THE
NATIONAL BROADBAND
STRATEGY

A VISION 2030 FLAGSHIP PROJECT

Broadband
4 Kenya
Enabling a Digital Kenya

KENYA
VISION 2030

Republic of Kenya

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Executive Summary

The Kenyan Government presents the National Broadband Strategy (NBS) for Kenya. The vision of this Broadband Strategy is to transform Kenya to a knowledge-based society driven by a high capacity nationwide broadband network.

This Broadband Strategy is critical to the achievement of Vision 2030 that seeks to provide Kenyan citizens with a lifestyle that is equivalent to the experience that a newly industrialized country provides.Kenya's Vision 2030 recognises the enabling role of ICTs and anchors some of its key aspirations upon the availability and adoption of broadband technologies. Kenya, therefore, needs a very clear roadmap towards the realisation of a connected and knowledge-based economy.This strategy provides such a roadmap.

The overall objective of this Strategy is to provide quality broadband services to all citizens. The broadband definition for Kenya for the period 2013 - 2017 is as follows:

Connectivity that is always-on and that delivers a minimum of 5mbps to individuals, homes and businesses for high speed access to voice, data, video and applications for development.

Access to broadband in Kenya for all citizens has the potential to generate enormous social economic benefits. Some of the benefits that accrue from national access to broadband include economic growth, job creation, growth of investment opportunities, access to online government services, improved education and training services, improved national safety and security services among others.

To advance towards achieving Vision 2030, this Broadband Strategy capitalizes on Kenya's strengths and improves on identified weaknesses to exploit opportunities and mitigate against challenges that we face as a nation in respect to national broadband development and uptake. Finally, it details a clear strategy for achieving our goals with the means to monitor and evaluate our progress.

> ' The overall objective of this Strategy is to provide quality broadband services to all citizens '

The Strategy focuses on five key thematic areas that have direct impact on its implementation and success.

These are:

- Infrastructure, Connectivity and Devices
- Content, Applications and Innovations
- Capacity Building and Awareness
- Policy, Legal and Regulatory Environment
- Financing and Investment

The role of the government in this Strategy will initially focus on the supply-side promotion of broadband as well as provide an enabling environment to allow optimum market growth of broadband services by leveraging private sector investment in critical infrastructure. In the later stages, however, the Government will focus on universalisation and ensuring that broadband is both accessible and used widely. It is expected that public and private sector investment and competition will expand the broadband market. The Strategy provides for the promotion of Public and Private Partnerships so that industry stakeholders and the national and county governments work together to deploy infrastructure, invest and build awareness and capacity for use of broadband.

This Strategy is visionary yet flexible enough to adapt to evolving markets and accommodate new technologies. It fulfils the requirements of our new Constitution of Kenya 2010 that provides for information access to all citizens as a basic right and the recognition that Kenya aspires to be a globally competitive and prosperous nation.

Highlights of the NBS Medium Term Plan (2013 - 2017)

The strategy has identified key enabling legal, policy Regulatory and institutional reforms necessary to support it as contained in Table 1. The strategy has gone further to identify pertinent projects for implementation as contained in Table 2 below.

The proposed reforms address various issues that are related to the Broadband agenda and which are fundamental in realizing the transformational gains of Broadband.

Table 1: Policy, Legal, Regulatory and Institutional Reforms

Key Areas	Issue	Expected Outcome	Implementing Agency
Broadband Policy	Develop a policy framework for broadband	Improved and streamlined growth in the ICT sector	Ministry of ICT
Institutional Reform	Establish and an agency responsible for all public ICT infrastructure development and management	Efficient and effective utilization of public funding in ICT infrastructure	Ministry of ICT
Spectrum	To provide a comprehensive spectrum plan on available spectrum and expected digital dividend , allocation mechanism and utilization reports of utilized spectrum.	To provide adequate spectrum for mobile Broadband services.	ICT Sector Regulator
Universal Service Fund	Provide for robust and holistic approach in the use, management and governance of USF as well as implementation of legislation	Operationalize USF to support expansion of service in high cost areas	MoICT, the ICT sector regulator
National co-ordination in complementary infrastructure deployment	Amendment of Roads Act to cater for the provision of ICT infrastructure along and across roads and railways.	Stimulate investment in ICT infrastructure	Ministry of Roads and infrastructure

Key Areas	Issue	Expected Outcome	Implementing Agency
National co-ordination in complementary infrastructure deployment	Amend the Building Act to ensure property developers make provisions for ICT infrastructure.	Ease of accessibility to ICT services	Ministry of Land, Housing and Urban Development
Way Leave Fees	Eliminate way leave fees charged for ICT infrastructure deployment.	Ease the development and deployment of ICT infrastructures in counties	ICT sector regulator and County Governments
Standards in ICT infrastructure deployment	Enforce standards for civil works related to burying fiber cables and installations over power lines	Minimize disruption on delivery of broadband services and damage to roads and power poles.	Ministry of Roads and infrastructure
Technical specification on fiber deployments	Develop and enforce minimum technical specifications for all fiber deployment	Eliminate duplication of resources and disruption to delivery of ICT services	ICT sector regulator and County governments
Infrastructure sharing	Develop and implement Industry Code of Practice	Optimization of utilization of ICT infrastructure and environmental sustainability	The ICT sector regulator
Trust and Security	Revise KICA2009 to make designating ICT infrastructure as critical infrastructure Draft laws on Data Protection and Access to information	Promote utilization of Broadband through enhanced trust and Security in broadband infrastructure and services	Ministry of ICT
Affordability of ICT services: Energy and Roads	Review legislation to make specific provision for rebates for energy and road deployment by ICT Infrastructure provider as well as Provision of categorization of ICT services as high energy users (special tariff)	Reduce burden on affordability due to unavailability and cost of energy and road infrastructure	Ministries of ICT, Finance, Energy and Roads & Infrastructure

Table 1: Policy, Legal, Regulatory and Institutional Reforms (Continued)

Key Areas	Issue	Expected Outcome	Implementing Agency
Open Access	Policy framework on open access	Access by all to national backbone networks	The ICT sector regulator
Creativity and artistic expression policy: Rights and Fundamental Freedoms in general	Establishment of policy on creativity and artistic expression	Align to rights recognized under the Constitution by closing the Policy gap on fostering creativity and artistic expression (A.33 and A.11)	Ministry of Sports, Culture and Arts
Intellectual Property Rights	Effective enforcement e.g. IPRs.	Facilitate environment that fosters innovation and protects fundamental rights	Ministry of Trade, KIPI, other stakeholders (continuous)

Table 2: NBS Key Projects

Project Title	Objectives	Expected Outcome	Implementing Agency
Infrastructure and Connectivity			
National Fiber Backbone	To extend the national fiber optic cable by 30,000KM	Robust and extensive ICT backbone infrastructure to support and compliment national broadband wireless network	Ministry of ICT and sector Regulator
National Data Centres	Establish 2 neutral national data centres	To host local content reliably and ensure interruption free broadband experience	Ministry of ICT

Table 2: NBS Key Projects (Continued)

Project Title	Objectives	Expected Outcome	Implementing Agencyncy
Capacity Building			
Digital Literacy	Mandatory ICT training in all Teacher training Colleges and TVET	Achieve digital literacy among teachers	Ministry of Education
Media and ICT Education	Mandatory ICT sensitization and Media Education from primary level	Improved Digital literacy rates, and advancement towards a knowledge based society	KICD and Ministry in charge of Education
ICT Technical Experts	Develop ICT curricula that aligns skills with industry demands and global standards	Increased high-end technical talent to develop, manage and maintain broadband services.	Commission of Higher Education (CHE)
Model ICT resource centre per ward	Establish ICT centres in all wards	To increase access and accelerate digital literacy	County governments
Content, Applications and Innovation			
Digitization of core Government Registries	All ministries and agencies to digitize core registries	To avail critical public service delivery data in digital form and develop applications to enhance access	Directorate of e-Government
County Management Information System	To develop a robust management information system for counties	Promote transparency, accountability and equity using ICTs	Directorate of e-Government County Governments
Facilitate ICT Innovation	ICT incubators in each public university	To establish a structured ecosystem that generates innovative and quality solutions to enhance access to digital content.	Kenya National Innovation Agency All Public universities

1. Introduction

1.1 The Process

The Ministry of Information, Communications and Technology (MoICT), in collaboration with the Communications Commission of Kenya (CCK), spearheaded the development of the Broadband Strategy with technical assistance from USAID's Global Broadband Initiative Program.

MoIC established a National Steering Committee comprising representatives from the Communications Commission of Kenya, National Communications Secretariat, E-Government Directorate, Vision 2030 Secretariat, Kenya ICT Board, and local and international technical experts from USAID's Global Broadband Initiative Program. The Committee's mandate was to guide the overall development of a comprehensive strategy for promoting national development of broadband-based Information and Communication Technologies (ICTs) in the country. The Committee achieved this through a consensus-based strategy and by active collaboration with a wide range of stakeholders in both the public and private sectors throughout Kenya.

A multi-sector consultative approach involving all relevant institutions in the country was adopted in the development of the NBS. Subsequently, the National Broadband Steering Committee organised a series of consultative stakeholder meetings and workshops. The initial draft of the strategy was developed through a technical working group meeting comprising experts on the thematic areas of the broadband ecosystem namely, Infrastructure and Connectivity; Applications and Devices; Content and Innovation; Capacity Building and Awareness; Policy, Legal and Regulatory Issues; and Finance and Investments.

Subsequently, the draft NBS was availed for wider consultation and reviewed by all stakeholders. Following the call for public consultation in the print media from 11th January 2013, inputs were received from a number of stakeholders including multinational organizations, public institutions, service providers, academia, and the general public through various mediums including social media. These inputs were analysed and incorporated into the NBS as appropriate. The analysis report of the stakeholder inputs as well as the actual submissions made by respective individual experts and institutions are available at:
http://www.cck.go.ke/links/consultations/published_responses.html

1.2 Defining Broadband for Kenya

The definition takes cognisance of the various needs within the broadband ecosystem including those from the demand and the supply sides. The key drivers that influence the definition from a demand perspective are Kenya Vision 2030 which seeks to provide its citizens a lifestyle that is equivalent to the experience that a newly industrialized country provides, and the Constitution of Kenya 2010 that anticipates information access to all citizens as a basic right as well as the recognition that Kenya aspires to be a globally competitive and prosperous nation. On the supply side, broadband is broken down to technical parameters that are easily measurable. These parameters include speeds, bandwidth and quality of service.

Whereas fast-changing technologies may rapidly see definitions based on speed become obsolete, countries set minimum speeds in defining broadband largely in order to measure progress.

The definition also takes into consideration international benchmarks of selected countries that are provided in Annex 1.

Subsequently, the broadband definition in Kenya for the period 2013- 2017 is as follows:

Connectivity that is always-on and that delivers a minimum of 5mbps to homes and businesses for high speed access to voice, data, video and applications for development.

Recognising the prese nt realities with respect to the extent of infrastructure roll-out within the country, and the immediate plans to further deploy broadband on nationwide wired and wireless systems, the definition is disaggregated on the basis of rural and urban areas as shown in Table 1. It is also recognised that the rural-urban divide is slowly getting obscured and the devolved system of government may redefine it further with counties being the focal points of development planning. Subsequently, the distinction in broadband speeds between the rural and urban areas will be blurred with the convergence that will arise out of regional development.

The speeds proposed from 2017 onwards are subject to review based on technological developments and other factors that may influence their revision.

Table 1: Minimum Broadband Speeds

	2013-2017	2018-2022	2023-2027	2028-2030
URBAN	40 Mbps	300 Mbps	1024 Mbps	2048 Mbps
RURAL	5 Mbps	50 Mbps	100 Mbps	500 Mbps

Penetration targets have further been articulated at the individual level in order to measure the access and usage levels of broadband. These targets are defined in Table 2.

Table 2: Broadband Penetration Targets

	Baseline	Target by 2017
% of penetration by households	6.3%	35%
% of penetration by schools	43.4%	100%
% of penetration by health facilities	n/a	100%

1.3 Why a National Broadband Strategy

Broadband is a strategic infrastructure for a 21st century economy. Not only does broadband secure inclusion within the global economy, but it also goes along way to underpin thecompetitiveness of a nation and its success in progressing the realisation of the Millennium Development Goals.

Having a National Broadband Strategy gives Kenya a competitive edge in the region as very few countries in Africa have established a similar framework.

The NBS provides a critical ICT roadmap that shall enable Kenya achieve its aspiration of becoming a globally competitive and prosperous newly industrialized middle-income country with a high quality of life by 2030.

Broadband is the platform for a developed Kenya; a Kenya that registers economic growth and innovation. Broadband enables healthcare, education, employment and government service delivery.

Vision 2030 recognises the enabling role of ICTs and anchors some of its key aspirations upon the availability and adoption of broadband technologies. Yet 90% of Kenyans do not have access to broadband, students do not have access to computers, and Kenyans do not have skills to use the Internet. Unless this approach is reviewed to address these gaps, Kenya will fail as a country to take advantage of the opportunities to uplift Kenyans' socio-economic status and adversely affect the country's global positioning and competitiveness. Kenya, therefore, needs a very clear roadmap towards the realisation of a connected and knowledge–based economy.This strategy describes such a roadmap.

1.4 Vision and Principles

1.4.1 Vision

The vision of the national broadband strategy is:

A knowledge-based society driven by reliable high-capacity nationwide broadband connectivity.

1.4.2 Principles

The future of broadband in Kenya shall be more than viewing television, surfing the Internet and making phone calls. It shall be about new forms of communication and mass collaboration through the virtually unlimited potential for sharing information, storage capacity, processing power and software made possible through high-capacity bandwidth connections. This collaboration will generate new ideas, accelerate economic development and lead to opportunities for wealth creation, social development and personal expression. The following key principles will guide the implementation of the broadband strategy:

1. **Open access:** Broadband access and use will be available

without discrimination. Multiple service providers will be encouraged to compete on shared platforms and services.

2. **Technology neutrality:** Use of common, interoperable standards and protocols will be encouraged. All local broadband networks shall have the right to non-discriminatory and cost-based interconnection with other broadband networks.

3. **Research and innovation:** Endeavour to develop and provide sustainable services through research and innovation. Kenya will pursue continuous innovation and productivity improvements by enhancing global connectivity for research and development, and by promoting and applying world class, innovative broadband technologies, applications, content and services.

4. **Equity:** Universal access to broadband services will be promoted. High-capacity broadband connectivity shall be affordable and widely accessible. Government policy will pay close attention to barriers of price, location, culture and language. Local communities will have access to interactive, open, broadband networks with sufficient capacity to meet the increasing information on communications and entertainment needs of their residents, businesses, institutions and local governments. Particular concern will be given to impoverished, isolated and disadvantaged populations including people with disabilities and women.

5. **Co-ordination and collaboration:** Public, Private Partnerships (PPP) shall be promoted.Industry stakeholders and the national and county governments will work together to deploy infrastructure and build awareness and capacity for use of broadband.

6. **Sustainable interventions:** Broadband policies, regulations and other initiatives will endeavour to be transparent and flexible so as to build foundations for sustainable contestable markets including innovative technology solutions.

7. **Competitive choice of technologies:** Broadband networks use several wire-based and wireless technologies with different transmission bandwidth, reliability characteristics and capabilities. It is recognized that it will not be economically feasible to deliver fibre optics to all communities in the near term. Where fibre connection is not practical, other technologies such as high capacity wireless broadband may be deployed.

8. **Policy responsiveness:** Technology, user needs and markets are highly dynamic. Therefore policy settings and programmes will be responsive and adaptive. Policies and regulations will embrace technological and competitive neutrality. Regulatory principles such as transparency and open competition will be applied to new technologies.

9. **Market-based investment:** Competitive markets in which service providers receive appropriate returns on their investments will drive the provision of broadband connectivity, applications and content. Where markets do not deliver services in a timely, affordable, efficient or equitable manner, government will intervene in the public interest. In all cases, commercially sound and sustainable investment will underpin decision-making and market operation.

10. **Promotion of a national value system that catalyses Vision 2030 and safeguards Kenya's cultural heritage:** Efforts will be made to ensure that utilization of the broadband is towards fulfilling the requirements of the constitution in regard to human rights to communication and information and in line with Vision 2030 of Kenya becoming a globally competitive and prosperous nation with a high quality of life by 2030.

2. National Benefits of Broadband

Broadband roll-out and access has the potential to generate enormous social economic benefits to various users and the general economy. This Broadband Strategy shall provide a coherent roadmap to a ubiquitous deployment of communicationsinfrastructure and strategies that are aimed at harnessing the opportunities that shall generate significant benefits in various sectors of the economy. Some of the general benefits that accrue from national access to broadband include:

1. **Economic growth and employment:** There is a significant proven correlation between broadband access and economic growth and development. Ubiquitous broadband services lower the cost of communication and can attract investment particularly in rural areas thereby stimulating local economic environments and increasing economic growth. Broadband networks have been shown to have a direct impact on employment – anincrease in broadband penetration would result in additional jobs.

2. **Promote IT enabled services:** The development of broadband infrastructure and ICT skills within the country will directly impact the success of the IT enabled services. one of the six priority sectors identified under vision 2013.

3. **Business opportunities and investment competitiveness:** Broadband will enhance both backward and forward economic linkages. Forward linkages will be enhanced through access to new domestic and international markets. Businesses will also benefit from enhanced backwards linkages, especially in the rural context, by gaining access to more suppliers and more competitive inputs subsequently increasing the competitiveness of their products. Further, a well-established ICT sector provides aconducive environment for business incubators. Business incubators nurture the development of entrepreneurial companies and those that are ICT-oriented would provide Kenya the opportunity to ascend to the level of a technological hub as envisaged in Vision 2030.

4. **E-government:** Ubiquitous access to fast-speed Internet in all parts of the country is an important input to the success of the e-government strategy. The National Broadband Strategy effectively addresses key related issues such as efficient backhaul, last mile broadband network and end user devices to support an efficient e-government strategy.

5. **National safety and security:** Interoperable broadband networks within the country and the region would support security agencies and other agencies to respond faster to emergencies and natural disasters. Broadband would, for example, aid communication of national security alerts on security websites and other relevant agencies in order to protect the public.

6. **Distance learning opportunities:** Deployment of broadband enables more people to engage in online learning. Distant learning powerfully expands education opportunities both for existing students and for those who may be unable to physically attend educational institutions.

7. **E&M-Health:** Broadband Internet access has the capacity to provide solutions to the constraints of healthcare delivery systems in the rural and other marginalized areas by facilitating roll-out of e-health applications in the country.

8. **E&M-Education and training:** Technology and skills play critical and complementary roles in increasing productivity, hence contributing to the economic development process. Broadband in Kenya will ensure availability of low-cost and quality education over the Internetand thus provide opportunities to students who are unable to get adequate education in a classroom setup. A National Education Transformation Program Policy to provide education-based Broadband Transformation could be considered in the medium to longtermreview and implementation of the strategy.

9. **Working and environmental benefits from telecommuting:** Deployment of broadband would most likely increase telecommuting. While employees would receive most of that benefit in the form of reduced travel time, society would also benefit to the extent that travellerswould not pay the full social cost of travelling such as pollution and traffic congestion. Reduced travel wouldboost societal welfare.

10. **Efficient frequency spectrum use:** Frequency spectrum is a natural scarce resource that is required for wireless services. A coherent broadband plan in Kenya would greatly derive maximum benefits from efficient utilisation of frequency spectrum by promoting sharing of infrastructure including spectrum and use of alternative technologies.

11. **Broadband for People Living with Disabilities:** For People with Disabilities (PwDs) in Kenya, broadband provides an important link to employment and education opportunities as well as inclusion in society. This group is typically employed at a lower rate than people without disabilities. Access to advanced technology at home would increase, for example, the availability of distance learning programmes that provide job certification among other preparations.

12. **Universal access:** Universal access to communication services depends on the level of deployment of communication infrastructure in a country. An infrastructure that is well spread across the country forms the basis of integrating cost effective technologies to reach the rural and remote areas. Telecommunication service providers are able to provide ICT services including telephone services to a wider population where infrastructure is well developed.

13. **Broadcasting services:** Broadband connectivity will enhance broadcasting by delivering multi-media content to the end-user in a variety of formats, and using different platforms in a converged environment. The implementation of NBS will therefore enhance the provision of broadcasting information to the majority of Kenyans and ultimately promote national, political, economic and cultural cohesion. Rural communities will be empowered to participate and contribute towards national socio-economic development.

3. Strategy

To advance towards achieving Vision 2030, the NBS capitalises on Kenya's strengths and improves on identified weaknesses to exploit opportunities and mitigate against challenges that may hinder the development, adoption, use, and growth of broadband services.

Major strengths include the availability of a National Economic Blue Print - Vision 2030; a Ministry dedicated to ICTs; requisite infrastructure such as roads; investment in alternative energy sources; an enabling fiscal policy regime; and a progressive constitution.

The following five key issues are core to national broadbanddevelopment, and as such form the basis for developing thisNational Broadband Strategy:

a)   Infrastructure, Connectivity and Devices
b)   Content, Applications and Innovation
c)   Capacity Building and Awareness
d)   Policy, Legal and Regulatory Environment
e)   Financing and Investment

In the following subsections, each of these strategic issues is explained, detailing the current status, addressing specific sub-issues and providing corresponding strategies that shall be adopted to address the issues.

3.1 Infrastructure, Connectivity and Devices

3.1.1 Current Status

3.1.1.1 Infrastructure

Kenya has made tremendous efforts to improve access to ICT infrastructure for voice and data services in order to enhance the development of the ICT sector.

The competitive environment in the mobile and data sub-sector has resulted in extensive and aggressive deployment of infrastructure in most parts of the country. Through wireless technologies, mobile operators are the primary providers of data/internet services in Kenya, accounting for 98% of total Internet subscriptions (CCK, 2012).

At the outset, the government defined distinct roles in the development of ICT in the 1999 national ICT policy.

In particular, the private sector was to invest in and implement ICT systems while the government, through the Ministry ofInformation and Communication, would be responsible for policy development. While this worked well in realizing rapid penetration and increasing coverage, it was clear that this investment was concentrated in and around urban areas and the along the Mombasa-Malaba corridor; secondly, the connectivity was focused on narrowband. This left out a large population in the rural areas without service requiring the government to intervene. The nature of intervention was to support further growth in the sector and reorient this growth towards the rural areas, broadband connectivity and affordability. On this basis, the government intervened in international connectivity, national fibre network and the last mile to complement private sector operators.

International connectivity has been the area of greatest concern for the government and has received strong attention over the last five years with great success.

Firstly, the MOICT spearheaded a private sector partnership to build TEAMS and this has inspired other initiatives. Today, four submarines cables, namely TEAMS, SEACOM, EASSY and LION provide international connectivity. Due to ensuing competition, the price of international bandwidth has come down significantly. At the national level, the government was concerned about the lack of adequate distribution of the capacity across the country. Once again, MOICT conceived and implemented a 4233 km National Optic Fibre Backbone Infrastructure (NOFBI), which was intended to link 80% of the districts and rural towns at the time of implementation. To extend the capacity to all parts of the country, the government is reviewing NOFBI with a view of extending and building additional links to enhance redundancy as shown in Figure 2.To complement NOFBI, the Ministry of Information, Communications and Technology is discussing a framework to develop a wireless broadband Network.

The government investment complements and is indeed a catalyst to the private sector who have invested heavily in ICT development spurred by competition overseen by the sector regulator. In the area of broadband, private sector operators have implemented fibre networks and 3G service with coverage in all major towns. Some of the operators are additionally pilot testing LTE. For the last mile broadband connectivity, operators are using Wi-Max.

In addition to the telecom operators, the sector regulatorhas licensed the energy utility firm to sell its excess dark fibre to the licensed operators. This complementary intervention by government has provided a very firm infrastructure foundation for broadband connectivity across the country.

To address costs, the government has used competition across the value chain as a tool to make bandwidth affordable.

This is inherent in the design of TEAMS where operators co-own the capacity and therefore compete on equal terms. In addition, the government intends that access to NOFBI be on an open-access principle.

There are notable challenges in the value chain.Whereas NOFBI is a very strategic intervention, there is a need to review its management to provide more reliable service. Price is not as significant an issue as the quality of service provided by NOFBI. More links shall need to be added to address redundancy in certain parts of the country. International redundancy also needs to be addressed as noted in the cutting of submarine cables experienced in 2012 in Mombasa. Also, there is a need to expand the network to cover more areas, to allow operators (including mobile phone as well as broadband services and ISPs) to reach citizens in more remote areas.

The dynamic and rapid evolutionary nature of technology poses a challenge to long term planning of broadband technologies. This means that the current and upcoming infrastructure may not support future applications that will necessitate continuous upgrades.

3.1.1.2 Local Access Network Connectivity

Last mile access continues to pose the greatest challenge to connectivity and operators are promoting multiple solutions to address unique challenges. In the urban areas and particularly Nairobi, there is a high level of competition
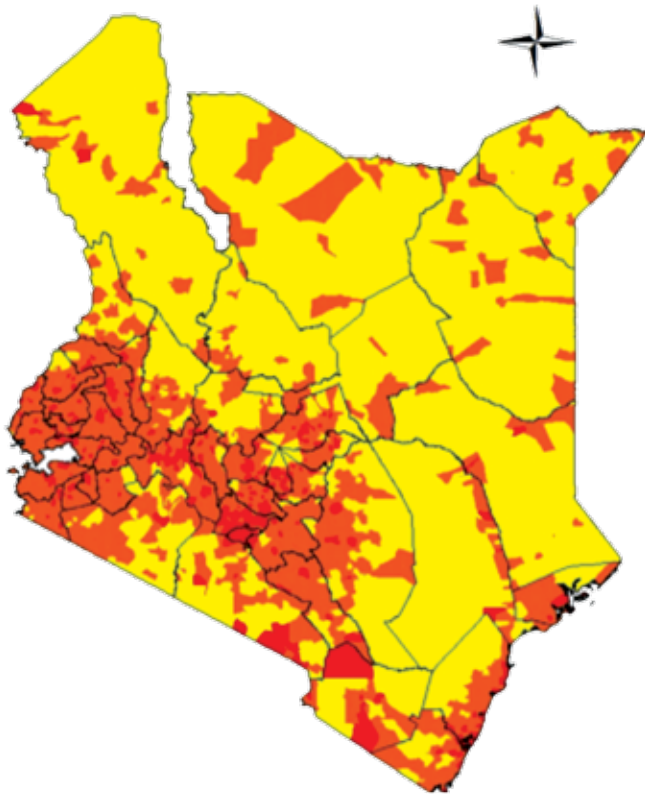
Figure 2: NOFBI Coverage

Key:
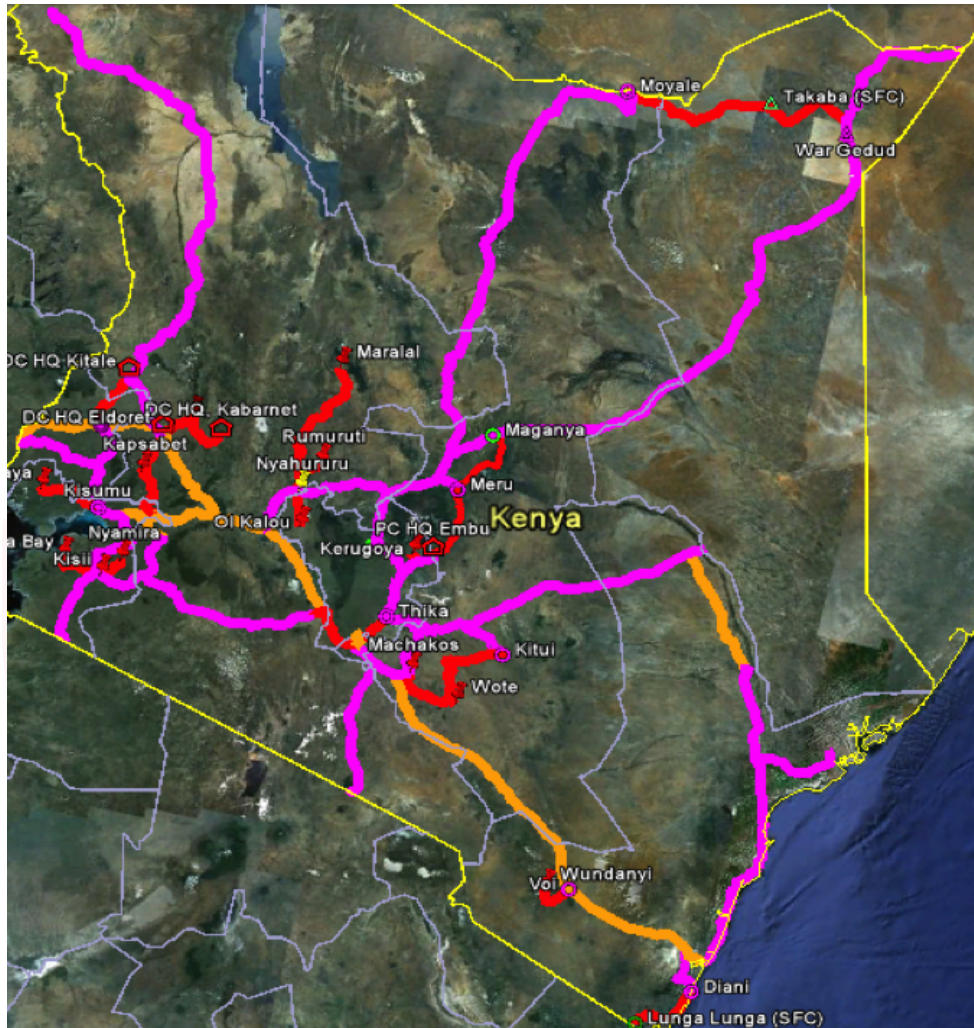
▬▬▬ (red)	OFC (New) of NOFBI Phase 2
▬▬▬ (purple)	OFC (Existing) of NOFBI Phase1
▬▬▬ (orange)	OFC (Existing) of Private Operators

Source – Communications Commission of Kenya

Figure 3: Service Access Gaps

Key:
- **No Service** (yellow)
- **Voice Services** (orange)
- **Voice and Data** (red)

Source – Communications Commission of Kenya

on fibre networks among operators who have implemented metro rings. Thus in up-market areas, fibre to the home is now being promoted, bringing with it high speed services including triple play. This complements 3G, which is now widespread in all urban areas. Similarly, the legacycopper lines albeit diminishing are available in urban areas and providex DSL. A final option is the use of fixed radio access and especially Wi-Max. Last mile access in the urban areas is not a challenge but it is to the expansive rural areas where much still needs to be done (see Figure 3 on service access gaps).

While the rural areas are not homogenous, sparse population, capacity to pay for services, and literacy among others factors compound the rural challenge. Other issues include poorly maintained or outright lack of access roads, commercial power availability, and security for the installations. In addition, wayleave is being arbitrarily levied by local authorities. The levies in some cases are sohigh that they dissuade operators from running fibre in some of the towns. Equally, landlords have perceived fibre and radio installations as a lucrative source of revenue and demand payments that increase the cost of the service. Finally, the lack of a clear spectrum policy is a key challenge faced by the industry and potential investors. It erodes the confidence and predictability necessary to promote a robust and vibrant Broadband market. Spectrum plays a very significant role and is often the only option to provide connectivity solutions. When the fee is uniform across the country, the fees paid for rural operations, which cover far fewer paying persons per coverage area than urban services, become a penalty to rural operations. In addressing this, in 2012 CCK reviewed spectrum fees for rural areas. This fee reduction for spectrum utilised in rural areas went a long way to mitigate this challenge.

Innovative efforts have been employed by operators in order to help address rural area challenges; key among these is an infrastructure-sharing framework to help operators share costs of rural networks.

3.1.1.3 Supporting Infrastructure

With the ushering in of competition, the telecommunications sector has rapidly grown and spread across the country much faster than supporting infrastructure. Thus, there are many sites that are off the power grid and therefore operators have to use diesel generators on a 24/7 basis. This poses a challenge on re-fuelling especially where the road network is poor. Also, the consumers need to charge their phones periodically and alternatives are limited. Where the road network is poor or non-existent, operators have to build and maintain the road network just to reach their base stations. These costs are never reimbursed even when the Ministry responsible for roads decides to take over the road.

Subsequently, the telecommunications sector has little choice but to fund non-telecommunications infrastructures – roads, diesel power generation or pay to expand the electrical grid across long distances, and wayleaves for public access, among others. These costs have a significant impact on the costs of last mile access in rural areas.

Green Energy is another infrastructural sub-issue. Kenya enjoys clear sunshine almost all year round, but unfortunately use of solar power for remote base stations has not been fully tapped. Operators blame this on very high capex per KW of power produced. Government has intervened to reduce the tax burden but has not significantly alleviatedcapex outlay. Wind power is another option and is now being commercially exploited near Nairobi, andlarger operations areexpected to be launched in other parts of the country. At the same time, new developments in base station technology permit the installation of smaller, localized cell sites that require substantially less power than larger base stations, while costing less to deploy and maintain. While operators are piloting these options, they have not yet realised significant results.

Table 3: Strategy for Infrastructure, Connectivity and Devices

Sub-Issue	Objectives	Outcomes	Strategies
Quality broadband network	Provide quality broadband services to all citizens	Improved quality of life in the way citizens work, live and learn	• Avail sufficient spectrum for Wireless Broadband Networks. • Government sponsored PPPs to fund infrastructure development. • Use of Universal Service Fund to extend broadband network penetration. • Enhance regulatory oversight with respect to quality of service.
Coordination and complimentary services	Provide a harmonized and enabling environment for infrastructure deployment	Reduced cost of deploying and operating broadband networks	• Provide a framework for synchronized planning of civil and ICT data projects. • Promote and ensure operators share common infrastructure. • Government to provide rebates/tax incentives for operators providing complimentary services (utilities) in marginalized areas.
Accessibility and affordability	Provide accessible and affordable broadband services to all citizens	Increased demand for and use of broadband services	• Government to provide subsidies for access devices. • Promote local production of access devices. • Promote and avail online local content (e.g. e-Govt. information and services) to spur demand. • Continued expansion of power, road, security infrastructure across the country. • Review regulatory framework to optimise spectrum. • Re-farm and avail additional spectrum to enhance last-mile solutions.
Availability and reliability	Develop a robust and reliable back-bone for the broadband network	A rich, interruption-free broadband experience	• Establishing redundancy at the International gateways and Landing Points. • Establishing redundancy within the domestic network (county level). • Building data-centres of international standards. • Enhance capabilities of Local Exchange Points.

3.1.1.4 Devices

The vibrancy of the Kenyan market has attracted global ICT industry giants such as Huawei, ZTE and Cisco that have set up locally in collaboration with local operators. This gives the country access to alternative and affordable ICT infrastructure connectivity devices that are customized to meet the needs of the majority of Kenyans.

However, it is clear that the cost of advanced ICT devices, from computers and laptops to smart phones and tablets among other hardware requirements, remains a significant deterrent to broadband ICT expansion and adoption especially among rural citizens and other low-income communities. There are many choices available, and prices continue to drop for many types of devices, but these are still beyond the reach of a large proportion of the population who might otherwise be interested to learn and use broadband-based services.

Kenya's reputation as a progressive country with foresight and with an innovation culture has opened up opportunities for Kenyans to participate in the global economy. Increasing the use of broadband and ICT also has the potential to enable Small and Medium Enterprises (SMEs) compete effectively with larger companies by exploiting the new business opportunities that will be created by use of new and rapidly growing technology areas like e-commerce which is envisioned to extend beyond the Kenyan borders.

At the same time, there is the opportunity for local manufacturing assembly and fabrication of ICT equipment required for broadband to address the fact that devices will be required that address local issues at an affordable cost while creating jobs.

3.1.2 Strategy

This section deals with the strategic issues related to Infrastructure, Connectivity and Devices necessary to deliver broadband services and proposes specific

strategies to address the current challenges while outlining the expected outcomes for each intervention.

A summary of the key strategic issues is presented in Table 3 followed by a detailed analysis.

The first strategic issue focuses on the Infrastructure, Connectivity and Devices necessary to deliver broadband services. A high-quality physical and core network is requisite to availing broadband services. In addition, facilitating access to such a broadband network by the citizenry is necessary to stimulate and optimize use of the broadband network. The NBS addresses this issue in four sub-issues, namely:

- Providing and extending a quality broadband network,
- Coordinating and complimenting its construction,
- Accessibility and affordability, and
- Availability and reliability.

'Currently the availability of broadband services is limited to urban areas and covers only 18% of the Kenyan geographic space '

Considering that currently availability of broadband services is limited to urban areas and covers only 18% of the Kenyan geographic space, there is need to provide ubiquitous quality broadband services to all citizens. Providing and extending a quality broadband network across the country will lead to improvement in the quality of life of citizens in the way they work, live and learn using the broadband network.

Spectrum is a central issue to the realisation of the NBS, subsequently the sector regulator is expected to provide sufficient spectrum in order to realise a ubiquitous broadband network.

The strategy recommends a clear and comprehensive spectrum plan that indicates availability, allocation plans and utilisation of spectrum for Broadband use.

The plan should provide information on digital dividend and the corresponding allocation mechanisms for it. The strategy anticipates that the spectrum plan shall be availed every five years starting from 2013 in order to meet the expected growing demand for wireless broadband services and in response to network expansion and technology upgrades. It is also expected to provide greater transparency and predictability, which is necessary to promote investment.

The second sub-issue deals with coordination and complimentary services related to constructing the broadband network. The often un-coordinated and disparate infrastructure initiatives are key weaknesses that result in unwarranted duplication of resources that ultimately leads to higher cost of services and inhibits further roll-out of networks. To this end the government will develop a policy to set clear guidelines for operators to share operator-specific infrastructure to avoid duplicating infrastructure in the same areas. Likewise, harmonising related infrastructure development by relevant ministries such as roads and energy to ensure provision of cable ducts in the design of roads, pipelines, railways and power lines will go a long way in alleviating the cost burden of deploying fibre networks. Considerations to provide incentives and rebates to operators extending roads and power may be necessary.

By ensuring adherence to minimum construction standards in the laying of fibre, specifically related to the depth of laying cable, accidental damage to fibre and the subsequent disruption of services shall be minimised.

In order to address the impeding perception by developers and Local Councils that fees for way leaves and access rights by ICT service providers should be maximised, there is an immediate need to emphasise the importance of ICT infrastructure in towns and buildings with the ultimate goal of reducing and eventually eliminating such barriers that significantly increase the cost of infrastructure deployment.

There are challenges related to accessibility and affordability of broadband services especially with respect to access devices such as computers, smart-phones, set-top boxes, amongst others. In mitigating this, the strategy proposes that government subsidises and/or zero-rates

tax and duty on access devices. Initiatives to support local manufacturing of access devices such as set-top boxes should also be encouraged. Strategies to promote online local content will spur demand and eventually reduce the cost of access as a critical mass of users is realised.

The strategy proposes that for some purposes, such as providing ICT facilities for schools and medical clinics, it may be important to ensure that direct funding support for devices is available as an integral element of service delivery for target users. In other respects, measures to help reduce prices and expand availability for devices among the broader population may also be justified as a means to help stimulate demand for broadband ICT, which could in turn drive down costs and increase benefits for everyone. But such programmes should also work closely with suppliers, service providers, and government agencies to allow market forces to help deliver the devices that people need at the right prices, wherever possible.

The technology and choices available among the many different types of end-user equipment are so broad and change so rapidly that it would be risky for Government to attempt to dictate what devices customers should use. The most effective programs will provide the right form of stimulus and financial assistance while leaving choice ultimately in the hands of the marketplace.

Regular surveys to determine the state of broadband with regard to broadband supply (infrastructure, connectivity and devices), demand, and adoption is key for informed decision making inaddressing accessibility and affordability of services.

The reliability of the network in relation to quality of service is a key sub-issue that affects the degree of uptake and usage of broadband services. Unreliability of broadband services, resulting in poor Quality of Service (QoS), is largely related to cable cuts that affect both the domestic and international links, vandalism, power supply interruptions and lack of network redundancy. The establishment of a robust and reliable backbone for the broadband networkwill mitigate this and ensure an interruption-free broadband experience to citizens.

The strategies addressing availability and reliability include establishing redundancy both at the international and the domestic levels of the broadband networks. Building datacentres of international standards will attract international content that will be hosted and accessed locally. Enhancing capabilities of local Internet Exchange Points will also provide redundancy with regard to accessing local content. Reliable and sufficient energy supply across the country is also necessary to ensure un-interrupted provision of broadband services.

3.2 Content, Applications and Innovation

3.2.1 Current Status

The availability of a robust broadband infrastructure enables the provision of information content and related application services and facilities that are intended to improve a society's quality of life. Information content covers all forms of electronic software and content from online information services to communications networking applications to Eand M-Government and E and M-Commerce. Vision 2030 recognizes ICT as an enabler of the various sectors of the Kenyan economy and indeed developed ICT specific flagship projects. This recognition strengthens and at the same time challenges the ICT sector to provide relevant content to meet the needs of the citizenry.

Kenya's cultural diversity provides a wide pool of indigenous content that can be made available for cultural heritage and preservation in line with the constitutional requirements. In addition, the country already has a functioning manual-based business context accruing non-digital content that is readily available for digitization despite the high cost of the process.

'There are notable weaknesses that threaten the development of local content, applications and innovative services that are relevant and appropriate to the general citizenry.'

Despite Kenya being a fast adopter of technological services, there are notable weaknesses that threaten the

development of local content, applications and innovative services that are relevant and appropriate to the general citizenry.

These weaknesses include general non-alignment between demand and supply (for example ignorance of content creators on national agenda and national interests), low or inexistent synergy/collaboration exacerbated by a value system that does not encourage sharing or openness between creators/service, and the absence of quality assurance mechanisms for online content. Further, the Kenyan consumer has a preference for low-cost/low-priced products and a tendency to distrust online content which contribute to the slow pace of local online content, applications and innovations.

While it is widely recognised that the cost of digitizing existing content shall be high, broadband will provide opportunities for efficient and effective interaction between the Government and its citizens enhanced by the mandatory use of Government online services.

'Kenya's central geographical location provides an advantage for attracting both local and international content on its Internet exchange points,

Further, Kenya's central geographical location provides an advantage for attracting both local and international content on its Internet exchange points that shall ensure optimum and efficient use of our broadband infrastructure and content generation.

In addition the Internet, supported by high-speed broadband, promises to create major opportunities in all sectors of the economy. Embedded devices like pace makers in healthcare, bio-sensors, RFID tags for security, and concepts like smart cities are all examples of areas that will greatly benefit from high speed broadband.

Availability of local content is a challenge that presents an opportunity for all inclusive job creation from blogging to

the building of the necessary infrastructure and platforms that enable capable citizens generate their own content.

The fact that Kenyans are generally content consumers means the country ends up paying much more for international bandwidth in comparison to hosting the content locally.

Broadband is key to fostering an agile and ubiquitous online Government. In this regard, there is need to emphasise the importance of policy and governance models; and to assist Government in the process of developing sustainable online Government implementation by optimising the range of possibilities for extending the outreach, efficiency and effectiveness of public services. The government's goals to provide electronic services to citizens across the country should be closely coordinated with infrastructure and access strategies, including those implemented under the USF, as well as other aspects of the broadband strategy.

There are a range of services that can be delivered more effectively using ICTs, and both the national government and local administrations can take advantage of these services to increase their connections with the public and communities, while improving efficiency and transparency. Deployment of e-government capabilities will also help expand awareness and provide additional opportunities for training in use of ICTs.

The challenges of e-government include both network connectivity as well as software application development and capacity building. The most important reason for co-ordinating e-government implementation policies with universal service and broadband development is to ensure economies of scale from shared infrastructure investments and service delivery.

Ideally, there should be an integrated national public network that combines the traffic and services of all government departments from education to health to public administration including the links between national and local government offices.

The broadband capacity needed to connect these users should also be part of the integrated national (fibre)

backbone as well as local broadband access networks;this will increase savings and provide greater incentives for private investors to build out these networks.

Similarly, development of e-government applications should come from co-ordinated programs of software and content development, which can serve both public and private needs. Whenever applications are created for government that utilize broadly relevant tools or content – for example user interfaces in indigenous local languages – it would be most cost-effective for these platforms to be shared among many developers and applied to creation or modification of multiple applications wherever possible. This can be encouraged by strategic financial support from the USF, and coordination among different stakeholders under the broadband strategy.

3.2.2 Strategy

Lack of digital content and applications that have local relevance is a major hindrance to broadband uptake. This issue manifests itself in three dimensions which are identified as sub-issues that will be addressed. The first sub-issue is related to availability of local content in digital formats. Even though there is no shortage of digital content globally, it is digital content that has local relevance that is important for broadband uptake locally. Copious amounts of local content exist such as our cultural (indigenous) content, paper-based content especially in Government, as well as other data (e.g. weather data and traffic data), but which is not in digital form. The objective therefore is to convert non-digital content into digital forms and to promote collection of relevant data in digital forms.

A related sub-issue is access to digital content. Even if the content were available in digital form, there is a lack of applications (software and hardware solutions) that serve this content to local consumers. For example, digitizing core government registries avails public data in digital form.

However, without applications that enable online service delivery, the perceived value of digitizing the registries would not be realised. Development of high quality applications targeting local consumers remains a challenge for various reasons including a lack of appreciation of local needs by content creators and application developers, lack of sufficient highly-skilled technical expertise as well as an ineffective process of developing, protecting and offering

sustainable online services. There is a need therefore to promote development of high-quality relevant applications that avail local digital content to all.

Relevance is a key determinant on whether local content will be consumed and whether the content will contribute to socio-economic development in line with the broadband vision since if the content is not relevant to local needs then broadband will not be useful. Innovation is the process by which content creators and application developers match their products to the needs of local consumers, thereby

creating relevant content and applications. The prevailing unstructured innovation chain, especially with respect to innovations that integrate ICTs, has been identified as another sub-issue that inhibits development of relevant content and applications. This is characterized by a lack of collaboration between diverse skill sets (technical, creative, R&D, legal, marketing, business and entrepreneurial) that are critical for successful and sustainable innovations; lack of funding; and poor enforcement of IPR protection. The objective therefore in addressing content relevance is to institutionalize the innovation value chain with the overall aim of nurturing a thriving innovation ecosystem that will lead to an increase in innovations that address local needs.

To address this strategic issue and related sub-issues, the objectives and strategies to be pursued and outcomes to be realized are shown in Table 4.

Table 4: Strategy for Content, Applications and Innovations

Sub-Issue	Objectives	Expected Outcomes	Strategies
Availability of local content in digital form	Avail local content in digital form	Increased availability of local digital content	• Digitize existing local content • Capture new local content • Create public awareness on available online content
Access to local digital content	Promote the development of quality, relevant applications that enhance access to, and use of, digital content	Increased availability of applications that serve digital content	• Promote development of relevant applications to serve content online • Promote development of solutions for universal accessibility • Provide incentives for businesses to offer online services • Develop standards and guidelines for quality assurance of applications • Fund R&D to identify viable solutions • Create public awareness on available applications
Unstructured Innovation chain	To institutionalize the innovation value chain	A structured, well-funded ecosystem that generates innovative and quality solutions to enhance access to digital content	• Establish certified incubators across the country • Create a one-stop shop to support and promote innovation services to incubators • Establish an innovation fund • Undertake capacity building to strengthen technical skills of content and application developers

3.3 Capacity Building and Awareness

3.3.1 Current Status

Kenya's adult literacy rate is estimated at 87% (UNICEF, 2003). This implies that Kenya, whose citizens value education, has an opportunity to enhance the general populace literacy to include digital literacy. In addition, the high rate of mobile penetration of 71.3% (CCK, 2011) is indeed an indication of the 'technology thirst' available in Kenya that provides a base upon which capability can be enhanced to use appropriate emerging technologies, services and applications.

In addition, 75% of Kenya's population is youthful and readily willing to learn, adopt, and adapt to new technologies.

This youthful population accounts for a critical mass interested in ICT and available to participate in the sector as application developers, content creators, and technical support when appropriate technical skills are acquired.

There is a skills gap both in the technical aspects involving the development of broadband infrastructure and the general citizenry in the basic use of ICTs.

The current curriculum in basic and higher learning institutions does not adequately address the current and future ICT needs.

There is an obvious opportunity to build capacity for the ICT industry and at a national level as a means of increasing ICT literacy. Efforts to integrate ICT into the formal education system as recommended in the proposed primary school ICT curriculum, and the on-going creation of ICT laboratories in public secondary schools, provide another platform to empower a large pool of potential users of broadband services. Training in emerging technologies such as the IPv6 and mobile broadband are required as the country moves

towards their deployment in globally positioning the country. In developing goals and targets for school connectivity, it will be very important to coordinate with Education officials at the national and local levels to identify needs and appropriate solutions. At the university level, the KENET national university network should be strengthened and utilized to its full potential, and ideally integrated with secondary school networks. It will also be important to ensure that e-Learnings initiatives are coordinated with network and service rollouts, along with adequate ICT training for teachers and administrators.

The presence of broadband services can provide enormous opportunities to Kenyans. However, the slow uptake of e-government services is attributed to low IT literacy skills resulting in poor knowledge in identifying credible sources of information and inability to consume sophisticated products. Low IT skills also contribute to lack of awareness of consumer rights and legal provisions provided for by the products such as quality of service provisions in consumer Service Level Agreements (SLAs).

Shared points where people can meet to use ICT services have been promoted over the last 10 years by different organizations and with different configurations. In the late 90s and early 2000s, these points of access were broadly referred to as telecentres. In 2005, the government started taking a serious view of telecentres as confluence points between the citizen and the government and also as an opportunity to empower the rural population with livelihood opportunities. MOIC promoted the digital village concept as a tool in the rural areas to engage the community in empowerment activities. Under the Kenya ICT Board, the government is supporting the establishment of 290 digital villages in all the 290 constituencies. These digital villages are intended as pathfinders to catalyse more private-sector-led or community-driven initiatives across the country.

The digital village concept or variations by various promoters will continue to be a very important tool to engage and sensitise those outside the digital divide. It is however necessary to broaden the indicators of success beyond financial returns. Being pathfinders, such initiatives will often spur new digital villages in the neighbourhood which often cannibalise the incumbent digital village.

Thus, while sustainability of telecentres is a key issue, it is ultimately the impact of these facilities on the overall ICT environment and market rather than their own specific survival that is most important.

While the majority of young people in Kenya are interested in ICT programmes, a recent evaluation of IT skills in Kenya (KICTB, 2011) has shown that there is a gap in the high-end talent pool of the IT skilled workforce. In particular, of the total 27,000 IT professionals in Kenya in 2010, IT support people represent the largest portion (27%), followed by Applications Systems Analysts and System Engineers (13% each). This can be attributed to focusing on Science, Technology and Engineering (STE) curriculum as opposed to encouraging creativity and problem-solving to enhance availability of technical skills required to develop, maintain and sustain vibrant broadband-supported services are dramatically underrepresented in ICT programmes. Measuring and increasing their participation has the potential to significantly increase the overall talent pool of the country.

The fact that the use of ICTs may be considered disruptive to the traditional way Kenyans work, live and learn shall be mitigated by a nationwide ICT literacy and awareness campaign that should gradually increase adoption and usage of ICTs.

The success and positive impact of broadband in Kenya depends on the capacity and ICT skills of the citizens to use these services resulting in citizens thriving in an information society, and enhancing the infusion of ICTs as a lifestyle in Kenya.

3.3.2 Strategy

Human capacity remains the biggest strength that a country can harness for development. With respect to broadband, it is important to distinguish between two aspects of human capacity – supply and demand. Supply focuses largely on the technical skills required to develop, manage and maintain broadband services; while demand focuses on digital literacy skills and awareness creation that empower the general citizenry to consume and leverage broadband services. Capacity building and awareness is therefore a strategic

issue that will be addressed to accelerate broadband uptake and utilization. There are four related sub-issues that have been identified in relation to this, namely:

• Digital literacy,
• Awareness, and
• Technical skills,
• Co-ordinating capacity building and awareness activities.

Widespread broadband uptake and utilisation requires a digitally literate citizenry. Further, the ability of the end-user to leverage digital content for enhanced social or economic value requires that they have the capacity to understand and apply the knowledge contained therein. While the end-user's capacity is a function of the individual's knowledge level and reasoning capability, widespread broadband uptake and utilisation requires citizens empowered with ICT to access and use broadband services in a knowledge-based society. Programmes should particularly target women who tend to have much lower levels of digital literacy and thus less motivation and capacity to utilize broadband technologies. Digital literacy should therefore be addressed at all levels of the society – within the educational sector by addressing ICT issues such as curricula, the scope of facilities and services that will be provided to different types of schools in different settings, and the funding contributions from various entities that will be required; and in the general populace by engaging in nation-wide digital literacy training. In addition, there is need to raise awareness on the availability and usefulness of broadband services so as to spur uptake.

Technical skills are essential to facilitate the supply side of broadband services. Technical skills are required for the installation and management of broadband infrastructure and services as well as in the development and provision of high-quality local content and applications. There is a short supply of high quality technical expertise that is needed to support widespread broadband development. Compounding this problem is the lack of standard curricula in areas such as ICT and engineering training, as well as a mis-alignment of existing curricula with the technical needs of the country as we transform into a knowledge-based society. To address this sub-issue, it is important to enhance quality standards for curricula development,

implementation and assessment at all education levels.

The third sub-issue is awareness targeted at end-users both in the public and private sector, as well as the general citizenry. This is a central issue as evidenced by the low understanding and appreciation of the importance of ICTs for socio-economic development by decision and policy makers, the slow adoption of e-services nationally, and the existence of cultural barriers including technophobia which hinders adoption of ICT as a way of life. This issue is addressed in this NBS since successful adoption and utilization of broadband hinges on developing a vibrant techno-centric culture. The objective of addressing this is to improve awareness of existing and emerging technologies, services and applications, and their usefulness at all levels and sectors of society.

Currently, disparate institutions and agencies undertake capacity building and awareness activities in a highly uncoordinated fashion resulting in duplicated efforts and inefficient use of resources. There is also a related challenge of access to well-equipped ICT knowledge centres and citizen service centres where capacity building and awareness activities can be undertaken effectively. The objective of addressing this is to harmonize, enhance, consolidate and improve access to capacity building and awareness initiatives.

The set of objectives, strategies to be pursued, and expected outcomes to address this strategic issue and related sub-issues are given in Table 5.

Table 5: Strategy for Capacity Building and Awareness

Sub-Issue	Objectives	Expected Outcomes	Strategies
Digital Literacy	To enhance digital literacy skills in the population	A digitally-literate citizenry capable of participating in a knowledge-based society	• Implement e-Government's curriculum on citizens' digital literacy • Implement KIE's primary-school level ICT curriculum • Review and implement secondary school, TVET and TTCs ICT curricula in line with the required skills for a knowledge-based society • Ensure digital literacy for women is comparable
Technical expertise	To develop sufficient quality technical expertise	Increased high-end technical talent to develop, manage and maintain broadband services	Enhance quality standards for higher education curricula implementation and assessment of core technical programs
Awareness	To create awareness of existing and emerging technologies, services, and applications at all levels and sectors	Improved awareness of technologies, services, and applications at all levels and sectors	• Use various media platforms to create awareness • Deploy mandatory use of e-services on different platforms in all sectors • Create and disseminate multilingual publicity content
Coordination of and access to capacity building and awareness activities	To harmonize, enhance, consolidate and improve access to capacity building and awareness initiatives	Better coordination of capacity building initiatives and improved access to quality capacity building and awareness services	• Strengthen coordination of capacity building initiatives • Establish capacity building centres and strengthen existing ones

3.4 Policy, Legal and Regulatory Environment

3.4.1 Current Status

The fact that Kenya has a converged regulatory authority – the Communications Commission of Kenya (CCK) – is a key advantage. CCK has provided regulation that promotes investment, equity, affordability and access of services. Once operationalized, the Universal Service Fund (USF) is expected to provide an incentive to the roll-out of ICT services in the underserved and un-served areas.

The Government, in recognition of the key role of ICT, has put in place the National ICT Policy of 2006 and a legal framework to support the sector (GoK, 2009). In addition, the constitution and other legislations (Consumer Protection Act, 2012; Regulations 2010; Competition Act, 2010; Persons with Disabilities Act, 2003; and Draft laws on Data Protection and Access to Information) augment the existing ICT-specific policy, legal and regulatory frameworks to accommodate a wide scope of issues related to the progression of the ICT sector such as access to information, security and data protection.

> One of the current limitations is the fact that broadband is not adequately addressed within the current national policy, legal and regulatory framework.

With broadband being globally recognised as a fundamental development factor, it merits consideration as a critical national infrastructure. One of the current limitations is the fact that broadband is not adequately addressed within the current national policy, legal and regulatory framework. In addition, there is no clear legislative provision on public sector participation in relation to broadband infrastructure/services.

While there is limited policy and legislative considerations for broadband, the new constitutional dispensation creates an opportunity to develop and implement a progressive legal framework aligned to other national and international policies and laws for ICT and broadband-related issues.

This also provides a window for the development of a robust legislation on international cyber terrorist attacks and other relevant and important concerns.

3.4.2 Strategy

For effective and efficient deployment and utilization of services delivered and accessed through broadband, and enabling and facilitating policy, legal and regulatory environment is needed The fourth strategic issue focuses on the policy, legal and regulatory environment. For effective and efficient deployment and utilization of services delivered and accessed through broadband, an enabling and facilitating policy, legal and regulatory environment is needed. This is expected to fast track the fulfilment of the requirements of the new constitution that provides the broader framework for the governance of ICTs aimed at enhancing access through enabling legal and regulatory environment. Vision 2030 envisions a globally competitive and prosperous Kenya. In addition, in the new constitution, some rights to citizens have been defined. The Bill of Rights has touched on fundamental rights and freedoms with focus on access to and use of both infrastructure and content, while governance principles and structures are mainly concerned with regulating access and implementing constitutional requirements on content transmitted through the infrastructure. The specific Constitutional aspirations for ICTs under the Bill of Rights are detailed in Annex 4.

The Constitutional aspirations envisage access to, use of, and benefit from ICT services. The current policy, legal and regulatory status has not addressed the above issues adequately. The extent to which the issues have been addressed through the existing policies and regulations is summarized in Table 6. To address the above constitutional requirements and existing policy and regulatory gaps, two strategic sub-issues have been identified namely policy framework on broadband, and legal and regulatory framework on broadband.
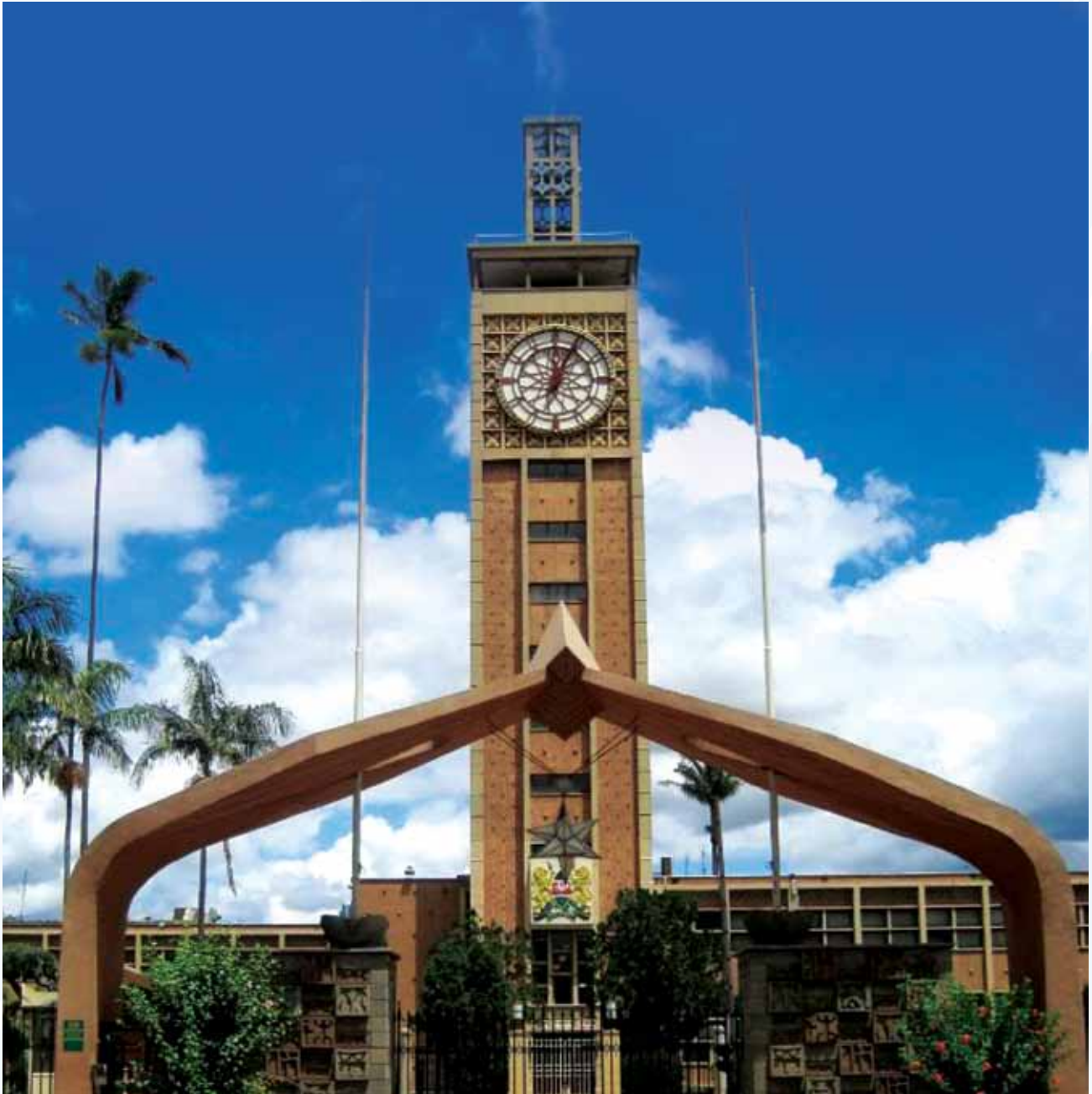
Table 6: Status of, and Recommendations for, Policy and Legislative Environment

Issue		Current Status		Way Forward	Responsibility and Time Frame
		Policy	Legislation (Acts and Regulations		
Rights and Fundamental Freedoms specific to ICT	Privacy - Article 31 Freedom of media - Article 34 Access to information - Article 35 (Access to information held by public institutions available on online platforms through broadband services) Intermediary liability with respect to data transmission	All rights recognised under the Constitution. Data Protection and Freedom of Information Policies in place	A. 31 - Data Protection Bill to be tabled in Parliament A. 35 - Access to Information Bill to be tabled in Parliament A. 34 – Media Bill and ICCK Bill under discussion Intermediary liability legislation not harmonised	Implement proposed legislation Harmonisation of legislation on intermediary liability	MoICT and other stakeholders e.g. CIC, Attorney-General, Kenya Law Reform Commission 2013
Rights and Fundamental Freedoms in general	Freedom of expression - Article 33 Culture – Article 11 Intellectual Property Right - Article 40 Consumer Protection - Article 46, including QoS and SLAs	All rights recognised under the Constitution. Policy gap on fostering creativity and artistic expression (A.33 and A.11)	Various Acts catering for IPRs: Trademarks Act, Cap 506 Anti Counterfeit Act, 2008 Industrial Property Act, 2001 Copyright Act, Cap 130 Consumer Protection legislation: Consumer Protection Act, 2012 Kenya Information and Communications (Consumer Protection) Regulations 2010 Competition Act, 2010 International instruments and benchmarks Other national legislation e.g. Trade Description Act	Review legislation dealing with Consumer Protection to cater for broadband specific issues.	Consumer Protection –MoICT 2014
				Effective enforcement e.g. IPRs.	IPR – Ministry in charge of Trade, KIPI, other stakeholders (continuous)
				Establishment of Policy on creativity and artistic expression	Creativity and artistic expression policy- MoICT, and Ministry in charge of National Heritage and Culture 2014
Inclusion of special groups	Persons with Disability (PWD) - Article 7 and 54 Language and Culture - Article 44 Marginalised groups - Article 56	Recognised under the Constitution. Government institutional framework recognises these groups	Persons with Disabilities ACT, 2003	Policy and legislation to be reviewed to cater for requirements of PWD and other special groups in using ICT services e.g. e-Accessibility Policy and legislation	MoICT 2015

Table 6: Status of, and Recommendations for, Policy and Legislative Environment (Continued)

Issue	Current Status		Way Forward	Responsibility and Time Frame
	Policy	**Legislation (Acts and Regulations**		
Sustainable Environment	Environment - Article 69	Policy catering for environment issues in general exists Government institutional framework to recognise these groups Draft Infrastructure Sharing Policy and Industry Code of Practice provides for environmental aesthetics Need for E-Waste Management Policy (both infrastructure and consumer terminals)	Environmental Management and Co-ordination Act 1999 No specific e-waste Management Regulations in place	Establishment of E-Waste management policy and regulations by 2014	(e-Waste) Ministry in charge of Environment and Mineral Resources, NEMA 2013
				Finalisation of the draft policy on infrastructure sharing and implementation Implementation of Industry Code of Practice	(Infrastructure Sharing Policy, Code of Practice) MoICT, the ICT Regulator 2013
Governance and Infrastructure	Devolution and access to services - Article 6, 176, Fourth, Fifth and Sixth Schedule Institutional framework that caters for management of public-funded national ICT infrastructure	Recognised under the Constitution.	County Authority Act (Part IX, XII), other Acts	Harmonisation of county and central government issues as they relate to ICT e.g. roads authorities, way leaves, cable and pipe locating devices, safe digging practice, associated levies Amend legislation to require providers of physical infrastructure (roads, railway, pipelines, power lines, property developers) to make provision for future installation of ICT infrastructure	Ministry in charge of Roads, County Governments
Cultural Barriers	Techno-phobia Literacy Cultural taboos Household dynamics	Constitution seeks to address these barriers	No specific legislation required	Public awareness to close the gap Address cultural barriers that discourage or prevent women and girls from accessing broadband services	Ministry of State in charge of National Heritage and Culture with the assistance of MoICT 2013

Table 6: Status of, and Recommendations for, Policy and Legislative Environment (Continued)

Issue		Current Status		Way Forward	Responsibility and Time Frame
		Policy	**Legislation (Acts and Regulations**		
Trust and Security	Cyber-security Network security, taking into account redundancy and diversity/restoration Robust e-commerce framework Other e-services (e-health, e-education, e-agriculture, etc.) Capacity building in the justice system	No harmonised policies relating to trust, security and e-commerce Network integrity recognised in ICT Policy Guidelines (2006)	Draft laws on Data Protection and Access to Information No legislation recognising ICT as critical national infrastructure	Need for specific legislation Recognition of ICT as critical national infrastructure and putting in place appropriate legislation.	Legislation – MoICT 2013
				Liaise with the Kenya Police Service and the Judiciary to put in place appropriate structures to address cyber-crimes e.g. ICT court, ICT Police Unit Enhanced regulations on enforcement of provisions of network integrity	Justice system reforms, network integrity - MoICT, the ICT Regulator, Kenya Police Service, Judiciary 2015
Affordability of ICT Services – Taxes	Consumer taxes on end-user devices - VAT Consumer taxes on ICT services – VAT, excise duty Direct taxes on infrastructure – import/customs, excise duty, VAT, other fees	No specific policy addressing issue of affordability Need to provide for a policy that minimises effect of taxation on affordability of ICT under-user equipment and services Benchmark on existing international best practice on the matter. Need to harmonise EAC policy on the matter.	No specific legislation.	Provide for this matter under national Finance Policy, taking into account international and regional agreements Amendment of existing taxation legislation.	MoICT and Ministry in charge of Finance 2013
Universal Access	Access to broadband	Specific Universal Service policy related to broadband under development	Review of legislation in line with proposed policy, if necessary	Finalise review and adoption of national broadband policy	MoICT 2013
				Provide for robust and holistic approach in the use, management and governance of USF as well as implementation of legislation	MoICT, the ICT Regulator 2013

Broadband Kenya

Table 6: Status of, and Recommendations for, Policy and Legislative Environment (Continued)

Issue		Current Status		Way Forward	Responsibility and Time Frame
		Policy	Legislation (Acts and Regulations		
Spectrum	Provision of adequate spectrum for mobile broadband services	ICT Policy Guidelines (2006) provide for spectrum management in general	Review of legislation in line with proposed policy.	Prioritise development of a Spectrum Policy Framework for Broadband by 2014. The policy should indicate frequency bands, timelines, and address the use of the digital dividend for mobile broadband.	MoICT, the ICT Regulator 2014
Community Based Operators	Devolve ownership of infrastructure and services to the grassroots and counties	No specific policy that encourages investments in ICT at grassroots	No specific legislation required	Provide for enabling policy and regulatory framework	MoICT, the ICT Regulator 2013
Standardisation of ICT Curriculum	Standardisation of curriculum in primary, secondary and tertiary levels	ICT Policy Guidelines (2006) provide standardisation of ICT curriculum in primary, secondary and tertiary levels	No specific legislation required	Review ICT Policy to provide for standardisation of ICT curriculum at primary, secondary and tertiary levels.	Ministry of Education

Policy framework on broadband has been identified as a sub-issue because the current policy does not prioritize deployment of broadband. While broadband is mentioned in section 5.8 of the ICT Policy Guidelines (2006) where it states that "to facilitate access to affordable Internet services the Government will encourage the deployment of broadband access technologies", new and emerging technologies in relation to broadband development should be considered. Emphasis has been given to Digital subscriber line on copper, Cable TV networks and Satellite networks; and Industrial and Scientific (ISM) apparatus

frequency band. Due to broadband service(s) being a minute section of the broader ICT policy, and consolidated with other services such as broadcasting and the postal services which are not as fast growing as the broadband service, it does not receive the significant attention that it deserves.

In order to address the issue, there is need to develop a broadband policy framework that shall lead to improved and streamlined growth of the ICT sector through utilisation of broadband services.

The second identified sub-issue is the legal and regulatory framework on broadband. The current KICA CAP 411A places emphasis on basic services and has not considered broadband as a basic service. Further, there is no clear legislative provision for public sector participation in relation to infrastructure/services provision. Creation of a legal and regulatory framework on broadband will lead to an enhanced institutional and legal framework for policy implementation.

Broadband infrastructure is becoming a key issue and needs to be managed in a way that public and private investment can be accommodated. For instance, there is no institutional framework to manage public-funded infrastructure such as the NOFBI, TEAMs and the upcoming Wireless Broadband Network.

Issues related to way leaves, rights of way, vandalism, and cable cuts have hindered growth in the sector. Consideration of information and communication technology infrastructure as a critical national infrastructure within the legal framework should address these concerns.

This can be realised through harmonisation with the relevant legal instruments including the Roads Act, and the Building and Construction Act.

The regulatory imperative must, of necessity, address the subject matter of affordability from both the access and device point of view. A thorough review of the pricing structure across the broadband value chain will be necessary to identify structural and cost inefficiencies (including dominance, wholesale/retail pricing, funding structures etc.) which contribute to the high cost of broadband services and hence create artificial barriers to access. The current ICT Policy seems to downplay this important regulatory requirement and instead focuses on other cost inhibitions such as fiscal policy and cost of requisite requirements such as energy. It will also be useful to set targets that seek to base prices as a percentage of average monthly incomes.

To address the policy, legal and regulatory issue and related sub-issues, the objectives and strategies to be pursued and outcomes to be realized are summarised in Table 7.

Table 7: Strategy for Policy, Legal and Regulatory Environment

Sub-Issue	Objectives	Expected Outcomes	Strategies
Policy framework on broadband	Develop broadband policy framework	Improved and streamlined growth of ICT sector	• Review and align the National Information and Communications Policy guidelines to reflect issues of broadband. • Create a National Broadband Policy. • Leverage on regional and international frameworks for collaboration on broadband.
Legal and regulatory framework on broadband	Develop legal and regulatory framework on broadband	Enhanced institutional and legal framework for policy implementation	• Review and align existing legislation (Kenya Information and Communication Act CAP 411A and other relevant Acts e.g. Roads Act, Building and Construction Act) with the requirements of the new constitution and National broadband policy. • Review and align relevant regulations with the requirements of legislation.

3.5 Finance and Investment

3.5.1 Current Status

The financial services sector is an essential component of the overall broadband ICT ecosystem.If there is to be any chance for Kenyan society to truly evolve toward an information-based economy, the financial sector must be deeply involved on many levels. Currently, the rapid growth of the mobile money transfer platform and e-banking services is beginning to change the dynamic of average Kenyans' opportunities to utilize modern financial services to improve their choices in life. The efficiency and ease of money transfers that this pioneering service provides will increasingly allow customers, as well as small businesses and entrepreneurs, to become more accustomed to electronic transactions, and to expand their options for developing e-commerce and other ICT-driven markets.

At a broader level, as larger businesses, banks, and government offices increase the deployment of ICT-based payments, procurement, record-keeping, financial transfers, and other applications, all sectors will benefit and the

Kenyan economy will run more smoothly. Improvements in these areas in remote towns and villages will help integrate these communities with the national economic and social structure of the country. To facilitate these developments, the national broadband strategy should explore the needs and challenges facing financial services companies as well as businesses and consumers with respect to expanding the use of electronic services and e-commerce. Where new laws, regulations, practices, or collaboration may be required, the strategy should propose means to address these.

> Globally, most governments have recognized the need to fund core ICT infrastructure including broadband.

Globally, most governments have recognized the need to fund core ICT infrastructure including broadband. In Kenya the government was a key shareholder in laying the first submarine fibre optic cable – the East African Submarine Cable System (EASSy). Currently, the presence of a stable financial system, a liberal regulatory framework for public-private partnerships, and the prevailing entrepreneurial spirit provide incentives for other interested players to invest in broadband.

Whereas there are emerging SMEs in the ICT sector boosted by the inherent entrepreneurship culture, these enterprises are stifled by lack of local investment funds and venture capital to boost their growth. The unavailability of funds and the generally limited management capacity impacts negatively on the adoption of ICT applications by SMEs.

Having a countrywide high capacity backbone to support high-speed broadband services will create both opportunities and challenges for the country. To start with, there are opportunities for existing operators and new investors to participate in extending the broadband backbone and last mile networks. The county governments also have an opportunity to finance, promote and roll-out broadband services in their localities, and leverage on the network to promote local and cross county trade and investment. In terms of national investment, the Government and financial institutions have an opportunity to leverage on their resources through creative financial initiatives such as a broadband infrastructure bond. Furthermore, there is an opportunity to provide policy and legislative frameworks that reduce the cost of deploying networks by encouraging sharing of infrastructure and spectrum to ensure greater coverage and affordable broadband services to all Kenyans in line with Vision 2030.

As Kenya advances towards being a newly industrialised nation, the grappling for government resources for ICTs shall persist considering the competition needs and prioritisation with other basic and fundamental needs.

3.5.2 Strategy

The fifth strategic issue focuses on the finance and investing aspects related to the broadband sub-sector. The total funding required to deploy the requisite broadband infrastructure using both fibre and broadband wireless technologies, undertake national capacity building and

awareness, as well as content and innovations within the first five years is Kenya Shillings two hundred and fifty billion (Ksh. 250 billion). Availability of funds is therefore critical to the overall execution and actualization of the broadband strategy. Another financial aspect relates to the use of ICTs within the Financial Sector. In addressing this issue, strategies are provided for funding ICT projects related to broadband, and increase in the use of ICT to deliver services by financial institutions.

At the moment there is very little funding allocated to ICT projects by financial institutions. There seems to be very limited understanding of the ICT value proposition by the financial sector - and this might be the reason behind low interest in funding ICT related projects. To address this issue, there is need to stimulate Private Sector investments and promote Public, Private Partnerships (PPPs) within the ICT Sector. The expected outcome is to see an increase in the amount of investments going into the ICT sector particularly with regard to broadband related projects.

> The Kenyan government currently spends 0.5% of the national budget on ICTs. This strategy will ensure that government spends at least 5% of its overall budget on ICTs and broadband within the first five years

Various strategies addressing this include developing innovative financial instruments such as launching a Broadband Infrastructure Bond, a Broadband Venture Capital Fund and exploiting existing instruments such as the Growth Enterprise Market available within the Capital Markets. Globally, governments are the largest single users of ICTs. The Kenyan government currently spends 0.5% of the national budget on ICTs. This strategy will ensure that government spends at least 5% of its overall budget on ICTs and broadband within the first five years. Another strategy involves developing and promoting linkages between the ICT sector and financial institutions. This is expected to facilitate and deepen the appreciation of the

ICT value proposition on the part of financiers.

The second sub-issue looks at how financial institutions can increase the use of ICTs to deliver their services. Whereas there is partial automation of financial services in government and private enterprises, there remains a large pool of financial institutions that have not fully automated their financial operations. Specifically, many SACCOs, MFIs and Pension Fund Schemes are yet to automate to a level where their clients can access their financial services over the Internet. To address this issue, there is need to foster development and use of ICTs within the Financial Sector. The expected outcome will be to see widespread utilization of ICTs in the delivery of financial services.

The strategies addressing this sub-issue include ensuring that Government provides complete automation of its financial operations to enable citizens to fully complete financially-related transactions online.

Another strategy is to provide local banks with a National Payment Gateway to enable customers share banking infrastructure such as ATMs, amongst others. A strategy to encourage medium-sized financial institutions to share resources such as cloud-computing-based services is envisioned. A final strategy is to ensure that all e-financial-related legislation such as e-Transaction, e-Crime and Data Protection Acts are in place by the year 2017.

To address financing and investment strategic issues and related sub-issues, the objectives and strategies to be pursued and the outcomes to be realized are summarized in Table 8.

Table 8: Strategy for Financing and Investment

Sub-Issue	Objectives	Outcome	Strategies
Financing of ICT projects	To stimulate Private Investments and Promote PPPs within the ICT sector	Increased Investments in the ICT Sector	• Develop innovative financial funding mechanisms (e.g. Broadband Infrastructure Bonds, Government Supported Broadband Venture Capital Fund). • Exploit existing innovative financial mechanisms (e.g. Growth Enterprise Market from NSE) • Operationalize the USF to avail opportunity for extending broadband coverage. • Enhance the role of Government in promoting broadband-related investments. • Develop linkages between the financial and the ICT sectors. • Develop ICT-related insurance schemes • Devolved funds for regional projects
ICT-related financial services and applications	To foster the development and use of ICT financial services and applications	Widespread utilization of ICTs in the delivery of financial services	• Promote and expand the use of ICTs in government-related financial transactions • Tighten security of financial systems through cyber-related legislation and enforcement • Promote the use of shared ICT financial applications amongst MFIs/SACCOS/SMEs • Promote collaboration amongst service providers within the Financial Sector

4. Strategy Implementation

An implementation plan has been developed specific to the five strategic issues in Section 3. Table 9 highlights flagship projects based on the five strategic areas outlining the objectives, expected outcomes and implementing agencies.

The consolidated 2013-2017 implementation plan is presented in Table 10. It shows the outcomes, performance indicators for each outcome, targets to be achieved over the plan period and the persons/offices responsible for achieving these targets.

4.1 Implementation Plan

Table 9: NBS Projects for MTP 2013 - 2017

Project Title	Objectives	Expected Outcome	Implementing Agency
Infrastructure and Connectivity			
National Fibre Backbone[2]	Develop a robust ICT backbone infrastructure	Extension of NOFBI to all district headquarters Increased investment by private sector to extend ICT Backbone Infrastructure to achieve target of 50,000KM	MoICT, Kenya ICT Board Private Sector
Comprehensive Spectrum Policy and Plan	Wireless Broadband Network	Sufficient spectrum for a Wireless Broadband Network	ICT Sector Regulator
Wireless Broadband Network[3] - LTE	High Speed Broadband for all	Broadband wireless national network	MoICT/ PPP The ICT sector regulator
National Data Centres[4]	To host local content reliably	2 neutral national data centres	MoICT, Kenya ICT Board
Digitization of core Government Registries	To avail critical public service delivery data in digital form and develop applications to enhance access.	All ministries and agencies to digitize their core registries.	Directorate of e-Government
Development of a County Management Information System	To develop a robust management information system for counties	Implementation of a robust IMS in every county that promotes transparency, accountability and equity	Directorate of e-Government County Governments

Table 9: NBS Projects for MTP 2013 - 2017

Project Title	Objectives	Expected Outcome	Implementing Agency
Innovation			
Establishment of open-access ICT Incubators in public universities and special economic zones across the country	To establish a vibrant innovation ecosystem that taps local talent to address local problems	ICT incubators in each public university	Kenya National Innovation Agency Public universities - Moi University, University of Nairobi, JKUAT, Maseno University, Egerton University, Kenyatta University, MasindeMuliro University of Science and Technology SEZ

[2]ICT Board is currently handling NOFBI (Phase2) projects
[3]Discussions are already underway on an open LTE network for Kenya
[4]ICT Board is currently handling the National Data Centre Projects

Table 9: NBS Projects for MTP 2013 - 2017 (Continued)

Project Title	Objectives	Expected Outcome	Implementing Agency
Capacity Building			
Digital literacy	To increase the digital literate population	10 million Kenyans trained in ICT literacy	E-government Directorate
		All TVET and TTC must incorporate ICT training	MoE
Enhancing high-end Technical Skills	Create standards and guidelines for ICT curricula implementation and assessment at all education levels in line with global standards	Quality assurance Development of curricula that aligns skills with industry demands	MoE and KICD
Create a model ICT resource centre per ward	To increase access and accelerate digital literacy	Establish ICT centres in all wards	County government
Funding			
Broadband Infrastructure Bond	Ksh.70 Billionfundraising for BroadbandStrategy implementation	Increased penetration of broadband Financing the expansion of NOFBI, public mobile broadband wireless, establishment of data centres	Ministry of Finance, Central Bank of Kenya Private Sector
Legal and Regulatory Reforms			
Rights and Fundamental Freedoms in general	All rights recognized under the Constitution. Policy gap on fostering creativity and artistic expression (A.33 and A.11)	Establishment of policy on creativity and artistic expression	Creativity and artistic expression policy- MoICT, and Ministry in charge of National Heritage and Culture
Intellectual Property Rights	Effective enforcement e.g. IPRs.	Build capacity for IPR	IPR – Ministry of Trade, KIPI, other stakeholders (continuous)

Table 9: NBS Projects for MTP 2013 - 2017 (Continued)

Project Title	Objectives	Expected Outcome	Implementing Agency
Inclusion of special groups	Align with Constitutional recognition of these groups	Policy and legislation to be reviewed to cater for requirements of PWD and other special groups in using ICT services e.g. e-Accessibility Policy and Legislation	MoICT, NCPWD
Infrastructure sharing	Optimization of utilization of ICT infrastructure and environmental sustainability	Finalization of the draft policy on infrastructure sharing and implementation Implementation of Industry Code of Practice	The ICT sector regulator
Environmental sustainability	Environmental sustainability	Establishment of e-waste management policy and regulations	NEMA The ICT sector regulator
Co-ordination in Infrastructure deployment	Harmonization of county and central government issues as they relate to ICT e.g. roads authorities, way leaves, cable and pipe locating devices, safe digging practice, associated levies	Ease the development and deployment of ICT infrastructures in counties Harmonize and standardize way leave fees in all counties	MoICT, the ICT sector regulator,County Governments
National co-ordination in complementary infrastructure deployment	Amend legislation to require providers of physical infrastructure (roads, railway, pipelines, power lines, property developers) to make provision for future installation of ICT infrastructure	Amendment of Roads Act to cater for the provision of ICT infrastructure along and across roads. Enact legislation to mandate provision for ducts for ICT infrastructure in development of railway, power lines Amend the Building Act to ensure property developers make provisions for ICT infrastructure.	MoICT, Ministry of Transport and infrastructure Ministryof Transport and infrastructure, Energy, ERC, MoICT MoICT and Ministry of Land, Housing and Urban Development
Trust and Security	Recognition of ICT as critical national infrastructure and putting in place appropriate legislation	Put a provision in KICA designating ICT infrastructure as critical infrastructure	MoICT

Table 9: NBS Projects for MTP 2013 - 2017 (Continued)

Project Title	Objectives	Expected Outcome	Implementing Agency
ICT investment on complementary services: Energy, Roads	Harmonised policies and legislation related to energy, roads and ICT, as appropriate. Specific provision for rebates for energy and road deployment by ICT Infrastructure providers Provision of categorisation of ICT services as high energy users (special tariff)	Establish a framework for rebates for energy and road deployment by ICT infrastructure providers Establishment of framework to categorize energy users recognizing consumption levels	MoICT, ERC, Ministries in charge of Finance, Energy, Transport and infrastructure
Universal Access	Finalize review and adoption of national broadband policy Provide for robust and holistic approach in the use, management and governance of USF as well as implementation of legislation	A policy framework that addresses national broadband issues Operationalize USF	MoICT MoICT, the ICT sector regulator
Spectrum	Provision of adequate spectrum for mobile broadband services	Avail a spectrum plan on availability and allocation of spectrum for broadband services taking into account market-based spectrum allocation pricing	MoICT, the ICT sector regulator
Open Access	Policy framework on open access	Access by all to national backbone networks	The ICT sector regulator, MoICT
Operationalizing the NBS			
Institutionalization of the NBS	Enhance capacity of the Vision 2030 ICT secretariat	Implementation of the NBS	MoICT,the ICT sector regulator
Infrastructure Management	Co-ordinate public infrastructure development and management	Efficient and effective utilization of public funding in ICT infrastructure	MoICT, the ICT sector regulator

Table 10: Medium Term (2013 – 2017) Implementation Plan

1. Infrastructure, Connectivity and Devices

Sub-Issue	Outcome	KPI	Baseline	Target	Year	Responsibility
Quality[5] broadband network	Improved quality of life in the way citizens work, live and learn	Minimum broadband speed (Rural)[6]	256 Kbps[7]	5 Mbps	2017	MoICT, County Governments, Private Sector
		Minimum broadband speed (Urban)	256 Kbps	40 Mbps	2017	
		Broadband Spectrum	N/a	Avail Spectrum for Wireless Broadband Network	2017	The ICT Sector Regulator
Coordination and complimentary services	Reduced cost of deploying and operating the broadband network	No. of Civil Works with Data	None	60%	2017	MoICT

[5]GPON, Wi-Max, Wi-Fi, 3G already exist for 'high' bandwidth delivery, LTE is in the process of being set up.
[6]The sparse population in most rural areas makes it difficult to give the same capacity as urban areas.
(http://www.oecd.org/internet/broadbandandtelecom/44381795.pdf)
[7]Source: Quarterly Sector report (CCK) Q4 2012

1. Infrastructure, Connectivity and Devices (Continued)

Sub-Issue	Outcome	KPI	Baseline	Target	Year	Responsibility
Services	broadband network	Provisioning				Ministry of Energy
		No. of Operators sharing common/core infrastructure	None	70%	2017	Ministry of Transport and infrastructure
		% of broadband network supported by the national power grid and road network	60%	95%	2017	County Governments, Private Sector
Accessibility and affordability	Increased demand for and use of broadband services	% of penetration by households	6.3%[8]	35%	2017	Private Sector, MoICT, County Governments
		% of penetration by schools	43.40%[9]	100%	2017	Ministry of Education
		% of penetration by health facilities		100%	2017	Ministry of Health
		% of women accessing broadband	5.2%[10]	30%	2017	MoICT
		% of broadband subscriptions (population)	2%[11]	25%	2017	The ICT Regulator
		% of geographic coverage (population)	12%	25%	2017	The ICT Regulator
		Cost per Mbps in relation to average income	30%[12] of average national Income	10%[13]	2017	The ICT Regulator
Spectrum	More open and transparent spectrum management	5yr spectrum report and forecast report in response to the targets	1	1	2017	The ICT Regulator

[8]Source: 2010 ICT Survey (page 22)
[9]Source: 2010 ICT Survey (page 49)
[10]Source: Kenya National Bureau of Statistics, National ICT Survey, 2009.
[11]Source: Quarterly Sector report (CCK) Q4 2012
[12]Source: CCK
[13]Average cost of Internet per Mbps is Ksh. 3000. Average income is Ksh. 8000 - used to calculate the baseline
[14]For mobile, the spectrum is allocated as follows: - (5Mhz in 800, 25Mhz in 900, 40Mhz in 1800,30Mhz in 2100) Band. KPI is to get at least 1 published report from CCK/ICCK with a full spectrum plan for the MTP

1. Infrastructure, Connectivity and Devices (Continued)

Sub-Issue	Outcome	KPI	Baseline	Target	Year	Responsibility
Availability and reliability	A rich, interruption-free broadband experience	No. of active submarine landing station locations [15]	1	2	2017	Private sector, MoICT
		No. ofsubmarine fibre restoration routes [16]	4	6	2017	Private sector, MoICT,
		No. of diverse routes to the 47 counties - National[17]	4	2	2017	Private sector, MoICT, County Govt.
		Number of neutral national data centres[18]	1	2	2017	County Govt., Service Providers, MoICT
		No. of cross border connection points per neighbouring country[19]	1	2	2017	Private sector, MoICT
		Quality of Service[20]		99%	2017	Service Providers, the ICT Regulator
		National peering points[21]		5	2017	Private sector, MoICT

[15]It was noted that all landing stations are at Mombasa, others at locations like Malindi, Lamu, Kilifi, Shimoni and Lungalunga were proposed by 2032
[16]The current ones as at October 2012 are: Seacom, EASSY, TEAMS, LION
[17]A physical route connecting all 47 counties to ensure redundancy, scalability and improved service levels for citizens
[18]KDN is the only truly neutral datacentre that meets international standards. The government is in the process of building another one. Ref: ICT Board representatives at the technical working group.
19Connections to each country have to be redundant. The strategy proposes having at least two links per crossing.
[20]For QOS, all parameters taken have to meet the standards 99% of the time. For example, if say the delay is 10ms, one has to meet that 99% of the time. ICCK will use these guidelines to come up with specific SLA's for Service Providers. They will also decide on how to measure the parameters.
[21]More exchange points and peering will be needed whether public or private. SLAs will cater for public peering points that will be distributed at strategic points in the country.
[22]Online businesses as a percentage of total registered businesses in Kenya.

2. Content, Applications and Innovation

Sub-Issue	Outcome	KPI	Baseline	Target	Year	Responsibility
Availability of local content in digital form	Increased availability of local digital content	% of registered Kenyan Businesses that are online	n/a[22]	75%	2017	KENIC
		% of websites in local languages	n/a	20%	2017	Ministry of Sports Culture and Arts
		% of local languages with online content	n/a	75%	2017	Ministry of Sports Culture and Arts
		% of broadcast content that is local	16%[23]	40%	2017	The ICT Regulator
		% of online educational programs	n/a	20%	2017	CUE, KENET
		% of cultural heritage institutions with online presence [24]	n/a	50%	2017	Ministry of Sports Culture and Arts
Access to local digital content	Increased availability of applications that serve digital content	Quality Assurance Guidelines for online applications	n/a	Approved Guidelines	2014	Directorate of e-Government
		% of public service applications that meet universal accessibility requirements[25]	n/a	100%	2017	Directorate of e-Government
		% of public service applications hosted in government data centres	n/a	100%	2017	Directorate of e-Government
		Sector-specific incentives for businesses to offer online services	n/a	Approved and adopted Incentives	2014	State Departments
		% increase in online services per sector	n/a	10% p.a	2017	State Departments

[23]Synovate Media Research Report, September 2012.
[24]Such institutions include museums, historical sites, CBOs etc
[25]In this context, universalaccessibility requires compliance with bilingualism (Kiswahili and English) as well as addressing special needs groups e.g. persons with visual or aural disabilities.

2. Content, Applications and Innovation (Continued)

Sub-Issue	Outcome	KPI	Baseline	Target	Year	Responsibility
Availability of local content in digital form	Increased availability of local digital content	% increase in online transactions per sector	n/a	15% p.a	2017	State Departments
		% increase in outgoing traffic differentiated by regions	n/a	10% p.a	2017	MoICT
		% increase in county Internet traffic accessing Kenya Data Centres	n/a	20% p.a	2017	County Executive in charge of ICT
		% of State Departments and agencies with core registries on-line	n/a	100%	2017	Directorate of e-Government
		% of counties with core registries online	0%	100%	2017	County Executive in charge of ICT
		% of population interacting with government via localized social media platforms	n/a	50%	2017	State Departments
Unstructured innovation value chain	A structured, well-funded ecosystem that generates innovative and quality solutions to enhance access to digital content	Certification criteria and guidelines for incubators	None	Approved	2017	KENIA
		% of counties with certified incubator activity	0%	50%	2017	KENIA
		% of successful incubates	n/a	20%[27]	2017	KENIA

[26]Regions include EAC, Continental and International
[27]This estimate is informed by reports from Kauffmann Foundation (2012) and Gompers et al. (2006

3. Capacity Building and Awareness

Sub-Issue	Outcome	KPI	Baseline	Target	Year	Responsibility
Digital Literacy	A digitally-literate citizenry capable of participating in a knowledge-based society	% of population that is digitally literate	n/a	40% of total population[28]	2017	E-government Directorate, Ministry of Education, PPPs
		% of primary school population that is digitally literate	n/a	19% primary school population[29]	2017	Ministry of Education, PPPs
		% of secondary school population that is digitally literate	n/a	58% secondary school population[30]	2017	Ministry of Education, PPPs
		% of TVET population that is digitally literate	n/a	60% of TVET population[31]	2017	Ministry of Education, PPPs
		% of TTC population that is digitally literate	n/a	100% of TTCs population[32]	2015	Ministry of Education, PPPs
Technical expertise	Increased high-end technical talent to develop, manage and maintain broadband services	Adopted and implemented standards for ICT curricula	n/a	Established standards for ICT curricula implementation and assessment at all higher education levels[33]	2014	Ministry of Education, PPPs
Awareness	Improved awareness of technologies, services, and applications at all levels and sectors	% increase of usage	n/a	% increase of usage of technologies, services, and applications at all levels and sectors[34]	2013-2017	MoICT, e-Government Directorate, the ICT sector regulator

[28]Assumption: On average, 1,905,277 citizens will be trained annually, and a similar number will go through alternative training programs
[29]Estimated 5% public and 80% private enrolments have access to computers, primary school curriculum will be rolled out in 2013
[30]Estimated 33% public and 80% private enrolments have access to computers, secondary school curriculum will be rolled out in 2014
[31]TVET curriculum will be implemented by 2014
[32]Only 22 TTCs and all must implement curriculum by 2014
[33]Standards to be implemented by all middle level colleges, polytechnics and universities offering IT related courses
[34]The government will deploy all mandatory e-government services for access by citizens

3. Capacity Building and Awareness (Continued)

Sub-Issue	Outcome	KPI	Baseline	Target	Year	Responsibility
Awareness	Improved awareness of technologies, services, and applications at all levels and sectors	Knowledge level (%) of population	n/a	80% of the national population aware of existing and emerging technologies, services, and applications at all levels and sectors		MoICT, E-Government Directorate, KICT Board, the ICT sector regulator, Media Owners Association
Coordination of, and access to capacity building and awareness activities	Improved coordination of capacity building initiatives Improved access to quality capacity-building and awareness services	Number of coordinated initiatives	n/a	3 nation-wide initiatives in each county annually	2013-2017	MoICT, Ministry of Education, E-Government Directorate, County Government
		Consolidated database	n/a	A national database of capacity building and awareness initiatives	2013-2014	MoICT, Ministry of Education, E-Government Directorate, PPPs
		Number of primary schools	540[35]	1 equipped primary school per sub-location per year[36]	2013-2017	MoICT, County Government, Public Private Partnerships
		Number of secondary schools	1450[37]	1 equipped secondary school per ward per year[38]	2013-2017	Ministry of Education, County Government, Public Private Partnerships
		Number of centres	37 pasha centres, 10 KNLS centres	780 centres[39]	2013-2017	MoICT, Ministry of Education, E-government Directorate

4. Policy and Regulations

Sub-Issue	Outcome	KPI	Baseline	Target	Year	Responsibility
Policy framework on broadbandy	Improved and streamlined growth of ICT sector	An approved policy framework for broadband	Current policy has not adequately addressed broadband issues i.e. policies with respect to energy and roads are not harmonised with ICT policies	Current policy will either be revised to address issues of broadband or an inde-pendent broadband policy framework will be developed	2014	MoICT, Ministries of Finance, Energy and Transport and Infrastructure and ERC
Legal and regulatory framework on broadband	Enhanced institutional and legal framework for policy implementation	An approved legal and regulatory framework for broadband	No existing regulatory framework on broadband, and current legislation is not harmonised	Approve a legal and regulatory framework for broadband	2015	MoICT, Ministries of Finance, Energy and Roads and ERC

5. Funding

Sub-Issue	Outcome	KPI	Baseline	Target	Year	Responsibility
Financing of ICT Projects	Increased Investments in the ICT Sector	% of Govt. funding directed towards ICTs	0.5% of National Budget	5% per annum[40]	2013-2017	Ministry of Finance, MoICT
		% of County Govt. funding directed towards ICTs	None	5% per annum	2013-2017	County Governments[41]
		% of USF spent on broadband expansion	None	60% per annum	2013-2017	MoICT, the ICT sector regulator
		No. of investment forums linking ICT and Financial Sector	None	2 per Year	2013-2017	MoICT, the ICT sector regulator

[40]South Africa, Brazil, and Malaysia govt. spend on ICT is respectively at 1.1%, 1.9%, 5.5% of their National Budgets, IDC Reports
[41]County Government Act(GoK, 2012)

5. Financing and Investments (Continued)

Sub-Issue	Outcome	KPI	Baseline	Target	Year	Responsibility
Financing of ICT Projects	Increased Investments in the ICT Sector	% Increase of Private ICT investments	33B Ksh/ USD 0.4B[42]	10% per annum	2013-2017	Ministry of Trade, State Department for (IPC), the ICT sector regulator
Use of ICTs in Financial Sector	Widespread utilization of ICTs in the delivery of Financial Services	% of automated Govt. financial transactions	30% of Govt financial transaction	60%	2013-2017	Ministry of Finance, County Govt.s
		No. of e-transaction related legislation[43]	Currently one[44]	1 per year	2013-2017	MoICT, Attorney General, Parliament
		Establish a National Payment Gateway	10% done	100%	2017	Kenya Bankers Association, CBK
		% of MFIs/ SACCOS Sharing Financial Systems[45]	None	5% per annum	2017	Kenya Bankers Association, CBK

[42]CCK Quarterly Report, 2012
[43]India, Mauritius and South Africa have independent legislation on Cybercrime, e-Transaction and Data Protection.
[44]Kenya Communications Amendment, Act 2009
[45]Assumption is that MFIs/SACCOS would be willing to share Software Infrastructure.

4.2 Estimated Cost of Investment

Table 11 presents the budgetary requirements for the implementation of the NBS.

Table 11: Summary of Estimated Cost of Implementing the NBS

Items	USD	KSH
1. Infrastructure (LTE, FTTx and Backbone)	2,170,200, 000	184,464,600,000
2. Capacity Building and Awareness • 10% of Infrastructure costs	217,000,000	18,000,000,000
3. Content Applications and Innovations • 20% of Infrastructure costs	434,000,000	36,892,900,000
4. Contingency • 10% of Infrastructure costs	217,000,000	18,464,600,000
Grand Total	3,038,200,000	257,822,100,000
Exchange Rate (USD/KES)	1	85

4.3 Risks and Mitigation

Implementation of this strategy may be affected by various risks. In order to successfully implement the strategy, these risks must be managed. Table 12 shows the risks, assessment of their seriousness and mitigation strategies.

Table 12: Risks and Mitigation Strategies

Risk Type	Details	Risk Assess-ment	Mitigation strategies
Insufficient funding of broadband	Commitment from Government Political goodwill Competing Government priorities Lack of private sector investment	High	• Promote Government buy-in • Integrate broadband strategy into Performance Contracting process • Political advocacy/lobby groups
Poor implementation of broadband strategy	Capacity challenges Project management and planning Procurement delays	High	• Recruit competent personnel • Adopt international Project Management methodologies • Adhere to procurement regulations
Lack of supportive policy and legal framework	Delays in enacting legislation Delays in operationalizing enacted legislation	High	• Advocacy and lobbying • Government agencies to operationalize legislation

Table 12: Risks and Mitigation Strategies (Continued)

Risk Type	Details	Risk Assess-ment	Mitigation strategies
Spectrum availability	Lack of spectrum to deploy last mile solutions	Medium	• Expedite the migration from analogue to digital broadcasting to free up the digital dividend by funding digital broadcasting infrastructure and subsidising the purchase of Set Top Boxes • Expedite frequency re-farming exercise to optimise the utilisation of the already allocated spectrum for deployment of mobile broadband
High cost of implementation	Cost of infrastructure Duplication of infrastructure Lack of coordination of civil works to ICT works Use of outdated technologies	Medium	• Promote shared infrastructure • Provide tax incentives • Use of Alternative Technologies • Appoint coordinating agency
Slow uptake of Broadband services	Lack of relevant content Affordability of broadband devices and services Low awareness Low ICT literacy	Medium	• Implementation of content strategies including development of relevant content • Provide tax incentives /subsidies • Promote competition • Implement capacity building strategies
Service availability	Maintenance of infrastructure Vandalism	Medium	• Enforce SLA • Operationalize legislation

4.4 Institutional Framework for Implementing NBS

I.) NBS Directorate

The focal oversight function for the NBS shall be the IT Enablers Directorate responsible for delivery of the Vision 2030 projects within the Ministry of Information, Communications and Technology. The Directorate shall be responsible for overseeing and co-ordinating the implementation of the NBS and reporting to the Vision 2030 Delivery Secretariat. This is the prevailing arrangement with all Vision 2030 projects. The rationale for this institutional structure is that it gives focus in co-ordination, monitoring and evaluation in the implementation of NBS. The institutional framework also allows for the much-needed direct liaison with theVision 2030 Delivery Secretariat for purposes of harmonisation with the overall Vision 2030 objectives.

The Directorate will comprise a dedicated NBS secretariat with a hands-on executive role to implement NBS; and an advisory committee to oversee the work of the secretariat. The advisory committee is proposed to have a similar composition to that of the Steering Committee of the NBS and have a duration not exceeding three years.

ii.) Institution to manage public infrastructure

Establish a new institution or reform an existing one to carry the mandate of managing public ICT infrastructure such as NOFBI and Broadband Wireless Network.

The benefits of this institutional arrangement include:

- Project ownership and management
- Structured co-ordination
- Investment rationalisation
- Providing a one-stop shop for future investment in public ICT infrastructure

iii.) Other reforms for new institutional structure to work

Additional reforms that have been identified within the Education sector and that are of strategic importance in delivering the strategy include:

- Mandatory ICT sensitization and Media edication from primaru level; and
- Ensure standardisation of ICT curriculum and delivery personnel (i.e. trainers), particularly at tertiary level (private universities, public universities and other tertiary institutions) in order to meet industry requirements.

4.5 Monitoring and Evaluation

Instituting monitoring and evaluation mechanisms within the overall strategy will enhance the success of implementing the NBS strategy. Monitoring and evaluation is envisaged to improve success of broadband services in Kenya by ensuring sustainable change is achieved in the delivery of this NBS strategy.

Underpinning the monitoring and evaluation approach will be the use of Results Based Management (RBM) as has been adopted in the public sector to achieve key performance indicators given in Table 10, resulting in improved efficiency and effectiveness in public service management.

The key elements of RBM are:

a) Performance target setting - the process of setting performance targets for ministry departments, groups or individuals in carrying out specific work assignments.

b) Performance planning - the process of establishing a shared understanding of what is to be achieved and how it is to be achieved and managing resources to ensure successful implementation.

c) Performance monitoring and reporting.

d) Performance appraisal - the process of evaluating organization, group or individual performance against predeter mined targets.

Therefore the Government-instituted performance management contracts approach is recommended as a management tool for ensuring accountability for results and measuring the extent to which targeted results are achieved.

Table 13 outlines the proposed approach to monitoring and evaluation of the implementation of the national broadband strategy, aligned to the institutional structures discussed in section 4.4.

Table 13: Monitoring and Evaluation

Monitoring and Evaluation Components	Institutional Structure
Organization/unit responsible for M&E across all sectors and levels of Government	Directorate of Vision 2030 IT Enablers and the Vision 2030 Secretariat
How will the targets be negotiated with the various organizations responsible in various sectors and levels of Government	Vision 2030 Directorate and respective Ministries
How will the realization of these targets be monitored	Annual Performance Contracts and Directorate of Vision 2030 IT Enablers

5. Conclusion

Broadband services accessible to all everywhere will allow people to communicate and transact anywhere, anytime in both rural and urban areas of Kenya. This will in turn spur social and economic growth. Broadband is therefore crucial for Kenya if we are to progress into a knowledge-based society. It is a key catalyst in achieving Vision 2030.

Fast-changing technologies may rapidly see definitions defined by speed become obsolete by waves of technological advancement; it is for this reason that this strategy proposes regular assessment if it is to remain relevant with the changing times.

There is therefore need to review and evaluate the strategy in a relatively short period of time. This will provide scope for possible adjustments to the strategy as technology and the market may dictate. It will also provide for a measure of achievements for the overall goals set out in this strategy.

6. Annexes

Annex 1: International benchmarks on broadband definitions
Annex 2: List of abbreviations
Annex 3: Definition of terms
Annex 4: Specific constitutional aspirations for ICTs under the Bill of Rights

6.1 International Benchmarks on Broadband Definitions

To have an insight into the variants of global broadband targets, we summarise in Table 14, Broadband targets set by a number of countries.

Table 14: International Broadband Targets

Country	Target	Year	Current mbps (Q1/2012) (Av. Peak)
Canada	5mbps	2016	25.4
USA	4 mbps	2012	28.7
	100mbps to 100 million homes	2020	
EU	Basic broadband (512kbps to 4mbps) to all	2013	-
	Ultra-fast broadband by 2020: 50% households should have subscriptions above 100Mbps	2020	-
Austria	Basic broadband (512kbps to 4mbps) to all	2013	20.2
Argentina	10 mbps to all	2015	14.4
Brazil	1mbps to all	2014	15.1
Chile	70% broadband penetration to all households	2014	19.7
Peru	500,000 connections of at least 4mbps	2016	11.6
	2mbps broadband connections to all education and health centres, as well as municipalities in urban areas		
Thailand	Fibre-optic networks deployed offering speeds of at least 100mbps in major economic provinces	2020	19.4
Taiwan	2mbps to all	2007	24.8
	30mbps to reach 80% nationwide	2011	
South Korea	Raise average speeds to 10mbps with a maximum of 1Gbps	2012	47.8
New Zealand	80% of rural households to have speeds of at least 5mbps, with the remainder to achieve speedsof at least 1mbps	2015	16.1
Malaysia	50% of households at 2mbps	2020	15.4
Japan	100% broadband coverage and 90% ultra high speed FTTH coverage by March 2011	2011	39.5

Table 14: International Broadband Targets (Continued)

Country	Target	Year	Current mbps (Q1/2012) (Av. Peak)
India	2mbps	2012	6.9
	4mbps	2014	
China	Average broadband connection speeds would be 20mbps in cities and 4mbps in the countryside, with the most developed cities enjoying speeds of 100mbps or more	2015	5.9
Australia	100mbps	2016	16.6
Israel	100mbps to 10% of the country	2013	23.5
	100mbps to two-thirds of the country	2019	
United Kingdom	Basic broadband (512kbps to 4mbps) to all	2013	23.7
Egypt	75% of households have access to 2mbps broadband	2015	7.6
	90% of households have access to 25mbps broadband	2021	
South Africa	Universal access to broadband services (download speeds of at least 256kbps)	2019	6.1
Germany	4mbps	2013	23.4
Italy	Basic broadband (512kbps to 4mbps)	2013	17.7

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6.2 List of Abbreviations

ATM	-	Automated Teller Machine
BPO	-	Business Process Outsourcing
CBO	-	Community-based Organisation
CCK	-	Communications Commission of Kenya
CUE	-	Commission for University Education
CPE	-	Customer Premises Equipment
DPP	-	Department of Public Prosecutions
EASSY	-	Eastern Africa Submarine Cable System
ERC	-	Energy Regulatory Commission
GDC	-	Government Data Centre
GoK	-	Government of Kenya
GPON	-	Gigabit Passive Optical Network
HR	-	Human Resource
ICT	-	Information and Communication Technology
IP/MPLS	-	Internet Protocol/Multi Protocol Label Switching
IPR	-	Intellectual Property Rights
ITES	-	IT Enabled Services
KENET	-	Kenya Education Network Trust
KENIA	-	Kenya National Innovation Agency
KBC	-	Kenya Broadcasting Corporation
KICA	-	Kenya Information and Communication Act
KICTB	-	Kenya Information and Communication Technology Board
KICD	-	Kenya Institute of Curriculum Development
LION	-	Lower Indian Ocean Network
LTE	-	Long Term Evolution
MFI	-	Microfinance Institution
MOE	-	Ministry of Education
MoICT	-	Ministry of Information, Communications and Technology
MOU	-	Memorandum of Understanding
MTP	-	Medium Term Plan
NBS	-	National Broadband Strategy
NOFBI	-	National Optical Fibre Backbone Infrastructure
NSE	-	Nairobi Stock Exchange
OandM	-	Operations and Maintenance
PPP	-	Public Private Partnerships
PWDs	-	Persons with Disability
RandD	-	Research and Development
RFID	-	Radio-Frequency Identification
QoS	-	Quality of Service
SACCO	-	Savings and Credit Co-operative
SLA	-	Service Level Agreement
SMEs	-	Small and Medium Enterprises
STE	-	Science, Technology and Engineering
SWOT	-	Strengths, Weaknesses, Opportunities and Threats
TEAMS	-	The East African Marine System
TTC	-	Teacher Training College
TV	-	Television
TVET	-	Technical and Vocational Educational Training
TX	-	Transmission
USAID	-	United States Agency for International Development
USF	-	Universal Service Fund
WI-FI	-	Wireless Fidelity

6.3 Definition of Terms

Broadband: Broadband can be defined as a high-capacity (able to carry a lot of data per second, rather than the particular speed of the data), always-on Internet connectivity service. Broadband is a term used to describe a wide range of technologies that allow high-speed bandwidth data transmission or access to the Internet and other electronic services. It represents the next phase in the evolution of the Internet.

Broadband Technologies: There is a wide range of technologies that can be used to provide broadband access. These include fibre optic cable; cable, Digital Subscriber Line (DSL); Fibre-To The Home (FTTH); satellite, mobile (3G, W-CDMA, LTE, 4G, etc.), and fixed wireless (including "Wi-Fi" and "Wi-Max"); and Broadband over Power Lines (BPL). Each technology has its own benefits, costs and limits in terms of deployment, bandwidth, reliability, costs and coverage.

Community Access Points: Community Access Points (CAPs) are public and community buildings where computers, scanners and printers have been installed for local people to use.

Digital Content (eContent): Local content which is disseminated and accessed using digital means.

Digital Dividend: The spectrum that will become available when television broadcasters switch from analogue to digital only platforms.

Digital Literacy: The use of digital technology, communication tools and networks to access, evaluate and create information in order to effectively participate in a knowledge society.

Internet of Things: A network infrastructure linking physical and virtual objects through the exploitation of data capture and communication capabilities.

FTTx: A generic term for any broadband network architecture using optical fibre for last-mile telecommunications.

IP Telephony: Internet Protocol telephony allows users to place and receive phone calls for free or at very low tariffs via a phone and an adapter connected directly to their broadband connection with no need for a standard telephone line or even a computer.

Last Mile: The final leg of a telecommunications network that connects to/reaches the customer. The access network that enables final connection by the end users.

Local Content: The expression of the locally-owned and adapted knowledge of a community; where a community is defined by its location, culture, language, or interest.

Open Access Network: An Open Access Network (OAN) is a network architecture that allows any suitably authorized operator or service provider to access passive or active connectivity from designated Points of Presence (PoP) to deliver services to end users.

Rural Area: Is a large and isolated area of an open country (in reference to open fields and not forests), often with low population density.

Spectrum Re-farming: The clearing and reassigning by government of frequencies from low-value (by economic and/or social criteria) services to applications/services with higher value to yield greater economic or social benefit such as re-using existing 2G and 3G spectrum for LTE.

Urban Area: Is an area with an increased density of human–created structures and higher population density in comparison to the areas surrounding it. This definition includes cities, municipalities, town councils and urban councils.

Video over Broadband: Video on demand via broadband allows for a video stream to a computer enabling users to watch high definition television (HDTV) programmes directly via their fibre Internet connections.
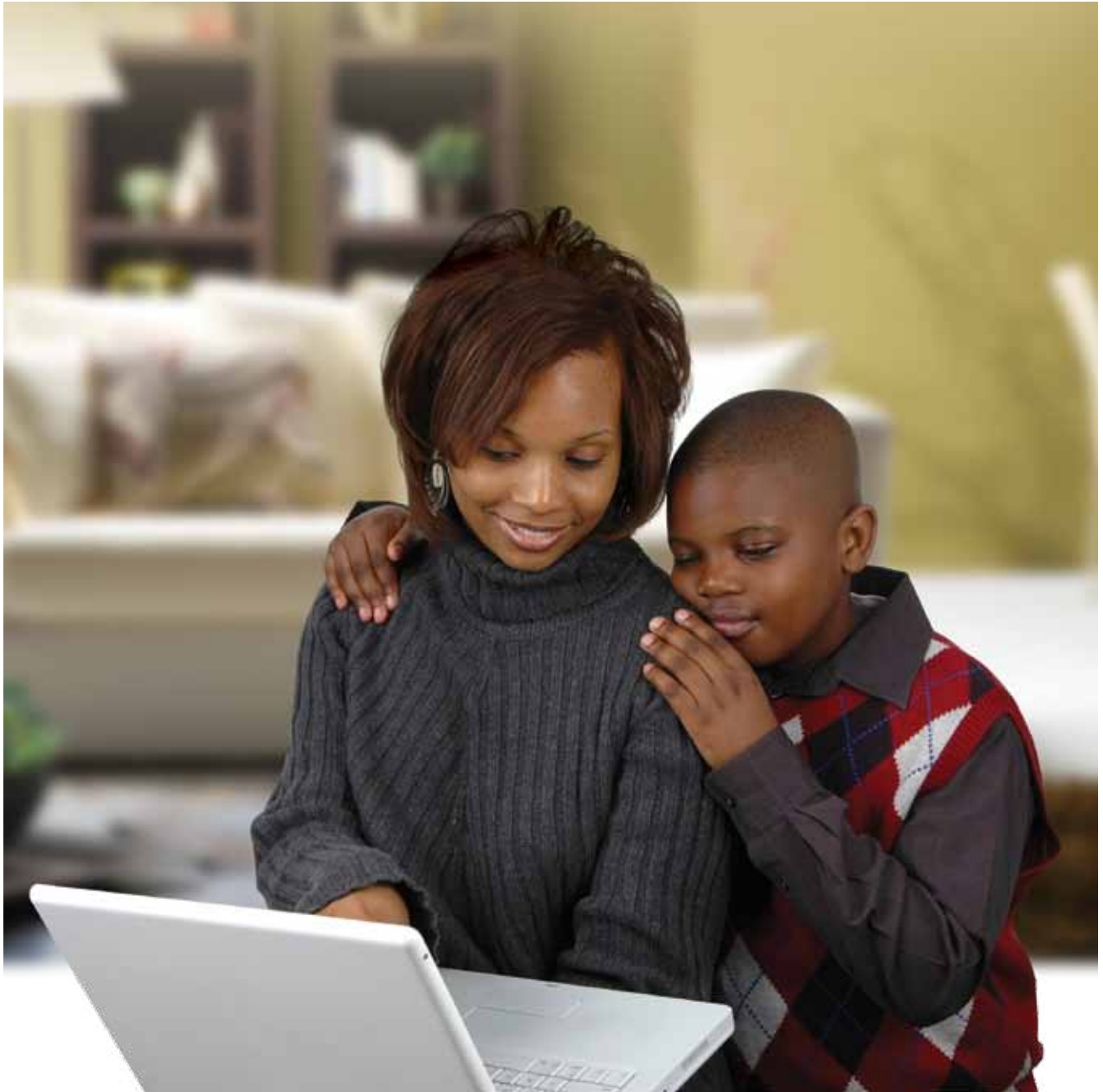
6.4 Specific Constitutional Aspirations for ICTS Under the Bill of Rights

- Implementation of rights and fundamental freedoms under **Article 21 (3) in the Bill of Rights.** All State organs and all public officers have the duty to address the needs of vulnerable groups within society. **The needs include access to ICT.**

- **Article 27 (1) on equality and freedom from** discrimination provides that: "Every person is equal before the law and has the right to equal protection and equal benefit of the law." **The benefits of the law include benefits arising out of ICT regulation.**

- **Article 31 on privacy** provides that: "Every person has the right to privacy, which includes the right not to have— (c) information relating to their family or private affairs unnecessarily required or revealed; or (d) the privacy of their communications infringed." **These provide constitutional limitations in the use of information and communications.**

- **Article 33 (1) on the freedom of expression provides that:** "Every person has the right to freedom of expression, which includes— (a) freedom to seek, receive or impart information or ideas; (b) freedom of artistic creativity; and (c) academic freedom and freedom of scientific research". **This is useful in regulating ICTs especially in terms of content.**

- **Article 34 (1) on freedom of the media provides that:** Freedom and independence of electronic, print and all other types of media is guaranteed. **The provision lays a constitutional foundation for regulating both infrastructure especially the frequency spectrum and content in relation to broadcasting and proposes governance principles for regulating the ICTs especially regulatory independence.**

- **Article 35 (1) on access to information** provides that "Every citizen has the right of access to— (a) information held by the State; and (b) information held by another person and required for the exercise or protection of any right or fundamental freedom….(3) The State shall publish and publicise any important information affecting the nation."

- **Article 46 (1) on Consumers rights** applies to goods and services offered by public entities or private persons. The right applies to all goods and services including ICT-related ones.

- **Article 54 (1) states that:** "A person with any disability is entitled— (c) to reasonable access to all places, public transport and information; (d) to use Sign language, Braille or other appropriate means of communication; and (e) to access materials and devices to overcome constraints arising from the person's disability." This provision prescribes access to ICTs by PWDs.

- **Article 56 on minorities and marginalised groups** provides that: "The State shall put in place affirmative action programmes designed to ensure that minorities and marginalised groups— (e) have reasonable access to water, health services and infrastructure." **Infrastructure includes ICT related infrastructure.**

Constitutional aspirations for ICTs on Governance principles and structures have focused on the following:

- **Article 10 on national values and principles of** governance binding the State and all persons when enacting, interpreting and implementing the Constitution, any law and public policy. Values and principles relevant to ICT governance include sharing and devolution of power, equity, human rights, public participation and sustainable development among others.

- **Article 11 (2) on culture** providing that: "The State shall— (c) promote the intellectual property rights of the people of Kenya." Intellectual property promotion and protection is key to ICT governance especially through enhancing innovation in ICTs.

- **Fourth Schedule on distribution of functions between the National Government and the County Governments, Section 18 (i), (j) and (k)** gives National Government the function of postal services; telecommunications; and radio and television broadcasting. However in order to adhere to devolution requirements, cooperation/inter-governmental relationship between the National and County Governments is necessary and is addressed by the Devolution Laws.

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