REPUBLIC OF KENYA

NATIONAL BROADBAND STRATEGY

2018-2023

ACKNOWLEDGEMENTS

This strategy is a culmination of collaborative work that could not have been completed without the support of the government and the concerted efforts of the National Broadband Strategy (NBS) Steering Committee and stakeholders including Information and Communications Technology (ICT) infrastructure providers, service providers, the education sector, finance, complementary infrastructure sectors including Roads and Energy, special interest groups and the general public each of whom devoted their time, effort and expertise.

It would not have been possible to develop the strategy without the invaluable input from the Cabinet Secretary Ministry of Information and Communication Technology (MoICT), Principal Secretaries in the Ministry, other Ministries, Departments and Agencies (MDAs), senior officials, the Communications Authority of Kenya (CA) and officials from other Government Ministries who took time to participate in extensive consultations that helped shape this Strategy.

The Strategy echoes the country's commitment to leverage on broadband as an enabler towards a globally competitive knowledge-based society and it is our hope that the same collaborative commitment and spirit that enriched the development of this Strategy will be carried forward for the successful implementation of the Strategy.

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FOREWORD

Broadband has in recent years impacted and transformed peoples' lives in different ways and continues to shape the modern economy. However, there continues to exist certain challenges such as digital divide in accessing broadband services that have somewhat negated the broadband imprint envisioned in the first National Broadband Strategy (2013-2017) that aimed at transforming Kenya into a knowledge-based society enabled by high-capacity nationwide broadband connectivity. Besides infrastructure capacity limitations and inadequate institutional framework, cyber security, privacy and data protection have also in part affected the uptake of broadband services in Kenya.

Nevertheless, the knowledge economy also known as the fourth industrial revolution presents and continues to provide a platform upon which Kenya can leverage on new technologies such as Internet of Things (IoT), Big Data Analytics, Artificial intelligence (AI), and distributed ledgers to actively participate in the global economy which invariably demand high-speed broadband and data services.

The process of formulating this Strategy has given us the opportunity to take stock of past successes and failures. Through this process, we have also envisioned the strategic objectives for the future while at the same time appreciating the rapidly evolving ICT landscape. The strategic themes adopted in this Strategy reinforce our broadband vision, namely, to be a globally competitive knowledge-based society enabled by broadband. It complements, among others, the African Union Agenda 2063 and the Sustainable Development Goals (SDGs) as we embark on the next phase of the Vision 2030 journey – the Medium Term Plan III (MTP) (2018–2022) and the implementation of the Big 4 Agenda.

In the implementation of this Strategy, we entrust the various agencies identified in the respective action areas with the firm belief that through implementation of the strategic initiatives, the societal and economic benefits of digital transformation will be realized. We reaffirm the need to harness the synergies and inter-linkages prominent in digital landscapes towards this end.

I am optimistic that with the envisaged partnerships and collaboration of all stakeholders, the objectives we aspire to accomplish will ultimately translate into milestones that will in fullness of time be attributed to our collective efforts. I strongly urge each one of us to embrace broadband; the key to a true knowledge-based economy that will cement our position within the information society.

Thank you and God bless you.

Hon. Joe Mucheru, EGH

Cabinet Secretary, Ministry of Information, Communications and Technology

ACRONYMS AND ABBREVIATIONS

4P	-	Pervasive Public Pipes in-Perpetuity
ACA	-	Anti-Counterfeit Agency
AfDB:	-	Africa Development Bank
AG	-	Attorney General
ASP	-	Application Service Providers
ATU	-	Africa Telecommunication Union
BB	-	Broadband
BDU	-	Broadband Delivery Unit
CA	-	Communication Authority of Kenya
CAPs	-	Community broadband Access Points
CBD	-	Central Business District
CBK	-	Central Bank of Kenya
CBO	-	Community Based Organization
CCK	-	Communication Commission of Kenya
CCP	-	County Connectivity Project
CDN	-	Content Delivery Network
CERT	-	Computer Emergency Response Teams
CH	-	Copyright Holder
CIH	-	Constituency Innovation Hubs
CIRT	-	Cyber Incident Response Team
CMA	-	Capital Markets Authority
CMS	-	Content Management System
CoG	-	Council of Governors
COP	-	Child Online Protection
CS	-	Cabinet Secretary
DBO	-	Design Build Operate
DC	-	Data Controller
DCI	-	Director of Criminal Investigation
DLP	-	Digital Literacy Program
DSL	-	Digital Subscriber Line
EACC	-	Ethics and Anti-Corruption Commission
EASSY	-	Eastern Africa Submarine Cable System
EMCA	-	Environmental Management and Coordination Act
ERB	-	Engineers Registration Board
EU	-	European Union
FINTECH	-	Financial Technology
FIRST	-	For Inspiration and Recognition of Science and Technology
FY	-	Financial Year
Gbps	-	Gigabits per Second
GCCN	-	Government Common Core Network
GDP	-	Gross Domestic Product
GDPR	-	General Data Protection Regulation
GEMS	-	Growth Enterprise Management Segment
GIS	-	Geographic Information System
GNI	-	Gross National Income
GOK	-	Government of Kenya
GSM	-	Global System for Mobile communication
HAPS	-	High Altitude Platform Station

IBP	-	Integrated Broadband Project
ICT	-	Information and Communication Technology
ICT4D:	-	ICT for Development
ICTA	-	Information and Communication Technology Authority
IFC	-	International Finance Corporation
IoT	-	Internet of Things
IPC	-	Investment Promotion Center
IPs	-	Intellectual Properties
IPPF	-	Infrastructure Project Preparation Facility
IPTV	-	Internet Protocol Television
ISO	-	International Organization for Standards
ITES	-	Information Technology Enables Services
ITU	-	International Telecommunication Union
JTL	-	Jamii Telecommunications Limited
KCAA	-	Kenya Civil Aviation Authority
KCCI	-	Kenya Chamber of Commerce and Industry
KDAR	-	Kenya Data Access Regulation
KENET	-	Kenya Education Network
KENHA	-	Kenya National Highways Authority
KERRA	-	Kenya Rural Roads Authority
KETRACO	-	Kenya Electricity Transmission Company
KFC	-	Kenya Film Commission
KFCB	-	Kenya Film Classification Board
KICD	-	Kenya Institute of Curriculum Development
KIPI	-	Kenya Industrial Property Institute
KNSDI	-	Kenya National Spatial Data Infrastructure
KPI	-	Key Performance Indicator
KPLC	-	Kenya Power and Lighting Company
KURA	-	Kenya Urban Roads Authority
LSK	-	Law Society of Kenya
M&E	-	Monitoring and Evaluation
Mbps	-	Megabits per Second
MDA	-	Ministries, Departments, and Agencies
MENA	-	Middle East and North Africa
MFI	-	Microfinance Institutions
MNO	-	Mobile Network Operator
MOEST	-	Ministry of Education, Science and Technology Science and Technology
MoICT	-	Ministry of Information and Communications Technology
MTP	-	Medium Term Plan
NBC	-	National Broadband Committee
NBS	-	National Broadband Strategy
NCA	-	National Construction Authority
NCSC	-	National Cyber Security Centre
NDC	-	National Designation Codes
NEMA	-	National Environment Management Authority
NEPAD	-	New Partnership for Development
NFP	-	Network Facilities Provider
NGO	-	Non-Governmental Organization
NOFBI	-	National Optic Fibre Backbone
NPS	-	National Police Service
NREN	-	National Research and Education Network

NSE	-	Nairobi Securities Exchange
ODR	-	Online Dispute Resolution
OTP	-	One Time Password
OTT	-	Over the Top
PA	-	Public Authority
PAP	-	Public Access points
PC	-	Personal Computers
PDTP	-	Presidential Digital Talent Program
PPP	-	Public-Private Partnerships
PWD	-	Persons With Disabilities
QoS	-	Quality of Service
SACCO	-	Savings and Credit Cooperative Organization
SADC	-	Southern African Development Community
SC	-	Multi-agency broadband Steering Committee
SDGs	-	Sustainable Development Goals
SGR	-	Standard Gauge Railway
SLA	-	Service-Level Agreement
SME	-	Small and Medium-sized Enterprises
SOC:	-	Security Operations Center
TCO	-	Total Cost of Ownership
TEAMS	-	The East African Marine Systems
TESPOK	-	Technology Service Providers of Kenya
TI	-	Transparency International
ToR	-	Terms of Reference
TVET	-	Technical and Vocational Education and Training
TWG	-	Technical Working Group
USF	-	Universal Service Fund
USP	-	Universal Service Provision
VAS	-	Value Added Services
WIMAX	-	Worldwide Interoperability for Microwave Access

EXECUTIVE SUMMARY

The Government of Kenya presents the National Broadband Strategy (2023) for the country. This strategy builds on the 2013-2017 strategy and takes into account recent technological and industry trends as well as market realities. The vision of NBS 2023 is to transform Kenya into a globally competitive knowledge-based society enabled by affordable, secure and fast broadband connectivity.

Broadband is expected to facilitate connections that will create opportunities for smart solutions that will help in transforming Kenyans' everyday life, their common creativity, the development of business ideas, regardless of their location and thus enable societal and economic benefits of digital transformation to be realized. In collaboration with the private sector and development partners, the Government intends to leverage broadband to deliver its Vision 2030 flagship projects as well as the Big 4 Agenda; namely food security, universal healthcare, affordable housing and manufacturing.

By implementing NBS 2023, the government aims at increasing access to broadband coverage of 3G to 94% of the population by 2020; and increase digital literacy in schools to 85%, expand broadband to the 47 counties and especially to have 50% digital literacy amongst the workforce.

The strategic objectives of this strategy are outlined in the implementation plan which is organized into seven thematic areas namely: (1) Infrastructure and Connectivity, (2) Services, Content and Applications; (3) Capacity Building and Innovations (4) Policy, Legislation, and Regulation; (5) Privacy and Security; (6) Broadband devices; and (7) Finance and Investment. The seven thematic areas cover the broadband ecosystem, which have been broken down into gap analysis, opportunity identification, strategic objectives and an implementation plan for each theme.

The strategy underscores the role of both the public and private sector in funding of broadband infrastructure and emphasizes the participation of government, private sector investments and development partners in financing broadband projects particularly by incentivizing infrastructure rollout in remote areas and in areas encumbered by challenges concerning the profitability of broadband investments.

This NBS is aligned with Vision 2030 and the Government's Big Four Agenda. Under this framework, to become a globally competitive and informed society that effectively participates in the knowledge-based economy, the *availability, access to high-speed broadband countrywide and access to reliable, affordable, and secure* broadband is imperative. To this end, Kenyan societies; businesses, government agencies and individuals are envisaged to embrace paperless transactions.

The implementation of this strategy requires intervention in several strategic areas as follows:-

- National Government to facilitate access to national optical fiber broadband infrastructure (NOFBI) on an open access basis for all operators.
- Treating broadband as critical infrastructure, sensitizing everyone on its importance and using it to elicit demand and uptake.
- Harmonization of the development of infrastructure to reduce duplication and encourage sharing of infrastructure thus increase coverage and achieve cost efficiency
- Engagement at both National and County government levels to increase awareness, and use of broadband services
- Promoting development and universal access to digital content and services, including emerging technologies in Fintech (Blockchain, Mobile Money, Big Data analytics, IoT and artificial intelligence)
- Capacity building to increase digital literacy among citizens,

- Adoption of common technical standards and facilitate the development of international, regional and national backbones
- Providing an enabling environment and encourage local industry device manufacture, maintenance and recycling which will create jobs and address e-waste issues.
- Protection of consumer interests and ensure security in accessing broadband services
- Draft policies on broadband ecosystem as a whole including spectrum and develop instruments and practical tools such as guidelines and regulations that would more precisely define various risk levels as relates to particular information security scenarios
- Promotion of private sector investments, Joint Ventures, and Public Private Partnerships (PPPs) within the ICT sector; and introduce tax and regulatory incentives for infrastructure investment, particularly where initial capital outlay is high among others.

The achievement of the 2023 broadband strategy is anchored on execution of key flagship projects among other projects within each thematic area as presented in Table 1.

Table 1: Flagship Projects for NBS 2023

Thematic Area	Project	Proposed Target
Policy, legal and regulatory framework	Enact data Protection law (Article 31 of the Constitution) Enact law pronouncing broadband as critical Infrastructure	Enactment of Act by 2020 Enacted legislation by 2020
Infrastructure and Connectivity	Last mile connectivity by extending broadband to the Ward level- entails construction of Ward base stations at least 2 stations for each of the 1,450 wards in the country.	100% connectivity by 2023
Services, Content and applications	Creation of standards for services and content	Services and content standards by 2021
Capacity Building and Innovation	National public education on broadband	One awareness campaign every quarter
Devices	Design and manufacture broadband devices in Kenya	At least 1 device by 2020 by a local manufacturer
Privacy and security	Establishment of a cyber-security operations center and International collaboration on cybersecurity.	1 security operation by 2021 preceded by a Cyber-security strategy
Finance and Investment	Creation of conducive environment for Broadband investment through fiscal and regulatory incentives	Fiscal and regulatory incentives implemented
Big Four and BB	Universal healthcare services delivery at level 1-6 heath facilities. Develop e-agriculture systems to improve food security Embed broadband in the government affordable housing project and in other housing projects to realize smart housing Promote broadband in the manufacturing sector to improve efficiency	100% by 2020 2 systems by 2022 Embed broadband in all smart housing projects 100% of all manufacturing firms using broadband

In order to implement this strategy, a multi-stakeholder National Broadband Council shall be set up and mandated to coordinate the implementation of NBS 2023 with the support of monitoring and evaluation by the National Communication Secretariat. A robust monitoring and evaluation framework with timelines for deliverables will be prepared and publicized to guide in the tracking of the implementation. The Ministry of ICT is confident that this NBS 2023 will usher in an era of

coordinated investments in national ICT infrastructure in order to eliminate unnecessary duplication of investments and thus ensure optimal use of resources in the sector.

The proposed budget for this strategy is estimated at Kshs. 111 billion (1.5% of the Gross Domestic Product (GDP) for Financial Year (FY) 2017/18) spread over five years. This translates to 0.3% of the GDP being spent on broadband (BB) each year which is commensurate with the contribution of the sector to the GDP per annum. It is also proposed that the budget is increased as the contribution of ICTs to GDP increases. The funding for the budget will be sourced from the private investment and through PPPs while the Government will provide an enabling environment and incentives. Further, an integrated planning for broadband projects will be adopted to ensure that all inputs are catered for to ensure successful implementation.

This strategy comprises six (6) chapters and 10 appendices. Chapter 1, outlines the process followed in the development this strategy, definition of broadband, rationale, background, vision and principles. Aspects of supply and demand, equity, assumptions and expected outcomes are also presented in this chapter. Chapter 2 presents the relevance of broadband to national development plans including vision 2030 while Chapter 3 outlines the strategic thrust and objectives of this strategy. Chapter 4, 5, and 6 outlay the Role of Stakeholders, Governance and Delivery structure, and Deployment and Performance Management respectively.

1. INTRODUCTION

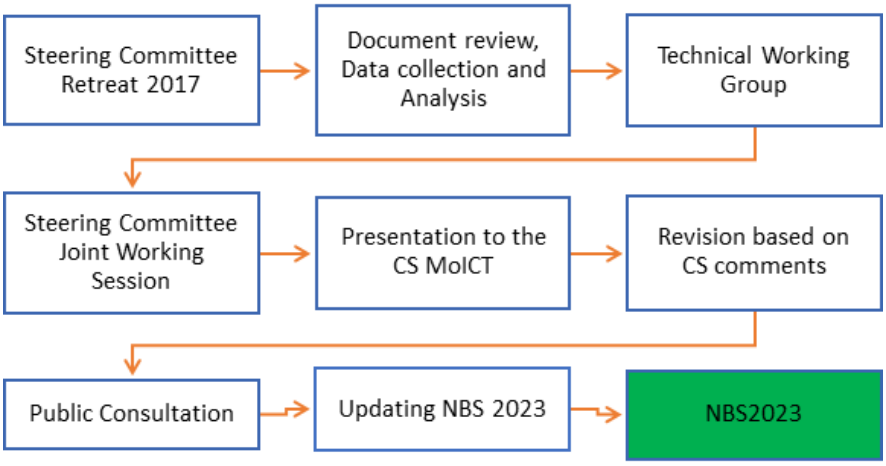
The Government considers broadband as an enabler of all sectors including social, economic and political development of Kenya within the framework of ICT for development (ICT4D). To harness the full developmental potential of ICTs, we need, as a country, to have a well-coordinated and synchronized strategy. This National Broadband Strategy 2018-2023 (NBS 2023) has been formulated to enable effective contribution of broadband for Kenya in its quest to be a globally competitive knowledge-based society.

1.1 Process

This strategy has been developed through consultations with stakeholders comprising the government, sector players, users of broadband, civil society and global partners who have generously shared their knowledge and experience thereby providing learning and assisting to shape this strategy (See Appendix VI). These consultations resulted in inputs cutting across government and the various sectors of the economy which have addressed the critical role of the broadband ecosystem in the economy as a whole.

With the expiry of the first National Broadband Strategy 2013-2017 (NBS 2017), it was imperative to take stock of Kenya's performance with a view to revising the strategy to guide the country for the next five years. The Ministry of ICT (MoICT), through the Principal Secretary, constituted an inter-agency multi-stakeholder team to embark on the process of developing the second edition of the National Broadband Strategy. The review exercise was coordinated through thematic areas with a view of developing a Strategy that caters for the needs of all sectors. As the various Technical Working Groups (TWGs) embarked on the review, a number of questions were asked. These included; how much of these targets had been realized by 2018; what challenges had been identified during the implementation of NBS 2017; and whether the targets were realistic in the first place. Before the TWGs sessions, primary data were collected using survey questionnaires, interview guides and focus group discussions and analysed. Secondary data were also collected from published sources, which included regulator of the ICT sector and online reports and analysed. The findings were discussed in TWGs and a draft NBS 2023 report prepared and later refined. The report was then presented to the CA management and their input incorporated before presenting of the report to the Cabinet Secretary in charge of ICT for further input. The input from the CS was then incorporated and the Strategy subjected to public consultations. The input from the public consultations was synthesised and presented during the NBS 2023 validation workshop. During this workshop, more input was received from stakeholders and incorporated into the final document. NBS 2023 is the final result of this process. The process that was followed is shown in Figure 1.

Figure 1: NBS 2023 Development Process



1.2 Definition of Broadband

NBS 2017 defined broadband as (*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).* A review of this definition and benchmarking of definitions of broadband necessitated a comprehensive definition of broadband for Kenya to include quality, affordability, security and the overarching aspirations of Kenya as captured in Vision 2030. In this regard, and for purposes of this strategy, broadband for Kenya is defined as:

> *"Connectivity that delivers interactive, secure, quality and affordable services at a minimum speed of 2Mbps to every user in Kenya".*

1.3 Rationale for the National Broadband Strategy

The NBS 2017 was envisaged to provide a holistic and coordinated approach in ensuring:

- High-speed and reliable broadband networks that are universally accessible throughout the country;
- Local and relevant content are generated and availed;
- All citizens including children in primary schools and adults across the country would be empowered through digital literacy and awareness;
- A vibrant and well-funded innovations ecosystem be nurtured to tap into our youth to provide creative solutions
- Would stimulate the uptake of ICTs. In addition, the ICT policy, legal and regulatory frameworks were envisaged to be enablers to drive the Strategy.

1.3.1 Growth of ICT Sector in Kenya

In the last decade, the ICT sector in the country has experienced exponential growth largely attributable to liberalization, and a robust regulatory regime under CA. However, it is still of concern to the Ministry of ICT that, despite heavy investment in ICT infrastructure, there exists a wide 'digital divide' in the access to Internet services in the country.

While the unprecedented growth of voice services, which was recorded at slightly more than 94 percent of the population as at December 2017 is plausible, the same cannot be said about high-speed Internet or data services. By December 2017, the number of Internet users in Kenya was 33

million, out of which, only slightly less than 1 million were broadband subscriptions. There is, therefore, need to look into why broadband uptake is still low despite the country being connected to four international undersea fiber optic cables.

1.3.2 Broadband Gaps

Despite interventions by MoICT such as investment in the National Optical Fibre broadband infrastructure (NOFBI) to increase broadband access, the following gaps remain pertinent:

(i) The need to clearly define broadband for Kenya
(ii) Broadband has not reached most parts of rural Kenya
(iii) Last mile connectivity is still a challenge
(iv) High broadband charges in Kenya.
(v) Lack of relevant digital content and applications
(vi) Shortage of demand-side skills to enable broadband services to be used effectively
(vii) Lack of supporting infrastructure, i.e. poor or no access roads, lack of main power supply and disparity in requirements by County Governments e.g. high wayleaves fees that discourage broadband rollout.
(viii) Incoherent investment models, construction costs, and collaboration across the industry chain.
(ix) Insufficient levels of trust in and security of broadband.
(x) Limitations related to broadband devices, which are both demand enablers and e-waste contributors.
(xi) Limited innovative broadband services that are relevant for uptake across all socio-economic sectors to improve efficiency in these sectors and awareness of such services.
(xii) Governance and delivery framework for broadband
(xiii) Broadband vision for Kenya

1.3.3 Promoting Broadband Development

Access to broadband has been recognized worldwide as an accelerator of economic development and an enabler of socio-economic wellbeing. The government intends to leverage ICTs to deliver its development plan, the Vision 2030 and the Big 4 Agenda.

In this regard, this strategy is an outcome of a comprehensive review of NBS 2017 and best practice benchmarking which addresses the gaps in the implementation of NBS 2017 while providing a roadmap for 'Kenya Connected by 2020' and for other national development agendas among other initiatives:

- The government will make necessary interventions to ensure development of broadband including targeted subsidies
- Encouraging technology pilots to stimulate innovations
- Encouraging cost reduction through network sharing
- Embracing public-private partnerships that spur development
- Creating enabling institutional, regulatory, policy and legal environment
- Introducing incentives that encourage investment in high-cost areas
- Elaborating on the specific role of the Universal Service Fund (USF) in complementing the overall strategy
- Enhancing the governance and delivery structure for broadband in order to realize its benefits across all sectors of the society
- Comprehensively defining broadband for Kenya
- Reviewing the broadband vision for Kenya

1.3.4 Contrasting NBS 2017 with NBS 2023

An evaluation of the extent of achievement of NBS 2017 targets revealed that most of them had not been achieved, some may have been very ambitious, and there was inadequate governance and delivery structure. Further, less emphasis was placed on the demand side of broadband both in strategic objectives to be pursued and in the focus (thematic) areas. Specifically, drivers of broadband uptake, namely privacy and security, affordability, innovation, and creation of awareness of broadband were much less emphasized compared to supply side aspects such us rollout of backbone infrastructure. NBS 2023 builds on the gains and fills the gaps that were discerned upon the end date evaluation of NBS 2017.

1.4 Background

Information and Communication Technologies (ICTs) are acknowledged globally as enablers of socio-economic development. When implemented properly, these technologies could reduce, if not eliminate altogether, poverty and imbalances in society. To harness the full developmental potential of ICTs, a well-coordinated and synchronized strategy for the ICT sector is needed.

1.4.1 Overview of Broadband in Kenya

Kenya has made tremendous strides in promoting the uptake of ICT services. Mobile telecommunications in the country, for example, constitute close to 44.1 million mobile subscriptions for a population of just over 46.4 million people. Nevertheless, the digital divide must be addressed if all Kenyans are to participate actively in the knowledge economy. In some parts of the country, for example, people still have to walk more than 2 kilometers to access mobile cellular signal and most particularly in 13 far-flung counties from Turkana to Mandera and further down to Tana River. In addition, access to Internet and data services is still a mirage in many parts of Kenya.

To scientifically identify the access gaps in the country, CA in 2016, conducted an ICT Access Gaps Study. According to the Study report, there are more than 580 sub-locations with less than 50% Global System for Mobile communication (GSM) population coverage of which 164 had no mobile signal at all. On the other hand, there were 2,221 sub-locations with less than 50% 3G-population coverage of which 1,221 have no access to 3G services at all. There is low geographical coverage of broadband services; for example, 50% of locations have no 3G services; further, 83% of the land mass lacks broadband services coverage. In addition, fiber optic cables only cover 60,000 km (17% land coverage). Clearly, the challenge of bridging the digital divide is huge and requires concerted effort by all stakeholders.

In an effort to bridge these gaps, CA is currently implementing two flagship projects through the mechanism of the Universal Service Fund (USF), namely:

(i) The Voice Infrastructure and Services Project geared towards ensuring all sub-locations in the country have access to basic mobile voice services. In the 2017/2018, financial year the Authority connected 78 sub-location that were previously un-served.
(ii) The Education Broadband Project aimed at facilitating broadband connectivity to all public secondary schools in the country. In the Financial year 2017/ 2018, CA had connected a total of 896 public secondary schools.

One of the gaps identified in the NBS 2017 was inadequate attention to broadband in the current national ICT policy, specifically, the existing policy, legal and regulatory framework needed to more exhaustively address the issues of access to, use of and benefit from broadband services; and

security of broadband from both the supply and demand sides. Further, the institutional framework for the delivery of broadband needed attention.

Key evaluation questions that informed the development of NBS 2023 revolved around the following issues:

(i) Broadband Definition;
(ii) Broadband outcomes and impacts;
(iii) Policy, Legislation and Regulation;
(iv) Broadband coverage;
(v) Monitoring and Evaluation of broadband;
(vi) Broadband Thematic areas;
(vii) Flagship Projects;
(viii) Institutional Framework for Broadband strategy delivery;
(ix) Relevance of broadband to the SDGs, Vision 2030 and the Big 4 agenda; and,
(x) Broadband vision for Kenya.

1.4.2 Drivers of Uptake of Broadband

The uptake and adoption of broadband remains a crucial component of a robust broadband ecosystem. The demand and supply sides of broadband must therefore be responsive to the market dynamics that eventually feed into a balanced ecosystem that takes stock of the demand side by, for example, availing relevant content, offering connectivity at affordable prices, providing quality of service, building capacity and education, creating awareness and guaranteeing security online. On the supply side, the legal, policy and the regulatory regime should provide for competition, flexibility and cooperation, the regulators should promote investment by providing incentives such as tax breaks, promoting cooperative business models through licensing and adopting best practices in the regulation of broadband. Service providers should also contribute by adopting progressive business models such as infrastructure sharing to address bottlenecks like digital divide. Other drivers of broadband such as government support and investment, income, population density, education levels and services should also be taken into account.

1.4.3 Emphasis of the National Broadband Strategy

The strategy reiterates focus of NBS 2017 and others that have emerged since its launch in 2013 within the context of achievement of its implementation targets. It is based on identified gaps in the extent of implementation of NBS 2017 and specifies actions to remedy any previous shortcomings. Since most of the previous ICT strategies (including the Kenya NBS) have to a comparatively larger extent addressed the supply side compared to the demand side of the broadband, this strategy, to further stimulate the development and diffusion of broadband moving forward, will include creating policies, legislation and regulations with more emphasis on:

(i) Policy framework on broadband, namely a review and alignment of the National Information and Communications Policy guidelines to reflect issues of broadband and leverage on regional and international frameworks for collaboration on broadband.

(ii) Legal and regulatory framework on broadband, which includes a review and alignment of existing legislation (Kenya Information and Communication Act CAP 411A and other relevant Acts e.g. Roads Act, Building Code) with the requirements of the Constitution, 2010. A review and alignment of relevant regulations with the requirements of updated legislation is also necessary.

(iii) Cyber security which is a crucial demand side issue in broadband and given the many_cyber breaches that continue to be committed leading to huge financial and other types of losses (including privacy) across sectors, will also be highlighted in order to build trust and confidence broadband hence stimulate uptake of broadband services. In this regard,

review of the National Cyber Security Strategy is key, among other cybersecurity related actions.

1.4.4 Thematic areas

In order to address the gaps that were discerned in the NBS 2017, and hence leverage broadband for socio-economic development, this National Broadband Strategy is premised on the following seven (7) thematic areas:

- Infrastructure and Connectivity;
- Services, Content, and Applications
- Capacity Building and Innovations;
- Policy, Legislation, and Regulation;
- Privacy and Security;
- Broadband devices;
- Finance and Investment;

The three additional thematic areas; broadband services, broadband devices and privacy and security of broadband have been added to specifically address the demand side of broadband where quality services, devices to access broadband services, and concerns about privacy and security while using broadband services are important considerations.

1.5 Vision and Principles

This strategy has a vision and a set of principles that guided its development and will also inform its implementation over the 2018-2023 period.

1.5.1 Vision

The vision of this strategy envisages the contribution of broadband to the realization of Vision 2030 and is as follows:

"A globally competitive knowledge-based society enabled by secure and fast broadband connectivity"

1.5.2 Theme

The overall theme of this strategy is 'broadband for all.' This implies that all citizens will have access to secure, quality and affordable broadband and be able to access all available broadband opportunities for all aspects of their lives. Similarly, all citizens will have equitable access to broadband.

1.5.3 Principles

This strategy is based on a set of four principles that have been identified and are explained as follows:

- *Promotion of National values towards the achievement of Vision 2030*

  As a key enabler towards the realization of the Vision 2030 and beyond, this strategy echoes and calls upon each player within the broadband ecosystem to uphold the values enshrined under Article 10 of the Constitution as the fundamental basis upon which the implementation of the strategic objectives of this strategy must be underpinned which include ***equity, cohesion and social inclusion.*** This strategy aspires to avail the benefits of broadband to all without exclusion. To this end, the interests residing in each corner of the societal fabric as enshrined in our Constitution including the special interest groups have been taken into account in coming up with action areas that will, if faithfully implemented, contribute to equitable inclusion and thereby unleash the broadband wonders to all.

- *Awareness creation, security, education, research and innovation*

The journey towards a knowledge-based society is gaining pace by the day. Invariably, data and online presence have blossomed in economic and social value. This has made high-speed broadband an imperative that is becoming a necessity by the day. As such, building technical and user capacity, education, awareness creation, research and innovation remain crucial components of a robust knowledge-based society. This strategy aspires to make possible the broadband vision by making these components prominent.

- *Collaboration, coordination, integration and sharing*

At the heart of a robust broadband ecosystem must exist ready, willing and open collaborative, coordinated and integrated regimes including at the operational, technical and policy levels. These regimes should embrace sharing of ideas, experiences, insights and resources as a means of realizing the aspirations of this strategy. This principle will be embraced and encouraged in order to effectively address the demands of the knowledge economy. This is especially necessary for the fight against cybercrime, in cyber security, management of scarce resources and in the delivery of all the other NBS 2023 programs and projects.

- *Open access, technology and network neutrality and competitiveness*

Ultimately, the success of this Strategy will hinge on an enabling legal, policy, regulatory and institutional environment that not only acknowledges the supply side of broadband, but one that equally protects the demand side of broadband. By providing an environment characterized by market mechanisms, flexibility, international cooperation among other best practices, it is hoped that the balance between the demand and supply sides of broadband, will be achieved and thereby contribute positively to the broadband vision.

1.6 Supply and Demand of Broadband

The deployment of broadband should encompass both the supply and demand aspects of broadband.

An important driver of broadband uptake is effective attention to demand-side questions besides affordability. In this regard, privacy and security are crucial demand-side considerations. The European Union (EU), in a communication titled *An Open, Safe and Secure Cyberspace*, and published in February 2013 posits that:

> "Information and communications technology has become the backbone of our economic growth and is a crucial resource which all our economic sectors rely on as it now underpins the complex systems which keep our economies running with many business models built (and dependent) on uninterrupted availability of the Internet and the smooth functioning of information systems."[1]

This EU position has important implications for the development of broadband in Kenya; specifically with regard to the demand side of broadband.

On the supply aspect, broadband infrastructure and services will be rolled out throughout the country. The delivery of services will be through wired and wireless connectivity, while the existing broadband and cellular coverage will be expanded with the Government – MoICT and CA –providing an enabling environment that encourages investment by the private sector. For the high economic impact areas, the existing broadband services will be upgraded to provide higher speeds of more than 10 Megabits per second (Mbps). Since infrastructure is expensive, the Government should negotiate with Public Private Partnerships (PPPs) and enter into agreement with Telecom companies to roll out high-speed broadband infrastructure in selected areas through national broadband infrastructure projects.

To facilitate the effective supply of broadband therefore, enabling legislation, regulation and institutional framework should be provided.

[1] Lloyd I, Information Technology Law, (7th) OUP, New York, 2014 https://books.google.co.ke/books?id=I2X0AwAAQBAJ&pg=PR3&source=gbs_selected_pages&cad=3#v=onepage&q&f=false (accessed on 20 July 2017)

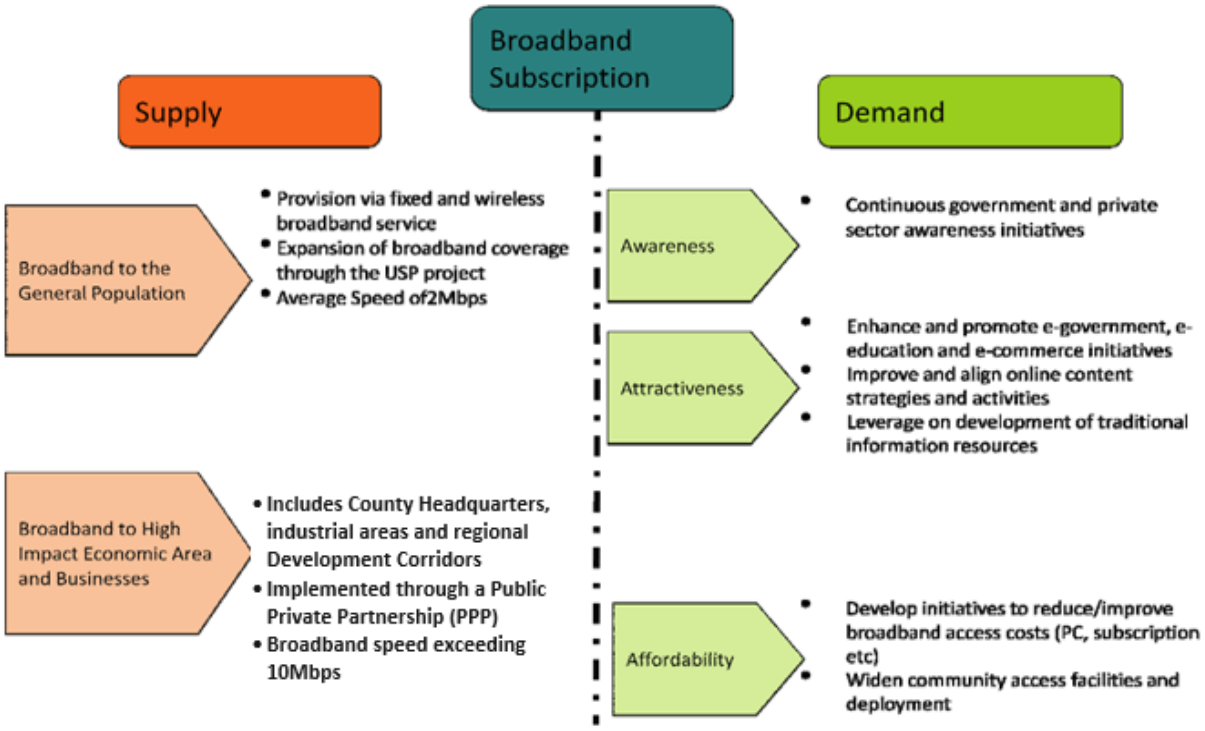


Figure 2: Broadband Strategy Implementation Focusing on Demand and Supply

Source: Adapted from Malaysian Broadband Initiative. http://www.skmm.gov.my/Sectors/Broadband/National-Broadband-Initiative.aspx. Accessed July 20, 2018

Understanding that supply alone is insufficient, an effective strategy to encourage demand with the emphasis on Awareness, Attractiveness, Affordability and Security Online as part of the promotion of broadband should be adopted. The approach for creating awareness will be through continuous government and private sector involvement in the awareness programs and capacity building initiatives. In order to improve the attractiveness of online content, efforts should be focused to enhance and promote e-Government, e-Education and e-Commerce; and the creation of local content including content local languages.

It is recognized that broadband is essential to all socio-economic endeavours. Increasingly, all essential services are only being accessed through broadband where e-commerce is becoming a major method of delivering business services hence the need to deploy broadband and create conditions that promote its demand and use by all citizens without discrimination. In this regard, affordability of broadband is imperative if citizens have to harness its full potential. The high cost of devices also constitutes a barrier to the uptake of broadband.

1.7 Equity and Social Inclusion

This strategy is based on the constitutional underpinnings of specific application of rights proposing initiatives focusing on children, persons with disabilities, youth, minorities and marginalized groups and older members of the society. The strategy further, includes initiatives on digital literacy, access devices and material for Persons Living with Disabilities (PWDs), affirmative action programs for (underserved/unserved areas) and programs aimed to ensure that all persons including older members of the society and women fully participate in the affairs of the society.

Upon identification of existing barriers, efforts have been made to include persons living with disabilities (PWDs) in broadband. However, with the gaps in current efforts, there is a need to address accessibility for persons with disabilities. In this regard, various needs must be met if we are to accelerate the broadband adoption path for people with disabilities. Specifically, the government will[2]

- Improve implementation and enforcement of existing accessibility laws;
- Gather and analyze more information about disability-specific broadband adoption issues;
- Coordinate accessibility policy and spending priorities;
- Update accessibility regulations;
- Update subsidy programs and ensure the availability of training and support; and
- Update its approach to accessibility problem-solving.

Among other actions, this effort will involve the modernization of broadband accessibility laws, rules, and related subsidy programs by the CA, the Judiciary and Parliament.

1.8 Assumptions

There are a number of prerequisites for the successful development of broadband and realization of its potential. The success of NBS 2023 is premised on the following:

(i) The government will create a policy, regulation and institutional framework that will facilitate the delivery and uptake of broadband
(ii) A robust broadband strategy delivery governance structure will be provided to include leadership, accountability and monitoring and evaluation (M&E) framework
(iii) The strategy will be private-sector driven
(iv) All stakeholders will effectively play their respective roles

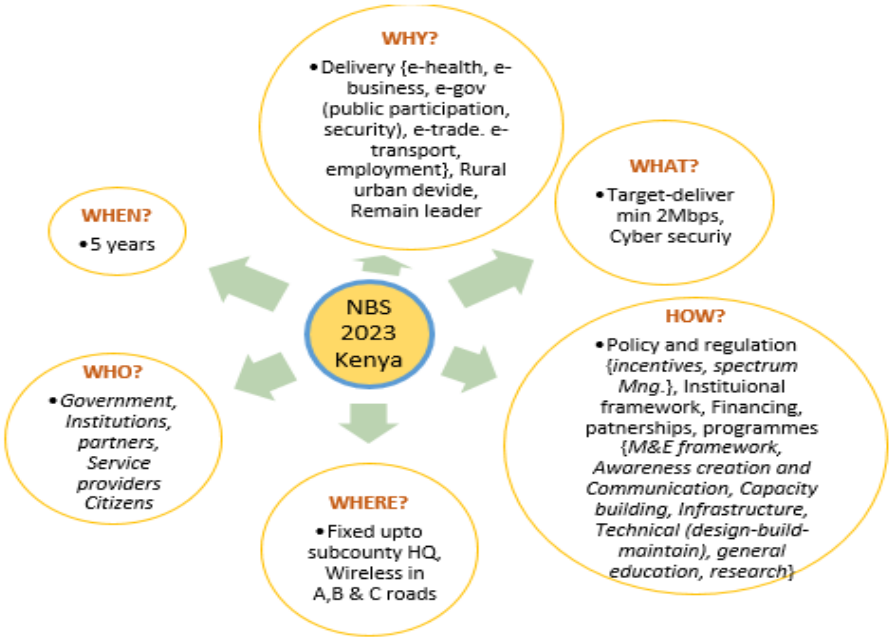


Figure 3: NBS 2023 Overview

[2] https://transition.fcc.gov/national-broadband.../equal-access-to-broadband-paper.doc

1.9 Outcomes of the Broadband Strategy

The implementation of this strategy will result in a number of outcomes that are pertinent to the country's development plans. The outcomes are as follows:-

1.9.1 Infrastructure and Connectivity Outcomes

(i) Last mile infrastructure is provided by fixed or wireless means to achieve 95 % national broadband coverage.
(ii) Fixed infrastructure is available up to the level of the ward.

1.9.2 Services, Content and Applications Outcomes

There is a government bus architecture that enables all government applications to share this data.

(i) There is a government data presentation standard and data classification mechanism that underpins a vibrant and effective government data digitization program.
(ii) All core government data (persons, land and infrastructure, assets and institutions) is defined through a coherent legal framework that exists in accessible digital format and is well protected and maintained.
(iii) Kenya's creative economy is well-equipped through capacity building, technology, services and institutions to design, create, register, publish and market at least 100,000 digital works a year.
(iv) Affordable and quality services and platforms exist to enable Kenyan businesses to quickly exploit digital technology to support their operations, strategy and marketing.

1.9.3 Capacity Building and Innovation Outcomes

Kenyans have basic digital literacy where:

(i) There is a mix of quality general ICT degrees, engineering degrees, and specialist ICT degrees, which graduate at least 10,000 persons every year.
(ii) Affordable digital literacy program for adults is available through e-learning through cyber cafes in order to allow every adult to acquire necessary digital skills.
(iii) A culture of innovation and fabrication is fostered among Kenyan youth. Centers are available to enable cost-effective access to technology, equipment and skills throughout the country. Innovators are assisted to cost-effectively protect their intellectual property.
(iv) Digital education is fully integrated into the basic education system, tertiary colleges and Technical and Vocational Education and Trainings (TVETs) run local and international certification courses leading to 50,000 Kenyans achieving ICT-related professional certifications every year.

1.9.4 Devices Outcomes

Every citizen has a broadband device, which also serves as an identity device. This device has the capacity to be used for information access, communication, e-learning, e-health, and emergency and disaster management. It is envisaged that the devices are assembled in Kenya and are affordable to the greater population.

2. RELEVANCE TO NATIONAL LEGAL, POLICY AND REGULATORY FRAMEWORKS AND NATIONAL DEVELOPMENT PLANS

Though ICT and broadband is a standalone economic sector, it is also an enabler of all sectors of social, economic and political development of Kenya within the framework of ICT for development (ICT4D). The implication of this is that broadband is essentially not an end in itself but more of a means to various ends. In this regard, it is aligned with the Constitution of Kenya 2010 (Bill of rights, and administrative standards and justice), V2030 (social justice and wealth creation), SDGs[3] (ICT policies and Plans) and the Big 4 agenda. It is specifically aligned to the *Industry, Innovation and Infrastructure (Goal 9)*, which support other SDGs such as Zero Hunger (Goal 2), Good Health (Goal 3), Sustainable Cities and Communities (Goal 11), which are relevant to Government of Kenya's Big 4 Agenda. The strategy is also aligned with SDG 4 (Quality Education) in the context of capacity building; and partnerships and collaborations (Goal 17). The strategy is also aligned with ICT policy, ICT master plan, County Integrated Development Plans (CIDPs)[4] Science, Technology & Innovation Act, Industrialization Act and with the Computer Misuse and Cyber-crimes Act among others.

2.1 Big Four Agenda

In order to become an information society that effectively participates in the knowledge-based economy, the availability of good quality, affordable, secure and pervasive broadband is imperative since it affects all the elements necessary for the Government to deliver development for all citizens. This strategy offers the fitting strategies for facilities to attract investment, both foreign and local, to encourage manufacturing industries, which will create new jobs for Kenyans and avail quality products for citizens.

This strategy is aimed at enabling the diffusion and use of broadband ICT in all spheres of human endeavour in Kenya, namely the political, social and economic pillars of the national development agenda – the Vision 2030 through the attendant Medium-Term Plans and other sectoral strategic plans. The strategy addresses the Big 4 Agenda of the Government by complementing the efforts that the parent MDAs are making through the infusion of efficiency by use of broadband services in the context of ICT for development (ICT4D), job creation and availing of quality and affordable products through manufacturing of devices. The strategy also brings improvements in the sector through Artificial Intelligence (AI) and Internet of Things (IoT) technologies, broadband enabled affordable housing, food security through improved broadband enabled supply chain, and Universal healthcare delivery to Kenyans through e-health.

Specifically, the strategy will contribute to the realization of the Big 4 development agenda such as providing health information systems, agricultural information systems, supporting manufacturing and building sustainable cities. To this end, the following policy decisions will be implemented to realize the Big 4 Agenda:

- Integrate BB in the Big 4 sectors
- Funding for building of the Big 4 architecture
- Farm registration and identification
- Geospatial mapping of all buildings and land

It is anticipated therefore that broadband will make a major contribution towards the achievement of Kenya's Constitutional and development commitments. This strategy is, therefore, a justified candidate for substantial government and partner investment

[3] Kenya made a commitment on 25th September 2015 to on implement the SDGs (see https://www.un.int/kenya/media/unga-2015)

[4] It is envisaged that the CIDPs will be updated as necessary ensure implementation of NBS 2023

2.2 Broadband Delivering the Big Four Agenda

The thematic areas in the NBS 2023 have been ultimately mapped in line with the Big 4 Agenda pointing to the solutions that will be brought about through the implementation of the Strategy. An illustration of how NBS will be embedded to deliver the Big Four agenda is shown in Table 1.

Table 2: Broadband Delivering Big Four Agenda

Big 4 Agenda	Affordable Housing	Universal Healthcare	Manufacturing	Food Security	
	The national Broadband strategy				
NBS Theme	Infrastructure and devices	Services, Content, Applications	Policy, legislation, and regulation	Capacity Building and Innovations	Finance and Investment	Privacy and Security;
NBS Contribution to Big 4	Notes Provide core and supporting infrastructure, and end user devices to deliver broadband in the Big 4 sectors Provision of smart living and smart cities	Notes -Development of appropriate and good quality services specific to the Big 4 sectors - Development of content, applications and innovative services in the Big 4 sectors -Use of BB for smart agriculture and efficient distribution channels and market information	Notes Formulation of policies, enactment of laws and development of regulations to guide the secure use of broadband in the Big 4 sectors	Notes -Training and education of the Big 4 sector members on adoption and use of broadband in delivering on the Big 4 -Public awareness creation for broadband	Notes -Providing incentive(s) for investors in broadband in the Big 4 -Government stimulus fund to spur uptake /use of broadband to deliver the Big 4	Notes Enact laws to protect broadband users, enhance cybersecurity and prosecute cybercrimes

Affordable housing	Universal Healthcare	Manufacturing	Food Security
Broadband ready housing: Have legislations for installation of cables in all modern housing to ease accessibility of Internet at home. ***KPI: Number of new homes with BB***	*Connectivity:* Deliver broadband to all health facilities through the NOFBI and other initiatives by the private sector. This can be done in collaboration with KPLC as is linked to majority of the health facilities. ***KPI: Number of health workers/facilities using BB*** *Applications*: Avail applications (apps) and content that can be consumed by all citizens who have smart phones for healthcare	• Enhance manufacturing of broadband devices within the country. This will in turn have affordable devices in the country	*Supply chain efficiency*: Use the Internet (broadband) to harmonize the demand and supply sides of the food value chain by linking areas of production to relevant markets

	Big Data analytics: data on staffing, accountability and quality can be utilized to ensure better leadership and governance of health facilities *Telemedicine*: to assure the population of accessible healthcare by affording them ability to consult professionals globally. *Health information*; use broadband in the health facilities to store and access health information including patient details and health record.		
Security of housing: Ensure secure residences by promoting installation of ICT security gadgets through an affordable business model to avail devices	**Monitoring of heath**: Track all supply and usage of healthcare services and facilities and ensure timely availability of all necessary healthcare (facilities and services)	-Manufacture quality products through adoption of global standards for locally manufactured ICT devices - manufacture of devices to drive down cost and improve availability - Use of BB for efficiency improvement in manufacturing -Job creation through apps development and content creation and innovation ***KPI: Number of jobs in software development***	*Quality of food:* Verify quality of the food consumed and ensure only quality foods are consumed by the whole population. *Digital agriculture*: such as the use of IoT technologies to improve farming and food production ***KPI: Number of farmers using BB/Apps***

In order to support the Big 4 Agenda, broadband will be promoted in these sectors and incentives provided for development of services, content and e-applications that will improve efficiency in the Big 4 sectors. It is recommended that a study be conducted to determine opportunities for use of broadband in the Big 4 sectors and appropriate incentives be provided to exploit these opportunities. This will ensure that full potential is realized in these sectors as a contribution to socio-economic transformation occurs within the life of this NBS 2023.

2.3 Broadband for All

For each measure, NBS 2023 envisions a Kenya where a user in the remotest part of the country can connect with other users within and outside the country at the click of a button to communicate, transact and interact over a fast, reliable, secure and affordable Internet connection. This will enable each user to receive information, access and share content, trade and socialize in addition to other services that have now become available as a result of broadband-enabled opportunities.

The success of this Strategy therefore ultimately depends on the solutions and services that will be availed to the people through broadband as an enabler or gateway to the limitless opportunities that continue to spring within the fourth industrial revolution.

In this regard *Broadband for Wanjiku* aims to among other things;

- Enable more people to access and use affordable broadband
- Enhance consumer choice
- Complement and drive other sectors and government agendas
- Increase efficiency
- Provide access to global markets
- Encourage innovation
- Promote inclusion through technology

2.3.1 Benefits of successful implementation of this strategy

If successfully implemented, this strategy will unlock vast opportunities including research, communication, networking, career development, e-commerce, socializing and innovation. A robust broadband ecosystem will enhance access to information, leverage on ICTs as enablers and drivers of the national, regional and global economic blueprints and aspirations such as Vision 2030, Big 4 Agenda, Agenda 2063 and the Sustainable Development Goals to which Kenya subscribes.

Through ICTs, the government and private sector can also partner to deploy technologies aimed at increasing digital presence and boost access to services such as biometric enrolment of citizens to the National Hospital Insurance Fund for universal healthcare, creation of a central database of farmers for registration of farmers, classification of their farm products and provision of market information. Broadband will also increase productivity, and create innovation and talent hubs to stimulate growth and create employment.

ICT companies can also be listed on the Stock Exchanges to boost investment while mobile commerce will be used to provide digital financial solutions and inclusion. As noted in the ITU m-Powering report 2018, it is /will be important to identify other local challenges that can be readily addressed using ICT as catalysts for increased Internet usage[5] through collaboration between government, private sector, and development partners.

3 STRATEGY

The focus of this strategy is on seven thematic areas, which are Policy, Legislation and Regulation; Infrastructure and Connectivity; Services, Content, and Applications; Capacity building and Innovation; Devices; Privacy and Security; Finance and Investment; and the accompanying institutional framework to deliver the strategy.

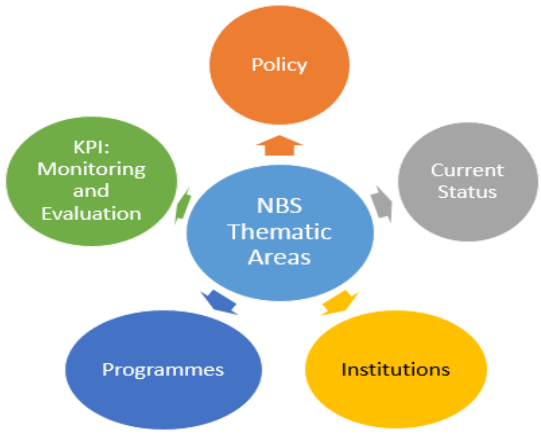
In this chapter, an examination of the strategic issues regarding broadband ecosystem development is first presented. This is followed by a presentation of the current situation and gap analysis, opportunity identification, strategic objectives formulation and lastly, an appended (Appendix) implementation plan for each thematic area.

[5] https://www.itu.int/en/ITU-D/Initiatives/m-Powering/Documents/Mpowering_Report_18-00029-v2.pdf

Besides the strategies that have been provided under each thematic area, other strategic initiatives under this strategy are to:

- Provide incentives to encourage private sector to invest in networks across the country
-
- Encourage technology pilots to stimulate innovations
- Encourage cost reduction through network and infrastructure sharing
- Embrace public private partnerships that spur development
- Provide enabling institutional, regulatory, policy and legal environment
- Introduce incentives that encourage investment in high cost areas
- Elaborate on the specific role of the Universal Service Fund in complementing the overall strategy

Figure 4: NBS Thematic Areas



- Enhance the governance and delivery structure for broadband including provision of a robust Monitoring and Evaluation for the strategy

In addition to addressing each thematic area, this strategy encompasses:

(i) Program approach to broadband flagship projects implementation with clear ownership, responsibility, expected outcomes, key performance indicators (KPIs), targets; and measurements and frequency of measurement

(ii) Quality, security and affordability of broadband, which addresses the demand side of broadband.

(iii) Comprehensive definition of broadband for Kenya to also include quality, affordability, security, and the overarching aspirations of Kenya.

(iv) Broadband for all where persons living with disabilities, minorities and the vulnerable individuals are not left out of broadband equation

3.1 Policy, Legal and Regulatory Environment

The purpose of the policy, legislation and regulation (PLR) is to ensure safety and high quality of service, motivate maximum broadband coverage, inspire rich content and applications, and ensure affordability of broadband and continuous digital literacy programs that address the needs all citizens

Several legislations dealing with various issues that affect the broadband have been enacted:

- Kenya Information & Communication Amendment Act 2013
- Consumer Protection Act, No. 46 of 2012
- Access to Information Act No 31 of 2016
- Computer Misuse and Cyber Crimes Act 2018

1. Current status

A number of pending broadband-enabling legislations, regulations, policy, and fundamental freedoms specific to ICT and broadband are presented in Table 2
Amendments to Copyright Act to provide for enforcement of right to copyright where infringement occurs online (point out the gaps to be addressed to make it more supportive of BB)

Table 3: Fundamental Freedoms and Pending legal instruments

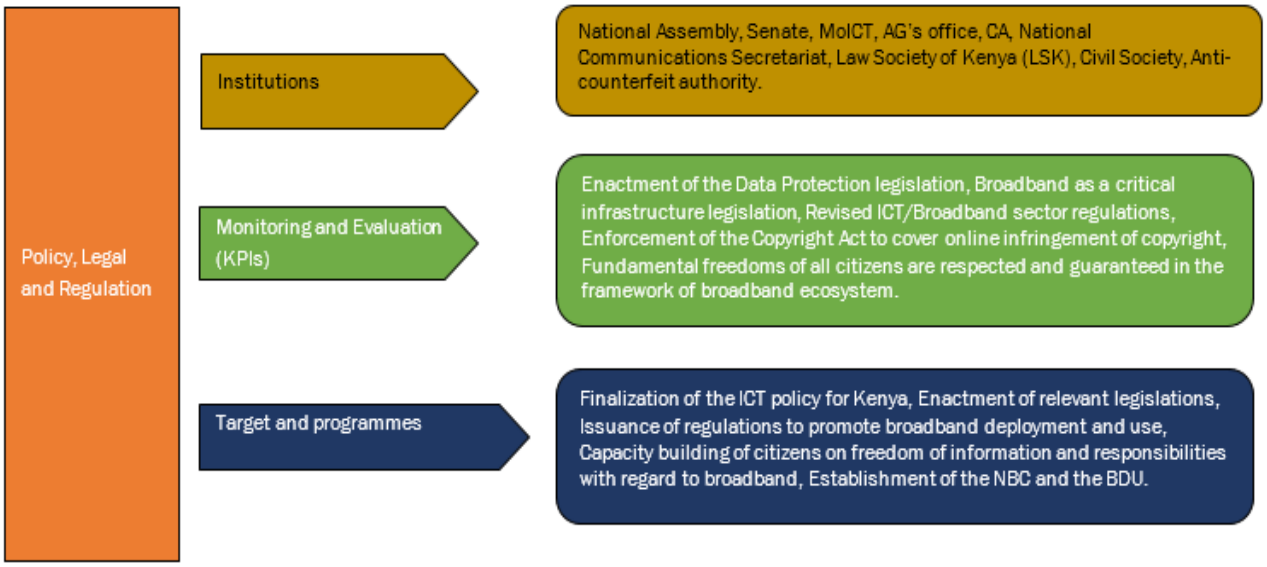
Pending legislations, policy and regulations:	Fundamental freedoms
• Data Protection (Article 31 of the Constitution) • Cyber security • Critical Infrastructure (including domain names for essential services) • Electronic Transactions • Revised sector regulations • ICT policy • Online Infringement of Copyright	• Right to Information: Access to information Act 2016 • Data Protection and Privacy: Data Protection and Privacy Legislation; pending but committee has been set up • Freedom of Expression: Media Council Act 2013, deals with protection of freedom of speech of media • Right to Security: Computer misuse and cybercrime Act 2018; deals with criminalization of cyber violations • Sustainable Environment: E-waste regulations, pending; EMCA 2015 Cap 387; Environmental Audit & Impact Assessment • Right to Property (Article 40(5))

2. Policy for Broadband

Thematic Area	Policy Focus	Strategy/Action
Infrastructure	-Affordability -Broadband as a critical infrastructure -Spectrum Management -Rural BB infrastructure	(i) Infrastructure sharing (ii)Legislation updated to include broadband and as critical infrastructure (iii) Spectrum refarming (iv) Establish PPP regulations for broadband that would enable rural infrastructure operators to offer services

		to multiple mobile network operators. (v) Work with a range of partners, to launch initiatives focused on connecting the unconnected and under-connected such as through the use of High Altitude Platform Station (HAPS), especially in rural and remote areas to provide more affordable, fast and flexible backhaul of broadband services, and further become a key link to emergency communications in the wake of natural disasters.
Services, Content and Application	-Quality of Service -Affordability -Consumer Protection -Disruptive technologies -Net neutrality -Data Protection -Electronic Transactions -Competition -Language -Child Online Protection -Digitization of curriculum -Intellectual Property Rights -Public key fields	Relevant regulations to address each aspect of service and content
Capacity Building and Innovation	-Local professional certification in critical Broadband areas -Intellectual Property Rights (IPRs)	(i) To revive specialized institutions to support specialized skills and competencies required by Broadband related sectors (ii) Promote and enforce IPRs Establish connectivity initiatives aiming to lower the cost of backhaul technologies.
Devices	-Quality -Accessibility	Ensure availability of genuine broadband access devices
Privacy and Security	-Infrastructure -Detection -Enforcement	(i) Collaborate with National Police Service to secure BB infrastructure (ii) Promote establishment of Independent cybercrime forensic organizations (iii) Conduct education and regular awareness programs on online privacy and security to citizens (iv) International cooperation for cyber-security management response (v) ISO 27001 certification and compliance
	-Integrated infrastructure development -Special Purpose Vehicles -Design, implementation, operation and maintenance (O&M), and sales	(i)Institutionalize multi-stakeholder approach to broadband development (ii) implement innovative models such as Design Build and Operate (BDO) upon assessment of their merit

Figure 5: Status on Policy, legal and Legislation



3. Regulations for Broadband under the NBS 2023

The following are the strategic issues with regard to law and regulation that will be addressed in this strategy:

(i) Licensing and authorization frameworks
(ii) Spectrum management
(iii) Growth of existing infrastructure
(iv) Opening vertically integrated markets
(v) Network neutrality
(vi) Security in cyberspace
(vii) Privacy and data protection
(viii) Regulation of broadband content

The following regulatory actions will be taken to support the realization the NBS 2023 vision:

(a) Licensing and authorization

To ensure technology and service neutrality except where scarce resources are involved by promoting unified licensing frameworks capable of accommodating technology and service neutrality.

The government will require compliance to security and privacy by equipment and systems as part of the licensing and authorization requirements in accordance to international standards such as ISO 27001 etc. and will continue updating the security and privacy regulations as the situation arises. With regard to licensing and authorization, the Government of Kenya will:-

(i) Continually facilitate faster and less expensive deployment of connectivity infrastructure by streamlining local licensing processes and reducing other legal barriers to entry.
(ii) Open up rights of way and access to facilities to remove impediments to sharing of passive infrastructure and enhance competition.

(b) Spectrum management

To facilitate converged service availability and maximize value and use of spectrum by:

- Ensuring flexibility in spectrum licensing and authorization (e.g. enabling platforms such as spectrum trading to enable entry of secondary markets)
- Adopting flexible use rules for existing licenses
- Adopting internationally harmonized band plans during allocation and assignment of spectrum
- Use of market mechanisms to assign spectrum
- Continually make spectrum charging responsive to the market realities and in line with best-practice

Around the world, spectrum authorities are making decisions about how best to put spectrum to work, driving technology and investment across the full range of connectivity platforms and services including end user broadband access, backhaul, broadcast, fixed terrestrial, fixed satellite and mobile services. Regarding broadband policy reforms, will adopt the principle of flexibility underpin spectrum licensing, authorizations, and rules of use. These principles include:

(a) Ensure an abundant supply of spectrum is available: An abundance of spectrum will reduce service provider barriers to entry and increase competition and innovation. In this regard, the Government of Kenya will re-evaluate spectrum allocation periodically to ensure that it is well utilized.

(b) Promote flexible use: The Government of Kenya will ensure that the spectrum policies are sufficiently flexible to allow spectrum use by multiple parties in unserved and underserved areas.[6] The policies will promote flexible use of spectrum and sharing across users and platforms, such as mobile, satellite, and new technologies like high altitude platform stations (HAPS) and Terragraph will significantly increase the spectrum available for broadband.

(c) Balance Licensed and Unlicensed spectrum: Spectrum policy should support both licensed and unlicensed allocations and promote technology neutrality. The value of licenses fees will ensure appropriate investment incentives must be balanced against circumstances where the case for deployment is less attractive.

(d) Promote Both the Capacity and Coverage of Networks: the Government of Kenya will pursue policies that not only enhance the capacity of networks but also expands their coverage to underserved areas and populations.

(c) Growth of existing infrastructure

To promote competition and entry whilst maintaining incentives for investment in new infrastructure and innovation.

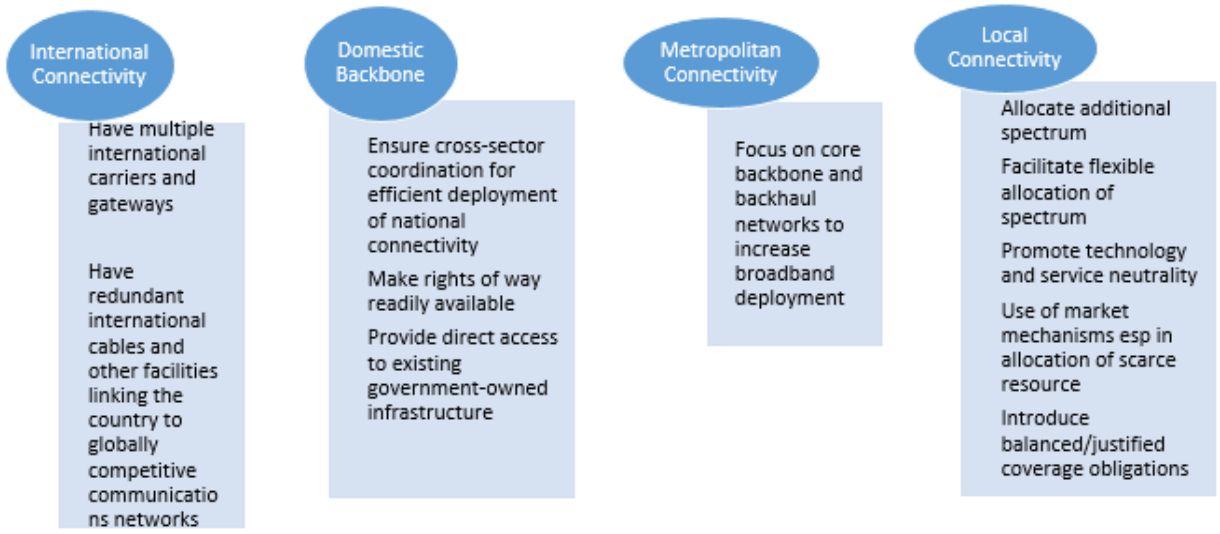
In this regard, the government will: -

(i) Make policies, regulations, enact legislations and provide incentives for private sector investment in the ICT sector

(ii) Promote infrastructure sharing (e.g. through joint ventures) in order to reduce capital expenditures and operating expenses associated with rollout and operation of broadband.

(iii) Continually monitor and conduct market study to ensure market efficiency by ensuring that there is no market failure.

[6] See Appendix I to these submissions



(c) Opening vertically integrated markets

To promote innovative business models which attract investments along the broadband value chain by defining various markets in the broadband value chain such as physical layer, active layer and service layers.

Open Access

Open access is 'the possibility for third parties to use an existing network infrastructure to provide services.' Open access is essential in the case of publicly funded national broadband networks, and generally required wherever there is the likelihood of economic bottlenecks preventing competitive supply. There is an emerging regulatory consensus that there should be open access to national broadband infrastructure. In this regard, regulatory action for broadband networks will focus on ensuring access on fair, reasonable and non-discriminatory terms, rather than on encouraging infrastructure competition. Open access will especially be mandated where broadband and next-generation access roll-out is supported by public funding. In such circumstances, mandated open access will promote network investment, prevent the uneconomic duplication of facilities, and strengthen competition. Though monopoly on infrastructure, particularly in rural areas and developing countries may seem sensible, this area will receive necessary regulatory intervention in line with market development to ensure that such monopoly does not create bottlenecks to development of broadband in Kenya.

(d) Cyber security

To revise and reform governmental and private sector safeguards to promote trust, security, privacy and consumer protection in ICT services within the first year of the NBS 2023 through the following strategies:-

(1) Retroactive Security Measures

To react to security issues after the fact by focusing on early detection and response.

(2) Regulatory actions to ensure security

(i) Increase oversight and regulation of computer and communications technologies by strengthening both "hard" and "soft" security and privacy measures.
(ii) Encourage institutions and companies to conform to best practices
(iii) Mandate a safety-culture approach to cybersecurity and privacy
(iv) Obligate companies to provide security and privacy mechanisms in their products

(v) Interpret laws (e.g. torts) to include increased penalties for cybersecurity breaches
(vi) Make the nodes of communications networks accountable for their security provisions (such that administrators of these nodes can detect vulnerable or malicious nodes and punish or isolate them as a deterrent measure)
(vii) Use of economic incentives to promote security (e.g. requiring that data breaches and non-compliance with best security practices be reported).

(3) Cybersecurity Research

(i) Studies on how people apply or circumvent security systems in order to design more rational/responsive systems
(ii) Metrics for levels of security and values of assets to inform level of security necessary vis-à-vis absolute security
(iii) Research to counter the innovative capabilities and abilities of cybercriminals who are ever a step ahead

(4) Digital Literacy regarding cyber security

To educate users on digital vigilance including password use and detection of potential threats.

(5) Forms of Cybersecurity Measures

(i) *Hard cybersecurity.* Technical security mechanisms that determine the predictable functionality of an electronic system with respect to its proposed utility. This includes encryption, authentication; measures to protect confidentiality, integrity and accessibility that are innate to the technology itself.

(ii) *Soft cybersecurity*. These are legal protection mechanisms that may include liability rules for product failures (for instance, the burden of proof where an illegitimate transaction has taken place), or measures in the event that a crime has been committed.

(e) Network Neutrality

To formulate regulations to govern Internet content in the framework of network neutrality.

Network neutrality is critical to keeping the Internet free and open for everyone. It ensures that providers of Internet access services do not leverage their control of the underlying network infrastructure to interfere with consumers' ability to access the online content, services, and applications of their choice. Maintaining strong net neutrality protections in Kenya will ensure consumer choice while preserving the ability of the entire Internet ecosystem to innovate. In order to 'formulate regulations to govern Internet content in the framework of network neutrality,' the following net neutrality principles should apply:

(a) No Blocking or Throttling: Providers of Internet access should not be permitted to block, slow, or degrade people's ability to use, send, receive, or offer any lawful content, application, service, or non-harmful device of their choice on the Internet.
(b) No Paid Prioritization or Fast Lanes: Providers of Internet access should not be permitted to enter into arrangements that provide certain content at faster speeds or require content providers to pay in order to provide a certain quality of service to end users.
(c) Reasonable Traffic Management: Any network management practices should be based on objective technical considerations, not commercial considerations, and be tailored to achieving a legitimate network management purpose. Any such practices should not result in preferential treatment of the Internet access provider's affiliated content or services, or the blocking or throttling of specific classes of content or services.

(d) Technological Neutrality: Providers of Internet access should abide by these net neutrality principles regardless of how Internet access is provided, be it via wireless or wireline.
(e) Transparency: Providers of Internet access should be transparent about their network practices and the speed of the traffic that flows over their networks.

The government will permit zero-rating programs for the benefit of consumers and connectivity because free access to popular sites on the Internet will encourage more people to sign up for data plans and provide greater freedom to explore local content. This increase in demand for local content spurs local businesses and entrepreneurs to create new online products and services.

(f) Privacy and Data Protection

Individual Participation

- Emphasizing informed consent where consumers freely give specific and informed indication of their agreement to data collecting and processing activities

Requiring increased transparency of data collection and data processing

- Consumers must be given sufficient information to make informed choices regarding the collection and use of their personal data. This may be addressed by facilitating standard privacy notices drafted using plain language or by educating consumers on privacy matters.
- Transparency can also be enhanced using policies such as data breach notifications

Increasing responsibility of data controllers

- Mandate Data Collectors (DCs) to incorporate substantive privacy protections into their practices, including data security, data minimization, sound retention practices, and data accuracy as a right for consumers including maintaining comprehensive data management procedures throughout the life cycle of their products and services

Raising Awareness

- Especially among younger users, regarding the impact of broadband and new technologies on personal privacy

International Cooperation

- Increased international cooperation in the enforcement of privacy laws and data protection

Encryption

- Building capacity on Encryption methods
- Advocate for Policies Requiring messaging and communication channels to use Encryption
- IoT Devices and other Internet enabled devices to support Encryption by default

(g) Regulation of Content

To make regulations regarding content as follows:-

(1) Freedom of Expression

- Content regulation, including surveillance and monitoring of Internet use, needs to take into account the standards set by international human rights law
- The full guarantee of the right to freedom of expression must be the norm, and any limitation should be considered as an exception, and this principle should never be reversed (see the report by the UN Special Rapporteur on the Promotion and Protection of the Right to Freedom of Opinion and Expression)

(2) Intellectual Property Rights (IPRs)

- Enact graduated response (three-strike laws) where users who infringe copyrights online would be given first and second warnings and upon a third infringement, they

could be subjected to a fine, jail time, and suspension of their Internet access (based on the attaching judicial processes). Further, the government will ensure a robust commitment to competition investigations and enforcement aimed at keeping markets open to new competitors and avoiding concentration.

- Have mechanisms through which copyright holders (CH) can work with ISPs to curb copyright infringement (e.g. upon detection of an infringement, the CH contacts the ISP in control of the infringing IP address where after the ISP traces the customer directly and warns the customer e.g. that copyright infringement is a violation of the ISPs terms of service that could lead to disconnection). The requirement to remove copyright infringing content will be subject to the verification of the Copyright by the Kenya Copyright Board (KENCOBO).

(3) Regulating Specific Forms of Content

This will cover regulation of content for protection of minors, prevention of vices, and protection of national security. In so doing, the government will conduct studies and make regulations, self or government, that will be in line with best international practice and will implement a regulatory regime for content that distinguishes between commercial advertisement or branding and the free expression of political, social or economic commentary by natural persons. Specifically,

(i) Content regulation will take into account the standards set by international human rights law, and that a full guarantee of the right to freedom of expression must be the norm in any form of content regulation, and that any limitations should be considered narrow exceptions to this norm. For Self-Harm content the government may for instance consider; prosecution of the author, use Internet platforms to offer advice and campaign against damaging content, self-regulate through content screening and purging,. Other include; prioritizing the protection of users beyond commercial interests including liability laws for content, legal duty of care to specific groups including children and vulnerable adults and classification of and censorship on harmful content defined under law including content promoting fake news, hate speech, extremism or content causing mental health problems.

(ii) The regulation of online content including for OTT, and communications applications will also recognize the critical importance of those services in fulfilling the NBS's identified outcomes, including of driving broadband adoption and growing Kenya's economy. Disruptive as OTTs are, the government remains proactive in ensuring that these technologies do not offend the provisions of the Constitution and best practice. Through Consumer Protection and Competition Laws, the concerns raised can be addressed as and when they arise through the authorities mandated including the Courts as the government works towards effective regulation of OTT service providers who currently enjoy the absence of specific laws that regulate their operations.

3.1.1 Gaps

The identified gaps include lack of synchronization of operations by government entities and authorities handling infrastructure rollout, infringement of fundamental freedoms, sector guidelines not embedded in regulations such as branding of phones, lack of technology ready devices, such as 4G compatible devices, Persons with disabilities (PWD) not included in broadband, e-waste regulations not yet enacted, depleted resources which require infrastructure sharing, expensive ICT services and duplication of infrastructure; and inadequate focus on broadband in the current national ICT policy, legal and regulatory framework. Specifically, the current policy, legal and

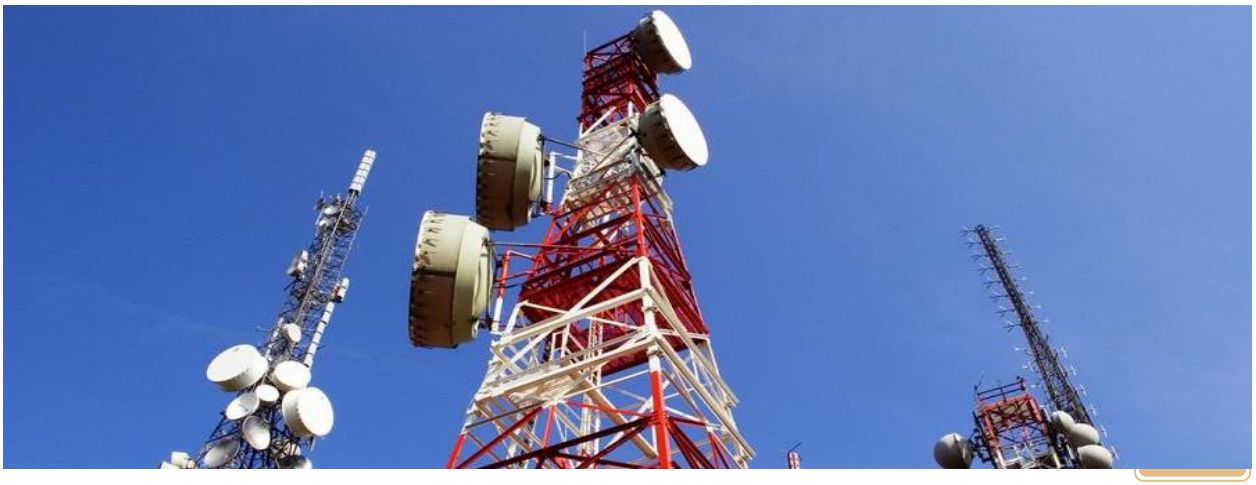
regulatory framework needs to more exhaustively address the issues of access to, use of and benefit from broadband ICT services and security of broadband from both the perspectives of supply and demand. Further, the institutional framework for the delivery of broadband needs enhancement with a view to strengthening it. Inadequacy of appropriate legislation for broadband infrastructure should also be addressed, e.g., with regard to treating broadband as critical infrastructure

3.1.2 Strategic objectives

- To elevate broadband to critical infrastructure status through legislation
- Implement Infrastructure sharing regulations;
- To implement Cyber Security laws;
- The Inclusion of persons living with disabilities (PWDs) in broadband, such as through audio signals;
- Review of Tax policies, including tax exemptions on broadband devices;
- Development of a plan for new technology such as the Fifth Generation network (5G) after Radio frequency meeting (the World Radio Conference 2019 schedule for in October 2019) by 2020; further the testing of 5G technology should be underway presently ahead of 2020;
- More ownership and responsibility by government agencies;
- Environmental impact assessment and Audit to address environmental impacts of broadband;
- To harmonize legislation across all the Counties and National government including wayleaves and associated physical infrastructure to avoid duplicated charges, and collaborative planning, deployment and maintenance of broadband; and,
- Development and enhancement of Data Sovereignty law - e.g., Government to define standards and policies to be met to store, process and transmit 'Kenyan' Data.

3.2 Infrastructure and Connectivity

Though the private sector has made great strides in the development of infrastructure[7], there are still opportunities for government intervention where purely commercial considerations do not suffice. It is also noted that direct participation by the government in the infrastructure development should be targeted at the discernible gap areas considering that connectivity has progressively become affordable as a result of competition and availability of alternatives. In the past, the government has invested over 200 million USD in NOFBI on the national backbone spanning 6,400 km and touching all 47 counties. In addition, Satellite will be deployed where terrestrial systems are not feasible; the approach is to use multiple technologies to deliver broadband provided they are the most cost-effective for a particular site. This notwithstanding, spectrum costs and the process of acquiring can constitute big barriers to the rollout of wireless infrastructure and need to be addressed. Further, the overall cost of business in deploying and running infrastructure is a challenge due to lack of energy and lack of proper road infrastructure, wayleaves and inadequate security of this infrastructure resulting to vandalism and/or sabotage.



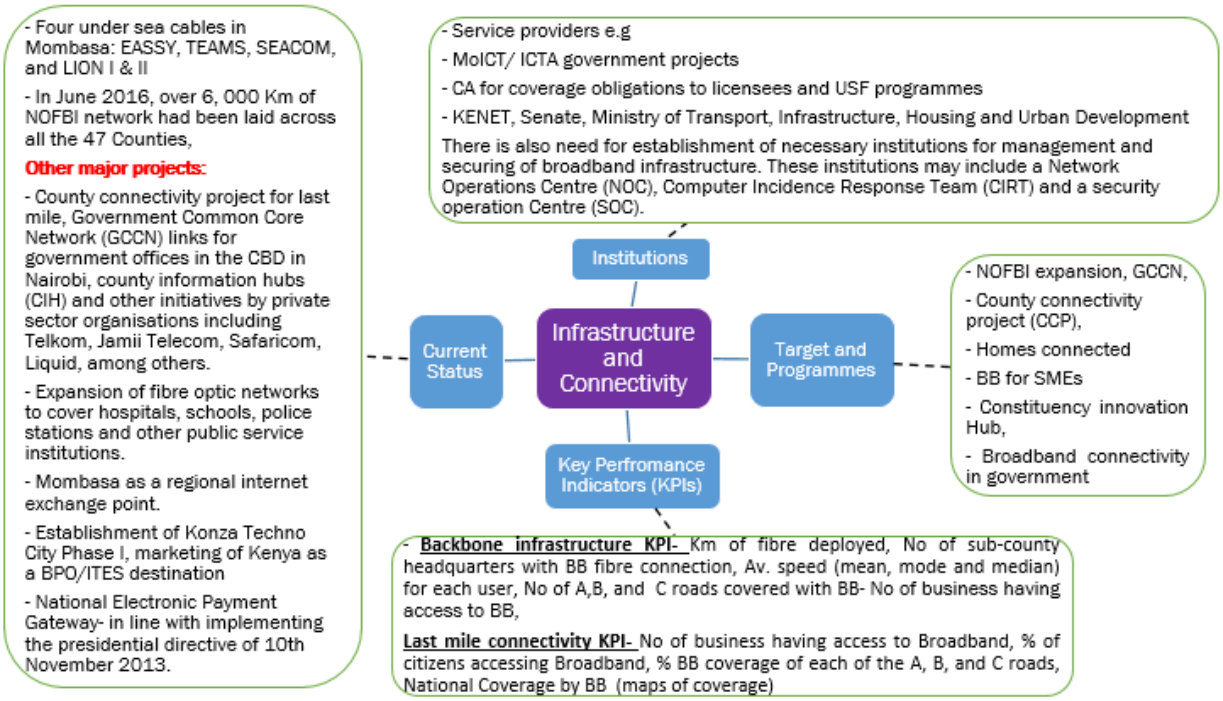
Today, nearly four billion people are still not connected to the Internet. Among those that have broadband connectivity, many are under-connected. Connecting the unserved and underserved populations is a complex effort that requires not just bringing network infrastructure to more people, but taking additional steps to solve the affordability and relevance challenges that also undermine access.

The gaps, opportunities for improvement, strategic objectives and an implementation plan for infrastructure and connectivity under this Strategy are as follows:

3.2.1 Gaps

- Quality of broadband services exhibit low speed connections and poor reliability
- Rural areas are lacking in coverage
- Low geographical coverage of broadband services; for example, 50% of locations have no 3G services; further, 83% of the land mass lacks broadband services. In addition, fiber optic cables only cover 60,000 km (17% land coverage)
- Parallel installations due to lack of coordination of infrastructure development which have resulted in reducing coverage, constraining investment in broadband and reducing ability of consumers to afford broadband
- Lack of sharing arrangement of critical infrastructure
- Low access to and uptake of broadband services (penetration of 39.7%)
- Spectrum Licensing framework stuck in the pre-broadband era

Figure 6: Status on Infrastructure and Connectivity

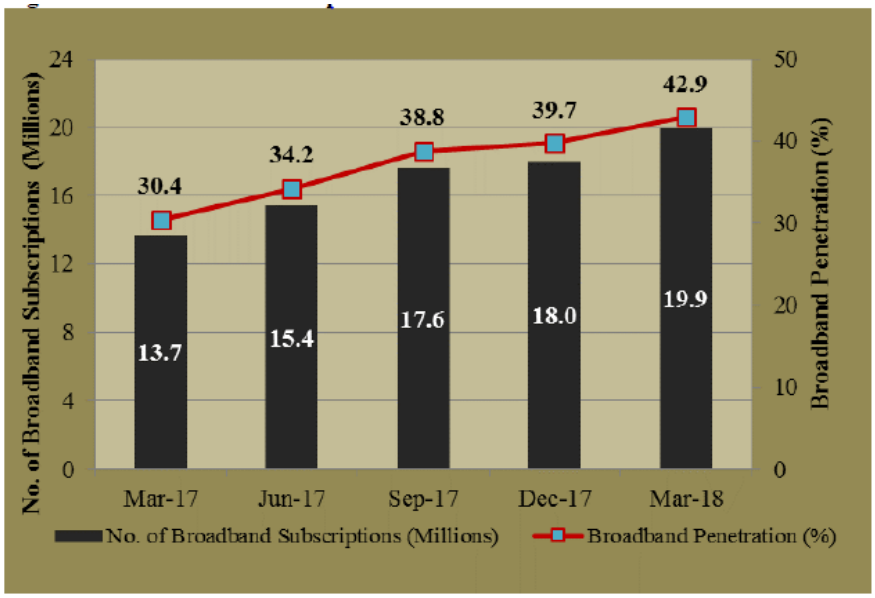


3.2.2 Opportunities

- Increase broadband penetration in rural areas for socio economic development and transformation
- Increase broadband connection to the 47 Counties
- Stimulate demand for broadband services and entrepreneurships

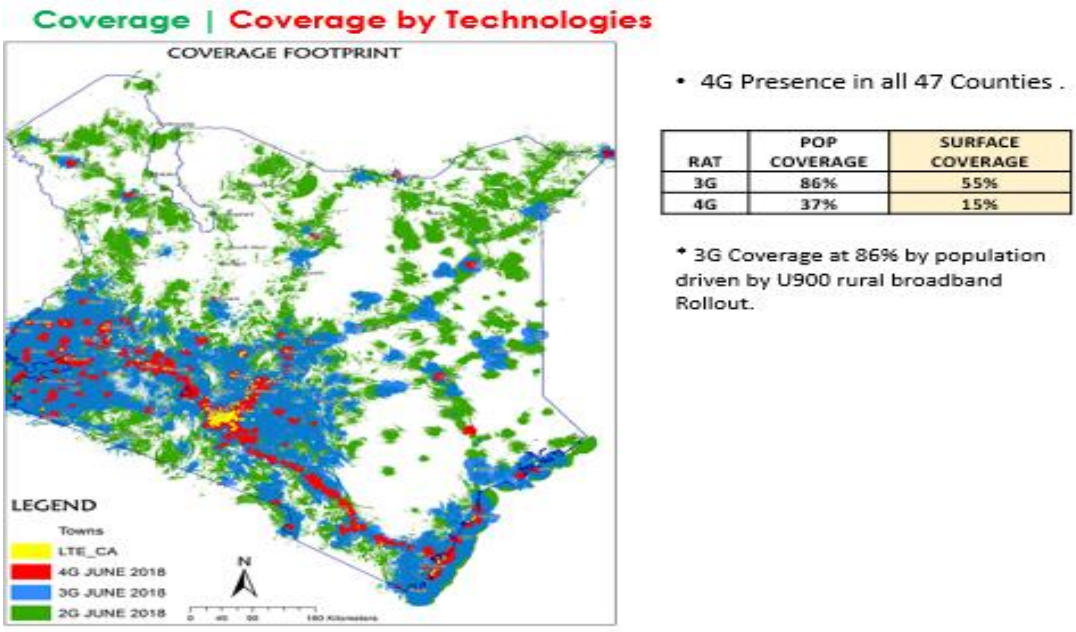
- Increase investment in broadband services to realize better connections and speeds by providing incentives for investors
- Increase the number of collaborations for broadband infrastructure development
- Update the spectrum management and licensing framework to take care of broadband and emerging services

Figure 7: Kenya Broadband Penetration and Subscription



Source: CA, Operators' Returns.

Figure 8: Mobile Technology Coverage in Kenya



Source: CA operators return

5G Networks

5G innovation will require investment from telecoms operators, and the return on this investment will, in part, be driven by consumer demand for new innovative services. Internet and online service providers have a role to play in driving demand, provided that the regulatory environment does not create artificial barriers to the dynamism of the Internet ecosystem.

5G will be essential to meet business and consumer demands by providing faster speed broadband. In addition, 5G networks will likely also facilitate new use cases, such as the Internet of Things (Internet connected devices), as well as broadcast-like services and lifeline communication in times of natural disaster[8]. The Government will identify incentives that will attract investment in and demand/use of 5G networks.

3.2.3 Strategic objectives

- Treat broadband as critical infrastructure, sensitize everyone on the importance and use to elicit demand and uptake
- Harmonize development of infrastructure to reduce duplication and increase coverage
- Increase coverage and connection to public institutions, including schools, hospitals, and Government agencies digitization
- Extend Broadband Connectivity to cover all classified roads (A, B and C roads)
- Ensure open access to infrastructure for all
- Increase awareness of broadband to County governments, and use of broadband services
- Improve 3G and 4G wireless connections
- Deploy 5G network
- Use USF to provide broadband in underserved areas like rural areas
- Review spectrum allocation and pricing mechanisms to make it more market responsive
- Introduce tax rebates/subsidies for deployment of broadband in marginalized areas to stimulate investment in and uptake of broadband for specific projects addressing needs in this areas
- National Government will facilitate access to national optical fiber broadband infrastructure (NOFBI) on an open access basis
- The national government to take charge of all supporting infrastructure including ducts and wayleaves
- Government will from time to time address spectrum needs according to technology changes and service demand

3.2.4 Affordability

Improving connectivity across Kenya means pursuing policies that improve the affordability and availability of the Internet. In 2018, 1GB of data cost a Kenyan mobile user 4.01% on average of Gross National Income (GNI)[9], which is double the UN Broadband Commission's Sustainable Development 2025 Target of "1GB of mobile broadband data available for 2% or less of GNI per capita." Other sub-Saharan African nations like Ghana and Nigeria are actively working towards achieving this affordability target. This strategy will make broadband affordable to the citizenry in line with the recommended UN broadband commission level of 2% or less of the GNI per capita.

(i) The government will implement policies that promote the sharing of passive infrastructure and spectrum resources that will help to achieve affordability goals without sacrificing the benefits of competition and innovation.

[8] NGMN 5G Initiative White Paper https://www.ngmn.org/uploads/media/NGMN_5G_White_Paper_V1_0.pdf Accessed on 24 May 2017.

[9] 2018 Affordability Report, Alliance for Affordable Internet (A4AI)

(ii) 'Open Access,' including the sharing of passive infrastructure can also enhance competition[10] and drive prices down.

(iii) The government will use fiscal incentives on devices to have more impact on affordability and access to broadband.[11]

(iv) Public private partnerships will be promoted as one of the tool to help facilitate the sharing and expansion of infrastructure in high cost areas

3.3 Services, Content, and Applications

In the context of broadband, services can be defined as professional facilities designed for technology application by enterprises and end users. Technology services provide specialized technology-oriented solutions by combining the processes and functions of software, hardware, networks, telecommunications and electronics.

"A means of delivering value to customers by facilitating the outcomes customers want to achieve without the ownership of specific costs and risks." ITIL

A service can thus be defined as the act of supplying a need or content through the use of technology. This NBS focuses on how services and content are offered other than what is being offered.

Services under broadband

- Voice
- messaging
- Data
- Value Added Services (VAS) -news, heath, farming, education
- Government services
- Mobile money
- Cloud services
- Co-location
- OTT services (Facebook, WhatsApp, twitter etc.,)
- Video conferencing
- IoTs

Over-the-Top Services

As the need for more Internet-based services increases, so does the demand for broadband Internet. Over-the-top services (OTTs) continue to grow in popularity and constitute a fundamental broadband issue. On one hand, the demand side experiences exponential growth of OTT services due to the

[10] 2018-2023 NBS p.36

[11] Kenya has shown the impact that tax reductions on devices can have when it removed VAT on devices in 2009. This led to a 200% increase in device sales and contributed to voice penetration jumping from 50% to 70%. While Kenya has since re-applied VAT to devices, countries such as Ghana and Côte d'Ivoire have taken learnings from Kenya and reduced either the import tax or sales tax on devices.

expanded scope of services including OTT Commerce; Jumia, Alibaba, Amazon, OTT Communication; chat applications such as WhatsApp, WeChat, Facebook Messenger, voice calling and video chatting services such as Skype and FaceTime, OTT Media; video streaming services such as Netflix, YouTube, while the supply side, most especially the traditional service providers frown at changing economic landscape of the markets. Essentially, the service providers have to continuously invest in expanding the mobile and fixed networks whereas the OTTs, which are largely unregulated, ride on these networks virtually with minimal investments in the local markets. In between, the regulator as an impartial arbiter has to mediate the disruption by ensuring sustainability of the emergent ecosystem. The regulatory obligations of licensing, market accessibility, taxation, quality of service, pricing, interconnection, net neutrality, infrastructure obligations and privacy become ever essential.

This strategy recommends the creation of a regulatory framework that accommodates both existing providers and facilitates competitive entry of new players to spur innovation, enhance consumer choice, ensure quality of service, guarantee the security of users, and make services affordable among other drivers of broadband uptake and encourages competition. The government shall further consider potential human rights –restricting effects of Terms of Service (ToS) for particularly dominant web-based services and will remain proactive in ensuring that these technologies do not offend the provisions of the Constitution and best practice.

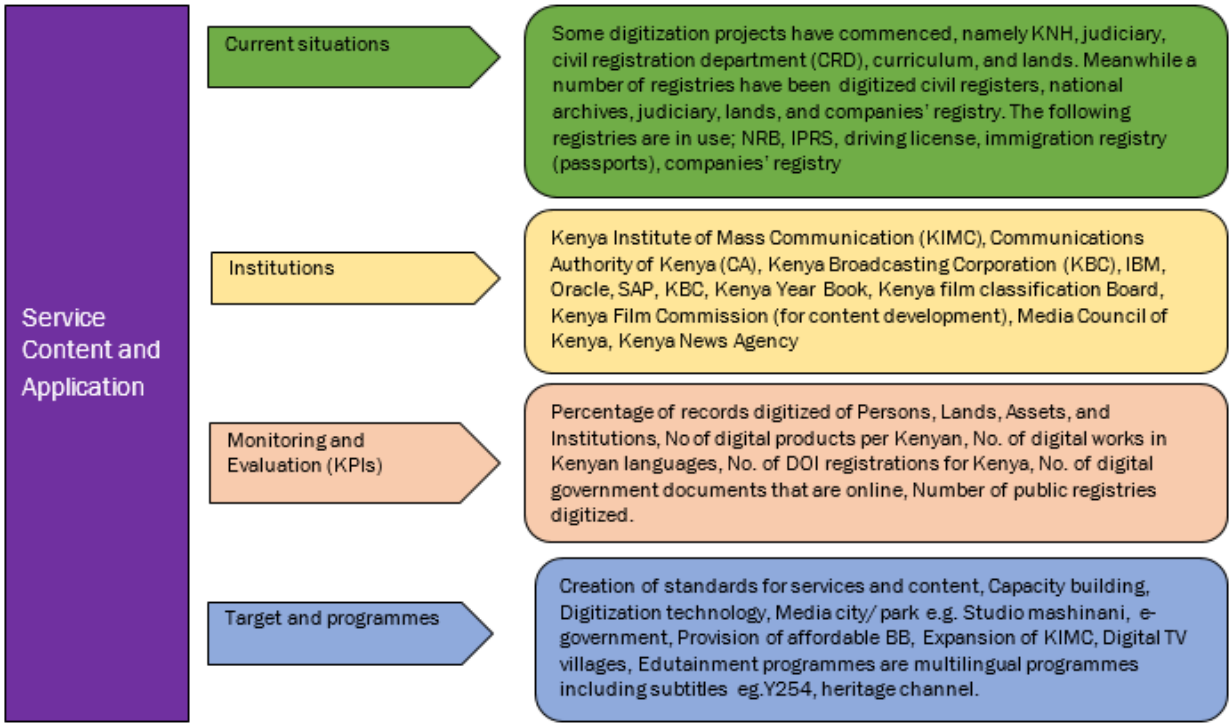
3.3.1 Gaps

A review of NBS 2107 revealed that services were expensive, out of reach for some customers and in need of quality improvements. Content and Applications including those specifically necessary for the Government's Big Four agenda focus areas are necessary. The target to digitize core government registries including the development of County Government management information systems has not been achieved while payment services in majority of the counties are still manual. Similarly, the target to increase local digital content was 75% for local languages on online content, 20% for websites in local languages and 20% for online educational programs; however only 40% local broadcast content has been achieved while the other targets were not achieved. There is therefore, lack of digital content and applications that have local relevance, which is a major hindrance to broadband uptake.

3.3.2 Opportunities

The opportunities available in the services, content and applicators include promotion of content development through incentives, aligning content and applications with development sector needs and conducting research to come up with innovative products and services

Figure 9: Status on Service, Content and Application



3.3.3 Strategic objectives

Consistent with the identified gaps and available opportunities, the following strategic objectives will be pursued to improve the status of Kenya's broadband with regard to Services, Content, and Applications.

- Undertake research and create innovation in the field of Applications and Content Development
- Enable profitable value chain for content, application developers, marketers and innovators.
- Endeavour to have rich multicultural and multilingual Kenyan content in cyberspace.
- Seek to avail digital information that supports an effective e-commerce, logistics and supply chain ecosystem in Kenya.
- Provide a robust commitment to competition investigations and enforcement aimed at keeping markets open to new competitors and avoiding concentration.
- Accelerate promotion of e-learning – e.g.by implementing schools connectivity program
- Promote universal access to digital content and services
- Promote digital literacy programs
- Put in place an open access policy to ICTs' and Digital Content for e-government services in the delivery of public service
- Promotion of emerging technologies in Fintech (Blockchain, Mobile Money, Infosec, Data Science/ Big Data)
- Promote provision of quality, affordable, accessible and relevant broadband services to all citizens
- Provide targeted incentives to address critical areas of BB that are still underdeveloped and which not be attractive for investment from private sector
- Increase awareness and demand for broadband services
- Ensure sustainability of broadband content
- Protect consumer interests and ensure security in accessing broadband services

While details of implementation actions and outcomes on broadband services are presented in Appendix I-3, similar action plan for Content and Applications if found in Appendix I-4

3.4 Capacity Building and Innovation

The digital world holds tremendous promise for the society. Going online can offer access to boundless beneficial information, facilitate new ways of interactive learning, and provide for enriching life experiences and foster meaningful cultural exchanges. From education, health,

agriculture, government services, expression to recreation, citizens are increasingly empowered, and even expected to exercise their rights online. The digital future may look bright, but it is far from guaranteed without effective capacity building initiatives and awareness campaigns in ICT.

This strategy explores the ways in which public and private actors can seek to improve awareness and build capacity on broadband access among the citizenry, and thus ensure equitable access to broadband for all in order to impart the knowledge, skills and experience needed to fully exercise and exploit the digital opportunities available online. Also proposed are specific strategies to develop high-end technical skills to support the broadband eco-system in Kenya.

3.4.1 Gaps

- Limited awareness of broadband services
- The curriculum in schools and tertiary institutions is not aligned with the awareness and skills requirements of broadband/ ICTs
- Lack of synergy and collaborations between implementing agencies
- Inequitable access to technology
- Shortage of appropriate skills
- Inadequate relevant local content
- Inadequate training for new graduates
- Limited funding for skill development

3.4.2 Opportunities for improvements

Despite the existing gaps in the available technical and related capacity for broadband, there are opportunities to further enhance capacity and innovations in the broadband arena; these include:

- Leveraging on existing infrastructure to deliver broadband
- Expansion of resources centers
- Re-skilling the existing workforce on emerging technologies, trends and Open Internet Standards.
- Partnerships with the robust private sector and training institutions
- Active involvement of community leaders, champions and members who understand local perspectives in creating ICT training programs and curricula that support development of talent within communities for broadband deployment.
- Initiate mechanisms that promote peer to peer learning opportunities to facilitate knowledge exchange among communities such as establishment of a national community networks development program in collaboration with strategic partners to develop capacity, provide guidance, mentorship and handholding for startup community networks to lower the risk factors.
- Create strategies to encourage local businesses especially in rural and underserved areas to adopt use of ICTs. This can be done through harnessing the power of community led initiatives to help spread interest and uptake.
- Introduction of courses at higher education institutions that teach and promote the development and use of Open Internet Standards so as to encourage adherence to globally accepted standards in innovation and design of devices or software.
- Skilling of policymakers through inter-ministerial/agency cooperation, in partnership with private sector and civil society, to ensure that public servants are able to engage and implement recommendations arising from the growing evidence-base of challenges and opportunities to realize this strategy's objectives, and a vibrant digital economy
- Mainstream gender-responsive approaches to capacity building and innovation
- Support bottom-up capacity building initiatives by groups and organizations working within communities, who are in a strategic positions to design, roll out and implement programs that are context-appropriate
- Kenya Education Network (KENET) to provide training in Internet Protocol version Four (IPv4) and IPv6 and related Internet resources training. It will also lead ICT/ broadband research, innovations and training in broadband; and develop ICT curricula.

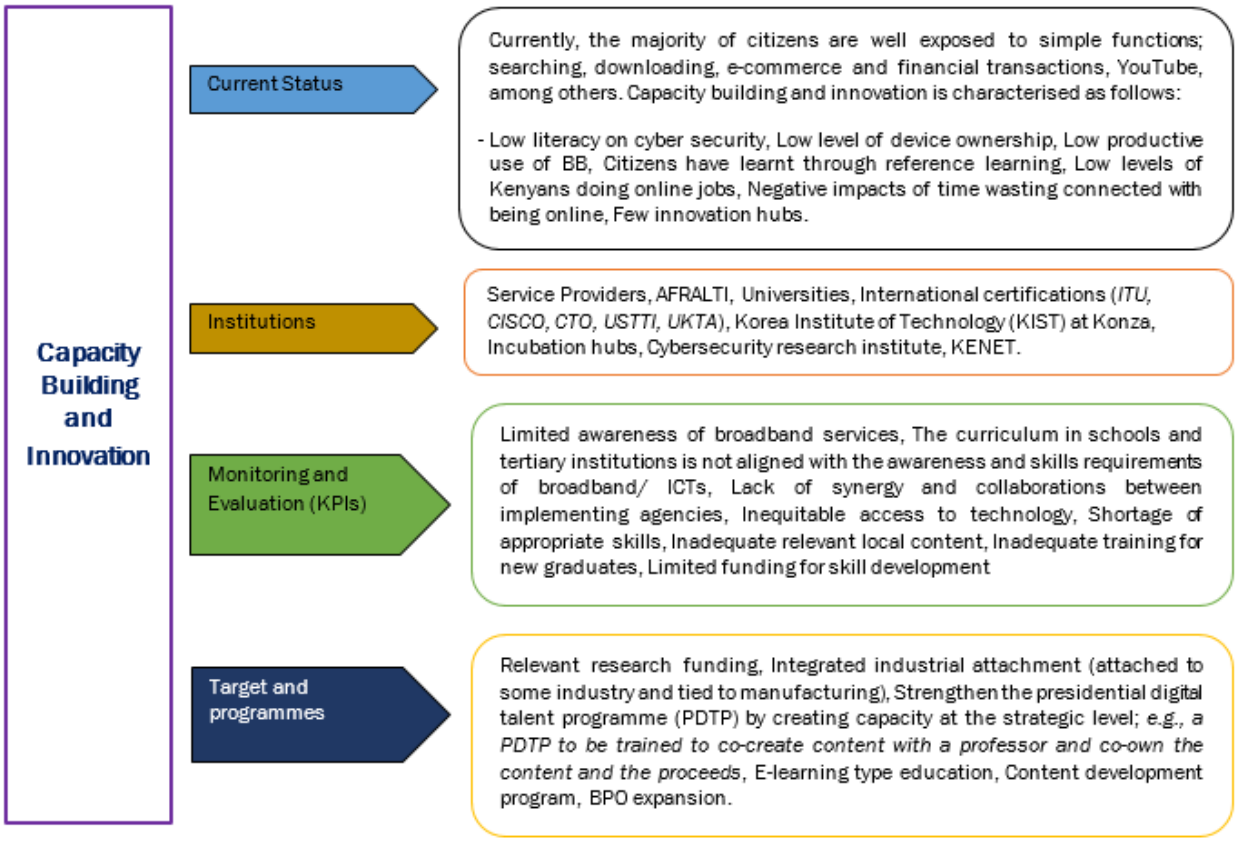
3.4.3 Expected outcomes

By implementing appropriate strategies, the expected outcomes in this thematic area are:

- Increased awareness of ICT and broadband services including online security
- Increased digital literacy of the general citizenry
- Enhanced high-end technical skills
- Improved access and efficiency in delivery of e-Government services
- More informed citizenry on existing legal policies and regulatory frameworks
- Increased innovations that leverage on emerging technologies

Strategic objectives and an implementation plan for the CBI thematic area is presented in Appendix I-5.

Figure 10: Status in BB Capacity Building and Innovation



3.4.4 Broadband Innovations and employment projects

In order to support socio-economic development opportunities for 'digital jobs' online jobs will be created and innovations promoted through the Community Innovation Hubs (CIH) project. This will ensure that the creation of youth employment and creation of innovations that will be used to support the Big 4 Agenda program and projects such as e-agriculture applications, e-health among others. In this regard, broadband innovation and employment creation projects will be implemented; a listing of possible innovations and digital jobs is presented as Table 4.

Table 4: Broadband Innovations and employment projects

Project	Specific projects	Beneficiaries	Value to society
Ajira Digital	**A. Online Training**		
	Digital Nation Africa This is a platform where registered users can access online learning on new technologies. It also provides job opportunities that match the user experience and skill. https://developer.ibm.com/africa/	Universal to anyone with an email address and can access Internet	1. Expansion and creation of skills to users on emerging technologies. 2. Creation of innovative solutions through mobile apps. 3. Provision of learning opportunity and knowledge sharing with students and youth in learning institutions
	Core Certifications This is a program aims to equip learners with communication and writing skills, basic conversational skills and digital literacy skills. The courses will be offered by private sector such as Alison.com and Google.	Learners interested on improving their communication skills and enhancing their IT skills	1. Improve communication and writing skills in today's workplace 2. Accelerate business growth through digital marketing and enhanced online presence 3. Help people to develop new skills and take advantage of all the social and economic opportunities that come along with such skills
	Admin Support + Customer Service This offers training on various ICT skills including Windows XP, Office skills and Email Etiquette	Universal to all	Creates professional office workers with enhanced communication skills
	IT & Networking Online course to provide experience on Networking, TCP/IP and Unix	IT professionals, Web designers and learners interested on IT and networking	Enhanced skills of ICT professionals and knowledge sharing in the field.
	Web, Mobile & Software Development. Short online courses on programming languages such a Ajax, HTML 5, Java, xhtml and Android.	• Individuals with basic knowledge in programming languages and web developers • Students interested on setting up blogs	1. Improvement on the existing skillsets of IT professionals on the programming languages. 2. Creation of employment through creation of blogs that facilitate knowledge sharing and online marketing.
	Design and Creative Online course on graphic and Web designing.	SMEs and entrepreneurs Learners with interest on graphic design knowledge	Enablement SMEs and MSMEs to market their business through the digital network
	Sales and Marketing	SMEs and business owners	1. Enhanced business growth through effective marketing strategies.

	Online course to enhance skills of learners to implementing marketing strategies		2. Creates a competitive market place 3. Creation of global presence of businesses
	Accounting The course provides learners with guidance on book keeping and accounting	Learners interested in accounting knowledge SMEs and business owners	Enhances financial management by startups and entrepreneurs
	B. Job Platforms		
	Online Work Ajira digital provides various online job platforms through which users can access working accounts. The online work accounts include; Niko Job, EVA Virtual Assistant, Tuko Works, Kuhustle, Crowdsource Africa, Cloudfactory, Freelancer, Upwork, iWriter, Upwork, Peopleperhour, MachineDesign, Cadcrowd, WordPress, Metafilter, Gigster, Problogger among others[12]	Public	Creation employment as well as enable individuals to own online working accounts hence being self-employed.
Studio Mashinani	Studio Mashinani is a project targeting the Youth of Kenya to show case their talents in Performance Art. Currently the government has set up four studios[13]	Youth	Provision of opportunity and platform for the youth to showcase and nature their talents.
Y254	This is a channel with an online presence that presents entertainment content that has a particular focus on Kenya's Youth. In addition, Y254 will also publicize original music and entertainment content created by Kenya's Youth working together with KBC through Studio Mashinani.	Youth	1. Facilitation of promotion of local music and entertainment content. 2. Marketing of startup artists and enhances their skill and experience in the sector.
Constituency Innovation Hubs (CIH)	These are innovative hubs will be equipped with Internet access and digital devices to enable the youth access tools to innovate and market creative ideas online to enable them earn income. Currently the Government has set up innovation hubs in 20 Constituencies[14] and intends to upscale this in all the 210 Constituencies in a bid to transform the country into an information society and prepare citizens for a digital economy.	Public	The hub enables the public to access online jobs and allow them obtain agribusiness and micro finance information.

[12] https://ajiradigital.go.ke/guides
[13] https://ajiradigital.go.ke/support_centers
[14] https://ajiradigital.go.ke/support_centers

3.5 Broadband Devices

Broadband entails Internet access through portable devices such as smartphones, PCs and tablets. It can also include customized devices such as Police terminals, and other smart connected devices such as Internet Protocol Televisions (IPTVs), wearable's and other IoTs. Important considerations for selecting the most cost-effective and suitable device for an intended purpose include, total cost of ownership (TCO) which encompasses repair, maintenance, power supply and useful life. Access to online content and essential services such as agriculture or health that can improve citizen's lives in line with the government's Big Four strategy requires access devices, whether individually owned, shared or public.

With an estimated fixed and mobile broadband penetration rate of 2 subscriptions per 100 people in 2010, Kenya still has significant progress to make with respect to broadband uptake[15]. Device prices are not getting lower, whilst the low-end devices are of low quality. Government use of devices has been on the increase both in public offices and in schools with the introduction of the digital literacy program (DLP) but there are still limited devices in health facilities and within the Police. Despite the DLP, efforts to promote local manufacturing of devices have not been sufficiently successful.

It is equally important to determine and understand the potential physical and psychological negative effects from device usage, especially on children and to identify avenues for effective management of electronic waste considering the rising number of these devices.

3.5.1 Gaps and Opportunities

Table 5: Gaps and Opportunities for Broadband Devices

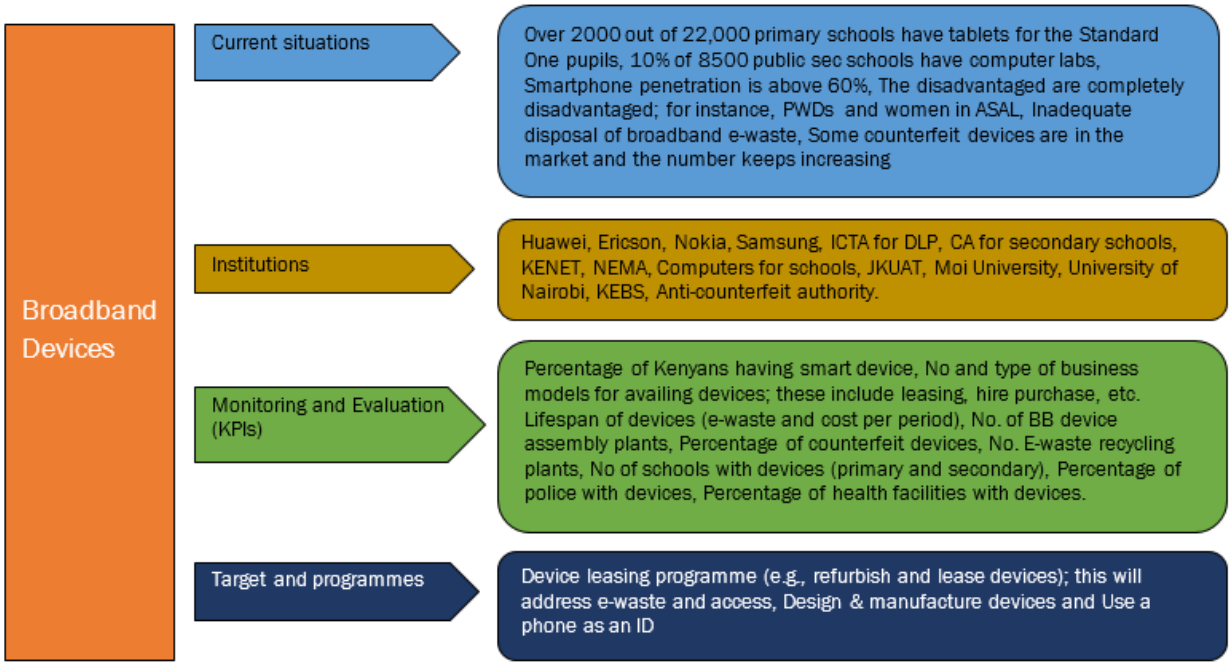
Attribute	Gaps	Opportunities
Affordability	40% of subscribers do not have smart phones	Reduce costs, provide incentives to enable service retailers provide payment by installment
Access	There are currently 64 libraries and 11 CIH that provide access points nationwide	Leverage NOFBI to establish Wi-Fi points; and expand public access points with high-speed broadband
Government Use	17000 primary schools have received tablets; 1,000 secondary schools have devices. Only 8,000 modern devices for police, most still using old devices if any and few in police stations. Few devices in public health facilities.	Provide devices for secondary schools and increase devices at primary schools; Provide devices for health facilities; Provide devices in police stations and for police officers
Adoption	Limited use of local content and still low uptake of devices in rural areas; no awareness off health impacts of devices	Provide training and awareness on benefits and uses of broadband; understand health impacts of devices
E-Waste	Only one recycling center in Kenya which mostly exports for overseas	Establish local recycling facilities in PPP; Provide incentives for take-back of devices

[15]Broadband In Kenya, 2011. *Build It and They will come.* Information for development Program. https://www.infodev.org/infodev-files/resource/InfodevDocuments_1108.pdf

	recycling	
Counterfeit	Large number of counterfeit devices in the market	Use rebates to reimburse legitimate devices; establish certifications for retailers; expand phone testing
Local Assembly	Local assembly of DLP but no manufacturing or ICT supply chain	Develop feasibility study to attract contract manufacturers
New Devices	Few IoT or customized devices currently in the market or in use	Drive the use of IoT, support development of local IoT devices, and drive the use of customized devices to aid specific groups of users

The expectation under this thematic area is that every citizen will be able to afford a broadband device for use in all socio-economic endeavours: learning, access to financial services, access to health, and for e-commerce and for entertainment. The following is a summary of the current status of broadband devices, institutions that involved, KPI availability, required policies and proposed program to ensure that devices are accessible to all.

Figure 11: Status on Broadband Devices



3.5.2 Strategic Objectives

- To promote access to a broadband enabled device by all citizens in order to access e-government services.
- To enable public sector to work efficiently by providing access to devices in government offices, educational and health facilities, as well as when working outside of an office, such as public security.
- The Government will develop a framework for security of IoT devices based on best-practice
- To increase demand devices.
- To establish a local industry for device manufacture, maintenance and recycling, this will create jobs and address e-waste issues.
- To ensure availability of standards based devices in the market.

Table 6: Broadband Devices Initiatives and Outcomes

Issue	Initiative	Outcome

Cost of Broadband	Zero-rate Broadband devices to increase affordability	Increased ownership of devices
	Establish partnerships with vendors, operators and financial institutions for bulk purchasing and low-interest loans (e.g. SACCOs) and purchase contracts for devices (including government employees)	Increased ownership of smart digital devices
Access	Increase number of devices in libraries (and increase broadband speed and reliability)	Increased access to broadband
	Establish Public Access Points with devices at Sub-County offices	Increased access to broadband
	Establish Public Access Points with devices at constituencies, utilizing educational, health, post office facilities	Increased access to broadband
Government use	Ensure every education facility has devices; each student should be able to use a device at least once per week preferably with keyboards for secondary and above. Each teacher to have a device	Use of Broadband to improve education
	Provide devices for health facilities and every community health volunteer	Use of broadband to improve health
	Provide devices in police stations and for police officers (number of devices per police station to be determined during the action planning (e.g.., 1 per officer)	Use of broadband to improve safety
Adoption of broadband	Network operators, USF, Counties and other agencies to support training and awareness raising activities in villages and public access points for users to understand the benefits of broadband and the use of broadband devices and services	Increase ownership and use of devices
	Research health impacts of device usage, especially amongst children (e.g., social skills)	Increase safe ownership and use of devices
E-Waste	Establish local recycling facilities in PPP (with supportive policies to encourage PPP)	Reduced e-waste
	Provide incentives for take-back of devices and create a supply chain for value addition from recycling	Reduced e-waste
Device Management system(s)	Use rebates to reimburse legitimate devices	Reduced counterfeit devices
	Establish certifications for retailers	Reduced counterfeit devices
Local Assembly	Develop feasibility study to attract contract manufacturers	Strategy for local ICT manufacturing
New Devices	Drive the use of IoT through government procurement and support for innovation	Increase in IoT devices
	Support local IoT device manufacture or customization in partnership with other companies/Gearbox etc.	Increase in IoT devices
	Drive the use of customized devices to aid specific groups of users	Increase in IoT devices

While implementing Public Access Points (PAPs) there are a need to have a time limit for using the devices, a very small fee for use, and a restriction of access to certain sites only, e.g. e-government, Kenya Institute of Curriculum Development (KICD), Ajira etc. In addition, PAPs at schools could be a membership-based system for security purpose. Further, Internet of things (IoT) for animal tracking, SGR freight tracking. The implementation plan on broadened devices is found at Appendix I-6

3.6 Privacy and Security

In addition affordability, reliability and quality of services, broadband networks also need to be sufficiently secure, trustworthy and respect the privacy of the consumers. Privacy and security are imperative drivers of demand for broadband and online services – the more the users perceive adequacy of privacy and security, the more confident they will be in transacting online and the more the adoption of broadband will be. This underscores the fact that privacy and security are crucial broadband demand-side drivers.

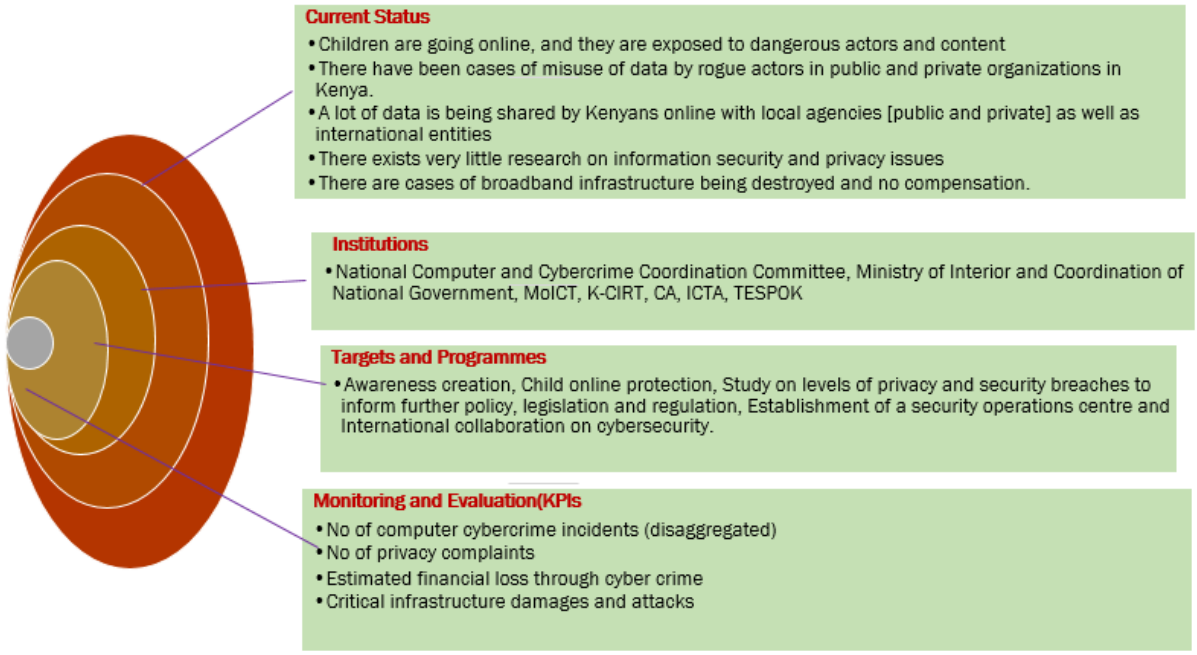
At the core of confidence and security of networks and services, is information security and privacy, which will be ensured by building confidence in the security of online transactions, and of the broadband service users. Consistent with this objective, the Kenyan Government will: *Promote legislation for information security, data protection and the protection of privacy of citizens and ensure the interface between technology and rights to privacy are well regulated.* Specifically, Kenya's national and regional communications networks will be made secure and reliable through the empowered computer emergency response teams (CERTs) and standards. Further cooperation in the fight against cybercrime and cyber security breaches will be pursued to ensure that the vulnerable members of the society are protected.

Security. There is prevalence of social engineering attacks, SIM swapping, bank fraud and identity theft leading to inconvenience, and loss.

Privacy and data protection. Consistent Article 31 of the Constitution a Draft Bill and policy have been finalized and undergoing stakeholder consultations with data protection commission (MoICT and Senate consulting).

Overall, the citizens and businesses are significantly insecure while online, their privacy is being infringed and private data is not adequately protected.

Figure 12: Status on privacy and Security



A summary of gaps, opportunities, strategic objectives and an action-oriented implementation plan with regard to privacy and security as applied to broadband in Kenya follows.

3.6.2 Gaps

- Weak Child Online Protection (COP) legal and regulatory framework
- Lack of laws and policies that govern the use of data
- Lack of awareness on the best information security practices and data protection procedures
- Lack of confidence in the security of online platforms i.e. e-government, online markets etc.
- Lack of adequate research and development in information security and privacy issues, locally
- Broadband cables are considered critical infrastructure and not a utility.
- While the right to privacy is enshrined under Article 31 of the Constitution, there is no data protection law with provisions on how data should be handled by all entities that have or gain access to personal data during their business.
- The European Union General Data Protection Regulations came into force on 25th May 2018 and the Regulations have implications on Kenyan businesses.
- The citizenry lack adequate skill and knowledge on the best online practices, which as a result exposes them to dangerous actors who use their personal information for criminal purposes.

3.6.3 Opportunities for improvement

- To be innovative in how children's content is regulated as they often bypass the existing protections to enact a data protection law that will govern the use of data and personal information to international standards.
- To provide civic education and capacity building on safety online and the scope of privacy rights
- Set up frameworks to authenticate systems and users
- Safeguard the systems further to build confidence.
- Encourage more research institutions and centers to engage in online privacy and security research
- Have ICT infrastructure declared a utility in the law so as to have punitive measures taken against anyone who vandalizes and/or destroys broadband infrastructure.

3.6.4 Strategic Objectives

In sum, and in working on this strategy, the strategic objectives with regard to privacy and security are as follows:

1. The ratification of the Budapest Convention on Cybercrimes to enhance the country's international positioning on cybercrime and to address the existing gaps in its cyber-laws
2. Enactment of the cyber-specific laws following rigorous due process including stakeholder involvement
3. Drafting of policy instruments and practical tools such as guidelines that would more precisely define various risk levels as relates to particular information security scenarios
4. Enhanced cooperation of organizations in order to utilize the varying strengths of these organizations in the regulation of the highly technical Internet space thereby increasing its regulatory efficiency over cyberspace
5. Further research, capacity building and talent exchange in Internet governance and regulation best practices within the borderless cyberspace
6. Implement ISO 27001 or similar standard

Consistent with the foregoing objectives, an implementation plan comprising expected outcomes, actions, indicators and targets is presented in Appendix I-7

3.7 Finance and Investment

Broadband is emerging as a true backbone of the digital economy due to its transformative potential for all facets of society. In realization of this imperative, the government of Kenya is introducing broadband as a development agenda to ensure that digital inclusion for all is achieved. To this end, universality and affordability of broadband calls for an effective cooperation between both the private and public sector stakeholders in the financing and deployment of broadband. Focus action areas that include; gaining access to low-cost private sector finance; formulating effective policy and regulation for the ICT sector; devising appropriate tax policies for the sector; selecting and implementing other interventions underpin the investments to be made.

The success or failure of a broadband deployment project primarily hinges on two factors; the investment model that assesses the financial viability of the venture, and the financing model. The investment model comprises all the capital, operating expenses and revenues, assumptions and provides the classical metrics of business viability, such as return on investment and net present value. The financing model addresses the approach that will be followed to fund the required investment to roll out infrastructure. The investment model and funding assumptions are constrained by a number of project contextual variables, comprising the competitive environment and players driving the broadband rollout. In this section, a presentation of possible investment and business models, and financing approaches that can be adopted for the NBS 2023 is made.

To be able to source for funding, an elaborate national broadband strategy that is clearly aligned with national priorities including the Big Four Agenda is required. With this NBS in place, funding will be sought from the private sector. A clear investment and business model is not only crucial for the effective deployment of broadband but for attracting the required finances.

The funding for NBS 2023 envisages implementation of broadband initiatives and projects to be funded through private sector initiatives, and Public Private Partnerships while the government will provide incentives. To encourage private investment the Government will put in place favorable policy decisions to ensure investment is forthcoming. This can be done through tax incentives, regulatory incentives on building key infrastructure, industry collaboration (in specific areas such as education, agriculture and healthcare), tax holidays and by reducing the costs of rolling out fibre networks where the reuse and sharing of physical infrastructure that supports digital networks will be mandated. Other sources of finance include innovative models for partnership and fibre infrastructure sharing.

Government collaboration models for investment in broadband will include the following:

(1) *PPP:* where government and private sector institutions such as Banks and other Corporates roll out broadband connectivity to all parts of Kenya. An example of this is where Italy has enlisted banks to finance its open plan for fiber at up to US$8 billion broadband rollout. Tax holidays will be good an incentive for projects of long-term nature where new capital intensive investment is required such as construction of ducts and expansion of the NOFBI to all counties, sub-counties and wards

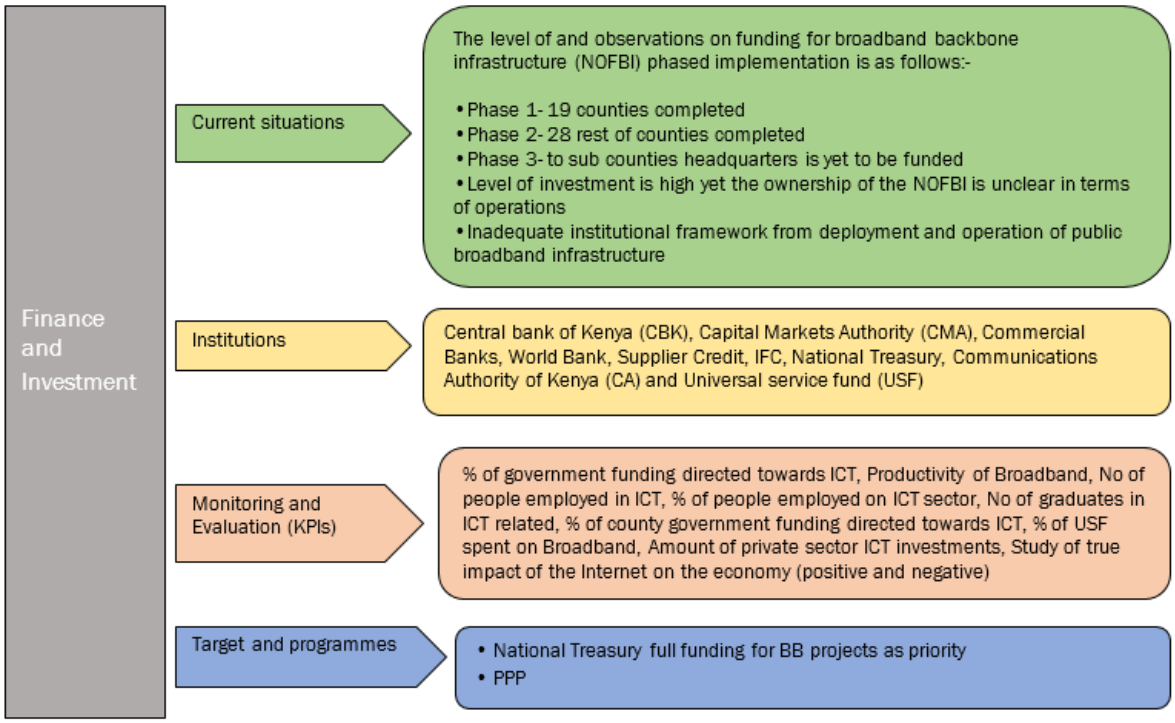
(a) Design Build and Operate (DBO): This is a model used for public-private partnerships. In a private DBO model, the private partner will be responsible for the design as well as the building and operation of broadband facilities. DBO ensures technology neutrality, as the private partner is able to choose a preferred technology without any public intervention. In a public DBO model, the public partner is responsible for design, building, and operation. The NBS 2023 recommends use of private DBO in financing broadband

(b) Public-Private Community Partnership (PPCP): This is a special variation of PPP is public-private community partnership (PPCP) in which the local community is one of the partners involved. PPCP addresses some of the concerns raised in relation to PPP projects, as it ensures a local participation and focus on local development rather than profitability as the only parameter of success. PPCP is widely used in community projects such as the proposed bottom up citizen model but is also applied in projects aiming to reduce the digital divide, which the broadband strategy aims to address.

(2) **Private Sector Funding (PSF):** This model will involve development of schemes where the private sector are invited to contribute to the development of broadband projects and national infrastructure base. In this case, the government will allow private actors to earn a reasonable return on investments in those projects where they accept all the risks. Alternatively, the National Government will need to incentivize through tax holidays, and tax cuts for broadband projects implemented by the private sector. The target Private sector actors in the PSF model include Banks, Industry collaborations to implement the projects, the World Bank, Africa Development Bank (AfDB) International Telecommunication Union (ITU), and Africa Telecommunication Union (ATU).

(3) **Collaborative Government Funding:** In this approach, the Government will collaborate with local entities who have relevant expertise in broadband related aspects such as the laying of public physical infrastructure to roll out aspects of the broadband. The potential collaborators are public corporations such as Kenya Pipeline Corporation, Kenya Railways Corporation, Kenya Power and Lighting Company (KPLC), Kenya Urban Roads Authority (KURA), Kenya Rural Roads Authority (KERRA) for provision of shared open infrastructure in counties, rural areas and national highways; and KENET for the rollout of broadband to educational institutions in Kenya.

Figure 13: Status on Finance and Investment



Target/programs:–→ Private sector, PPP and National treasury/USF

3.7.1 Financing and investment Gaps

The strategy identifies various gaps in financing of broadband which include lack of coordination for financing broadband initiatives; inadequate delivery structure for coordination and implementation; insufficient awareness of the financing options/instruments especially to the small operators such GEMS (Growth Enterprise Management Segment); suboptimal prioritization of projects; limited sharing of resources to minimize on duplication of resources especially in regard to fiber cable deployment and low budgetary contribution by national government towards ICT sector. Currently the government contributes 0.5% of National Budget towards ICT. Further, there is insufficient awareness by the county government on how they can support ICT services.

3.7.2 Opportunities

- Availability of regional financing from the World Bank and Africa Development Bank (AfDB), which can be explored. This should be done by developing of proposals and submitting them consideration by the financiers
- Improving awareness on the various financing options /instruments. To be facilitated by CA, MOICT, Capital Markets Authority (CMA), Central Bank of Kenya (CBK) & financial institutions
- Provision of tax incentives on end user devices
- Promoting market based competition
- Tax holiday on new investment in ICT sector
- Security/protection of investment in the ICT sector
- Engaging with Council of Governors and the regional county blocs with a view to improve their understanding of the ICT services and how the various counties can support deployment/provision of ICT services in the counties under the leadership of the CA.

3.7.3 Investment model

Attracting investment in broadband is crucial. Given the scarcity of resources, the choice of the model for investment in broadband is an important decision, which can lead to success or sub-optimal results with regard to broadband deployment. The choice of one model over another is a decision based on the budgetary and socio-economic context of the area, the ambition (mission)

level of the public authority/organization charged with delivery of broadband, and the development goals for the country.

Some questions that a public authority[16] (PA) (in this NBS, the Ministry of ICT) will need to answer in the choice of the broadband investment model are:

1. How can we create an engine that ensures future investment in infrastructure beyond the immediate project and funding available?
2. Are there benefits in keeping control and ownership of the passive infrastructure and in defining the deployment priorities?
3. Would we rather keep the ownership of the infrastructure but let an operator define and execute the deployment?
4. What are the pros and cons to involve vertically integrated operators (incumbents and others) to upgrade or expand the network?
5. Do we also see the scope to support local bottom-up citizen initiatives?
6. Given the socio-economic conditions on the ground, which level of competition is required to facilitate penetration of high quality and affordable services?

There are four models[17] representing a range of options for combining public and private investment in the implementation of broadband, which are presented in increasing order of involvement by the Public Authority (PA) in charge of broadband (e.g., broadband council). Each model is applicable in different circumstances, depending on the scope of the required infrastructure, and the specific aims of the PA, and the investment/risk appetite of potential private sector partners.

The most important choice a PA faces is how much to commit, and what role to take vis-à-vis the market, the citizens, and the businesses in the country. This should be considered separately from the public authority's role in making decisions on the best financial resources.

New technologies and innovative deployment models can help dramatically reduce network costs and increase the quality of broadband in general. Those technologies are difficult to develop without a robust, affordable, and efficient system for granting of experimental licenses and authorizations for experimental deployment models, as well as ensuring speedy transit through customs for technologically innovative products and devices.

In summary, the examples of the investment models are as follows:

a. **Bottom-up citizen model.** The bottom-up, or local community model involves a group of end users organizing themselves into a jointly owned and democratically controlled group (frequently a co-operative) capable of overseeing the contract to build and operate their own local broadband network. This falls into digital communities for county governments, or digital villages, Innovation/Technology hubs or centers, for example "silicon savannah" (the Konza city)
b. **Private design, build and operate (DBO) model.** The private design, build and operate (DBO) model involves the Broadband Authority[18] issuing funding (often in the form of a grant) to a private sector organization to assist in its deployment of a new network. The public authority has no specific role in the ownership or running of the network, but may impose obligations in return for the funding.

[16] For the purposes of this NBS, the Public Authority (PA) is the national broadband council (NBC)
[17] Guide to broadband investment. European Union Regional Policy
[18] This can be a public organization mandated to oversee the deployment of broadband

c. **Public outsourcing model**. Under a public outsourcing model, a single contract is awarded for all aspects of the construction and operation of the network. The major characteristic of this model is that the network is run by the private sector, but the public sector retains ownership and some control of the network.
d. **Joint venture model**. A joint venture is an agreement under which ownership of the network is split between the public and private sector. Construction and operational functions are likely to be undertaken by the private sector.
e. **Public design, build and operate model.** A public DBO model involves the public sector owning and operating a network without any private sector assistance. All aspects of network deployment are managed by the public sector. A public sector operating company may operate the entire network, or may operate the wholesale layer only (with private operators offering retail services). Access to NEPAD Infrastructure Project Preparation Facility (NEPAD-IPPF) fund will depend on the availability of national broadband policies and specific NBP projects.

A number of investment models have been successfully implemented such as Joint Ventures between KPLC, standard gauge railway (SGR), Pipeline, MoICT and CA on the provision of National Fibre. Developing a National Fibre Company[19] and leasing models (Equipment & Accessories where financing can be provided either by a financial institution or by vendor).

The private sector is the best positioned to finance broadband infrastructure, and is better equipped to enable the rapid deployment of infrastructure to a wide area of coverage. Consequently, where there are instances in which 'purely commercial considerations' are insufficient, the options that are available and can provide value, which include public-private partnerships will be used to deploy broadband in Kenya. With the NBS having identified 'inadequate financial resources' as 'one of the crucial factors affecting broadband development in Africa,' In order to deliver on desired infrastructure development outcomes the 'private design, build and operate (DBO) model,' where the government will provide support and assistance in the deployment of a new network (in the form of funding such as tax holiday for a certain period) to be built and operated by the private sector is encouraged.

3.7.4 Business Model

The business model defines the roles and responsibilities of different actors in the broadband value chain, with special focus on the public authority charged with the delivery of broadband. A broadband network broadly consists of a *passive infrastructure* (ducts, cables, masts, premises), and *active equipment* (implementing the technology: transponders, routers and switches, control and management servers). On top of that, applications and *services* are delivered. The three layers are characterized by different technical and economical properties and different business roles:

1. The **physical infrastructure provider (PIP)**, which owns and maintains the passive infrastructure;
2. The **network provider (NP)** which operates (and typically owns) the active equipment (incumbent operators, new independent operators, broadband companies)
3. The **service provider (SP), which** delivers the digital services (e-health, elderly care, TV, Internet, phone, video-conferencing, entertainment, teleworking, smart monitoring, etc.)

Depending on which market actors take up which roles (PIP, NP, SP), different business models arise. If one market actor takes all three roles, it is said to be vertically integrated, and the resulting business model is referred to as a vertically integrated model (all large telecom operators fall in this category; the actions on investment and business models are presented in Table 7

[19] South Africa has implemented this model for broadband delivery; the company is known as Broadband Infraco Limited (BBI) see http://www.infraco.co.za/CorpProfile/default.aspx

Table 7: Broadband Investment and Business Model

Broadband Aspect	Description of models	Proposed Action[20]	Timeline
Investment Model	Direct investment: the public-run Municipal Network model (aka Public DBO)	Elaboration of the investment models and Publication of Guidelines	Q2 2019
	Indirect investment: the private-run Municipal Network model	Elaboration of the models and Publication of Guidelines	Q2 2019
	Support of bottom-up initiatives	Elaboration of the models and Publication of Guidelines	Q2 2019
	Operator subsidy (aka gap-funding or private DBO)	Elaboration of the models and Publication of Guidelines	Q2 2019
Business model	Physical infrastructure provider (PIP), which owns and maintains the passive infrastructure	Elaboration of the models and Publication of Guidelines	Q3 2018
	Network provider (NP) which operates (and typically owns) the active equipment (incumbent operators, new independent operators, broadband companies)	Elaboration of the models and Publication of Guidelines	Q3 2019
	Service provider (SP), which delivers the digital services (e-health, elderly care, TV, Internet, phone, video-conferencing, entertainment, teleworking, smart monitoring, etc.)	Elaboration of the models and Publication of Guidelines	Q3 2019

3.7.5 Financing Broadband

Funding Broadband Access[21]. Inadequate financial resources have been identified as one of the crucial factors affecting broadband development in Africa. Viable sources of funding that can be pursued include structured public-private partnerships, liberalization of ICT to attract investors into the broadband infrastructure space and privatization of state owned ICT corporations to improve efficiency. Among the measures to implement broadband are government investment in basic infrastructure e.g., for national fibre optic backbone networks such as the national optical broadband infrastructure, NOFBI (Kenya) setting up special purpose vehicles (SPVs) for broadband (e.g., as was the case for the East Africa Marine System [TEAMS] and the East African Submarine System [EASSy] submarine cable systems). Additionally, fiscal incentives for broadband infrastructure, such as reduction of taxes, could go a long way in stimulating broadband and are highly recommended for wireless broadband access.

At the highest level, the financing model of broadband networks comprises three sources of funds, namely private lenders (through a single institution or a syndicate), public funds (through grants or low interest loans), and equity investors (governments, multilaterals or the private sector). The following are some of the possible financing options for broadband: -

(i) **Use structural funds to finance the rollout of high-speed broadband networks**[22]**.** Use the Structural and Rural Development Funds that are earmarked for investment in ICT infrastructures and services. This can be achieved by designing projects that would

[20] Proposed to be based on the Guidelines for Broadband Deployment in SADC prepared by Dr. Thomas Senaji /ITU in collaboration with CRASA (2014). This action should be led by the Public Authority (such as the National Broadband Council) charged with the delivery of broadband.

[22] http://ec.europa.eu/digital-agenda/en/pillar-iv-fast-and-ultra-fast-Internet-access/action-48-use-structural-funds-finance-roll-out-high

accelerate the deployment and use of broadband along all the broadband thematic areas/pillars. In this case some of the funds will be directed to broadband ICTs.

(1) Financing national broadband infrastructure

National broadband infrastructure can be financed through mechanisms such as the following:

- ***National open access network***: The network assets of operators are purchased; the government remains a majority shareholder, at least temporarily, although the national company can be opened to private investors. The network is open to all service providers at regulated prices (e.g., National Broadband Network (NBN) in Australia, and Broadband Infraco [BBI] of South Africa).
- ***National open access alternative carrier:*** A variance of the prior model, in this case the national network remains an alternative carrier to the incumbent backbones. Its purpose is to break down potential bottleneck prices that could be raised by incumbents (e.g., Telebras in Brazil, Argentina Conectada in Argentina).
- ***Government financing of the national network.*** In this case, the government invests temporarily in a network to be deployed by a private carrier. The purpose in this case is to facilitate through funding, the deployment of a high capacity infrastructure (e.g., NGN network in Singapore).

National government local networks (e.g., to Schools to facilitate the DLP and Laptop project). In this case the Government acts more as a facilitator by dedicating a special fund to help financing neutral open access models, most of the time being at a regional or municipality level (e.g., National Very High Speed Plan in France, Broadband Delivery UK Plan, Municipal Fibre to the Home (FTTH) investment in Sweden, BB Delivery in the UK). In this case, the government is the project sponsor

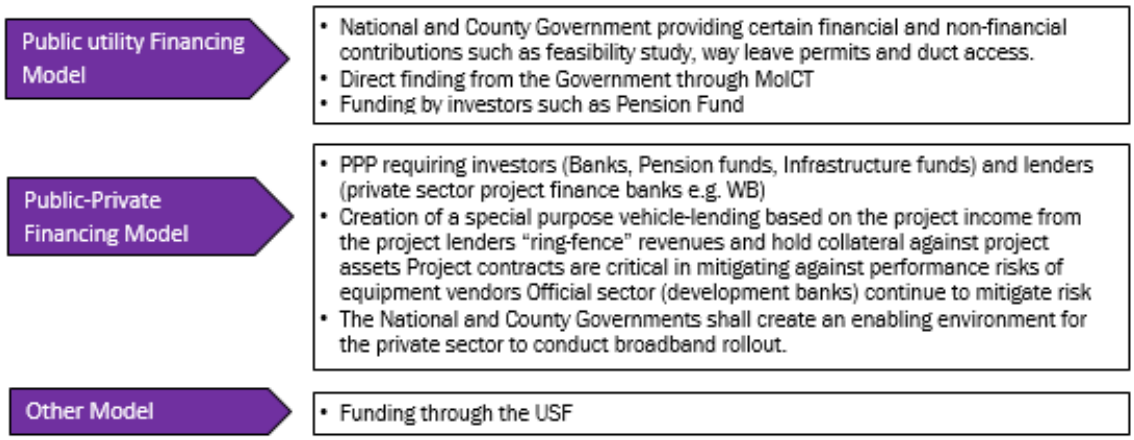
(2) County Governments Financing

In this case, the county government assumes ownership of a fiber optic network laid out to serve the population in its county. The model is, in many cases, triggered by the concern of the county to be left unserved by ultra-fast networks deployed by telecommunications carriers and cable TV operators to serve high-density areas only (e.g., in the rural and marginalized areas). It can assume one of three business models:

- County retail, whereby the county becomes the service provider offering triple play services to the population under its purview;
- County wholesale service offering (or 'Open Access'), where the county provides access to the infrastructure to third parties (e.g. service providers) for a fee; or
- County financing of an infrastructure, which is owned, operated and maintained by a private provider on a 'lease' model (based on a public private partnership model

A summary of the financing options is presented in Figure 13

.Figure 14: Financing Models



3.7.6 Partnerships

Public Private Partnerships (PPPs) could involve partnerships or joint ventures between e.g. utility providers such as KPLC and telecommunication firms (and other infrastructure providers). The trend towards increased demand for high speeds of Internet will drive investment partnerships between Internet/telecom companies and public sector companies to invest in broadband. The rationale for this comes from the fact that Kenya has the highest Internet speeds in Africa: Kenya (12.16 MBPs); Rwanda (1.69); SA (6.74); Mauritius (5.71) and Morocco (5.1)[23]. A caution offered in this plan is that the principal rule that public-sector players must not undertake commercial activity in competition with private-sector players is to avoid the danger of distorting competition. Regional and local initiatives for public-private collaboration that promote the deployment of infrastructure should also be sought carefully.

Public private partnerships are an important means to bringing network infrastructure to high-cost rural areas, especially if those partnerships facilitate infrastructure sharing. In rural areas that are either unserved or underserved, the sharing of infrastructure can be critical to addressing the challenge of deploying networks in high-cost areas that would otherwise be economically unsustainable. The sharing of passive infrastructure (i.e., the sharing of physical space such as ducts and towers, non-electric infrastructure at cell sites, as well as power supply) can lower upfront capital expenditures, which reduces barriers to the investment in new deployments.

Investment in connectivity infrastructure. The government will promote partnerships with private sector (PPPs) on investment in connectivity infrastructure to develop technologies and platforms for use by Mobile Network Operators (MNOs) and Internet Service Providers (ISPs) to make affordable Internet access possible in communities in Kenya including through the use of unmanned aerial vehicles, lasers, satellites and terrestrial wireless systems.

PPPs will be implemented in line with the broadband business models along the broadband value chain. Specifically PPPs will be utilized to develop broadband in at least three levels that constitute the broadband business models; these are:

(i) Physical layer comprising physical infrastructure development such as 'dark' optical fibre along the highways, towers for radio equipment among others.
(ii) Active layer which will comprise implementation of broadband networks over the physical infrastructure; and lastly,

[23] State of the Internet In Kenya, 2017. https://www.ifree.co.ke/wp-content/uploads/2018/02/State-of-the-Internet-in-Kenya-report-2017.pdf

(iii) The service layer where public and private sector will collaborate in the creation of services, content and application for use across all sectors of the economy, including in the Big 4 Agenda.

These broadband investment and business models will be elaborated within the first six months of the life of this NBS and policies/guidelines/regulations prepared to operationalize them. A comprehensive study is recommended to be conducted within the first one year of NBS 2023 to determine the most suitable business models in the Passive, Active and Service layers of broadband.

Further, other partnerships between MDAs that are aimed at promoting and developing broadband infrastructure, services, content, and applications will be implemented such as those between the MoICT and the Big 4 Agenda MDAs; and other MDAs.

Meanwhile, any drawbacks in the existing policy, legislation and regulations with regard to the effective implementation of PPP programs and projects will be identified and addressed within the first 12 months of this NBS to pave way for smooth implementation of BB projects under this framework.

3.7.7 Private Sector Investment Opportunities in NBS 2023

There are various opportunities for investment in broadband in the rural areas where huge digital divide between the urban and the rural areas exits.. Infrastructure and connectivity opportunities include extending broadband to ward levels, and distributing broadband to local communities using appropriate broadband last mile technologies

Other investment opportunities include broadband connectivity to housing units which will be constructed as part of the Big Four Agenda and the second phase of the SGR project where optical fibre can be integrated in the road and wireless access used to serve the population along the railway and pipeline provides an opportunity for optical fibre to be integrated in the rail road and wireless access used to serve the population along the railway and pipeline. Further, there is opportunity for content and applications development through the constituency innovation hubs. Similarly, broadband in universal health care delivery and smart agriculture to support food security in Kenya are other opportunities for the private sector. There is also an opportunity to deploy and embed broadband in the manufacturing sector to not only improve efficiency in this sector but also to manufacture broadband devices and accessories.

The government will support the private sector by providing enabling environment comprising policy, legislation and regulation to attract investments for the development of broadband by private investors.

3.8 Integrated Broadband Projects

This NBS envisions various projects to be implemented as a means to achieve the vision of affordable, accessible and secure broadband for all citizens. Implementation of these projects will be done through collaborative mechanisms among the various stakeholders in the framework of integrated broadband projects (IBP) where all inputs for the project are planned at the same time to avoid delays arising from omitted components at implementation stage; specifically,

(i) The expansion of the NOFBI for instance will involve collaboration between the Ministry of Transport and Infrastructure, KURA, KERRA, Kenya National Highways Authority (KENHA), KPLC and Kenya Electricity Transmission Company (KETRACO).
(ii) County broadband infrastructure will be implemented through partnership between the private sector county governments and Postal Corporation of Kenya (e.g., at the Huduma centres).
(iii) Connectivity to schools will be achieved through collaboration between the Ministry of Education, Science and Technology (MoEST), KENET and the private sector. Further, enhancing capacity building for and awareness of broadband requires extensive effort by the

MoEST, KICD, TVET colleges, Universities and the NBS delivery unit to work together to include broadband in the curriculum as well as have national broadband awareness campaigns.

(iv) Utility services providers including the Nairobi Water and Sewerage Company with a customer base of over 250,000 will also be engaged in broadband connectivity to the homes this may be done along with the installation of smart meters as is being implemented by the company.

In this regard, an integrated planning of broadband projects will be applied to ensure that all stakeholders provide input, which will ensure that the projects are successfully implemented,

4. ROLES OF STAKEHOLDERS

4.1 Multi-stakeholder Approach to NBS 2023 Implementation

There are various stakeholders who will play important roles in the implementation of this Strategy. The following are the key roles of stakeholders with regard to the implementation of the NBS (The indicative roles of stakeholders is presented in Appendix II).

(i) Parliament (The Senate and the National Assembly) to enact necessary legislation necessary fully operationalize the NBS

(ii) MoICT as the custodian of the NBS, will monitor its implementation through the NBC; be responsible for the review of the NBS, champion public education on the NBS and set up the broadband delivery unit (BDU) at the key implementing agencies which will have membership in the NBC

(iii) Ministry of Infrastructure and the relevant authorities under it - KERRA, KURA, KeNHA

(iv) The regulator (CA) shall draft and ensure implementation of regulations regarding the NBS

(v) Service providers and licensees
- (1) Provide consumer education
- (2) Provide broadband services of acceptable quality and at affordable prices;
- (3) Be part of the development of the demand side of the broadband ecosystem;
- (4) Develop content and e-applications.

(vi) Consumer organizations
- (1) Articulate consumer concerns
- (2) Demand for acceptable quality of service and pay for it

(vii) **Kenya National Education Network**

Kenya National Education Network (KENET) is the National Research and Education Network (NREN) of Kenya mandated to provide high speed connectivity and cloud services to the education, research and government institutions affiliated to the education sector including hospitals, aimed at transforming education and research using ICT. The NREN is thus a specialized operator of a private educational and research broadband network and research infrastructures offering services like identity federation, community cloud and research computing, for the benefit of researchers, faculty, students and staff. It is a critical component of the National Innovation System. It is also the vehicle for the government to increase the penetration of broadband services in educational and research institutions. It will therefore lead ICT/ broadband research and innovations in broadband; and develop ICT curricula.

(vii) **Kenya Power and Lighting Company**

KPLC is both a provider and an enabler of broadband. It is a provider because it has rolled out an optical fibre infrastructure over the power lines, which can be used by broadband service providers. Secondly, KPLC distributes power to various consumers where other providers of broadband depend for supply power to their (other BB providers) network. It is

anticipated that the MoICT, Ministry of Energy and that of Infrastructure will closely collaborate in the development of broadband. More specifically, the areas to which broadband needs to be extended and where there is no power supply will be identified by the BDU under the auspices of the NBC and shared with these lead MDAs for coordinated action.

(viii) **Kenya Electricity Transmission Company Ltd**

Kenya Electricity Transmission Company Ltd (KETRACO) is wholly owned government company incorporated with the mandate to plan, design, construct, own, operate and maintain high voltage electricity transmission grid and regional power interconnectors that will form the backbone of the National Transmission Grid. In the execution of this mandate, KETRACO will be encouraged include fibre cable along with its power lines to cover areas not reached by NOFBI; this infrastructure, where feasible, will also be utilized as a carrier of the NOFBI to underserved areas.

(ix) **Postal and Courier Subsector**

Postal services can play a pivotal role in delivering services, lowering the costs associated with access and providing inclusion to basic broadband services. By utilizing ICTs to improve delivery of public services through one-stop-shop over the wide postal physical infrastructure for example, the bottlenecks associated with digital divide can be addressed in part.

Post offices have a strong presence in rural areas. In Sub-Sahara Africa (SSA), it is estimated that 82% of post offices are located outside the three largest cities of each country.[24] This means that post offices are located exactly where the population lives, not only in urban areas, but also in peri-urban and rural areas; and have a lot to offer to rural populations in terms socio-economic inclusion.

The role that the postal sector plays therefore include the following main areas, among other things:-

(1) Facilitation of communication within the country and with the rest of the world;
(2) Facilitation of trade, through the movement of parcels and other goods within the country and internationally;
(3) Bridging the digital divide, through provision of Internet cafes (the Public Access Information Centres, PAICs) and other Information Communication Technologies (ICTs) within the postal network;
(4) Contribution to Education and Literacy, through delivery of learning materials through the postal network and access to online learning through the postal infrastructure; and,
(5) Contribution to GDP, through postal revenues;

Through broadband therefore, proper and well-managed e-Post services can leverage on the efficiency and scope of opportunities available online and facilitate provision of other ancillary services such as e-Finance services, e-Commerce services, e-Government services and e-Learning services.

(x) **Kenya Network Information Centre**

Kenya Network Information Centre (KeNIC) will effectively administer the Kenyan **ccTLD** market, setting the pace of the local domain market and increase the uptake of **.ke** domains by ensuring affordability of this resource

[24] UPU, 2008

It is reiterated that for avoidance of ambiguity, each of the stakeholders mentioned would play the roles specified in their respective mandates and licenses; and collaborate with other stakeholders in the broadband ecosystem to ensure its success.

4.2 Role of Private Sector and Development Partners

The private sector will play an important role in the implementation of broadband. To facilitate this, the government will create conducive environment for ensuring the attraction of private investment and competition between providers of broadband services. At least 70% of the financing is expected to come from the private sector for the relevant national broadband projects. The strategies through which the private sector will be involved in investment in broadband opportunities in NBS 2023 include:

(i) Cooperation between the public and private sector in developing networks in areas, which are considered to be underdeveloped. These will include extending broadband to marginalized and remote areas of the country. The collaboration will also cover priority projects for deployment of fast Internet connections for the public institutions in rural areas.

(ii) Encouraging local, regional and international financing agencies to invest and/ or finance key NBS 2023 projects. These agencies include the World Bank[25], AfDB, and IFC. In order to engage them, integrated broadband project proposals will be developed for consideration by the financiers

(iii) The private sector will develop innovative financing options/instruments through which the private sector will participate in financing broadband. Capital Market Authority and financial institutions will facilitate this initiative. The instruments could be securities such as bonds and development of a National Fibre Company in which the private sector companies (and individuals) can invest. Such a fibre company would pool resources from various investors.

(iv) For financing of devices, the private sector will set up manufacturing plans for broadband devices. Another approach is *leasing model* for equipment and accessories/devices–where financing would be in in the form of provision of equipment or devices by a financial institution or by a vendor at affordable periodic installments.

(v) Innovative investment arrangements attractive to the private sector investors in the Kenyan markets will also be implemented. These will include the *Design, Build and Operate (DBO)* where investors will be encouraged to invest in broadband projects and *Build and Operate* under some arrangement with the Government recovering their investment. The DBO model is will be used for public-private partnerships. The private DBO model, where the private partner is responsible for the design as well as the building and operation of facilities will be encouraged.

While the private sector and the development partners play their respective stated roles, the Government will:-

(i) *Make Build-out Requirements Effective*: Motivate licensees to meet build-out milestones and timeframes by making licenses contingent on build-out requirements.

[25]The World Bank can support governments in developing their broadband services. By information sharing, benchmarking, technical assistance and support in regulation, the World Bank can help governments to improve the functioning of markets, stimulate investment and learn from the experiences of other countries. The World Bank can also provide financing for strategic investments to support the development of key parts of the infrastructure. International submarine cables, cross-border connectivity and high capacity domestic backbone networks are all examples of areas in which World Bank investments can play a catalytic role, crowding-in private sector investment and improving service delivery. The EASSy cable along the East coast of Africa and the RCIP program throughout Eastern and Southern Africa are all examples of where the World Bank is supporting the development of these key infrastructure bottlenecks through Public-Private-Partnerships (see Tim Kelly et al, 2009 https://www.oecd.org/ict/4d/43631862.pdf)

(ii) *Speed Network Deployment by determining spectrum auction*: Award spectrum to bidders committed to efficient allocation and maximal utilization by also incorporating speed of build out when determining auction winners.

(iii) *Keep Rural Deployment on Pace:* To keep rural deployment on pace with urban deployment, the Government of Kenya could make access to spectrum in urban areas contingent on meeting build-out requirements in rural areas.

(iv) *Increase spectrum available for innovative access and backhaul technologies*: The Government will continually identify and allocate frequency bands that can be utilized for high capacity backhaul via solar powered aircraft, Wave terrestrial access and backhaul solutions, and higher throughput satellite backhaul capacity.

Table 8: Strategic role of key stakeholders in Broadband Value chain

Stakeholder/Value chain	Devices	Connectivity	Capacity building	Local business value created
Private sector	Provide service to include devices as a package devices *(1) Mobile Devices* *(2) Tablets* *(3) Laptops-* *(4) Clouding* *(5) Mobile Offices*	Provide Internet 'blankets' in towns and cities	(i) Training of customers on new technologies and services (ii) Conducting BB awareness programs across the country	(i) Local communities and private sector have set up business with specific products targeting BB use at local levels e.g., at wards and village level. (ii) Private sector innovative capabilities and production of new services, products and creation of tech companies, including use of modern mobile applications. (iii) Establishment of variety of ICT based services/applications utilizing the BB network to continuously improve the quality of people's lives.
Counties	(i) County governments to offer computer purchase assistance to staff and youth to be able to access broadband (ii) Counties to establish partnerships with service providers/ equipment provider for affordable BB devices	(i) **County BB plans and investment:** County Governments should come up with plans and targets and strongly implement BB policies for their population (Note: BB leading countries like Japan, Sweden and South Korea drove market penetration by establishing targets at various levels). (ii) **County governments BB projects** including e-government, digital-health, and e-learning or distant education in line with broadband infrastructure (iii) **Community access networks**: Rural broadband expansion should be undertaken by counties through creation of community access networks to distribute services to the communities (liaison with the regulator). (iv) Each County to establish three (3) community network hubs for rural penetration. And in each hub establish Digital Knowledge Centre	(i) Budgetary provision for regular sensitisation training on BB at all levels of the county government (ii) Development of customised programs to facilitate Internet education, computer use in schools, and homes. (iii) Special programs to educate housewives, who tend to control household finances on use and benefits of BB	1. Enhanced digital; literacy (bridge digital divide) 2. Employment resulting from emergence of new businesses which quickly adopt and diffuse new 3. Technologies and infrastructure suitable for their businesses 4. Improved health 5. Improved access to education

		(DKC) and Digital Knowledge Library ((DKL) **(v) ICT cultural community:** Counties should Contribute toward the creation of a Sustainable ICT-based cultural community and showcase county's unique knowledge assets. (iv) **Digitisation of operations**: Counties aim at digitizing and Designing knowledge contents in their counties (vi) Counties try to facilitate the sharing of Digital resources even within counties particularly in the county economic blocks		
Communities	1. Pooling of resources to acquire BB devices 2. Sharing of existing devices 3. Ensuring safe disposal of obsolete devices	1. Ensure security of infrastructure 2. Mobilise resources to purchase broadband services 3. Generate content	1. Organize at least one community meetings to sensitize members on broadband 2. Share knowledge among community members through for a and meetings	1. BB infrastructure is free from vandalism hence continuity of service 2. Relevant local knowledge is created and commercialized hence generation of income 3. Increased digital literacy 4. Enhanced access to digital opportunity
National Government	1. Fiscal incentives on importation and/ or manufacture of devices and related accessories 2. BB stimulus package across the BB value chain 3. Enabling policy, legal and regulatory environment (see appropriate chapter) 4. Government subsidization, demand aggregation, and sponsored pilot projects	**(i)** *Expand broadband backbone***:** Government to promote a nationwide fiber-optic expansion through formation of network hubs (47 in No.) in each county HQ by the end of 2022 **(extension of NOFBI)**. The government to promote provision of a combination of broadband wireless technology and/ or wired communication as may be feasible. ***The*** *infrastructure be accessed on open access principles by all service providers*[26] (iii) *Knowledge sharing***:** The national Government will build a sustainable knowledge sharing Network in Kenya and internationally with neighbouring countries in East Africa in which Enhanced online applications	1. Promote the development of ICT/ BB centres of excellence in the country 2. Train all employees in government on BB services	1. Countrywide access to BB on open access basis 2. Platform for entrepreneurs to deploy BB end user while riding on national BB infrastructure 3. Jump-starting the process by which demand for new services reaches a critical mass making it possible for service providers to reduce their cost to rates a mass market will support e.g. through the promotion of on-line access, developing ICT-intensive "smart communities," creating incentives for the creation of local content for transmission via the Internet, expediting electronic commerce and delivering electronic government services.

[26] *Examples of this model is the Korean Government and Swedish government. The Korean government has been very supportive in the thrust toward making Korea advance in BB technology by encouraging a free market and actively policing the service providers through effective regulatory framework. One of the main providers is a state owned Company where Government has shares just like Kenyan Government has shares in Telkom and Safaricom. These companies pushed penetration in S Korea to point where S Korea leads the world the global broadband leadership rankings The Country had a home Internet access of more than 88% of the population by 2016. In terms of broadband users in Sweden, in the year 2016, 93% of the population in Sweden had Internet access at home (mobile broadband services with over 100 Mbps speeds), with main dominant provider being a State-owned company.*

		and cyber security		
National and County governments	The national and county governments to sponsor science and technology parks by forging synergies among research centers, educational institutions and technology-based companies[27]	Direct underwriting, loans, favorable tax treatment, and other types of financial support for construction of new high capacity backbone digital, broadband networks at both the national and county government levels	Regular public education forums and awareness creation	Affordable and widely available broadband services being used by citizens for, socio-economic activities/development
Stakeholder/Value chain	**Finance and Investment**	**Policy, legislation and Regulation**	**Services, Content and application**	**Privacy and Security**
Private sector	Invest in broadband	Participate in public policy dialogues	Provide content, services and applications that are affordable and of acceptable quality and suitable for socio-economic development	Implement security measures in the equipment and services that are provided
Counties	Provide incentives for rollout of Broadband in the county up to the ward levels	Enact enabling bylaws	Provide public content, services and applications that are affordable and of acceptable quality and suitable for socio-economic development such are permits, registration of persons, etc.	Ensure that BB infrastructure is not vandalized
Communities	Utilize and pay for BB services	Utilize Within the confines of the law and contribute to public policy development	Create and commercialize local content and applications	Adhere to acceptable security and privacy standards while using broadband services
National Government	Provide fiscal and regulatory incentives for rollout of national BB backbone to each county	Promulgate relevant policies, enact laws and issue regulations on BB	Provide public content, services and applications that are affordable and of acceptable quality and suitable for socio-economic development such are permits, registration of persons, etc.	Implement the security measures specified in the NBS including strengthening security infrastructure including the KE-CERT
National and County governments	Collaborate in organizing investment forums for BB annually	Collaborate in harmonization of laws and regulations that govern BB such as those on wayleaves, passive BB infrastructure	Collaborate in rolling out national data bases to support broadband	Collaborate on BB security issues including physical security, cyber security, etc.

[27] *This synergy can be achieved primarily through investments, preferential policies and focused leadership programs designed to finance research and development projects and to promote commercialization of applied research.*

5. GOVERNANCE AND DELIVERY STRUCTURE

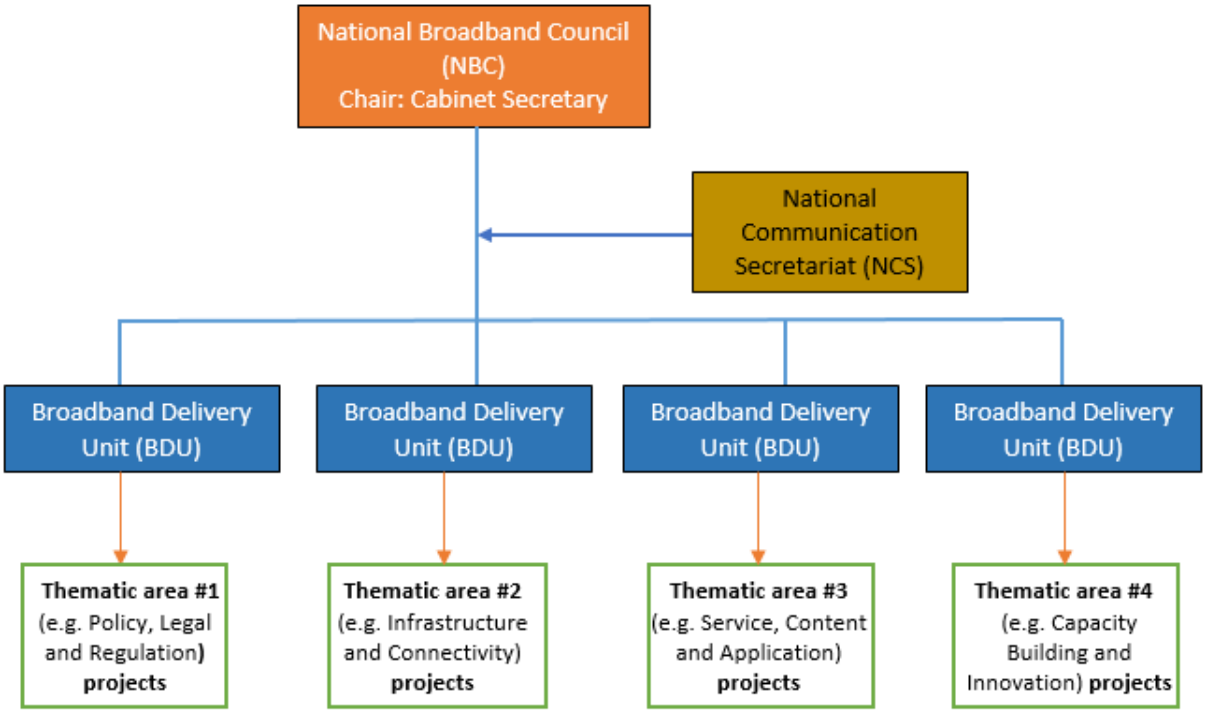
5.1 National Broadband Strategy Coordination

Arising from the weaknesses observed in the implementation of the NBS 2017, a clear structure to govern and deliver this NBS is recommended. The NBS coordination body shall ensure timely decision making and implementation of projects including operations, maintenance of the broadband systems and ensuring effective monitoring and evaluation. In this regard, and in line with best practice, a well-coordinated implementation framework is required to ensure success of the NBS 2023. Coordination mechanisms will be implemented for at least three fundamental reasons:

(i) For the provision of critical services such as power/electricity to schools, libraries, clinics, etc. as well as the supply of ICT equipment to other facilities;
(ii) To ensure that the deployment of NBS is aligned with the implementation of e-government and other government priorities/initiatives that require broadband; and,
(iii) To ensure that all aspects (supply side and demand side) of broadband are considered in the framework of integrated broadband projects

To be able to accomplish this mandate, a National Broadband Council (NBC) to be headed by the Cabinet Secretary in charge of MoICT will be formed with membership from relevant key institutions e.g., ICTA, CA, V2030 Delivery Secretariat, and others[28]. The purpose of this intervention is to provide strategic oversight for the effective implementation of NBS 2023. The NBC will achieve this objective by coordinating all necessary inputs and resources necessary for effective delivery of broadband since its membership will comprise key agencies that will be implementing various aspects of the Strategy. The structure of the NBC is presented in Figure 15.

Figure 15: Governance and Delivery Structure



[28] Utility providers such KPLC, CoG, Ministry of Transport, Infrastructure, Housing and Urban Development, and Service providers (represented by TESPOK)

The coordination of the broadband strategy will be performed by the NBC, which will provide the coordination is required for at least three fundamental reasons:

(1) For provision of critical services such as power/electricity to schools, libraries, clinics, broader offices etc. as well as the supply of IT equipment to other facilities
(2) To ensure that the deployment of NBS is aligned with the implementation of e-government and other government priorities/initiatives that require broadband
(3) To ensure that all aspects (supply side and demand side) of broadband and associated inputs (such as power supply, access roads, ducts, towers etc.) are incorporated in the framework of integrated broadband development

Under this governance and delivery structure, the typical functions of the MoICT will include:-

(i) Coordination of broadband requirements of all government ministries/departments;
(ii) Reporting NBS activities, progress, and challenges to the Government;
(iii) Seeking funding, directly from Government, funding institutions and private sector;
(iv) Negotiating and signing contracts with service providers and with other institutions on behalf of the Government, or ensuring that the same is done by other government ministries/institution as the case may be;
(v) Assisting the National Broadband Council (NBC) with whatever assistance they may require from the government; and,
(vi) Provide secretarial services to the NBC

The functions of the NBC are primarily to elaborate and ensure delivery of projects under the NBS 2023 including by overseeing the work of the broadband delivery units (BDU), which will be implementing the strategy on day-to-day basis. The composition and mandate of the NBC are elaborated in Part 5.2.

5.2 National Broadband Council

In order to implement this strategy, a multi-stakeholder National Broadband Council (NBC) appointed by the Cabinet Secretary in charge of ICT and mandated with overseeing the development of broadband by various institutions with a clear coordination framework will be set up within one month of the approval of this strategy. The NBC will be headed by the Cabinet Secretary in charge of the Ministry of ICT of the Republic of Kenya and shall have membership from government comprising the ICT regulator (CA) and representatives of key ICT stakeholders from the public and private sector. Specifically, the NBC membership shall comprise MoICT, ICTA, CA, Ministry of Education, Science and Technology, Council of Governors (CoG), Ministry of Energy, one representative of the ICT licensees providing broadband services (TESPOK), Kenya Chamber of Commerce and Industry (KCCI), PCK, a representative of the academia, Consumers' organization and Civil Society. Once set up, the NBC shall determine the mode of operation consistent with the objects of the NBS 2023 and the associated Strategic Implementation Plan/Matrix in their first meeting, which should be held not later than one month after the approval of this Strategy. The NBC shall also establish thematic task teams to deal with and report to it on quarterly basis on each of the broadband strategy thematic area programs and projects delivery through the Broadband Delivery Unity at the National Communication Secretariat (NCS). The NBS 2023 will be implemented using a program approach (See Appendix I). The NBC members will serve for a three- year term, which is renewable once.

5.3 Broadband Delivery Unit

A Broadband Delivery Unit (BDU) will be set up in each key-implementing agency within the first two months of approval of the NBS 2023. The BDU will develop programmes and projects in the thematic area pertinent to the implementing agency; for example, regulatory aspects of the strategy will be the responsibility of CA. It will be staffed either through secondment or direct recruitment of persons with expertise in the strategy's thematic areas. The staff will ensure effective planning, programming, scheduling and implementation and reporting of progress on projects in all designated thematic

areas to the NBC. It is emphasized that though some of the agencies represented in the NBC will not have direct responsibility for projects in a specific thematic area, they will collaborate and provide necessary input to these projects in the framework of integrated broadband projects (cf. Section 3.8).

Typical roles[29] of the NBC and working groups are presented in Box 1.

Box 1: Roles and activities of the NBC and Working Group

National Broadband Council Role and Activities[30]	Broadband Delivery Unit (Thematic Task Team) Roles and Activities
• Establish key principles and objectives • Define responsibilities for implementation of programmes and projects for each of the NBS 2023 thematic areas • Implement high-level targets • Define and appoint BDUs • Oversee and advise Working Group deliberations • Host Public Forum and Consultations • Develop a consensus agreement on harmonizing strategy inputs • Prepare draft National Broadband Implementation program document • Oversee creation of Action Plans to define implementation steps • Collaborate on establishing a follow-up regime	• Key issues, questions for all Working Groups: – **Status**: Current broadband investments, market, policies – **Trends**: How has broadband been advancing in this area? – **Needs**: Most critical gaps or needs to accelerate broadband – **Constraints**: What inhibits broadband development? – **Stakeholders**: Who can take responsibility? – **Linkages**: Key areas of interdependence and cooperation – **Economics**: Costs, demand, economic impacts – Recommendations

5.4 Compensation for National Broadband Council Members

The compensation for the NBC members will be honoraria according to the Salaries and Remuneration Commission provisions for such functions and which will be paid when the Council meets to conduct NBS 2023 business.

5.5 Collaboration

In its Global Internet Report[31] 2014, the Internet Society notes that "Internet ecosystem is characterized by the involvement of a broad range of stakeholders and the use of services and infrastructure with dispersed ownership and control and operates on the basis of openness, transparency and collaborative process to guide the functionality and development of the technologies and infrastructure that comprise the global Internet" In this regard, the spirit of collaboration, consultation, stakeholder involvement, public participation and inter-disciplinary engagement will be upheld at all times in order to ensure smooth realization of the broadband vision for Kenya. The NBC will promote collaborations necessary for the implementation of NBS 2023

5.6 Monitoring and Evaluation Framework

5.6.1 Monitoring and Evaluation of Broadband Plan

Crucial to the implementation of this strategy is determining whether the stakeholders are implementing the activities as planned and whether each project under each strategy pillar (thematic area) is on track, determining the challenges experienced during the implementation phase and proposing and implementing remedial actions. A robust monitoring, measurement and evaluation (M&E) framework with clear timelines for deliverables will be prepared and publicized (by the NCS) to all implementing agencies to ensure proper tracking of progress. Further, responsibility for this

[29] Adapted from David N. Townsend (2014 August).
[30] David N. Townsend (2014 August). Broadband Strategy development Overview and Framework. Proceedings of Universalizing Broadband in SADC workshop. Lilongwe, Malawi. August 2014
[31] https://www.Internetsociety.org/wp-content/uploads/2017/08/Global_Internet_Report_2014_0.pdf

function will be clearly defined and assigned in order to avoid ambiguity on whose responsibility for results and outcomes is in this aspect of the strategy. The M&E function will be performed by the National Communication Secretariat.

A template is provided for the monitoring of broadband deployment (Table 25). Each broadband task team will be required to prepare a similar plan for each project.

Table 9: Monitoring and Evaluation for Broadband (An Example)

Thematic area	Projects	Supply Target	Demand Target	Timeline	Outcome/Remark
E.g., Infrastructure	Metro broadband wireless network	100% to all citizens	Adoption by 60% of population	2020	Broadband is available for use by all citizens

5.6.2 Frequency of Measurement and Reporting

The M&E framework will ensure successful delivery of the NBS by ensuring that the target outcomes are achieved through:

- Monthly updates from the BDUs in the implementing agencies
- Quarterly projects implementation status
- Annual program implementation status and annual stakeholder forums
- Midterm review at the end of Year 2 for each thematic area achievements
- End term review which will be done at Year 5 where the complete NBS 2023 review will be conducted and formulation of the strategy for the next five-year cycle initiated

An instituted performance management approach to broadband implementation will be implemented.

5.7 Communication Strategy for the Broadband Strategy

Arising from consultations with stakeholders during the preparation of this NBS, limited awareness of what broadband is, available broadband services and its potential impact on society was noted. This points to the need to create awareness of the available and emerging broadband services and on the potential benefits that broadband has for socio-economic development. In this regard, effective stakeholder engagement and communication will be done to ensure that implementation of the NBS 2023 is successful. The purpose of the communications strategy will be to create awareness, understanding and secure commitment to achievement of Kenya's digital vision. In this regard, the NBC, will formulate and implement an appropriate communication strategy for this NBS.

6. BUDGET, STRATEGIC MAPPING AND RISK MANAGEMENT

6.1 Budget Background, Rationale and Benchmarking

The NBS 2017 was meant to be implemented with a budget of Kenya Shillings two hundred and fifty billion (Kshs. 250 billion). This amount was to be spent in the first five years for all the five strategic areas identified, namely deployment of broadband infrastructure using fiber and broadband wireless technologies, national capacity building and awareness, as well as content and innovations. Within the five strategic themes, six projects were identified; these were Infrastructure (Long Term Evolution (LTE), Fibre To The x (FTTx) and Backbone), Capacity Building and Awareness, Content Applications and Innovations, and Devices. The total budget of Kshs. 250 billion was not allocated to each of the projects identified under NBS 2017.

Though several projects were implemented in NBS 2017, statistics were not adequate to enable a clear understanding of the level of implementation of some of the projects. Some of the projects such as the national optical fibre backbone infrastructure (NOFBI) of which 12% (6,000 km) out of the 50,000km that were intended had been implemented. The percentage completion of the other projects under NBS 2017 such as digitization of core government registries where several registries

have been digitized was not documented. For some other projects, there was no indication whether they were undertaken or not; an example is the development of county management information system.

6.1.1 Budget Rationale for the NBS 2023 and Benchmarking

A review of expenditure patterns in many parts of the world show that countries spend varying percentages of their Gross Domestic Product (GDP) on broadband and telecoms. In general, some choose to be conservative while others choose to leapfrog their economic growth by spending higher amounts in proportion to GDP (studies reveal that for faster economic growth, a country should not spend less than 4% of GDP on ICTs). Countries in Middle East and North Africa (MENA) region including Egypt, Jordan, Morocco, Oman, Saudi Arabia, Syria and Tunisia for example invested on average 1% of their GDP in broadband by 2008 per annum. It is noteworthy, that the rapid technological change that the telecom/ICT sector is experiencing plays a major role in the economic growth, and the more a country invests the more it gets.

In developing this NBS 2023 it was recognized that significant expenditure has been made particularly in the rollout of infrastructure to the counties. Thus, the current budget is a zero budget that is, based on estimated expenditure on remaining works and is estimated at **Kshs. 111 billion** spread over five years. This translates to about 3.7% of the national annual budget on BB and 1.5% of GDP (2017). It is proposed that the budget be increased since the contribution of ICTs to GDP (currently standing at 1%) increases with higher ICT investment.

6.1.2 Breakdown of the Budget

The proposed budget for NBS 2023 is allocated as follows:

Table 10: Summary of estimated budget for implementing NBS 2023

S/N	Budget Item	Kshs. (Million)	USD $ (Million)	% percent of Infrastructure budget
1a	Infrastructure (NOFBI up to the sub-county, and Ward base stations) plus services and contingency @30% of equipment	54,295	543	
1	NOC[b]	5,430	54	10
2	Capacity Building, and Innovation	16,289	163	30
3	Service, Content Applications	10,859	109	20
4	Devices	13,574	136	25
5	Contingency	10,859	109	20
	TOTAL	**111,306**	**1,113**	

Assumptions:

a. **Broadband backbone**: NOFBI to sub-county (@ $15,000/km) for at least 2500km; Last mile: Base stations 2 per ward (@ $30,000 per ward); Broadband connection to all class A, and B roads totaling to 16300 km (currently 14300Km[32]) and broadband for all government offices, schools, hospitals and health centres

b. Network operation centre (NOC) at 10% of infrastructure

6.2 Strategic Mapping

To ensure performance management of the deployment of this strategy, this framework, which clearly demonstrates strategic mapping of the whole national broadband strategy is recommended. In this mapping, strategic objectives are linked with the broadband strategy thematic areas and the performance measures, which address each of the strategic objectives with clear measurable performance indicators (see Table 14). This will guide the various stakeholders in the discharge of their respective responsibilities under this NBS.

[32] http://www.kenha.co.ke/index.php/road-network

Table 11: Strategy Mapping of the National Broadband Strategy

Vision [for each Pillar/thematic area]	Strategic objective/strategies	Action	Target	Outcome/ Remark	Timeline
Infrastructure	To avail broadband networks for all Kenyans	Deploy broadband infrastructure for international, national, provincial and local loop (last mile) access	100%	The whole of Kenya is covered with broadband	2023
Connectivity	Access to broadband networks and services, and use by all Kenyans	Address barrier to connectivity at international, national and local levels	100%	All Kenyans can access and use affordable broadband services locally and internationally	2023
Broadband devices	Avail broadband devices to all citizens	Ensure affordable devices to access broadband services	100%	All Kenyans can afford broadband devices	2023
Broadband services	Avail quality high speed services in all sectors of the economy	Implement broadband innovation services for all sectors including the Big 4 areas	100%	Broadband is effectively delivering the Big 4 agenda	2023
Content, Applications and Innovations-	To ensure creation and availability of relevant content, e-applications and innovative services for all Kenyans	1. Establish/ strengthen Research and Development (R&D) in these areas 2. Set up a technology park 3. Create local content to be accessed by users of broadband	Continuous Technology operational by 2019 100% in all sectors	1.There is relevant local content for all Kenyans 2. There are e-applications in all sectors of the economy, such as e-education in all levels of education (100%), 3. e-health in at least 90% of all health facilities	2023
Capacity Building and Awareness;	To build adequate capacity to deploy broadband and utilize broadband services in all sectors by all Kenyans	Build or enhance the capacity of existing institutions to be Broadband centres of excellence	Continuous; 100%	1. All Kenyans have an appreciation of the potential of broadband 2. All Kenyans are able to use broadband for socio-economic development	2019 2022
Policy, legislative, regulatory and institutional environment	To ensure orderly deployment and use of broadband for socio-economic development of Kenya	1. Approve the NBS and associated BB 2. Harmonize policies, legislation and regulation	100% by 2019 100% by 2019	1. National development policies across all sectors are harmonized with regard to broadband strategy 2. Broadband is embedded in the universal goals of all sectors of the economy	2019 2019
Finance and Investment	To ensure adequate resources are available for investment in broadband	1. Implement fiscal incentives for broadband deployment 2. Implement PPP for broadband	100% by 2019	There are adequate finances to implement broadband	2020

		deployment			
Privacy and security of networks and services;	To ensure that all Kenyans are safe and secure while using online services	1. Enact laws and formulate regulations with regard to electronic transactions and cyber security	100% by 2019	There are laws that support and safeguard citizens while operating online	2019
Governance of broadband	To ensure adequate and effective governance of all broadband matters and delivery in Kenya	1. Set up the NBC 2. Set up the Broadband delivery unit 3. Set up task teams (working groups on each BB thematic area)	100% 100% 100%	1. National Broadband Council is set up 2. Broadband Delivery unity is established 3. program (thematic area) task teams (working groups) with clear roles and responsibilities for broadband development are in place	2019 2019 2019

6.3 Risks and Mitigation Strategies

Implementation of this strategy may be affected by various risks. In order to successfully implement the strategy, these risks must be managed. Table 24 shows the risks, assessment of their seriousness and mitigation strategies.

Table 12: Risks and mitigation strategies

Risk	Details	Risk Assessment	Mitigation strategies	Stakeholder roles
Insufficient funding of Broadband	▪ Lack of private sector Investment ▪ Competing Government priorities	High	▪ Provide incentives for investors e.g. through fiscal and regulatory incentive ▪ Prioritize broadband	▪ Government (Legislate and Enforce), ▪ Service Providers (Implement), ▪ Consumers (Benefit
Poor implementation of broadband strategy	▪ Project planning and management ▪ Coordination and delivery	High	▪ Adopt program approach ▪ Adopt project management discipline ▪ Create and operationalize the National Broadband Council (NBC) and the BDU (M&E) at the NCS	
Lack of supportive policy and legal framework	▪ Delays in enacting legislation ▪ Delays in operationalizing ▪ enacted legislation	High	▪ Government agencies to operationalize legislation ▪ Enforcement of legislation ▪ Enhance international collaboration	
Spectrum availability	▪ Insufficient spectrum to deploy last mile solutions	Medium	▪ Expediting frequency re-farming exercise to optimize the utilization of the already allocated spectrum for deployment of mobile broadband ▪ Provide spectrum for 5G	
High cost of implementation	▪ Cost of infrastructure ▪ Duplication of infrastructure ▪ Lack of coordination of civil works to ICT works ▪ Use of outdated	Medium	▪ Issuance of guidelines and regulations for infrastructure sharing ▪ Provide tax incentives ▪ Use of alternative technologies such as satellite	

Risk	Details	Risk Assessment	Mitigation strategies	Stakeholder roles
	technologies			
Slow uptake of broadband services	▪ Lack of relevant content ▪ unaffordable broadband devices and services ▪ Low awareness ▪ Low ICT literacy	Medium	▪ Development of relevant content ▪ Provision of tax incentives/subsidies for devices ▪ Promotion competition ▪ Implement capacity building strategies including awareness creation	
Service availability	▪ -Maintenance of infrastructure ▪ -Vandalism	Medium	▪ Enforcement of Service Level Agreements (SLAs) ▪ Enactment of legislation for broadband as a critical infrastructure	
Governance and delivery structure	▪ Absence of an effective governance and delivery structure for the NBS	Medium	Within the first quarter of the launch of NBS 2023: ▪ Establish a National Broadband Council (NBC) ▪ Establish a Broadband Delivery Unit (BDU) at the NCS	
Insecurity	▪ Northern frontier, which also represents broadband access gaps, is faced with a lot of insecurities. Without enhancing security it will be difficult to achieve the targets of expanding broadband to the *mashinani*	High	Enhance security and patrols in the affected areas	
DNS outages	▪ Unreliability of Internet services ▪ Paralyzing critical infrastructure ▪ Attacks on enterprise websites	High	▪ Ensure availability- have redundancies built into Internet infrastructure ▪ Restrict access ▪ Hide primary servers ▪ Think locally ▪ Ensure integrity of data by for example implementing Domain Name System Security Extensions ▪ Proactive monitoring of the DNS	
Typosquatting	▪ Interference with normal operations	High	▪ Educating users ▪ Installation of SSL certificates ▪ Registration of trademarks ▪ Buying multiple variations of your domain name	

GLOSSARY

Backhaul – A portion of the network comprising the intermediate links between the core network and the access network that connects to end user premises

Broadband - High-speed data transmission, such as cable, ISDN (Integrated Services Digital Network), and DSL (Digital Subscriber Line). It is generally taken to mean bandwidth higher than 2 Mbps.

Affordability: Entry-level Internet available for 2% or less of GNI per capita by 2022

Convergence - The integration of industries that up to now have largely operated separately from one another, but meshing along a specific value chain or bundling from different services at the applications end. Convergence is driven by the digitization of the presentation, transmission, storage, processing and creation of information.

Electronic Commerce (e-commerce) - The conduct of business in goods and services, with the assistance of telecommunications and telecommunications-based tools

Electronic Government (e-government) - Government's use of technology, particularly web-based applications, to enhance the access to and delivery of Government information and services to citizens, business partners, employees, other agencies, and government entities.

Data Classification - The process of organizing data by relevant categories through tagging, so that it may be used and protected more efficiently. The classification process makes data easier to locate/search and retrieve, eliminates duplication of data and ensures data security.

Digital Literacy: Ability to use Internet for socioeconomic purposes upon training

Information and Communications Technology (ICT) - Any communication device or application, encompassing radio, television, cellular phones, personal digital assistants, computer and network hardware and software, satellite systems and so on, as well as the various services and applications associated with them, such as video conferencing and distance learning. ICT refers to the technologies, including computers, telecommunications and audio-visual systems that enable the collection, processing, transportation and delivery of data, information and communications services between users. The ICT can be viewed as a combination of electronics, telecommunications, software, networks, and decentralized computer workstations, and the integration of information media, all of which impact firms, industries, and the economy as a whole. ICT comprises various "communication equipment" which include radio, TV, communication equipment and software among others.

Information and Communications Technology Policy (ICT Policy) - is an official document /specifying Kenya's aspiration regarding broadband ICT and how these aspirations can be achieved;

Information Society - A term used to describe a modern population that is conversant with – and actively using - information and communications technology. A society where the creation and exchange of information is a predominant social and economic activity

Information Technology (IT) - The study, design, development, implementation, support or management of computer-based information systems, particularly software applications and computer hardware

Key performance Indicator (KPI) - A set of quantifiable measures used to measure or compare performance

Latency – The time it takes, generally measured in milliseconds (ms), for a source to send a packet of data to a receiver

Open access - The possibility for third parties to use an existing network infrastructure to provide services on fair, reasonable and non-discriminatory terms, rather than on encouraging infrastructure competition

Open access network - A network that allows third parties to make use of the infrastructure owner's network assets

Passive - Refers to network elements without an active electronic component; typically comprising civil engineering infrastructure, ducts, dark fire and street cabinets

Public Internet access point (PAP) - a location which dispenses free information in various forms; and also offers users a PC based terminal for Internet access. Information kiosks form part of Multi-Purpose Regional Community Centres.

Public Private Partnerships (PPP) - An approach to facilitate cooperation between the public and private sectors in delivering important Government policy initiatives. PPPs can take various forms.

Quality of Service (QOS) - A set of standards and mechanisms for ensuring a given quality of performance of services provided over the network.

Regulatory Authority - A public institution established by legislation to control, by using rules and regulations, the provision of telecommunications, broadcasting and postal services.

Small and Medium Enterprises (SMEs) - Smaller enterprises with an annual turnover of not exceeding N$10 million; these enterprises are fully owned by Namibian citizens.

Telco-OTT (Over-The-Top) is a conceptual term that describes a scenario in which a telecommunications service provider delivers one or more of its services across all IP networks, predominantly the public Internet although sometimes telco-run cloud services delivered via a corporation's existing IP-VPN from another provider, as opposed to the carrier's own access network. It embraces a variety of telco services including communications (e.g. voice and messaging), content (e.g. TV and music) and cloud-based (e.g. compute and storage) offerings

Universal Access - Accessibility of a telephone, not necessarily in one's home, but through some means such as a public pay telephone or community resource centre providing telephone facilities. The objectives underlying the concepts are the similar, to make available and maintain affordable communications services.

Universal service - Service available, as far as possible, to all the people without discrimination on any basis with adequate facilities at reasonable cost; a Universal Service Provider (USP) provides these services.

Universal Service Obligation (USO) - Specific obligation imposed by postal law or license on the postal operator to provide a defined set of postal services to a specified community and locality usually under a regulated pricing system. In the event that such obligation results in financial loss of the postal operator a transparent compensation mechanism has to be put in place.

APPENDICES

Appendix I: Implementation Plans

Appendix I-1: Policy, Legal and Regulatory Environment

Table 13: Strategy for Policy, legal and Regulatory Environment

Sub Issue	Objectives	Outcome	Strategies	KPI	Baseline	Target	Responsibility
Broadband market	Promotion of Competition and Investment	Increased investment in broadband	Formulate policies and enact of legislation that encourage investment	Increase in investment in broadband ecosystem areas	N/A	50% increase by 2022	CA; MoICT/NCS
		Revised and harmonized charges e.g. for licenses such as for NFP and way leave permits/business permits	Implement technology and Service neutral rules	Harmonized deployment of infrastructure Policies/Regulations/ Laws	N/A	100% by 2019	County government; CA; Roads Authorities
		Fair competition in broadband	Proactive monitoring and addressing of anti-competitive behaviour Ensure fair competition (Practices such as market collusion, predatory pricing, punitive pricing at the intermediate markets, and infrastructure hoarding in violation of public interest should be deterred and sanctioned) Review of Advertising Code for fairness so as to avoid ambush marketing and strengthen rules on comparative marketing.	- Implement an Advertising Code of Conduct - Sanction unfair competition behaviour	N/A	100% by 2019 Continuous monitoring	CA/CAK/Advertising authorities

Sub Issue	Objectives	Outcome	Strategies	KPI	Baseline	Target	Responsibility
		Affordable broadband	• Tax and licensing incentives • Infrastructure sharing	Finalization of the draft infrastructure sharing regulation	N/A	Q2/2019	CA, TESPOK
		Kenya as a Data centre hub	Develop autochthonous legislation that will make Kenya a haven e.g. as a data centre hub	Policies, legislation and regulations for content provision that make Kenya a content/ data haven e.g. as a data centre hub	N/A	Policy enacted by 2021	CA/ MoICT
		Inter-platform competition	Review of KICA Fair Competition Regulations 2010 to include Inter-platform competition	Inter-platform competition is included in the Fair Competition Policy	N/A	Review compete by 2021	CA/MoICT
Institutional framework	Integrated deployment of broadband and delivery of broadband	Adoption of common technical standards for operation of telecommunications infrastructure to be adopted by all government entities	Review the Roads/Building Code etc. for Harmonization	NBC and BDU is in place	N/A	Q2/2019	CA/ MoICT
		Harmonized legislation pertaining to ICT infrastructure	Update Critical Infrastructure legislation to include broadband as critical infrastructure	Enacted Critical Infrastructure Bill	N/A	Enacted legislation by 2020	MoICT
		Incorporation of broadband planning into cities planning/building plans/road plans etc.	Collaborative development of a integrated infrastructure master plan that incorporates telecom infrastructure	-Amendment of Building Code to include provision of ICT infrastructure within the building code/KICA; -Roads Act to cater for ducts when building roads, and damages for	N/A	Q3/2019-20	County Government/CA/ MoICT/Lands/ Urban Planning/Council of Governors

Sub Issue	Objectives	Outcome	Strategies	KPI	Baseline	Target	Responsibility
				destructions of operators' infrastructure/ -Lands Act/Land's Registration Act to standardize the cost of wayleaves/County --Legislation for deployment and harmonization with national legislation			
	Secure broadband	-Protection of maps, plans, permits and all related documentation pertaining to critical infrastructure -Adoption of common technical standards and facilitation of the development of international, regional and national backbone that are secure	- Develop a mechanism for storage and retention of critical infrastructure information/data - Domesticate the Tampere Convention on deployment of resources during emergencies - Domesticate the Budapest Convention on Cybercrime	-Critical Information Infrastructure regulation for ICT broadband -Collaboration and Cooperation on International standards -Having a set of laws that distinguish Kenya from other jurisdictions and makes Kenya market more attractive	N/A	100% of necessary/enabling laws by 2020 -At least two collaborations in 2019; then Continuous -100% by 2021	Ministry of Transport/ National Land Commission/ MoICT CA
Spectrum Allocation	Effective Allocation and Assignment of Spectrum	Avail spectrum to licensees for bandwidth intensive broadband services	Expedited deployment of services requiring spectrum	Reviewing of Radio Communication & Frequency Spectrum Regulations 2010	N/A	100% by Q4/2019	CA/ MoICT
		Develop a regulatory framework that promotes optimal use of spectrum and make spectrum	Spectrum recovery for non-usage and reassignment of such spectrum	Reviewed KICA Radio Frequency & Frequency Spectrum Regulations 2010 to allow for	N/A	100% by 2019	CA/ MoICT

Sub Issue	Objectives	Outcome	Strategies	KPI	Baseline	Target	Responsibility
		hoarding, idling (none utilization) and warehousing impossible.		reassignment			
		Optimal Spectrum Assignment	Re-farming, reassigning and reallocation of spectrum frequencies to facilitate the rollout of new wireless broadband technologies capable of delivering high speeds at the access layer of broadband networks	Effective enforcement of Re-farming, reassigning and reallocation of spectrum frequencies to facilitate the rollout of new wireless broadband technologies as in KICA Radio Frequency & Spectrum Regulations 2010	N/A	2020	CA
Spectrum management	Maximize value and use of spectrum	Market based spectrum allocations	Finalized of ICT policy guidelines for spectrum management to be reflected in the National Information and Communication ICT Policy which should reflect KICA Radio Frequency and Spectrum Regulations	Revised National Information and Communication ICT policy 2006 to include spectrum management planning to reflect KICA Radio Frequency & Spectrum Regulations 2010	N/A	Finalized and launched by 2020	MoICT
		Offering tax incentives to reduce the cost of deployment of telecommunications infrastructure; Lower licensing fees for the first entrant Subsidized payment of spectrum license and usage fees for	Incentivize rollout of fiber infrastructure; Encourage the deployment of services in rural areas through licensing the CBOs and harmonization of policies dealing with spectrum i.e. wireless broadband spectrum policy with National Broadband	Single policy dealing with all matters ICT addressing the complete broadband ecosystem	N/A	100% by 2019	MoICT

Sub Issue	Objectives	Outcome	Strategies	KPI	Baseline	Target	Responsibility
		public protection and relief services and research and development initiatives;	Policy				
Open Access Framework	Facilitate access to right of way rights	Expedited issuance of way leaves to facilitate fast deployment of infrastructure particularly for housing projects	Develop policies that provide open access to government sponsored projects and for CBOs	-Amendment of Building Code /KICA; Roads Act/Lands Act/Land's Registration Act to cater for access of right of ways -Open access regulations	N/A	100% by 2020	Parliament, Ministry of Transport/ National Land Commission/ MoICT
Ease of doing business	Facilitate ease of doing business	Simplification of infrastructure deployment approval processes	Review timelines in statutes pertaining to deployment of infrastructure Reduce the number of procedures and documentation to obtained before approvals	Average time taken to obtain authorization	N/A	Half the time taken by 2019	CA, Council of Governors/ County Government/ Ministry of Lands/ Ministry of Roads
Broadband coverage in rural and Underserved areas e.g. slums	Increase broadband coverage in Kenya	Increased BB coverage	Encourage infrastructure sharing in the unserved and underserved areas	% coverage	N/A	50% by 2022	CA/MoICT
		Fiscal incentive plans for enhancement and improvement of any layer within the broadband infrastructure value	Issuance of special incentives by government such as tax rebates/subsidies	Finance Bill Inclusion in National and County Budget	N/A	Amended by 2021	National and County Treasuries

Sub Issue	Objectives	Outcome	Strategies	KPI	Baseline	Target	Responsibility
		chain					
	Network Security	Facilitate the protection and safeguard of cyber space and data transmitted through this avenue (networks)	Enactment of legislation that focuses on security and advocates for data privacy and protection, hence requiring upgrade of laws to cover new areas such as electronic transactions, e-commerce and cyber security etc.	-Review of Information Security Policy and Cyber Security Regulations -Enactment of Data Protection legislation	N/A	100% by 2019	MoICT, Parliament
	Telecommunications to be considered as critical infrastructure	Broadband is a critical infrastructure	Include broadband as a critical infrastructure in appropriate laws and regulations	Finalization of Critical Infrastructure Bill	N/A	100% by 2019	MoICT/AG
		Incorporation of telecommunications in critical infrastructure plan/distributed ledger	Existing Taskforce (2018) in place for review of plan/distributed ledger to finalize the review of critical infrastructure plan for broadband	Cyber cooperation to be addressed in Critical Infrastructure Plan/Distributed Ledger policy framework	N/A	100% by 2019	MoICT/AG
Cross-border cooperation on cyber security	Enhanced and effective cross-border cooperation on cyber security issues	Effective cooperation on cross border and transnational nature of the cyber space	Signing and operationalization of treaties that facilitate cross border cooperation on cyber threats	Reciprocity agreement/Bilateral Investment Agreements/ Multilateral Agreements	N/A	Continuous	National Cyber Coordination Authority
		Maintenance of a cyber-environment that encourages economic prosperity and certainty of transaction execution while promoting efficiency, innovation, safety, security,	Enact Cyber Security Law, Regulations, and Policies to protect and secure the cyberspace and telecom infrastructure	Reviewed Cybersecurity regulations/ National ICT Policy	N/A	100% by 2019	MoICT/Parliament

Sub Issue	Objectives	Outcome	Strategies	KPI	Baseline	Target	Responsibility
		privacy and business confidentiality.					
Capacity Building on Cyber Cybersecurity	Establishment of a team of local experts with competence in the prevention, detection and proactive interdiction of cyber threats and attacks, as well as, in forensic recovery of systems after attacks.	Broadened knowledge on cyber security/ ICT in the country	-Enforcement of Mutual Legal Assistance -Review and ratify the AU convention on Cyber security and personal data protection	Adoption/Ratification of the AU convention on cyber security and personal data protection; local data protection legislation	N/A	100% by 2019	AG/Ministries, Presidency
	Harmonized legislation on cyber security to facilitate cross border cooperation in the fight against cybercrime	Effective exchange of information/best practice/ reciprocal enforcement of judgments to avoid double criminality	Ensure visibility of the work carried out by existing bodies such computer emergency response team (CERT)	Implementation of Section 6 of the Computer Misuse and Cyber Crime Act	N/A	100% by 2019	CID; CA; National Computer and Cyber Crimes Coordination Committee
Carbon Footprint Measurement for ICT Sector	To strengthen approaches for climate change management	Effective monitoring of carbon footprint by the telecom sector	Development of national climate change action plan	Launch of National Climate change action plan	N/A	100% by 2020	Ministry of Environment/ NEMA
	To promote sustainable development	Policy and regulations on electronic waste menace	Finalization of E- waste Management Regulations for facilitation of sustainable environment	Implementation of EMCA-E-waste management Regulations	N/A	100% by 2020	Ministry of Environment/ NEMA

Sub Issue	Objectives	Outcome	Strategies	KPI	Baseline	Target	Responsibility
Monitoring and evaluation	To facilitate accountability and provide expertise on deliverables	Timely implementation of the action points	Regular meetings of technical working groups for monitoring and evaluation of progress in enforcement of strategy	Quarterly meetings, at least 80% of quarterly targets met	N/A	Four meetings per annum	Thematic area task working groups (TWGs)
Infrastructure specifically catering for Persons with Disabilities	Inclusion of PWDs in the National Broadband Strategy	Ease of access of ICT services to PWDs	Incorporation of regulations catering for PWDs within KICA; Customized telecom Solutions for PWDS	ICT Regulations for PWDs	N/A	Enactment of Act/regulation by 2020	CA/ National Council for PWDs
Data Protection	To ensure data integrity and legal protection during processing and use of data	Data Protection Act	Multi-stakeholder involvement in drafting of the Bill Adoption of Convention for the Protection of Individuals with regard to Automatic Processing of Personal Data	Increased online uptake operations Signatory of the Budapest Convention	No Act	Enactment of Act by 2020	Parliament/ Stakeholders
Broadband as a utility	To elevate broadband status to that of utilities such as electricity and water	Broadband as a critical Infrastructure Coordinated broadband governance and deployment Digital Inclusion	Enactment of enabling Laws, Amendment of Laws (Road Act, Critical Infrastructure Bill) Building Code Harmonization of existing legislation to facilitate integrated BB development -Review of tax policies for broadband (e.g. Tax exemption for Broadband Devices) to improve	-Installation of broadband infrastructure as part of the construction of roads, buildings -Uniform way leave fees across counties -Inclusion of broadband in National and county integrated development plans -Investment in broadband at national and county levels	Critical Infrastructure Bill Tabled No standard way leave charges	Enact with necessary adjustments as necessary by 2019 Have a standard schedule of fees	MoICT/ Parliament

Sub Issue	Objectives	Outcome	Strategies	KPI	Baseline	Target	Responsibility
			affordability -Affirmative legislation and regulation targeting special interest groups such as PWDs	-Broadband solutions for all			
Infrastructure sharing	To promote infrastructure sharing	Collaboration	Regulations on infrastructure sharing Development of master plan for integrated infrastructure	Reduced duplicity of resources Reduction in infrastructure deployment costs Migration to new technologies	N/A	80% reduction of duplicity by 2022 30% reduction on deployment costs by 2021 Continuous	CA, TESPOK
Cyber Security	To ensure security online and offline (infrastructure)	-Protection/safeguard of users online -Protection of broadband infrastructure	Cyber (Information) security regulations	-Increased cyber security awareness -Reduction in financial losses attributed to cyber security breaches -Reduction in user cybercrime	N/A	Sensitization of populace on the Cybercrimes Act 2018	CA
Enabling Environment	Ensure an enabling, responsive, progressive legal environment	Spectrum Allocation for Broadband	Finalization of Spectrum Policy Framework Harmonization of the legislative, regulatory and policy landscape	Spectrum policy issued Relevant policies, legislations and regulations harmonized	N/A	100% by 2019	CA/ MoICT

Appendix I-2: Infrastructure and Connectivity

Table 14: Strategy for Infrastructure and Connectivity

Sub-Issue	Objectives	Outcomes	Strategies	KPI	Target	Responsible
Broadband Coverage	Increase Access to broadband coverage to everyone	Improved quality of life in the way citizens work, live and learn. Reduce the Digital broadband divide	•MNOs to accelerate nationwide 3G and 4G rollout	▪ % 3G/4G Coverage -	▪ 3G coverage by 2020, to 94% of population	MoICT CA & MNO Safaricom, Airtel, KENET, Liquid Telekom, Zuku, JTL, Telkom Kenya KPLC other providers
			Service providers and Government to accelerate fixed (Fiber) Connectivity	▪Broadband connectivity to tertiary institutions, health and schools	▪Tertiary institutions—100% connected by 2020 ▪Primary schools: 50% by 2022 ▪Public Health facilities 100% by 2020; ▪public sector organizations-100%	
			Spectrum review on allocation and pricing to support broadband voice centric spectrum modeling e.g., 450 MHz, 700 MHz, 2.6 GHz, 3.5 GHz	▪Spectrum allocation review	▪Reviewed spectrum allocation	
			• 5G development workgroup in place	▪ 5G Trials.	▪5G trial by 2022	
Security of broadband infrastructure	Increase surveillance to secure BB infrastructure in urban and rural areas	Reduce vandalism, ensure consistent availability and reliable use	- Increase surveillance	▪ Number of infrastructure-related vandalisms	▪Secure 100% of all BB locations (including counties) by 2020	National police service (NPS) County Governments CA
			Government to enact legislation to safeguard Broadband as critical infrastructure	▪BB safeguard legislation	▪Enacted legislation by 2020	
			Engage Police to provide security for the facilities	▪Number of Counties and Sub Counties Covered with NPS surveillance System	▪47 counties by 2023	
			Sensitize communities and work with them to guard BB infrastructure	▪% of communities sensitized on security of BB	▪50% countrywide by 2023	

Sub-Issue	Objectives	Outcomes	Strategies	KPI	Target	Responsible
			Include county Government in the security of BB in their areas	▪Number of counties with BB surveillance	▪25 counties by 2025	
			Government to develop national strategies for reducing risks to Broadband as a Critical Infrastructure	▪Number of Counties with BB surveillance	▪47 counties by 2023	
Coordination and complementary services	- Provide a harmonized and enabling environment for infrastructure deployment - Avoid duplication of BB infrastructure	Reduced cost of deploying and operating broadband networks	•Enactment of the broadband Infrastructure legislation (Way leaves & Building Code Review)	▪ Broadband Infrastructure enabling laws enacted	▪Laws enacted by 2020	Parliament ICTA and Survey of Kenya to fully Implement KNSDI MoICT/ Ministry of Transport, Infrastructure, Housing and Urban Development collaboration KENHA, KURA KERRA, NCA CA, National Broadband Council
			Integrated Infrastructure global information system (GIS) (the KNSDI- Kenya National Spatial Data Infrastructure)	▪Inclusion of BB as critical infrastructure in legislation	▪Integrated GIS data by 2022	
			Integration of BB infrastructure in road and power connection	▪% increase in access of BB to underserved areas	▪30 % increase in access in underserved and unserved areas through integrated road and power projects	
			Synchronized planning of civil and ICT data projects	▪Harmonized way leaves in counties	▪National policy and regulations on wayleaves	
			Promote and ensure operators share common infrastructure.	▪Infrastructure sharing regulations	▪100% infrastructure sharing by 2020	
			Government to provide rebates/tax incentives for operators providing complimentary services (utilities) in marginalized areas	▪Number of incentives	▪An incentive mechanisms for complementary infrastructure	
Demand Stimulation	Provide accessible and affordable broadband services to all	Increased demand for and use of broadband services	• Promote local production of access devices	▪No of local producers for access devices	▪1 by 2023	Government Agencies/Public Sector
			Government to provide subsidies for access devices	▪Tax subsidy policy for access devices	▪Enacted tax subsidy law by 2023	

Sub-Issue	Objectives	Outcomes	Strategies	KPI	Target	Responsible
	citizens		Promote and avail online local content (e.g. e-Government information, eLearning, Online county services) to spur demand.	▪ Number of online local content available	▪ 20 by 2023	County Governments
			Public Wi-Fi/ Hotspot access (affordable Wi-Fi) in every ward	▪ % of wards covered	▪ 100% by 2023	
Policy, law and regulation	Safeguard infrastructure assets and assist in accelerating rollout	Reliable and high availability infrastructure An enabling regulatory and administrative environment that facilitates broadband rollout	Review of The Kenya Road Act	▪ % increase in connectivity to NOFBI	▪ 100% by 2023	MoICT Ministry of Transport, Infrastructure, Housing and Urban Development, CA
			▪ Review Building Codes to include broadband ICT provision	▪ Building code in place	▪ Reviewed building codes by 2023	
People	Promote social goodwill of broadband project	Stimulate uptake of services on the broadband	• promote a social culture of protecting infrastructure	▪ Level of awareness of broadband	▪ 100% by 2019	MoEST (TSC) MoICT County government NBC (and BDU)
			ICT Training at primary and secondary schools	▪ Broadband curriculum for primary and secondary school	▪ Broadband curriculum in place by 2020 ▪	
			ICT Training at constituency Innovation hubs	▪ Number of training conducted	▪ 2 trainings per county by 2023	
			NBS Strategy and implementation review meetings to be held per county with government and stakeholders	▪ NBS ICT Forum in every County ▪	▪ 2019 (continuous)	
Enablers	Enablers to enhance digital broadband uptake and	Increased broadband uptake and consumption	• CDNs for local Content Hosting	▪ % increase in CDNs	▪ 50% by 2020	KICD, ICTA Service providers
			• Build and increase cache for international Content (Facebook, Google, Netflix),	▪ % increase in local content caches	▪ 50% by 2022 ▪	

Sub-Issue	Objectives	Outcomes	Strategies	KPI	Target	Responsible
	experience		Multiple diversity in undersea cable	▪No of Increased International Fiber connectivity Connections	▪1 by 2023	
			Fiber connectivity for cross border connectivity (Ethiopia, Uganda, Tanzania, South Sudan, Somalia	▪No of Regional/cross border BB connectivity	▪2 by 2022	
			Utility Companies e.g., KPLC to assist in provision of diverse grid supply to assist towards data center resilience.	▪% coverage of power supply nationwide	▪90% by 2020 ▪	
			Publication of Data Center standards	▪No of certified and standardized data centers	▪2 by 2022	
Open Access to National broadband	Provide coverage and connectivity to all citizens Provide Open Access Fiber on major roads	Increased access to all citizens	- Build facilities and BB Installation roads, rails and ducts for fiber	▪% of duct coverage on all roads/rails	▪ 50% by 2022	MoICT Ministry of Transport, Infrastructure, Housing and Urban Development
			- Enactment of National Broadband Infrastructure Act.	▪Enacted National Broadband Infrastructure Act	Broadband Infrastructure Act BY 2020	
			National Broadband Council to coordinate broadband	▪NBC in place	▪ NBC in place after 2 months	
			County and National Government to lay infrastructure on Open Access (4P= Pervasive public pipes in-perpetuity)	▪Policy and regulations on Open access to BB backbone infrastructure	▪ Open Access Regulations	

Appendix I-3: Broadband Services Application and innovation

Table 15: Strategies for Broadband Services Application and innovation

Objectives	Outcome	Strategy	KPI	Target	Responsibility
Quality of service		- Enforce SLAs - Enforce the critical infrastructure law to curb vandalism	Level of SLAs enforcement % Reduction in cases of BB vandalism	100% enforcement level by 2019 Less than 5% vandalism by 2022	CA and Service Providers
Accessibility and Affordability	Affordable BB for all citizens	Subsidize content provision Create an enabling competitive environment Ensure broadband connectivity in every sub-county	Reduced/limited entry barrier of service providers	Enacted Regulatory policy for Telco sector to attract competitors	Treasury, CA, MOICT,NCSC
Demand for broadband services	Increased demand for BB services	Reduce taxes on broadband provision service	• % of tax reduction to BB service providers	• 5% tax reduction by 2023	Multi stakeholder
		Build capacity (education) to enhance demand	• No. of campaigns and awareness creation campaigns on BB	• 2 public awareness campaigns by 2022	
Cost and sustainability in delivery of services	Incentives for service provision in underserved areas	Concessions on universal service obligation rebates	• % of rebates/tax incentives for operators providing complementary services (utilities) in marginalized areas.	• Zero rating for complementary service provision by 2023	National Treasury, CA and related agencies
			• % proportion of private projects supported by government	• 30% of all projects	
Several services still manual	Automation of all services	All county and government services digitized Introduction of a carbon tax for those still transacting on paper	% of National government services online	100% by 2023	Government Agencies/Public Sector County Governments
			▪ % of County Services	100% by 2022	
			% reduction in paper transaction	80% by 2022	
Consumer protection and security	Confidence and privacy online	Enact legislation for consumer protection Enforce consumer protection guidelines	▪ Consumer protection Policy ▪ Awareness creation on consumer protection guidelines	Policy in place by 2023 2 campaigns by 2020	Multi stakeholder

Use of ICT financial services and application	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 application amongst MFIs/SACCOS/SMEs -Promote collaboration among service providers within the Financial sector	% use of ICT in financial sectors	100% by 2022	National Treasury and Service providers
			% increase in financial systems security	100% by 2022	
			% sharing of ICT financial application	100% by 2023	
		e-transaction related legislation Ease the process and simplify the understanding of financial services	Legislation to protect e-commerce and increase its use amongst Kenyans	1 policy enacted by 2022	MoICT, National Treasury and parliament
Support for research and innovation	Operational ICT broadband research and innovation centres	Create and implement a seed funding model for the innovations hubs Create an enabling policy and regulatory framework to support research and innovation. Support IPRs Strengthen the existing innovation hubs and research centers Information sharing across research centres Commercialization of the innovations within the country	• Number of innovations funded • The number of funding sources • National Intellectual and Industrial Property Right policy and legislations enacted • COM	100 innovations by 2022 10 sources by 2023 Policy enacted by 2023 1 per quarter	

Appendix I-4: Content and innovation

Table 16: Strategy for Content and innovation

Issue	Objectives	Outcome	Strategy	KPI	Target	Responsibility
Creation of employment	To have 5% of total workforce employed in digital content and application development	At least 5% of the total workforce employed in the development of content driven services in 5 years	Establish incubation/empowerment centers in counties and develop an ICT-centric innovation framework	No. of incubation centers	1 per county by 2022	MoICT County Governments
			Develop an ICT-Centric Innovation Framework	Innovation framework in place	1 by 2019	CA MOICT
			Put in place incentives for innovation and content	Policy to incentivize innovation	100% by 2019	CA
Digital content for all Kenyans	To develop/customize content for disadvantaged groups	100% customization of school content for at risk groups within 3 years	Prioritize implementation of solutions for universal accessibility	N/A	100% by 2021	KICD Ministry of Education, Science and Technology
Quality of local content	To ensure 20% of local content (broadcast) is of international quality	Increased global access to local content within 5 years	Private sector support through incentives for business partnerships	No. of successful business partnerships supported	At least 4 per year	MoICT
			Promotions of local content internationally	No. of local content pages available online	At least 100 by 2020	Kenya Tourism Board, MoICT Kenya yearbook

Sectoral content	To have Sector specific (e-government, e-commerce, e-learning, e-health, IoT and Robotics in Manufacturing) local digital or digitally enabled work platforms available	increase the availability of digital local platforms	Establish and utilize an innovation fund	% Utilization of the fund	100% by 2019	Kenya National Innovation Agency The National Treasury
			Develop Private Partnerships for empowerment	No. of Successful PPPs	At least 1 per year	MoICT
			Develop digital broadcast for youth and heritage channels	No. of digital broadcast media created	4 programs per year	CA, Kenya News Agency
Local content and application	Local content fintech APIs/platforms with international aspects	Increased global access to local applications within 5 years	Engage with the private sector through incentives for business partnerships	Policy to support incentives	Policy enacted and implemented by 2020	MoICT, IBM, SAP, Oracle,
Authentication management system	To have a Management System for authenticated content with digital rights	Content Management System (CMS)	Develop local Content Management System	Developed CMS	Developed and in use by 2022	MoICT
Local heritage	To have language packs for 10 Kenyan local languages for various content, services and solutions	At least 10 local language used in applications To be the Swahili learning international certifying body	Certification of language packs	No. of certified local languages	At least 10 by 2022	CA MoICT
			Training and up scaling	No. of trainings conducted	4 carried out each year	MoEST
			Swahili learning certification	Modality of certification; placement globally in Swahili certification	Modality identified by 2020 and in top 2 in global placement by 2020	MoEST
Digitization of government services	improve efficiency of government service provision	Government services with more than 100,000 transactions per annum digitized	Digitize Government services	% of government services digitized	60% by 2022	MoICT ICTA

Content haven	To encourage local hosting[33]	- Increase big data available to Kenyans for analysis that is sector specific - education, health, agriculture, manufacturing housing amongst others - Increase data centre capacity in Kenya - 100% of government, education and research data digitized and hosted in Kenya - To develop standards for all citizen data	Attract investment in Local Data Centres	No. of data centers	3	MoICT
			Enhance and promote Data Sovereignty laws - KDAR law makes Kenyan data held internationally accessible to Kenyans	KDAR Law	Law communicated to stakeholders	MoICT CA Media council
			Interoperability of all citizen data sets	% of interoperability	50% by 2022	MoICT
			Encourage utilization of existing local Data Centre Capacity	% of local data set utilized	100% by 2022	MoICT
			Exploit opportunities in GDPR refugee data - (Develop 3rd party verification to ensure compliance to GDPR and other laws)	Domestication of GDPR obligations	Completed by 2022	CA MoICT
	All Kenyan languages have content	To have all Kenyan content in multilingual formats Availability of local language content	Ratification of the language policy (Multilingual contact centers for public service delivery)	N/A	Programmes in all local languages by 2023	MoICT, CA, KBS
Digital certification	Digital certification centers for academic credentials	Digital certification policy	Develop the digital certification policy	Digital certification policy	Policy developed and rolled out nationally by 2022	CA, MoICT
	To Enforce IP - Intellectual Property Rights – Visibility, Registration,	IP rights enforcement	Enhance and promote protection of Intellectual Property rights	IP Policy	Policy enforcement and sensitization ongoing annually	CA, MoICT , Kenya film classification board, Kenya Film

[33] This will enable attraction of GDPR refugee data centres in Kenya which will have public data fields (e.g., name, ID, gender), standard keys. It also involves adopting of appropriate format standards accompanied by development of Data Sovereignty Laws and Kenya Data Access Regulation (KDAR); and ensuring that any data about Kenya is open for use by Kenyans and that certified checks of foreigners (background checks) are done

	Protection					Commission,
	To develop Policy for content	Content Policy for - Full digitization of national archives - promotion of open data - content and data protection (IP, privacy and security) - registration, publication and automatic protection of all Kenyan content	Development for standards for content development	No of standards developed	At least 2 by 2022	CA
			Certification of language packs	No. of certified local language packs	Develop 4 by 2022	KICD
			Develop and Enforce an open Data Policy	Open Data Policy	To have in place a policy and implement it by 2021	CA, MoICT

Initiatives and Activities

Table 17: Broadband Service initiatives and Activities

Issue	Objective	Outcome	Strategies
Quality broadband Services	- Ensure high availability - Ensure reliability of broadband services - Ensure relevance of broadband services	Improved quality of life in the way citizens work, live and learn A rich, interruption free broadband experience	• Use of Universal Service Fund to extend broadband network penetration. • Enhance regulatory oversight with respect to quality of service. • Encourage and promote creation of relevant and quality content • Regulatory oversight through use of management of service level agreements. • Enforce the critical infrastructure law to curb vandalism of broadband infrastructure • Measure quality of service
Accessibility and Affordability of broadband services	Provide accessible and affordable broadband services to all citizens	- Increased demand for and use of broadband services - Affordable and accessible broadband services/content are available to all	• Government to provide subsidies for access devices • Government to source funding and develop infrastructure • Government to enhance fair competition by creating a level playing field • Promote local production of devices. • Government/counties to open information hubs at constituency level

		- Broadband services are available to all nomadic, unserved and underserved communities	• Establish mechanisms to deliver services e.g. Cell on Wheels
Low demand and awareness of Broadband services	-Encourage consumption of digital services -Create awareness of available broadband services	There is sustainable demand and uptake for digital products	• Provide affordable devices and digital content • Digital literacy programs • Create awareness/publicity on available digital services • Create relevant and affordable broadband content
Cost and sustainability in delivery of services	Harmonize costing between national & county government Coordinate infrastructure rollout with other activities i.e. (power) Continuous review of spectrum pricing	Affordable services are available to all citizens	• Ensure cost effective spectrum for Wireless Broadband Networks. • Government to provide rebates/tax incentives for operators providing complementary services (utilities) in marginalized areas. • Cost sharing between government and private sector
Several services still manual	Digitize all government services Prioritize rolling of broadband services Encourage service providers to create and promote digital content	Efficient and convenient delivery of e-services	• Promote and avail online local content (e.g. e-Govt. information and services) to spur demand across the country • incentivize creation of digital content and services
Consumer protection and security	Protect and enhance consumer security and protect consumers from exploitation	Secure broadband experience	• regulations for consumer protection • innovation for improved security • investment in secure technology • consumer education

Appendix I-5: Capacity Building and Innovation

Table 18: Strategy for Capacity Building and Innovation

Sub-Issue	Outcome	Strategies/Activities	KPI	Target	Responsibility
Digital literacy levels in the country	Digital literate citizens across all ages, gender to participate in a knowledgeable society	Conduct a nationwide survey on the status of the level of digital literacy of the country Expand the digital literacy program for schools to include upper classes and secondary schools.	Percentage of schools and teachers trained Number of ICT training centers	85% of all schools At least 1 in each county by 2022	PPP's, KICD, learning institutions, NGO's, KENET, M.O.E, CA

		Implement a transformational digital literacy program for tertiary institutions.	Coordinated effort for capacity building for tertiary institutions	All tertiary institutions by 2022	PPP's, KICD, learning institutions, NGO's, KENET, M.O.E/CA
		Extend the services of the Huduma centers to include informal training to the general public on digital literacy and e-government services.	Number of digital Huduma centers offering training services	All Huduma centers by 2020	PPP's, learning institutions, NGO's, KENET,M.O.E/CA/1ICTA
		Design and Implement Mobile ICT centers at the sub-county levels to include informal digital literacy training.	No. of implemented working digital mobile centers	All sub counties by 2023	PPP's, KICD, learning institutions, NGO's, KENET, M.O.E/C.A/ICTA
		Design and implement Multi-level digital champions' capacity building program for informal digital literacy training.	Number of champions trained	20,000 champions by 2023	PPP's, MDA's, Ministry of devolution
		Delivery of the informal digital literacy programs in local languages	Number of programs delivered through the local language	-10 by 2023	MoICT, ICTA
		Implement a transformational digital literacy program into practice by government officials.	Number of government officials trained	Trainers trained in 100% of public institutions by 2023	PPP's, ICTA learning institutions, NGO's, M.O.E/CA
e-Government programs – Creating capacity for the uptake of government services.	Improved access and efficiency in delivery of e-Government services.	Implement a nationwide e-Government awareness and training programs Increase availability and use of e-Government services	Number of people accessing the government services	All Kenyans with an e-Citizen account by 2023	ICTA, ministry of devolution, ministry of ICT,
			Number of awareness and training programs	Reach all counties by 2021	
			Number of e-government services that have been accessed online.	At least 4 in the key services provided by 2022	
e-Learning programs	Incorporation of e-learning approaches in curriculum delivery at all levels.	Develop the hosting infrastructure and online content for e-Learning. Realign the curriculum for e-Learning - (digitization and instructional design). Design targeted e-Learning programs for marginalized regions and groups Develop open shared national e-Learning platforms	Percentage of relevant courses and curriculum developed	50% y 2023	Universities, ICTA, KICD, KENET, Research and innovations centers. KFC
			Percentage growth in users of e-Learners (male and female)	25% by 2022	
			No. of counties reached with e-Learning	47 counties by 2021	

		Review current curriculum to include digital literacy training	No. of sensitization programs held	8 programs held by 2023	
Judiciary and law enforcement sensitization	More informed judiciary and law enforcers	Implement a broadband sensitization program	No. of people trained	5,000 trained people	CA, ICTA, PPP's
ICT Cyber security awareness	A cyber security – aware population.	Expand the national child protection campaign to include PP's stakeholder Run nation- wide cyber security awareness campaigns	Number of agencies involved	All child focused government agencies	CA, KENET, KE-CIRT, Universities, Security agencies, Research institutions
			Number of nation-wide campaigns	At least 1 annually	
Development of hands-on technical skills	Increased number of technically skilled personnel in the country.	Collaborations to develop the technical skills Strengthen the internship programs Develop workshops/boot camps to develop the technical skills Retrain management on technical skills Develop a program for skills transfer for government workforce and experts.	% of graduates benefiting from the attachment program	50% of all graduates	Universities, Research institutions, KENET, ICTA, PPP's
			Number of industrial collaborations	All counties implement the program by 2023	
			Number of technical workshops held	4 Bootcamps /Workshops Annually	
			Number of successful programs and	100% of all programs by 2023	
			Number of personnel who have completed programs	47000 annually	
Emerging technologies	Innovations that leverage on emerging technologies A dynamic tech-savvy ecosystem	Creation of Training programs on emerging technologies Conduct a skills gap analysis on emerging technologies Encouraging research on emerging technologies	Number of innovations leveraging on emerging technologies	At least 4 out of Universities and Research Centres Testing within ICTA By 2023	ICTA, Universities and Research Centers, CA, NI 3C, Innovations hubs
			The level of adoption of emerging technologies Number of researches conducted on emerging technologies	At least 1 annually	
Sensitization on	Informed citizenry on	Develop sensitization programs and	Number of sensitization	At least 1 annually	CA, ICTA, KFC,

the legal policy and regulatory environment	existing legal policies and regulatory frameworks	campaigns Develop an online central repository for all thematic areas for the NBS	programs and campaigns An implemented online central repository system	System online by 2022	TESPOK, ERB, NBS steering committee (SC)

Appendix I-6: Broadband Devices

Table 19: Strategies for Broadband Devices

Objectives	Initiative	Outcome	KPI	Target	Responsible
Affordability	Zero-rate smart devices	Increased ownership of devices	% VAT on smart devices	0% by 2019	KRA, MoF
	Low-interest loans for smartphones	Increased ownership of devices	m KES fund	500m by 2020	National Treasury
	Cost of data	Affordable data bundles	% of reduction in unit cost of data	1KES-2MBs by 2019	CA
	Expiration of data	Renewable data bundles	No, of available renewable data bundle options	All data bundle options By 2019	CA
Access	Increase devices in libraries	Increased access to broadband	Number of devices per library	20 by 2020	KNLS,
	Establish Public Access Points at Sub-County offices	Increased access to broadband	% of sub-counties with PAPs	At least 25% of sub counties by 2022	County Government, Service Providers
	Establish Public Access Points (PAP) at each constituency	Increased access to broadband	Number of PAPs	290 by 2022	MoICT, CA, County Government
Government use	Devices in schools	Broadband to improve education	Number of devices/1,000 students	30 by 2022	CFSK, National Treasury
	Devices for health facilities	Broadband to improve health	% facilities with devices	100% by 2022	MoH, MoF, MoICT
	Devices in police stations and for police officers	Broadband to improve safety	% officers with handsets % stations with devices	100% by 2022 100% by 2022	NPS, MoF MoICT
Adoption	Training and awareness raising in villages	Increase ownership/use of devices	Number of people reached	50k/yr by 2022	MoICT, CA
	Research health impacts of device usage	Increase ownership/use of devices	Number of research completed	3 by 2020	NEMA, CA
E-Waste	Establish local recycling facilities in PPP	Reduced e-waste	% components that can be recycled locally	80% by 2022	NEMA, CA,
	Provide incentives for take-back of devices	Reduced e-waste	Number of devices taken-back	200k/yr by 2019	NEMA, CA
Counterfeit	Use rebates to reimburse legitimate devices	Reduced counterfeit devices	No of counterfeit devices	90% reduction in counterfeit by 2022	KRA, CA, KEBS, ACA, Ministry of Industry, trade and Cooperatives
	Establish certifications for retailers	Reduced counterfeit devices	Number of certified	All retailers by	KEBS,

Objectives	Initiative	Outcome	KPI	Target	Responsible
			retailers	2022	
Local Assembly	Develop feasibility study to attract contract manufacturers	Strategy for local ICT manufacturing	Number of studies completed	1 by 2022	MoICT, NEMA, CA
New Devices	Drive IoT through government procurement	Increase in IoT devices	Number of IoT devices procured	At least 10 by 2022	MoF, Ministry of Industry, trade and Cooperatives
	Support of local IoT device manufacturers	Number of local IoT devices made	Number of local IoT devices made	Every local manufacturer to produce at least 1IoT device by 2020	National Treasury, Ministry of Industry, trade and Cooperatives
	Drive the use of customized devices	Increase in IoT devices	Number of customized devices sold	Demand driven	National Treasury, Ministry of Industry, trade and Cooperatives

Appendix I-7: Privacy and Security

Benchmark on Trust and Security

Digital Belgium, an action plan that outlines the long-term digital vision of the country has identified digital confidence and security as one of its five priorities. It defines this to include "*respecting digital rights and strategically and effectively tackling illegal practices*". The focus under this head includes;

- Enactment and harmonization of Laws
- International cooperation
- Sensitization campaigns
- Protection of critical public infrastructure
- Online resolution of consumer disputes (ODR)

Cyber Security in Kenya

In its report titled 'Kenya Cyber Security Report,' Serianu notes that one of the most critical challenges facing Kenyan organizations is the lack of awareness among technology users with many of these users having little knowledge of the level of risk to which they are exposing themselves and their organizations.[34]

And while Kenya has for a long time lacked proper mechanisms to counter cybercrime, recent legislative interventions point towards a more secure cyberspace. A cybercrime countermeasure has been defined as an action, process, technology, device or system that serves to prevent or mitigate the effects of a cyber-attack against a computer, server, network or associated device. It can either be technical or regulatory; technical in the sense that computer and network users are advised to use Internet protection such as strong, unique passwords to protect themselves from hackers while regulatory measures include legal frameworks that define and detail the conditions for prosecution of cybercrime.[35]

The findings of studies on broadband strategies and plans such as those in the SADC member states and literature from other regions such as the European Union (EU) suggest that a national broadband strategy should address at least six key areas/themes which are important for its successful implementation and which should be supported by a platform comprising confidence in and security of networks, services, and users; and governance which also includes a monitoring and evaluation framework. At the core of confidence and security of networks and services, is information security and privacy, which form the support platforms upon which a solid digital economy can thrive.

The Kenya Information and Communication Act defines cybersecurity as the collection of tools, policies, security concepts, security safeguards, guidelines, risk management approaches, actions, training, best practices, assurance and technologies that can be used to protect the cyber environment.

Towards a Secure Cyberspace

In the wake of recent and rapid digitization, including digitization of government services, and the constant need for a robust, responsive and effective cybersecurity environment, a Cybersecurity Policy should therefore address ICT security concerns as bad experiences may limit the Internet/online experience and curtail the contribution of the sector to the country's socio-economic development.

[34] Serianu, Kenya Cybersecurity Report, USIU, Nairobi, 2016
[35] Dache Joash, The State of Cybercrime: Current Issues and Counter Measures pp. 27-31

Lack of adequate skills relating to computer/data and identity protection while online may compromise usage and participation, and as such represent important policy concerns, which also need to be addressed. The ITU guide on cybersecurity is presented in Figure 13

ITU Cybersecurity Guide

The ITU, in its guide titled the ITU National Cybersecurity Strategy Guide identifies 10 elements which they consider as constituting the main features of a holistic, multi-stakeholder and strategy led Cybersecurity Program. These are;

1. Top Government Cybersecurity Accountability;
2. National Cybersecurity Coordination;
3. National Cybersecurity Focal Points;
4. Legal Measures;
5. National Cybersecurity Framework;
6. Computer Incident Response Teams;
7. Cybersecurity Awareness and Education;
8. Public-Private Sector Cybersecurity Partnerships;
9. Cybersecurity Skills and Training Programmes; and.

Figure 16: ITU Cybersecurity Guide

The EU identifies one of its key objectives as making the Union a strong player in cybersecurity by being more ambitious in nurturing its competitive advantage in the field of cybersecurity *to ensure that its citizens, enterprises and public administrations have access to the latest digital security technology which is interoperable, competitive, trustworthy and respects fundamental rights including the right to privacy.*[36]

These practices provide experiences and aspirations upon which the Privacy, Trust and Security of the Kenyan Broadband can be hinged.

[36] EU, EU cybersecurity initiatives: Working towards a more Secure Online Environment, January 2017 https://ec.europa.eu/digital-single-market/en/news/eu-cybersecurity-initiatives-working-towards-more-secureonline-environment (accessed on 28 December 2017

Table 20: Strategy for Privacy and Security

Sub-Issue	Objectives	Outcomes	Strategies	KPI	Baseline	Target	Time	Responsible
Data Protection	To ensure protection of personal data	Comprehensive Data Protection Act	Offer recommendations to the Data Protection Task force on privacy and data protection issues that touch on broadband	Data Protection Act	N/A	100% by 2019	2022	Parliament/ Stakeholders
Child Online Protection	To guarantee safety of children while online	Secure online space for children online	Include online safety and security in the education curriculum Create mechanisms to deal with underage users Parental Control	Reduction in number of child-related cyber incidents	N/A	100% by 2019	2022	Parliament/CA/ Service Providers
Awareness on Information Security Practices and Data Protection Procedures	To make users aware of the online security risks To ensure security-conscious users online	Affordable security solutions Availability of up-to-date data on cyber security incidents	Research in Information Security and Privacy Collaborate with existing research centres and give incentives to tertiary institutions to do more research on information security and privacy Periodic countrywide research to study attitudes towards these technologies and their uptake	Reduced online security breaches Statistics on cyber security incidents	N/A	Continuous at least one collaboration per year	2022	Stakeholders/ Educational Institutions/Private Sector

Cybersecurity	To ensure accountability and prosecution of perpetrators of cyber security breaches	Prosecution of and coordinated redress to cyber breaches Availability of independent forensic reports	Establish a cybercrime forensic unit within the Directorate of criminal investigation (DCI) Establish Independent cybercrime forensic organizations	Prosecution for security breaches Availability of independent forensic reports		100% by 2020	2022	NPS/Ministry of ICT Stakeholders
Enforcement	To ensure cooperation in the enforcement of cyber laws	Utilization of available international channels to combat cyber-related breaches and crimes	Negotiate, ratify and adopt mutually beneficial cyber incident-enforcement laws/best practices	Number on bi-lateral and multilateral agreements on cyber-enforcement		Continuous	2022	National Government/Relevant Ministries
Research, Capacity Building and Talent Exchange	To promote progressive research, capacity building and talent exchange in cybersecurity	Embracing available exchange channels and opportunities to increase and improve capacity in information security	Create research centres Participate in talent exchange and capacity building programs	Number of information security research centres Number of trained experts Number of trained users		Continuous	2022	KENET, MoEST, MoICT, Universities

1. Further research, capacity building and talent exchange in Internet governance and regulation best practices within the borderless cyberspace

Appendix I-8: Finance and Investment

Table 21: Strategy for Finance and Investment

Sub-Issue	Objectives	Outcomes	Strategies	KPI	Target	Responsibility
Financing for ICT projects	To stimulate private investments and promote PPPs within the ICT sector	Increase investments in ICT sector	-Develop innovative financial funding mechanisms (e.g. Broadband infrastructure Bonds, Government Supported Broadband Venture Capital fund)	At least one innovative financing for BB	1 by 2019	MoICT, service providers, The National Treasury, CA
			Use USF to extend broadband coverage	% use of USF for BB	40% of USF	MoICT and CA
			Enhance the role of Government in promoting broadband related investments	No of enacted Incentive fiscal policies	3 by 2023	CA, National treasury
			Develop linkages between the financial and the ICT sector	No of collaborations established between ICT and financial services sectors	2 by 2019	CA, Service providers, MoICT
			Develop ICT-related Insurance schemes	No of ICT related Insurance schemes	2 by 2023	
Financing of ICT projects	Increased investment in the ICT sector	% increase in private ICT investment	Incentivize the private sector with financing models that show a positive and attractive return on investment or low interest financing	% increase in investment	10% per annum	Ministry of Trade, State department (IPC), CA
		% government funding directed towards ICTs	Increase in budgetary provision for ICT	% of budget contribution to ICT	5% National Budget	National Treasury & MoICT
		% County government funding directed towards ICTs	Motivate county governments to increase funding to ICT	Allocation of County Resources to ICT	5% County Budget	County Government

Sub-Issue	Objectives	Outcomes	Strategies	KPI	Target	Responsibility
		Number of investment forums linking ICT to financial sector	Mobilize funds through national and international forums	Number of forums held	At least 1 every 2 years	MoICT & CA
Financing of a national backbone infrastructure	To source sufficient funds for BB		Attract an international investor to build a national backbone infrastructure	Receipt of Ksh 20B to build a backbone infrastructure	NOFBI II	MoICT
	Elaboration of investment and business models	An investment and business plan within six months of NBS	Study on best business model	Conduct of study	1 study within 6 months of NBS life	CA

Appendix II: Role of Stakeholders

The deployment of broadband requires the concerted effort of various stakeholders including governments which play a key role. Governments at various levels have a critical role to play in the drive to have pervasive broadband infrastructure across the country. It is recognized that some governments have taken steps to partner with telecommunications/ICT service providers to deploy necessary fibre and other electronic infrastructure for the benefit of their citizens. Governments have necessary roles to play in removing many bureaucratic difficulties and obstacles that hinder faster broadband rollout. The Government efforts are complemented by those of the private sector and civil society.

Table 22: Roles of Government and other stakeholders

Stakeholder	Responsibility
National/Government	1. Policy and Regulation 2. Administration of Right of Way
County government	1. Removing barriers such as right of way cost and multiple taxation; 2. Participating in local government level negotiations and advocacy in communicating the positive economic impacts of broadband 3. Enabling and promoting the spread of metro networks 4. Providing funding for network build and broadband infrastructure development through Public Private Partnership programs including for rural and unserved/ underserved areas
Sub-county	1. Working with communities to reduce disruption to infrastructure build and operation 2. Educating communities on the benefits and importance of broadband 3. Driving community based public services such as community access centres/points (CAPs) 4. Migrating local government services (e.g. salaries, health services civic registrations, levy and fees collections etc.) online 5. Eliminating delayed or unduly long permitting processes such as those for right of way (ROW)
National Assembly/ Parliament	1. Reviewing existing Communications Law 2. Enacting new and relevant legislations that support the policy goals, plans and incentives for growing broadband
Private Sector	3. Improving the quality of existing broadband service, extending coverage to new areas and connecting new users to the broadband experience. 4. Work with the government, consumer groups and other stakeholders, in a collaborative manner, the private sector will also work to fill the gap between advertised broadband services and the actual experience that users have. 5. Attracting and providing required financing for the investments
Civil Society	1. Raising awareness about the benefits of broadband services to improve adoption. 2. Work with consumers to educate them on their rights as subscribers to broadband services 3. Provide capacity building opportunities as part of their work with disadvantaged groups
Local communities	1. Ensuring the security of broadband infrastructure 2. Investing in broadband through bottom-up initiatives with support of Government
KENET	1. Provide high speed connectivity and cloud services to the education, research and government institutions affiliated to the education sector including hospitals, in order to transform education and research using

broadband ICT.
2. Nurture broadband innovation as part of the National Innovation System
3. Lead in ICT/ broadband research and training; and develop ICT curricula.

Roles of National Government on Broadband[37]

1. Providing funding for network build and broadband infrastructure development through Public Private Partnership programs and the deployment of Universal Service Funds for rural and unserved areas.
2. Participating in state level negotiations and advocacy in communicating the economic impacts of broadband
3. Facilitating the enactment of new building codes and standards requiring the installation of telecoms/ICT infrastructure as a basic requirement for new buildings and estates;
4. Developing a national broadband availability Map and other databases for use in the planning and deployment of broadband;
5. Promoting green energy ICT initiatives;
6. Fast tracking current efforts to provide stable electricity supply;
7. Moving government services and processes online to stimulate broadband adoption and demand;
8. Generating Nationwide Awareness of the benefits of broadband;
9. Enacting laws where necessary to support the National ICT policy; and,
10. Engaging the Governors/authorities and positioning broadband as a recurring agenda item

Therefore the role for the MoICT with respect to broadband is one of accelerating penetration and access to broadband.

Source: Presidential Committee on broadband (2013). Nigeria's National Broadband Plan. Accessed July 07, 2014 from http://commtech.gov.ng/images/docs/The%20Nigerian%20National%20Broadband%20Plan%202013_19May2013%20FINAL.pdf

Appendix III: Broadband Implemented through Programs and Projects

In this appendix, a checklist for the effective delivery of the strategy and a program approach to the implementation of the strategy are presented.

Checklist on Delivery of the NBS

In order to realize an effective delivery of the Strategy, the following should be ensured:

(i) Technical capability (with special focus on interfacing and integration capabilities) for implementation otherwise delivery will be delayed;
(ii) Contract management which is crucial because 40% to 50% of cost increases are due to poor contract management;

[37] For details of this example, see http://commtech.gov.ng/images/docs/The%20Nigerian%20National%20Broadband%20Plan%202013_19May2013%20FINAL.pdf

(iii) Success criteria should be developed and a measurement framework created otherwise it will be impossible to track the progress of broadband delivery;
(iv) Information and data which should include a repository of data across the program in the form of a dashboard which can be checked transparently by all stakeholders – at least the steering committee and program/project management teams; and
(v) Coordinating authority for delivery of broadband

The NBS 2018-2023 projects will only succeed if there is an effective delivery framework comprising:

(i) Governing structure with adequate capacity;
(ii) Alignment of projects to the national and County development plans (MTP III) and County Integrated Development Plan II (CIDPs), the Big 4 Agenda and Vision 2030;
(iii) Focus on both demand and supply sides of broadband with a clear understanding of the drivers of both the demand and supply sides;
(iv) Funding of broadband which can be public, private, public-private partnership (PPP), and/or bottom-up initiatives;
(v) Delivery model with the right incentives for everybody but that also includes timelines, penalties etc.; and
(vi) Tracking and measurement of progress on/of the NBS projects through definition of targets and key performance indicators for each of the project objectives; and deployment of an aligned monitoring and evaluation framework.

Program management perspective

This perspective is necessary because each program under the NBS (e.g., e-health program) will have specific projects, which need to be coordinated. This perspective is lacking in a number of national BB plans with the resulting confusion in governance leading to delays, frustration and cost overrun. The deployment of broadband through projects with a focus on the services that will be delivered (starting with the user) is crucial. Some of the priority areas to be addressed in the NBS 2023 implementation can be the following depending on the particular national priorities:

(i) Universal education; e.g. implementation of virtual classrooms project;
(ii) Delivering universal healthcare to all such as via mobile health, telemedicine etc.;
(iii) Food security;
(iv) Transportation, such as provision of smart transport to deal with traffic congestion; and
(v) Promotion of broadband usage to target various segments' needs such as household, business, and government

Focus on Projects

Broadband should be implemented through specific projects with clear targets; and a monitoring and implementation framework. In this regard, concrete broadband implementation projects should be defined. They should be relevant to one or more identified objectives/strategies/focus areas and aim to achieve specific target outcomes in the plan.
The project elements to be defined include:
(i) project scope, objectives, targets;
(ii) institutional/stakeholder responsibility (both primary and secondary);
(iii) budget requirements and source(s);
(iv) time frame, and key milestones; and
(v) linkage and mutual interdependence with other projects.

Broadband Targets (HYPOTHETICAL EXAMPLE – TO BE REFINED)

In order to track the implementation of broadband, it is necessary that targets be set and monitored at regular intervals to ascertain the progress being made. Kenya's broadband targets for the year 2030 are presented in Table I-1.

Table I-1: Kenya's Broadband Targets to 2030

Target	Penetration measure	Baseline (Year 2017)	By 2020	By 2022	By 2030
Broadband access in Mbps (user experience)	% of population	39.7%	50% at 2Mbps	90% at 3Mbps 50% at 100Mbps	100% at 10Mbps 80% at 100Mbps
Schools	% of schools		50% at 10 Mbps	100% at 10Mbps 80% at 100Mbps	100% at 1Gbps
Health facilities	% of health facilities		50% at 10Mbps	100% at 10Mbps 80% at 100Mbps	100% at 1Gbps
Public sector facilities	% of government offices		50% at 10Mbps	100% at 10Mbps	100% at 100Mbps

These targets are to be reviewed periodically and supplemented by pricing and quality of service targets as well as speed of installation and fault repair. The QoS regulations for Kenya are already in place where no distinction is made between rural and urban because every Kenyan should access the same quality of service wherever they are.

Example of Broadband Plan Elements Together

In order to implement BB through projects, we need projects targeting specific BB components, and focus areas with clear objectives and strategy; and specific project name/description. An example is as follows (Table I-2):

Table I-2: Broadband Project

Broadband project - An example
Component: **Infrastructure** Focus Area: **Rural Broadband Access** • **Objective 1**: Community broadband access points (CAPs) • **Target Outcome**: 50% of communities with access points by 2018 – KPIs = Functioning CAPs with minimum 1 Mbps, usage measures • **Strategy**: Develop public-private partnerships with national operators, local stakeholders; coordinate with other rural broadband initiatives; ensure local community participation, capacity building, effective management and monitoring • **Project 1**: Broadband CAP rollout Pilot Project – 100 communities in 2019 – Ministry responsible, USAF funding; collaborate with operators, local stakeholders

Example of Summary Broadband Plan segment

A typical broadband plan segment showing focus area/thematic area, outcome, strategy, responsibility and project is presented in Table I-3.

Table I-3: Sample Summary of Broadband Plan Segment for the Ministry of Education, Science and Technology

Focus Area/ Objective	Outcome	Strategy	Responsibility	Projects
Education	Target			
1.Broadband connections in schools	50% of schools by 2018	Bottom Up networks, linked to schools	Ministry of Education, Science and Technology	1. Local BB access networks 2. School connectivity
2. ICT Curriculum	Customized classroom tools	National and local collaboration on curriculum development	Ministry of Education, Science and Technology	1. Collaborative ICT curriculum 2. ICT Apps Initiative
3. School Devices	1.2 million laptops, tablets by 2018	Discounted bulk purchases, customized devices	Ministry of Education, Science and Technology, Private supplier	1. School ICT devices project

Appendix IV: 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 publicize 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 goods and services.

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 marginalized groups provides that: "The State shall put in place affirmative action programs designed to ensure that minorities and marginalized groups— (e) have reasonable access to water, health services and infrastructure." Infrastructure includes ICT related infrastructure.

The 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 thematic area. 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/intergovernmental relationship between the National and County Governments is necessary and is addressed by the Devolution Laws.

Appendix V. ICT Summary Statistics

Report on Desk Review of CA Annual Report FY 2016/2017 and CA Second Quarter Sector Statistics Report for the Financial Year 2017/2018 (1st Oct 17-31st Dec 17)

Summary of Findings

In 2016, the ICT sector's growth expanded by 9.7% compared to the 7.4% growth recorded in FY 2015/2016.[38] (see Table III-1)

Table III-1: Summary of Findings

Indicator	2015	2016
Population (Millions)	44.2	45.4
GDP at Market Prices (in KES Millions)	6,260,646	7,158,695
Growth of GDP at Constant Prices (%	5.7	5.8
GDP Per Capita at Constant Prices (KES)	91,890	94,757
Transport and Storage sub-sector GDP at Current Prices (KES. Millions)	518,043	563,684
Information and Communication sub-sector GDP (KES. Millions)	60,485	68,853

Source: Communication Authority of Kenya

The estimated number of people with access to the Internet rose to 40.5 million during the year up from 37.7 million reported in FY 2015/2016.[39]

Management of Scarce Resources

Frequency Management

During the year, the Authority issued a frequency license in the 800MHz band to one Mobile Operator with the other two MNOs operating on trial licenses in the same band resulting to:

i. Increased rollout of 4G services
ii. 121% increase in 3G Transceivers
iii. 53% increase in 2G Transceivers[40]

Fixed Links

The authority assigned 1,043 links bringing the total number of installed fixed links to 8,423 representing a 14.1% increase.[41]

Fixed Wireless Access Systems

A 3.8% decrease in the utilization of frequencies for this service was recorded. This was attributed to the availability of competing technology in the unprotected bands and the preference for robust fiber connectivity in provision of integrated services of voice, video and telephony.[42]

Maritime Mobile Service Identity (MMSI)

During the period under review, 4 MMSI numbers were issued to ships flagged by Kenya.[43]

[38] CA Annual Report, p4
[39] Ibid, p5
[40] P8
[41] ibid
[42] ibid

Assignment of Numbering Resources

The Authority assigned 13 mobile National Designation Codes (NDCs) to mobile service providers to facilitate mobile telephony services and 4G services trials. They attributed the increase in demand to assignment to new Application Service Providers (ASPs) and growth in the provision of triple-play services.[44]

Promoting competition

The Authority enforced the Kenya the Kenya Information and Communications Regulations, 2010 on Tariff, Interconnection and Provision of Fixed Links, Access and Facilities; and Fair Competition and Equality of Treatment.[45]

Mobile Network Services

During the period under review, the mobile penetration rate stood at 88.7% down from the 90% penetration recorded in the preceding financial year.[46]

Internet Services

Data Internet subscriptions increased by 7.9% to stand at 29,419,164. Terrestrial Wireless, satellite and fiber optic data/Internet subscriptions increased by 251.2%, 147.5% and 98.4% respectively during FY 2016/2017.

Terrestrial mobile and fixed cable modem data/Internet subscriptions also rose by 9.1% and 29.3% respectively.

There was however a decrease of 11.4% in fixed DSL data/Internet subscriptions.[47]

Table III-2: Internet subscriptions and users

Table III-2: Internet Subscription and Users

Subscriptions/Users	2015/2016	2016/2017
Terrestrial mobile data/ Internet subscriptions	26,758,789	29,419,164
Terrestrial wireless data/ Internet subscriptions	13,449	47,231
Satellite data/Internet subscriptions	280	693
Fixed Digital Subscriber Line (DSL) data/Internet subscriptions	3063	2,715
Fixed fire optic data/Internet subscriptions	27,571	54,700
Fixed cable modem (Dial Up) data/Internet subscriptions	77,319	99,971
Total Internet Subscriptions	**26,880,471**	**29,624,474**
Total Number of Agents	**158,777**	**180,657***

Source: Communication Authority of Kenya

The sector statistics Q2 Report

Total data/Internet subscriptions stood at 33.3 million. Growth attributed to increased rollout of 3G and 4G mobile networks across the country.[48]

[43] P10
[44] ibid
[45] P14
[46] P17
[47] P18

Number of terrestrial wireless subscriptions grew by 29.2% to stand at 82,362 subscriptions.

Satellite subscriptions registered 8% growth to stand at 769 subscriptions.

Fixed digital subscriber line (DSL) subscriptions dropped to 1,953 from 2,106 recorded in the previous quarter

Fibre Optic data subscriptions increased to 99,643 from 90,548 marking a growth of 10% from the previous quarter.

During the quarter under review, the number of fixed cable modem subscriptions declined by 2.7 per cent to stand at 96,876 from 99,564 subscriptions reported in the previous quarter while other fixed data subscriptions rose by 9.4 per cent to reach 6,700 from 6,127 subscriptions recorded during the previous quarter. [49]

Table III-3: Data/Internet Subscriptions

Data/Internet subscriptions	Jul-Sep 2017	Oct-Dec 2017	Quarterly Variance (%)
Mobile Data Subscriptions	30,628,340	33,076,894	8
Terrestrial Wireless Data Subscriptions	63,749	82,362	29.2
Satellite Data Subscriptions	712	769	8
Fixed DSL Data Subscriptions	2,106	1,953	-7.2
Fixed Fibre Optic Data Subscriptions	90,548	99,643	10
Fixed Cable Modem Subscriptions	99,564	96,876	-2.7
Other Fixed Data Subscriptions	6,127	6,700	9.4
Total Internet Subscriptions	**30,891,132**	**33,365,197**	**8.0**

Source: CA, Operators' Returns

Broadband Services

During FY 2016/2017, the total number of broadband subscriptions increased by 42.1% an increase attributed to the growth in WIMAX and mobile broadband subscriptions.

The total available international bandwidth capacity increased from 1,730.74 Gbps to 2,906.87 Gbps representing an increase of 68%.

International leased bandwidth and international leased undersea bandwidth increased by 0.2% and 0.3% respectively while international leased satellite bandwidth reduced by 42.9%.[50]

During Quarter 2 2017/2018, the total number of broadband subscriptions stood at 18.0 million up from 17.6 million subscriptions registered in the previous quarter with speeds of less than or equal to 256Kbps recording the least number of subscriptions whereas speeds greater than 2Mbps registered the highest number of subscriptions.

The total international Internet bandwidth available in the country (Lit/equip capacity) increased to 3,182.592 Gbps.

The increase to 148.6 Gbps from 83.0 is attributed to the expansion of capacity by Lion 2, a submarine cable landing company, in order to meet the increasing demand for bandwidth in the country.

[48] CA Second Quarter Statistics Report for the Financial Year 2017/2018 (1st October-31st December 2017) p19
[49] Ibid, p20
[50] Above n 1, p19

During the period under review, Satellite Internet Bandwidth also increased by 79.7 per cent to stand at 5.592 Gbps from 3.112Gbps recorded during the previous quarter.[51]

Table III-4: International Internet Available Bandwidth (Gbps)

International Connectivity Bandwidth	*Jul-Sep 17*	*Oct-Dec 17*	Quarterly Variation (%)
SEACOM	2,020.0	2,020.0	0
TEAMS	702.0	702.0	0
EASSY	101.4	106.4	4.9
Lion 2	83.0	148.6	79.0
Satellite Internet Bandwidth	3.112	5.592	79.7
Total International Internet Bandwidth (Gbps)	**2,909.512**	**3,182.592**	**9.4**

Source: CA, Operators' Returns

The total international used Internet bandwidth rose to 916.287 Gbps during the quarter under review from 887.187 Gbps recorded in the preceding quarter marking a growth of 3.3 per cent. This translates to 28.8 per cent of the total International available bandwidth being used in the country.

The undersea cable bandwidth used during the quarter under review stood at 911.80Gbps up from 884.50Gbps recorded in the preceding quarter.

Similarly, used satellite bandwidth increased by 67.0 per cent to stand at 4.487Gbps. The trend in international used bandwidth is illustrated in Table III-5.[52]

Table III-5: International Internet Used Bandwidth (Gbps)

International Leased (Used) Bandwidth	*Jul-Sep 17*	*Oct-Dec 17*	*Quarterly Variation (%)*
International Undersea Internet Connectivity Bandwidth (Gbps)	884.50	911.80	**3.1**
International Satellite Internet Connectivity Bandwidth	2.687	4.487	67.0
Total International Internet Connectivity Bandwidth (Gbps)	**887.187**	**916.287**	**3.3**

Source: CA, Operators' Returns

National Cyber Threat Landscape

The National KE-CIRT/CC analyzed and validated the 4,589 cyber threats. It also identified 539 cyber threats that were critical and required immediate response.[53]

The various categories of the cyber threats handled during this period is indicated in Table

Table III-6: Cyber Threats Validated and Respondent To

Cyber Attack Vector	*Oct - 17*	*Nov - 17*	*Dec - 17*	*Total*
DDOS	1	0	2	3
Domain Impersonation	0	2	2	4
Fake News	3	3	0	6
Malware	10	9	121	140
Online Fraud	8	9	7	24
Online Hate Speech	30	26	6	62
Online Impersonation	26	45	33	104

[51] Above n 11, p 24-25
[52] Ibid p25
[53] p26-27

Phishing	3	2	1	6
Spam	0	1	0	1
System Misconfiguration	14	28	145	187
Website defacement	1	1	0	2
Total	96	126	317	539

Source: National KE-CIRT/CC

Notes-

The indicators used in the NBS are not the same as those used in the CA Annual Reports and Sector Statistics. (These could be provided as annexures in the FY Reports)

Appendix VI: NBS Review Technical Working Groups Participants

Table IV-1: TWG Participants

No.	Name	Organization
1.	Jennifer Gitiri	Office of the Attorney General
2.	Emily Muthoni	EACC
3.	Francis Monyango	Strathmore University Law School
4.	Patrick Mungai	Showmax Multichoice
5.	Leonard Mabele	Strathmore University
6.	Kennedy Kamau	CoG
7.	James Kioli	Commcarier Satellite
8.	Dianna Mbugua	NEMA Kenya
9	Peter Mwawa	Ministry of Interior and Coordination of National Government
10.	Misare Njaga	Jamii Telecommunications Limited
11.	Adam Lane	Huawei Technologies Limited
12.	Michael Maina	Wananch Group
13.	Benjamin Kamicha	KENET
14.	Dr. G. Mugeni	CA
15.	George Adeka	SAFARICOM
16.	Dan Kwach	EADC
17.	Stanley Ochiobi	Telkom Kenya
18.	Sammy Itemere	MoICT
19.	Johnstone Ketuturi	MoICT
20.	Limacar Daniel	MoICT
21.	Harrison Mwaniki	MoA&I
22.	Victor Maina	CA
23.	Ruth Gitonga	Techinovar
24.	Nasubo Ongoma	IHUB
25.	Eng. Vincent Adul	NCS
26.	Francis Waithaka	Finserve
27.	Maureen Chepng'etich	CA
28.	Victor Anyanje	Sigmund Peak International Ltd – Legal Expert
29.	Paul Kiage	CA and Chairman of the National Broadband Strategy Steering Committee
30.	Lawrence Lubanga	MTN
31.	Dr. (Eng.) Thomas Senaji	Sigmund Peak International Ltd - Lead consultant
32.	Francis Kagunza	DCI
33.	Dr. Tobias M. Mwalili	JKUAT
34.	Eliud Kibor	Sigmund Peak International Ltd
35.	Meriem Slimani	ATU
36.	Francisca Omunga	Private Consultant
37.	Eng. Vitalis Olunga	Vital Networks Limited
38.	Dr. Kennedy Ombuki	Sigmund Peak International Ltd
39.	Wilfred Waithaka	LIQUID Telecom
40	Peter Muia	KENET
41	Eric Sifuna	KENET
42	Alex Ombong'	KNLS
43	Edwin Ombega	CA
44	David Muasya	CA
45	Mboya Kiweu	Sigmund Peak International Ltd
46	Ruth Kariuki	CA
47	Christine Ngigi	VISION 2030 Delivery Secretariat
48	Brenda Kairima	CA
49	Ben Oduor	LIQUID TELECOM

50	Cleopa Otieno	Kenya Telecommunications
51	Waudo Siganga	Computex Society
52	Zipporah Msagha	Safaricom
53	Fredrick Okello	Liquid Telecom
54	Dr. Joe Kamau	EMC
55	Zachary Mokua	Safaricom
57	Leonard Mobele	Strathmore University
58	Carde Njoroge	KFC
59	Fiona Asonga	TESPOK
60	Ronald Ng'eno	CMA
61	Phillip Malinda	CSK
62	Mwaura Peter	Interior SDI
63	Lorna Nyandat	Internet solutions
64	Andrew Masila	SAFARICOM
65	Ruth Gitonga	Techinova
66	Robin Busalo	CA
67	Dr. K Getao	MOICT
68	Daniel Obam	NCS
69.	Stanley Ochiobi	Telkom Kenya
70.	Robin Busolo	CA
71.	Bornface Mamboleo	NEMA

Figure 17: TWG Chairs and Co-Chairs

Thematic Area	Chairperson
Infrastructure and Connectivity	Eng. Vitalis Olunga
Broadband Devices	Adam Lane
Application content and Innovation	Dan Kwach
Capacity building and awareness	Dr. Tobius Mwalili
Broadband Services	Zachary Mokua
Policy, legal and regulatory environment	Eng. Obam
Privacy and Security	Francis Monyango
Finance and Investment	Francisca Omunga

Appendix VII: Benchmarking

The following is a brief comparison of the Kenyan NBS and those of selected countries: Morocco, Mauritius, South Africa, Nigeria, and Lesotho

A. MOROCCO

At the heart of Morocco's modern-day ICT vision is Digital Morocco 2013 which is the National Strategy for Information and Digital Economy 2009-2013 (better known as Maroc Numeric) released by the Ministry of Industry, Trade, and New Technologies. The strategy focuses on umbrella areas – the governance structure, the beneficiaries and program, and the budget allocation to fund proposed strategies and recommendations. The Digital Morocco stands out from earlier e-Morocco strategies primarily for two reasons:

- The first is its emphasis on broadband, which for the first time is not only explicitly articulated but also is the first pillar in the strategy.
- The second is the country's demonstrated commitment - endorsed by His Majesty King Mohammed VI - to advance the sector and engage cross-sectoral governance bodies to support - *l'*agence *nationale de réglementation des télécommunications (ANRT)* – the National Telecommunications Regulatory Agency - its regulatory mandate and oversee implementation of planned activities.

Table 1. Comparison of the Content of Various Broadband Policies, Strategies and Plans

COUNTRY	MOROCCO (Broadband priority areas)	NIGERIA (Broadband strategies for Nigeria)	KENYA (Thematic areas of the NBS)	SOUTH AFRICA(Complementary Strategies for SANBS)	LESOTHO (Six Key Issues)
STRATEGIES/ THEMES	1. Incentives that encourage a well-balanced, broadband infrastructure and greater investments in both fiber backhaul and local access networks;	1. Develop clear policy, regulation and roles for the government	1. Infrastructure	1. Digital Readiness	Key Issue 1: What is broadband?
	2. The prioritization of broadband in universal access policies including concrete efforts for dealing with affordability and awareness issues; and	2. Ensure resilient submarine cables	2. Connectivity and Devices	2. Digital Development	Key Issue 2: Affordability
	3. Programs to develop digital literacy among the older and rural population in addition to those that can effectively cultivate a next generation of e-content and software producers and developers.	3. Promote enabling national Infrastructure	3. Content Applications and Innovations	3. Building the digital future	Key Issue 3: Competition and Private Investment
		4. Provide required	4. Capacity Building and	4. Realizing Digital	Key Issue 4:

		Investment	Awareness	opportunity	The Role of Government
		5. Critical National Infrastructure and Cyber Security	5. Policy, Legal and Regulatory		**Key Issue 5:** Ownership and Coordination for Broadband Outcomes
		6. Optimize Spectrum Utilization.	6. Finance and Investment		**Key Issue 6:** Demand side facilitator
		7. Employ an Open Access Model for Network infrastructure			
		8. Provide Transparent Costs and Capped Pricing			
		9. Development of a National Fibre and Wireless Broadband Coverage Map			
		10. Drive demand through digital advocacy, literacy and inclusion			

Legal and Regulatory Framework

Unified Licensing Framework

The Kenya Unified licensing framework comprises three categories: Network Facility Provider (NFP), Application Service Provider (ASP), and Content Service Provider (CSP)[54]. In addition, it has terminal equipment contractor license and Technical Personnel License This is comparable to that of Tanzania which four authorization categories, three of which are the same as Kenya: Network Facility Provider, Network Service Provider (included in NFP in Kenya), Application Service Provider, and Content Service provider. The preparation of ICT harmonized converged/ unified licensing framework was mandated by the 18th Congress of the East African Communications Organization (EACO) held in Kigali, Rwanda on 27th May 2011 where a task force was established and which held its meeting from 1st to 5th December 2012 in Nairobi, Kenya[55]. On the whole, the Kenya market structure as defined through license authorizations is comparable to those in the EAC and to best practice in a converged ICT market space. There may be unique variations but the principles are the same.

Mauritius

Policy formulation has been accompanied by the definition and adoption of clear legal and regulatory measures aimed at implementing policy and creating the environment necessary to promote investment and use of ICTs in Mauritius. The Institutional Framework was defined in 2001, with the creation of ICTA through the Information and Communication Technologies Act. A new licensing framework was introduced in July 2003 (2004 by the defunct CCK in Kenya), and applications from prospective operators were invited by ICTA for the following three categories.

The ICT (Amendment of Schedule) Regulations 2003 structures the licensing framework into; Commercial, Private Network and Engineering.
The Commercial license category defines three types of licenses namely;

- Infrastructure provider- authorized to set up the physical infrastructure for operators and service providers,
- Networking Services Provider- allowed to offer networking services that includes provision of network capacity (e.g. leased circuits) to service providers , and
- Network Application Provider.

Similar to the 2003 ICTA licensing regime, Kenya's 2004 licensing strategy which has Network facilities provider (NFP), Network service provider (NSP), Application service provider (ASP) and content service provider (CSP) categories of licenses has been a major driver for development of the sector.

Institutional Framework

Mauritius

As an initial step, key institutional decisions were made in 1989 by Mauritius with the creation of the National Computer Board, the Central Informatics Bureau, the State Informatics Limited, and the State Informatics Training Centre Limited. Similar to Kenya, regulation and operation were also separated, with the Ministry of Information Technology and Communication Technology dealing with the formulation and implementation of government policies in the ICT sector, and Mauritius Telecom being created in 1992. Kenya undertook similar reforms in 1998 with the splitting of the defunct Kenya Posts and Telecommunication Corporation (KPTC) into three entities (the regulator –

[54] For details see: http://ca.go.ke/index.php/licensing-fliers/93-general/256-unifiedlicensingframeworkandnewmarketstructure
[55]http://www.eaco.int/admin/docs/reports/Harmonized_Converged_Unified_Licensing_Framework_Taskforce_Report_2012_13.pdf

Communication Commission of Kenya, National postal operator – Postal Corporation of Kenya and Telkom Kenya Limited – Telecom operator), and various changes have taken place since then.

More recently, the Ministry of Information and Communication Technology has also been mandated with the responsibility for the elaboration of policies to circumvent challenges facing ICT businesses as a whole, and has taken the lead in elaborating the National Broadband Policy of January 2012. This is in line with the Government's recognition of the importance of continuously monitoring policies and the value of the national ICT assets in linking to the sector reform programs as clearly enshrined in the Government Program 2010-2015 and emphasized in the National Information and Communication Technology Strategic Plan 2011-2014. . It is noted that Kenya is yet to promulgate a broadband policy.

Recognizing the need to bring regulation up-to-date in light of the convergence of ICTs and to promote affordable and adequate access to quality ICT services through functional market-driven competition and regulatory principles in a trouble-free Networked Information and Knowledge Society, The Mauritius Parliament passed the Information and Communication Technologies Authority (ICTA) Act in 2001, effectively creating the ICTA which has the status of a body corporate. This is similar to the Kenya ICT Authority (KICTA) which is driving digital villages and other ICT initiatives throughout Kenya.

The ICT Act 2001 (as amended), ICTA has actively pursued key objectives, including "to create a level playing-field for all operators in the interest of consumers" and "to ensure that telecommunication services are reasonably accessible at affordable cost nationwide and are supplied as efficiently and economically as practicable and at performance standards that reasonably meet the social, educational, industrial, commercial and other needs of Mauritius." The Kenya Information and Communication Act (as amended) has comparable focus albeit with some differences specific to Kenyan context.

The Mauritian Competition Act 2007 also established the Competition Commission of Mauritius to promote competition and to deter anti-competitive or restrictive business practices. Similar to the CA, the ICTA of Mauritius is tasked with the promotion of the interests of the ICT sector, including the fostering of competition and the maintenance of a level playing field.

There is presently a statutory MOU which recognizes that in certain aspects of information and communication technologies regulation, the Competition Commission of Mauritius (CCM) and the Information and Communication Technologies Authority (ICTA) have overlapping powers, and in which the scope of intervention of both institutions is clearly described. In addition, there is the general agreement that ICTA acts ex-ante while CCM acts ex-post. Amendments made to sections 30 and 31 of the ICT Act in December 2011 established a statutory joint Working Group established between the ICTA and CCM in relation to market definition and significant market power (SMP) regulation. The equivalent of this arrangement is the Communications Authority of Kenya (CA) and the Competitions Authority of Kenya (CAK) whose complementary roles need strengthening through appropriate statutory joint working groups.

B. COMPARISON WITH MAURITIUS

Infrastructure

Mauritius was the first market in the greater Africa region to launch mobile telecom networks (in 1989), the first to provide a 3G service (2004), the first in the world to develop a nationwide Wi-MAX wireless broadband network (2005), and one of the first to launch IPTV services (2006). Long term evolution (LTE) services are now widely available, while the government has also supported the

building of a national Wi-Fi network, with additional funds set aside in the 2017-18 Budget. This financial support demonstrates deliberate action by the government to support broadband development by providing funding.

All sectors of the ICT market are open to competition. The country is a hub for submarine cables providing international connectivity, with the IOX Cable expected to be ready for service in 2019 and the LION3 cable providing additional capacity. Mauritius is successfully pursuing a policy to make telecommunications a pillar of economic growth, and to have a fully digital-based infrastructure.

International Access

Mauritius Telecom is a member of the South Africa Far East (SAFE) submarine fibre optic cable project linking South Africa with Malaysia and India via Mauritius and Reunion Island. Mauritius Telecom-Orange has been connected to the SAFE submarine cable since 2002. A second connection point was installed in 2009 via the Lower Indian Ocean Network (LION) cable, a 1,800km submarine fibre optic cable connecting Mauritius, Reunion and Madagascar with a capacity of 1.3Tb/s. Mauritius Telecom and Emtel have invested in Lower Indian Ocean Network (LION) in a joint venture with France Telecom and Orange Madagascar. Mauritius Telecom is also a partner in the ACE submarine cable which runs from France to South Africa along the continent's west coast.

Through its NBS, Kenya has made strides in ensuring international connectivity and supply of bandwidth that enables Kenyans to communicate at high speeds with the rest of the world; Kenya has the following international submarine cables landing at the port of Mombasa; The Eastern Africa Submarine Cable System (EASSy), The East African Marine System (TEAMS) and SEACOM cables. Similar to Mauritius, the Kenya ICT network operators and service providers have also co-invested with the government in broadband infrastructure such as in the EASSy and the TEAMS.

Spectrum management

Since its creation in July 2002, ICTA has achieved several significant milestones pertaining to spectrum management which have greatly helped the development of the ICT sector by enabling new technologies to be deployed and rollout of novel services in Mauritius. The CA has similarly addressed spectrum management with a view to ensuring that there is sufficient spectrum for use to deploy broadband.

Recognizing the potential of 4G to offer a solution to operators to deliver a range of data services, at much higher speeds with the added advantages of mobility and flexibility, ICTA adopted a Decision on 5 June 2012 on Additional Spectrum for the Terrestrial Component of the International Mobile Telecommunications (IMT) in the 1800 MHz Band to release additional spectrum for operators in Mauritius to provide high-speed mobile Broadband services such as 4G and beyond (LTE).

This Decision is in line with the Government's National Broadband Policy (Kenya is yet to elaborate a National Broadband Policy) to gear Mauritius towards greater broadband uptake and penetration so Mauritian citizens can benefit from the full range that Broadband connectivity can provide in terms of innovative services. Additional spectrum is already being made available for the deployment of the Frequency Division Duplex (FDD) for the terrestrial Component of International Mobile Telecommunications (IMT) in the 1800 MHz band.

Interconnection

Landmark decisions were made by the CA (and its predecessors) in dealing with interconnection charges such as the Interconnection Determination No. 2 of 2010 on mobile termination rates. In

terms of major decisions taken by Mauritius in respect of interconnection, a number of key decisions have affected both the wholesale and retail level, including:

- Carrier pre-selection for international calls (2004),
- Calling Part Pays (CPP) regime & cost based interconnection charges to mobile operators (2004),
- Minimum termination charges for international calls terminated in Mauritius (2006), and cost-based interconnection charges to fixed line operators & no provision for Access Deficit Charges (2006 and 2008).

These decisions have not only assisted interconnected operators in terms of their business case, but have also ensured competitive voice call tariffs to end users within various markets.
Kenya has implemented similar and more other regulatory decisions to ensure affordability of ICT services and to spur the development of the ICT sector. However, more will need to be done to address areas that represent gaps such as with regard to regulations on cyber security which are needed.

Pricing: addressing affordability

Another example of effective regulation concerns the regulatory interventions regarding the pricing of international access. The Kenya regulator (and its predecessor, the defunct CCK) have progressively addressed the demand side of the ICT (and by extension broadband prices) through evidence based price regulation such as through empirical cost studies that led to the regulation on interconnection charges. In Mauritius, much has been accomplished in terms of falling prices for international connectivity, especially from 2002 to 2012, when various determinations were made by the ICTA pursuant to applications made by Mauritius Telecom Ltd (MT) in accordance with section 31 of the ICT Act.

One of the price determinations, for example, addressed the issue of the high costs of monopoly international bandwidth on the SAT3/SAFE Cable, spurring the incumbent to lower prices. A similar picture is applicable in terms of bilateral half circuits also between 2002 and 2012, with an average reduction of up to 77% over the selected routes. In Kenya, the international band width costs have significantly dropped since the implementation of submarine cable systems landing at the port of Mombasa with customers have alternative providers hence benefitting from the competition on the international connectivity segment.

Price determinations measures such as those by Mauritius, and the effective reduction in international bandwidth prices have effectively spurred the development of economic opportunities, including in the ICT sector, with call centres and Business Process Outsourcing (BPO) gaining significant growth in the years following such price reductions as is also the case in Kenya. For example, between 2002 and 2012, the price of a full circuit E1s (a 2Mbps capacity), from Mauritius to Paris, on SAFE fell by as much as 84%. Tariffs for half circuit E1s on selected routes were also affected, with on average a 65% decrease over the period 2005 to 2009. Kenya has experienced similar price phenomena, thanks to the development of international connectivity. The CA has implemented similar decisions as those by its Mauritius counterpart, ICTA, which have as well had an impact on the price of the ICT services though more needs to be done to increase affordability of the ICT services in general and broadband in general. Specifically, According to Interconnection Determination No. 2 of 2010 dated August 16, 2010, the CA reduced mobile interconnection rates from Kshs4.42 per minute to Kshs2.21, representing a 50 per cent drop. “The rates will

progressively decline by 35%, 20% and 15% annually in 2011, 2012 and 2013 respectively to stand at Kshs0.87 by 2014[56]", reads the Determination.

Content, capacity building and investment

The other area of comparison concern Content applications and innovations (CAI), Capacity building and awareness (CBA), and Financing and investment. The general observation is that these thematic areas need more focus because the first two are demand side issues while the third thematic area is a supply side issue. While finance and investment is being addressed by the PPPs across the reviewed countries, there is still need for more innovations in the financing and business models to fur promote broadband development. Government (including the regulator) and other organizations such as consumer organizations, learning organizations (and centres of excellence) and service provider are also well placed to drive the CAI and CBA.

In summary, Kenya through the CA is employing best practice with regard to regulation of the ICT sector though more will need to be done moving forward pertaining emerging issues around broadband including more precision on cybersecurity and infrastructure sharing, among other areas that constitute gaps and need attention. Further, the Kenya ICT market operates in a manner consistent with best practice though there are areas that need further improvement and which should be addressed in the reviews of the NBS.

[56] https://www.kenyaengineer.co.ke/determination-on-interconnect-rates-for-fixed-and-mobile-phone-services-as-issued-by-cck/

Appendix VIII: Investment and Business Model

1. Investment models

There are several investment models that this strategy can use for the various projects enlisted:

S/N	Comment/Issue	Project /Investment model	Proposed solutions
1	Investment/financing models	**Infrastructure Investment-**	Although most of the financing should come from the private sector, funding for the relevant national projects for network roll-out also comes both from national public funds and from the USF. The following models of investment apply to several projects • **Government funding**: Increase Government spending in terms of budget allocation. The planned expenditure could be increased to 5% up from 0.05%. The principal role of the national government is to make the market work efficiently and provide the operators with good conditions. For example, it is cost-effective for broadband to be jointly laid or for duct for broadband (e.g. empty pipes) to be buried when electricity networks, water and sewerage, or other infrastructure are expanded or upgraded. • **PPPs:** This could involve partnerships or joint ventures between e.g. KPLC and Safaricom PLC or SGR and say ZUKU. The trend towards increased demand for high speeds of Internet will drive investment partnerships between Internet/Telkom companies and public sector finically liquid companies to invest in BB. The rationale for this comes from the fact that Kenya has the highest Internet speeds in Africa: Kenya (12.16 MBPs); Rwanda (1.69); SA (6.74); Mauritius (5.71) and Morocco (5.1). A caution offered in this plan is, the principal rule that public-sector players must not undertake commercial activity in competition with private-sector players is to avoid the danger of distorting competition. Regional and local initiative for public-private collaboration that promote the deployment of infrastructure should also be sought carefully. The Government will promote cooperation between the public and private sector in developing networks in areas which are considered as underdeveloped. Enabling fair conditions for ensuring competition between network providers for broadband I nternet. This can be done by enacting necessary laws to protect investment • **Build Operate and Own:** This model is recommended especially to County governments-where they can develop BB infrastructure and deploy fibre network to residents in these regions. This is because they own, control access to land and grant licenses to operators to deploy networks. The county would own the networks, have a fibre-based infrastructure locally, which networks may cover township service points, businesses and residents. Such county investment would facilitate enterprise and use of Internet for businesses, educational

			institutions, and government offices. These County broadband investments needs to be regulated by policy so that some counties do not overcharge. • **Incentives for private investors;** Tax incentives and holidays to investors to enable recover their investment would be helpful in attracting new investors in BB. Other forms of incentives could be in form of Home improvement tax allowance for connection of broadband cables. The Government can introduce possibility of a tax allowance for household work and for work on the repair, maintenance and refurbishment and extension of homes that require broadband services. The purpose being to reduce the level of undeclared work and to increase the labour supply. A home improvement tax allowance can be available for certain types of groundwork, e.g. on cables for electricity or electronic communication directly adjoining the building. The allowances reduce the cost of and promote upgrading of access networks for high-speed connectivity. Thus, it is both an investment driver and promotes enterprise • **Awareness of regional financiers**; Increased awareness of available financiers in the region can help in gaining access to investment funds. Financing agencies like, ITU, World Bank, AFDB can be explored particularly because they have interest in investment in BB and IT infrastructure.
2	Business Models	Business models	• **Unbundling**; i.e. Segregation of services so that one provider provides infrastructure and another connectivity or have different SPs to conduct last mile connectivity etc. The unbundling can be into three layers Passive layer, Active layer and Service layer. This however is dependent on the licensing regime. In some cases, especially if the vertically integrated actor is deemed to have significant market power (SMP), regulation imposes that network access be opened to competitors, either at the passive or the active layer. In that case, the network owner designs the network to deliver its own services and gives access to its competitors in forms compatible with the network design. Although sometimes incumbents refer to this model as "open access", this is in reality a vertically integrated model with unbundling (either at physical layer, called local loop unbundling (LLU), or at the active layer, called bit stream access unbundling. These business models should be operationalized through licenses for various actors. If, on the other hand, the roles are separated, we talk of an open network model. In an open network the infrastructure that is available to all market participants is at equal conditions. With regard to Investment and Business models, the actions are presented in Table 6. • **Market players**: Current and new market players or providers drive technical development and should be encouraged and enabled to develop new broadband-based services and business models and make investments in infrastructure for broadband. A case in point is where ***housing companies*** deploy fibre networks to offer the residents Internet services, raise the value of the property and gain control of the infrastructure. Several residential developers are doing this in urban cities in Nairobi, Mombasa and Kisumu, particularly in gated

			communities. Faiba Homes is an example, providing high speed Internet at home. • **Business outsourcing**: For example, in cloud computing companies can outsource software, computer capacity, storage space and other IT to a third party. This is the case of LIQUID Africa a South Africa company that outsources. The services then become available to the users through the Internet, generally as a subscription service, contributing to new ways of working and increased and availability for the users. • **Next generation networks (NGN):** NGNs are an ongoing technological development in which the networks are upgraded with fibre optic cables closer to the end-user so that higher speeds can be offered. Fibre and Wireless technologies are being developed in parallel to provide higher speeds and better utilization of spectrum. An example is Fibre, replacement of present-day GSM and 3G technology to 4G/5G. Terms such as Faiba Home (high speed Internet at home), 4G (Faiba4G) and Faiba Connect (Jamii Telecom Internet) are used. Safaricom Fibre to home coverage, POA WI-FI Internet include NGN base on high speed Internet targeting urban users. Citizens' need to be educated about the next generation access networks and their offered opportunities. This awareness will increase uptake and use of broadband
3.	Demand side broadband connectivity. - How to increase demand side on connectivity on BB	Creating Business demand	• Increased **e-government services**: e.g. e-health on the big 4. For example, to cancel and re-book appointments, renew prescriptions and ask questions. With high speed connection patients can also take a picture, for example of a tick bite or rash, or swollen leg (already happening) and send it by MMS message/WhatsApp to a skin specialist. E-Medical information about a possible diagnosis and treatment can be done 24 hours • **New Businesses**: Broadband access is required in most businesses for contacts with customers, suppliers and authorities, especially in rural and remote areas in Kenyan devolved environment. More and more businesses are choosing mobile office solutions. Example is a company that manufactures electronic support functions industrial use as in Konza silicon savannah city. A high capacity connection is essential as large files are sent. Production relating to devices for example for monitoring, remote control, programming and control systems can be done.

2. Case studies on financing of broadband

(i) Case Study of France PPP:

France's biggest optical fiber PPP contract is worth over US$1b for private financing.

- ► The THD Grand Estimate PPP project is France's biggest optical fiber PPP contract and one of the largest in Europe
- ► To connect one million households and businesses across over 3,600 cities
- ► Construction of the project is due to be completed in 2022, with a total term of 35 years

(ii) India PPP Case Study:

The Government of India has planned current NDCP 2018 to be funded through Public Private Partnerships where:

- ► BharatNet: Providing 1 Gbps to Gram Panchayats upgradeable to 10 Gbps

► GramNet : Connecting all key rural development institutions with 10 Mbps upgradeable to 100 Mbps

This does indicate that there can be many forms of partnerships as in the case of India.

Appendix IX: Communication Strategy

Purpose

Effective stakeholder engagement and communication will be essential for successful implementation of the NBS 2023. The purpose of this communications strategy is to create awareness, understanding and commitment to achievement of Kenya's digital vision.

Objectives

- To engage and communicate to create awareness on broadband;
- To collaborate by facilitating reflection, sharing of knowledge and key lessons as well as engage all relevant stakeholders in the implementation of the strategy;
- To monitor and act by creating opportunities to identify and address gaps to achieve broadband vision for Kenya.
- To create awareness through public consultations regarding major aspects of broadband development

Target Audience

The intended audience includes Parliament, the Cabinet, Investors, Service providers, consumers of broadband, learning institutions and the general public comprising adults, youth and children. Specific messages will be customized to these audiences and communicated to them on regular basis

Principles

The following principles will guide the approach to stakeholder engagement and communications in this strategy.

1) *Clarity*: make the purpose and benefits of this NBS clear to all stakeholders by using appropriately tailored messages and methods.
2) *Consistency*: use agreed key messages and techniques to build awareness of broadband
3) *Efficiency and effectiveness*: use existing communications channels and mechanisms known to be effective in reaching target audiences.
5) *Engagement*: genuinely involve and collaborate with key stakeholders through multiple and two-way communications

Roles and Responsibilities

National Broadband Council: The NBC will responsible for facilitating targeted and harmonized communication. They will also implement the communication strategy and policy and take lead and responsibility for facilitating and promoting good internal and external communications, as well as providing professional advice and support to the Cabinet Secretary.

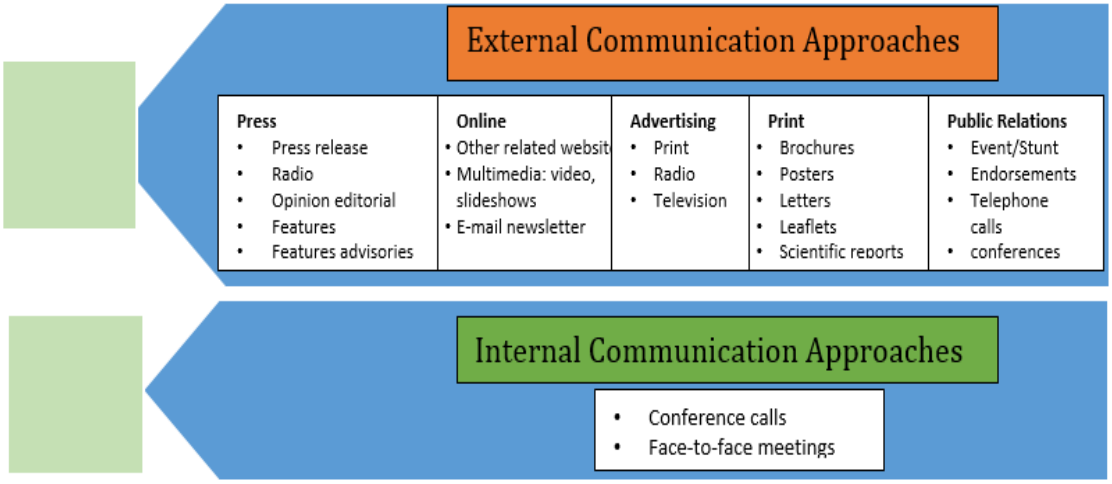
Broadband Delivery Unit: The BDD will work with the NBC to coordinate and track the progress of all communication activities on a day-to-day basis

NBS Program managers: Each of the eight thematic areas in this strategy will form a program headed by a program manager. Theses managers will work with the BDD to agree on messages and the methods of appropriate communication and respond to requests by the Unit (BDD) to enhance communication at their programs level and assist in the timely delivery of all the NBS 2023 actions and targets. They will also work in partnership with staff and their representatives in the implementing agencies to ensure the Communications Strategy succeeds.

All implementing agencies: These agencies will communicate appropriately with NBS program managers to notify them (program managers) of any communications issues raised by service providers and the general public.

Communications methods

This strategy will adopt both external and internal communication media below



Further, the following related aspects to communication would also be ensured

- *Periodicity of communication*- the periodicity of the communication to target audiences e.g., Quarterly, Annually, etc. For this NBS, the communication will coincide with the M&E program, which will specify the intervals at which various milestones are expected. This notwithstanding, the whole strategy will be communicated at the launch and then periodic communications according to the M&E will follow.
- *Budget* for the communication activities
- *Being on Brand* – which means being consistent with the various attributes of the communication such as logo, typefaces, slogan, colours, and key messages and the way words and images are used on all applications.
- *Promotion*; e.g., promoting the website containing the intended communication such as providing pop-ups of the link in other websites

Review

The strategy will be reviewed annually through clear and measurable criteria for both internal and external communication to determine the level of success in meeting objectives the objectives; and using these reviews to improve on the strategy.

External perspective	Internal perspective
❑ Have you achieved your objectives (i.e. raise funds, create awareness etc.)	❑ Did you reach the right people within the organization?
❑ Did you reach the right audience?	❑ Did they understand what the message was - did they do what had to be done?
❑ Did you use the right tools?	❑ Did you use the right tools?
❑ Were decisions taken as a result?	
❑ Did you come in on budget? If you did not, why?	

Communication Plan

Strategy	Activity	Indicator	Responsible	Timelines
Enactment of appropriate laws to spur broadband	Sensitize National Assembly and the Senate on the need for appropriate laws that promote Broadband	Relevant legislations and amendment to existing legislation enacted	Cabinet Secretary	2018/2019
	Cross border cooperation in the enforcement of privacy laws- governments must possess the capabilities to enforce cyber laws, which in many cases requires cross-border cooperation	Cooperation agreements/ MoU with other countries No. of Law enforcement agencies with necessary education, knowledge and skills to enforce cyber laws	Cabinet Secretary	2018/2019
	Draft new laws and regulations to address some of the supply and demand issues associated with developing broadband networks and services	Broadband enabling regulation including those on spectrum allocation are in place	NBS Council	2018/2019
Protection of intellectual property rights	Sensitization on standards set by international humanitarian law on content regulation including surveillance and monitoring and advocacy regarding intellectual property rights in cyberspace (advocacy)		NBS Council	2018/2019
Ensure `effective institutional framework to deliver on broadband	Examine existing laws and advise on institutional responsibilities	MDA advised on the institutional arrangement to govern and deliver NBS 2023	NBC BDU	2018/2019
	Create adequate awareness to implement laws and regulations that give rise to an enabling environment	Implementing agencies are aware of and implementing their respective mandates on the NBS 2023	NBS Program managers	2018/2019
Promote broadband funding	Sensitize MDA on the need to allocate funds for funding for broadband initiatives in those departments	Increased BB funding by the government	NBS Council	2018/2019
	Sensitisation of investors on the opportunities to invest in broadband and on the incentives that government will provide	Increased awareness of investors on opportunities in BB development	NBS Council	2018/2019
Broadband security and privacy	Sensitize the general public on security while using broadband	Awareness creation on broadband security	NBS Program	2018/2019
	Build global alliances and promote the application of international law in cyberspace	Increased collaboration on ensuring cybersecurity	NBS Council	2018/2019
Broadband services of good quality	Create awareness of BB services and their potential to all consumers	(i) Customers are aware of the available broadband service (ii) Customers are able to utilize BB services for socio-economic empowerment	Service providers	2018 (continuous)
Broadband Business Models	To create awareness of the possible BB business models: Passive layer, Active layer and Service layer and opportunities for PPP in each layer	Physical infrastructure, active network providers and service providers are aware of the existence of partnership opportunities and the guideline, regulations or policies that apply		

Appendix X: NBS 2023 Projects

NBS 2023 Projects

Table 23: Proposed NBS 2023 Projects

Thematic Area	Project	Proposed Target
Devices	Design and manufacture broadband devices in Kenya Device leasing programme (e.g., refurbish and lease devices)	At least 1 device by 2020 At least 1 programme y 2020
Capacity Building and Innovation	National public education on broadband Digital Literacy program (DLP) and skills-based curriculum for imparting broadband skills at all levels of society– adult programs, tertiary programs and primary/secondary focused programs **ICT curriculum** at all levels of education: Develop competency-based *ICT degrees, engineering degrees,* and applied ICT degrees, which graduate at least 10,000 persons every year Development of professional certification programs meeting the needs of an Integrated digital education system. Capacity building for research on broadband Integrated industrial attachment (attached to some industry and tied to manufacturing) Strengthen the presidential digital talent programme (PDTP) by creating capacity at the strategic level; e.g., a PDTP to be trained to co-create content with a professor and co-own the content and the proceeds, E-learning Capacity building of citizens on freedom of information and responsibilities with regard to broadband BPO and ITES capacity expansion Expansion of Kenya Institute of Mass communication (KIMC),	One awareness campaign every quarter 100% implementation by 2023 All programmes implemented by 2022 Certified programmes implemented by 2021 Continuous Integrated industrial attachment programme by 2020 Continuous Continuous Increase by 10% yearly Expanded by 2021
Infrastructure and Connectivity	**Supporting physical infrastructure** • Duct construction - National Project for provision of ducts (on public roads) as an open access infrastructure to be used by all but owned by the national government. • The duct physical infrastructure construction to be done on the cabinet (public road) by the national government and private investors allowed to offer services to the end user **National broadband infrastructure (NOFBI):** Extension of the National broadband infrastructure (NOFBI) to the sub-county level-an estimated 2500 Km Deployment of access network using multiple technologies including expansion of 3G and 4G coverage and introduction of 5G. Setting up of public Internet access points and Bottom-up citizen networks Last mile connectivity by extending broadband to the Ward level- entails construction of Ward base	50% on all roads by 2022 100% connectivity by 2023 100%^coverage 50% of all sub counties by 2022 and 100% at constituency HQs 100% connectivity by 2023 100% by 2023 100% by 2023 290 by 2023 100% in all constituencies by 2023

	stations at least 2 stations for each of the 1,450 wards in the country. Government Common Core Network (GCCN) linking all MDAs and Counties County connectivity project (CCP) Constituency innovation hubs (CIH) *Bottom up citizen networks* to supply broadband services to the users in all counties. *Broadband for Digital Education* by providing Internet connectivity to all secondary schools, TIVET and other tertiary learning institutions through KENET. National and constituency data centers	Extend BB to all learning institutions by 2023 1 national and 100 % county centers by 2021
Policy, legal and regulatory framework	Enact data Protection law (Article 31 of the Constitution) Enact law declaring broadband as critical Infrastructure Create laws and regulations on PWDs access to broadband Finalization of the revised National ICT policy for Kenya Enactment of relevant legislations (*cf. Table 2: Pending legal instruments and Fundamental Freedoms*) Issuance of regulations to promote broadband deployment and use Develop regulations to operationalize the various laws related to broadband e.g. on data protection and cyber security policy	Enactment of Act by 2020 Enacted legislation by 2020 Enacted legislation by 2021 Finalized and launched by 2020 Enacted by 2021 Issuance by 2020 Issued by 2021
Services, Content and applications	Digitization of all Government content, registries, programmes and services Creation of standards for services and content, Capacity building in Digitization technology, Establishment of Media city/ park e.g. Studio Mashinani Multilingual edutainment programmes including subtitles eg.Y254, heritage channel Content, applications and innovations promotion project Project on local language content	100% by 2022 Services and content standards by 2021 Constituency 1 by 2021 Programmes in all local languages by 2023 1 promotion campaign bi-annually Local language content developed for all languages by 2023
Big 4 and BB	Connect all hospital to broadband to provide universal healthcare services delivery at level 1-6 heath facilities. Develop e-agriculture systems to improve food security Embed broadband in the government affordable housing project and in other housing projects to realize smart housing Promote broadband in the manufacturing sector to improve efficiency	100% by 2020 2 systems by 2022 Embed in all smart housing projects 100% of all manufacturing
Privacy and security	Establishment of a cyber security operations centre and International collaboration on cybersecurity. Study on levels of privacy and security breaches to inform further policy, legislation and regulation Awareness creation on cyber security Child online protection	1 security operation by 2021 1 study by 2021 At least 1 awareness campaign every quarter 80% reduction in number of child-related cyber incidents by 2020

Finance and Investment	Creation of conducive environment for Broadband investment through fiscal and regulatory incentives PPP projects across the NBS value chain	Fiscal and regulatory incentives implemented BB funded at over 70% by the private sector
Broadband for PWDs	Deployment of broadband to meet the needs of the PWDs e.g., 1. Project to avail adequate devices for PWDs that have visual, audio or locomotive features 2. Innovative services for PWDs by service providers 3. Project for IoT to provide multiplicity of services for PWDs	
Governance and Delivery (Institutional framework)	1. Establish the National Broadband Council 2. Establish the Broadband Delivery Unit	

County Broadband infrastructure: The County Government should prioritize the County broadband/ IT infrastructure and encourage investment partnerships, joint installations for works in excavations, and other broadband infrastructure. Such collaborative programs will reveal the overall status (baseline) of the county regarding access to broadband in the county, the needs of businesses, individuals and the public sector and have, the need for action and how public-sector and private-sector players can collaborate.

More effective coordination on planned Infrastructure & excavation works. The Government through the CA can task an Agency with reviewing/auditing the present-day forms of broadband infrastructure works and submitting proposals for improved coordination, development and information management. The aim is to facilitate collaboration between different players in the expansion of broadband infrastructure and to increase opportunities for competition at physical infrastructure level in digital communication in connection with the deployment of high-speed networks. Effective coordination will reduce the lead time that service providers/ operators may be facing in concluding agreements with the government agencies and in obtaining necessary permits for the deployment of infrastructure for broadband. The government can consider creating a company that would own and manage a nationwide fibre network under the broadband infrastructure.

Coordinate IT-based development projects in government agencies: This project would target finalization of e-government services and coordination of IT standardization in Government offices, Huduma centres, and county government service areas. This includes an effort to increase use of IT and paperless operations in public sector, tertiary educational institutions, healthcare centres, and research institutions.