a broadband context with regard to speeds, prices and capacity.

3.2.2 Policy Framework Beyond Networks

Government's role in promoting broadband network rollout is a fundamental pillar in Kenya's broadband achievements to date. The bandwidth now available is impressive, however, the challenge remains how to make it meaningful from a user perspective. Some aspects of the regulatory framework will need to be amended to address this. This includes consideration of the legal and regulatory framework dealing with content and applications. In addition to the above, there is legislation that specifically affects the online sector including the following:

- **Constitution (2010)**[31] **–** Under the new Constitution, every person has the right to privacy, which includes the right not to be searched (i.e. their person, home or property); not to have their possessions seized; information relating to their family or private affairs unnecessarily required or revealed; or the privacy of their communications infringed. Citizens furthermore have the right of access to information held by the State; the provision to the public of timely and accurate information is promoted for the public sector.

- **Public Archives and Documentation Service Act** which was passed in 1966 and revised in 1990, and which created the Kenya National Archives and Documentation Service (KNADS) provides a framework for the preservation of public records and archives. The Government Printer and government ministries, agencies and departments must provide KNADS copies of any published or generally circulated document or report produced by their respective offices. As noted by Global Information Society Watch, the Act does not, however, expressly recognize the rights of citizens to access these public archives, nor does it require the information to be made available in

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[30]See CCK Website,
http://www.cck.go.ke/regulations/downloads/xFair_Competition_and_Equality_of_Treatementx_Regulationsx_2010.pdf

[31]
http://www.kenyalaw.org/klr/fileadmin/pdfdownloads/Constitution_of_Kenya__2010.pdf

electronic format, which are important aspects of e-law.

- **Copyright Act (2001)[32],** which provides intellectual property and copyright protection and restricts access to information. It is focussed on the traditional broadcasting sector and more recent concepts such as "open source", and "online content" are not sufficiently covered in the Act which is problematic from a broadband content and applications perspective. Strengthening such provisions will have a practical impact and facilitate the sharing of resources in schools, hospitals and clinics, amongst others. In the education sector as an example, digitised textbooks and educational software, can be shared electronically by all schools on an

education network thus reducing costs and increasing access.

- **Freedom of Information Bill**, which deals with the general right of access to information, which is defined as "any documentary material regardless of its physical form," that is held by public authorities and private bodies performing a public function. The Bill addresses the proactive dissemination of information through the publishing and updating of information by public authorities, and the right for persons to correct their personal data held in government records, as well as introducing the principle of maximum disclosure.[33] It also provides for the appointment of an Information Commissioner to ensure compliance with the legislation.

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[32] http://www.kenyalaw.org/Downloads/Acts/Copyright%20Act.pdf

[33] http://www.tikenya.org/documents/The_Freedom_of_Information_Bill.pdf (2007)

4.1 Defining Roles

Kenya's ICT sector and market reform process is supported by the sector ministry, the national ICT regulatory authority and the relevant Parliamentary Portfolio Committee on Communications. From an implementation perspective, Kenya's market oriented approach sees licensed operators responsible for implementing the aspirations set out in national policy. This is done by private operators and also through a number of innovative joint ventures and Public Private partnership models. Further to the institutions that have become the norm in liberalised markets (i.e. policy maker, regulator, operators), Kenya has a fairly unique framework which demonstrates its commitment to increasing universal service and access of ICTs, and also the strategic importance of ICTs and specifically broadband and Internet access in the economy.

Kenya's institutional framework as it relates to promoting broadband uptake and impact, is closely tied to a relatively new organisation called the Kenya Information and Communication Technology Board (KICTB). It plays an important role in terms of the promotion of the BPO industry, and also with respect to the facilitation and subsidization of projects that drive demand, such as the creation of "Pasha Digital Villages" and the rollout of the "Wezesha"[34] programme to subsidize laptops for university students. In addition, the establishment of the Government Information Technology Services (GITS) in 2000, a Directorate of E-Governance (created in 2004), and a National Communications Secretariat (NCS) (created in 2006) points to the strategic import of ICT to the government and its recognition that it is important that it creates content for users to access. Each of these institutions has a critical role to play in promoting and facilitating broadband access, mainly on the demand side.

These ICT sector specific institutions are further supported by a Monopolies and Prices Commission which deals with competition issues

[34] The program provides a voucher of KES 10'000 (US$120) towards the purchase of a laptop. The subsidies for the first phase will cover the purchase of around 16'000 laptops. See: http://www.ict.go.ke/index.php/sport/wezesha/about

4. Institutional Arrangements

and levelling the playing fields across the Kenyan economy.

4.2 Line Ministries and Departments – Breaking the Silo

The promotion of broadband presents both opportunities and challenges in light of the cross cutting impact of broadband on the economy, and the role that government as a whole (and not just the Ministry responsible for ICT) must play to meet the country's ICT targets and objectives. Kenya has learned that the promotion of broadband requires a level of coordination across line Ministries that appears to be unprecedented in recent history; hence a common concern is raised about the "silo effect." Public administration, health, education, agriculture and trade and industry departments are key institutional stakeholders in the development of broadband in Kenya. Their role is to ensure the promotion of broadband for their own internal efficiency, as well as to deliver content and services to their respective constituencies. Kenya's experience demonstrates that once the cables have landed the effective use of broadband by line ministries requires that they:

- Recognize the value of broadband

- Are themselves comfortable with using technology in general, and broadband in specific

- Trust technology

- Have the capacity to evaluate broadband projects and initiatives

- Coordinate their policy intervention and projects

The above does not seem to be the case for all government departments which is leading to delays in the achievement of some of the Vision 2030 targets, particularly as they relate to digitisation of government content and e-government. Looking outside of the MOIC, in Kenya a policy exists for ICT in Education, however, no formal ICT policy seems to exist for

Figure 4: ICT Sector Institutional Framework (Source: Adapted from MOIC Strategy, 2008- 2012)
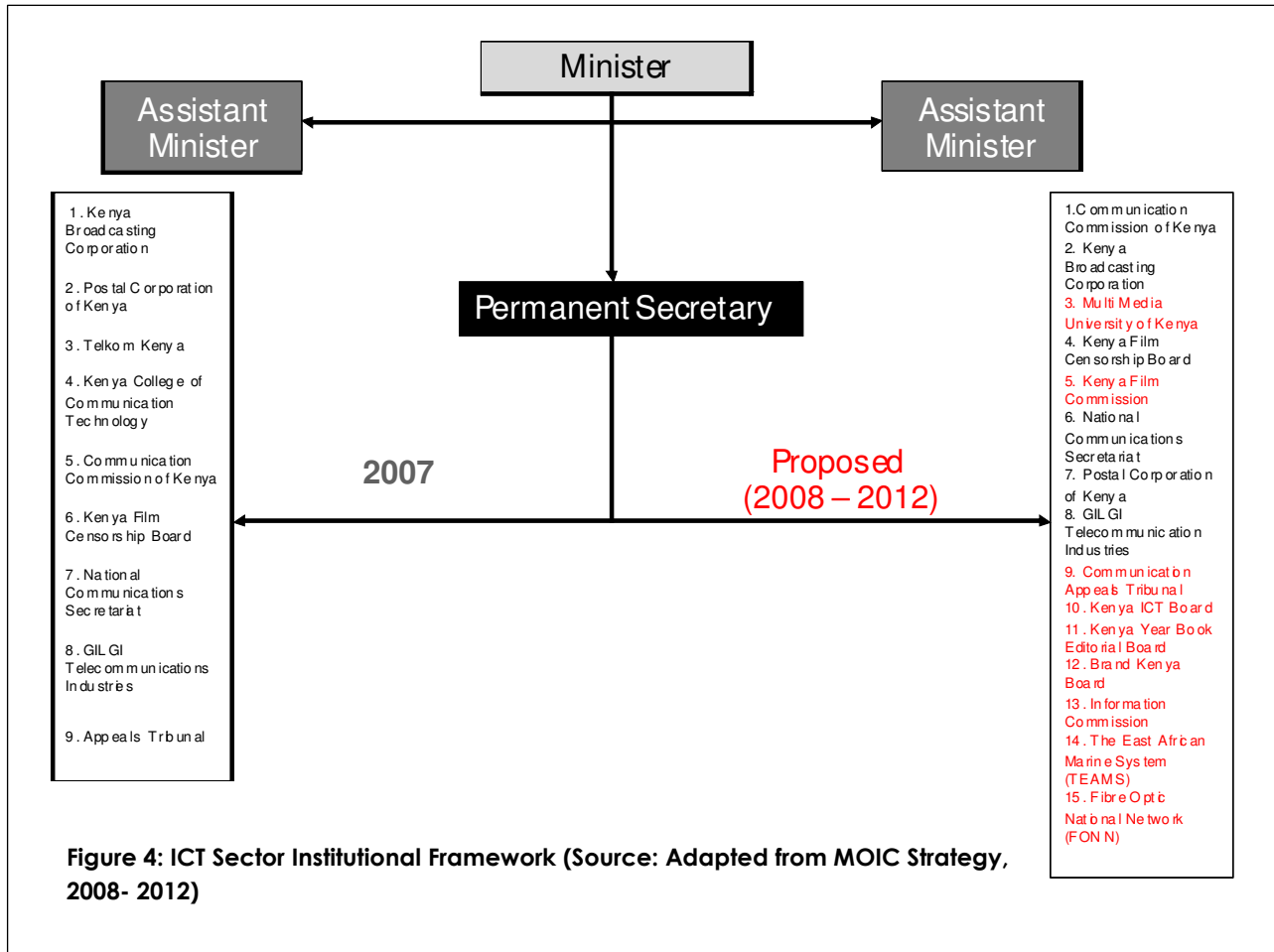
other sectors. As such, the extent to which they are coordinated with the National ICT Policy is unclear, and monitoring and evaluation of such policies is done by line ministries, with sharing of information across ministries reliant on the relationships between particular government officials, as opposed to mechanisms built into the institutional framework. This has the potential to increase costs and duplicate efforts – for example when the Department of Health promotes projects aimed at connecting rural clinics without collaborating with the Department of Education which may be addressing the rural schools divide simultaneously. Similarly, where Local Government Departments may initiate infrastructure projects, without having regard to projects underway that may be led or funded by other ministries.

4.3 Too Many Actors?

While on one hand the institutional framework can be seen as a strength in that all aspects of

policy formulation and its implementation are comprehensively addressed, on another it has been criticized for causing duplication in functions for example between the National Communications Secretariat and the better known KICTB which are both responsible for advising the government on policy issues;[35] and the KICTB and the Brand Kenya Board which both promote the 'ICT image and reputation' of the country. In addition, the role of the KICTB (funded primarily through donor funding) and the newly established Universal Service Fund (funded through levies on operators) may overlap with respect to the promotion and subsidization of projects which seek to increase accessibility, availability and affordability of ICTs and in particular broadband. Projects such as the telecentres and community access points projects that are promoted by the

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[35] Waema, Timothy, Catherine Adeya, and Margaret Nyambura Ndung'u. 2010. *Kenya ICT Sector Performance Review 2009/2010*. Cape Town, South Africa: Research ICT Africa. http://www.researchictafrica.net/publications.php .

USF and provide communities with a server, computers, printers, and free Internet connectivity for at least one year, may overlap with the KICTB's Digital Villages programme discussed later in this report. The presence of a strong MOIC Permanent Secretary who has a good understanding of the sector and how best to use the institutions effectively is central to minimising conflict and reducing overlap.

4.4 The People Factor

Many countries have excellent 'paper policies' but are thin on implementation. A significant contributor to the success or otherwise of a broadband strategy is the commitment of the people implementing it. In Kenya, a strong Permanent Secretary and dedicated and charismatic leaders of key ICT sector institutions are an important part of the country's success. In addition, the entrepreneurial nature of Kenyans has played a role. The conceptualisation and implementation of TEAMS and NOFBI required strong leadership to push national objectives, particularly in the face of regional challenges and the need to negotiate implementation with regional political and private sector players. The Kenyan case, like that in countries like Rwanda, South Korea and Malaysia, shows the importance of a "champion" to meet targets.

Like most countries in Sub-Saharan Africa, Kenya has experienced a telecommunications revolution, and particularly a mobile revolution. It has seen an increase in mobile subscriber numbers, and has innovated in ways that have impacted the region and the world. As expected, the ICT sector is an engine for economic growth.

5.1 The Mobile Miracle...

One of Kenya's greatest successes has been the unprecedented uptake and usage of mobile services. Kenya was a slow starter with only 114,000 subscribers seven years after mobile was first introduced, well below the subscription rates of the country's Sub Saharan peers. Following market reform and liberalization, there were 22 million subscribers in September 2010 for a penetration rate of 60 subscriptions per 100 people (Figure 5).

The mobile market comprises four licensees, including a dominant player in the market in the form of Safaricom (76 percent market share), a publicly listed company with shares also owned by the government and strategic investor Vodafone of the United Kingdom. The remainder of the market is divided between private operators Airtel

the mobile operators have a mobile money service. Over 80% of Safaricom's subscribers or 13.5 million people have registered for the M-Pesa service.[37] Mobile money is not the only non-voice application people are using on their mobiles with other activities including sending SMS, accessing the Internet and watching TV (Figure 6).[38]

Despite mobile success, there is still room for progress. Population coverage of 2G networks is still far from universal (86% in 2010) and 3G coverage is limited to urban areas. The remaining challenge remains access for residents of rural and remote areas without affordable network coverage.

5.2 ...Meets the Broadband Revolution?

The mobile miracle has become a typical success story of most developing countries, with the advent of pre-paid coupled with mobile technology driving the uptake of mobile voice services. What is unique about Kenya is that over the last two years, its broadband market has undergone a revolution. This was spurred by key developments including the landing of three undersea fibre optic cables (see Section 6.2). This

Figure 5: Regional Rates...Kenya takes the lead, mobile subscriptions per 100 people (Source: CCK and ITU)
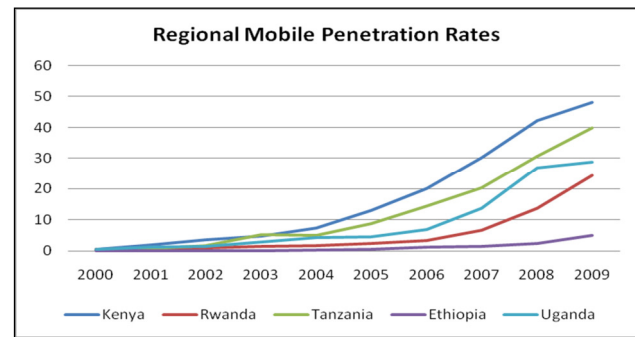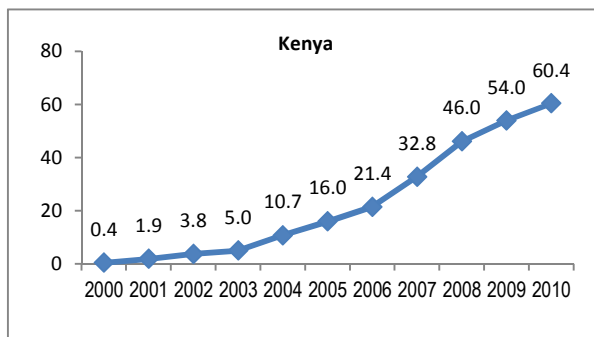
(14%), Essar (7%) and the mobile arm of the incumbent, Orange (4%).

Kenya's mobile sector is characterized by innovation, particularly mobile money. Safaricom's M-Pesa[36] led the way and today all of

[36] For more on M-Pesa see: Mas, Ignacio, and Dan Radcliff. 2010. "Mobile Payments Go Viral: M-PESA in Kenya." In *Yes Africa Can: Success Stories from a Dynamic Continent.*

Washington D.C.: World Bank. http://www.microfinancegateway.org/p/site/m/template.rc/1.9.43376/.
[37] Safaricom. "Half-Year Results Presentation." 10 November 2010. http://www.safaricom.co.ke/index.php?id=323
[38] Bowen, Hannah. 2010. Information at the Grassroots: Analyzing the Media Use and Communication Habits of Kenyans to Support Effective Development. http://www.audiencescapes.org/africa-research-survey-quantitative-analysis-ghana-kenya.

favourably positions the country from an infrastructural perspective particularly international Internet capacity. The undersea cables (that at least four licensees have built, or that are in the process of being built), are complemented by Kenya's regional and national fibre backbone projects (see Section 6) to drive connectivity in rural areas.

Despite the landing of the cables, there is significant scope for retail broadband to take off. Internet and broadband services are provided by mobile operators and by Internet Service Providers (ISPs) including the more popular Kenya Data Network (KDN), Jamii Telkom, UUNET, AccessKenya, Wananchi Online,

has been limited and in fact the number of fixed lines has been declining. The number of copper-based fixed lines stood at just 228,391 in September 2010 of which 12,216 were connected to a DSL subscription meaning that only a little over 5% of fixed lines were connected to broadband. Fixed wireless lines are based on CDMA 2000 1x technology including broadband EV-DO in the case of Telekom Kenya.

Consistent with the trends displayed as part of the 2G 'mobile miracle,' mobile broadband is far more prevalent than fixed with some 780,000 subscribers by the end of 2010.[39] Until recently Safaricom was the only mobile operator offering 3G services. It was granted a license in 2007 and

Figure 6: Uses of mobile phones in Kenya, 2009

Activity	% of Mobile Phone Users Who Use a Phone for That Purpose at Least Weekly
Send/Receive SMS from Another Mobile User	63%
Conduct Financial Transactions	23%
Listen to the Radio	22%
Receive SMS Information from Mobile Operator or Other Sources	15%
Access the Internet	12%
Watch Live Television	4%

AudienceScapes National Survey of Kenya, July 2009. N=1809 adult respondents (15+) who used a mobile phone within the last year.

Communications Solutions and AfricaOnline. While there is competition in the Internet and broadband markets, these are the least accessible ICT services in Kenya, as is the case in most African countries. There were only 37,356 fixed Internet subscriptions at September 2010 using WiMAX, DSL and fibre optic technologies. One challenge is the lack of fixed telephone lines and coaxial cable television networks to provide the basis for developing fixed broadband access. The total number of fixed lines (both copper and fixed wireless) stood at 369,971 in September 2010. Telkom Kenya, of which France Telecom is the strategic investor, is the primary provider of fixed lines. Though some competition has been injected through the licensing of Tier 2 (local loop, and regional) Network Facilities Providers the impact

launched service in 2008. Its HSDPA network uses the 2100 MHz frequency and provides download speeds up to 7.2 Mbps comparing favourably with fixed broadband solutions. Airtel and Orange were granted 3G licenses in 2010.

It is likely that broadband usage and uptake in a Kenyan context, like in many developing countries with high mobile penetration, will be primarily wireless. Overall Internet access (narrowband and broadband) from mobile phones already far outstrips fixed Internet subscriptions, and this is

[39] GSMA. "African Region Mobile Broadband Landscape." November 2010.
http://www.gsmamobilebroadband.com/resources/global_coverage_maps/list.aspx.

unlikely to change going forward in light of fixed line penetration.

5.3 Affordability

With reference to the broadband market, while wholesale bandwidth charges have decreased, there is a perception that retail prices have not dropped as much. According to the Kenya ICT Board the price of a monthly international E1 link dropped from US$7,500 in 2007 to US$ 1,290 by

2011 keep their costs high. Instead of lowering prices, operators are increasing speed or adding other features. For example, while the price of the Telkom Kenya 256 Kbps ADSL offering has not changed since 2009, it now includes 30 minutes of free on-net talk time per month. Another contributing factor to the perception of broadband price rigidity is the rapid drop in prices on mobile networks, particularly following a recent reduction in wholesale termination rates. According to the CCK, the average price of a pre-

Figure 7: Changes in mobile tariffs (KES) (Source: Communications Commission of Kenya)
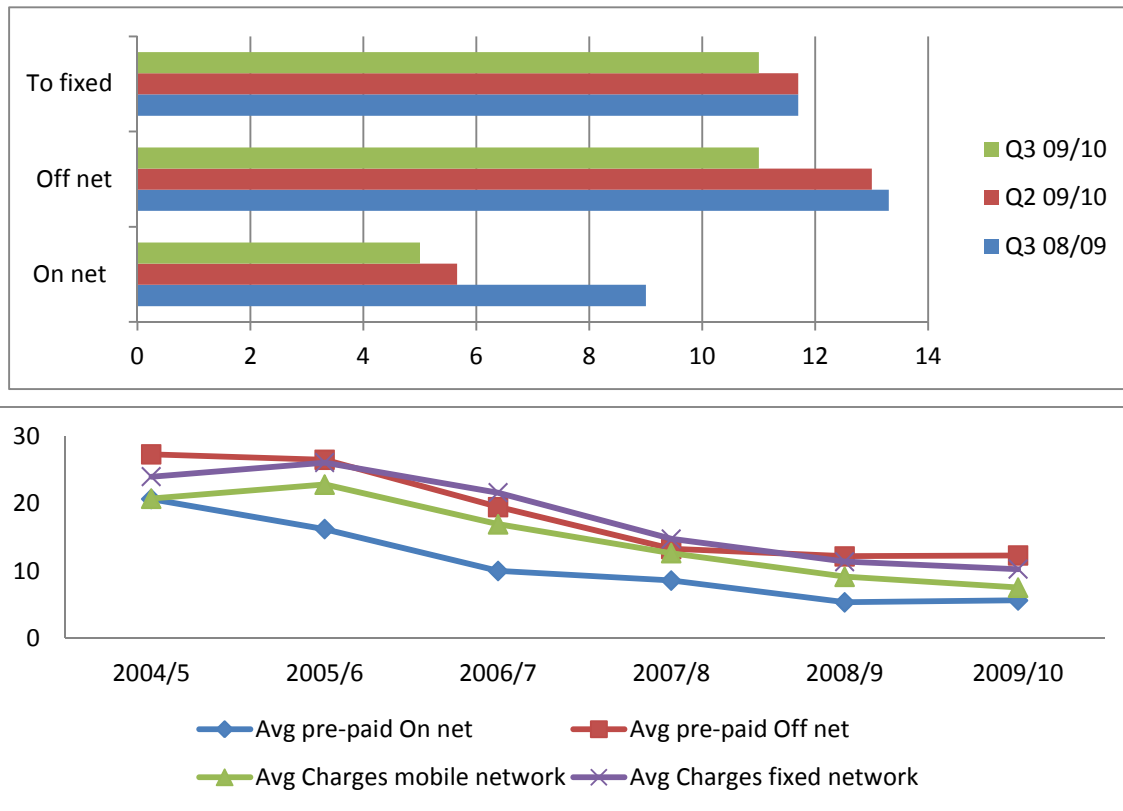
the end of 2009, a reduction of over 80%.[40] During the same time period retail prices have dropped by the same magnitude. For example Telkom Kenya's 256 Kbps DSL package dropped from KES16'008 to KES 2'999. There is some truth however to the recent rigidity in retail pricing. After initial reductions, they have mostly remained fixed at the same price with some operators arguing that their long term contracts with satellite providers which only expire post

paid on-net call dropped 33.4% from June-September 2010.

One notable aspect of Kenyan retail pricing is the variety of choices and entry-level speeds (Table 5-2). While an entry-level ADSL package begins with an advertised download speed of 256 kbps, most other technologies have a higher starting speed. The least expensive monthly price is fixed wireless using EVDO technology at around US$11 (KES 900) per month. However even that price is out of reach for many Kenyans. In order to make access more affordable most mobile operators offer prepaid data packages in small denominations. For example Orange offers 150

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[40] Kenya Information and Communications Technologies Board. 2009. *Progress Report 2007-2009*.
http://www.ict.go.ke/oldsite/images/pdfs/kictb%20progres s%20report%202008-2009.pdf

MB of use for US$2 (KES 150) per month while Safaricom offers as little as 5 MB for KES 5 (US$0.07) per day. While these may not allow intensive on-line use, they at least provide an option for the budget conscious consumer to check their e-mail.

Table 1: Broadband subscriptions in Kenya, 2010
(Source: GSMA and CCK)

Technology	Subscribers	Penetration
Mobile broadband	779,886	2.1
Fixed broadband	84,726	0.2
- Terrestrial wireless	15.907	-
- DSL	12,216	-
- Fiber optic	8.369	-
- Others	864	-
TOTAL	864,592	2.4

Note: Mobile broadband subscriptions refer to data published in November 2010. Fixed broadband refer to September 2010. There is a discrepancy between the total number of broadband subscribers reported by CCK and the item breakdown. Penetration figures based on 2010 population reported by the IMF

Table 2: Monthly retail broadband prices, February 2011

Operator	Technology	Download speed (Mbps)	Monthly price (KES)	Monthly price (US$)	Price per Mbps (US$)	Comment
Orange	EVDO	3.1	850	$11.16	$4	Data card
Telkom Kenya	ADSL	0.256	2,999	$39.36	$154	Includes 30 minutes per month of free voice on Orange networks
Safaricom	HSDPA	7.2	1,428	$18.74	$3	Price adjusted to reflect 1GB per month usage
Zuku	Cable modem	1	999	$13.11	$13	Limited availability; hybrid fiber/cable
Access	WiMAX	0.32	4,640	$60.90	$190	Guaranteed speed; speed shown averaged over month since different speeds apply at different times of day

Source: Adapted from information on operator websites.

Note: Including taxes. All plans are entry level with download speed of at least 256 kbps. Converted to US$ using 2010 annual average exchange rate. All packages for unlimited access unless noted.

The Kenyan government's role in the ICT sector has been all but "hands off." It is an example of a country where focussed and strategic interventions in the market by government have brought about positive benefits for the industry as a whole. However, balancing playing a strong and central leadership role in the ICT sector, with promoting the principles of a competitive market, can be difficult as seen in the discussions on PPP projects such as TEAMS and NOFBI and the BPO and Multimedia Technology Parks. While PPP modelled interventions have received a significant amount of attention, the supply side and demand side interventions made in Kenya have been carried out using a combination of private, public and PPP financing structures that are discussed in the following section.
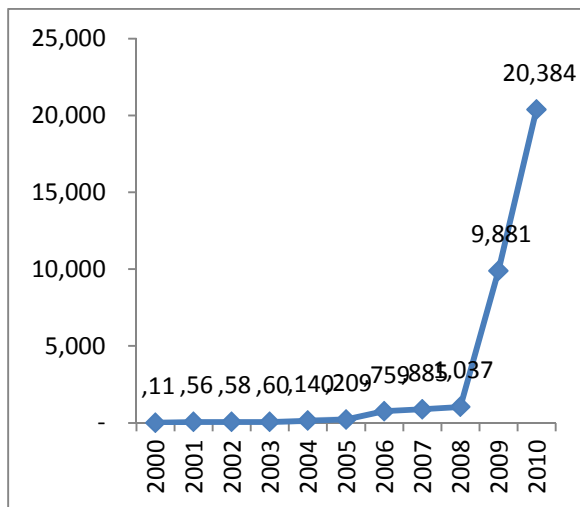
Figure 8: Kenya's international Internet bandwidth (Mbps) (Source: CCK)

6.1 Supply Side: Kenyan Approach to Building Network Capacity

Kenya's approach to addressing the network capacity challenge has been bullish. As discussed earlier in this document, the government's' attitude to broadband network deployment has been to "build it, and they will come." This is dramatically reflected in international Internet bandwidth capacity. It has taken advantage of its strategic location along the East Coast of Africa and used it to strengthen its infrastructure

6. Strategies and Approaches to Support Kenya's Long-Term Vision

position. From no international fiber optic connectivity at the beginning of 2009, Kenya had three high-speed undersea cables landing in Mombasa by the end of 2010 (Figure 9 and Table 3). In addition the LION cable and a terrestrial National Optical Fiber Backbone Infrastructure are being laid and set to launch commercially in 2011.

The addition of new fiber optic capacity has dramatically increased the amount of international Internet bandwidth available to Kenya (Figure 8). By mid-2010 Kenya had 20 Gbps of international bandwidth, an increase of 20 times since just before the cables landed and astounding 2,000 times since the beginning of the decade. It can draw on an available capacity of 200 Gbps if needed. Satellite accounts for just one percent compared to 100 percent at the beginning of 2009. This current bandwidth glut firmly places Kenya in a position to participate in the global information economy and is the most dramatic illustration of the country's proactive broadband push.
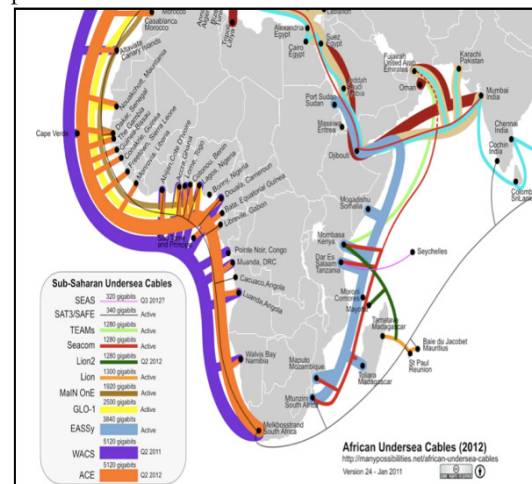
Figure 9: African fiber optic submarine cables (Source: http://manypossibilities.net/african-undersea-cables/)

6.1.1 Wholesale: How Kenya Did It

Private Public Partnerships: The benefits of TEAMwork
The Kenyan government has been keen to gain access to undersea fiber optic cables for years

19

Table 3: The cables have landed: Fiber optic cables in Kenya (Source: *Summit Strategies Ltd, supplemented by Pygma Consulting research*)

Cable	Capacity	Launch Date	Configuration	Business model	Participating parties – promoters
Eastern Africa Submarine Cable System (EASSy)	3.84 Tbps	July 2010	Covers almost 10,000km linking 8 countries from Sudan to South Africa via Djibouti, Somalia, Kenya, Tanzania, Madagascar and Mozambique.	Owned and operated by a consortium of 16 African (92%) and 6 international (8%) operators and service providers.	22 telecom operators from 20 countries
The East African Marine System (TEAMS)	1.28 Tbps	Sept 2009	Links Fujairah, UAE to Mombasa.	TEAMS Limited holds 85 %, Etisalat (UAE Incumbent) holds 15%. TEAMS Limited is a consortium consisting of the Government of Kenya (20%) and private investors (80%).	Kenya Government with Etisalat of the United Arab Emirates. regional operators and Private investors from Kenya and Uganda.
SEACOM	1.28 Tbps	July 2009	13,000 km undersea fibre optic network connecting South Africa, Madagascar, Mozambique, Tanzania, Kenya, India and Europe	SEACOM is a Mauritian company, owned by non-telecoms operator private investors.	Aga Khan Fund for Economic Development (26.56%) Venfin (25%) Shanduka (12.5%) Convergence Partners (12.5%) Herakles Telecom (23.44%)

construction of the cable from Fujairah to Mombasa.

given their suitability for massively increasing international bandwidth compared to satellite. It realized that the only solution for building a viable BPO sector was being connected to international fiber optic systems. The government became increasingly frustrated with the slow pace of the then New African Partnership for Development (NEPAD) endorsed EASSy cable project. It commissioned the TEAMS project to hasten provision of bandwidth and in the longer term provide variety when other submarine cables land to ensure competition and redundancy. The end result was Kenya's decision to promote a national project, with benefits for the region, as opposed to waiting for the regional (NEPAD) approach to bear fruit. As such, the Government of Kenya established TEAMS in terms of the Companies Act when the Government and ETISALAT (the incumbent telecom operator in the United Arab Emirates) entered into an MoU for the

The cable project was done under a PPP model and managed through a special purpose vehicle namely TEAMS. The decision of the government to take the lead and to invest in a broadband infrastructure project in a liberalized ICT sector requires some analysis. The liberalization of the ICT sector in Kenya is premised on the belief that encouraging competition and private sector participation in the delivery of ICTs is key. The decision to invest in TEAMS was taken by the government against the backdrop of a situation that had prevailed for over a decade of only one means of getting international bandwidth – satellite – which was costly and the absence of any prior investment in the delivery of undersea cable capacity to Kenya.
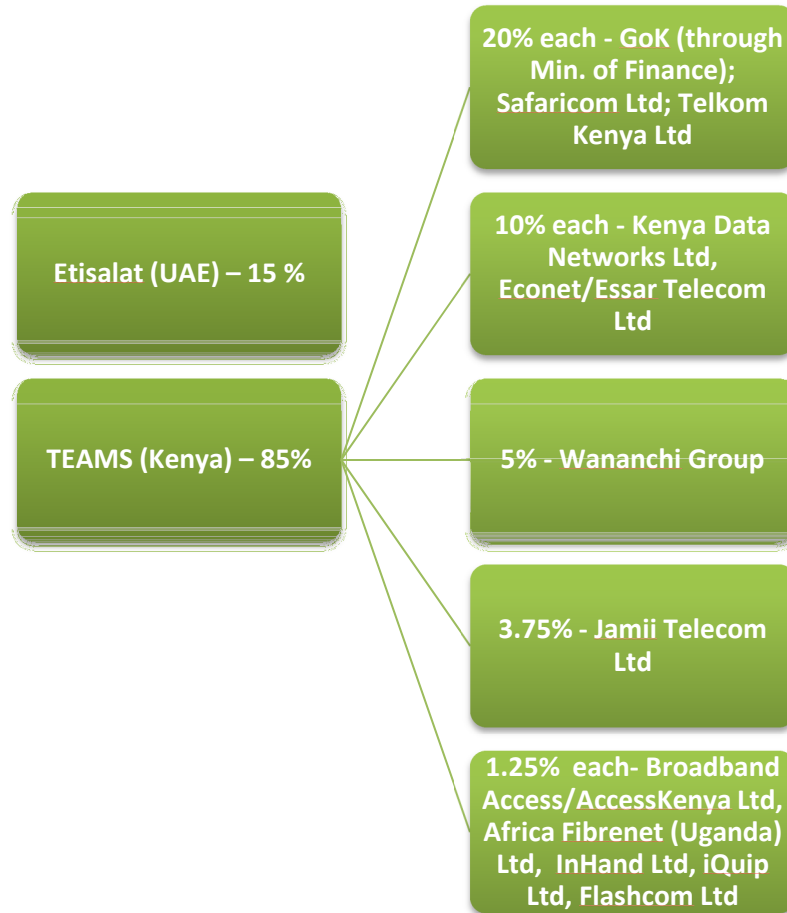
Figure 10: TEAMS Original Ownership Structure
(RIA Kenya ICT Sector Performance Review 2009/10)

The approach to structuring TEAMS is one that can be replicated for any major ICT infrastructure project. Its ownership is structured in terms of a two-tiered PPP approach.

- In the first tier, the project was initially funded by the Government of Kenya and ETISALAT according to their percentage ownership (85/15). ETISALAT then signed a construction and maintenance agreement to design and build the cable.

- In tier two, a privatization process was undertaken and the Government of Kenya sold part of its 85 percent stake in the project to local and regional investors, retaining only 20 per cent. The PPP consortium was called TEAMS Limited.

An investor's ownership of shareholding in TEAMS Limited is directly proportionate to the equivalent ownership of TEAMS' share of capacity on the cable system. All TEAMS consortium members are licensed and can sell capacity – since they all compete in the market, this will ensure price competition at both retail and wholesale level. Importantly,

- All licensees were given an opportunity to participate in the cable project, thus reducing costs. Amongst the 11 participants, there is representation from all of the license categories;

- Government's shareholding is held through the Ministry of Finance and not the MOIC which would present problems since it is the policy maker for the sector;

- Concerns of potential collusion in light of so many players cooperating are reduced

in light of Government's participation and 20 percent shareholding;

- TEAMS was not given exclusive rights and its implementation was not done at the exclusion of other fibre projects, hence the landing of EASSy and SEACOM within 12 months of each other.

- TEAMS capacity or access is provided to all market players on a competitive basis and in a transparent and non-discriminatory manner.

The Government's involvement in the cable, and its ownership of capacity equivalent to the value of 20 percent of its shareholding gives it a lever.

future. A simple ownership structure and good financial backing have been cited as key reasons why the TEAMS submarine cable succeeded.

Since the launch of TEAMS, two other undersea fiber optic cables have landed in Kenya, both using different ownership models. SEACOM, launched in July 2010, is a private sector consortium whose partners are specifically not operators to reduce conflicts between ownership and use. The EASSy cable, launched in July 2010, is owned by African operators. The importance of these two additional cables is that it demonstrates that the Kenyan government's involvement in TEAMS did not discourage investment by private players nor did it distort competition. In fact, it is arguable that Kenya's decision to promote TEAMS hastened the deployment of the other

Table 4: Internet subscriptions by operator, September 2010 (Source: CCK) Note Subscriptions refer to both narrowband and broadband. Celtel Kenya now trades as Airtel.

S/No.	Name of Operator	Subscriptions	Market share (%)
1.	Safaricom Ltd	2,977,584	92.18
2.	Celtel Kenya Ltd	149,053	4.61
3.	Telkom Orange	66,030	2.40
	Telkom Fixed	11,638	
4.	Communication Solutions(Access Kenya) Ltd	7,512	0.23
5.	Wananchi Telkom Ltd	7,500	0.23
6.	Kenya Data Networks	5,451	0.17
7.	Africa Online	1,608	0.05
8.	Flexible Bandwidth	1,198	0.04
9.	Swift Global	1,133	0.04
10.	Callkey Networks Ltd	800	0.02
11.	Others	516	0.02

Although this option has not been exercised, the Permanent Secretary argued that if the government was not satisfied with prices, it could sell capacity and compete with the other 11 TEAMS shareholders thus driving down market prices; and if that failed, the model enables the regulator to intervene through price regulation.[41] In addition, Government may dilute its shareholding should additional market players wish to "join the TEAM." This is critical in that it ensures that new entrants can also participate in

two cables. All three cable systems are offered on an open access basis providing competition which in turn increases quality and puts downward pressure on prices. Along with TEAMS they provide Kenya with a high degree of redundancy in case of disruptions to one of the cables.

6.1.2 Moving Inland: How Kenya is Doing It

Kenya has a number of terrestrial networks which connect to the three undersea cables that land in the country. The regulatory framework has enabled the entry of a number of players into this space and has resulted in some large ISPs rolling

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[41] Interview with Permanent Secretary, January 2011

Box 2: Electricity Company & Infrastructure Sharing

Kenya Power and Lighting Company (KPLC) was granted a Network Facility Provider licence (Tier 2, with regional spectrum) by CCK enabling it to construct, install and operate an electronic communications system which may in turn be leased to licensed operators. KPLC has indicated that it has 18 pairs of fibre for leasing and has so far leased three through infrastructure sharing agreements signed with licensed operators Safaricom (20 years), Wananchi Group (5 years) and Jamii Telecoms (5 years). The agreements allow them access to KPLC's fibre optic network that runs on the national electricity grid. KPLC's model enables ISPs to connect to them to reduce their time to market, and the need to duplicate costly broadband infrastructure.[1] Their infrastructure sharing model provides a supplementary revenue stream for KPLC. The three infrastructure sharing contracts signed to date are worth KES 588 million (USD 7.2 million) in revenue.

out national and metropolitan fibre backbones and wireless broadband access networks. The main players in this area are licensed by CCK under the unified licensing regime which allows Network Facility providers to rollout competitive international, national and regional networks (see Box 1).

There are now a number of players competing to provide retail broadband service on a fixed and wireless basis. Competitors in this market include two players who provide fixed residential fibre and copper networks; at least five players in the corporate fibre network space; and at least ten licensees providing wireless services. Table 4 shows the main ISPs including the number of both narrowband and broadband subscriptions.

Last mile access remains a challenge, however it is surmountable using a combination of private and public funding, and regulatory and policy clarity. The gains that have been made in Kenya with respect to last mile access have been enabled by a number of strategic regulatory and policy level interventions including:

- open market entry,
- facilitating competition through mandating infrastructure sharing,
- frequency spectrum licensing,
- facilitating private initiatives with regional implications, and
- investing in a PPP based terrestrial network.

Open Market Entry

Market entry is an important aspect of the policy and regulatory framework in that it determines the availability of opportunities for investment in the ICT sector. The CCK, like its counterparts in Tanzania, Rwanda and Uganda, has implemented an open licensing regime which enables market entry into all categories of licenses on an on-going basis. The CCK issues operating licenses on a first-come-first-served basis with an estimated turnaround time of 135 days.[42] Market entry is subject to the operator or service provider (1) meeting publicised minimum criteria, including the requirement that in general licensees should be registered and located in Kenya and issue at least 20 percent of their shares to Kenyans within 3 years of being licensed, and (2) paying a license fee. Spectrum licensing is subject to availability of the frequency spectrum resource.

The CCK started the process of migrating to a unified licensing regime in 2007 and issued the first licenses in 2008. The regime allows operators to decide which market to play in from a service and technology perspective, without the regulator being prescriptive. Since moving to the unified licensing framework, the country has seen in increase in mobile internet and mobile operators have become the biggest providers of internet services; at the same time though ISPs who were previously required to obtain a separate VoIP license and limited by technology restriction have been able to expand their service offerings.[43] At

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[42]http://www.cck.go.ke/licensing/telecoms/procedures.html
[43] Waema, Timothy, Catherine Adeya, and Margaret Nyambura Ndung'u. 2010. *Kenya ICT Sector Performance Review 2009/2010*. Cape Town, South Africa: Research ICT Africa. http://www.researchictafrica.net/publications.php .

an infrastructure level, in addition to the Network Facility Licenses, investors who wish to land a submarine cable in Kenya require a Submarine Cable Landing license; those interested in building system for the provision of international voice/data services are required to obtain a license for international Systems and Services (see Box 1).

Infrastructure sharing

A common solution that is encouraged as regulatory best practice for enabling last mile connectivity is Local Loop Unbundling (LLU). This helps to boost the ADSL broadband market since it allows competitors to the frequently monopolized copper line network of the incumbent operator. This has not been implemented by CCK and as such there is no specific framework governing this area in Kenya outside of the generic Facilities Leasing Regulations (See Section 3.2.1). The fact that broadband is increasingly expected to be delivered over wireless networks brings to question the importance of focussing on local loop unbundling where the copper local loop is inconsequential relative to wireless penetration. Although LLU is not in place, Kenya has promoted infrastructure sharing and facility leasing on a non-discriminatory and transparent basis in regulation as well as in its ICT sector Strategic Plan. This approach has seen the conclusion of infrastructure sharing agreements between telecoms operators and by telecoms and traditionally non-telecoms companies (i.e. the electricity utility, see Box 2) to increase revenue streams by selling excess capacity.

Licensing Broadband Access spectrum

The ease of entry, including the cost of acquiring a license affects market entry and ultimately competition. The CCK played an important role in creating a framework to encourage competition in the mobile market by reducing the license fee for third-generation (3G) spectrum by 60 percent to \$10 million in order to increase competition, which should in turn reduce prices and raise penetration. It furthermore indicated that aside from the normal frequency and service license fees, CCK would not charge operators for an upgrade to 4G.[44] As a result of its actions by the

end of 2010, Airtel and Orange had been issued 2100 MHz 3G spectrum bringing the total number of 3G licensees in the market to three. Safaricom was granted a 3G license in November 2007.

The unified licensing regime leaves it to licensed operators to determine which technologies to deploy. While the corporate market is well served, the residential market is still in its infancy. Other than 3G, broadband wireless technologies such as EV-DO and WiFi are available and can be provided with the necessary licenses relating to provision on network facilities and retail access.

Despite the recent award of two additional 3G licenses, spectrum allocation continues to remain a challenge particularly given its importance for wireless broadband. The expected growth of wireless data is likely to put severe pressure on existing spectrum availability. One constraint is that the government itself has important spectrum that could be used for broadband wireless access. Apart from freeing up the government-owned spectrum, another solution is to reuse spectrum in the transition to digital TV. One problem in addressing the looming spectrum crisis is that the issue has not received widespread public attention.[45]

Government-Led PPP

Following the success of the use of PPPs in deploying the TEAMS network, the government has utilised a PPP model to address the challenges relating to the national backbone network. The open access National Optical Fibre Backbone Infrastructure (NOFBI) terrestrial network complements TEAMS, SEACOM and EASSy by connecting the districts in the country. It is undertaken by a company established in terms of the Companies Act called the Fibre Optic National Network. Telkom Kenya has been issued a management contract to rollout the network, which contract will be open for competitive tender when it expires according to the Permanent Secretary. Over 5,000 km of cable has been laid to date in major cities and districts.

[44] Read more:
http://www.ibtimes.com/articles/28163/20100611/kenya-

to-cut-3g-licence-fee-no-charge-for-4g-cck.htm#ixzz1DlO2eVqM
[45] Mureithi, Muriuki. 2010. *Open Spectrum For Development: Kenya Case Study*. Association for Progressive Communications. http://www.apc.org/en/node/11700.

Private initiatives with regional implications

Kenya's decision to promote TEAMS does not appear to have been dismissive of the need for a regional approach to ICT development. Kenya's private operators such as Jamii Telecoms and Kenya Data Networks (KDN) are building backhaul networks connecting countries in the region. Jamii Telecoms is set to launch its Fibre to the Home (FTTH) network to deploy fibre-optic cables to 100,000 homes in Kenya. Kenya Data Networks, East Africa's largest data network, has deployed more than 15,000 km of fibre across Kenya, Rwanda and Uganda. KDN has a stake in TEAMS and also works with SEACOM to distribute their services in Kenya. In Kenya, KDN covers the main towns and has over 500 km of metropolitan fibre optic cable in Nairobi, 50 in the cities of Kisumu and Mombasa and 20 in Nakuru, Eldoret and Thika.

The CCK licensed KDN in January 2003 as a "Public Data Network Operator." The changes in the regulatory framework enabling a technology neutral and converged approach have made it possible for KDN to become a Tier 2 operator with permission to rollout a national network and access spectrum on a regional basis. This has enabled KDN to provide a broader range of services than originally envisaged in terms of the license. It provides last mile access using WiMAX technology as well as wholesale Internet connectivity to ISPs.

In addition to the initiatives by private operators on an individual basis, a consortium approach has been taken to the deployment of a regional backhaul network. Over 30 operators in the EAC have initiated and participated n the East African Backhaul System (EABs) project to rollout infrastructure to connect to the undersea cables that have landed in Tanzania and Kenya (See Box 3).

Universal Access: Still more to do...

Providing access to broadband spectrum, encouraging infrastructure sharing and licensing converged and technology neutral networks and services have promoted broadband network deployment. However providing service to rural areas remains a challenge. The ICT sector framework provides a number of options for stimulating investment in the last mile in underserved areas. The newly formed USF can be used to obtain subsidies at either an operator or consumer level based on projects identified by the Fund. Similarly, the Kenya ICT Board promotes projects aimed at the same objective (see Section 6.2.4).

The Government of Kenya has also recently endorsed a project to roll out an open access national Long Term Evolution (LTE) network in 2011 in a bid to ensure universal access to services and to create a level playing field for operators seeking access. According to discussions with the Ministry, the government will issue a tender for a public-private partnership to build a national network to be shared by telecoms providers ensuring a transparent, fair and open process.

Unlike the TEAMS project where high project costs and long time lags could be used to justify government intervention, the LTE project is more difficult to position in a competitive environment, and its impact on the market will depend on where the network is deployed and the identification of underserved areas. The process that the Kenyan government follows will be critical in light of the fact that there is competition in the last mile market, and there is a risk, as with any project where public subsidies may distort competition if it not managed properly. However,

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Box 3: East African Backhaul System (EABs)

EABS is a joint venture project among operators from Tanzania, Burundi, Rwanda, Uganda and Kenya. The Backhaul system links the five East African Community countries, and is particularly important for the three landlocked EAC countries Burundi, Rwanda and Uganda. The EABs involves about 30 operators in Eastern and Southern Africa and feeds from the cable systems that have landed in Mombasa and Dar es Salaam. The backbone infrastructure has been rolled out in four of the five EAC countries, with Burundi's segment still under construction.

http://www.intelligencecentre.net/2010/05/28/fixed-broadband-in-africa-is-finally-turning-the-corner/

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in light of Kenya's previous PPP experience in the ICT sector, it is anticipated that the model followed will be sound and transparent.

6.1.3 Kenyan Internet Exchange

Most internet traffic generated by users in developing countries tends to be international, resulting in large capital outflows paid to foreign Internet providers. Local content providers tend to be hosted offshore to lower the costs of infrastructure – thus a local Internet Exchange Point (IXP) is important to stimulate local hosting of services and encourage local content development. It also enhances competitive opportunities; reduces latency thus improving quality; and uses more local bandwidth thus increasing affordability of Internet services.[46]

Kenya has two IXPs (KIXP) – one located in Nairobi (launched initially in 2000) and one in Mombasa (launched in 2010) – operated by the Telecommunications Service Providers Association of Kenya (TESPOK) which is a non-profit organisation that represents ISP and other telecoms operators interests. The first KIXP was launched in Nairobi before the market was fully liberalised. Following a dispute in 2000, the KIXP was forced to shut down when CCK ruled in favour of Telkom Kenya which lodged a complaint arguing that KIXP was not licensed and violated its exclusive rights to carry international traffic. TESPOK/ KIXP appealed the CCK's decision at the Communications Appeal Tribunal presenting technical arguments demonstrating that KIXP was locally exchanging domestic Internet traffic and not infringing on Telkom Kenya's international rights. Following a year of debate, KIXP Limited was granted a licence by CCK in November 2001, making Kenya the first country in the world to create and issue an IXP license.[47]

Since then, following the arrival of the undersea cables and in anticipation of an increase in local and regional Internet traffic, a second IXP has been launched in Mombasa, the landing point for the undersea cables. This development ensures that the region's traffic is exchanged locally, thus improving the end user experience, and lowering costs for ISPs and operators who no longer have to send regional traffic via Nairobi. Unlike the Nairobi IXP which was hosted at a neutral location not owned by any licensee at launch, the Mombasa one is hosted by SEACOM for the next 3 years.[48]

6.2 Stimulating Demand: Services, Applications and Content

Despite the availability of bandwidth and more than ten retail access providers offering a multitude of broadband technologies (WiMAX, 3G, fiber and ADSL amongst them), and 2 IXPs, Kenyan broadband penetration is currently at only approximately 2 percent demonstrating room for significant improvement. On one hand, the low penetration is partly due to coverage; networks are urban focused and universal service and access must be addressed. On the other hand, the low penetration in the face of the availability of large amounts of bandwidth is evidence of the key difference between broadband networks and mobile networks that catered for voice. While 2G voice networks were successful based on an "if you build it, they will come" approach, this is not the approach for broadband. Once networks are deployed, broadband use and uptake is still dependant on other factors such as digital literacy, levels of education, relevance of content and applications. Affordability is also an issue since broadband access typically entails higher costs than mobile in terms of access devices and sometimes the lack of prepaid options.

Demand stimulation is an important part of Kenya's broadband framework, and is seen to be a key component of the policy framework in many of the countries that have been successful in developing broadband connectivity.[49] With literacy rates of over 60 percent, high levels of entrepreneurialism and an innovative IT and applications market, Kenya is well positioned to

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[46] Jensen, M. Promoting the Use of Internet Exchange Points : A Guide to Policy, Management and Technical Issues.
[47] Ibid.

[48] See http://www.businessdailyafrica.com/Company%20Industry/Internet%20data%20exchange%20point%20launched%20in%20Coast/-/539550/978498/-/5hru7b/-/index.html

[49] Williams, M. Broadband for Africa: Policy for Promoting the Development of Backbone Networks.

	Browsing internet	Sending /downloading e-mail	Word processing	Computer games	Spread sheets	Others
TOTAL (1'792)	69%	56%	50%	37%	28%	5%
Nairobi Kenya (290)	82%	69%	60%	52%	40%	8%
Lusaka Zambia (107)	57%	59%	60%	50%	22%	-
Antananarivo Madagascar (133)	44%	27%	59%	63%	39%	16%
Lagos Nigeria (204)	78%	67%	43%	18%	19%	6%
Hargeisa Somaliland (140)	56%	23%	8%	9%	16%	-
Kampala Uganda (206)	69%	57%	73%	41%	33%	3%
Luanda Angola (169)	67%	21%	55%	47%	25%	-
Addis Ethiopia (150)	80%	82%	75%	54%	60%	-
Bujumbura Burundi (190)	69%	72%	29%	18%	8%	21%
Kigali Rwanda (125)	71%	69%	67%	22%	36%	-
Dar Tanzania (1480)	73%	61%	17%	43%	14%	1%

Table 5: How computers are used in Africa
(Source: Maisha (2008) Consumer Insight Limited)

maximize on usage if the right policy framework is in place. This section discusses the Kenyan education and ICT policy framework, an important factor in broadband uptake, and then describes some model initiatives taken and strategies adopted which position Kenya well to increase uptake and usage.

New value added services, and in particular the Internet have emerged over the last decade in parallel with the mobile boom. Amongst the Internet based services available in Kenya are Voice over IP and WiFi which are legally provided and liberally used in Kenya. In developing countries, the existing fixed infrastructure is leveraged to deploy broadband and to offer triple play services — telephone, Internet and television – over IP networks. Notwithstanding the benefits of the mobile revolution, one of its drawbacks is that it has left countries like Kenya at a

disadvantage in terms of gaining access to high speed, high quality fixed broadband networks. The growing preference for mobile communications and wireless internet connectivity may satisfy consumers' needs to use basic applications and access content in the form of e-mails, browsing, and file transfers. However, wireless platforms are not likely to provide high speed, high quality networks for heavy business use or for rolling out triple play services in homes.

Triple play services in Kenya are hampered by the lack of fixed line infrastructure in the country, which in turn negatively affects the availability of fixed line broadband. In another Sub Saharan first, Kenya's Wanainchi Group, has launched a triple play service branded as Zuku which offers customers television, Internet broadband and telephony on one line using a combination of fibre, cable and Wimax technology. Zuku's triple play service is only available in a few neighborhoods in Mombasa and Nairobi and starts at KES 1'999 (US$ 24) per month for

unlimited broadband (1Mbps) and 43 English channels, plus free on-net voice calls.[50] Zuku has regional aspirations with a plan to launch in 9 countries.

6.2.1 Education

A 2008 study which compared Nairobi to 15 other capital cities in Africa, found that Kenyans had the highest rate of using computers for browsing the Internet (Table 5). In addition, 74 percent of residents in Nairobi have used a computer at least once, followed by Lagos, Nigeria and Kampala, Uganda at 69 and 68 percent, respectively. Kenya's high urban computer usage can be attributed to high literacy rates and the concerted efforts by the government and other stakeholders in promoting use of ICTs through various programmes and projects discussed in this section. The main challenges with respect to accessibility of ICTs in education are with respect to schools in remote areas and urban slums.[51]

Kenya's 8-4-4 (primary – secondary - tertiary) educational policy introduced universal free but non-compulsory primary school education in 2003. From a policy perspective, in addition to the 2006 National ICT Policy which promotes e-learning, there is the 2006 National ICT Strategy for Education and Training,[52] which addresses connectivity and infrastructure, digital equipment and content, harnessing emerging technologies, integration of ICT in education, training and research and development.[53] The Ministry of Education (chaired by the Permanent Secretary and supported by the ICT unit) leads in terms of the ICT and Education strategy. ICT can be used to address the challenges related to the high costs of purchasing and distributing text books and other learning and teaching materials, and poor math and science performance – broadband will be important to ensure sufficient capacity and speeds to download voluminous information, and open source software can increase access to information at a low or no cost.

The National ICT Policy emphasises the importance of integrating ICTs in the curriculum at all levels of education, establishing education networks so that educational resources can be easily accessible and shared, and promoting e-learning. They can also be integrated in the curriculum in order to equip Kenyans to participate in a knowledge based economy. Computer Studies is offered as part of the official Kenya Certificate of Secondary School Examination (KCSE) curriculum defined by the Kenya Institute of Education (KIE). In this curriculum, students are expected to learn and develop practical ICT skills with the main focus being general IT awareness and software development. In the final year of study, candidates are expected to develop a complete software project using a recommended set of tools and programming languages.[54] The CCK has initiated a number of universal access projects including the digitisation of the secondary school curriculum. The CCK has collaborated with the Kenya Institute for Education (KIE) and provided KES 15 million (US$ 180,500) of funding to support the acquisition of software and hardware, and provide capacity building, to digitise 11 subjects for the Form 1 KCSE curriculum. The digitised subjects were piloted in 20 schools of which 16 are the beneficiaries of the CCK's school-based ICT centre initiative.[55]

[50] Zuke Website, http://www.zuku.co.ke/coverage/
[51] ICT in Education Options Paper (Ministry of Education & USAID), July 2005
[52] National ICT Strategy for Education and Training, Ministry of Education. 2006. http://www.csdms.in/gesci/pdf/KENYA.pdf
[53] Farell, G. ICT in Education in Kenya, Survey of ICT and Education in Africa, Kenya Country Report, 2007.

[54] Use of ICT in Enhancing Teaching and Curriculum Delivery in Marginalised Secondary Schools in Kenya http://www.strathmore.edu/hp/
[55] http://www.cck.go.ke/services/universal_access/projects/digitisation_of_secondary_school_curriculum.html

Figure 11: Kenya ICT Trust Fund Structure, Collaboration through PPPs (Source: Kenya ICT Trust Fund)
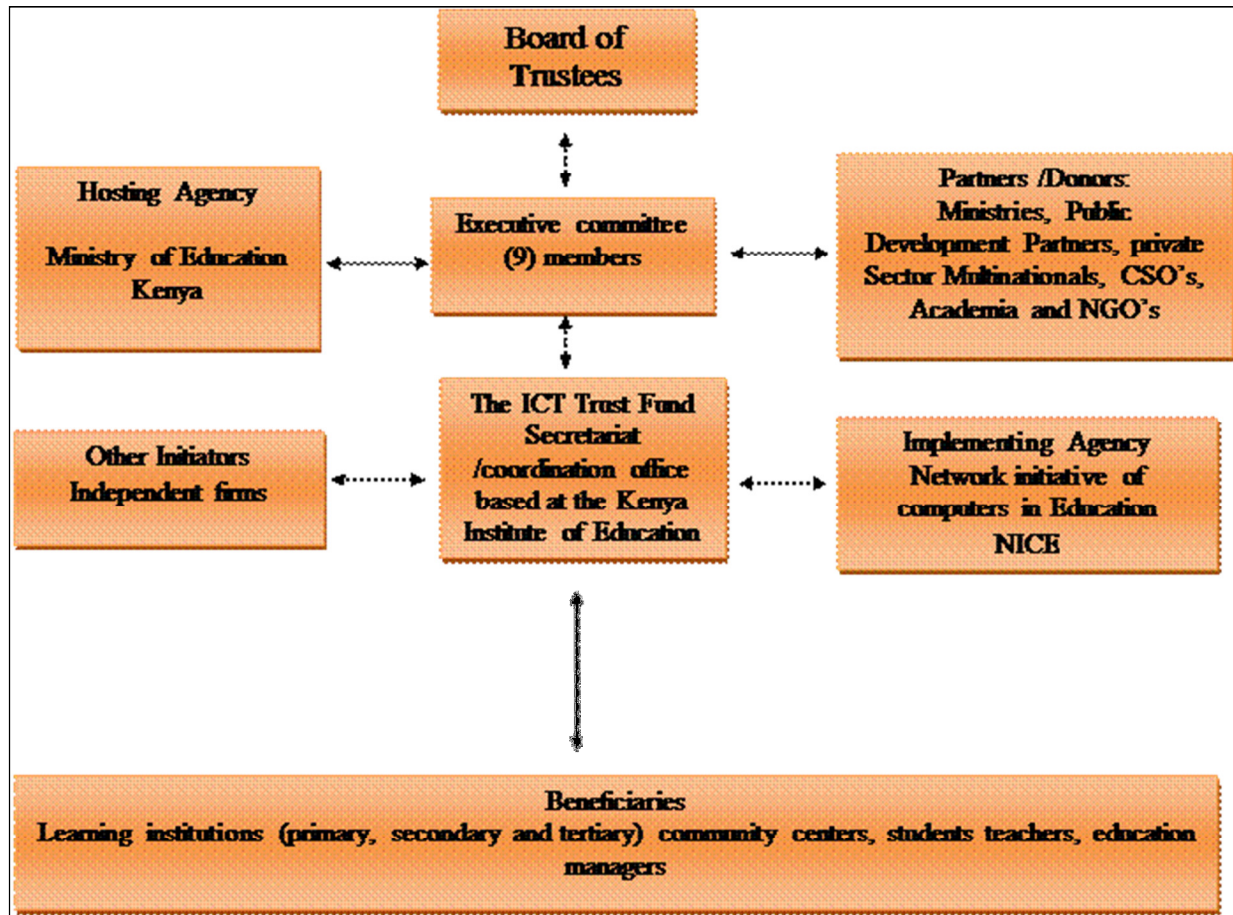
Another important institution in the ICT for Education (ICT4E) space is the Kenya ICT Trust Fund, founded in 2004, which facilitates PPPs to mobilize resources to bring a portal for information sharing and the development on a national computer assembly centre.[56] Its implementation arm is the Network Initiative of Computers in Education (NICE) which is responsible for core activities aimed at promoting ICTs in the learning institutions (primary, secondary and tertiary institutions). Kenya ICT Trust Fund draws its membership from the government, private sector, and regulatory bodies. Kenya ICT Trust Fund in 2010 successfully disbursed over 3000 donated software licenses, issued at least 200 teacher training certificates in collaboration with Microsoft, and refurbished 250 computers donated by the Kenya Ports Authority for distribution in the coastal region of Kenya.[57]

At a tertiary and regional level, three East African higher education regulatory authorities have signed an agreement harmonizing their approach to ICTs making the possibilities of distance learning, e-education and use of virtual universities more accessible. This will enhance the EAC, increase the mobility of EAC residents, and promote the use of regional and international standards.

6.2.2 Equipment

Access devices, which are traditionally laptops and computers, and increasingly smartphones and tablets, must be affordable for broadband uptake to increase. In Kenya, laptops and PCs are competitively priced and readily available on the market. In 2003, in line with measures taken in Tanzania and Uganda, the Department of Finance zero-rated tax on all computers and other ICT equipment imported into the country in a move that has seen the sector accelerate its growth. The decision is part of a strategy to drastically reduce the cost of computers in the country and complement other projects such as the

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[56] Ibid.
[57] See Kenya ICT Fund website:
http://www.kenyaictfund.or.ke/initiatives.html

Technology Parks. The Ministry of Finance in Kenya took bold moves in the 2009/10 financial year and committed to[58]:

- invest KES 1.3 billion (US$ 100 million) for mobile computer labs for high schools in all constituencies;

- support Digital Villages in partnership with the World Bank to create business hubs and entrepreneurial opportunities in rural areas

- launch a one million laptop/PC campaign in conjunction with broadband providers by undertaking to underwrite part of the interest on funds that are borrowed to buy personal computers and laptops;

- allow ISPs to offset against their taxable income the costs incurred in acquiring the right to use undersea cables over a 20 year period;

- increase the depreciation on telecoms equipment, including cables from 12.5 percent to 20 percent; and

- provide tax deductions of 5 percent on

software; and

- exempt all handsets from VAT.

These comprehensive incentives should stimulate the supply of computers, reduce costs and increase PC penetration to stimulate broadband use. However, a related factor that is not included in the favourable tax regime is the 10 percent excise duty on mobile airtime. It is argued by operators that the 10 percent airtime tax coupled with the 16 percent value added tax (VAT) adds to the cost of services for end users and negatively impacts the affordability and accessibility of services.

6.2.3 *Promoting Applications, Content and Services*

BPO sector

Box 4: BPO Bandwidth Capacity Support

The Kenya ICT Board supports the Local BPO industry by providing bandwidth capacity support funding. The purpose of this capacity support is to reduce the cost of bandwidth making local operators competitive on a global scale. The BPO "Bandwidth Capacity Purchase Scheme" is aligned with Kenya's Vision 2030 and was conceived as a transitional and non-discriminatory support with a sunset clause so as to be compatible with Kenya's existing commitments under the WTO. The period of validity was initially between 1st July 2007 to 31st December 2008, pending the landing of the undersea cables which were expected to significantly reduce retail rates. This period has however been extended and the subsidies are still available pending an evaluation of retail reductions.
.
BPO operators are licensed by the CCK and eligibility for the support is open to all operational BPO operators in Kenya. The subsidy is provided by means of a reimbursement of monies paid for bandwidth as indicated on the ISPs invoices to the BPO operator.

Source: Kenya ICT Board, http://www.ict.go.ke/oldsite/index.php?option=com_content&task=view&id=178

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[58] 2009/10 Budget Vote Speech, Deputy Prime Minister and Minister of Finance, June 2009.
http://www.statehousekenya.go.ke/economy/budget2009-2010.pdf

Kenya's BPO strategy is central to Vision 2030 and is highlighted as one of the means to make Kenya a middle-income country within a period of 20 years; in part through creating 7,500 direct jobs in the BPO sector and 2,500 indirect jobs by 2012[59]. Kenya compares itself to Mauritius—one of Africa's BPO successes—in the ICT sector Strategic Plan and hopes that increased bandwidth, cheap labour, clear accents and its location could help it tap this multi-billion dollar industry. As with other aspects of the country's broadband strategy, Kenya's policy framework (Kenya ICT Strategy 2006) provides strategic direction on how to realize the BPO vision. In terms of institutions, a self-regulatory regime is provided for – the "Kenya BPO and Contact Centre Society[60]" has been formed to set standards and provide for self-regulation. The Kenya ICT Board is responsible, as part of its role of marketing the sector, for promoting the

Figure 12: How PesaPal works
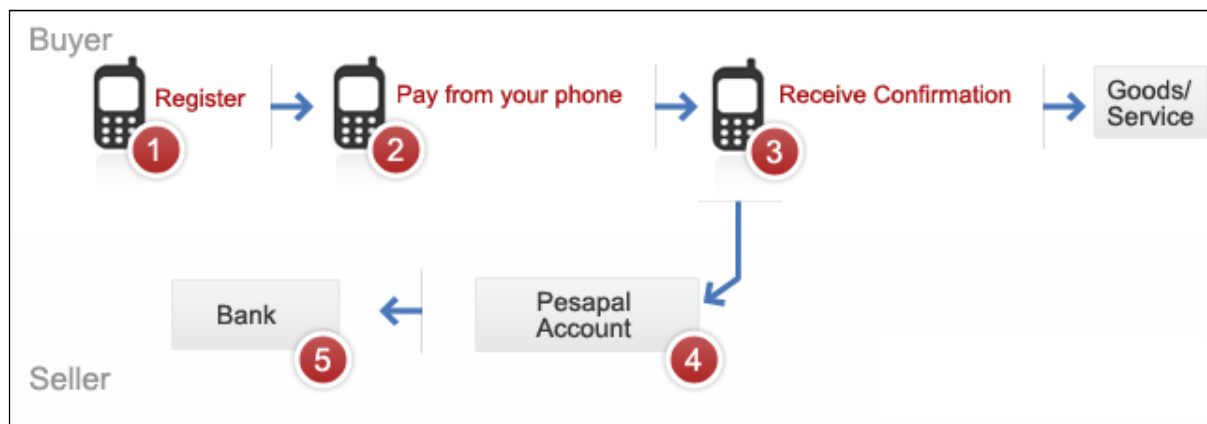
country abroad as a BPO destination. The Kenya ICT Board furthermore provides bandwidth

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[59]Vision 2030,
http://www.communication.go.ke/documents/Vision_2030_Popular_Version.pdf

[60] http://www.kenyabposociety.or.ke/

subsidies to the BPO sector through a grant from the World Bank (See Box 4), in anticipation of price decreases until the impact of the newly landed cables is felt.

Other measures taken in countries like India and Philippines that have thriving BPO sectors include government-supported corporate locations such as business and technology parks and export processing zones; laws supporting intellectual property; attractive labour laws; and reasonable rates for skilled and unskilled workers. Similarly, Kenya has identified Export Processing Zones (EPZ) which will be used to locate technology parks such as Kitengela (See Section 6.2.4, *Public Private Partnerships*). It is also in the process of amending and updating its IP legislation. Following the various funding and policy initiatives relating to the BPO sector, Kenya currently has 25 licensed BPO operators, although not all of them are operational.[61] According to the KICTB, by 2009 about 3,550 BPO jobs had been

created from a baseline of 500 in 2007.[62]

Online government services
The Kenyan government is taking steps to digitise content and provide services online. Although there is still significant work to be done in this area, the Kenyan e-government portal (http://www.e-government.go.ke) enables citizens to apply for public service jobs, track the status of ID and passport applications, obtain exam results, submit tax returns and report corruption. In addition there is a business licensing e-registry. Providing e-government services has proven to be challenging in light of the 'silo effect' discussed earlier and the need for line ministries to take responsibility for developing and digitising relevant content for users.

The fact that ICT Units are not necessarily senior in the organisational structure of a ministry means that the projects may not be prioritised or given the strategic importance that they deserve. Kenya

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Box 6: Mobile Money Meets E-Commerce

In a recent innovation launched in early 2011, registered customers of mobile phone money transfer service, M-Pesa, can withdraw cash in any currency from Visa branded automated teller machines (ATMs) anywhere in the world. They can also make purchases in accepted merchant outlets or shop online moving it from a money transfer service to a mobile commerce innovation, still for the unbanked. This innovation will move M-Pesa from a service conducted primarily over 2G networks, to one whose relevance will increase over broadband networks in light of the ability to use it to shop online and across borders.

PesaPal[1] is a payment platform that enables Kenyans to buy and sell on the Internet using M-Pesa, Zap and Credit Cards and has targeted e-commerce, school payment, and e-ticketing as value propositions. It is an online based service that uses the popular mobile money accounts that were launched in Kenya, or credit cards to:
- Get receipts immediately for payments,
- Get email and SMS notifications.
- Load money once and use it for multiple payments using PesaPal Credit,
- Make payments (such as school fees) in instalments,
- Request and receive payments from other members,
- Receive protection from fraudulent sales
- Buy tickets for events in Kenya online
- Buy products and services from vetted merchants.

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[61] CCK Register of Licensees under Unified Licensing Framework
http://www.cck.go.ke/licensing/telecoms/register.html

[62] Kenya Information and Communications Technologies Board. 2009. *Progress Report 2007-2009.*
http://www.ict.go.ke/oldsite/images/pdfs/kictb%20progress%20report%202008-2009.pdf

has seen that line ministry projects that are done in collaboration with the MOIC, such as the Judiciary Telepresence Project (see Box 5) and the Technology Park project which is partnered with the Trade Ministry are likely to achieve success.

Encouraging local innovation

Kenya is earning a reputation as an innovation hub, and a centre for the development of relevant African applications and content. Initially developed on narrowband mobile and SMS platforms, many of Kenya's innovations have had regional and global impact. Innovations include:

- *Ushahidi*, an open source application used in conjunction with Google Maps, use *crowd sourcing* for social activism and have since been replicated in Haiti.

- M-Pesa which has generated considerable publicity leading to similarly styled mobile money solutions to spread across the continent. Interestingly, although M-Pesa is a 2G mobile solution, it is finding relevance online through its recent partnership with Visa, and can be used as a tool to generate demand.

- *KenyaImagine*, a local website originally founded to address the gap in quality of online content from Kenyan news and magazines, has turned into an online content hub, with involvement of local Kenyans as well as the Kenyan Diaspora.

In addition, to these innovations which have taken place in a narrowband context, applications like *PesaPal*, a locally developed payment platform that is a sort of hybrid of PayPal and M-Pesa, will find greater relevance as broadband take up increases. *PesaPal* enables Kenyans to buy and sell on the Internet using mobile money or a credit card and has targeted applications such as school fee payment, e-ticketing and e-commerce (See Box 6).

6.2.4 Funding Local Demand

Loans, grants and subsides

While it is still early and the impact cannot be evaluated, Kenya has put in place several funding mechanisms to support local development of content and applications, and to stimulate the BPO sector. The institutions that mainly support

this are the Kenya ICT Board (KICTB) and the newly established Universal Service Fund managed by the CCK and focused on under serviced areas. The USF is funded from a levy imposed on licensed operators, while the KICTB receives funding for projects mainly from donors, including a Revolving Fund for Digital Villages.

In 2007, as part of the World Bank's Regional Communications Infrastructure Project, Kenya agreed to rollout *Digital Villages* in rural areas to promote Internet connectivity to enable citizens to access government and commercially generated information available on the web.[63] The KICTB started with a pilot programme in 2009 called the "Pilot Pasha Centres" (Pasha means "to inform" in Swahili). The pilot programme was important to ensure the development of a model that was relevant within the Kenyan rural context and was sustainable. Although a single model was initially envisaged, the pilot resulted in three categories of Pasha Centres being developed. The categories acknowledge the evolving definition of broadband and the types of applications supported by different speeds. Accordingly, human resource capacity and training will vary depending on the category of the Pasha Centre that is deployed. Five digital villages located in Nkubu, Garissa, Kangundo, Malindi and Mukuru were established in the pilot phase.[64] The Kenya ICT Board in 2009 and 2010 had conducted nationwide training of 1000 people in business management, entrepreneurship, marketing, basic accounting and technical management (a "starter-kit") to prepare potential Pasha Centre managers to run their centres, and from January 2011 will disburse at least one loan for a Pasha Centre per county. KICTB's target is to have 210 Pasha Centres, one in each constituency, by 2012.

While Pasha Centres are a significant project aiming to increase digital inclusion, other projects are underway involving other consumer groups such as academia. The Kenya Education Network (KENET) and the KICTB have worked together to disburse 200 MB of bandwidth to 64 tertiary

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[63] Drury, Peter. 2011. *Kenya's Pasha Centres: Development Ground for Digital Villages*. http://www.cisco.com/web/about/ac79/emgmkt/index.html.
[64] http://www.ict.go.ke/index.php/sport/pasha/pasha-updates/299

institutions across Kenya using private and donor funding.[65]

Table 6: Categories of Pasha Centres
(M=Mandatory) (Source: Cisco IBSG, 2010)

Mandatory Functions	Basic	Standard	Advanced
Number of PCs	M>3	M>7	M>15
Internet Access	M (256 Kbps)	M (512 kbps uncontended for all PCs)	M (minimum 1Mbps)
Collaboration software			M
Videoconferencing software			M
Web 2.0 access – webcam and microphone		M	M
eSkills Training Services	M	M	M
Group training facilities			M
Pasha Portal accessible	M	M	M
Government information	M	M	M
Management Information	M	M	M

The KICTB recognizes the need for locally developed and relevant national content and has issued grants for digital content and software applications as part of the Tandaa Digital Content Strategy. The KICTB has amongst its priorities: issuing Kenyan firms and software application developers grants to support local content and software applications; providing subsidies for laptops for university students ("Wezesha"), although uptake has been low and through interviews with university students it appears that

many are able to obtain laptops relatively easily, the low cost of hardware and the competitive nature of the market being two contributing factors. The cost of the laptop or PC is far less of a concern that the cost of connectivity itself.

Public-private partnerships
Most of the demand side initiatives in Kenya have been either led by donors or established through PPPs. Kenya has managed to successfully structure PPPs to stimulate demand. The biggest success stories do two important things – they leverage the strengths of the private and public sectors, and they break the "silo effect" by encouraging collaboration across government departments and line ministries. This is exemplified in the approach to the establishment of technology parks.

The Government has committed to establishing Multimedia Technology Parks and promoting home-grown industries developing ICT products

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[65] KICTB Interim Update (11 June 2010) at http://www.ict.go.ke/index.php/theboard/board-reports/update-on-11th-june-2010-

through fostering a partnership between the MOIC, the Ministry of Trade and Industry and private investors. The Minister of Trade and Industry has identified Export Processing Zones (EPZs) which will also house the Technology Parks, thus linking the ICT sector to broader economic projects. The government through the MOIC will, in terms of the PPP, provide land (500 hectares in Kitengela which is about 25 kilometers outside of Nairobi) and the plans for the layout. Private sector players interested in the concept,

land and plan, will then be able to build out the business premises and either use it for their own operations or lease it out to other appropriate businesses.

PPPs are furthermore used in Kenya to establish data recovery centres, to provide storage and recovery for all government databases, and for the establishment of Incubation Centres and Satellite Assembly Centres where local PCs will be assembled. Additionally skilled graduates will be employed at Incubation Centres and Satellite Assembly Centres , thus increasing the impact of broadband on job creation.

7.1 Potential Stumbling Blocks

Despite Kenya's success it is important to acknowledge some of the unique aspects of the Kenyan regime, which if not noted and properly managed may make the implementation of similar strategies in other countries a challenge. Two aspects of the Kenyan case that make it different from most best practice case studies are that Kenya does not have a broadband policy, nor does it have a simple institutional framework – these two issues are discussed in turn.

Kenya does not have a single broadband strategy. The strategy is instead integrated into a number of policies and plans found in a number of sectors, such as education and health. *Vision 2030*, supported by the *ICT Strategic Plan 2008 – 12*, is what ties all of these strategies together and in so doing, recognizes the role of ICT as an enabler of all other policies, and broadband or high-speed access is a key component of the ICT sector. In the absence of a single policy, strong leadership is the main factor that ties the various aspects of the policy together and makes the Kenyan approach work.

Kenya has created a multidimensional institutional framework. The Kenya ICT Board is a success story in itself in terms of its ability to design and develop programs and secure funding for implementing them. A strong, central body is thus essential, as is determined leadership. However, the risk lies in the fact that the Kenya ICT Board has overlapping mandates with the Kenya ICT Trust Fund (education) and the USF (CCK) creating the potential for conflict and duplication. Likewise the National Communications Secretariat and the MOIC have similar roles.

In addition to ICT specific and Kenya specific challenges, there are challenges which are shared with many developing countries. Challenges arising both from the ICT sector as well as adjacent sectors such as electricity and education remain. These challenges may stall the further impact of broadband in the country – Kenya has missed its 2010 target to provide electricity overage in 20 percent of the country. The national target was to raise the coverage rate gradually

from 4 percent then to 20 percent in 2010 and 40 percent by 2020.[66]

7.2 Kenya's Strengths

Kenya's accomplishments arise first from the manner in which it has tackled the challenge of lack of backbone network infrastructure and now the creation of strategies and programmes to increase uptake is vital. The manner in which Kenya has approached these two elements of the broadband ecosystem can serve as a model for other developing countries. The lessons it has learned and challenges it has faced are also instructive. Developing countries can learn key lessons from the Kenyan broadband experience including:

- **Necessity of a clear vision,** in Kenya's case *Vision 2030*, which includes ICTs and specifically a focus on the BPO sector as one of its key pillars provides guidance to all ministries, departments and agencies, as well as the private sector;

- **Importance of government leadership and a project "champion"** – It is repeatedly mentioned that the story of the landing of the cables in Kenya is not complete without the perspective of the Permanent Secretary. Clear and unequivocal leadership in support of stated national policy objectives is critical in ensuring that projects move from theory to practice;

- **Central role of good regulation,** including flexible and technology neutral licensing, the facilitation of infrastructure sharing, the encouragement of facilities based and service based competition, the regulation of wholesale prices to stimulate competition, and the facilitation of innovation;

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[66] See: Kenya to Miss Rural Electricity Target for 2010, Reuters. See:
http://www.reuters.com/article/2009/10/22/kenya-electricity-idUSLM45319020091022

- **Benefits of Public Private Partnerships at all levels of the broadband ecosystem –** to build high cost backbone networks, to develop applications, services and content, and to support initiatives to improve literacy and ICT in education. These must be well designed so that they promote broadband without distorting the market;

- **Actions speak louder than words –** implementation of legislation,

programmes and properly structured projects is critical, while respecting the market reform process. Although the government of Kenya has demonstrated this in the cases of TEAMS and NOFBI, this remains to be seen with regards to demand stimulation. For example, while the new Constitution declares the citizen's right to public information, actual access is limited by various factors, including the availability of content and the nature of the platforms on which this information is deployed.

Kenya's "Build It and they Will Come" approach to broadband has led to broadband achievements being partially realized in less than five years since the ICT Policy was adopted. The Kenyan government has taken an active role in breaking the satellite dependency for international capacity and thus overcoming the first hurdle, with the highest upfront costs, in the broadband ecosystem. The delivery of international bandwidth over high-speed networks has been successfully accomplished with the landing of three cables to date. Stimulating demand remains a challenge. Kenya has proactively put in place a sound regulatory and policy framework, backed by clear strategies to try to improve this going forward.

However, broadband is not a panacea. Using innovative means, 2G mobile networks, service and applications are being used to achieve many of the same functionalities that broadband enables in Kenya including access to banking, mobile money and now e-commerce, SMS based e-government services, and even e-education through applications such as textbooks downloaded on mobile phones. The user experience would be enhanced through broadband networks, however, this does not mean that in the absence of broadband Kenya will remain behind. It is mainly businesses and the BPO sector that will be the beneficiaries, in the short term, of the broadband revolution that is taking place in Kenya – the same is likely to be true for all of the countries in the region. As with the evolution of 2G, broadband for the mass market, accompanied by low cost services and importantly devices, will be introduced over time as operators, vendors and equipment manufacturers broaden their consumer markets.

The strategy of improving Kenya's positioning in terms of broadband access is deliberate, and is aligned with the objectives of *Vision 2030*. The glut of capacity enabled by infrastructure investments which have been both government led and privately driven, places Kenya in a strategic position in the region and in the continent and promises, if all other elements of the ecosystem are supportive, to improve socio-economic development. The cables have been laid and now the people need to come.

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*info*Dev is a global development financing program among international development agencies, coordinated and served by an expert Secretariat housed at the World Bank Group, one of its key donors and founders. It acts as a neutral convener of dialogue—and as a coordinator of joint action among bilateral and multilateral donors—supporting global sharing of information on ICT for development (ICT4D), and helping to reduce duplication of efforts and investments. *info*Dev also forms partnerships with public and private sector organizations who are innovators in the field of ICT4D. *info*Dev is housed in the Financial and Private Sector Development (FPD) Vice Presidency of the World Bank Group.

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