



Telecommunication
Development Bureau (BDT)



Report

Kenya's National Broadband Mapping Systems Workshop

25-27 August 2025

Villa Rosa Kempinski hotel

Nairobi – Kenya

1. Introduction

Kenya was selected among the first eleven (11) African countries participating in the Africa Broadband Mapping Systems (Africa-BB-Maps) project, spanning the period 2025 to 2028. This four-year initiative, led by the International Telecommunication Union (ITU) and funded by a 15 million euros investment from the European Commission (EC), aims to reshape connectivity across the selected 11 African nations i.e. Angola, Benin, Botswana, Burundi, Côte d'Ivoire, Eswatini, Kenya, Malawi, Nigeria, Uganda, and Zimbabwe. Launched in Abidjan, Côte d'Ivoire, in April 2025. The objective of the Africa-BB-Mapping project is to create harmonized, validated, and publicly accessible broadband mapping systems, weaving together data from sectors such as energy, transport, health, education, and urban planning to drive evidence-based policymaking, promote digital inclusion, and attract strategic investments in digital infrastructure.

Kenya as a country has a geographical spatial coverage spanning 580,367 square kilometers and is home to approximately 54 million people. Kenya is recognized regionally for its efforts in investing in digital development, making the country a front-runner on matter digital development within the region. Guided by the our National ICT Policy 2020, the National Digital Master Plan 2022-2032 and the National Broadband Strategy 2023, the country aspires to increase broadband penetration to 80% by 2030, prioritizing unserved and underserved communities.

As one of the selected 11 African countries benefiting from this project, Kenya held its National Broadband Mapping systems workshop from 25th to 27th August, 2025 at Villa Rosa Kempinski hotel, Nairobi – Kenya.

2. Opening of the Workshop

The workshop was graced by dignitaries, including the Principal Secretary, State Department of Broadcasting & Telecommunications – Mr. Stephen Isaboke, EBS - Ministry of Information, Communications and the Digital Economy, Kenya, the Ambassador, European Union Delegation to Kenya, Her Excellency Henriette Geiger and the Director-General of the ICT national regulatory authority – Communications Authority of Kenya (CA), Mr. David Mugonyi, EBS. The Director, Telecommunication Development Bureau (BDT) of the ITU, Dr. Cosmas Zavazava also graced the occasion, albeit virtually.

In their opening remarks, the Director General – CA, commended the progress that Kenya has made in digital development, albeit still being far away in the journey of providing meaningful connectivity to all Kenyans. Stated that the existing digital divide is the enemy to Kenya's achievement of its bigger vision of becoming a digital transformation, lauded the Broadband Mapping initiatives for being critical to Kenya's efforts in digitizing its critical institutions and provision of e-services. He also expressed his gratitude to ITU and EC for the support extended toward the realization of the broadband mapping in Kenya.

Director, BDT expressed ITU's commitment to fully support Africa's effort to bridge the digital divide and stated that broadband mapping was seen as key in supporting effective broadband infrastructure roll-out. He emphasized that mapping's end goal is to transform lives through bridging the digital infrastructure gaps. The Director, BDT urged Kenya to

leverage partnerships and collaboration among all contributors in the ecosystem to ensure that the ultimate impact of the Broadband mapping project contributes to overall national socio-economic development.

The Ambassador, European Union Delegation to Kenya, in her remarks noted the challenge related to the existing digital gaps, confirm the existing opportunities of funding mechanisms through the Global Gateway, she spoke to the UNICEF_GIGA initiative funded by EU in collaboration with ITU, with major financing from the EU private sector through Global Gateway. H.E the Ambassador further confirmed that 15M Euros have been invested to ensure that Broadband mapping project in Africa is successfully implemented. She stressed on the importance of the project delivering publicly accessible broadband maps that will anchor strong coordination for digital development and in turn unlock cross-country opportunities. Finally, she also emphasized the need to strengthen partnerships and collaboration

The session's Chief Guest, Mr. Stephen M. Isaboke, EBS, Principal Secretary, State Department for Broadcasting and Telecommunications - PS-BT, Ministry of Information, Communications and the Digital Economy (MICDE), Kenya in his remarks reiterated the importance of broadband to the achievement of Kenya's national goals. He stated that Kenya government is committed to spreading broadband across the country. He further stated that Kenya's commitment to digital development has been demonstrated through the prioritization of digital transformation among the five (5) priority pillars of the government that include the Digital Superhigh and Creative Economy. He spoke to the on-going Digital Superhighway projects that includes; deployment of 100,000Kms of fiber, establishment of 1450 ICT hubs and rolling out of digital skilling programmes. The PS-BT expressed government's full commitment to support the broadband mapping project in Kenya and equally, called upon all stakeholders to actively participate in ensuring that we see Kenya's Broadband Mapping platform come live and is effectively sustained.

3. Session 1 - Policy Dialogue & Strategic Orientation

The workshop's first session was guided by the theme 'Policy Dialogue & Strategic Orientation'. To start off the discussions, the Regional Director for Africa, ITU Dr. Emmanuel Manasseh, spoke to the role of broadband mapping in national digital development plan. In his remarks, Dr. Manasseh, stated that: identifying connectivity maps is critical to inform decisions such as where to deploy infrastructure, funding decisions, tracking impact of the investment in digital development; collaboration and Partnerships are key and can enhance effectiveness through sharing of data, minimizing duplication and leveraging existing capabilities which in effect saves costs. He reiterated ITU support to the broadband mapping Project and looked forward to supporting Kenya as well as the prioritized 11 African Countries to deliver on this Project.

4. Session 1a: Context and Current State

The session on context and current state was discussed under the aegis of the policy and strategic orientation discussions. The session's aimed at: Establishing a shared understanding of the work of the national ICT regulator, Communications Authority of Kenya (CA), as pertaining to national broadband mapping; Establishing the level of the regulator's institutional maturity; Establishing the regulator's work with its stakeholders, and how the Authority envisions the future of this work with contribution; and Setting expectations to establish national ownership and sustainability of this project.

The session was moderated by Mr. Christopher Kemei with the following speakers drawn from the different functions of the Authority.

- Mr. Paul Kiage, Deputy Director, Universal Service Fund (USF)
- Mr. Derick Khamali, Assistant Director, Licencing & Compliance
- Mr. Dennis Sonoiya, Principal Officer, Standards and Resource & Management

To address the session objectives the question of CA's effort in implementing GIS and broadband was discussed. Additionally the session considered the mapping challenges, mitigation and expectation from ITU to assist CA achieve objectives of broadband mapping. The discussions concluded with proposed a way forward to support the effective implementation of an effective broadband mapping system for Kenya.

4.1 CA's Efforts in Implementing GIS and Broadband Mapping;

The Authority representative informed the session that Kenya, through it Ministry of Information Communication & the Digital Economy (MICDE) has established various ICT policy and strategies to support the realization of it vision of becoming a digitally transformed nation. The established frameworks include the National ICT Policy, 2020, National Digital Master Plan 2022-2032 and the National Broadband Strategy.

Guided by the established ICT policies and strategies, the national ICT regulator, CA commenced the Broadband Infrastructure development and mapping efforts in the year 2004. This journey commenced with a study in 2024 that provided several recommendations, including the use of GIS to capture ICT infrastructure data. Since 2004, Kenya has made significant strides in the areas of ICT infrastructure roll-out and use of GIS. Subsequently, other studies have been undertaken, including ICT Access Gap Studies 2016 and 2021, that reported 3/4G coverage of 78% and later 96.3% respectively. The geographical 3/4G coverage stood at 17% in 2016, this significantly improved to 56.5% in 2021. To support the achievement of Kenya's targeted broadband coverage of 100% by 2030, Kenya has continued to create an enabling environment to support the roll-out of ICT infrastructure. Such initiatives span areas such as updating policy and regulation to reflect the current realities, use of Universal Service Fund (USF) to bridge the digital gap, establishing partnerships and collaboration between various stakeholders including, government, private sector, academia, advocacy bodies and others, and providing incentives within the ICT sector to allow for ease of doing business for ICT infrastructure providers.

It was reported that CA has in place an operational GIS platform, albeit noted limitations which include limited numbers of licences, access restriction both internally and by the public, insufficient data and capacity/skills for effective use of the system. Other reported

efforts by CA that compliment the broadmapping initiative included; adoption of a technology neutral approach to licensing to allow for deployment of ICT infrastructure, the establishment of a Compliance and Enforcement framework required to ensure that licensed ICT operators provide accurate and timely fiber infrastructure data to operationalize an effective GIS. Additionally, CA has in place a Spectrum Management framework that ensure the planning and allocation of spectrum resource for ICT services deploying, including broadband services.

4.2 Challenges, Mitigation and Expectation from ITU to achieve objectives of Broadband Mapping

The following challenges were identified as requiring mitigation and support from ITU as well as other stakeholders to enable effective broadband mapping in Kenya; Low accuracy of available broadband coverage maps; Limited enterprise integration between the various existing ICT infrastructure systems, critical to feeding into GIS; Lack of efficient coordination in Cross Border coverage; Limited capacity of existing GIS systems; and Limited compatibility and integration between the existing inter-sectoral GIS system that hold data critical to making GIS output meaningful and useful.

4.3 Wayforward Towards Execution, National Ownership and Sustainability

The CA pointed to the following as part of the consideration to support the deployment of the broadband mapping project and to support the realization of the expected impact of the project:

- i. The need to invest in advanced institutional GIS systems that possess capacity to integrate with other internal systems.
- ii. The need to advocate for integration of CA's GIS systems with other public and private institutions with relevant data.
- iii. The need for the ICT regulator working with other stakeholder to re-define the concept of broadband to ensure that the GIS broadband mapping exercise supports the delivery of Meaningful Connectivity for overall digital transformation.
- iv. The need to further harness the strength of partnerships and collaboration, in the areas of availing data, capacity building, system integration and resourcing to update systems.

5. Session 1b: Context and Current State – Intervention by Governmental & Public sector

The session on context and current state - intervention by government and public sector was also discussed under the aegis of the policy and strategic orientation positioning. The session's aimed at: Providing the stakeholders in the government to share their respective GIS investment, mapping efforts; Considering their relationship with CA, how they work in GIS and mapping; and Exploring how they can either continue to contribute to broadband mapping initiate or partner to contribute to the initiative.

The session was moderated by Mr. Christopher Kemei with the following speakers drawn from the different government agencies with mandates relevant to the broadband mapping initiative:

- Kenya Power and Lighting Company – Ecra Maina
- Kenya Electricity Transmission Company Limited (KETRACO) - Mr. Antony
- ICT Authority (ICTA) - Mr. Thomas Bwale
- Kenya National Bureau of Statistics (KNBS) - Ms. Linah Ngumba
- Survey of Kenya (SOK) - Ms. Faith Kendi

To address the session objectives the discussants spoke to their institutional information, investment in fiber infrastructure and mapping, and relationship with CA. They further deliberated on how the Government Institutions can contribute to the Fiber Mapping initiative. Kenya Power, KeTRACO, ICT Authority, Kenya National Bureau of Statistics and Survey of Kenya made the following submissions:

Kenya Power

The Kenya Power, is the government national institution mandated to provide power grid for the country. On the ICT front, the institution is licensed by CA as a Network Facility Provider-Tier 2 and Application Service Provider and has invested in fiber infrastructure. Kenya Power indicated that they institution already has an existing strategic relationship with CA. One of the key project anchored on the two institution's collaboration in the implementation of the Digital Superhighway broadband roll-out project. Kenya Power shared their comprehensive GIS mapping readiness. The institution has elaborate power infrastructure mapped on their ArcGis system.

Kenya Electricity Transmission Company (KeTRACO)

KeTRACO presented on their mandate and infrastructure which has positioned the institution as a critical resource for use in the roll-out of broadband infrastructure. The institution has invested in fiber infrastructure for internal use but also leases out its excess capacity to the Mobile Network Operators and other ICT service provider. It was reported that KeTRACO has adopted ArcGIS for mapping their infrastructure and the platform captures the institutions fiber infrastructure. The institution is licensed by CA as a Network Facility Provider-Tier 2 and Application Service Provider.

ICT Authority (ICTA)

ICT Authority is the authority mandated to oversight the adoption of ICT within the government. Presently, ICTA is charged with the responsibility of rolling out the National Optic Fiber Backbone Infrastructure. ICTA is working with CA to deploy Phase I of the Digital SuperHighway broadband connectivity project, targeting to roll-out 100,000Kms of fiber by financial year 2026-2027 and is also the coordinating agency of the Kenya Digital Acceleration Program, financed by the World Bank. ICTA intimated to the challenge of not having comprehensive complementary maps to strategically guide deployment of infrastructure.

Kenya National Bureau of Statistics (KNBS)

The Kenya National Bureau of Statistics (KNBS), is the government national institution mandated to collect data of various development indicators for the country. The KNBS has an existing collaboration framework with CA to support the collection of ICT data nationwide. KNBS has been annually collecting broadband usage data to inform the progress achieved in the bridging of the digital gaps.

Survey of Kenya (SoK)

The Survey of Kenya (SoK) is the national custodian of GeoSpatial data spanning from cadastral information, topographic maps, settlement distribution, satellite imagery, aerial photographs and GNSS survey data. It was reported that the SoK has an elaborate GIS system that is able to map the national areas accessing services and those without services. The institution possesses accurate data of infrastructure and indicated willingness to collaborate through integrating its GIS systems with the CA.

5.1. Contribution to the Fiber Mapping initiative

While speaking to their mandates, all the represented government agencies made mention of their existing collaboration with CA and expressed interest to either continue partnering with CA or moot new partnerships in instances where partnerships had not been initiated. The pointed out areas in the submissions, that the institutions can contribute to, as part of ensuring the delivery of an effective broadband mapping system included: Provision of infrastructure data e.g data on electricity grid network, fiber optic network mapping, electricity access data as baselines; Access to the various GIS platform for integration to support realtime update of GIS overlaying data, and visualization; Collaboration in GIS database development and upgrades; Supporting in the last mile delivery for broadband; Infrastructure sharing to minimize duplication and re-direct resources to priority infrastructure roll-out areas, to reduce ultimate cost of services; and Adopting harmonized data reporting standards and mechanisms to enhance accuracy

5.2. Challenges That May Hinder Government Agencies Support of the Broadmapping Project

Several issues were identified as gaps limiting the effective contribution of other government institutions in the broadband mapping in Kenya. Among among these were; Lack of harmonized approach to data collection and reporting across the institutions; Limited or no integration between the various GIS platforms; Limited budgetary resources to support acquisition of appropriate systems including the GIS platforms; and Inadequacies in staff technical skills to utilize advance technological application and GIS related software

5.3 Wayforward on How the Private Institutions Could Contribute to the Broadband Mapping Initiative

The institutions were in full support of the CA's vision in mapping fiber infrastructure and proposed the following going forward:

- i. To leverage the new National Broadband Strategy under development, to ensure the mapping of broadband infrastructure inform the gap areas, end to end;
- ii. Invest in leveraging the use of emerging technologies such as Artificial Intelligence;
- iii. To explore the option of having a common portal serving the GIS platforms owned by all the private and public institution that can support broadband infrastructure;
- iv. Enhancing investment for capacity building, especially for government institutions;
- v. Seeking funding support to ensure that all relevant government institution can support fiber mapping in one way or the other acquire the GIS platform for this purpose.

6. Session 1c: Context and Current State – Intervention by the Private Sector

The session on context and current state - intervention by private sector was anchored under the main session theme of the policy and strategic orientation. The objective of the session was to provide the stakeholders in the private sector to share their respective GIS investment, mapping efforts, their relationship with CA, how they work in GIS and mapping and how they already contribute or could contribute to the broadband mapping initiative.

The session was moderated by Mr. Christopher Kemei with the following speakers drawn from the different private sector institutions serving various roles in the ICT sector:

- Safaricom PLC - Mr. Patrick Barasa Wesonga
- Liquid Telecom - Mr. Richard Were
- Representative, ESRI Eastern Africa – Mr. Biko Orlale
- Representative, GSMA – Mr. Linus Melly

To address the session objectives the private sector discussants spoke to their institutional information, investment in fiber infrastructure and mapping, and relationship with CA. They further deliberated on how the private institutions can contribute to the Fiber Mapping initiative. Safaricom Plc, Liquid, ESRI and GSMA made the following submissions:

Safaricom PLC

Safaricom is licensed by CA and is presently the largest telecommunications network in Kenya. As a mobile operator, Safaricom reported that the company collects data on network coverage, fiber footprint and links, traffic and usage statistics, customer complaints, driver testing, GIS-based radio planning (ArcGIS, QGIS), satellite imagery and predictive analytics. Safaricom further reported that the company uses advance GIS methodology that facilitates overlaying of data to facilitate outputs that inform their smart planning for coverage. Safaricom additionally stated that the company has experienced a number of benefits from it investment in mapping of data. The reported benefits included: improved regulatory alignment and streamlined reporting, reduced infrastructure duplication/cost savings and data driven investment planning.

Liquid Telcom

Liquid is licensed by CA as a Network Facilities Provider – Tier 2. Liquid reported that the company has considerable investment in terms of ICT infrastructure, with significant infrastructure taking the form of fiber infrastructure. The institution has established GIS platform with updated diverse ICT infrastructure data. The company made mention of the need to enhance collaboration on exchange of accurate data and the need to pursue integration of the various GIS platforms.

ESRI

ESRI is a technology solution provider and the provider of ArcGIS software. Esri informed the session that its ArcGIS software has various customized solutions including Broadband map solution for mapping and analyzing gap, powered by its capability to integrate ICT infrastructure. The system also has other functionalities such as analyzing Quality of Service (QoS). It was further presented that the advancement in the GIS solution now enables fast and precise signal coverage prediction therefore meeting the efficiency parameters which is a challenge when dealing with big data. It was mentioned that ESRI is presently the ArcGIS solution provider for CA. The data collected on the GIS platform relates to the licensed ICT services. It was further noted in the presentation that despite CA having the GIS platform and data input, the platform can further benefit from integration with other institution to facilitate overlaying of relevant data to effectively identify the access gaps.

Challenges presently affecting the effective operationalization of the CA GIS were presented. These included; the low quality of data received; accuracy concerns; lack of integration with other data sets by relevant government and private organizations; and the need to upskill officers capacity to handle advanced technical systems operations.

GSMA

GSMA is the global mobile operators association, covering more than 2000 mobile operators across the regions including African and by implication Kenya. GSMA shared its experience in collecting ICT data on broadband connectivity. It was further reported that the Association's reports have aids governments in making informed decision towards digital development. GSMA stated that whereas progress is being recorded in the area of expanding coverage in Kenya and the region, statistics by GSMA have revealed a challenge relating to an emerging concern associated with usage gaps. GSMA recommends the need to harness efforts by relevant government institution and private sector to device intervention that will address factors contributing to digital divide.

6.1. Contribution to the Fiber Mapping initiative

The private institutions expressed their readiness to contribute to the success of the broadband mapping initiative as key stakeholders. The stated contribution of the private sector to the initiative included; Establishing internal transparent, validated national broadband maps in compliance with the regulations; Sharing standardized datasets in agreed formats; Contributing in QoS field validation; Exploring use of open data;

Establishing collaborations with regulator, academia and innovators; and Sharing experiences/best practices based on their successes in deploying effective GIS platforms.

6.2 Challenges That May Hinder Private Sector Institutions Support of the Broadband mapping Project

The following were mentioned as part of the limitation that may negatively impact on the success of the broadband mapping initiative; Continuing production and use of inconsistent operator data formats; Overstated coverage reporting caused by lack of accountability mechanism; Limited GIS capacity to support big-data; Limited harmonization between players leading to missed opportunities in the savings on investment cost, both at the technical mapping level and to reduce service cost that contributes to meaningful connectivity; and Lack of supporting policies and regulation that allow for strategies such access and sharing of data.

6.3 Wayforward Towards Execution, Ownership and Sustainability

The institutions were in full support of the CA's vision in mapping fiber infrastructure and proposed the following going forward:

- i. Aligning operator data with CA regulatory framework
- ii. Providing granular GIS layers for national mapping (covering, capacity, affordability)
- iii. Enabling Data driven (evidence-based) planning to avoid duplication of infrastructure
- iv. Supporting policy development and universal service initiatives
- v. Establishing transparent, validated national broadband maps
- vi. Sharing standardized datasets in agreed formats
- vii. Contributing to QoS field validation
- viii. Exploring open data collaborations with academia and innovation

7. Session 1d: Context and Current State– Intervention by the International Partners

The session on context and current state - intervention by international partners was domiciled under the main session theme of the policy and strategic orientation. The objective of the session was to gain insights from the international partners on their views on digital development and initiatives to promote broadband coverage Kenya. The session was moderated by Mr. Christopher Kemei with the following speakers drawn from the different government agencies with mandates relevant to the broadband mapping initiative:

- Representative, World Bank - Mr. Tim Kelly, Lead Digital Development Specialist
- Representative, EU – Milou Vanmulken, Digitalisation Lead
- Representative, Internet Society – Mr. Barrack Otieno

- Representative, EACO - Ms. Caroline Koech

The session participants included the World Bank, European Union, Internet Society and East African Communications Organization (EACO). The international partners made mention of the following in their discussions.

World Bank

World Bank expressed the interest of the Bank in promoting broadband fiber mapping, owing to their on-going digital development programmes. In this regard, the Bank's representative indicated that they were concurrently working on developing a framework for Open Fiber Data Standard (OFDS) to promote open data on ICT networks as a public good. It was further mentioned that the Bank under the Kenya Digital Acceleration Programme (KEDAP) is investing approximately USD200M to support various digital projects including fiber mapping to identify the unserved and underserved areas in the country. The representative spoke to the new broadband infrastructure financing approach, where the Bank has adopted reverse auction model as an approach to sourcing for bidders to participate in the roll-out of planned fiber infrastructure project.

European Commission (EC)

European Union commended on going efforts by the Kenya government towards bridging the digital divide. The EC representative spoke to their changing model of investment which is now involving co-funding between financing from European Union (EU) and the private sector. It was reported that EC has invested locally in technology companies such as Cassava Technologies and Poa Internet Ltd an ISP/ASP service providers. The representative spoke to the need to use regulation to operationalize the effective broadband data collection, sighting the success story of the regulators within the EU. It was also stated that EU is supporting other digital development projects in Kenya such as revising Kenya's Data Protection Policy and development of the attendant Strategy. All members presented were urged to create interest in the ongoing development in the data protection space as these will bear a ripple effect of the broadband mapping project.

Internet Society

Internet Society, Kenya representative spoke to the great interest that the institution has in the broadband infrastructure and is pursuing strategies to ensure that connectivity covers the entire population in Kenya. It was reported that one of the digital development initiatives that the institution was supporting in Kenya is within the Community Networks (CN) segment. Additionally, Internet Society has also been explore initiatives relating to mapping of coverage undertaken at the community level using the open-street maps technology, in order to include the communities on the world maps. It was observed that, through the CN initiatives, atleast 17 networks are presently operational in Kenya following the promulgation of the CN licensing framework, with other efforts beign made to achieve a target of licensing and operationalizing atleast 100 CNs by 2027.

East Africa Communications Organization (EACO)

EACO is a regional organization mandated to harmonize ICT practices within the East African region. The Executive Secretary (ES), EACO, informed members that presently, EACO has a membership of Seven (7) East African Community countries. The EACO- ES stated that, the institution has the advantage to canvas for the regional digital development and regulatory positioning, while pushing for adoption at the national level. The EACO-ES mentioned some of EACO's capabilities and successes which included initiatives such as; cross-border frequency coordination that has reduced cross border interference; harmonizing USF frameworks to provide members with broadband financing models; collection of regional ICT statistics; and development of regional broadband strategy. EACO-ES reiterated the institution's commitment to partner with all other relevant institutions, not only to the broadband mapping project but, to also leverage the output of the initiative to develop transformational digital development policies.

7.1 Challenges Identified by International Partners That May Hinder Effective Implementation of Broadband Mapping Project

According to the perspective presented by the international partners, there still exists some limitation that may negatively impact on the success of the broadband mapping initiative. Key among the mentioned challenges include; Inadequacies in data governance; Existence of gaps in the data management legal frameworks; Limited capacity development at the local level; and Fragmented policies within the ICT sector and across sectors e.g electricity, roads etc, that limit the much desired harmonization

7.2 Wayforward Towards Kenya's Execution, National Ownership and Sustainability of Broadband Mapping

The international partners mentioned the following as part of the proposal to be considered going forward to support the initiative:

- i. The need to invest in communities as a way of bridging the digital gap using the 'bottom-up approach.'
- ii. The need to partner especially to support connectivity solutions at the community level.
- iii. The need to have valid and accurate data oversighed by mandated bodies
- iv. Supporting a coordinated resource planning/fund mobilization
- v. The need to leverage emerging technology such as AI and application of decision-intelligence to fast-track gains such as broadband mapping
- vi. Coupling efforts such as mapping initiatives with strategies such as investing in content creation to has the achievement of the ultimate goal which is attaining meaningful connectivity.

8. Session 2: Africa-Broadband (BB)-Maps in Kenya: Objectives, Technical Framework, Timeline

The workshop's second session was guided by the theme 'Africa-Broadband (BB) Maps in Kenya: Objectives, Technical Framework and Timelines'. To start off the discussions, ITU's Broadband Maps project coordinator - Africa, Mr. Dana Jon Kamason, stated the objective of the project which is to establish and operationalize sustainable national broadband mapping systems to enable; validated, publicly accessible broadband data; evidence-based policy and regulation; targeted infrastructure investment; inclusive and equitable connectivity; accelerated digital transformation; regional harmonization; alignment with international standards. The session was informed that the mapping project is anchored on three (3) pillars ie. Policy & Regulation; Technology and Capacity Development. The technical framework is prioritizing the three (3) components i.e. People; Process and Technology. It was further stated that implementation of the project will consist of the assessment of current status and developing strategies that will move Kenya to the desired position. It was also indicated that Kenya's broadband mapping roadmap will cover the period 2025-2028, consists of the following stages: Foundation and readiness – 2025; System development and capacity building – 2026; Operationalization and policy alignment – 2027; and Sustainability and regional leadership - 2028.

DAY 2 - Technical Systems & Data Readiness

9. Session 2a: Keynote on Strategic Technical Priorities for Broadband Infrastructure Mapping

The first session of the second day of the workshop was guided by the theme 'Technical Systems & Data Readiness'. To start off the discussions, the Communications Authority of Kenya's representative Eng. Edwin Ombega, spoke to the strategic technical priorities for Broadband Infrastructure Mapping. The session focused on key issues such as; the importance of Collaboration within the ICT industry and across sectors; the need to dedicate investment targeting the bridging of the digital divide; the importance of prioritizing collecting of accurate data to inform policies and strategies to expedite the closing of gaps; and the urgent need to harness efforts, leveraging broadband to ensure that we are leaving no one behind.

10. Session 3: Case Studies from ITU Experts: What Lessons Apply

The session led by ITU's representative – Project Officer, African BB-Maps project, Mr. Elind Sulmina focused on policy work of the Africa BB Maps. It was reported that the overall policy of the initiative was to 'strengthen enabling environment for broadband mapping to fully operate without policy and regulatory constraints. The stated aim of the project being to strengthen broadband mapping systems within the national regulatory agencies, ultimately, contributing to the closing of connectivity gaps, while remaining aligned with harmonized regional practices. It was further mentioned that the key outputs out of the policy work process will be policy analysis and guidelines at country level; and increased policy dialogue and awareness at national/regional level. The other key highlights of the presentation covered aspects such as; Pillars of policy work of BB mapping; Regulatory practices & frameworks; Policy promotions & advocacy; and Expected policy outcomes of the project.

Mr. Maiyo, ITU's GIS Expert lead the session that focused on how ITU has supported in the Europe region and the challenges/lessons learnt from EU. The session spanned issues relating to creating a comparative analysis between the Europe jurisdiction and the Kenya situation providing cases of countries such as Italy, Slovenia, Lithuania, Poland and

Cyprus. The Data sources components include the Operators, government agencies; policies available ; Geoportal; National spatial data infrastructure (NSDI). The BB mapping system development ecosystem involved; National regulatory authority; relevant government ministries; network operators; service operators, mobile operators, local authorities, state owners of address databases and cadastral data, utilities and owners of physical infrastructure, and customers.

The recommended stakeholders engagement cycle involved the following steps; stakeholder analysis (identifying main stakeholder); Informing Phase (Providing stakeholders with balanced and objective information to help them understand the project); Consult phase (gathering feedback on the information provided); Involving phase (to define system requirements, ideas and concerns are fully understood and taken into account); Collaboration phase (useful at the stage of system testing. The deliberations of the session captured key issues including : the need to own the BB mapping project as a national project that requires domestication of any provided options/ country benchmarks to suit Kenya's situation, focusing on a wholistic approach that include key components of consumer needs, data protection, security issues and others; the need for CA to further engage with KNBS and leverage the available collaboration framework to enhance the questions in the national census to better address the data requirements for BB mapping purposes; and the urgent need for CA to deepen engagement with county government in order to ultimately resolve the challenge affecting roll-out of broadband infrastructure at the county level.

11. Session 4: Technical Deep-Dive: Architecture, Standards, Tools And Data Ecosystem

The session focused on the technical deep-dive: architecture, standards, tools & data ecosystem. The objective of the session was to: share ITU's Technical specifications to establish or strengthen the national broadband mapping systems in Kenya and assess the before versus the after; timeline and Country Implementation Plan (CIP), including the analysis on Data Standards, Tools, Interoperability, Operator Reporting, QoS, and Crowdsourcing Best Practices. The session was moderated by Mr. Dana Jon Kamason, Project Manager, Africa-BB-Maps, ITU, which the following institutions speaking to the subject of BB Maps system architecture, standards, tools and data ecosystem;

- Mr. Derick Khamali, Assistant Director, Licencing & Compliance, CA
- Mr. Julius Lenesaiyan, Officer, Licencing & Compliance, CA
- Mr. Victor Wahome, Aegir Consultant
- Ms. Aisha Jenkins, ITU Speaker
- Dr. Leonard Mabele, AFRALTI/ Open Data Services Consultants

ITU Representative - Mr. Dana Jon Kamason

ITU Africa project coordinator Mr. Kamason took members through a technical brief of the GIS platform. It was noted that GIS software can take the format of Open Source software or Proprietary software. The ITU confirmed that the project shall be adopting an Enterprise system approach. Other components that were raised as core to facilitating decision making, included: **Architecture Pillars of the BB Maps:** Issues to consider include security, integration, performance & scalability, automation, reliability and observability;

Architecture Systems Patterns: Location Services, Imagery data management and analytics, self service mapping analysis and sharing, Mobile operation and offline data management, enterprise application hosting and management, real-time data streaming and analytics, data editing and management, big data analytic; **Architecture Deployment model:** Decision to opt for either On-premises, IaaS, PaaS, SaaS, or another other; and **Open data** e.g Geospatial Open data for Kenya, Street Maps etc

Communications Authority (CA) Quality of Service (QoS) Mapping

CA's representative Mr. J. Lenesaiyan made a submission on the present telecommunication QoS measurement and mapping framework. The presentation spoke to the architecture of CA's QoS framework which is anchored on three (3) pillars i.e. Drive-Test, Network Performance and Quality of Experience (QoE). The QoS measurement Unit is sub-location level. Further reference was made to the CA-QoS measurement targets both voice and data quality. The presenter confirmed that the measurement of QoS for telecommunication services will greatly benefit from the outputs of the BB mapping platform.

ITU Representative - Ms. Aisha Jenkins,

ITU's representative responsible for the project's capacity building, Ms. Jenkins affirmed the importance of capacity building to support project implementation. In her presentation Ms. Jenkins shared her experience in GIS capacity building was also agreed that each country needs do vary and therefore capacity building to support the BB mapping project will be customized to the Kenya situation.

World Bank Open Data Services Project - Open Fiber Standards Consultant

The World Bank's Kenya Digital Acceleration Programme (KEDAP) Consultants on the Open Fiber Standards Consultant presented a summary of the Open Fiber Data Standard on publishing publically data on fiber networks. The presentation indicated the benefits of OFDS to both the government and the private sector. One of the use cases of OFDs benefits is the facilitation of transport services, best used in the developing countries. The mapping mainly captures the backbone typology. It was noted that institutions can meet the privacy requirements by classify what is Open Data for public access and what is classified data.

Aegir Consultants

Aegir is a technology firm, specializing in integrating of enterprise systems. Aegir's representative spoke to the importance of implementing enterprise system with the capability to integrate with other systems. He further spoke to the importance of having a clear vision to support any digitization project beyond deploying the system. He reiterated that it is the vision of the project that determines the best architecture, approach and successful of implementation.

11.1 Factors Limiting Adoption of Effective BB Maps Architecture, Standards, Tools and Data Ecosystem

The challenges associated with the aspects of BB Maps system Architecture, Standards, Tools and Data Ecosystem that could possibly hinder the realization of a sustainable broadband mapping platform were identified. These included factors such as; Duplication in investments in rolling out of infrastructure ; Lack of complete record of nation-wide fiber infrastructure rolled out, including dark fiber and lit fiber; Inadequate stakeholder mapping and engagement; Limited data availability and accessibility; Data Quality & Standardization limited by inconsistent or total lack of adherence to open standards, incomplete reporting; Technical & infrastructure limitations limiting integration with legacy systems, incomplete infrastructure maps, limited processing capacity; and Fragmented mandates requiring regulatory & institutional coordination.

11.2 Proposed Mitigations for Effective Operationalization of BB Maps Architecture, Standards, Tools and Data Ecosystem

Arising from the deliberations, it was noted that the issues that can be prioritized to facilitate the achievement of an effective and sustainable technical ecosystem for effective broadband mapping initiative included:

- i. Adoption of Open Fiber Data Standard to anchor the components of; sharing of agreed data sets publicly, harmonizing data set, enhancing data accuracy.
- ii. Revision of regulation and policy to support open data.
- iii. Undertaking a deep-dive in the scope and span of stakeholders required for effective collaboration and partnership to ensure data accuracy and harmony.
- iv. Investing in capacity building ;
- v. Adoption of sustainable and scalable GIS solution.

12. Session 5: Policy Deep-dive: Presentation of Upcoming Policy Analysis Work

The session was on policy deep-dive and thereby provided ITU's an opportunity to share the proposed policy development framework, specifications to establish or strengthen the national broadband mapping systems in Kenya. The session was moderated by Mr. Elind Sulmina, ITU Project Officer, Africa-BB-Maps project. The session speakers were:

- Eng. Leo Boruett, Director, USF, CA
- Prof. Thomas Senaji, ITU Speaker

ITU Representative – Mr. Elind Sulmina, Project Officer

The ITU representative Mr. Sulmina, took members through the outline of developing the policy framework and the recommended structure which consisted of four (4) main chapters. The chapters covered were: Chapter. 1 - Introduction/content/background/problem statement ; Chapter. 2 - Strategies, policies and regulatory environment for broadband mapping; Chapter.3 – Project setup and technical

requirement for broadband mapping and Chapter.4 – Project set-up and technical requirement for broadband mapping project management/common challenges. The other components that were advanced as being pertinent to realization of effective and sustainable BB mapping system were: Infrastructure mapping; Investment mapping; Service mapping; and Demand mapping.

Communications Authority of Kenya, Eng. Leo Boruett

Director, Communications Authority of Kenya - Universal Service Fund (USF) spoke to the linkage between the national Constitutional requirement, which prioritizes the provision of service to the people. He indicated that this constitutional requirement is the reason the regulator exists making every effort including the BB mapping effort being about service provision to the citizens. The other ICT policy framework documents that were mentioned as being of pertinency to this initiative included; the National ICT Policy, 2020, ICT regulations, ICT Licensing framework, ICT Sector Guidelines, and compliance monitoring tools. He identified present gaps that can inform the revision of policy for better BB mapping project implementation. The identified gaps included: The need to enhance accountability, enhancing interoperability, and enforcing data sharing.

ITU Representative – Prof. Senaji

ITU's Expert Prof. Senaji spoke to the essence of the desired policy supporting the achievement of Universal Meaningful connectivity. Meaningfully connectivity implying indiscriminate access to broadband that is of – high quality, readily availability, affordability, access to affordable devices, digital skills, safe and secure online experience. It was submitted that, the themes to consider in the policy should include; promotion of innovation, and data management. Prof. Senaji spoke to challenges at regional level included; High cost of data; Security concerns; Incomplement One Network Areas implementation. Additionally, he made mention of national and regional trends supporting digital development. The noted trends included: Increased adoption of digital transformation; Improving connectivity; improving affordability; Improving digital inclusion and Digital entrepreneurship. He further shared lessons learnt from Body of European Regulators for Electronic Communications (BEREC). The good practices in policy adopted within the European jurisdiction in implementing broadband projects included; focusing on end users, sustainability practices, monitoring and analysing market trends, and consumer protection.

The discussions on policy deep dive and benchmark with the European experience concluded with the call for Kenya to benchmark with the European good policy and regulatory practices. It was further advanced that the East Africa region can leverage EACO, to adopt BEREC's experience as a benchmark in effective and sustainable implementation of the BB Maps initiative.

13. Session 6 & 7 - Co-creation Dialogue on the Technical, Policy and Regulatory Work

The meeting applied practical co-creation sessions that provided opportunity for in-depth discussions on technical aspects and policy and regulatory aspects. The indepth discussion focused on the following three (3) main BB Maps concerns;

i. **Technical Aspects – Data governance –**

Explored aspects such as; Data governance; Standarization; Collection mechasism; Data Quallity and Validation and Verification;

ii. **Technical Aspects - System/Platform –**

Looked at aspects such as Performance; Security; Scalability; Reliability; Automation; Integration; Observability; Cost Training;

iii. **Policy & Regulatory Aspects –**

Considered aspects such as Internal legal or policy barriers; Coordination Challenges between data providers and CA; Data ownership and confidentiality; Institutional limitations; National & Regional harmonization.

The co-creation session ended with written submissions containing recommendation on possible way forward on data governance operating procedures (See Annex i); guide to selection of broadband mapping system (See report at Annex ii) and matrix on gaps and mitigations to achieve and enabling policy that will support broadband mapping (See report at Annex iii).

DAY 3 - Stakeholder Coordination & Roadmap Development

14. Session 8: Effective Coordination for Broadband – Cross-Sector Synergies, Data Sharing & Protection

The first session of the third day of the workshop was anchored on the theme ‘Stakeholders Coordination & Roadmap Development’. The session was moderated by Mr. Christopher Kemei, and had the following speakers set-pace for the discussions on how Kenya can achieve effective coordination for Broadband project.

- Eng. Edwin Ombega, Principal Officer, USF, CA
- Mr. Dana Jon Kamason, Project Manager, ITU Africa-BB-Maps

To start off the discussions, the Communications Authority of Kenya’s representative Eng. Edwin Ombega, spoke to the subject matter of effective coordination for broadband. The following aspects were presented as benefits of effective coordination in Broadband projects: Reduction of cost; Contribute to ease in achieving ubiquitous services; Competitive markets pass on the benefit to the users in terms of lower service cost; Faster pace of deployment of services as most burden of approval is borne by one partner and the benefit passed on to others co-deploying; Enhanced infrastructure resilience and Environmental sustainability. In terms of broadband infrastructure coordination, the following models were noted as being key to coordination: Joint Deployment; Hosting; Dark Fiber; Joint Venture; Wholesale telecommunication. The following issues were identified as part of challenges that impact on effective coordination; Limited awareness on the benefits of co deployments and sharing; Regulatory constraints imposed by the legacy mandates of public utilities ; Price regulations and need to secure compensation/recouping investment; Lack of clear legal and regulatory framework for infrastructure sharing; Lack of sufficient funding to secure present infrastructure for future use; and Lack of capacity/skills to deploy complex project

The presentation paved way for deliberations by the meeting, where it was concluded that it is of importance to give credence to multi-agency/multi-stakeholder approach to effectively operationalize BB Maps initiative. It was further agreed that implementation of such a project can benefit from a co-creation approach, using the guidance of a Steering Committee and Technical Working Group (TWG) under the guidance of a lead agency. Additionally, the session generally agreed that coordination is closely linked to effective stakeholder mapping, targeting both government institutions and private sector players. It was finally stated that, from partnering with other stakeholders will deliver benefits to the projects including; data sharing, systems integration, policy reviews and capacity building.

The following were fronted as recommendations going forward;

- i. Encourage cross sector co-deployment and sharing project, supported by government policy;
- ii. Encourage public policy that advances cross-sector infrastructure co-deployment and sharing;
- iii. Maintain a geospatial inventory of infrastructure for sharing;
- iv. Pursue and cross-industry coordination and regional cross border coordination;
- v. Harmonization of relevant sector regulations;
- vi. Encouraging competition and addressing low-revenue areas.

15. Session 9: Finalization of the Stakeholder Mapping – Roles & Responsibilities

The session was moderated by ITU's BB Maps Africa Project Coordinator Mr. Kamason. Members were taken through key issues that guide effective stakeholder mapping. Members collaboratively undertook the mapping exercise that linked the key stakeholder mapping pillars i.e Lead agency; Data governance roles; Policy role; and Capacity development role which the relevant responsible parties. The outcome of the collaborative stakeholder mapping delivered the following results:

- i. The lead agency – Communications Authority of Kenya (CA)
- ii. Data governance role:
 - Data Providers; - Several institutions in possession of relevant data
 - Data Custodian – CA
 - Data Stewards – All Stakeholders
 - Data Owners – Data Providers
 - Data Consumers – All Stakeholders
- iii. Policy Roles – MICDE, CA, Office of Data Protection Commissioner
- iv. Capacity Development Roles – ITU, CA (working with local partners)
- v. Other Roles: M&E, Awareness Creation, Enforcement and Compliance

16. Session 10: National Roadmap – Final Timeline, Training Program & Next Steps

The session was led by ITU's BB Maps Africa Project Coordinator Mr. Kamason and Ms. Jenkins. Focus was given to issues relating to capacity development Roadmap for the Kenyan context. The ITU Capacity Development Framework (2026-2028) was shared. The capacity building framework indicated that the programme will mainly focus on GIS, Data, Policy with the expected outcome being, sustainable expertise in the three components. The training will take different formats and approach which will include a mix of in-person,

online instructure and on-line self-paced. The target audience will include; GIS Specialist technical teams, Data Managers Analysts and Policy and Regulatory Officers. The training will be coordinated by ITU working with the local specialist institutions.

The Africa BB-Maps next steps was shared with members. This was in form of a roadmap that envisioned a time span of four (4) years i.e. 2025 to 2028. The key projected milestone to be covered will be; 2025 – Foundation & Readiness; 2026 – System Deployment & Capacity Building; 2027 – Operationalisation & Policy Alignment; 2028 – Sustainability & Regional Leadership. Underlying this journey will be five (5) core drivers i.e. the continual identifying gaps, improving, innovating and effective management of the process and eventual sustainability beyong 2028.

17. Closing Ceremony

The workshop come to an end on Wednesday 27th August 2025 afternoon hours. The closing session was presided over by the Director – Universal Service Fund, Communications Authority of Kenya, Eng. Leo Boruett. In his closing remarks, Eng. Boruett expressed his sincere gratitude and that of the Authority's Management to the ITU for selecting Kenya to be among the 1st eveleven (11) African countries to benefit from the BB mapping project. He thanked all the stakeholders for dedicating time to attend the workshop. He finally called upon all stakeholder to keep up with the demonstrated commitment and continue supporting the BB Mapping Systems project process to ensure successful implementation and operationalization. In his concluding remarks he called upon all stakeholders to rember that BB Mapping project will assist Kenya achieve the bigger national goal of bridging the existing digital divide, towards attaining a digitally transformed nation.