Technical Assistance for Preparation of a Commercial Transaction Manual for Digital Infrastructure Deployment

The Information and Communications Technology Authority, Kenya

Deliverable #2:
Open Access Network Report

Issued by
Detecon Consulting FZ-LLC
3rd Floor Building No.01 Office N
Dubai Internet City
UAE

Subsidiary of Detecon International GmbH
Bayenwerft 12 -14
50678 Cologne
Germany

Your contact persons:

Ulrike Eberhard
Mobile: +49 170 228 39 63
e-Mail: Ulrike.Eberhard@detecon.com

Sasa Nedeljkovic
Mobile: +49 171 388 16 22
e-Mail: Sasa.Nedeljkovic@detecon.com

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ICT Authority

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1 Executive Summary

The Government of Kenya is steadily advancing the digital transformation of its economy, with the overarching goal of fostering inclusive growth and enhancing the quality of life for its citizens. In close collaboration with international partners most notably the World Bank, Kenya is implementing the Kenya Digital Economy Acceleration Project (KDEAP), an ambitious initiative aimed at to enhance digital infrastructure, services and skills for inclusive participation in the national digital economy and to boost cross-border digital services.

A central focus of this effort is the development of a robust telecommunications networks, including backbone and middle-mile infrastructure, to deliver high-speed internet connectivity to schools, healthcare facilities, and underserved communities. Complementing programs such as the National Optic Fiber Backbone Infrastructure (NOFBI) - One Government Network - and the Digital Superhighway that are further strengthening broadband access across counties and sub-counties. These initiatives are part of a broader national strategy to ensure that digital services are accessible to all Kenyans, regardless of geographic location or socioeconomic status.

This report has been prepared as part of the 'Commercial Transaction Manual' (CTM) project, which will establish the operational framework and disbursement guidelines for Component 1 of KDEAP – Phase 1.

Within this Open Access Report, the consultant provides an assessment of Kenya's current telecommunications market landscape, identifying key stakeholders, evaluating potential investors for KDEAP opportunities, and drawing on international best practices in Open Access. The findings and strategic insights derived from this analysis are synthesized into a set of recommendations, presented in Chapter 10, to inform and support the decision-making process, during the development of the CTM.

Outlined below are the main findings, insights and recommendations derived from the assessments.

Kenya leads in Sub-Saharan Africa's telecom sector, with strong mobile and internet penetration. Its access to submarine cables gives it a strategic advantage for regional connectivity. While mobile and new LEO satellite services are growing, fiber remains essential for national backbone and cross-border backhaul to landlocked neighbors like Uganda and South Sudan.

The government is actively working to close the digital divide through initiatives like KDEAP, which aims to expand affordable internet and digital skills. KDEAP is structured in two phases (2023–2028 and 2026–2030), involving both public and private stakeholders.

Investment interest is high, with telecoms, utilities, and global players potentially interested in exploring opportunities. Licensing is governed by the NFP framework, though rollout faces local-level regulatory hurdles.

Infrastructure sharing is legally supported but not widely practiced. Stronger enforcement is needed to improve service competition, particularly in remote and rural areas.

Relevant Recommendations for the elaboration of the CTM document include:

- To consider the eligibility of new investors profiles, beyond the current licensed operators. It may enable Backbone networks to leverage cross sector use of infrastructure.
- To evaluate leverage KDEAP subcomponent 1.5 (Cross-border) with facilitating the way leaves for deployment of submarine cables and streamline relevant processes for Datacentre's, SCLS's and landing of submarine cables, in order to become an attractive international connectivity HUBs, similarly to Singapore, India, or Hong Kong.
- To evaluate the participation of operators on the selection of priority routes (or operators' proposals).
- The current set of licenses issued by CA in Kenya does not include (nor exclude, for that matter) a wholesale-only access. Understanding this is a topic for a concurrent project at CA, it is recommended to evaluate the wholesale-only license for the selected commercial model.
- The level of tax is quite high, and this raises the cost to communicate in Kenya which in turn raises the proportion of areas which are not profitable to be served. It is recommended that telecommunications should be seen as a driver of economic development to be encouraged rather than a luxury good to be taxed.
- There is international evidence on the benefit of the adoption of Open Access Fiber networks for backbone and middle mile networks. It is recommended the adoption of open access principles, following recommendations from international organizations as the European Commission, the World Bank and ITU.
- It is recommended to include on the CTM document, considerations related to the technology challenges (Multi-vendor interoperability) that may arise as part of the implementation of open Access Fiber, and as well considerations with regards to the benefits in terms of Sustainability and carbon footprint reduction.

The recommendations outlined above have been reviewed and aligned with all relevant stakeholders. This common understanding will serve as basis for the coming deliverables, specifically the Commercial Model and the Commercial Transaction Manual, ensuring consistency and a common direction moving forward.

2 Project context

2.1 Fiber Based Broadband Challenges in Kenya

Kenya's efforts to deploy rural broadband face numerous obstacles, such as challenging geography, sparse populations, high user costs, limited ISP competition, low digital literacy, insufficient relevant content, and unreliable power. To overcome these hurdles, a combination of innovative technologies and diverse financing models—like Public-Private Partnerships (PPPs), Universal Service Funds (USF), blended finance, subsidized loans, and development finance from entities like the World Bank—is crucial. Government support through direct subsidies, tax incentives, demand aggregation, and Output-Based Aid (OBA) can further encourage private sector investment. By integrating these technical solutions and financing strategies with supportive regulatory frameworks and public-private partnerships, Kenya can significantly advance rural broadband deployment and close the digital divide.

2.1.1 Broadband Development in Kenya

Kenya's broadband development has seen significant progress with the arrival of undersea fiber optic cables like TEAMS, SEACOM, and EASSy. These cables have established a robust foundation for high-speed internet, lowering costs and boosting speeds. The National Optic Fiber Backbone Infrastructure (NOFBI) project has further expanded fiber networks nationwide, connecting all 47 counties and ensuring even remote areas have high-speed internet access. Companies such as Safaricom, Zuku, Liquid Telecom, and Jamii Telecommunications have accelerated efforts to bring broadband to end-users by offering fiber-to-the-home (FTTH) services in major urban centers and expanding to more regions. The Kenyan government has also launched several initiatives and policies to support broadband development, including Vision 2030, the National Broadband Strategy (2013-2017), and the Digital Economy Blueprint (2019), with the goal of transforming Kenya into a leading digital economy in Africa

In summary, the fixed broadband in Kenya has seen several key developments in recent years:

Expansion of Fiber Networks: The National Optic Fiber Backbone Infrastructure (NOFBI) project has been instrumental in laying extensive fiber networks across the country, connecting all 47 counties[1].

Increased Competition: Companies like Safaricom, Zuku, Liquid Telecom, and Jamii Telecommunications are actively expanding their fiber-to-the-home (FTTH) services, particularly in urban areas[2]. This competition is driving improvements in service quality and reductions in prices.

Higher Speed Preferences: There has been a significant shift towards higher internet speeds. As of December 2024, nearly 40% of fixed internet customers preferred speeds

between 10 Mbps and 30 Mbps, and there was a remarkable increase in users opting for speeds between 100 Mbps and 1 Gbps.

Market Growth: The fixed broadband market is growing, with Safaricom leading in market share, followed by Jamii Telecommunications and Zuku. New players like Poa Internet are also making significant strides.

2.1.2 Status of Rural Broadband Deployment in Kenya

Kenya's rural broadband deployment has made strides, notably through the National Optic Fiber Backbone Infrastructure (NOFBI) project, which has connected all 47 counties with fiber optic cables. This project provides the backbone for further local distribution of internet services. However, last mile connectivity in rural areas remains slower and less extensive compared to urban regions. Companies like Safaricom, Liquid Telecom, and Jamii Telecommunications are expanding their services, but their focus has primarily been on more profitable urban and peri-urban areas. In rural Kenya, mobile networks, particularly Safaricom's 4G, are the most common form of internet access, while 5G is still largely confined to urban centers.

To bolster rural broadband deployment, the Kenyan government has launched initiatives like the Universal Service Fund (USF) and the Digital Literacy Program (DLP). Administered by the Communications Authority of Kenya, the USF finances the expansion of ICT services in underserved areas, targeting schools, health centers, and other public institutions. The DLP aims to enhance digital literacy by distributing digital devices to schools nationwide, including rural areas. However, the success of these programs depends on reliable internet connectivity, which remains inconsistent in many rural regions

Despite these efforts, several challenges continue to impede rural broadband deployment in Kenya. Geographical barriers, such as remote and mountainous regions, make it costly and logistically challenging to lay down fiber optic cables or establish reliable mobile network infrastructure. Low population density reduces the economic viability for ISPs to invest heavily in infrastructure, leading to slower deployment. High costs for end-users, limited competition among ISPs, low digital literacy rates, lack of relevant content, and unreliable power supply further complicate the deployment and maintenance of broadband infrastructure in rural areas. Addressing these challenges is crucial to ensuring that all citizens have access to the benefits of high-speed internet.

2.1.3 Technical Solutions for Rural Broadband Networks

Deploying broadband in rural areas necessitates a blend of innovative technologies to address challenges like low population density, difficult terrain, and limited infrastructure. While fixed broadband provides high bandwidth, it is prohibitively expensive outside densely populated, affluent areas and is primarily used in urban centers and along mid- and long-fiber backbone infrastructure.

Satellite broadband, utilizing either geostationary or low Earth orbit (LEO) satellites, offers connectivity in remote areas. Geostationary satellites have been used commercially, but their high cost and low bandwidth make them less suitable for widespread public use. LEO satellites, such as those from OneWeb, Starlink, and Project Kuiper, promise higher speeds, though their actual performance is still under evaluation. TV White Space (TVWS) technology leverages unused spectrum in the TV broadcast band to deliver wireless broadband, with signals capable of traveling long distances and penetrating obstacles.

3 Market Survey Assessment

Kenya's telecommunications sector stands out in Sub-Saharan Africa, with strong internet penetration and a growing contribution to the national economy. The ICT sector accounts for 8–10% of GDP, placing Kenya ahead of many regional peers. This growth is driven by a dynamic mobile market, expanding fixed broadband services, and ongoing investments in fiber infrastructure.

The mobile segment dominates, with a penetration rate of 139% in 2024—well above the regional average. Safaricom leads the market with a 64% share, followed by Airtel at 32%, and Telkom at 2%. Both Safaricom and Airtel launched 5G services in 2023, rapidly expanding coverage across the country. These developments are supported by improvements in mobile backhaul, with operators investing in fiber and microwave links to strengthen network reliability.

In the fixed broadband space, penetration grew steadily from 1.5% in 2020 to 3.0% in 2024. Safaricom, Jamii Telecommunications, and Wananchi Group are key players, offering fiber-to-the-home and hybrid fiber-coaxial services. Newer entrants like Poa Internet and Airtel are also expanding fixed wireless access, including 5G-based solutions.

At the core of this ecosystem is the national fiber backbone, which supports both fixed and mobile services. Government-led initiatives such as the National Optic Fiber Backbone Infrastructure (NOFBI) and the Digital Superhighway are expanding this backbone to improve connectivity across all counties. These efforts are crucial for enabling open access, reducing infrastructure duplication, and ensuring that broadband services reach underserved areas.

Figure 1 - Telecom Landscape in Kenya

The team put together the current licenses owned by the companies that are potentially interested to invest, both telecom companies and utilities companies.

Company	License Type
Safaricom	Network Facilities Provider Tier 1 (NFPT1), Application Service Provider (ASP), Content Service Provider (CSP)
Airtel	Network Facilities Provider Tier 1 (NFPT1), Application Service Provider (ASP), Content Service Provider (CSP)
Telkom	Network Facilities Provider Tier 1 (NFPT1), Application Service Provider (ASP), Content Service Provider (CSP)
Jamii Telecom	Network Facilities Provider Tier 1 (NFPT1), Application Service Provider (ASP)
Liquid	Network Facilities Provider Tier 1 (NFPT1), International Gateway Operator, Submarine Cable Landing Rights
Zuku (Wananchi)	Network Facilities Provider Tier 2 (NFPT2), Application Service Provider (ASP), Content Service Provider (CSP)
Poa Internet	Network Facilities Provider Tier 3 (NFPT3), Application Service Provider (ASP)
Mawingu	Network Facilities Provider Tier 3 (NFPT3), Application Service Provider (ASP)
Frontier	Network Facilities Provider Tier 2 (NFPT2), Application Service Provider (ASP)
Vilicom	Network Facilities Provider Tier 2
ATC	Network Facilities Provider Tier 1
TEAMS	International Gateway Operator
SEACOM	Network Facilities Provider Tier 1 (NFPT1), Submarine Cable Landing Rights
KPLC	Network Facilities Provider Tier 2 (NFPT2) – for leasing dark fiber infrastructure
KETRACO	Network Facilities Provider Tier 2 (NFPT2) – for leasing dark fiber on transmission lines
KPC	Network Facilities Provider Tier 2 (NFPT2) – for fiber along pipeline infrastructure

Tabel 1 - Licenses per Potentially Interested Investor Companies *(Source: Detecon analysis)*

3.1 Market Survey Interviews

The interviews outcome has provided evidence of the high interest from potential local and international investors to participate in the KDEAP initiative, almost all potential investors have confirmed non-binding interest to participate actively on the component 1 of the KDEAP Project, the potential investors confirmed the set-up of internal teams to evaluate commercial models that enable an efficient use of the KDEAP fundings.

An overview of the interviews findings and remarks is described as follows:

Operator Name	Expanded Summary
Telkom Kenya	▪ Tier 1 Licensed operator ▪ Concerns about investment protection and low demand areas ▪ Valuable skills and assets in fiber optic networks ▪ Network reaches all 47 counties Interest in subcomponents 1.1, 1.2, 1.3, 1.5 ▪ Open to collaboration with public and private entities ▪ Focus on telecommunications build and operations ▪ Sees potential in large areas for network deployments ▪ Perceives Kenyan telecom NDA as an advantage ▪ Interest in digital infrastructure investments
TEAMS	▪ Interest in pre-purchase of internet and subcomponent 1.5 ▪ Emphasizes network resilience for international connectivity ▪ Inquired about the stage of the process and funding ▪ Offered assistance with Co-Build investment experience
BCS	▪ Licensed Tier 2 Operator ▪ Experience in international fiber routes ▪ Interest in subcomponents 1.1 and 1.5 ▪ Interest in Co-build/Consortium model ▪ Legal team open to innovative investment approaches ▪ Awaiting further quantitative information for business plans
JTL (Jamii Telecommunication)	▪ Interest in participating as potential investor ▪ Interest in larger geographical areas for bidding ▪ Suitable to mix sub-components for commercial viability ▪ Inquired about environmental studies for funding access ▪ Concerned about Wayleaves and infrastructure protection
Liquid	▪ Around 200 employees in Kenya ▪ Interest in economically viable investments ▪ Concerned about energy reliability and wayleaves costs ▪ Issues with government coordination and infrastructure theft ▪ Supports Open Access to avoid over-investment ▪ Estimates 42K km fiber network needed to fill infrastructure gap ▪ Against MRRA due to network quality concerns
YAFIBR	▪ Non-binding interest as potential investors ▪ Interest in co-build or asset exchange for network ownership ▪ Preferred underground network rollout methodology ▪ Supports Open Access Networks

	▪ Interest in grant funding for new and existing fiber networks ▪ Sees potential in improving duct network coverage and rental fees ▪ Advocates for tax incentives on digital infrastructure assets ▪ Emphasizes community involvement during network rollout
FON (Frontier Optical Networks)	▪ Interest in participating as potential investors ▪ Network is 60% underground and 40% aerial ▪ Operates around Nairobi and Mombasa with expansion plans ▪ Underground build costs around 10 USD per meter
Airtel	▪ No confirmed interest as potential investors yet ▪ Internal reviews and discussions ongoing ▪ Setup internal teams for KDEAP initiative review
Google	▪ Already involved in investments in Kenya ▪ Willing to evaluate further opportunities ▪ Requested confidentiality of their answers ▪ Official answers to be provided within 2 weeks
POA Internet	▪ Internal review of the request ongoing ▪ Interest in open access to avoid infrastructure duplication ▪ Concerned about network resilience and security risks ▪ High cost of permits and Wayleaves is a challenge ▪ Advocates for cross-sectorial coordination

Figure 2 - Summary of Interviews

Shared replies from operators are in the Appendix 2.

3.2 Potential Commercial Models

International evidence indicate that the digital divide, represented as infrastructure gap, particularly for backbone, middle mile and last mile networks, approached in a co-finance framework includes a mix of commercial models, where the difference can be identified on areas such as: procurement, ownership, operational model, and service offered depending that generally differ on the layer - backbone, middle-mile, last-mile, or institutional access. The main two infrastructure models that dominate are:

- **passive**, where the public entity lays ducts and dark fiber and lets ISPs light it themselves (think NetCo), and
- **active**, where the network is lit and managed by the provider (OpCo), offering wholesale bandwidth directly

Passive setups are cheaper and promote competition but need capable ISPs. Active models cost more but are plug-and-play for smaller players. Most sustainable networks blend both - leasing dark fiber to big telcos while selling lit services to smaller ISPs.

On the commercial side, open access wholesale is the most likely go-to model. By this one, the public networks lease capacity to all operators on equal terms, avoiding monopolies. Retail or vertically integrated models (where the builder also sells to end-users) are less common in public projects, except in areas with no private ISPs.

When it comes to rolling out public fiber in emerging markets, there's no one perfect solution fitting any possible scenario. Governments are typically mixing funding and delivery models depending on their budget, market maturity, and policy goals.

- One option is **fully public builds**, where the state funds and owns the network - such as Uganda's NBI or Argentina's ARSAT. These are strategic assets, often open-access, but they require important public capital and operational capacity.
- Then there are **models**, which come in flavors: concessions (like Peru's RDNFO), joint ventures (e.g., Burundi's BBS), or lease/DBO setups. In these, the private sector brings capital or ops know-how, while the state ensures public interest - usually via open-access rules or reversion clauses.
- **Co-builds / consortium** are another route - multiple stakeholders (Telcos, and sometimes with government) pool resources to deploy shared infrastructure. This is common in submarine cables such as TEAMS in Kenya.
- Last options – we have the **subsidized private deployment** - the government chips in just enough to make rural or low-ROI areas viable, often via reverse auctions. The private operator builds, owns, and runs the network, but must meet coverage and pricing conditions.

A full market survey and assessment may be found in Appendix 1 to this document.

In summary:

The telecommunications market assessment has identified the following findings and potential impact on the development of the Commercial Transaction Manual (CTM):

Finding 1: Mobile penetration is ~119%, while fixed penetration is ~3% (which is within range of Sub-Saharan Africa region).

Impact 1: Enhancing the Backbone networks and middle mile may bring significant benefits to the Kenyan telecommunications market, understanding the cost associated to energy of wireless networks, therefore a fiber expansion is needed for both retail fixed services (mobile fixed substitution) and mobile backhaul (especially in the light of 5G bandwidths) and satellite backhaul.

Finding 2: Safaricom, Jamii, Liquid, Telkom and Airtel are telecom operators owning fiber capacities and have NFPT1 licenses.

Impact 2: The participation of existing licensed operators in the KDEAP project, will be beneficial not only as co-investor, but instead they bring a wealth of local knowledge and operational know-how of Kenyan networks.

Finding 3: KETRACO, Kenya Power among other entities are totally or partially state owned. Therefore, the CTM should evaluate the inclusion of stakeholders (or assets) that are not fully privately owned and potentially -in some cases- may not be current holders of a telecommunications license.

Impact 3: From a Commercial model perspective, targeting private investors, companies such as Jamii, Airtel, Liquid, Zuku (Wananchi Group), and Poa Internet are not the only ones positioned for the scope. Partially or fully public owned assets may also be part of the commercial model evaluation.

Finding 4: Poa Internet's strategy is focused on connecting underserved urban and peri-urban areas in Kenya, but also low-income rural communities.

Impact 4: Poa Internet similarly to other licensed operators, may be regarded as a good fit in terms of project scope and their announced strategy. However, the readiness to co-invest and the most suitable commercial model needs to be confirmed.

Finding 5: Helios Investment Partners and African Infrastructure Investment Fund 4 (AIIF4) are actively investing in the region.

Impact 5: As potential private investors, AIIF4 and Helios may represent a profile of potential investors which may require further research (one on one interview) in order to evaluate their suitability and interest to participate as potential investors (understanding Helios is financed by EIB)

Finding 6: International investors such as Google and Starlink are actively present in the region.

Impact 6: Google and Starlink may emerge as a new international investor profile to address their operations and investments in African, further research is recommended to understand their potential participation in the KDEAP project.

Finding 7: There are six submarine cables offering connectivity with the rest of the world. Three more submarine cables are expected to land on the Kenyan coast.

Impact 7: Kenya is taking advantage of its position in the region and enjoys great potential to become a digital HUB for international connectivity. By its positioning in East Africa, Kenya may be part of a terrestrial East to West Africa connection to circumvent the Suez Canal. This may represent an opportunity to attract global investors to evaluate innovative business models for international connectivity.

Finding 8: One-on-One interview has proven to provide better information and insights than public consultations and also are acting as (investment) scouting activities of potential investors and to explore suitable commercial models for KDEAP in Kenya.

Impact 8: Increased number of one-on-one interviews are expected and reported to ICT authority in Kenya; it is expected that between 20 to 30 interviews will provide valuable information for the identification of potential investors and for the exploration of suitable commercial models to be implemented under the KDEAP project phase 1 in Kenya.

Finding 9: There is confirmed and non-binding interest from existing licensed operators to participate in the KDEAP project, either as potential investor or as part of the Build and operations of the network.

Impact 9: There are common expectations such as return on investment, open access to the new infrastructure, expand the footprint of backbone and middle mile. At the same time there is also common recognition of the main challenges to overcome, including way leaves costs and processing for approval, coordination between authorities (subcounty - county, and cross sector coordination e.g.: roads and ducts) and security concerns in some areas of the country where infrastructure is vandalized or stolen.

4 Review of procurement legislation and rules, policy and regulation instruments, and taxation frameworks

4.1 Procurement, legislation and rules

This chapter reviews Kenya's national procurement laws and their alignment with World Bank procedures, focusing on competitive selection for telecom infrastructure projects.

The World Bank emphasizes open, competitive procurement, requiring transparency, non-discrimination, and anti-corruption compliance. Key methods include Best and Final Offer (BAFO) and electronic reverse auctions, which are suitable when many bidders exist, and price is a key factor. These auctions must include clear evaluation criteria and participation guidelines.

Kenya's Public Procurement and Asset Disposal Act (PPADA) 2015, along with its 2020 regulations, governs public procurement. It supports various methods such as open tendering, restricted tendering, direct procurement, and electronic reverse auctions. Pre-qualification is allowed for complex procurements, leading to restricted tenders.

Electronic reverse auctions under PPADA require approval from the Public Procurement Regulatory Authority and must invite all suppliers in a given category—though the term "specific category" remains undefined.

Overall, Kenya's procurement framework is broad and generally compatible with World Bank standards, though some procedural clarifications may be needed.

A full review of procurement legislation and rules may be found in Appendix 2 to this document.

In Summary:

There do not appear to be any significant issues with respect to the actual procurement regime in Kenya regarding compatibility with World Bank rules.

4.2 Policy and regulation instruments

This chapter reviews Kenya's telecom policy and regulatory environment to ensure alignment with project goals and identify any potential legal or procedural barriers.

The Ministry of Information, Communication, and Digital Economy (MICDE) oversees the sector, while the Communications Authority of Kenya (CA) regulates it. The CA is responsible for licensing, spectrum management, consumer protection, and promoting fair competition. It also manages the Universal Service Fund (USF), which supports broadband expansion, including the Digital Superhighway initiative. The ICT Authority (ICTA) coordinates government ICT functions.

The primary legislation is the Kenya Information and Communications Act (1998), amended in 2013 to strengthen CA's regulatory powers.

Under the Universal Licensing Framework (ULF), licenses are categorized into Network Facilities Providers (NFPs), Application Service Providers (ASPs), and Content Service Providers (CSPs). NFPs are further divided into tiers based on geographic and spectrum scope. While there is no dedicated wholesale-only license, some entities use NFP Tier 2 licenses for wholesale services.

The 2015 Fair Competition Regulations aim to prevent market abuse and ensure equal treatment. The 2020 ICT Policy Guidelines promote universal access, digital innovation, and infrastructure growth, targeting a 10% ICT contribution to GDP by 2030.

Draft 2022 regulations on infrastructure sharing propose open access, capacity surplus requirements, and non-discriminatory use of public infrastructure. However, their current legal status remains unclear.

A full review of policy and regulation instruments may be found in Appendix 3 to this document.

In Summary:

There are no particular obstacles posed by the national regulatory regime in Kenya, however the following observations can be made:

- There is a relatively low level of network capacity wholesaling and infrastructure sharing in Kenya, this is not unusual as operators like to build their own network, especially with respect to their key customers and focus areas.
- In order for open access infrastructure sharing and wholesale models to become more prevalent, the infrastructure sharing regime has to be extended and generally enforced in order for these models to gain traction.

A key obstacle is the tendency of local county administration to try and get revenue from telecommunications operators through costly permitting in general and high costs of way-leaves in particular. The impact of this is far greater than any shortcomings in the regulatory regime at national level.

4.3 Policy and taxation framework

This chapter reviews Kenya's taxation policies affecting digital infrastructure investment, with a focus on how tax burdens may influence investor interest.

Key sector-specific taxes include a 15% excise duty on voice, SMS, and data services, reinstated in 2023 after a temporary increase to 20%. Additionally, a 10% excise duty applies to imported mobile phones, and a KES 50 tax is levied on imported SIM cards.

Non-sector-specific taxes also impact the industry. The corporate tax rate, temporarily reduced to 25% during the COVID-19 pandemic, returned to 30% in 2021. A 16% VAT applies to telecom services, cloud computing, IoT, and device sales.

According to GSMA, Kenya's telecom sector faces the highest overall tax burden in the region. This heavy taxation may raise service costs, reduce affordability, and limit network expansion—particularly in underserved areas.

A full review of taxation framework may be found in Appendix 4 to this document.

In Summary:

There are two issues with the taxation issue in Kenya:

- The level of tax is quite high and this raises the cost to communicate in Kenya which in turn raises the proportion of areas which are not profitable to be served. As a general rule, telecommunications should be seen as a driver of economic development to be encouraged rather than a luxury good to be taxed.
- The tax framework is subject to relatively frequent changes, and this raises the level of unpredictability and therefore risk.

5 Framing the issue of Open Access Networks in Kenya

This chapter aims to clarify the report's perspective on the approach to access Backbone networks for broadband connectivity services in Kenya. Before delving into issues related to access to Backbone networks and Facilities, it is essential to clearly define and frame Backbone Network and its role in providing national and international connectivity.

5.1 Understanding Fiber Backbone and priority routes in Kenya

As described on Appendix 1 of this document, the estimated required national backbone network length to achieve the Kenyan connectivity targets is around 100,000 kilometers, from that target which comprise private and public fiber. However, this figure may vary according to new information from audits performed at the same time of the elaboration of this report.

Understanding the size of the challenge, the KDEAP initiative aims to reduce the infrastructure gap by maximizing the use of existing assets, developing innovative commercial models that encourage the participation from the private sector, while addressing the most urgent connectivity needs for Kenyan citizens. As a result, backbone network and government agencies (including schools and government offices) are priority areas to address during the implementation of the KDEAP initiative.

As part of the Commercial Transaction Manual (CTM) development, a Pilot phase prioritizes:

- 5,000 kilometers of backbone network;
- Schools, TVETs and training colleges,
- Campus Wi-Fi for 55 universities & TVETs.

All of these elements will be expanded significantly later. In addition, to the pilot -phase, the KDEAP project also includes:

- The provision of internet capacity to around 300 public Wi-Fi hotspots (out of the 25,000 targeted by the Government)
- Provision of at least 50 Gbit/s in additional internet pre-purchase for the One Government Network (OGN; formerly NOFBI) in long-tern supply agreements
- Provision of internet capacity to Government sites in urban and semi-urban areas under a framework agreement
- Provision of internet capacity to Government sites in rural areas that are not currently connected to the internet, again under a framework agreement.

The prioritized 5,000 kilometers of backbone network routes, have been selected as per the following criteria factors: Existing fiber backbone routes, currently out of service due to vandalism or other reasons.

- Routes to improve Kenya's national backbone network resilience by adding new redundancy routes to complement existing routes, in order to build fiber rings to increase network and connectivity service availability.
- National backbone routes that enhance international fiber routes towards neighboring countries.
- Priority routes or coverage areas proposed by local operators.
- Areas that add value, as part of new residential or business / Industrial developments.
- Routes that serve areas identified as climate-vulnerable hotspots[1]

[1] See World Bank. Forthcoming 2025. *Greening Digital Infrastructure in Eastern Africa*.

5.2 Backbone Network as essential bottleneck facility

Regulatory authorities in many countries have recognized that Fiber Backbone Networks components are an “essential bottleneck facility" and there is a potential for the Backbone network owners to deny access to Backbone infrastructure and thereby prevent competition from new entrants. Also, Fiber Network Backbone assets and network sites are listed under examples of “essential facilities” in the sense of definition section of a Reference Paper on regulatory principles under the World Trade Organization. Moreover, a market player controlling essential facilities is considered a “major supplier” (dominant service provider) in the definition of the mentioned WTO Regulatory Reference Paper[2].

In most of the countries with relevant incumbent operators, the original infrastructure of the Backbone was built supported with government funding, which would not necessarily be commercially viable in other circumstances. In addition, these facilities require significant investment and most of this will be sunk cost. Significant sunk costs create an asymmetry in the market between incumbent and potential new entrants, and the incumbent could exploit this situation to deter entry of new operators.

In order to prevent the misuse of dominant power by the incumbent operator, there may be a need for suitable regulatory intervention in the electronic communications markets to oversee potential anti-competitive behavior of operators in the market with regards to bottleneck facilities. In this respect, various countries have enforced specific obligations on the incumbents owning bottleneck facilities such as fiber backbone networks by either adopting dedicated regulations or applying the general principles of Open Access Networks. In order to avoid a limited access or dominant power to the backbone network to be built as part of the KDEAP initiative, this document in the following chapters will explore the applicability and implications of the concept and principles of *Open Access Networks* for Backbone Networks in Kenya, in the context of bottleneck facilities.

[2] mWTo Regulatory Reference Paper (1997)

6 Open Access Network Concept

6.1 Overview

Open Access Network models for backbone networks can incorporate various technologies, services, and local considerations to determine the most suitable approach to overcome domestic bottleneck infrastructure (essential facilities) that facilitate national connectivity, i.e., Backbone network. These include access to cables in a given priority area and/or route, or network sites.

These issues can lead to creation of bottlenecks and therefore need to be removed through regulatory intervention. Regulatory authorities in many countries have removed such bottlenecks by mandating the non-discriminatory, fair and open access for backbone, mid mile and last mile networks in their countries[3].

6.2 Understanding the Open Access concept

The principle of open access is internationally recognized as best practice and essential to organize the management of resources that are difficult to duplicate. A study from World Bank InfoDev underlines the importance of open access as an approach for bringing the cost of national and international connectivity cost down, thus leading to a reduction of the cost of electronic communications services especially for developing countries (particularly Africa), a spread of national infrastructure and providing incentives for development of new businesses. The overall aim would be to provide more competitive rates for connectivity services across the national (fiber) networks[4].

- **Open access concept:** The concept of open access is a regulatory tool to enhance transparency in upstream wholesale services and promote competition in the provision of downstream services for the greater benefit of services users. In some cases, this concept is accompanied by a strict structural separation between the wholesale and downstream market levels. The provider of wholesale services is in many cases limited to its activities as “wholesale operator” (“operator of operators”) and must offer its wholesale services in a non-discriminatory manner to all operators in the downstream market segment, without itself being a player here.
- **Underlying principles of Open Access:** Beyond any differences that may exist in the details of its concrete implementation, depending on the choice of regulatory models in countries, the concept of "open access" is generally articulated around

[3] OECD (2013): Recommendations on ““Broadband Networks and Open Access”, OECD Digital Economy Papers, No. 218, OECD Publishing, Paris. http://dx.doi.org/10.1787/5k49qgz7crmr-en p.:35-37.

[4] See World Bank InfoDev: “Open Access Models, Options for Improving Backbone Access in Developing Countries (with a Focus on Sub-Saharan Africa)”, Final Draft August 2005, p. 34-35.

a number of principles, recognized as best practice principles some of which are listed below:

(1) Service users can freely choose their service provider on the infrastructure that is subject to the open access principle;

(2) Any operator and service provider that is duly authorized by the regulator is entitled to access that infrastructure for the provision of own services (“anyone can play”);

(3) Any operator and service provider duly authorized by the regulator is free to increase access points on that infrastructure subject to technical feasibility and payment of the costs of these additions;

(4) Any operator and service provider authorized by the regulator should receive services under fair and non-discriminatory conditions;

(5) In order for a competitive market to function, everyone must be able to connect to everyone else. Service providers would be able to get access to infrastructure from the local to the international level, regardless of their market size and influence (any-to-any connectivity);

(6) No one should be prevented from using a particular technology when using the infrastructure. Therefore, regulatory measures should be technology neutral. Every regulatory authority committed to market development would be keen to encourage cost reduction through technology innovation (technological neutrality);

(7) Information about market prices and service have to be transparent and available to all. This transparency requirement is particularly important to ensure fairness in the delivery of connectivity – for example at national or international level –, as it will allow clear comparisons to be made between different providers. Consumers need to be sufficiently informed in a way that allow comparisons between “offers” (Transparency).

(8) The different roles of players need to be transparent. In order to create trust in the market, infrastructure providers need to be clear that they will not enter service markets to compete with their customers. The regulator exists to encourage competition rather than restrict it but to do so in a way that genuinely encourages increased investment and lower access costs to communications technology. Where appropriate, regulation becomes “light-touch” rather than prohibitive or restrictive. Government exists to create the legal framework through which competition issues can be mediated.

(9) The operator of the infrastructure that is subject to the open access principle is not permitted to compete with its customers (service providers) in the provision of downstream services to subscribers on this infrastructure (structural separation). In other words, such operator is limited to the role of “operator of operators”.

- **Appropriate tool for *ex-ante* SMP regulation:** Open access can therefore make it possible for the regulatory authority to address ex-ante the ability of an operator to exercise significant power (SMP) on the wholesale markets.
- **Relevance for Backbone Network access:** This approach is also relevant with regard to access to Backbone Network infrastructure that are critical underlying infrastructure for national and/or international connectivity services and difficult to replicate. Structural separation would mean that the entity operating such an infrastructure (Backbone) will have to choose between two options: (1) integrating the infrastructure (Backbone) into a specially created entity to manage the infrastructure, or (2) keeping it and limiting itself to offering wholesale services to other operators without itself participating in the downstream market for services (internet connectivity services) offered through the infrastructure (Backbone) it operates as an "operator of operators".

6.3 Potentials of an Open Access Approach

The following potentials are being associated with the implementation of an open access approach[5]:

- ✓ **Greater efficiency in tackling infrastructure needs:** Open access enables country decision-makers to address existing and future infrastructure needs without simply inadvertently entrenching the market position of the historic operator or other dominant player(s). Many countries have already embraced the solution that brings together available relevant infrastructure assets (including those outside of the historic operator) under a single umbrella, creating for example a wholesale-only national infrastructure operator. Open access approach suggests ways of creating new models through which this might occur.
- ✓ **Faster market development:** It creates an enabling environment for higher trust and co-operation between competing players, which in turn contributes to faster market development. In particular, under an open access regime, there is limited room for usual debates about what the historic operator(s) (or the dominant player(s)) should or should not be doing and its capacity to stifle eventual development dynamics of the market.
- ✓ **Incentives for advent for local market players:** Open access creates conditions for the advent of new market players that can evolve as strong local champions, playing an important role in infrastructure development at the city and rural district level. This will contribute to reduction of the national digital divide.
- ✓ **Improved access for underserved areas**: There is greater possibility for business models that address low-income users in rural areas. Open access bears the potential to bring together existing entrepreneurial energy and new local

[5] See World Bank InfoDev: “Open Access Models, Options for Improving Backbone Access in Developing Countries (with a Focus on Sub-Saharan Africa)”, Final Draft August 2005, p. 39.

investment and for the creation of employment in the rural areas, i.e., where countries need employment most.

- ✓ **More innovative cooperations:** Open access helps innovative approaches by maximizing both public and private finance in infrastructure development. The balance of interests between different public companies and/or the private sector may be reflected on approaches such as PPP models, consortiums for co-build among others makes sure that involvement of relevant stakeholders like the public sector does not block much needed commercial financing from the private sector. It offers new innovative models for investment in infrastructure, particularly in infrastructure for national backbone connectivity. In this way, it will create cheap, widely available bandwidth to deliver on a wide range of development objectives.

Implications for policymakers, Government agencies and regulators

Based on open access as the suggested model for operating relevant communications infrastructure, the World Bank has identified a number of implications for policy and regulatory measures to be implemented by relevant country decision makers[6].

- **Identifying bottlenecks in the sector**: When considering a new approach for facilitating access to relevant infrastructure, it will be important to first identify the actual bottlenecks and restrictions within the sector. Such current state assessment includes in particular understanding of (1) what is preventing the development of the market and (2) who is withholding access for new players. Each of these bottlenecks can be addressed through either competition or regulatory mechanisms. Where competition legislation does not exist, it will be important to put it in place to address issues of significant market power (SMP) that existing general frameworks may not deal adequately with.
- **Infrastructure-based vs Service-based competition:** A successful separation of services and infrastructure is essential in order to create greater clarity about market pricing and access to infrastructure. The principle of open access to infrastructure to all players is a central part of this change. Regulators need to ensure that larger entities that are usually vertically integrated operate services and infrastructure at “arms-length” from each to ensure equity and transparency in the market.
- **Decision-makers as trust-makers:** Policymakers and regulators as the referees of different interests have a key role to play in creating trust in the marketplace. In practical terms, the suggested Open Access approach would generally require the setting up of bodies representing both the “public interest” and the market sector[7]. It is important to ensure that these kinds of bodies contain a wide range of qualified representatives at board level, particularly the newer parts of the industry (the

[6] See World Bank InfoDev: “Open Access Models, Options for Improving Backbone Access in Developing Countries (with a Focus on Sub-Saharan Africa)”, Final Draft August 2005, p. 38; 46.

[7] It is commonplace that growth of the economy and a social responsibility for the less well-off are example of public interest.

ISPs) and consumers. Both policymakers and regulators need to be perceived as fair and reliable partner of the market players that deals fairly with competition issues that usually result from the existence of dominant player(s) in the market and creating a level playing field for providers.

- **Critical action for decision-makers:** Government decision-makers and the national regulatory authorities need (1) to ease market entry by removing as many unnecessary regulatory barriers as possible; (2) to create a favorable business environment that offers investors enough certainty to develop their businesses and get a fair chance at a reasonable rate of return; and (3) where necessary, to provide incentives to the “risk-taking” needed for the private sector to expand the market. Such incentives could consist in the public sector acting as “anchor” customers to stimulate initial demand for new communications services for example in public schools, health care facilities and administrative departments on the basis of a sustainable, low recurrent cost infrastructure.

7 Open Access Network

7.1 Open Access to Network facilities within the framework of GATS at the WTO

When addressing competition issues related to access to domestic bottleneck facilities (backbone networks and related backbone and/or middle mile facilities) to facilitate national or international connectivity services through fiber optic-based backbone network systems, countries should keep in mind eventual requirements resulting from the trade frameworks for the international telecommunication service market under the World Trade Organization (WTO). Of particular relevance are the General Agreement on Trade in Services (GATS), the Basis Agreement of Telecommunications Services (BATS), and the Reference Paper on regulatory principles (Reference Paper). Failure to comply with eventual requirements, for instance, with regard to market-entry barriers – such as inadequate access to essential facilities –, may expose a country to disputes under the WTO.

General Agreement on Trade in Services (GATS)

The GATS is the document that puts trade in services, including, but not limited to, trade in basic and value-added telecommunications services, within the ambit of the new multilateral trading system under the WTO established in 1994[8]. The GATS would be relevant for the present report only with regard to the mode of supply "cross border supply" (supply of a telecoms service from the territory of one country into the territory of any other country, without being established in this country – KDEAP Sub component 1.5), and "commercial presence" (supply of a telecoms service through commercial presence in the territory of a WTO member)[9].

In the context of the present report, three (3) GATS provisions are to be considered by any WTO member country that is addressing competition issues related to access to domestic bottleneck facilities (backbone network, network facilities and related International Gateways (IGW) facilities) to facilitate international connectivity services through international cable systems. These provisions include Article II (MFN principle), Article XVI (Market Access requirement) and Article XVII (National Treatment requirement)[10].

[8] The GATS foresees a mixture of 2 types of rules: (a) "general obligations and disciplines", which apply whether or not a WTO member has made commitments to market-opening measures concerning specific telecommunications services, and (b) other provisions that only apply where such specific commitments have been "scheduled" (i.e. are included in a particular member's Schedule, known as “schedule of specific commitments”). While the MFN principle from Article II belongs to the first type of provisions, the Market Access (Article XVI) and National Treatment (Article XVII) requirements belong to the second type of provisions.

[9] The GATS distinguishes four (4) distinct modes of "Trade in services", as defined by Art. 1 GATS, including "cross border supply" (Mode 1), "consumption abroad" (Mode 2), "commercial presence" (Mode 3), and “presence of natural persons" (Mode 4). See Article I GATS.

[10] For the avoidance of doubt: The MFN principle from Article II belongs to the category of those GATS provisions that prescribe "general obligations and disciplines", which automatically apply whether or not a WTO member has made specific commitments to open its domestic market for telecommunications services (to avoid this, the country must enter eventual exceptions in the Annex of Article II Exemptions). On the contrary, the Market Access (Article XVI) and National Treatment (Article XVII) requirements belong to the category of those GATS provisions that only apply where the country has made corresponding specific commitments (i.e., included in a particular Schedule, known as “schedule of specific commitments”). The MFN principle would also apply in the cases of specific commitments, unless otherwise specified in the Annex of Article II Exemptions.

- The Most-Favored-Nation Treatment (MFN) principle in Article II of GATS is a key provision, which would require that, subject to eventual exemption, once a member country has accorded a certain treatment to services and service suppliers of any third country (needs not to be a WTO member state), it cannot treat similar services and service suppliers of any other WTO member state less favorably. In other words, an advantage negotiated with one country must be extended to all trading partners who are WTO members, unless the country has entered eventual discrimination in its Annex on Article II Exemptions.
- Moreover, where a country has made specific commitment to open its telecommunications services market – Market Access, Article XVI GATS – for the modes of supply referred to above, it would be bound to comply with the MFN principle from Article II of GATS as well as the National Treatment requirement in Article XVII of GATS. According to the National Treatment requirement, the country shall not operate discriminatory measures benefiting domestic services or service suppliers[11]

The Basis Agreement of Telecommunication Services (BATS)

It is the Telecommunications Annex (1997) of the GATS. It addresses in more detail several issues affecting market entry in telecommunications, for example, regulation, licensing and certain aspects of network interconnection. Its core obligations are contained in section 5 “Access to and use of Public Telecommunications Transport Networks and Services", meaning essentially access to "basic public telecommunications"[12].

- WTO members incur these obligations regardless of any specific commitments in the basic telecommunications sector. This is because the BATS addresses access to these services by users rather than the ability for service providers to enter markets to sell such services. The latter is addressed in schedules of commitments of countries.
- Given that the present report focuses on the ability to access domestic bottleneck infrastructure (KDEAP subcomponent 1.1) and to access international connectivity through cross-border cables (KDEAP subcomponent 1.5), the BATS would be relevant only for a country that has made specific commitments at the WTO that cover this market segment, especially Market Access and National Treatment[13]. Categories covered by such specific commitments on basic telecommunication include, unless otherwise specified, local, long distance, international, wire-based (including, e.g., all types of cables and, usually, radio portions of fixed

[11] The national treatment requirement implies that the member concerned does not operate discriminatory measures benefiting domestic services or service suppliers. The key requirement is not to modify, in law or in fact, the conditions of competition in favour of the member's own service industry. Article XVII GATS.
[12] Most of the annexes to the GATS concern particular service sectors -- such as air transport, financial services, and telecommunications. The Annex on telecoms, also referred to as the “Fourth Protocol to the General Agreement on Trade in Services” (Fourth Protocol), has 7 sections. See ITU "Six Degrees of Sharing, chapter 6.4.6 Applying international trade agreements (WTO) to cable access, footnote 79 on p. 138.
[13] For the avoidance of doubt, the MFN principle would apply to the categories of basic telecommunications even if the country has not made specific commitments on basic telecommunications. A country could escape the MFN requirement only if it has entered relevant exception in its Annex of Article II Exemptions.

infrastructure), and radio-based (all forms of wireless, including satellite). Therefore, in the light of the present report, the categories “long-distance”, “international” and “wire-based” would be of relevance for eventual country’s commitments.

The Reference Paper on regulatory principles

The WTO Regulatory Reference Paper represents the regulatory component of the basic telecommunications agreement. It contains a negotiated set of pro-competitive regulatory principles that countries should follow to support the transition of the telecommunications sector to a competitive marketplace and to guarantee effective market access and foreign investment commitments. It is legally binding on those WTO member countries, which have committed to it by appending the document, in whole or in part, to their schedules of commitments[14].

It provides a blueprint for telecommunications reform, at a time when competition was being introduced, that largely reflected “best practice” in sector regulation at the time, and in large part continues to do so today. It deals with six (6) regulatory principles including competitive safeguards, interconnection, universal service, licensing, allocation and use of scarce resource and creation of independent regulator. The present report takes a special look at the requirements related to competitive safeguards, interconnection, licensing and creation of independent regulator.

- Competitive safeguards. WTO members are required to enact appropriate measures to prevent major suppliers from engaging in anti-competitive practices. The paper does not prescribe particular or specific guidelines for governmental measures. It is left to the entire discretion of members to determine the appropriate measures (section 1 Reference Paper).
- Interconnection. Among all the six (6) regulatory principles, interconnection is the most detailed in the Reference Paper. It contains a set of pro-competitive regulatory matters that set the acceptable parameters for interconnection, given the critical importance of fair interconnection policies in promoting competition and entry in telecommunications markets. These matters focus on dominant providers (major supplier) and include the need to ensure interconnection, public availability of the procedures, transparency of interconnection arrangements and dispute settlement (section 2 Reference Paper). Of particular importance are the following[15].

[14] Unlike the GATS Annex on telecoms, the regulatory principles of the Reference Paper are legally binding only for those WTO governments which have committed to it by appending the document, in whole or in part, to their schedules of commitments. For the avoidance of doubt, this is correct only as far as the BATS as such is concerned. When it comes to whether foreign actors can enter a market for telecoms services in another country, country’s specific commitments are relevant. A country would be bound to allow entry of foreigner in the domestic telecoms sector only if it has included this in its schedule of specific commitments. Therefore, as far as market entry is concerned, the BATS shares the same fate as the Reference Paper: relevant only if the country has included this in its specific commitments.

[15] Footnote 55 in the EU Commission notice - EU Commission Notice on the application of the competition rules to access agreements in the telecommunications sector, 1998 – shows that that the EU considerably influenced the content of the Reference Paper. Its definition section and section 2

  - Interconnection is to be provided under non-discriminatory terms, conditions (including technical standards and specifications) and rates and of a quality no less favorable than that provided for its own like services or for like services of non-affiliated service suppliers or for its subsidiaries or other affiliates.
  - Interconnection is to be provided in a timely fashion, on terms, conditions (including technical standards and specifications) and cost-oriented rates that are transparent, reasonable, having regard to economic feasibility, and sufficiently unbundled so that the supplier need not pay for network components or facilities that it does not require for the service to be provided.
  - Interconnection is to be provided upon request, at points in addition to the network termination points offered to the majority of users, subject to charges that reflect the cost of construction of necessary additional facilities.
  - In terms of transparency of interconnection arrangements, the major supplier should be requested to make publicly available either its interconnection agreements or a reference interconnection offer (RIO).
- **Public availability of licensing criteria.** The focus of the disciplines of the Reference Paper's related to licensing is on transparency. Applicant should know the terms, conditions, criteria and the length of time needed to reach a decision on their application. The reference paper also insists that the applicant should be informed of the reasons for denial of their award of licenses. These disciplines are guiding principles to be applied by members meant to prevent distortions that licensing conditions may introduce in domestic markets. However, the Reference Paper does not address the issue of when such a license should be required or what conditions could be attached to license or the cost trends for license. Finally, it does not introduce the concept of mutual recognition of licenses. (section 4 Reference Paper).
- **Creation of independent regulator.** The Reference Paper requires member states to establish a regulatory body that is separate from, and not accountable to, any supplier of basic telecommunications services, with decisions and procedures that are impartial with respect to all market participants. This requirement is to be seen in the light of the importance of a regulatory entity as a crucial factor in the liberalization of telecommunications services, and its role as a referee in enforcing rules between market players to ensure a successful competitive market. The Reference Paper is not mandating a specific format for the regulatory authority to be established. The only criterion embodied in the relevant provision is that the

(Interconnection) were mainly copied from the EU "Additional commitment on regulatory principles by the European Communities and their Member States" used by the Group on basic telecommunications in the context of the World Trade Organization (WTO) negotiations), European Commission, Official Journal of the European Communities, p. 52, L 347, Volume 40, 18 December 1997

regulatory body should be independent and non-accountable to any supplier of basic telecommunications services (section 5 Reference Paper).

7.2 Recommendations from the International Telecommunication Union (ITU)

Regulatory approaches for addressing bottleneck infrastructure

For the ITU, multiple network bottlenecks can occur in the provision of electronic communication services by incumbent operators and new market entrants. These bottlenecks are often caused by either a lack of infrastructure needed for the service delivery, or by monopoly ownership of all or main critical infrastructure by a single operator, which is typically the incumbent operator. For example, in some markets, incumbents have used their ownership of essential network infrastructure – such as backbone network infrastructure, backhaul links, Access Network Facilities and other access to international gateways – to constrain the ability of new entrants to compete by means of certain business strategies and practices, some of which are listed below:

- Excessive access/leasing costs. In some markets, for example, incumbents levy higher leasing charges on competing operators than on their corporate customers and affiliates;
- Service limitations. Some network operations try to limit the amount of bandwidth or QoS they will support; and
- Restrictions on points of interconnection (PoI). Some incumbents set technical restrictions or limit access to network switches, ports and gateways.

In a number of markets, control of backbone and international connectivity (whether by incumbents or other relevant operators) has been used to manipulate and constrain the development of competition. This can lead to artificial shortages of bandwidth and inflated prices, thereby hampering the provision of robust national and/or international telecommunication services[16].

These two regulatory options are further described below.

1. **Imposing specific regulation on owners of bottleneck facilities (regulatory option 1)**

   Regulatory intervention is often required where the costs and timelines associated with duplicating bottleneck facilities would be so excessive that they would be commercially non-viable. In many developing countries in which the incumbent still controls access to critical national or international network infrastructure and is able to use this control to impose excessive prices on other operators, undercutting competition. Therefore, the following measure are considered:

[16] ITU refers to the case of Singapore where, due to such concerns, IDA (now IMDA), the regulator, has moved to open up access to Bottleneck facilities. ITU, "Regulating in the broadband world", Trends in Telecommunication Reform 2006, p. 63.

- Regulatory intervention to make sure that existing competitors and new entrants gain fair and competitive access to existing this essential infrastructure;
- Regulatory policy shall promote open access to national and/or international capacity and international gateways, for example, collocation and connection services at Network facilities[17].
- Active establishment or incentives for establishment of (local or/and regional) Internet Exchange Points (IXP) and local caching in order to reduce reliance on international connectivity for local or regional internet communication ISPs. NRAs believe that establishment of Internet Exchange Points (IXP) could also encourage shared and more affordable access to national and international broadband capacity for Internet service providers willing to enter the market[18].
- Liberalization of access to network facilities has been another trend taking place in many countries, including also in Africa. Liberalization includes licensing or authorization of multiple players for the provision of access to backbone network facilities, access to international gateway services and opening up to competition. Countries that have liberalized access to backbone networks, backbone facilities and international gateways have seen prices fall and quality of service improve[19].

NRAs recognize the potential benefits of infrastructure sharing, whether mandatory or optional, and requirements to offer shared facilities must not be biased towards any specific service provider or types of services but could well also apply to all providers. In other words, when it comes to offering access to shared facilities, an asymmetric approach targeting only dominant operators is not the only way. A symmetric approach could also yield positive outcomes[20].

2. Facilitating alternative infrastructure deployment and use (regulatory option 2)

As far as deployment of alternative infrastructure is concerned, the ITU recommends a number of approaches for consideration by regulatory authorities:

- Not restricting competing market players in their ability to install their own independent facilities[21].
- Facilitating access to existing telecommunications infrastructure used not only within the boundaries of the electronic communications sector, but also in other

[17] ITU, GSR 2008, Best Practice Guidelines on innovative infrastructure sharing strategies to promote affordable access for all, section 2 “Competition and investment incentives”
[18] ITU, GSR 2008, Best Practice Guidelines on innovative infrastructure sharing strategies to promote affordable access for all, section 2 “Competition and investment incentives”
[19] ITU, Trends in telecoms Reform 2008, "Six degrees of sharing: Innovative infrastructure sharing and open access strategies to promote affordable access for all", chapter 1.3.2.2 “Addressing market failures – From price regulation to functional separation”, p. 17
[20] ITU, GSR 2008, Best Practice Guidelines on innovative infrastructure sharing strategies to promote affordable access for all, section 2 “Competition and investment incentives”
[21] ITU, GSR 2008, Best Practice Guidelines on innovative infrastructure sharing strategies to promote affordable access for all, section 2 “Competition and investment incentives”

infrastructure industries such as electricity, gas, water, sewage, etc. This could make a big difference in the context of technological development. Experience from some more developed markets such as Australia and the United Kingdom shows that backbone networks can be more quickly established by leveraging existing infrastructure. For example, railway signaling, or pipeline monitoring activities involve communications links, which can be made available to licensed telecommunication operators. Also, cables can be strung across electrical pylons that can also act as the location of radio antennas for wireless technologies. Other alternative infrastructures include main roads, oil and gas pipelines, and water channels, especially maintained canals. (*Cross-sectoral use of infrastructure*)[22].

- Ensuring and facilitating access to government land, including railways, electrical grids and road networks. Governments can streamline and standardize the application process for access to rights of way and ensure just and reasonable fee structures. (*Streamlining relevant processes*);
- Paving the way for telecommunication networks to be incorporated into new infrastructure developments. Governments can include broadband network conduits in road projects or incorporate cable arrays in new electrical grids[23].
- Promoting the joint deployment, management and maintenance of certain facilities with other market players and with other industries, as this joint work is likely to reduce capital and operating expenditures. It provides for timed and organized opportunities for access to bottleneck resources – for example, ducts and conduits for the joint laying of fiber – and consequently to distribute the cost of civil works among service providers, reduce the inconvenience for traffic in towns and cities, and provide for a positive environmental (including aesthetic) impact, in particular by reducing the number of mobile masts and towers. Such sharing can bring about long-term efficiencies, which may in turn enable more investment in innovative products and services and ultimately benefit consumers[24].
- Creating broadband alliances to pool financial and other resources and to enhance negotiating power with network vendors[25].

[22] Where such supporting infrastructure – such as electrical grids, railways and pipelines – does not exist, a solution could be for the regulatory framework to promote the use of wireless technologies, e.g., satellite trunking, especially where traffic is not expected to be substantial. This can be achieved through the expeditious allocation of unused or little-used spectrum and by lowering license fees. See ITU, "Regulating in the broadband world", Trends in Telecommunication Reform 2006, p. 64; also, ITU, GSR 2008, Best Practice Guidelines on innovative infrastructure sharing strategies to promote affordable access for all, chapter B “Innovative regulatory strategies and policies to promote infrastructure sharing”, section 11 “Sharing with other market players and industries”. Such approach of cross-sectoral use of passive infrastructure can be referred to as “cross-sectoral solidarity”.

[23] In this respect, the ITU gives the example of Chile whether the ICT project side-stepped difficulties of geographical isolation and infrastructure shortage in rural areas by taking advantage of electrical plant. See ITU, "Regulating in the broadband world", Trends in Telecommunication Reform 2006, p. 64

[24] See ITU, GSR 2008, Best Practice Guidelines on innovative infrastructure sharing strategies to promote affordable access for all, section 2 “Competition and investment incentives”; also ITU, GSR 2008, Best Practice Guidelines on innovative infrastructure sharing strategies to promote affordable access for all, chapter B “Innovative regulatory strategies and policies to promote infrastructure sharing”, section 11 “Sharing with other market players and industries”. Such approach of cross-sectoral use of passive infrastructure can be referred to as “cross-sectoral solidarity”, which could make a big difference in the context of technological development.

[25] In this respect, the ITU gives the example of the Wireless Broadband Alliance that gives operators in the United States, the United Kingdom and the Asia-Pacific region benefits of scale in areas such as testing of products and services, influencing development and adoption of technology standards and negotiating international roaming agreements. See ITU, "Regulating in the broadband world", Trends in Telecommunication Reform 2006, p. 64

- Developing countries may also explore the pooling of resources to collectively launch satellites that provide broader regional service, or to back a commercial satellite operator[26].

In summary:

The ITU clearly identifies two (2) main options for promoting access and competition in situations where bottleneck infrastructure is controlled by one or a few market players: imposing specific regulation on owners of bottleneck facilities (***regulatory option 1***) and facilitating alternative infrastructure deployment (***regulatory option 2***). These 2 approaches are not mutually exclusive and can be combined. Although the ITU is mainly referring not only to backbone infrastructure, its statements are of priceless relevance for the present report, given that the "bottleneck" or "essential facility" nature of backbone networks is addressed, which is relevant also for main element of domestic connection namely Backbone Networks (KDEAP subcomponent 1.1), but also for international capacity through terrestrial cross-border (KDEAP subcomponent 1.5) or submarine cable. In terms of regulatory approach, whether *symmetric or asymmetric*, ITU's recommendations do not explicitly give any preference: imposing specific regulatory requirements on owners of bottleneck facilities and/or encouraging existing or new licensees to deploy alternative infrastructure, both do not target only dominant providers, but all relevant market players that meet the criteria. Moreover, when it comes to offering access to existing essential facilities to be shared, an asymmetric approach targeting only dominant operators is not the only way. Instead, a symmetric approach could also yield positive outcomes.

7.3 Innovative strategies and policies to promote infrastructure sharing

While infrastructure sharing can take two main forms including passive and active sharing, the present chapter focuses on passive sharing that involves sharing of passive telecommunication assets, i.e., non-electrical, network infrastructure, as it is more relevant for the present report. Such non-electrical network infrastructure might include rights of way, wayleaves or easements for infrastructure such as: ducts, pylons, masts, trenches, towers, poles, buildings, equipment rooms and related power supplies, air conditioning, and security systems[27].

[26] An example is Shin Satellite, a commercial operator in Thailand, which launched its Ipstar satellite, which had a wide footprint across the Asia Pacific region. Shin had extended broadband access to rural areas of Thailand, Laos, Cambodia and Myanmar. See ITU, "Regulating in the broadband world", Trends in Telecommunication Reform 2006, p. 64

[27] See ITU, Trends in telecoms Reform 2008, "Six degrees of sharing: Innovative infrastructure sharing and open access strategies to promote affordable access for all", chapter 2.2 "Passive and active infrastructure", p. 30. It is worth noting that passive infrastructure is referred to in the EU framework as "physical infrastructure".

The understanding of regulators within the ITU with regard to infrastructure sharing strategies includes sharing of civil engineering costs in deploying networks, promoting open access to network support infrastructure (e.g., poles, ducts, conduits) or essential facilities (e.g., Backbone network facilities, cross-border facilities and international gateways) as well as sharing of access to radio-frequency spectrum and end-user devices[28]. The regulatory authorities recognize that successful infrastructure sharing may be facilitated by the introduction of appropriate regulatory obligations and regulatory policies. The following requirements are expected to be essential elements of such obligations and policies[29].

1. **Open access to essential infrastructure.** Backbone Networks, Backbone facilities, and cross-border facilities and international gateways can be opened for collocation and connection services, allowing operators to directly compete with each other in the services market[30]. Affordability for Internet access, for example, whether in urban or rural areas, will depend, in large part, on the cost of access to such essential infrastructure.
2. **Reasonable terms and conditions.** For infrastructure sharing, great emphasis needs to be laid on the necessity to protect the value of existing investment in infrastructures and services. Moreover, price and non-price terms and conditions should not act as an artificial barrier to sharing.
3. **Pricing for access and use of shared facilities.** Pricing should provide the right economic signals to market players, assisting them in making reasonable and commercial “build-or-buy” decisions, i.e., whether it is more commercially reasonable for them to self-provision facilities or rather to lease existing ones. Also, pricing should provide for the right incentives for investments in infrastructure, in a form of reasonable return on investment for instance but should not be used as an artificial barrier to entry for new market players. Moreover, commercially negotiated pricing should prevail, except where market power exists, making it necessary for NRA intervention to regulate prices.
4. **Efficient use of resources.** Non-replicable or non-easily replicable resources such as towers, ducts and Wayleaves / rights of way – required for deploying cables, either on poles or in trenches, for fiber middle mile and backbone networks – can be shared for installations that serve a similar purpose, which allows for optimal use and can be offered on a “first-come first served basis” subject to commercial agreements under fair pricing conditions[31].

[28] See ITU, Trends in telecoms Reform 2008, "Six degrees of sharing: Innovative infrastructure sharing and open access strategies to promote affordable access for all", Foreword, p. iii. Sharing of SCLS is a type of "passive infrastructure sharing".
[29] ITU, GSR 2008, Best Practice Guidelines on innovative infrastructure sharing strategies to promote affordable access for all, chapter B “Innovative regulatory strategies and policies to promote infrastructure sharing”
[30] For details on ITU guidelines for implementing open access, to the extent relevant for this report, see the chapter 5.3.7 “Enabling open access to networks” in this document.
[31] See also ITU, Trends in telecommunication reform 2008, "Six Degrees of Sharing: Innovative infrastructure sharing and open access strategies to promote affordable access for all”, chapter 2.2 “Passive and active infrastructure”, p. 30. Although the ITU best practice explicitly cite only towers, ducts and rights of way, it can be relevant for all essential “bottleneck” facilities, such as Backbone networks or transmission links, given that non-replicability or difficult replicability is one of the features of these facilities. Therefore, it could be of interest also for ICTA in Kenya, in the context of easing access

5. **Licensing of "wholesale-only" providers.** Regulators could consider licensing or authorizing market players that only provide passive network elements, but which do not compete for end-users, such as mobile tower companies, public utilities companies with rights of way or wayleaves access, and fiber providers.
6. **Conditions for sharing and interconnection**. Regulators recognize that infrastructure sharing can only take place on a neutral, transparent, fair and non-discriminatory basis. One of the recent developments in policymaking is the concept of "equivalence of inputs", according to which all market players should enjoy the same access to essential facilities[32]. Interconnection frameworks can ensure that all licensed operators are granted the right to interconnect as well as encourage the sharing of essential facilities and guarantee that network security and quality of service are not compromised.
7. **Improving transparency and information sharing.** There is the need for transparent processes to facilitate infrastructure sharing, and market players need to know what is available for sharing under clearly established terms and conditions, in order to avoid unfair actions. For instance, regulators could require publication on websites of the details of existing as well as future infrastructure installations that are available for sharing by other service providers, such as the availability of space in existing ducts, planned deployment or upgrading works and interconnection[33].
8. **Sharing with other market players and industries**. Sharing should be encouraged not only within the boundaries of the Telecommunications/ICT and Broadcasting industry, but together with other infrastructure industries (such as electricity, gas, water, sewage, etc.) as well. Enabling such joint infrastructure building with other market players and with other industries provides for timed, organized opportunities for access to ducts and conduits (for example, duct installation during road construction) to distribute the cost of civil works among local stakeholders such service providers, reduce the inconvenience for traffic disruptions during construction in towns and cities, and provide for a positive environmental (including aesthetic) impact, in particular by reducing the number of mobile masts and towers. This could make a big difference in the context of technological development[34]

backbone and middle mile collocation services, which is one of the main services together with transmission links and connection services across backbone networks

[32] ITU, Trends in telecoms Reform 2008, "Six degrees of sharing: Innovative infrastructure sharing and open access strategies to promote affordable access for all", chapter 1.3.2.2 "Addressing market failures – From price regulation to functional separation", p. 16-17

[33] An example is the infrastructure atlas (ISA) of BnetzA, the German regulatory authority. The ISA is operated by the Central Information Office (ZIS) of BnetzA. It is the central information and planning tool for Gigabit expansion in Germany and is handled in the Telecommunications Act (TKG). It contains location data of network operators' infrastructures, which can be made available to companies, the federal government, federal states (Bundesland), districts and municipalities within the framework of the Gigabit expansion. This means that the ISA is not publicly accessible. Only authorized users have access, and only for a limited period of time and upon request. According to BnetzA, the ISA simplifies and accelerates the planning of Gigabit expansion projects, and sharing of existing facilities also reduces expansion costs. See BnetzA website, "Infrastrukturatlas", at https://gigabitgrundbuch.bund.de/GIGA/DE/Infrastrukturatlas/start.html

[34] Such approach of cross-sectoral use of passive infrastructure can be referred to as "cross-sectoral solidarity". See ITU, GSR 2008, Best Practice Guidelines on innovative infrastructure sharing strategies to promote affordable access for all, chapter B "Innovative regulatory strategies and policies to promote infrastructure sharing", section 11 "Sharing with other market players and industries"

In summary:

The international best practice guidelines from regulatory authorities within the ITU on strategies for sharing relevant infrastructure, is of priceless relevance for the assessment in the present report. *On the one side*, it puts forward some extremely relevant orientations regarding infrastructure sharing, including, but not limited to, no need for asymmetric approach targeting only dominant operators when it comes to offering shared facilities (symmetric approaches also to be considered); making sure that opening infrastructure access to competing market players does not discourage them from investment in own independent facilities; in order to find a balance between protecting existing infrastructure owners (the value of their investment) and access seekers (from artificial barrier to sharing through price and non-price practices by infrastructure owners); priority for commercially negotiated pricing except in case of existing market dominance; sharing of non-replicable or non-easily replicable resources (e.g. towers, ducts and Wayleaves, Backbone Network and other bottleneck resources identified as "essential facility") for installations that serve a similar purpose on a *first-come first-served basis*; licensing or authorizing *"wholesale-only" operators* (structural separation in the market) for passive network elements; neutrality, transparency, fairness and non-discrimination requirement for infrastructure sharing; and need for interconnection frameworks to ensure the right to *any-to-any interconnection* and encourage sharing of essential facilities.

On the other side, it also specifically deals with access to essential facilities, access to National backbone (relevant for KDEAP subcomponent 1.1) and cross-border networks and capacity and network facilities (relevant for KDEAP subcomponent 1.5), in terms of the need for regulatory policy to **promote open access** to national backbone, for example, collocation and connectivity services at backbone network and facilities.

7.4 Enabling open access to telecommunication networks

From ITU's perspective, there is a need to rethink the different degrees of regulation to anchor relevant national strategies and regulatory frameworks around the multi-facetted concept of open access to and over networks, given the growing complexity of the ICT market environment. This includes ensuring equal and non-discriminatory access to the networks and lifting potential bottlenecks that could prevent end users from enjoying the full benefits of living in a digital world, driven by speed, ubiquity of access and affordable prices, irrespective of the location of the network providers and users. In this context, regulatory frameworks are expected to set the right balance between *service competition* and *infrastructure competition* to address the challenges associated with access to networks and services. The **open access** concept provides for an enabling environment

to achieve effective competition while ensuring accessible, affordable and reliable services for consumers[35].

In order to pave the way to a harmonized worldwide understanding and implementation, regulatory authorities within the ITU have adopted best practice guidelines for enabling open access to electronic communications networks and related infrastructure. Essentials of these guidelines are as follows, limited to aspects of relevance to analysis in the present report[36].

1. **Defining open access:** The ITU acknowledge that many concepts are being used to refer to "open access". In order to make sense of the various concepts, ITU's guidelines provide for the following elements:
    - From a service provider's perspective, open access means the possibility for third parties to use an existing network infrastructure.
    - Open access can have two (2) main forms, including *regulated open access* (such as unbundling, especially where there is a dominant operator), and *commercial open access* relevant for KDEAP in Kenya.
    - Every user (consumer) should have access to all services and applications carried over these networks, as long as those services and applications are public and lawful. This shall apply regardless of the type of network and who is supplying or using them, and in a transparent and non-discriminatory fashion.
    - The user's range of choice should not be unduly constrained by the inability of competitors to obtain access services, especially over the last mile infrastructure.
2. **Open access to networks:** The policy and regulatory tools needed to enable open access to network facilities (i.e., Backbone fiber networks, "essential" or "bottleneck" facilities, other networks) without harming investment and innovation include the following elements:
    - Legislation should set out the general principles of open access – non-discrimination, effectiveness and transparency – highlighting the importance of both active and passive infrastructure sharing in the deployment of electronic communications networks in property owned by any operator, private entities and public bodies, even if they are operating in other sectors.
    - Regulators may consider mandating dominant providers of national broadband networks, including Backbone Networks, to provide open access on a fair and non-discriminatory basis to their networks and essential facilities for competitors at different levels of the networks, in order

[35] See ITU, GSR 2010 - Best Practice Guidelines for Enabling Open Access: Best practices in designing, building out and managing open access networks, p. 1
[36] See ITU, GSR 2010 - Best Practice Guidelines for Enabling Open Access: Best practices in designing, building out and managing open access networks.

to encourage broadband deployment, preserve and promote the open and the interconnected nature of the public Internet.

- Importance of wholesale regulation, including the obligation to publish reference offers for access (ROA) to essential facilities and prices oriented to costs, as means to ensure open access.
- A centralized information system, containing the data records of infrastructures held by public bodies, electronic communications operators and other public utilities that can be shared, are of great advantage to all market players. Operators should be encouraged to enhance transparency by setting up and make available in a database accessible online, information regarding passive infrastructure (i.e., civil elements such as ducts and towers) that can be shared (including paths and space available) with the respective prices oriented to costs[37].
- Coordination among all stakeholders (from the ICT sector and beyond, e.g., electricity, gas, water, sewage, etc.) in the deployment of civil works to prevent any barriers to the spread of broadband networks (*cross-sectoral use of infrastructure*)[38].
- Defining flexible open access rules adapted to the fast-paced broadband growth.
- Development of a change management strategy to assist the regulators in reforming their regulatory practices in order to adequately adapt to the exigencies of new market structures, innovations and business models.

3. **Accommodating service-based and infrastructure-based competition:** When addressing the challenges associated with access to networks and services, it is important for regulatory frameworks to set the right balance between *service competition* and *infrastructure competition*. In that respect, regulators need to encourage and reward investment while retaining open access. *On the one side*, service prices should ensure infrastructure owners a fair return on their investments capable of giving them the incentives to make necessary further infrastructure investments. *On the other side*, access seeking service providers need to know they can access this new infrastructure on fair, reasonable and non-discriminatory terms.
   Detailed on how to achieve this balance are contained in a recommendation of the European Commission[39], described in the following chapter of this report.

[37] An example is the infrastructure atlas (ISA) of BnetzA, the German regulatory authority.
[38] See also chapter 7.2 paragraph 1 (Reference Paper on regulatory principles under the World Trade Organization) in the present report.
[39] Commission Recommendation of 11 September 2013 on consistent non-discrimination obligations and costing methodologies to promote competition and enhance the broadband investment environment, 2013/466/EU. For details on the EoI approach as implemented by the EU, see the relevant chapter dealing with the EU practice in the present report.

7.5 Open Access Internet – European Commission

Open Access is part of the European commission acts and recommendations to encourage and achieve the Gigabit Connectivity targets. The recent Gigabit Infrastructure Act (GIA)[40] introduces a set of actions to simplify and speed up the deployment of very high-capacity networks, such as fiber and 5G, by reducing the administrative burden and the costs of deployment. The full availability of gigabit networks and the rollout of 5G performant networks in all populated areas are key elements to support the digital transition of the European economy and society, as set out in the EU's digital transition targets for 2030.

The Gigabit Infrastructure Act (GIA) and new rules replaces the Broadband Cost Reduction Directive[41], the Next Generation Access Recommendation (2010) and the Non-discrimination and Costing Methodology Recommendation (2013).

The Gigabit Infrastructure aims to improve the regulatory conditions needed to:

- promote connectivity, access to and take-up of very high capacity networks ('VHCN');
- promote effective competition;
- contribute to the development of the internal market for electronic communications networks and services;
- promote the interests of people in the Union.
- It also aims to increase legal certainty and regulatory predictability in view of the long-term horizons for investment in VHCNs.

The main recommendations are consulted and reflected on publications from the European telecom regulator BEREC (Body of European Regulators for Electronic Communications), such as the BEREC Report on "Open Access"[42] from 2011 and the BEREC Guidelines on the implementation of the Open Internet Regulation[43]

Across European NRAs the "Open Access" or forms of mandated access is documented as "Access Obligations" that arise from a variety of legislative provisions, based on both EU and National policy:

- "Open Access" – State Aid Guidelines.
- Regulated Access – The EU Regulatory Framework.
- National Legislation.
- Competition Law – The TFEU and the EC Merger Guidelines.

The following Figure summarize the various forms of mandated access across European countries:

[40] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52023PC0094
[41] http://data.europa.eu/eli/dir/2014/61/oj
[42] https://www.berec.europa.eu/sites/default/files/files/doc/berec/bor_11_05.pdf
[43] https://www.berec.europa.eu/sites/default/files/files/document_register_store/2022/6/BoR_%2822%29_81_Update_to_the_BEREC_Guidelines_on_the_Implementation_of_the_Open_Internet_Regulation.pdf

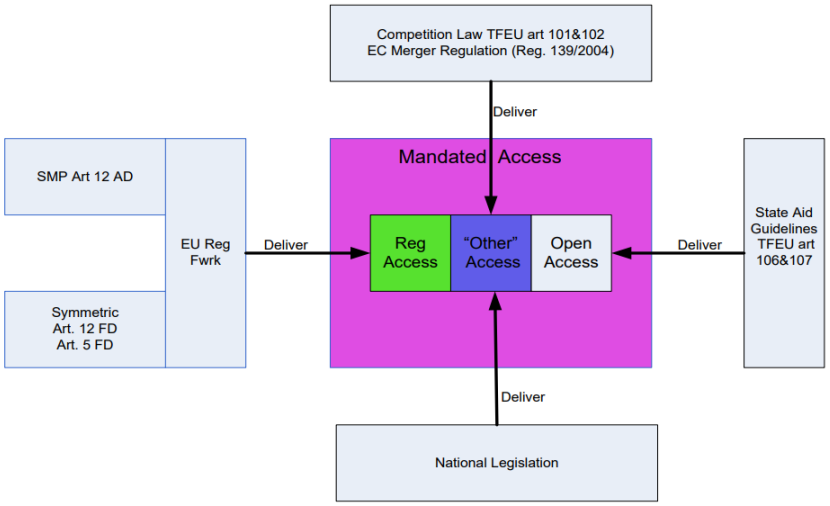


Figure 3: Various forms of mandated access across EU. ***Source: BEREC BoR(11) 05, page 8***

The Term "Open Access" in EU Policy Context

The term "open access" lacks a formal definition in the EU Regulatory Framework or other legal instruments. It is generally understood as transparent, non-discriminatory wholesale access that fosters competition at the retail level.

Across EU documents such as the Commission's State Aid Guidelines, "open access" refers to mandated access to subsidized networks, ensuring effective, transparent, and non-discriminatory conditions. This includes both passive and active network elements.

Across the European different national conditions and evolving Next Generation Access (NGA) networks, a single, comprehensive definition is not feasible. As such, the term is used in quotation marks throughout European document to reflect its context-dependent nature.

The Next Generation Access Recommendation 2010

The 2010 NGA Recommendation (2010/572/EU) is a guideline designed to support national regulatory authorities (NRAs) in ensuring consistent, pro-competitive regulation during the transition from copper to fiber-based broadband networks. The recommendations related to Open Access include:

- **Mandated Access:** Operators with significant market power (SMP) must provide wholesale access to their NGA networks under fair, transparent, and non-discriminatory terms.
- **Access Types:** The Recommendation supports both passive access (e.g. ducts, dark fiber) and active access (e.g. bitstream), depending on market conditions and infrastructure duplication feasibility.
- **Investment Incentives:** While promoting open access, the Recommendation also seeks to preserve investment incentives by allowing risk-adjusted returns for network investors.
- **Regulatory Consistency:** NRAs are encouraged to apply consistent remedies across the EU to avoid market fragmentation and ensure legal certainty.

- **Technology Neutrality:** The Recommendation is technology-neutral, applying to all NGA technologies including fiber-to-the-home (FTTH), fiber-to-the-cabinet (FTTC), and others.

The Non-discrimination and Costing Methodology Recommendation 2013.

The Commission Recommendation 2013/466/EU from September 2013. This EC recommendation identify the following key principles guaranteeing fair and non-discriminatory access to network by service providers without discouraging investment in network deployment. According to the ITU, these EC principles may guide other countries as well:

- Prices should be based on a bottom-up LRIC costing methodology, determining the current cost structure of a hypothetical efficient NGA that meets broadband policy objectives.
- The regulatory asset base for the cost model should be valued at full replacement cost, except for existing civil engineering assets, which should be valued on the basis of inflation-adjusted net-book value.
- Effective non-discrimination is best achieved through an equivalence of inputs (EOI) requirement, so that alternative service providers can replicate the service offerings of the broadband access network operator.
- To be effective, an EOI approach needs to incorporate service-level agreements (SLAs) and key performance indicators (KPIs), covering matters such as ordering processes, provision of service, quality of service (QoS), fault repair times, and migration.

In summary:

Open access is a multi-facetted concept that, for the European Commission (EC), enables effective competition while ensuring accessible, affordable and reliable services for consumers. The regulatory challenge when addressing access to networks and services in a digital world is to strike a balance between *service competition* (enabling open access to network facilities) and *infrastructure competition* (imposed access to Backbone network and facilities shall not harm investment and innovation). Mandating providers of Backbone networks to provide open access on a fair and non-discriminatory basis to their networks and essential facilities for competitors at different levels of the networks is an approach worth considering, in order to encourage broadband deployment, preserve and promote the open and the interconnected nature of the public Internet. Imposing obligation to publish reference offers for access (ROA) to essential facilities and prices oriented to costs is a means to ensure open access. Effective non-discrimination is best achieved through an equivalence of inputs (EOI) requirement. EC's regulatory principles guaranteeing fair and non-discriminatory access to network by service providers without discouraging investment in network deployment have widespread application and provide an approach that could be applied in many cases.

7.6 Open Access for Fiber Networks – FTTH Council Europe

The FTTH Council is aligned with the European Commission principles and targets to achieve the Gigabit Connectivity targets. Open Access is a principle promoted by the FTTH Council to support efficient fiber to the home (FTTH) networks. The approach and definitions is reflected in the promotion of wholesale business model, where a single fiber infrastructure is shared among multiple service providers under transparent, non-discriminatory conditions.

The Term "Open Access" for the FTTH Council Europe in a context of fiber network business models and implementation.

The term "open access"[44] implies a resource that is made available to clients, other than the owner, on fair and non-discriminatory terms; in other words, the price for access is the same for all clients and is hopefully less than the cost of building a separate infrastructure.

In the context of telecommunications networks, "open access" typically means the access granted to multiple service providers to wholesale services in the backbone network and local access network enabling them to reach the subscriber without the need to deploy a new fiber network (in order to avoid duplication of infrastructure). The wholesale pricing structure is cost oriented and transparent and the same for all service providers. Wholesale products are offered at different levels throughout the infrastructure based on the type of open access model:

- **Passive open access infrastructure** like ducts, sewers, poles, dark fiber and wavelengths, offer telecommunications operators the opportunity to share a passive infrastructure, and to deploy their own infrastructures on top of delivering services.
  Active open access infrastructure such as Ethernet layer-2 and IP layer-3 make it possible for service providers offering residential, business and public services to share a common active infrastructure that is built by a passive infrastructure player and operated by an active infrastructure player.

A representation of infrastructure operator services and services operator services (retail services) in described in the following figure provided by the FTTH council Europe.

[44] FTTH Handbook, Edition 9. P, 241

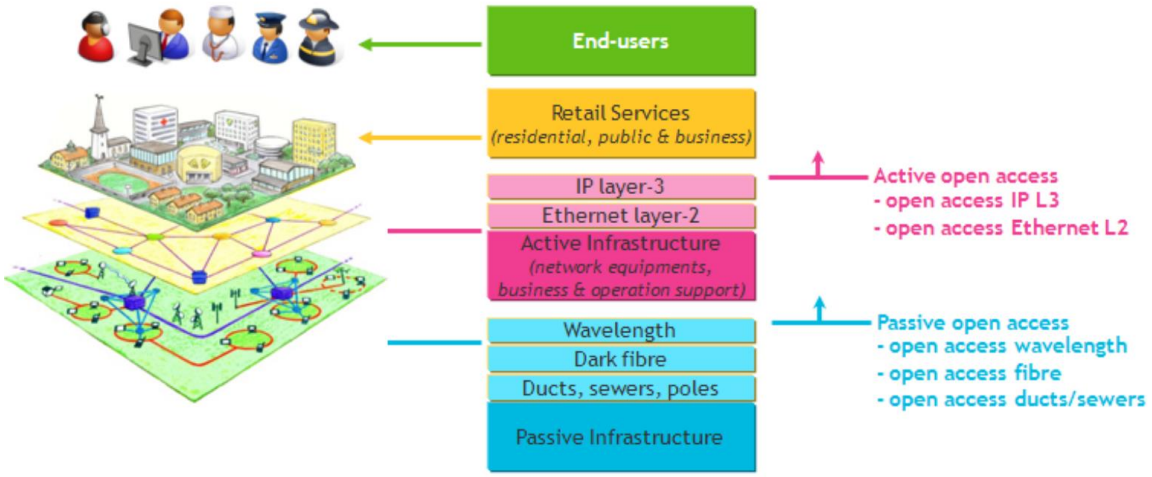


Figure 4: Open Access models (source: FTTH Council, Business Guide v5)

Additionally, and following the EU market definition, a second classification based on the location of the fiber across the network[45], services can be identified on Backbone/Middle mile and last mile/local loop as follows:

- **Wholesale Local Access (WLA)** - Involves sharing the last mile/ local loop connection between the local serving distribution point and end users.
- **Wholesale Central Access (WCA) -** refers to sharing the access providing connectivity to end users and the networks connecting at a central serving node (higher in the network hierarchy, backbone or middle mile).

Common wholesale services include:

Local Loop Unbundling (LLU) - passive access service offered as WLA consisting of the local fiber optic loop (from the end user premises to the local distribution point).

Bitstream Access (BSA) - an active access service offered primarily as a WCA consisting of an active Layer 2 or Layer 3 service from the end user to the central point of interconnection. A BSA specification usually includes QoS policy, security mechanisms (IP and MAC anti-spoofing) and service client endpoint authentication.

Managed Capacity: and active service

Dark Fiber (DF): passive access services offered as WCA consisting of fiber core or strands (single or a pair) on a monthly rental basis between two network sites or network facilities, normally prices

[45] FTTH Business guide, Edition 5, P, 19.

In summary:

For the FTTH Council Europe provides a technology perspective to Open Access, their understanding of “open access” typically means the access granted to multiple service providers to wholesale services in the backbone network and local access network enabling them to reach the subscriber without the need to deploy a new fiber network (in order to avoid duplication of infrastructure). The wholesale pricing structure is cost oriented and transparent and the same for all service providers. Wholesale products are offered at different levels throughout the infrastructure based on the type of open access model.

The business models and implementation of them, recognize four main layers: End Users, Retail Services (residential, public and business), Active Infrastructure, and passive infrastructure. Including nuances related to the location within the network where the service is provisioned, namely at the end user side as Wholesale Local Access (WLA), and between network site locations defined as Wholesale Central Access (WCA).

7.7 Open Access: International Adoption - Best Practice

Open Access Fiber has been adopted internationally in many countries, the following countries have adopted Open Access Fiber to bridge the digital divide, each experience may provide learnings relevant for the implementation of the KDEAP initiative in Kenya.

7.7.1 New Zealand – The Ultra-Fast Broadband (UFB)

New Zealand’s journey toward an open telecommunications market began in the late 1980s, when it dismantled its state-owned monopoly and opened the sector to competition. In 1989, all legal barriers to entering the local telecom market were removed, and Telecom New Zealand was privatized the following year. At first, there was no dedicated telecom regulator—disputes were handled under general competition law, which led to high-profile legal battles. By 2001, the government recognized the need for a more tailored approach and introduced a telecommunications-specific regulatory framework. This included the creation of a commissioner with powers to enforce access rules and oversee Telecom’s public service obligations. Over the next few years, the framework was strengthened, allowing for local loop unbundling and the operational separation of Telecom into distinct network, wholesale, and retail divisions. This led to the formation of Chorus, which took on the task of upgrading infrastructure by installing thousands of fiber-fed roadside cabinets and rolling out ADSL2+ to improve broadband speeds.

Despite these efforts, the government realized that regulatory changes alone wouldn’t be enough to bring high-speed internet across the whole country. In 2008, the opposition proposed a bold plan to deliver ultra-fast broadband to key sectors and most of the population within a decade. This led to the creation of Crown Fiber Holdings (CFH), a state-owned company that would co-invest with private partners to build fiber networks

across the country. The plan envisioned up to 33 Local Fiber Companies (LFC), each responsible for deploying open access fiber in specific regions. By 2010, the first partnerships were already being negotiated, laying the groundwork for what would become one of the most advanced open access fiber systems in the world.

The UFB program, launched in 2009, was a public-private partnership aimed at deploying fiber to 87% of the population. The government co-invested with four Local Fiber Companies (LFCs):

- Chorus
- Enable
- Northpower Fiber
- Tuatahi First Fiber

A Wholesale-Only Model was selected, therefore LFCs do not sell directly to consumers (retail). Instead, they provide Layer 2 (bitstream) services to Retail Service Providers (RSPs or Service Companies) like Spark, One NZ, and 2degrees.

This ensures structural separation between infrastructure and services, promoting competition and consumer choice.

The Commerce Commission regulates the fiber market under a utility-style framework. The regulatory oversight includes oversees of pricing, service quality, and access terms to ensure fair competition.

Wholesale services followed a layered Open Access Model where the model supports both Layer 1 (physical infrastructure) and Layer 2 (bitstream) access. This allows RSPs to innovate and differentiate their services while using the same underlying infrastructure.

Today, an internet penetration of 96% reflect New Zealand's strong digital infrastructure and the success of its open access fiber model in achieving almost universal connectivity.

7.7.2 Singapore – Next Generation National Broadband Network (NGNBN)

Singapore with a population of around 5.1 Mn, has long had strong broadband connectivity. Most of its residents—about 85%—live in apartment buildings, which makes it easier to roll out network infrastructure. In 2006, as part of a broader plan to advance its digital future, a government advisory group recommended building a nationwide fiber-optic network. This new network would replace older copper and cable systems and deliver gigabit-speed internet to homes, schools, and businesses. At the same time, they also proposed a country-wide wireless broadband network to ensure people could stay connected anywhere, anytime.

Planning for this next-generation broadband network began in 2006. The government decided it would be built through a public-private partnership, with clear separation between the companies handling the physical infrastructure, the electronics, and the services. The layered approach in Singapore included:

- **Passive Infrastructure (NetCo):** In 2008, a company called OpenNet was chosen to build the fiber network, responsible for the fiber network.
- **Active Infrastructure (OpCo):** In 2009, Nucleus Connect was selected to manage the active components, handling the electronics.
- **Retail Services (RSPs):** Includes providers like Singtel, StarHub, M1, and others who deliver services to end users.

The project aimed to connect over a million homes and more than 150,000 businesses. The government committed up to S$ 1 Bn in funding, with most going to OpenNet and the rest to Nucleus Connect. By late 2010, the network had already reached 40% of the country, with plans to cover 60% by the end of that year and 95% by mid-2012. The network was activated, and several internet providers were ready to offer services over it.

7.7.3 Alberta, Canada – SuperNet

The Alberta, Canadian case is regional, not national, as the previous ones and does not directly apply to residential or business premises. Alberta, a province in Western Canada, is approximately the size of France and has a population of 3.8 Mn. 75% lives in seven urban centers, while the rest are scattered across rural and remote areas. A portion of revenues from exploitation of the province's natural resources goes to the Alberta Heritage Fund, a unique Canadian source of finance or government programs.

In 2000, Alberta announced plans to build a fiber optic network to promote economic development. The Alberta SuperNet, a public-private partnership between the government and private companies Bell Canada and Axia NetMedia, aimed to extend broadband connectivity and improve government service delivery. The total cost was at least C$ 330 Mn, equivalent to USD 313.5 Mn in September 2010.

The SuperNet in Alberta aims to provide all Albertans with access to government services and high-speed internet across the province. It connects over 4700 government facilities, including provincial offices, health sites, and libraries, enabling a wide range of services to be delivered to local communities. Axia, a ten-year renewable contract with the government, provides broadband connectivity for these services. The government acts as an anchor tenant for the SuperNet, spending significant amounts each year on services. Axia also wholesales services to third-party providers on the SuperNet, providing a point of presence in 402 rural/remote communities. Pricing for service is uniform across the province, and Axia does not act as a retail provider.

Like other next generation networks, the SuperNet does not simply deliver ‘the internet’. It is a private network, supporting connections between any points on the network. The SuperNet can act as a ‘middle mile’ to aggregate traffic from anywhere on its fiber optic network to a central location (‘meet me’ point) where it can be connected to the internet or other services. It is this functionality that allows internet service providers (ISPs) to extend broadband connectivity into any SuperNet community, but the service provider must also provide infrastructure from the SuperNet POP to the customer premise. About 300 communities have at least one service provider accessing the SuperNet at the local POP,

but this does not necessarily mean that residential internet services are available in that community.

7.7.4 Australia – National Broadband Network (NBN)

In March 2007, Australian Labor Opposition leader Kevin Rudd announced a plan for broadband, aiming to inject $A 4.7 Bn of public funding into a National Broadband Network. This plan would bring speeds of 12 Mbits/sec to 98% of Australians by upgrading the fixed line network to FTTN or FTTP. The plan capitalized on perceptions of Australia lagging in the developed world in fixed line broadband adoption, the technical opportunity of next-generation access networks, criticism of incumbent Telstra's power, and large budget surpluses. This policy bridged Labor's opposition to privatizing Telstra.

Telstra's delayed plans to upgrade its fixed network to FTTN led to the Labor Opposition's 2007 national broadband plan. The government referred Telstra's 2005 plan to the competition regulator, which was later modified to offer faster speeds in major cities. The Labor Opposition's plan was based on these plans, which broke down during discussions. The government announced a cheaper plan covering WiMAX and ADSL2+ local access and fiber backhaul in non-metropolitan areas. A tender was won by a joint venture between Singtel/Optus and rural group Elders, but the contract was terminated by the Labor government in November 2007.

The new government commenced another tender process for its own plan, an FTTN or FTTP network offering 12 Mbits/sec to 98% of the population. A number of bids were received including one from Telstra that was ruled ineligible because it failed to comply with one of the specifications. Faced with a policy framed around an old plan to upgrade the incumbent’s network and a list of bidders that now did not include that incumbent, this process too was terminated in April 2009, and replaced with the still more ambitious FTTP plan, to cost an estimated A$ 43 Bn. By committing to build a fiber access network that would completely replicate the incumbent’s copper one, the new plan allowed the Government to claim its new enterprise would be building the national broadband network itself, although it was also widely perceived as a strategy to force the incumbent Telstra into some form of accommodation.

A state-owned company to build and operate the fiber and wireless networks, NBN Co, was formed in 2009. It began designing and building the fiber access network in the island state of Tasmania, in conjunction with the state-owned power utility there. Retail services were first offered in mid-2010. Further trial sites on the mainland were also chosen and the government let a USD 250 Mn contract to build competing backhaul on some major non-metropolitan routes.

The NBN was a major issue dividing the two main parties in the August 2010 election campaign. The opposition proposed a much cheaper strategy similar to the one it was in the process of deploying before it lost office in 2007. The Government did not win enough seats to govern in its own right but secured the support of several independents and a Green Party member in Tasmania, sufficient for a minority government. Broadband policy

was cited by the final two country independents as a crucial factor that led them to support Labor rather than the (Conservative) coalition.

The institutional structure in Australia, was a wholly state-owned National Broadband Network Company (NBN Co) to both build and operate the fiber network—the base and the middle of the Singapore pyramid.

In summary:

When policy discussion arises about the open access regulation of fixed fiber networks, significant focus has been placed on different models of 'Separation' between network infrastructure, wholesale services and retail operations. This is no longer a theoretical issue, as 'Open Access' fiber networks have been already deployed in many countries including the mentioned on this document as evidence of the applicability of the Open Access approach for the KDEAP project in Kenya. What is relevant to consider is the relation between expectations of the investment versus the selected commercial model, along local conditions such as geographical size, population densities and infrastructure gap that challenged each of the four countries described.

The four governments took distinct institutional structures, Alberta in Canada didn't partner with the local incumbent (Telus) and selected two partners (Bell Canada and Axia NetMedia). New Zealand created a state-owned entity (CFH) to invest in partnership with up to 33 local fiber companies, overseeing the selection and investment process through CFH. Singapore implemented the most structurally separated model, with three-tier system: OpenNet owns the fiber, Nucleus Connect operates it, and existing retail providers deliver the services. Despite this separation, major incumbents in Singapore like Singtel and StarHub still hold significant roles. Australia, in contrast, established a full state-owned company, NBN Co, to build and operate the network, including a subsidiary for Tasmania. As a result, the learnings and implications of institutional structure for KDEAP project in Kenya indicate that local conditions such as geography, population density, stakeholders and investors profiles will play a key role to select the most suitable approach according to local market and conditions.

7.8 Open Access: Other considerations

As part of an Open Access Network implementation the following considerations may be relevant during the elaboration of an Open Access Network approach[46].

- Multi-vendor strategy and network interoperability
- Sustainability and carbon footprint reduction

The FTTH council recommendations for the points above include.

[46] FTTH Handbook, Edition 9. P,243.

Multi-vendor strategy and network interoperability

The implementation of an Open Access network may arise concerns with regards to a multi-vendor strategy that allows telecom operators to buy equipment from multiple vendors, so that the company does not become dependent on an individual supplier. Such a strategy not only allows the operator to negotiate equipment prices with multiple parties but also enables the implementation of a robust supply chain and mitigation of technical problems. Therefore, during the technical requirements or network design of Open Access Network to offer wholesale services, it is important to include interoperability requirements, particularly for Interoperability between equipment of different CPE and access equipment providers, as it is important for telecom operators. From the operator's point of view, it is important to be able to have multiple sources of access equipment and multiple sources of CPE.

Open Access Networks in Wholesale Local Access (WLA), specifically for based on xPON Network Technologies, require that operators plan the implementation of the multi-vendor strategy, if they have decided to implement GPON (or XG-PON / XGS-PON) networks. The interoperability test plans are required to be defined by the Broadband Forum for GPON as TR-255 and for XG-PON / XGS-PON as TR-309. However, the lack of strict implementation guidelines for the OMCI and PLOAM layers meant that suppliers have a lot of freedom in deciding the implementation details. Therefore, if an operator wants to achieve differentiation between OLT and ONT providers, it should only focus on ONTs that have passed the Broadband Forum BBF-247 ONT certification program. In addition, it is recommended to use OMCI to configure Layer 2 parameters only, while configuration related to more advanced Layer 3 features (e.g. Wi-Fi) should be done using separate configuration protocols such as TR-069.

Other initiatives include the efforts to develop and implement a standardized way of describing terrestrial fiber optic networks, designed to enable effective information sharing and aggregation among telecommunication regulators and operators. The initiative is defined as "Open Fiber Data Standards"[47] supported by Internet.org[48] and The World Bank with KDEAP[49] among others.

Sustainability and carbon footprint reduction

Open Access Networks for Wholesale Local Access (WLA), specifically for based on xPON Network Technologies can be operated with significantly lower carbon emissions than legacy competing networks technologies such as copper or HFC (DOCSIS).

There are two primary reasons for this: Reliability and Power Consumption.

[47] https://open-fibre-data-standard.readthedocs.io/en/latest/index.html
[48] https://www.internetsociety.org/blog/2025/04/the-open-fibre-data-standard/
[49] https://projects.worldbank.org/en/projects-operations/procurement-detail/OP00285733

Fiber based networks are more reliable than their legacy competitors. This results in fewer faults which in turn means far less resource required to deal with network faults and customer issues. The Fiber Broadband Association in North America has found that “Truck Rolls” and “Customer Churn” are responsible for 85% of Access Network OPEX on average across all technologies. However, Fiber based networks OPEX is significantly lower because they do not experience the same level of Customer Churn or the same level of faults. The reduced fault levels lead to reduced Truck Rolls and therefore a reduction in carbon emissions attributable to the network. The following graphs show the anticipated OPEX saving derived from fiber network operations.

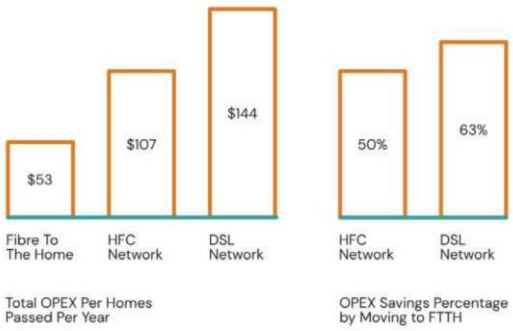


Figure 5: Open Access Fiber, Sustainability and carbon footprint reduction (Source: Fiber Broadband Association, FTTH Council Europe FTTH Handbook v9)

Secondly, FTTH networks require less electrical power. This is primarily because FTTH networks require fewer active elements than legacy copper/HFC networks. Breko (a broadband industry association based in Germany) has published a study comparing the energy consumption of these networks and found that GPON is the best FTTH network in terms of sustainability, followed by FTTH Point-to-point and XGS-PON. If all households in Germany were supplied (given a 100 % capacity rate) with GPON, this could save almost 240 MW compared to FTTC. Based on a sum data rate of one Gbit/s, a full supply of FTTH point-to-point systems can save almost 1100 MW in power compared to FTTC.

In the context of the KDEAP project, the learnings may translate in network requirements from a sustainability standpoint including the adherence to climate-resilient standards, while Carbon reduction learnings may include the application of environment and social standards requirements during construction.

In summary:

Open Access fiber according to the FTTH Council Europe require other considerations related to implementation and technology. Including in one hand, technology challenges and standardization considerations for multi-vendor strategy and network interoperability, while on the other hand bring benefits in terms of Sustainability and carbon footprint reduction as reported by the Fiber Broadband Association and the FTTH Council Europe.

8 Implications for the Commercial Transaction Manual (CTM) in Kenya

8.1 Main recommendations to consider as part of CTM

The present document provides relevant information for the development of the Commercial Transactional Manual (CTM), within the main implications to consider during the development of the CTM for Kenya, areas that require attention include:

- To consider the eligibility of new investors profiles, beyond the current licensed operators. It may enable Backbone networks to leverage cross sector use of infrastructure.
- To evaluate leverage KDEAP subcomponent 1.5 (Cross-border) with facilitating the way leaves for deployment of submarine cables and streamline relevant processes for Datacentre's, SCLS's and landing of submarine cables, in order to become an attractive international connectivity HUBs, similarly to Singapore, India, or Hong Kong.
- To evaluate the participation of operators on the selection of priority routes (or operators' proposals).
- The current set of licenses issued by CA in Kenya does not include a wholesale-only access. Understanding this is a topic for a concurrent project at CA, it is recommended to further evaluate the wholesale-only license for the selected commercial model.
- The level of tax is quite high, and this raises the cost to communicate in Kenya which in turn raises the proportion of areas which are not profitable to be served. It is recommended that telecommunications should be seen as a driver of economic development to be encouraged rather than a luxury good to be taxed.
- There is international evidence on the benefit of the adoption of Open Access Fiber networks for backbone and middle mile networks. It is recommended the adoption of open access principles, following recommendations from international organizations as the European Commission, the world bank and ITU.
- It is recommended to include on the CTM document, considerations related to the technology challenges (Multi-vendor interoperability) that may arise as part of the implementation of open Access Fiber, and as well considerations with regards to the benefits in terms of Sustainability and carbon footprint reduction.

8.2 Recommended Potential investors profiles relevant for the development of the CTM

Market Assessment

Kenya in among the leading countries in Sub-Saharan Africa in telecom market metrics such as internet access and mobile penetration. However, the great access to intercontinental connectivity via submarine cables (leading to high speeds and relatively lower cost compared to landlocked African neighbors) gives Kenya the chance to improve. Although mobile is dominant and LEO satellite services (that entered the market in 2024) will be a competition, fiber rollout is still relevant to optimize country's backbone, to serve mobile and even satellite's backhaul to "irrigate" with connectivity the landlocked neighbors (Uganda, Rwanda, South Sudan, Ethiopia). From a country's ICT development perspective, the end game may be positioning Kenya as a regional hub for East Africa, establishing an IXP, hosting CDNs & hyperscalers, and sell cheaper (but high volumes) of IP Transit at least to the aforementioned group of four landlocked neighbors.

In terms of internal connectivity challenges, GoK is making constant effort to bridge urban-rural digital divide and improve the connectivity access for rural communities, schools, police stations, and other state institutions. Apart from the frame programs such as Vision 2030, the National Broadband Strategy (2013-2017), the Digital Economy Blueprint (2019), and the ICT Master Plan (2020-2030), Kenya Digital Economy Acceleration Project (KDEAP) brings together public and private sector players *to* "deliver increased access to affordable and high-quality internet services for the Government, businesses, and citizens while enhancing digital skills and the development of Kenya's digital economy and enhanced integration with the region". KDEAP will be implemented using a Multiphase Programmatic Approach (MPA), within two phases: Phase 1 2023-2028 and Phase 2 2026-2030.

In this phase of the project, together with the ICTA stakeholders, the team has shortlisted and interviewed the potential interested parties, both established telecom companies (with fixed business, or owning fiber backbone, or mobile backhaul), and utilities companies.

Apart from the group of operators already investing in fiber (telecom and utilities companies), investment funds such as Helios Investment Partners (directly connected to European Investment Bank) and African Infrastructure Investment Fund 4 (AIIF4) are investing in the region. Google is present in the region by the Umoja cable (also in Kenya), connecting South Africa to Australia in its "wet" segment. Starlink may be also interested in fiber capacities in Kenya for satellite backhauling.

From a strategic perspective, let alone the results of the market survey, Poa Internet stands out by its strategic fit, as their focus is the underserved urban and peri-urban areas, as well as low-income rural communities.

Market Survey Interviews

The interviews outcome has provided evidence of the high interest from potential local and international investors to participate in the KDEAP initiative, almost all potential investors have confirmed non-binding interest to participate actively on the component 1 of the KDEAP Project, the potential investors confirmed the set-up of internal teams to evaluate commercial models that enable an efficient use of the KDEAP fundings.

Licensing

Within the overall license framework, the key license is the National Network Facilities Provider (NFP) license– owner and operator of network infrastructure (based on satellite, terrestrial, mobile or fixed technologies). There are different tiers for the NFP License, from national to local but this only affects the entitlement to spectrum. The four Tier licensees[50] national operators including all the main national operators have Tier 1 licenses while other operators of interest

The current set of licenses issued by CA does not include a wholesale-only access. However, our understanding is this is a topic for a concurrent project at CA.

As for the current license holders, telecom and utilities companies, there are infrastructure focused operators that hold Network Facilities Provider Tier 1-3 and potentially Submarine Cable Landing Rights, or International Gateway (IGW), while the ones having retail focus possess Content Service Provider and Application Service Provider on top.

An open point is the type of license a bidder must get, either a Wholesale (Only) Provider or a Network Facilities Provider license.

As a result of the market assessment, the following recommendations may be of significance for the development of the Commercial Transaction Manual (CTM):

- Enhancing the Backbone networks and middle mile may bring significant benefits to the Kenyan telecommunications market, understanding the cost associated to energy of wireless networks, therefore a fiber expansion is needed for both retail fixed services (mobile fixed substitution) and mobile backhaul (especially in the light of 5G bandwidths) and satellite backhaul.
- The participation of existing licensed operators in the KDEAP project, will be beneficial not only as co-investor, but instead they bring a wealth of local knowledge and operational know-how of Kenyan networks.
- From a Commercial model perspective, targeting private investors, companies such as Jamii, Airtel, Liquid, Zuku (Wananchi Group), and Poa Internet are not the

[50] CA: Register of licensees

only ones positioned for the scope. Partially or fully public owned entities and assets may also be part of the commercial model evaluation.

- Poa Internet similarly to other licensed operators, may be regarded as a good fit in terms of project scope and their announced strategy. However, the readiness to co-invest and the most suitable commercial model needs to be confirmed.
- As potential private investors, AIIF4 and Helios may represent a profile of potential investors which may require further research (one on one interview) in order to evaluate their suitability and interest to participate as potential investors (understanding Helios is financed by EIB).
- Google and Starlink may emerge as a new international investor profile to address their operations and investments in African, further research is recommended to understand their potential participation in the KDEAP project.
- Kenya is taking advantage of its position in the region and enjoys great potential to become a digital HUB for international connectivity. By its positioning in East Africa, Kenya may be part of a terrestrial East to West Africa connection to circumvent the Suez Canal. This may represent an opportunity to attract global investors to evaluate innovative business models for international connectivity.
- Increased number of one-on-one interviews are expected and reported to ICT authority in Kenya; it is expected that between 20 to 30 interviews will provide valuable information for the identification of potential investors and for the exploration of suitable commercial models to be implemented under the KDEAP project phase 1 in Kenya.
- There are common expectations from potential investors such as return on investment, open access to the new infrastructure, expand the footprint of backbone and middle mile. At the same time, there is also common recognition of the main challenges to overcome, including way leaves costs and processing for approval, coordination between authorities (subcounty - county, and cross sector coordination e.g.: roads and ducts) and security concerns in some areas of the country where infrastructure is vandalized or stolen.

8.3 Relevant observations from a policy, regulation and taxation framework perspective for the development of the CTM

There are no particular obstacles posed by the national regulatory regime in Kenya, however the following observations can be made:

- There is a relatively low level of network capacity wholesaling and infrastructure sharing in Kenya, this is not unusual as operators like to build their own network, especially with respect to their key customers and focus areas.
- In order for open access infrastructure sharing and wholesale models to become more prevalent, the infrastructure sharing regime has to be extended and generally enforced in order for these models to gain traction.

A key obstacle is the tendency of local county administration to try and get revenue from telecommunications operators through costly permitting in general and high costs of way-leaves in particular. The impact of this is far greater than any shortcomings in the regulatory regime at national level.

Regarding the taxation framework, there are two taxation issue in Kenya:

- The level of tax is quite high and this raises the cost to communicate in Kenya which in turn raises the proportion of areas which are not profitable to be served. As a general rule, telecommunications should be seen as a driver of economic development to be encouraged rather than a luxury good to be taxed.

The tax framework is subject to relatively frequent changes and this raises the level of unpredictability and therefore risk.

8.4 Recommended Open Access approach and principles relevant for the development of the CTM

Based on literature and recommendations from the International Telecommunications Union (ITU), there is a clear recognition on the validity of Open Access as a regulatory tool to promote access and competition in telecommunication infrastructure identified as bottleneck infrastructure. On this regards the ITU clearly identifies two (2) main options for promoting access and competition in situations where bottleneck infrastructure is controlled by one or a few market players: imposing specific regulation on owners of bottleneck facilities (regulatory option 1) and facilitating alternative infrastructure deployment (regulatory option 2). These 2 approaches are not mutually exclusive and can be combined. Although the ITU is mainly referring not only to backbone infrastructure, its statements are of priceless relevance for the present report, given that the “bottleneck” or “essential facility” nature of backbone networks is addressed, which is relevant also for main element of domestic connection namely Backbone Networks (KDEAP subcomponent 1.1), but also for international capacity through terrestrial cross-border (KDEAP subcomponent 1.5) or submarine cable. In terms of regulatory approach, whether

symmetric or asymmetric, ITU's recommendations do not explicitly give any preference: imposing specific regulatory requirements on owners of bottleneck facilities and/or encouraging existing or new licensees to deploy alternative infrastructure, both do not target only dominant providers, but all relevant market players that meet the criteria. Moreover, when it comes to offering access to existing essential facilities to be shared, an asymmetric approach targeting only dominant operators is not the only way. Instead, a symmetric approach could also yield positive outcomes.

The ITU also recognizes Open Access in the context of infrastructure sharing, for this purpose innovative strategies and policies are part of the international best practice guidelines promoted by ITU, where it highlights:

The international best practice guidelines from regulatory authorities within the ITU on strategies for sharing relevant infrastructure, is of priceless relevance for the assessment in the present report. *On the one side*, it puts forward some extremely relevant orientations regarding infrastructure sharing, including, but not limited to, no need for asymmetric approach targeting only dominant operators when it comes to offering shared facilities (symmetric approaches also to be considered); making sure that opening infrastructure access to competing market players does not discourage them from investment in own independent facilities; in order to find a balance between protecting existing infrastructure owners (the value of their investment) and access seekers (from artificial barrier to sharing through price and non-price practices by infrastructure owners); priority for commercially negotiated pricing except in case of existing market dominance; sharing of non-replicable or non-easily replicable resources (e.g. towers, ducts and Wayleaves, Backbone Network and other bottleneck resources identified as "essential facility") for installations that serve a similar purpose on a first-come first-served basis; licensing or authorizing "wholesale-only" operators (structural separation in the market) for passive network elements; neutrality, transparency, fairness and non-discrimination requirement for infrastructure sharing; and need for interconnection frameworks to ensure the right to any-to-any interconnection and encourage sharing of essential facilities.

On *the other side*, it also specifically deals with access to essential facilities, access to National backbone (relevant for KDEAP subcomponent 1.1) and cross-border networks and capacity and network facilities (relevant for KDEAP subcomponent 1.5), in terms of the need for regulatory policy to promote open access to national backbone, for example, collocation and connectivity services at backbone network and facilities.

The European Commission (EU) recommendation is based on Open Access Internet, as part of the connectivity for a European Gigabit Society Targets. The recommendations can be summarized as follows:

Open access is a multi-facetted concept that for the European Commission (EC) enables effective competition while ensuring accessible, affordable and reliable services for consumers. The regulatory challenge when addressing access to networks and services in a digital world is to strike a balance between ***service competition*** (enabling open access

to network facilities) and *infrastructure competition* (imposed access to Backbone network and facilities shall not harm investment and innovation). Mandating providers of Backbone networks to provide open access on a fair and non-discriminatory basis to their networks and essential facilities for competitors at different levels of the networks is an approach worth considering, in order to encourage broadband deployment, preserve and promote the open and the interconnected nature of the public Internet. Imposing obligation to publish reference offers for access (ROA) to essential facilities and prices oriented to costs is a means to ensure open access. Effective non-discrimination is best achieved through an equivalence of inputs (EOI) requirement. EC's regulatory principles guaranteeing fair and non-discriminatory access to network by service providers without discouraging investment in network deployment have widespread application and provide an approach that could be applied in many cases.

The FTTH Council provides a technology perspective and recommendations for a successful implementation of Open Access Networks, summarized as follows:

For the FTTH Council Europe provides a technology perspective to Open Access, their understanding of "open access" typically means the access granted to multiple service providers to wholesale services in the backbone network and local access network enabling them to reach the subscriber without the need to deploy a new fiber network (in order to avoid duplication of infrastructure). The wholesale pricing structure is cost oriented and transparent and the same for all service providers. Wholesale products are offered at different levels throughout the infrastructure based on the type of open access model.

The business models and implementation of them, recognize four main layers: End Users, Retail Services (residential, public and business), Active Infrastructure, and passive infrastructure. Including nuances related to the location within the network where the service is provisioned, namely at the end user side as Wholesale Local Access (WLA), and between network site locations defined as Wholesale Central Access (WCA).

International experience in the adoption of Open Access Networks, particularly in the cases of New Zealand, Singapore, Canada and Australia provides learnings and consideration that are relevant to the development of the Commercial Transaction Manual for KDEAP in Kenya, summarized as follows:

When policy discussion arises about the open access regulation of fixed fiber networks, significant focus has been placed on different models of 'Separation' between network infrastructure, wholesale services and retail operations. This is no longer a theoretical issue, as 'Open Access' fiber networks have been already deployed in many countries including the mentioned on this document as evidence of the applicability of the Open Access approach for the KDEAP project in Kenya. What is relevant to consider is the relation between expectations of the investment versus the selected commercial model, along local conditions such as geographical size, population densities and infrastructure gap that challenged each of the four countries described.

The four governments took distinct institutional structures, Alberta in Canada didn't partner with the local incumbent (Telus) and selected two partners (Bell Canada and Axia NetMedia). New Zealand created a state-owned entity (CFH) to invest in partnership with up to 33 local fiber companies, overseeing the selection and investment process through CFH. Singapore implemented the most structurally separated model, with three-tier system: OpenNet owns the fiber, Nucleus Connect operates it, and existing retail providers deliver the services. Despite this separation, major incumbents in Singapore like Singtel and StarHub still hold significant roles. Australia, in contrast, established a full state-owned company, NBN Co, to build and operate the network, including a subsidiary for Tasmania. As a result, the learnings and implications of institutional structure for KDEAP project in Kenya indicate that local conditions such as geography, population density, stakeholders and investors profiles will play a key role to select the most suitable approach according to local market and conditions.

In sum, beyond any differences that may exist in the details of its concrete implementation, depending on the choice of regulatory models, the concept of "Open Access" is generally articulated around the following underlying principles:

(1) Service users can freely choose their service provider on the infrastructure that is subject to the open access principle;

(2) Any operator and service provider that is duly authorized by the regulator is entitled to access that infrastructure for the provision of own services ("anyone can play");

(3) Any operator and service provider duly authorized by the regulator is free to increase access points on that infrastructure subject to technical feasibility and payment of the costs of these additions;

(4) Any operator and service provider authorized by the regulator should receive services under fair and non-discriminatory conditions;

(5) In order for a competitive market to function, everyone must be able to connect to everyone else. Service providers would be able to get access to infrastructure from the local to the international level, regardless of their market size and influence (any-to-any connectivity);

(6) No one should be prevented from using a particular technology when using the infrastructure. Therefore, regulatory measures should be technology neutral. Every regulatory authority committed to market development would be keen to encourage cost reduction through technology innovation (technological neutrality);

(7) Information about market prices and service have to be transparent and available to all. This transparency requirement is particularly important to ensure fairness in the delivery of connectivity – for example at national or international level –, as it will allow clear comparisons to be made between different providers. Consumers need to be sufficiently informed in a way that allow comparisons between "offers" (Transparency).

(8) The different roles of players need to be transparent. In order to create trust in the market, infrastructure providers need to be clear that they will not enter service markets to

compete with their customers. The regulator exists to encourage competition rather than restrict it but to do so in a way that genuinely encourages increased investment and lower access costs to communications technology. Where appropriate, regulation becomes “light-touch” rather than prohibitive or restrictive. Government exists to create the legal framework through which competition issues can be mediated.

(9) The operator of the infrastructure that is subject to the open access principle is not permitted to compete with its customers (service providers) in the provision of downstream services to subscribers on this infrastructure (structural separation). In other words, such operator is limited to the role of “operator of operators”.

8.5 Recommended Approach

The required actions for the CTM elaboration, in line with the objectives of the KDEAP Project, component 1. Are around 5 stages that will provide information and outcomes, in order to support the decision-making process for the design of the Kenyan CTM as part of KDEAP Phase 1, component 1. The proposed approach of 5 Stages is as follows:

1. **Commercial Model**

Based on the literature review, the public consultation and the one-on-one interviews, the consultant has investigated six commercial models, where three of them are compliant with the world Bank 'Matching Investments' procurement requirements:

- **Concession** - a private company that is building and operating a public network under a temporary license, often with public subsidies to close viability gaps (difference between the cost of a project and the revenue it can realistically generate). Optionally, the ownership may go back to the state after the term.
- **Joint Venture** - both government and private operators co-investing and co-owning a new entity that builds and runs the fiber network. Each party contributes with capital and is participating to the governance.
- **Co-build (Consortium)** - multiple private partners - and sometimes public institutions / Government jointly funding and deploying fiber infrastructure. Each party owns capacity (i.e. IRUs they can use and sell) and may operate their segment or appoint a shared operator. Example: Kenya's TEAMS cable, co-funded by government and telcos.

2. **From Potential Investors to Eligible Bidders**

   Under the World Bank procurement guidelines for matching investments, Eligibility of bidders must be applicable for the KDEAP project, therefore the eligibility criteria must be defined in line with the preferred commercial model, in order to elaborate the CTM document.

3. **Regulatory Approach**

   Definition of the regulatory approach, particularly with regards to the adoption of Open Access Network principles and the approach towards the wholesales market.

4. **Elaboration of the Commercial Transaction Manual**

Elaboration of the Commercial Transaction Manual, it is expected to have a series of iteration as part of the document reviews and validation.

5. **Mock-up Auction and training**

Elaboration and coordination of the mock-up auction, information session for potential bidders, and CTM training to ICTA.

9 Appendix 1: Market Survey

This chapter aims to clarify the report's perspective on accessing Backbone and middle mile networks for broadband connectivity services in Kenya. Before delving into issues related to Backbone network access, it is essential to look at the overall telecommunications market, then zoom-in to Kenya infrastructure and players, and the Backbone Network role providing national and international connectivity.

9.1 Kenya's Telecommunications Market Overview

In general, the telecommunications in Kenya are advanced and the country is positioned as among the leaders in Sub-Saharan Africa from the point of view of metrics such as internet penetration. This is significant, since internet is the base digital services (including mobile banking) is being built upon, thus the overall economy traction is augmented.

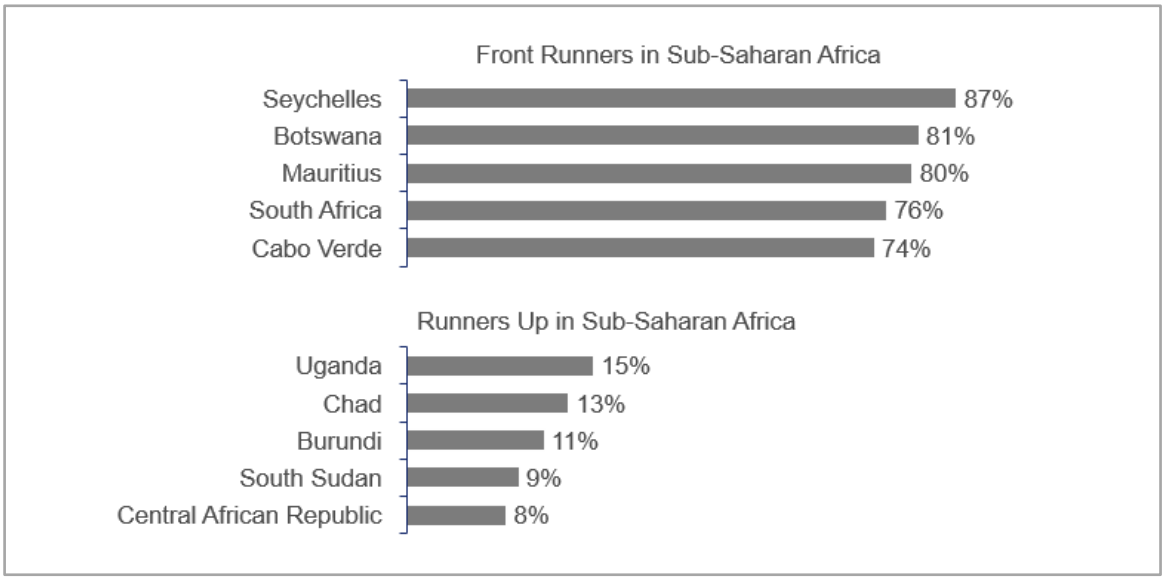


Figure 6 - Internet Penetration on the African Continent (*Source: World Bank*)

The ICT contribution to GDP is another parameter where Kenya is above its Sub-Saharan African peers, with 8-10%, lower than Nigeria (~15%), but higher than South Africa (6-7%), Ghana (4-5%), Rwanda (3-4%), amongst others. *(Source: African Development Bank).*

In order to get a comprehensive view on the telecom market in Kenya, the following building blocks are to be analyzed: mobile market, fixed market, and fiber backbone market (connectivity market), including ongoing and foreseen projects that may impact the fiber capacities rollout.

9.1.1 Mobile Market

The mobile market in Kenya has experienced significant growth, driven by increasing smartphone adoption and the expansion of 3G, 4G, and emerging 5G networks (as of 2023, Safaricom & Airtel). As of 2024, mobile services dominate the telecom sector, with

prepaid plans being the most popular due to their affordability. Major players like Safaricom, Airtel Kenya, and Telkom Kenya continue to invest in network infrastructure to enhance coverage and service quality. An important part for the topic of capacities rollout, the mobile backhaul, essential for connecting cell sites to the core network, has seen improvements with the deployment of fiber and microwave links, ensuring better data transmission and network reliability.

Mobile backhaul capabilities

Safaricom, also a market leader in fixed, is using its own infrastructure for mobile backhaul, especially in urban and high-traffic areas. Marginally, is using NOFBI and other provider in isolated cases.

Airtel is deploying a mix of fiber and microwave in key urban areas such as Nairobi, Mombasa, Nakuru, Kisumu, and Eldoret, elsewhere being based on leased capacities. For long-haul routes like Mombasa–Nairobi, Airtel leases dark fiber from other providers such as Kenya Power and Lighting Company (KPLC) and Kenya Electricity Transmission Company (KETRACO). However, Airtel has plans to extend its own fiber network, and play a role on the wholesale and enterprise market for fixed products.

Telkom has managed NOFBI historically, and its network is still integrated with NOFBI to a certain degree. For mobile backhaul, Telkom is using its own fiber backbone and metro networks, which are used for both backhaul and enterprise services.

9.1.1.1 Mobile Penetration

The mobile penetration has historically increased in Kenya, reaching 139% in 2024 (as per ICTA). The mobile penetration in the region (East Africa) is 98%, therefore Kenya is well situated from this perspective.

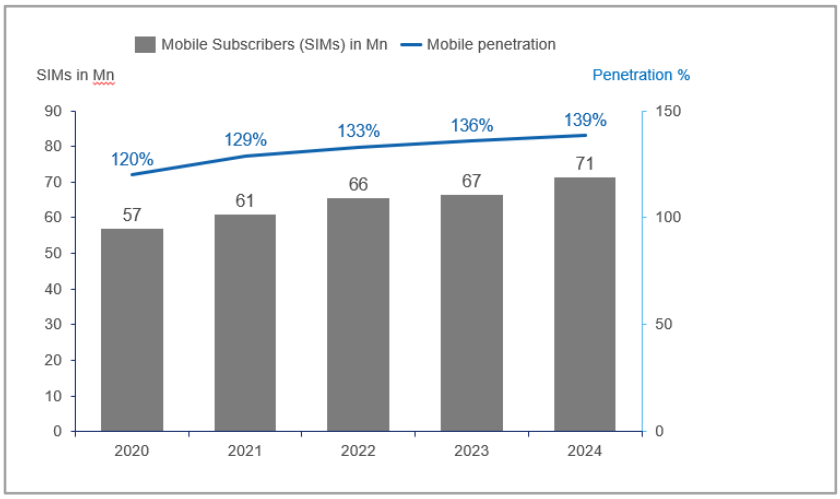


Figure 7 - Mobile SIMs and Mobile Penetration Dynamics *(Source: ICTA, Telegeography, Detecon Analysis)*

9.1.1.2 Mobile Market Shares

Safaricom dominates with a substantial 64% share (in green), showing its strong market presence. Airtel follows with an important 32% share (in red) indicating its attacker

position. Telkom holds a smaller portion at 2% (in blue) reflecting its limited market influence. Other companies collectively account for 1%, indicated by the grey segment, highlighting their minimal impact. This chart underscores Safaricom's leading role in the Kenyan telecom market, with Airtel as a notable competitor, while Telkom and other players have relatively minor shares.

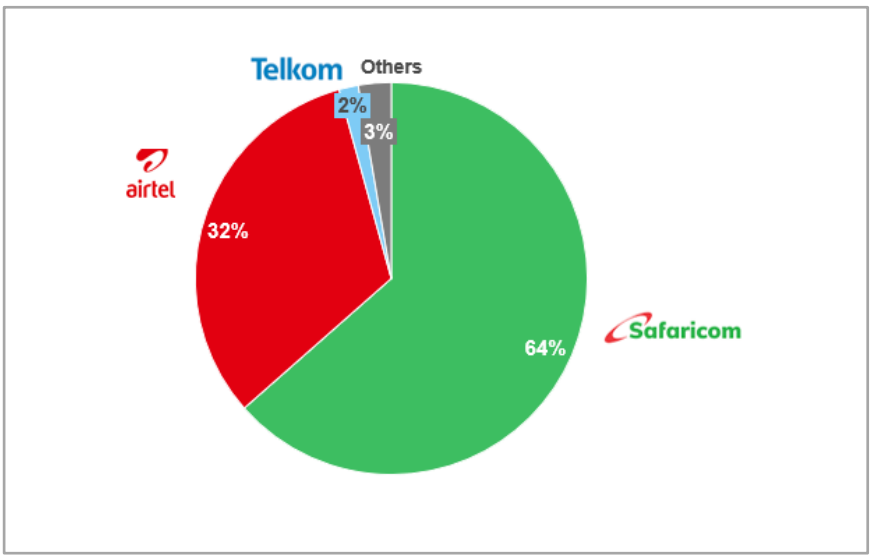


Figure 8 - Mobile Market Shares *(Source: ICTA)*

9.1.1.3 Mobile Technology

Safaricom, the market leader, launched 5G in 2023, expanding its coverage to all 47 counties by 2024. Airtel Kenya also launched 5G in 2023, with plans to increase its 5G sites to 1,000 by the end of 2024. Telkom Kenya and Jamii Telecommunications provide 4G services since 2017. Market liberalization in 2000 introduced competition, with significant developments including mergers, acquisitions, and technological advancements shaping the industry.

Operator	5G Launch	4G Launch	3G Launch	2G Launch
Safaricom	2023	2014	2008	1996
Airtel Kenya	2023	2018	2012	2000
Telkom Kenya	N/A	2017	2011	2008
Jamii Telecom (Faiba)	N/A	2017	N/A	N/A

Table 1 - Mobile Technology Launches *(Source: Telegeography)*

9.1.2 Fixed Market

The fixed telecom market in Kenya is also growing, particularly in the fixed broadband segment. Government initiatives and investments by telecom operators are driving the

expansion of fiber-optic networks, improving last-mile connectivity. The fixed backbone infrastructure, which includes long-distance fiber-optic cables, is crucial for supporting both fixed and mobile services. The government's strategic plans aim to enhance backbone infrastructure to ensure high-quality and affordable communication services across the country.

9.1.2.1 Fixed Penetration

The following chart illustrates the growth of fixed broadband connections in Kenya from 2020 to 2024. The bars represent the number of fixed broadband connections in millions (left axis), while the line (right axis) indicates the fixed broadband penetration percentage.

In 2020, there were 0.7 million connections with a penetration rate of 1.5%. This increased to 1.0 million connections and 1.9% penetration in 2021. By 2022, the figures rose to 1.3 million connections and 2.4% penetration. In 2023, the connections reached 1.4 million with a 2.8% penetration rate. Finally, in 2024, there were 1.5 million connections and a penetration rate of 3.0%.

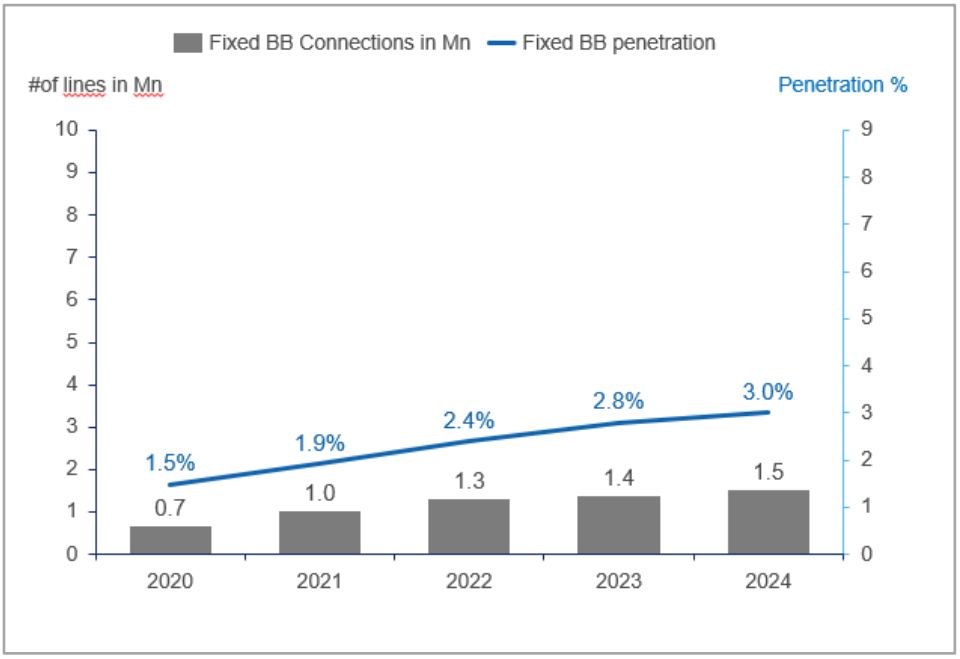


Figure 9 - Fixed Broadband Connections and Penetration (Source: World Bank, Detecon Analysis)

9.1.2.2 Fixed Market Shares

The pie chart below illustrates the market share distribution of internet service providers in Kenya. Safaricom dominates the market with a 36% share, (in green). The second-largest segment (in red) is Jamii Telecommunications (JTL), accounting for 24%. Wananchi Group holds 15% of the market, shown (light blue). Poa Internet (in dark blue) accounts for 14%, Vilcom Networks has 3%, while other operators have 8%.

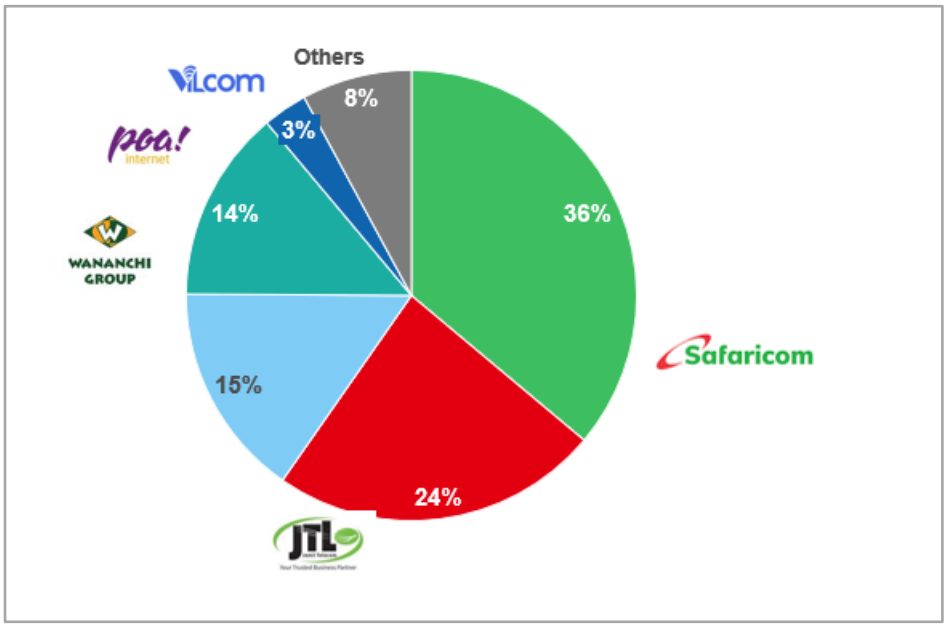


Figure 10 - Fixed Market Shares ***(Source: Telegeography)***

9.1.2.3 Fixed Technology

Safaricom provides Fiber to the Business (FTTB) and Fiber to the Home (FTTH) services, with significant coverage growth since 2015. It also offers 5G Fixed Wireless Access (FWA) services on the 3500 MHz frequency and LTE-Advanced FWA services in 800/1800 MHz frequencies.

Jamii Telecommunications (Faiba) offers Fiber to the Building (FTTB) and Fiber to the Home (FTTH) services since November 2011, covering over 200,000 homes in different regions. It also provides nationwide satellite services. Its WiMAX 802.16e FWA service on the 3300 MHz frequency has been shut down.

Wananchi Group (Zuku) offers Hybrid Fiber-Coaxial (HFC) cable services, covering over 500,000 homes (November 2024 data). Its WiMAX 802.16e FWA service on the 3500 MHz frequency has been shut down.

Poa Internet Kenya has been offering FWA services since 2015, expanding to hundreds of locations by November 2024.

Airtel Kenya launched its 5G Fixed Wireless Access (FWA) network in July 2023, operating on the 2600 MHz frequency. By November 2024, it had approximately 1,000 sites across 39 counties.

Liquid Home Kenya has been providing FTTH services since January 2016, reaching over 15,000 homes in major cities. It also offers WiMAX 802.16-2004 FWA services on the 3500 MHz frequency in 75 locations and satellite services nationwide.

Mawingu launched its FWA service in 2016, with partial coverage of 30 counties by November 2024.

Starlink Internet Services Kenya launched its LEO satellite service in July 2023, providing nationwide coverage.

Telkom Kenya offers FTTB and FTTH services, with its ADSL service shut down in 2015. It also provides LTE FWA services in all major towns and cities.

ISP	DSL	Cable	Fiber	5G-FWA	Other-FWA	Other
Safaricom			●	●	●	
Jamii Telecommunications (Faiba)			●			●
Wananchi Group (Zuku)		●				
Poa Internet Kenya (poa!)					●	
Mawingu					●	
Starlink Internet Services Kenya						●
Liquid Home Kenya			●			●
Telkom Kenya			●		●	
Airtel Kenya			●	●		

Table 2 - Fixed Broadband Technologies ***(Source: Telegeography, Detecon analysis)***

For the purpose of this study, it is relevant that the main fiber market players are at the moment: Safaricom, Jamii Telecommunications (Faiba), Liquid Home, Telkom and Airtel.

9.1.3 Fiber Network Backbone (Fixed Connectivity Market)

Under this chapter, the report will look into the current telecom operators and utilities companies holding fiber capacities, as well as other potential interested parties in the scope of the project hereby, but also to the licensing as-is situation, the government programs and strategies, and the international and national connectivity.

9.1.3.1 Market Players in Fiber Connectivity Market

In order to generate a view on the potential interested parties to co-invest, the report will consider the existing telecom companies, with fiber footprint and / or concrete plans to invest in fiber, and other companies (utility companies amongst them).

9.1.3.1.1 Telecom Companies

Safaricom

Industry: Telecommunications and Financial Services.

Ownership: Government of Kenya (35%), Vodacom (35%), Vodafone (5%), and public/free float (25%) **Services:** Mobile voice & data, fixed broadband, mobile money (M-PESA), enterprise solutions, cloud, IoT. **Fiber Footprint:** Very extended national fiber network exceeding 10,000 kilometers, covering metro, backbone routes and last mile. **Announced Plans:** aggressive 5G rollout with over 500,000 5G users in 2024, expansion of FTTH and enterprise services, continued investment in rural connectivity and digital inclusion. **2024 Revenue:** +KES 310 billion (~USD 2.4 billion), with strong growth in data and M-PESA.

Jamii Telecommunications (Faiba)

Industry: Telecommunications

Ownership: Privately held Kenyan company **Services**: Fixed broadband (Faiba Home), mobile data (Faiba 4G), enterprise connectivity, VoIP **Fiber Footprint**: nationwide fiber network, with focus on urban **Announced Plans**: expansion of Faiba 4G coverage, still rollout of FTTH and enterprise fiber services, 5G trials and wholesale partnerships **2024 Revenue**: Not available; significant market share in fixed broadband segment (est. 20-25%)

Telkom

Industry: Telecommunications

Ownership: Partially private company **Services**: Mobile voice & data, fixed broadband, enterprise ICT solutions, wholesale capacity, and infrastructure leasing **Fiber Footprint**: national fiber backbone and metro in big cities, international gateway infrastructure, including submarine cable landing stations and cross-border links, wholesale capacity to ISPs, mobile operators, and enterprise clients

Announced Plans (2024): restructuring and potential privatization or partnership initiatives, expansion of 4G and rural broadband coverage, strengthening of enterprise and wholesale offerings, cloud and managed services, continued investment in Google Equiano cable system and terrestrial fiber infrastructure, focus on digital transformation and customer experience improvement

2024 Revenue: KES 42.5 billion (approx. USD 282 Mn), as part of Telkom Group consolidated revenue - revenue streams include mobile services, fixed connectivity, ICT solutions, and infrastructure leasing

Liquid Intelligent Technologies

Industry: Telecommunications and digital Infrastructure.

Ownership: Subsidiary of Liquid Intelligent Technologies, a privately owned pan-African telecom group. **Services:** Fiber broadband, data centre services, cloud, cybersecurity, enterprise connectivity **Fiber Footprint:** owns one of Africa’s largest fiber networks, with over 100,000 kilometers on the African continent and thousands of kilometers in Kenya **Announced Plans**: expansion of cross-border fiber routes, investment in cloud and

cybersecurity services, strengthening partnerships with utilities companies like KETRACO and KPC. **2024 Revenue:** USD 622 million (Group level).

Airtel

Industry: Telecommunications

Ownership: Airtel Bharti (Indian multinational) **Services:** Mobile voice and data, mobile money (Airtel Money), enterprise solutions **Fiber Footprint:** has metro fiber in major cities; buys on wholesale basis longhaul fiber from KPLC, KETRACO. **Announced Plans:** expansion of 4G and 5G services, growth in mobile money and digital financial services, strengthening rural coverage and affordability **2024 Revenue:** estimated at KES 30–40 billion (~USD 232-320 Mn)

Zuku (Wananchi Group)

Industry: Telecommunications and digital Infrastructure.

Ownership: Privately owned, with investment from international private equity firms (ATMT Fund 1) **Services:** Fiber broadband, enterprise connectivity, data center services, cloud solutions, and cybersecurity

Fiber Footprint: Operates a significant fiber network across East Africa, including thousands of kilometers in Kenya. It has a robust regional presence through its subsidiary Wananchi Telecom Ltd (WTL). WTL core fiber backbone connects a number of local and regional networks links from Mombasa to Nairobi to Kampala, Dar Es Salaam to Rwanda, Burundi and Zambia **Announced Plans**: expansion of cross-border fiber routes, investment in cloud and cybersecurity, strengthening partnerships with utilities companies like KETRACO and KPC, potential plans for satellite cooperation (backhaul and even satellite capacities buying on wholesale basis) **2024 Revenue:** Not available. Wananchi Group is backed by ATMT Fund 1, a USD 100 Mn infrastructure-focused fund, with plans for an additional USD 50 Mn to support new fiber and digital infrastructure projects

Poa Internet

Industry: Telecommunications and digital connectivity

Ownership: privately owned, with backing from international investors and venture capital (Africa 50, Novastar Ventures, Seedstars Africa Ventures, Seedstars Intl Ventures, USTDA, Blink, Biscayne Americas Advisers)

Services: Fixed wireless broadband, home internet, public Wi-Fi hotspots, and community internet access

Fiber Footprint: does not have extensive fiber infrastructure but are in partnerships and existing infrastructure to sell last-mile wireless broadband, primarily targeting underserved urban and peri-urban areas in Kenya

Announced Plans: rollout of street Wi-Fi zones and home broadband in Nairobi and other urban centres; targeting low-income rural communities

2024 Revenue: Not available

BCS (Bandwidth & Cloud Services)

Industry: Telecommunications and digital connectivity

Ownership: privately held Pan-African telecom infrastructure company operating under licenses in eight African countries including Kenya, Uganda, and Rwanda

Services: Fiber construction, carrier-grade IP Transit, global & regional connectivity, colocation services, Open Access FTTx

Fiber Footprint: +80,000 km of terrestrial and metro fiber across 17 African countries, +100Points of Presence (PoPs) across Africa, Europe, Asia, and the Americas, key cross-border links: Kenya - Tanzania, Uganda - Rwanda, DRC

Announced Plans: expand fiber infrastructure in oil & gas corridors, strengthen regional interconnects and partnerships with ISPs, scale dark fiber managed services in unlicensed jurisdictions

2024 Revenue: Not available

YAFIBR

Industry: Telecommunications and digital connectivity

Ownership: Privately owned infrastructure provider founded in 2015 with operations in Kenya, Ghana, South Africa, Bulgaria

Services: Dark Fiber, Network Planning & Civil Works, Wholesale Fiber Access: Consulting

Fiber Footprint: Active operations in Nairobi and Mombasa, with planned expansion to South Africa. Known for deploying fiber in challenging terrains and underserved regions

Announced Plans: Broaden East African footprint, launch new fiber corridors in Kenya and Southern Africa, enhance service delivery through local partnerships and engineering teams

2024 Revenue: Not available

Frontier Optical Network (FON)

Industry: Telecommunications & Fiber Infrastructure

Services: Metro and backbone fiber, FTTx, IP Transit, colocation, disaster recovery, managed capacity, and mobile backhaul

Ownership: Private Kenyan company

Fiber Footprint: +700 km in Nairobi and Thika, 150 km in Mombasa; presence in major data centers (e.g., iColo, EADC, IX-Africa)

Plans: expand metro fiber, enhance data center services, and strengthen regional interconnectivity

2024 Revenue: Approx.USD5Mn

Paratus

Industry: Telecommunications& Satellite Connectivity

Services: Fiber and satellite internet, enterprise connectivity, ICT solutions

Ownership: JV between Paratus Group(Namibia) and MoveOn Telecoms

Fiber Footprint: Part of Paratus Group's pan-African network; expanding in Kenya as of 2024

Plans: Strengthen presence in East Africa, integrate with Paratus' continental infrastructure

2024 Revenue: Not available

ATC Kenya (American Tower Company)

Industry: telecom Infrastructure (Towers & Real Estate)

Services: tower leasing, site management, power backup, and colocation for MNOs

Ownership: branch of American Tower Corporation (USA)

Fiber Footprint: limited footprint; primarily passive infrastructure (towers)

Plans: Support in 5G rollout, expand rural and urban tower coverage

2024 Revenue: estimated +**USD 6Mn**inKenya

Atlas Water/Atlas Towers Kenya

Industry: telecom infrastructure (Towers)

Services: tower construction and leasing for 4G/5G networks

Ownership: private

Fiber Footprint: Not a fiber provider; focused on tower infrastructure

Plans: invest USD 48.9Mn in 4G tower rollout for Safaricom, Airtel, and Telkom

2024 Revenue: Not available

Vilicom

Services: high-speed fiber internet for homes and businesses, web hosting, hotspot connectivity, and network consulting

Ownership: private

Fiber Footprint: operates across multiple counties in Kenya, with a focus on urban and peri-urban areas

Plans: expand fiber coverage, enhance customer service, and scale enterprise solutions

2024 Revenue: Not available

TEAMS

Industry: submarine fiber infrastructure

Services: international bandwidth, IP transit, dedicated lease lines, and cable traffic restoration

Ownership: JV, with 85% owned by GoK and Kenyan telecoms (e.g., Safaricom, Telkom Kenya, Jamii, Wananchi, etc.) and 15% owned by Etisalat (UAE)

Fiber Footprint: 5,000 kilometers undersea cable linking Mombasa (Kenya) to Fujairah (UAE);connected to Kenya's national backbone and regional cross-border networks

Plans: upgrade capacity (currently 5.2 Tbps), expand regional reach, and support East Africa's growing data demand

2024 Revenue: Not available, revenue generated through wholesale bandwidth and IP transit

9.1.3.1.2 Utilities Companies

KPLC (Kenya Power and Lighting Company)

Industry: Energy (distribution and retail) & Telecommunications (fiber leasing) **Services**: Electricity distribution and dark fiber leasing **Fiber Footprint**: Over 4,000 kilometers of fiber along medium-voltage power lines, in urban and sub-urban areas. **Announced Plans**: KPLC continues to expand its fiber network, with an additional 600 kilometers planned. It offers long-term IRUs to ISPs and telecom operators. KPLC has commenced implementation of the Government's Digital Superhighway project which involves rolling out last-mile fiber optic cable connectivity to approximately 6,000 government institutions nationwide **2024 Revenue**: As per the latest audited financials (June 2024), KPLC reported a revenue of KES 157.4 billion (~USD 1.2 billion), with fiber leasing contributing a growing share (not publicly disclosed, however estimated ~12-15%).

KETRACO (Kenya Electricity Transmission Company)

Industry: Energy transmission (high voltage) & Fiber infrastructure **Services:** High-voltage electricity transmission and dark fiber leasing **Fiber Footprint:** Over 2,360 kilometers of fiber along high-voltage transmission lines. **Plans:** KETRACO has a partnership with Liquid Intelligent Technologies to wholesale its fiber network, including cross-border capacities to Ethiopia and Uganda. It is expanding its footprint to support regional digital corridors. **2024 Revenue:** Total revenue undisclosed**,** Fiber revenue increased from KES 201 Mn ~USD 1.5 Mn to KES 312 Mn (~USD 2.4 Mn), corresponding to a ~55% growth.

KPC (Kenya Pipeline Company)

Industry: Oil & gas logistics and fiber infrastructure **Services:** Oil transport and fiber leasing **Fiber Footprint:** Over 7,000 kilometers of overhead ("aerial") fiber optic cable installed along pipeline routes across Kenya and into the region. **Plans:** KPC is leasing excess fiber capacity to ISPs and telecoms as part of its revenue diversification strategy.

It is targeting regional expansion and digital corridor integration. **2024 Revenue:** KES 35.4 billion (~USD 274 Mn) - 15% revenue growth, and a KES 10 billion (~USD 77 Mn) profit before tax - 32% increase for the financial year ending June 2024.

9.1.3.1.3 Other Potentially Investor Companies

Helios Investment Partners (former owner of Helios Towers)

Industry: Private Equity / Digital Infrastructure

Services: Investment in telecom towers, digital infrastructure, fintech, and energy

Fiber/Tower Footprint: Former subsidiary Helios Towers has +14,000 telecom towers across nine markets in Africa and Middle East

Ownership: Private equity firm headquartered in London, focused exclusively on Africa

Announced Plans: expansion of Helios Towers in high-growth mobile markets, investment in digital inclusion, carbon efficiency, and local talent development, focus on sale-and-leaseback tower model with major mobile operators

2024 Revenue: Not publicly disclosed. Net loss of USD 41.6 Mn for the 4th quarter of 2024

African Infrastructure Investment Fund 4 (AIIF4)

Industry: Infrastructure Investment

Ownership: African Infrastructure Investment Managers (AIIM)

Services: Equity investing in digital infrastructure, energy and logistics

Fiber Footprint: Indirect – invests in companies like Eastcastle Infrastructure (telecom towers) and N+One Data Centers (carrier-neutral data centers in Morocco and Senegal)

Announced Plans: invest in sustainable infrastructure across Sub-Saharan Africa,

expand digital infrastructure through data centers, towers, and connectivity platforms

2024 Revenue: Not available. Fund commitments of USD 748 Mn (USD 954 Mn including co-investments)

Starlink (Karibu Kenya)

Industry: Satellite Internet / Telecommunications

Ownership: Privately held, division of SpaceX, a US aerospace company

Services: High-speed, low-latency satellite internet for residential, business, and mobile users

Fiber Footprint: None. Operates via Low Earth Orbit (LEO) satellite constellation. May be interested in renting (or even building) fiber for terrestrial backhaul.

Announced Plans: Expand coverage to rural and underserved areas in Kenya, offer mobile and maritime connectivity across Africa, introduce business-grade packages for SMEs and enterprises. May be interested in renting fiber for terrestrial backhaul.

2024 Revenue: USD 8.2 Bn

Pricing in Kenya:

- Residential: KES 6,500/month (~50 USD)
- Business: From KES 8,000/month (62 USD)
- Roaming: From KES 14,000/month (108 USD)

Google

Industry: Technology / Digital Infrastructure

Ownership: Subsidiary of Alphabet Inc., USA

Services: (amongst others) Cloud computing, AI, cybersecurity, digital skills training, fiber infrastructure

Fiber Footprint: Umoja fiber optic cable, connecting Kenya to Australia via multiple African countries

Announced Plans: launch of Umoja cable in partnership with Liquid Intelligent Technologies, strengthen cybersecurity for platforms, invest in AI research, cloud services, and digital upskilling in Kenya, announced a USD 1 Bn Africa investment commitment by 2026

2024 Revenue: Not available per country; USD 350 Bn Alphabet group revenue in 2024

KENET

Industry: Telecommunications / Education Technology Infrastructure

Ownership: Non-profit organization established by the Kenyan government and academic institutions. Operates as a trust to serve the research and education community in Kenya

Services: provision of high-speed internet connectivity to universities, colleges, and research institutions, network infrastructure management and support, capacity building and technical training for ICT staff in member institutions, hosting and cloud services for academic and research applications, collaboration with regional and global research and education networks (RENs)

Fiber Footprint: operates a national research and education network (NREN) with fiber links connecting major universities and research centers across Kenya. It leverages partnerships with national fiber infrastructure providers and government initiatives like the National Optic Fiber Backbone Infrastructure (NOFBI)

Announced Plans: expansion of fiber connectivity to more tertiary institutions, especially in underserved counties, integration with the government's 100,000 km fiber rollout plan under KDEAP**,** deployment of advanced services such as eduroam,

federated identity, and cloud-based academic platforms, strengthening partnerships with global RENs like UbuntuNet Alliance and GEANT

2024 Revenue: estimated to be primarily grant-funded through government allocations, development partners, and institutional contributions. Specific revenue figures are not publicly disclosed

9.1.3.2 Existing Licenses of the Current Fiber Capacities Owners

The team put together the current licenses owned by the companies that are potentially interested to invest, both telecom companies and utilities companies.

Company	License Type
Safaricom	Network Facilities Provider Tier 1 (NFPT1), Application Service Provider (ASP), Content Service Provider (CSP)
Airtel	Network Facilities Provider Tier 1 (NFPT1), Application Service Provider (ASP), Content Service Provider (CSP)
Telkom	Network Facilities Provider Tier 1 (NFPT1), Application Service Provider (ASP), Content Service Provider (CSP)
Jamii Telecom	Network Facilities Provider Tier 1 (NFPT1), Application Service Provider (ASP)
Liquid	Network Facilities Provider Tier 1 (NFPT1), International Gateway Operator, Submarine Cable Landing Rights
Zuku (Wananchi)	Network Facilities Provider Tier 2 (NFPT2), Application Service Provider (ASP), Content Service Provider (CSP)
Poa Internet	Network Facilities Provider Tier 3 (NFPT3), Application Service Provider (ASP)
Mawingu	Network Facilities Provider Tier 3 (NFPT3), Application Service Provider (ASP)
Frontier	Network Facilities Provider Tier 2 (NFPT2), Application Service Provider (ASP)
Vilicom	Network Facilities Provider Tier 2
ATC	Network Facilities Provider Tier 1
TEAMS	International Gateway Operator
SEACOM	Network Facilities Provider Tier 1 (NFPT1), Submarine Cable Landing Rights

KPLC	Network Facilities Provider Tier 2 (NFPT2) – for leasing dark fiber infrastructure
KETRACO	Network Facilities Provider Tier 2 (NFPT2) – for leasing dark fiber on transmission lines
KPC	Network Facilities Provider Tier 2 (NFPT2) – for fiber along pipeline infrastructure

Tabel 2 - Licenses per Potentially Interested Investor Companies *(Source: Detecon analysis)*

9.1.3.3 Governmental Programs and Strategies

Kenya's connectivity landscape is under a major transformation, with large efforts to expand internet access across the country.

On the wholesale side, Kenya's market is defined by operators leasing out network capacity to other service providers. This includes fiber leasing, international bandwidth, and infrastructure sharing. Major players such as Liquid Telecom, Jamii Telecommunications, Safaricom, and Telkom Kenya are central to this space. Airtel is trying to catch up, as they have recently announced the intention to compete in enterprise and wholesale. The sector is growing fast, driven by increasing demand for high-capacity networks and the expansion of undersea cables that connect Kenya to the global internet.

On the undersea cables, Kenya has benefited from the landing of TEAMS, SEACOM, and EASSy. These have given Kenya the access to high-speed internet, helping to lower costs in the same time. Complementing this is the National Optic Fiber Backbone Infrastructure (NOFBI), which has laid fiber across all 47 counties, ensuring even remote areas are connected. Licensed operators are now pushing broadband further to end-users, working within a tiered regulatory framework.

GoK supported these efforts with a series of strategic policies and plans - Vision 2030, the National Broadband Strategy (2013-2017), the Digital Economy Blueprint (2019), and the ICT Master Plan (2020-2030) - all aiming to position Kenya as a leading digital economy in Africa.

Fiber capacities cannot be tackled alone without stating that mobile and satellite are both complements, but also substitutes for fixed capacities.

Kenya stands out for its high mobile broadband penetration, among the highest in Africa. This has been largely driven by widespread mobile internet use, with Safaricom's 4G network playing a major role. As of 2024, Kenya has around 53 Mn internet users, most of whom access the web via mobile phones. This underscores the central role of mobile connectivity in the country's digital journey.

In 2024, the arrival of Low Earth Orbit (LEO) satellite services added a new dimension to Kenya's digital ecosystem. Providers like Starlink, EUTELSAT OneWeb and soon Kuiper are / will be offering high-speed, low-latency internet—especially valuable in remote areas where traditional infrastructure is limited. These satellite services are complementing existing mobile and fixed broadband networks, helping to close the connectivity gap.

While mobile broadband dominates and LEO satellite services presents itself as serious competition, fixed broadband is gaining ground in urban areas, where competition among ISPs is improving service quality and driving prices down.

At the heart of all this is physical ICT infrastructure, which can be thought of in three layers: First Mile, Middle Mile, and Last Mile:

- The First Mile includes the undersea cables
- the Middle Mile refers to the national backbone and metro networks;
- the Last Mile is the final stretch that connects users - especially public institutions like schools, hospitals, and government offices - to the broader network. Strengthening this last mile is key to delivering digital services across the country and ensuring no one is left behind.

9.1.3.4 International Connectivity

9.1.3.4.1 Horn Of Africa Gateway Development Project (HoAGDP)

The Horn of Africa Gateway Development Project (HoAGDP) is an eight year infrastructure initiative launched in 2020, funded by the World Bank and the Government of Kenya. Its goal is to accelerate the economic development in Northeastern Kenya and promote regional integration with the Horn of Africa countries.

The project is part of a regional program under the Horn of Africa Initiative, with similar efforts planned in Somalia and Ethiopia to maximize cross-border synergies.

In Kenya, the project focuses on upgrading the Isiolo–Mandera road corridor and deploying ICT infrastructure. While KeNHA (Kenya National Highways Authority) oversees civil works, the ICT Authority (ICTA) is responsible for installing a new fiber optic cable along the 740 kilometers route, covering Isiolo, Meru, Wajir, Garissa, and Mandera counties.

The ICT component includes building fiber spurs and rings, and connecting schools, hospitals, markets, rest stops, and community centers along the corridor. ICTA is currently in the design phase, with implementation expected to begin next year.

9.1.3.4.2 Eastern Africa Regional Transport, Trade And Development Facilitation Project (EARTTDFP)

The World Bank-funded EARTTDFP Project involves the construction of a fiber optic cable network along part of the Eldoret–Nadapal/Nakodok Corridor, spanning five counties: Uasin Gishu, Kakamega (part), Trans Nzoia, West Pokot, and Turkana.

The network begins at the Eldoret County Commissioner’s office and extends to the Nadapal/Nakodok border, where it links with South Sudan’s infrastructure. It is designed to serve national and county government offices, as well as schools, hospitals, Huduma centers, security posts, and border facilities.

The project was jointly implemented by KeNHA (Kenya National Highways Authority) and the ICT Authority using an integrated infrastructure model. KeNHA handled the civil works

for the main backbone, while ICTA managed the spurs, fiber installation, equipment deployment, and network commissioning. Work on the South Sudan side of the project was suspended after the outbreak of hostilities in 2014 but may be restarted at some time in the future, with alternative funding.

Existing submarine cables

Kenya is currently one of the most connected countries on the Eastern Coast of Africa. There are six submarine cables; TEAMS, EASSY, SEACOM, DARE, PEACE and LION that offer connectivity to the rest of the world via redundant routing. Over the next couple of years, three more sub-marine cables are expected to land in the Kenyan coast: 2AFRICA, AFRICA 1 and UMOJA 1 Cables.

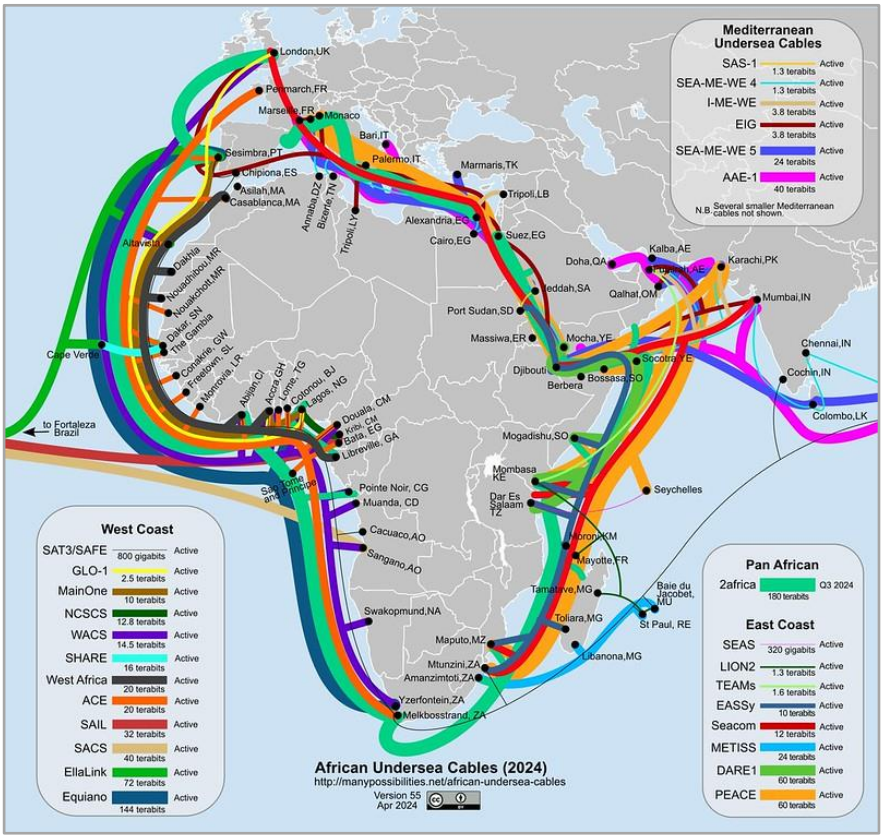


Figure 11 - Submarine Cables Around Africa 2024 ***(Source: manypossibilities.net)***

9.1.3.4.3 TEAMS (The Eastern African Marine System)

Length: ~ 5,000 kilometers

Ready for Service: 2009

Landing Points: Mombasa – Kenya, Fujairah - UAE

Capacity: Originally designed to have an initial capacity of 80 Gbps upgradable to 640 Gbps should the initial capacity be insufficient. During the implementation of the project,

the designed capacity of the system was increased to 1.2 Tbps and the initial capacity to 120 Gbps (5.2 Tbps upgradable capacity).

Ownership: A consortium including the Government of Kenya, Safaricom, Telkom Kenya, Jamii Telecom, and Etisalat.

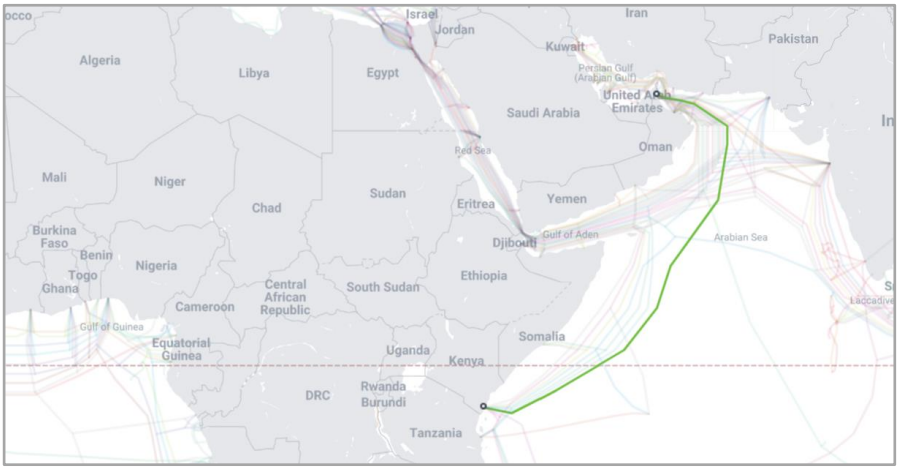


Figure 12 - TEAMS Submarine Cable Map

9.1.3.4.4 EASSy (Eastern Africa Submarine System)

Length: ~ 10,000 kilometers

Ready for Service: 2010

Landing Points: East Africa: Kenya (Mombasa), Tanzania, Somalia, Djibouti; Southern Africa: Mozambique, Madagascar, Comoros, South Africa.

Design Capacity: Initially designed with 68*10Gbps DWDM technology. The design capacity was upgraded to 4.72 Tbps in 2011 with ASN's 40Gbps wavelength technology, further upgraded to more than 10Tbps with ASN's 100Gbps technology in 2014. The system has deployed a latest upgrade with Ciena's GeoMesh Extreme solutions to reach a system capacity of 36Tbps.

Ownership: A consortium of over 20 telecom operators, including Telkom Kenya, MTN, Vodacom, and Sudatel.

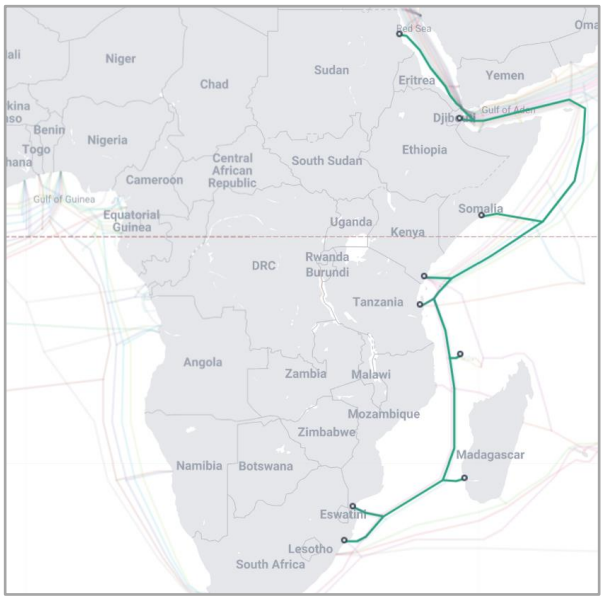


Figure 13 - EASSy Submarine Cable Map

9.1.3.4.5 SEACOM

Length: ~17,000 kilometers

Ready for Service: 2009

Route: Connects South Africa to Europe and India via Kenya (Mombasa), Tanzania, Mozambique, and Djibouti.

Speed: Upgraded to 1.5 Tbps in 2018. Ready to be upgraded and add 1.7 Tbps, bringing its total capacity to 3.2 Tbps along Africa's eastern and Southern coasts.

Significance: First privately funded submarine cable for East Africa; dramatically reduced bandwidth costs and latency.

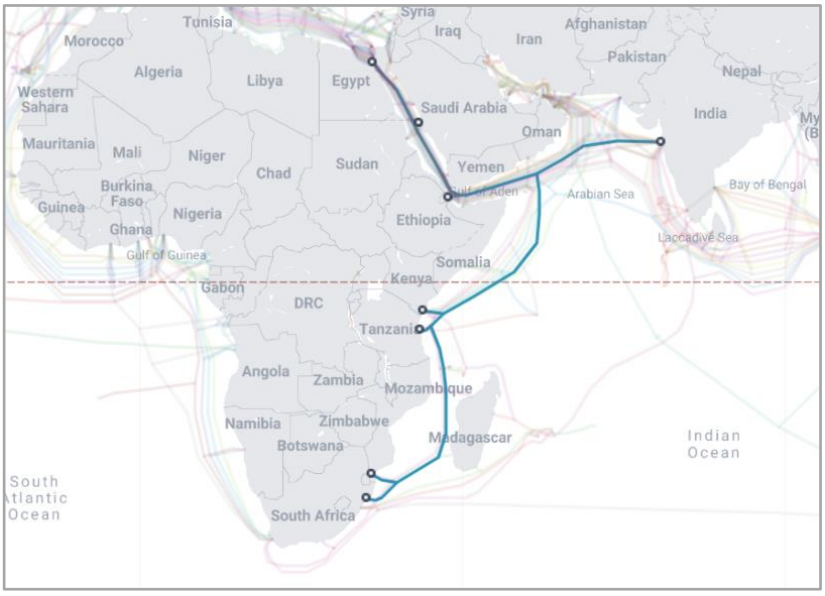


Figure 14 - SEACOM Submarine Cable Map

9.1.3.4.6 DARE (Djibouti Africa Regional Express)

Length: ~5,000 kilometers

Ready for Service: 2021

Route: Connects Djibouti, Somalia, and Kenya (Mombasa)

Speed: up to 36 Tbps of capacity

Consortium: Djibouti Telecom, Somtel, and Telkom Kenya

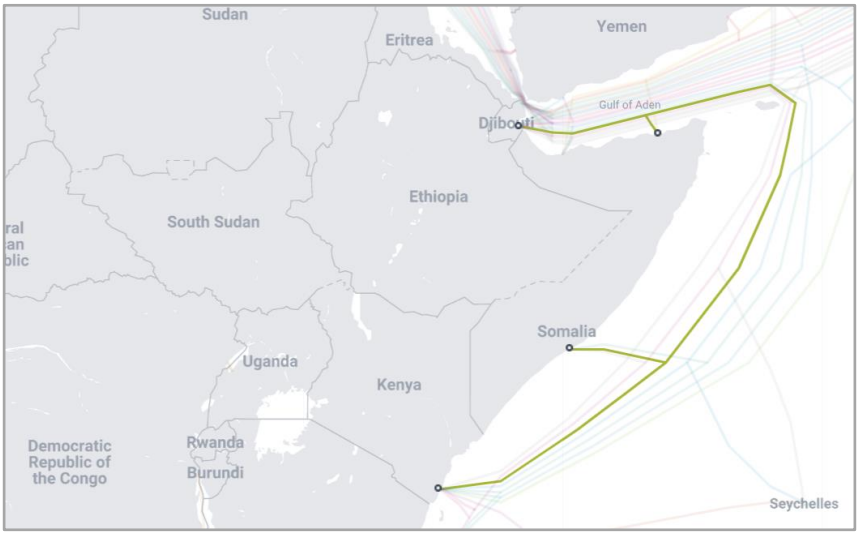


Figure 15 - DARE Submarine Cable Map

9.1.3.4.7 PEACE (Pakistan & East Africa Connecting Europe)

Length: ~15,000 kilometers

Ready for Service: 2022

Route: Connects Pakistan to France via Kenya, Egypt, and the Mediterranean

Landing in Kenya: Mombasa

Highlights: High-capacity, low-latency route between Asia, Africa, and Europe; supports growing cloud and content demand.

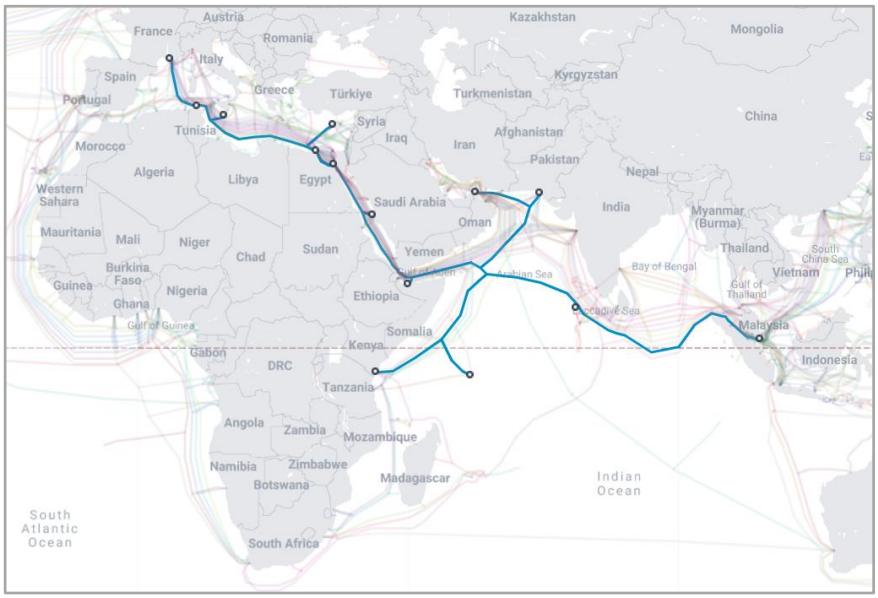


Figure 16 - PEACE Submarine Cable Map

9.1.3.4.8 LION (Lower Indian Ocean Network)

Commissioned: LION1 in 2009, LION2 in 2012

Route: Connects Kenya to Madagascar, Réunion, and Mauritius

Landing in Kenya: Mombasa

Speed: Two fiber pairs, with an initial design capacity of 1.28Tbps (2*64*10Gbps).

Purpose: Strengthens connectivity between East Africa and Indian Ocean islands; part of Orange Group's regional infrastructure.

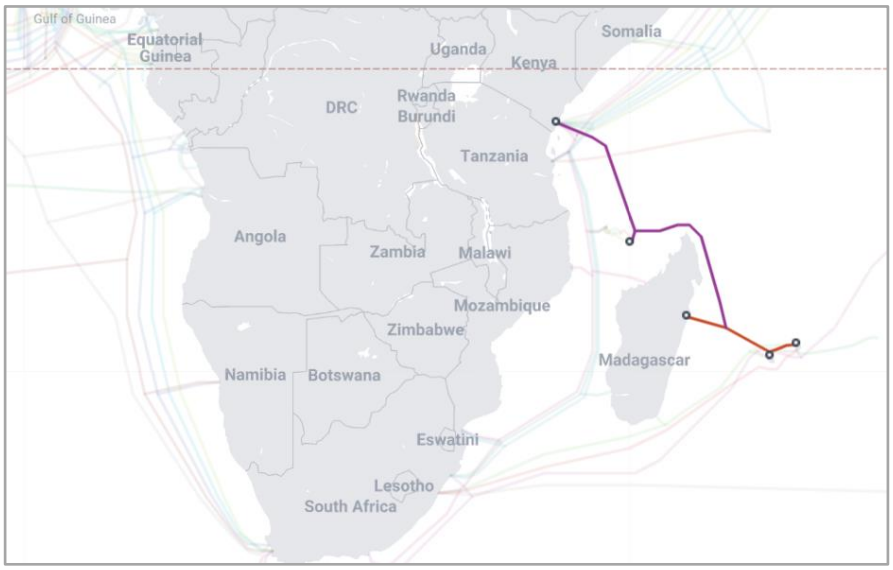


Figure 17 - LION Submarine Cable Map

<u>Submarine cables with established future landing station in Kenya</u>

9.1.3.4.9 2 AFRICA

2Africa is an international submarine telecommunications cable that circumnavigates the coastline of Africa to interconnect Europe and the Middle East.

The system has a design capacity of 180 Tbps across 16 fiber pairs. When complete, 2Africa will be the largest subsea cable in the world, at 45,000 kilometers long, connecting 46 cable landing stations across 33 countries

2Africa passes from Europe through the Atlantic Ocean and Indian Ocean, and then back into Europe via the Red Sea and the Mediterranean Sea.

Cable ownership

2Africa is funded by a consortium consisting of eight members, namely: Meta Platforms, China Mobile, MTN Group, Orange S.A, Saudi Telecom Company, Telecom Egypt, Vodafone Group Plc, West Indian Ocean Cable Company

Open access model

The consortium has mandated that every operator of 2Africa must provide effective access to the international capacity at reasonable prices and on non-discriminatory terms. Cable landing station operators can be penalized and even completely disconnected from the 2Africa system if they fail to provide access to capacity at their landing points.

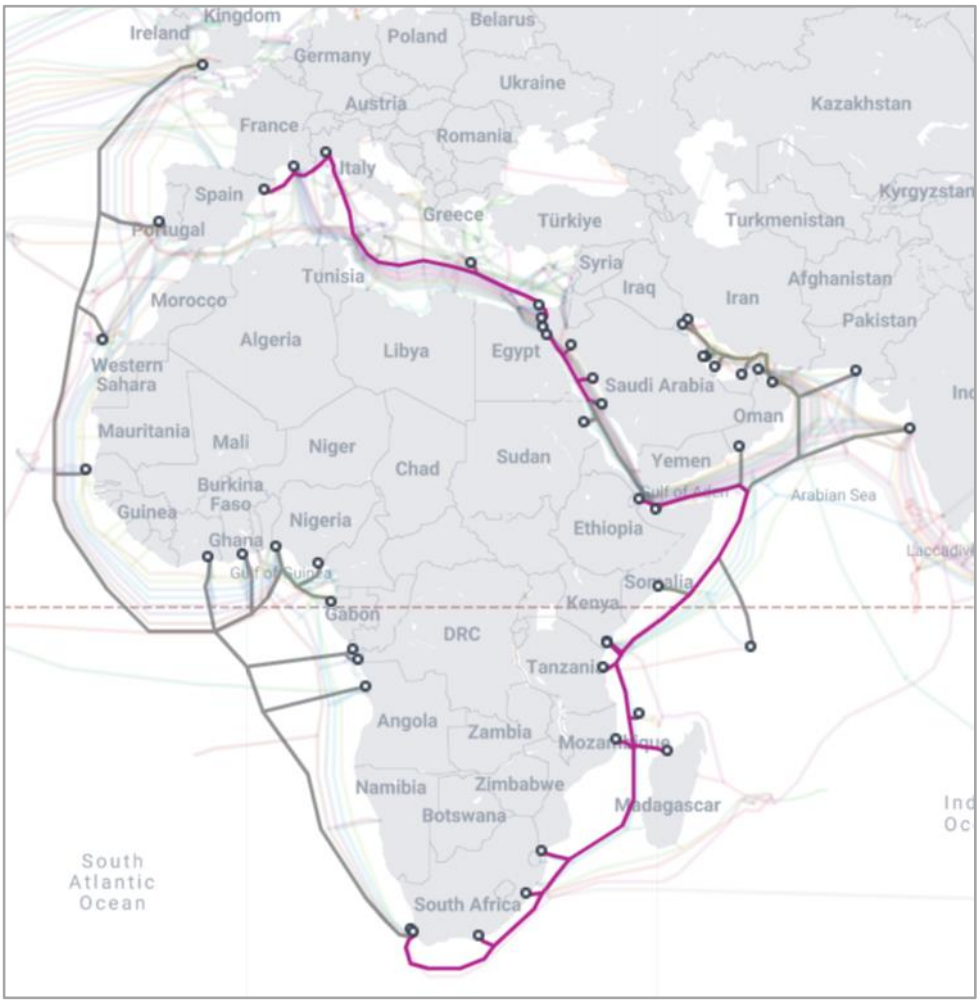


Figure 18 - 2Africa Submarine Cable Map

9.1.3.4.10 AFRICA-1

Africa-1 is a 10,000 kilometers long international submarine telecommunications cable system from France to the Middle East, through Africa.

The cable system, consisting of 8 fiber pairs, has a design capacity of 96 Tbit/s and will be constructed by Alcatel-Lucent Submarine Networks (ASN).

It is expected to become fully operational in 2025.

Cable Ownership

G42, Mobily, Omantel, Pakistan Telecommunications Company Ltd., TeleYemen, Telecom Egypt, e&

Landing points and operators

Africa-1 will initially land in France, Kenya, Egypt, Djibouti, Saudi Arabia, United Arab Emirates and Pakistan. The next phase of the cable will include landings in Italy, Algeria, Tunisia, Sudan, as well as Yemen, Somalia, Tanzania and Mozambique.

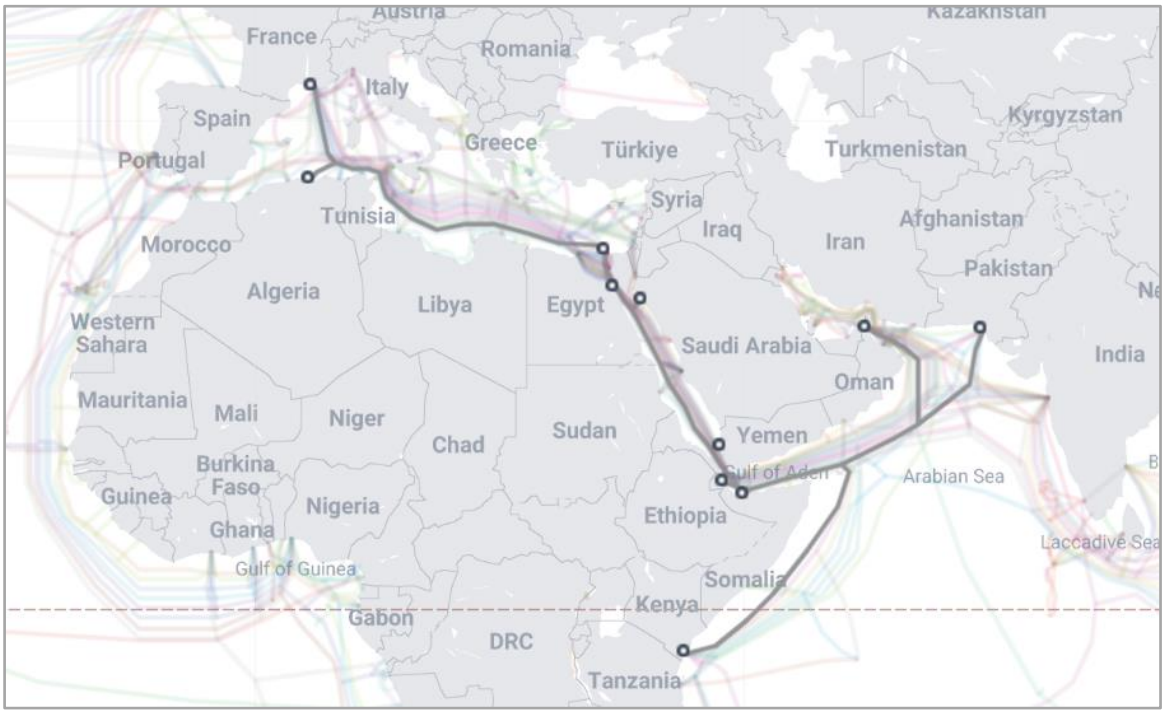


Figure 19 – Africa-1 Submarine Cable Map

9.1.3.4.11 UMOJA

Google announced a landmark infrastructure project: Umoja, the first-ever fiber optic cable directly connecting Africa and Australia.

The cable stretches from Kenya, traversing Uganda, Rwanda, the Democratic Republic of the Congo, Zambia, and Zimbabwe before reaching South Africa.

It will then connect to the Google Cloud region and continue its journey to Australia via the Indian Ocean.

Notably, the terrestrial portion of Umoja is built collaboratively with Liquid Technologies and is designed to provide access points for other countries to join the network.

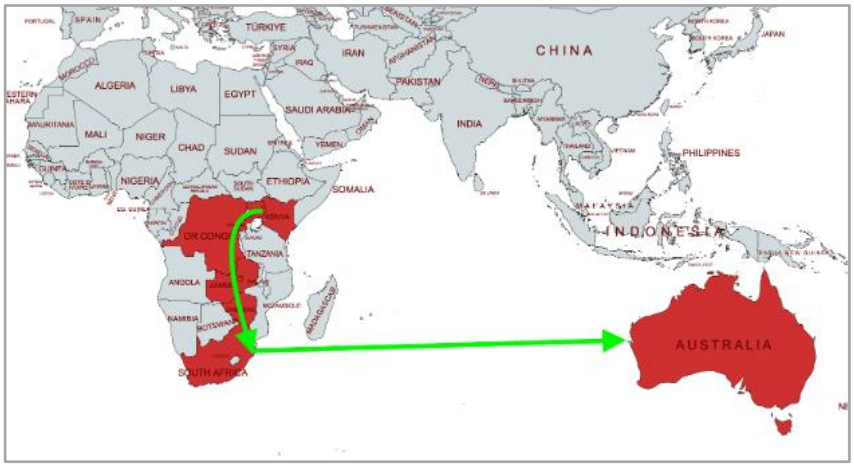


Figure 20 - UMOJA Cable Map

9.1.3.5 National Connectivity

9.1.3.5.1 National Optic Fiber Backbone Infrastructure (NOFBI)

In the last ten years the government has funded about 8,900 kilometers of terrestrial fiber that has reached the sub-county level mainly connecting key government institutions and offices to deliver services according to the Kenya National Digital Master Plan 2022-2032.

The government implemented the National Optic Fiber Backbone Infrastructure (NOFBI) in three Phases.

NOFBI phase I was implemented between 2005-2009 and covered 4,300 kilometers of terrestrial fiber.

The NOFBI Phase 2 project work started in September 2014 and its scope included 2,100 kilometers fiber links and IP equipment to all the 47-county headquarters, the building of metropolitan area networks in all 47-county headquarters and creating redundancy to the national backbone.

In 2017, the government embarked on NOFBI 2E network with a scope of 2,500 kilometers fiber links and IP equipment covering sub-counties and creating sub-rings to further increase redundancy as shown in figure below.

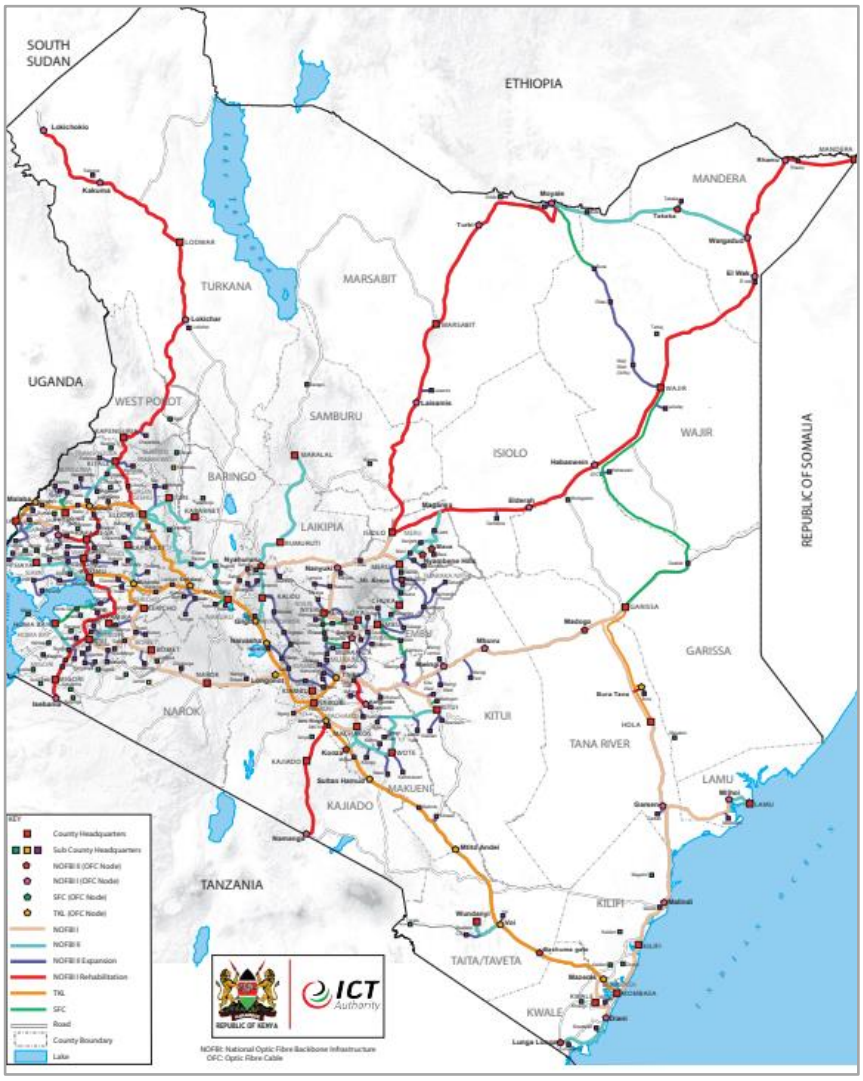


Figure 21 - NOFBI Map

9.1.3.5.2 Digital Superhighway

The Government of Kenya is implementing the Digital Super Highway Project to expand national fiber coverage, lower internet costs, and improve access to e-government, health, agriculture, and financial services.

Key components may in the future include:

- Installation of 25,000 public Wi-Fi hotspots
- Establishment of 1,450 Digital Village Smart Hubs and Studios
- Development of three data centers
- Strengthening of data protection and cybersecurity

The project, launched in November 2023, is partly funded through the Universal Service Fund (USF) managed by the Communications Authority (CA).

In Phase 1, CA allocated KES 5 billion to deploy 2,500 kilometers of backbone, metro, and last-mile fiber. So far,1,512 kilometers of backbone and 312 out of 405 last-mile sites have been completed.

Phase 2 focuses on last-mile connectivity across all 47 counties, targeting ~8,000 sites. In 2024, ICTA contracted Kenya Power to connect 3,868 public institutions, including schools, TVETs, health centers, and digital hubs, leveraging existing energy infrastructure.

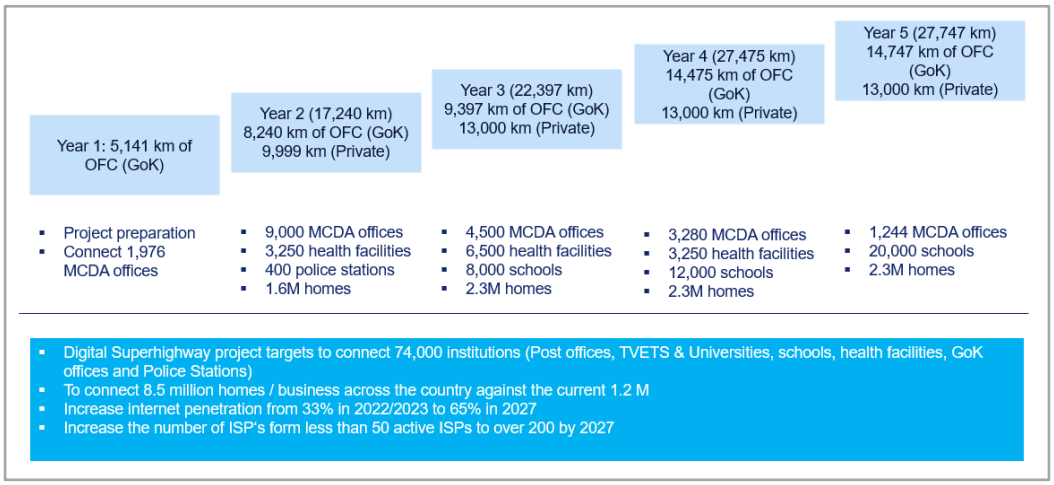


Figure 22 - Digital Superhighway Roadmap

9.1.3.5.3 GIGA

In 2019, the Republic of Kenya joined Giga, the joint initiative between UNICEF and the International Telecommunication Union (ITU) to connect every school in the world to the internet. The decision to join Giga coincided with other notable initiatives that reflected the government's goals of expanding digital infrastructure, enhancing access to education and promoting economic growth.

UNICEF began its work in 2020 by identifying 1,160 public primary schools, in conjunction with the Ministry of Education and Ministry of Information, Communications and The Digital Economy, to connect to the internet using a jointly agreed-upon criteria.

These schools are to be recommended to be connected with at least 10 Mbps download and 5 Mbps upload speeds, reflecting Giga's recommended minimum speeds for meaningful school connectivity and the Government's National Broadband Strategy.

In working with the public sector, UNICEF partnered with Kenya's Information and Communication Technology Authority (ICTA), to deliver connectivity to schools that were in close proximity to NOFBI.

Schools were connected incrementally. In the first phase of the project in 2020, ten schools were connected to the internet by way of a shared value partnership with three private operators.

The second phase expanded work to connect an additional one hundred schools in 2021. By the end of 2023, more than five hundred schools had been connected to the internet for the first time.

UNICEF strategically engaged both private and public stakeholders to deliver each phase of the project on time and within budget. In engaging the private sector, UNICEF selected local, private internet service providers for long-term agreements (LTAs): These are Maruway Networks, Poa Internet, Telkom Kenya, Safaricom PLC, Frontier Optical Networks, Airtel Kenya and Liquid Intelligent Technologies.

The Communications Authority current efforts with fiber deployments with the support by the USF to connect schools, with 886 schools connected to the internet by 2024.

ITU has also been working closely with the Communications Authority of Kenya to advance school connectivity initiatives as well with the support of the United Kingdom Foreign, Commonwealth and Development Office (FCDO).

The EU launched a Digital Economy Package for Kenya, which will provide funding for internet for 1,300 schools in underserved areas.

Out of an estimated 43,000 schools, at least 23,300 still need to connected, and payment of ongoing internet costs remains a challenge.

9.2 Market Survey Interviews

The interviews outcome has provided evidence of the high interest from potential local and international investors to participate in the KDEAP initiative, almost all potential investors have confirmed non-binding interest to participate actively on the component 1 of the KDEAP Project, the potential investors confirmed the set-up of internal teams to evaluate commercial models that enable an efficient use of the KDEAP fundings.

An overview of the interviews findings and remarks is described as follows:

Telkom Kenya

Contact: Julius Cheptiony, *Chief of Strategy & Business Development*

Date: 13.05.2025

Time: 9:30am

General findings and remarks from the interview:

- Telkom Kenya is a Tier 1 Licensed operator
- Telkom Kenya has expressed concerns with regard to protection of their investments, particularly to address potential low demand (build in areas with not enough customers).
- Telkom Kenya has valuable skills to build and operate fiber optic networks and also valuable fiber network assets currently deployed across Kenya.
- Telkom Kenya network reaches all 47 counties (Headquarters) also known as Constituency Innovation Hubs (per county).
- Telkom Kenya expressed interest to participate as a potential investor in subcomponent 1.1, 1.2, 1.3, 1.5.
- Telkom Kenya is open to innovative collaboration with other public and private entities, in order to develop economically viable investment with a long-term view.
- Telkom Kenya is clear that they main value is on telecommunications build and operations.
- Telkom Kenya see potential on large areas for network deployments, recognising that economies of scale can be seen at sub-county and/or county level.
- Telkom Kenya perceive the Kenyan and telecom NDA as an advantage over other potential investors (they do not intend to exit)
- Telkom Kenya expressed interest to participate or collaborate in Digital infrastructure investments in Kenya.

TEAMS

Contact: Joel Tanui, Chief Executive Officer

Date: 13.05.2025

Time: 11:00am

General findings and remarks from the interview:

- TEAMs expressed interest to participate as a potential investor particularly on pre-purchase of internet and subcomponent 1.5 for international connectivity.

- TEAMs highlighted the relevance of network resilience for international connectivity, not only for terrestrial border crossing routes, but also for international terrestrial and submarine cable routes.
- TEAMS Asked about the stage of the process and if it is ‘Grant’ or ‘Funding’.
- TEAMS offered assistance with their experience in a Co-Build investment, in terms of internal procurement stages and lesson learned.

BCS

Contact: John Orutwa, Chief Technology Officer

Date: 13.05.2025

Time: 13:30am

General findings and remarks from the interview:

- BCS is a licensed Tier 2 Operator.
- BCS has experience in international fiber routes and highlight the need to enhance the number of cross-border links.
- BCS expressed interest to participate as a potential investor, with particular interest in subcomponent 1.1 and 1.5.
- BCS expressed interest by raising questions about considerations for a potential Co-build/Consortium model.
- BCS Legal team indicate that there may be legal adjustment for a potential investment and expressed interest in the openness of the Kenyan authorities to discuss innovative investments approaches for the Kenyan connectivity market.
- BCS Legal team expect further information with regards to quantitative information in order to develop business plans to evaluate any potential investment.

JTL (Jamii Telecommunication)

Contact: Cyrus Sang, Director of Strategy

Date: 14.05.2025

Time: 14:30hrs

General findings and remarks from the interview:

- JTL confirm interest to participate actively in the process as potential investor.
- JTL indicate interest in larger geographical areas, in order to bid for an economically viable region or geographic area e.g.: Sub-County area.
- JTL mentioned that it would be suitable to mix sub-components in order to provide revenues (e.g.: Schools and Backbone) within a designated coverage area, to factor in the commercial viability at the moment of bidding.
- JTL asked about studies such as environmental studies as requirement to access funding.
- JTL expressed concern on the topic of Wayleaves and also on the topic of protection of infrastructure.

A few days after the interview, JTL has shared the following answers:

1. **What are the main obstacles faced by your company (Operators, Infrastructure and Service Providers) in expanding to undeserved areas in Kenya?**
   a) Commercial Viability/ Weak business case.
   b) Lack of reliable fiber backhaul infrastructure and other telecom infrastructure such as towers.
   c) High cost of leasing backhaul services.
   d) Lack of reliable power supply.
   e) Unreasonably high and unpredictable wayleave costs.
   f) Insecurity in Northern Kenya.

2. **What kind of support or intervention do Operators and Service Providers expect from the government for future initiatives in expanding to undeserved areas?**
   a) Government subsidies and use of USF funds for fixed network services
   b) Support of PPP Models
   c) Government to be anchor customer to make it commercially viable
   d) Tax incentives for infra in underserved areas, waiver of excise duty to make services affordable
   e) Provide wayleaves at no cost or at a standardized minimum charge to cover administration and maintenance cost

3. **Do you have any suggestion to improve the current selection process for Priority Routes, Educational and Government institutions with missing connectivity? If yes, please describe your proposed approach.**
   a) To improve the viability and sustainability of this model, the priority, educational and government institutions requirements for a defined area such as a county should be given to one service provider
   b) There seems to be too much focus on cost rather than the capability of the service provider to deliver and sustain the service over the period. There should be a way to avoid pricing competition where small ISP's who want to win a lot will give very low costs and deliver a substandard infra commensurate with the price they give. I propose that there shuld be areas reserved for Tier 1&2 providers and others for Tiers 3 based on the critical nature of the infrastructure.
   c) The model should also be able to compensate a service provider who brings their existing infrastructure to the project.

4. **Do you have any suggestion for a potential Commercial Model for public and private sector cooperation? If yes, please describe it in more detail.**
   a) Anchor Customer Model – the government commits to be an anchor client and pays for all the public institutions for a minimum of 5 years (with ROI of 2-3 yrs) to guarantee commercial viability
   b) Public Infrastructure leased to the private sector for a minimum of 5 years with a pay per use model and a minimum O&M charge.

c) Subsidy model using the USF funds to de-risk the private sector capital. This can be combined with a Build Operate Own model.

5. **Would you agree to include Open Access Wholesale Network principles as part of CTM to ensure fair participation and transparency?**
   Yes.
6. **Will your organization participate as a bidder for the implementation of any KDEAP Subcomponents ((1.1 National Backbone expansion, 1.2 Last mile and Internet Service for Education, 1.3 Last mile and Internet Service for government, and 1.5 Cross-border Backbone expansion))? If not, please provide further details.**
   Yes.
7. **What is your organization´s view on the usage of a Multi-Round Reverse Auction (MRRA) as the preferred option for the allocation of subsidies for financing KDEAP Subcomponents 1.1-1.5?**
   This model focuses on price and might risk awarding the project to non-competent cheapest bidder. Hence risking the viability and sustainability of the project.
8. **What are the key challenges you anticipate in collaborating with government, public, and private sector partners in the implementation of KDEAP Component 1 initiatives? What are your suggestions for overcoming those challenges?**
   Procurement and Contracting Complexities
   a) Bureaucracy – slows down project progress and sometimes ending up in losses to the private sector
   b) Misaligned government priorities and interests can derail the project
   c) Corruption
9. **Do you have any other comments or suggestions which might be relevant for the development of the Commercial Transaction Manual?**
   a) Focus should be on the viability and sustainability rather than cost.
   b) The allocation should be based on the license tier 1.2 or 3 because this has direct reflection on the financial and operational capacity to deploy and maintain the services.

Liquid

Contact: Christopher Mwangi, CTO

Date: 15.05.2025

Time: 09:00am

General findings and remarks from the interview:

- Liquid has around 200 employees in Kenya.
- Liqui express interest to invest if there is economic viability (focus revenues) and facilities to access capital (to cover new network build CAPEX).

- Liquid express concern with regards to the lack of energy and also on the reliability of the energy provided, these applies in many areas where the network is planned to be deployed.
- Liquid understands that one of the relevant costs are wayleaves and also express concern with regards to the slow approvals.
- Liquid indicated the opportunity to enhance coordination between different government agencies, for instance with Road Authority who normally damage the existing telecommunications infrastructure during new roads constructions and also normally do not deploy ducts one the trenches are open. Similar case with Property Developers who do not coordinate the civils works with operators.
- Liquid indicate that maintenance of infrastructure is high and relevant mainly driven by theft of infrastructure, for instance 5 kms of fiber network disappears overnight in the Mayale and/or Kakuma. This even occur consistently in some areas.
- As a result, Liquid expect some degree of protection of the infrastructure by local authorities, as the theft of infrastructure is not prosecuted according to Liquid experience (No guilty found, or penalties are extremely low).
- Liquid express interest and supports Open Access, as the over-investment in some routes do not support the development of telecommunications infrastructure in Kenya, For instance on the route Mombasa-Nairobi, Liquid estimate around 45 cable systems in operations.
- Liquid view on the infrastructure GAP, is estimated that beside the private fiber networks an additional 42K kms of fiber network are required to fill the infrastructure GAP in Kenya.
- Liquid is pre-liminary against MRRA, understanding that this approach focus on price, however from Liquid perspective will have a significant impact on Network Quality as Fiber Optic Network Standards within Kenya vary significantly between companies.

Safaricom

Contact: Elaine Ngina Kylo

Date: 26.05.2025

Time: 12:00hrs

General findings and remarks from the interview:

- Safaricom has already explored the infrastructure GAP and have a formed opinion about effective approaches to close the GAP.
- Safaricom expressed a sense of urgency to accelerate the deployment of digital infrastructure, however they faced delay on areas such as wayleaves approvals.
- Safaricom expressed interest on an open discussion with government, in order to collaborate and to present the Safaricom perspective on how to accelerate the deployment of infrastructure (so far, unsuccessfully).
- Safaricom believes that the private sector can play a more relevant role, and they are available to collaborate with ICTA and the GoK.

- Safaricom has requested time to evaluate internally, before any answer is formulated as part of the interview.

YAFIBR

Contact: George Mokogi, CEO

Date: 16.05.2025

Time: 10:30am (At Radisson Blue Hotel)

General findings and remarks from the interview:

- YAFIBR confirm non-binding interest as potential investors.
- YAFIBR indicates that they have a portfolio to invest in the upcoming years and they have expressed interest to co-build or asset exchange of the infrastructure or other approaches that enable them to participate of the ownership of the network.
- YAFIBR indicate that they preferred network rollout methodology is underground and currently all the YAFIBR is UG.
- YAFIBR is supportive of Open Access Networks, as their business model is wholesales and their current services are only 'Dark Fiber' and 'Collocation', serving Hyperscalers, Mobile Operators, LEO' Operators, Community Networks among others.
- YAFIBR express interest in innovative investment models, however it is important that the entity is a privately entity, in order to have an style and speed of operations that is suitable to YAFIBR.
- YAFIBR believes that efforts to improve the wayleaves efficiency in terms of cost and time for approval, may bring significant benefits to the industry. For instance, approval may take between 2 weeks up to 3 Months, while a 96f cable between counties may cost more than USD 100,000 per year only for wayleaves.
- YAFIBR express interest in Grant Funding for new fiber networks, but also for those already lay down.
- YAFIBR also see potential to improve the duct network coverage and current rental fees, in order to reduce the 6 SH per meter/per month.
- Tax incentives on materials and other digital infrastructure assets, may also translate on impulse to improve digital infrastructure in Kenya.
- For YAFIBR, community involvement is also crucial, as during network rollout some communities become hostile towards the operators teams (increasing costs).
- YAFIBR is supporting Open Access.

FON (Frontier Optical Networks)

Contact: James Turuthi - CTO

Date: 16.05.2025

Time: 14:30hrs

General findings and remarks from the interview:

- FON confirm interest to participate as potential investors.
- FON Network is a mix of Underground 60% and Aerial deployment 40%, the underground network is normally based on their own ducts, as costs and delays make the rental option not attractive.
- FON operates around Nairobi and Mombasa with plans to expand the network coverage nationwide in Kenya.
- FON indicate that cost to build underground are currently around 10 USD per meter.

FON Answer to questions are as follows:

10. **What are the main obstacles faced by your company (Operators, Infrastructure and Service Providers) in expanding to undeserved areas in Kenya?**
    A: High Infrastructure Costs: The cost of deploying towers, laying fiber, and setting up power sources in remote and sparsely populated regions is prohibitively high.
    Limited Backhaul Connectivity: Many rural areas lack existing backhaul infrastructure, making expansion technically and financially challenging.
    Low Economic Viability: Low population density and limited disposable income among residents make it difficult to achieve a reasonable return on investment.
    Prohibitive and inconsistent costs of wayleaves. Each county charges different wayleave charges from the next.
11. **What kind of support or intervention do Operators and Service Providers expect from the government for future initiatives in expanding to undeserved areas?**
    Access to Shared Infrastructure: Support in developing and accessing national backbone infrastructure on an open-access basis.
    Security Support: Collaborations with local governments and security agencies to secure critical infrastructure.
    Standardization and rationalization of wayleave charges across counties.
12. **Do you have any suggestion to improve the current selection process for Priority Routes, Educational and Government institutions with missing connectivity? If yes, please describe your proposed approach.**
    Partner with selected ICT firms as infrastructure deployment partners. Assign each firm a specific region to deploy and support. Sign an open access agreement with each firm to allow for controlled competition. Allow other firms to connect end users using the deployed infrastructure on a revenue share basis with the infrastructure provider and Government. As part of its revenue share portion, Government can mandate the provider to connect schools and Government institutions.
13. **Do you have any suggestion for a potential Commercial Model for public and private sector cooperation? If yes, please describe it in more detail.**
    Capacity Building: Partner with NGOs or telcos to train local technicians for maintenance and support.
    Areas with business potential but poor infrastructure: Government to support cost of infrastructure roll out. Private sector to finance cost of operations. customer costs to be controlled for a minimum fixed period.

Areas with no business potential: Government to subsidize cost of roll out and operations for a fixed duration.

Government may want to consider licensing a fixed number of infrastructure operators per region to deploy infrastructure (ducts, towers) only with no license for end user connectivity. Other operators licensed to connect end users be made to ride on the infrastructure.

14. **Would you agree to include Open Access Wholesale Network principles as part of CTM to ensure fair participation and transparency?**

    Yes, but open access concept needs to properly structured to ensure Private entities do not single handedly invest in infrastructure only to share the same with competitors. A proper infrastructure sharing model still needs to be developed. For instance, if infrastructure providers were to have their wayleaves Zero rated and probably some tax intervention, then they could be made to share deployed infrastructure as part of their contribution.

15. **Will your organization participate as a bidder for the implementation of any KDEAP Subcomponents ((1.1 National Backbone expansion, 1.2 Last mile and Internet Service for Education, 1.3 Last mile and Internet Service for government, and 1.5 Cross-border Backbone expansion))? If not, please provide further details.**

    Yes, our organization is keen to participate as a bidder in the implementation of relevant KDEAP subcomponents.

16. **What is your organization´s view on the usage of a Multi-Round Reverse Auction (MRRA) as the preferred option for the allocation of subsidies for financing KDEAP Subcomponents 1.1-1.5?**

    Properly implemented, MRRA would be ideal for project financing and deployment. However, there is need to ensure corruption loopholes are addressed before implementation. For instance, what stops an insider from leaking the bid price of company A to its competitor in company B before the next round. how does the system ensure technically incompetent bidders don’t underquote so as to win the project only to be unable to implement.

17. **What are the key challenges you anticipate in collaborating with government, public, and private sector partners in the implementation of KDEAP Component 1 initiatives? What are your suggestions for overcoming those challenges?**

    Procurement and Contracting Complexities

    Lengthy and rigid procurement processes may not align with the fast-paced nature of infrastructure rollout and innovation in the telecom space.

    Delayed payment processes by Government

18. **Do you have any other comments or suggestions which might be relevant for the development of the Commercial Transaction Manual?**

    Tax Relief: Reduce import duties on telecom equipment and smart devices to lower CAPEX and consumer prices.

    5G and Spectrum Policy: Create a forward-looking spectrum policy that allows for flexible use and sharing in rural areas.

Address wayleave issues across counties.

Airtel

Contact: Hussein Versi - CTO

Date: 19.05.2025

Time: 10:00am

General findings and remarks from the interview:

- At this stage, Airtel DO NOT confirm interest to participate as potential investors. As internal reviews and discussions are expected during this week.
- Airtel indicate the setup of internal teams for the review of the KDEAP initiative, an answer will be provided within a week time.

BCS (Second Meeting)

Contact: John Orutwa, Chief Technology Officer

Date: 20.05.2025

Time: 14:00am

General findings and remarks from the interview:

- BCS provided an overview of the answers to the questions, as follows:

(To be updated – The presented answer have not been received formally yet)

Google

Contact: Michael Murungi

Date: 22.05.2025

Time: 12:30hrs

General findings and remarks from the interview:

- Google is already involved in investments in Kenya and there is a willingness to evaluate further opportunities, however, it is not possible to confirm non-binding interest at this stage.
- Google has requested confidentiality of their answers; therefore, the feedback will be included as anonymous answers within the overall one on one interview summary.
- Google will provide official answers to the questionnaire within the next 2 weeks.

POA Internet

Contact: Stanley Kienja – Head of Networks Operations

Date: 23.05.2025

Time: 10:00hrs

General findings and remarks from the interview:

- POA confirmed an internal review of the request in order to provide official answers to the questionnaire.
- POA preliminary comments indicate interest in open access to avoid duplication of infrastructure and minimize CAPEX for the operations. Currently, POA depends on other carriers for the provision of broadband services in Kenya.
- Network resilience is also a relevant topic for POA particularly for backbone network between Mombasa and Nairobi.
- Security risks and the protection of telecommunications infrastructure is a concern for POA, particularly in some areas of Kenya. The POA representatives indicated a perceived correlation between the increasing number of smaller operators and the increase security risks for network infrastructure.
- High cost of permits and/or Way leaves is a challenge, POA indicates that cross-sectorial coordination between government agencies and representatives may bring benefits for the industry.
- Formal answer will be provided within the next two weeks.

9.3 Market Stakeholders and potential investors

The previous chapter of this document have provided an overview of the existing telecommunications market in Kenya, additionally the survey interviews have shed light on the interest from local licensed operators to participate on the KDEAP initiative. Moreover, the national licensed operators identified as potential investors are the following:

#	Potential Investor (National, license operator)
1	Airtel Kenya
2	Telkom Kenya
3	Safaricom
4	BCS
5	JTL
6	Liquid
7	Bayobab
8	FON
9	Karibu Connect
10	Vilicom
11	VGG Connect
12	American Tower Corporation (ATC)
13	Atlas Tower Kenya (ATK)
14	YAFIBR
15	TEAMs
16	TESPOK
17	Paratus

In order to adopt international best practice in terms of cross-sectorial use of infrastructure, the following potential investors may also be relevant for the KDEAP project.

#	Potential Investor (National, Non-license operator)
1	Kenya Power
2	Kenya Electricity Transmission Company - KETRACO

International Potential Investors have been identified in the following table.

#	Potential Investor (International)
1	Google
2	META
3	China Telecom
4	Starlink
5	Amazon

An overview of the previous list of potential investors for KDEAP Project, is described in the following figure 22.

Figure 23 - Overview of Telecom Providers and Other Potentially Interested Parties

9.4 Potential Commercial Models

International evidence indicate that the digital divide, represented as infrastructure gap, particularly for backbone, middle mile and last mile networks, approached in a co-finance framework includes a mix of commercial models, where the difference can be identified on areas such as: procurement, ownership, operational model, and service offered depending that generally differ on the layer - backbone, middle-mile, last-mile, or institutional access. The main two infrastructure models that dominate are:

- **passive**, where the public entity lays ducts and dark fiber and lets ISPs light it themselves (think NetCo), and
- **active**, where the network is lit and managed by the provider (OpCo), offering wholesale bandwidth directly

Passive setups are cheaper and promote competition but need capable ISPs. Active models cost more but are plug-and-play for smaller players. Most sustainable networks blend both - leasing dark fiber to big telcos while selling lit services to smaller ISPs.

On the commercial side, open access wholesale is the most likely go-to model. By this one, the public networks lease capacity to all operators on equal terms, avoiding monopolies. Retail or vertically integrated models (where the builder also sells to end-users) are less common in public projects, except in areas with no private ISPs.

When it comes to rolling out public fiber in emerging markets, there's no one perfect solution fitting any possible scenario. Governments are typically mixing funding and delivery models depending on their budget, market maturity, and policy goals.

- One option is **fully public builds**, where the state funds and owns the network - such as Uganda's NBI or Argentina's ARSAT. These are strategic assets, often open-access, but they require important public capital and operational capacity.
- Then there are **models**, which come in flavors: concessions (like Peru's RDNFO), joint ventures (e.g., Burundi's BBS), or lease/DBO setups. In these, the private sector brings capital or ops know-how, while the state ensures public interest - usually via open-access rules or reversion clauses.
- **Co-builds / consortium** are another route - multiple stakeholders (Telcos, and sometimes with government) pool resources to deploy shared infrastructure. This is common in submarine cables such as TEAMS in Kenya.
- Last options – we have the **subsidized private deployment** - the government chips in just enough to make rural or low-ROI areas viable, often via reverse auctions. The private operator builds, owns, and runs the network, but must meet coverage and pricing conditions.

In conclusion, one can draw the conclusion the trend is toward blended models a mix-and-match with the public funding derisking the build, private players operates and scale it, and open access keeps the market fair.

Based on Detecon analysis, we have identified six commercial models for partnering in the area of fiber rollout. However, in order to comply with the World Bank procurement guidelines for matching investments applicable for the KDEAP project, the viable

commercial models for co-financing matching investments are reduced to three models framed in red in the table below.

Model	Build/Deploy	Own	Operate/ Maintain	Finance	Example
State-Funded Public Network	Government (via SOE or contractor)	Government (public asset)	Public operator or contracted private manager	Govern-ment budget or loans (100% public funding)	Uganda NBI: Govt built & owns 4,000+ km fiber; a private firm is contracted to operate & sell capacity
Concession	Private (concessio-naire)	Private (during term; may revert to state)	Private (with regulatory oversight)	Mixed: Private investment + public subsidy/ guarantees (viability gap)	Peru Backbone: Private Azteca built/operates 13,500 km; USD 333 Mn project with gov't subsidy, 20-year term
Joint Venture	Both (shared effort or via JV company)	Both (jointly through the JV)	JV company (both parties involved)	Both: capital from government and operators pooled	Burundi BBS: Govt & 5 operators co-own company; WB loan helped finance 1,250 km which BBS operates
Public DBO with Private Lease	Government (contracts build)	Government (after build)	Private (leases network under contract)	Government funds build; private pays lease or ops costs	Kenya NOFBI: Gov't built ~5,000 km backbone in 2019; Telkom Kenya leased/operated segments to provide services (open to others) - handed over to ICTA
Co-Build (Consortium)	Private partners (and sometimes government contributions in-kind)	Each partner owns capacity (IRUs) or shares ownership	Each operates their portion or a managing entity operates whole of it	Private capital from each partner; often facilitated by gov't or dev bank	TEAMS cable: Kenya gov and 8 private operators co-built submarine fiber; each got capacity rights

Matching Investment (Subsidized Private)	Private (under contract obligations)	Private	Private (subject to conditions)	Mainly private capital, plus one-time public subsidy (grant)	Colombia Fiber: Telefónica built fiber to hundreds of towns with gov't subsidy; company owns/operates but must offer open access

In summary:

The telecommunications market assessment has identified the following findings and potential impact on the development of the Commercial Transaction Manual (CTM):

Finding 1: Mobile penetration is ~119%, while fixed penetration is ~3% (which is within range of Sub-Saharan Africa region).

Impact 1: Enhancing the Backbone networks and middle mile may bring significant benefits to the Kenyan telecommunications market, understanding the cost associated to energy of wireless networks, therefore a fiber expansion is needed for both retail fixed services (mobile fixed substitution) and mobile backhaul (especially in the light of 5G bandwidths) and satellite backhaul.

Finding 2: Safaricom, Jamii, Liquid, Telkom and Airtel are telecom operators owning fiber capacities and have NFPT1 licenses.

Impact 2: The participation of existing licensed operators in the KDEAP project, will be beneficial not only as co-investor, but instead they bring a wealth of local knowledge and operational know-how of Kenyan networks.

Finding 3: KETRACO, Kenya Power among other entities are totally or partially state owned. Therefore, the CTM should evaluate the inclusion of stakeholders (or assets) that are not fully privately owned and potentially -in some cases- may not be current holders of a telecommunications license.

Impact 3: From a Commercial model perspective, targeting private investors, companies such as Jamii, Airtel, Liquid, Zuku (Wananchi Group), and Poa Internet are not the only ones positioned for the scope. Partially or fully public owned assets may also be part of the commercial model evaluation.

Finding 4: Poa Internet's strategy is focused on connecting underserved urban and peri-urban areas in Kenya, but also low-income rural communities.

Impact 4: Poa Internet similarly to other licensed operators, may be regarded as a good fit in terms of project scope and their announced strategy. However, the readiness to co-invest and the most suitable commercial model needs to be confirmed.

Finding 5: Helios Investment Partners and African Infrastructure Investment Fund 4 (AIIF4) are actively investing in the region.

Impact 5: As potential private investors, AIIF4 and Helios may represent a profile of potential investors which may require further research (one on one interview) in order to evaluate their suitability and interest to participate as potential investors (understanding Helios is financed by EIB)

Finding 6: International investors such as Google and Starlink are actively present in the region.

Impact 6: Google and Starlink may emerge as a new international investor profile to address their operations and investments in African, further research is recommended to understand their potential participation in the KDEAP project.

Finding 7: There are six submarine cables offering connectivity with the rest of the world. Three more submarine cables are expected to land on the Kenyan coast.

Impact 7: Kenya is taking advantage of its position in the region and enjoys great potential to become a digital HUB for international connectivity. By its positioning in East Africa, Kenya may be part of a terrestrial East to West Africa connection to circumvent the Suez Canal. This may represent an opportunity to attract global investors to evaluate innovative business models for international connectivity.

Finding 8: One-on-One interview has proven to provide better information and insights than public consultations and also are acting as (investment) scouting activities of potential investors and to explore suitable commercial models for KDEAP in Kenya.

Impact 8: Increased number of one-on-one interviews are expected and reported to ICT authority in Kenya; it is expected that between 20 to 30 interviews will provide valuable information for the identification of potential investors and for the exploration of suitable commercial models to be implemented under the KDEAP project phase 1 in Kenya.

Finding 9: There is confirmed and non-binding interest from existing licensed operators to participate in the KDEAP project, either as potential investor or as part of the Build and operations of the network.

Impact 9: There are common expectations such as return on investment, open access to the new infrastructure, expand the footprint of backbone and middle mile. At the same time there is also common recognition of the main challenges to overcome, including way leaves costs and processing for approval, coordination between authorities (subcounty - county, and cross sector coordination e.g.: roads and ducts) and security concerns in some areas of the country where infrastructure is vandalized or stolen.

10 Appendix 2: Review of policy and regulation instruments

10.1 Objective

The purpose this chapter is to carry out a review of existing and planned policy and regulatory instruments for the telecom sector.

This review is of all the telecoms laws and instruments applicable to the projects, including the 'Interconnection and Provision of Fixed Links, Access and Facilities' regulations the 'Universal Access and Service' regulations, Licensing regulations and those relevant to infrastructure sharing etc, to ensure that that any proposed models abide by the provisions of these regulations and meet their objectives. There will also be an identification of any regulations which might constitute an obstacle to the program.

10.2 Institutional structure

Ministry

The responsible ministry is the Ministry of Information, Communication, and Digital Economy (MICDE).

Regulator

The Kenya Information and Communications Act, 1998 split the Kenya Posts and Telecommunications Corporation, which previously operated as both the fixed line incumbent and the regulator, into three separate entities: the Postal Corporation of Kenya (PCK), national PTO Telkom Kenya, and the Communications Commission of Kenya (CCK) which is now known as the Communications Authority of Kenya (CA) following the Kenya Information and Communications (Amendment) Act, 2013.

The mandate of the CA includes:

- licensing and regulating all networks and services in the communications industry
- managing the country's frequency spectrum and numbering resources
- facilitating the development of e-commerce and cybersecurity
- type approving and accepting communications equipment
- protecting consumer rights
- maintaining and promoting effective competition within the sector to ensure a level playing field for all players
- regulating retail and wholesale tariffs for communications services
- managing the universal access fund
- monitoring the activities of licensees to enforce compliance with the licence terms and conditions as well as the law.

In May 2025, the CA has launched the Universal Service Fund (USF) Strategy 2023-2027 which amongst other things supports the Digital Superhighway initiative which "is hinged on a robust plan to enable citizens to access broadband through the deployment of 100,000 km of fiber, and 25,000 Wi-Fi hot spots." The fact that the Universal Service Fund

which is under the CA is also engaged with the financing of telecommunications in under-served areas raises the risk of potential overlap and duplication with the KDEAP programme.

ICTA

The Information and Communication Technology Authority (ICTA) operates under the Ministry of Information, Communications and Digital Economy. It was established in August 2013 with the aim of rationalizing and streamlining the management of all government ICT functions. ICTA serves as the implementing agency for the Kenya Digital Economy Acceleration Project (KDEAP) and hosts the Project Implementation Unit (PIU).

10.3 Legislation

The primary legislation for the ICT sector is the Kenya Information and Communications Act, 1998 as amended.

As noted, the Kenya Information and Communications (Amendment) Act, 2013 established the CA and granted it additional powers, including power to prosecute and powers to make regulations.

10.4 Regulations

10.4.1 Universal Licensing Framework

The Universal Licensing Framework (ULF) 2008 aims to encourage competition by facilitating the introduction of integrated telecoms services under a technology neutral license. Under the previous system, companies were required to obtain separate licenses to function as a fixed voice, broadband or mobile operator. The ULF license categories include:

- National Network Facilities Provider (NFP) – owner and operator of network infrastructure (based on satellite, terrestrial, mobile or fixed technologies). There are different tiers for the NFP License:
    - Tier 1 is for the deployment of infrastructure nationally and spectrum assignments that can be deployed nationally.
    - Tier 2 is for the deployment of infrastructure nationally, but spectrum assignments can only be deployed regionally.
    - Tier 2 is for the deployment of infrastructure only within a county boundary and spectrum assignments can only be deployed within the county.
- Applications Service Provider (ASP) – provider of services to end users using the infrastructure of an NFP (examples include MVNOs and vehicle tracking);
- Content Service Provider (CSP) – producer of content and services to be supplied through ASP connections.
- International Gateway Systems and Services License.
- Submarine Cable Landing Rights License;
- Terminal Equipment Provider; and

- Private VSAT licenses.

Licenses under the ULF are valid for a period of ten or 15 years.

The main implication is that while a Tier 2 operator is able to provide infrastructure nationwide it is only able to deploy spectrum regionally (despite spectrum applications taking place under a separate process).

There is no Wholesale only license but there have been providers of wholesale services such as Kenya Pipeline Company who have used the NFP Tier 2 license for wholesale services to operators.

10.4.2 Fair Competition and Equality of Treatment Regulations, 2015

The Kenya Information and Communications (Fair Competition and Equality of Treatment) Regulations, 2015, aim to provide a regulatory framework for the promotion of fair competition and equality, and protect against the abuse of market power or other anticompetitive practices within the sector. The rules outline the standards and procedures that the CA shall apply when determining whether a licensee is dominant in a given market – defined as having more than a 50% share – and provides for the appropriate remedies for abuse of dominance, anticompetitive behavior and any unfair treatment to consumers and other licensees.

10.4.3 National Information Communication and Technology Policy Guidelines 2020

The guidelines aim to facilitate universal access to ICT infrastructure and services, and to realise the potential of Kenya's digital economy by creating an enabling environment for all citizens and stakeholders. They seek to create the infrastructure conditions that enable the use of 'always-on, high speed, wireless, internet across the country' and facilitate the creation of infrastructure and frameworks that support the growth of data centers, IoT, machine learning and local manufacturing, as well as increase the contribution of ICT to GDP to 10% by 2030. The guidelines originally had a 30% Kenyan ownership limit, but this was scrapped in 2023.

10.4.4 DRAFT Access and Infrastructure Sharing Regulations, 2022

The draft Access and Infrastructure Sharing Regulations, 2022 were consulted on during 202 . The Regulations purposed to:

- establish a framework for better cooperation in infrastructure sharing,
- eliminate unnecessary duplication of ICT infrastructure,
- maximize the use of existing and future ICT infrastructure,
- minimize the negative impacts on public health, safety, and the environment caused by the proliferation of infrastructure installations,
- and promote competition in the provision of ICT infrastructure.

According to Section 5 of this draft Access and Infrastructure Sharing Regulations, 2022, the following conditions are necessary for infrastructure sharing:

- A telco deploying infrastructure for its own use must provide at least 30 percent more capacity than the projected owner's needs.
- Publicly-owned infrastructure shall be operated and made accessible to infrastructure users in accordance with the principles of open access and non-discrimination.
- Passive infrastructure may be established at a location where co-location or infrastructure sharing with an existing infrastructure provider is not feasible.
- The CA may impose infrastructure sharing obligations.

It is unclear what the present status of these draft regulations is.

In Summary:

There are no particular obstacles posed by the national regulatory regime in Kenya, however the following observations can be made:

- There is a relatively low level of network capacity wholesaling and infrastructure sharing in Kenya, this is not unusual as operators like to build their own network, especially with respect to their key customers and focus areas.
- In order for open access infrastructure sharing and wholesale models to become more prevalent, the infrastructure sharing regime has to be extended and generally enforced in order for these models to gain traction.

A key obstacle is the tendency of local county administration to try and get revenue from telecommunications operators through costly permitting in general and high costs of way-leaves in particular. The impact of this is far greater than any shortcomings in the regulatory regime at national level.

11 Appendix 3: Review of taxation framework

11.1 Objective

The purpose this chapter is to carry out a review of review of the taxation framework for the telecom sector as it would apply to digital infrastructure investment, and how this might impact investor appetite.

Th review of the taxation framework is primarily to identify elements that might be problematic, these include the Digital Service Tax, withholding taxes on digital payments and Excise duty on telecoms. The effect of these measures needs to be assessed in terms of the total cost of telecoms services and potential dampening of demand. To be discussed will be whether compliance with WBG requirements has already been assessed or whether this should be assessed within the frame of the project.

11.2 Sector specific duties

The excise duty applicable on voice, SMS and data services was increased from 10% to 15%, through the Finance Act 2018. In 2021 these duties were increased to 20%, but reduced back to 15% under the Finance Act 2023.

On 1 July 2022 a 10% excise duty on imported mobile phones came into effect under the Finance Act 2022, as well as a tax of KES50 on every imported ready-to-use SIM card.

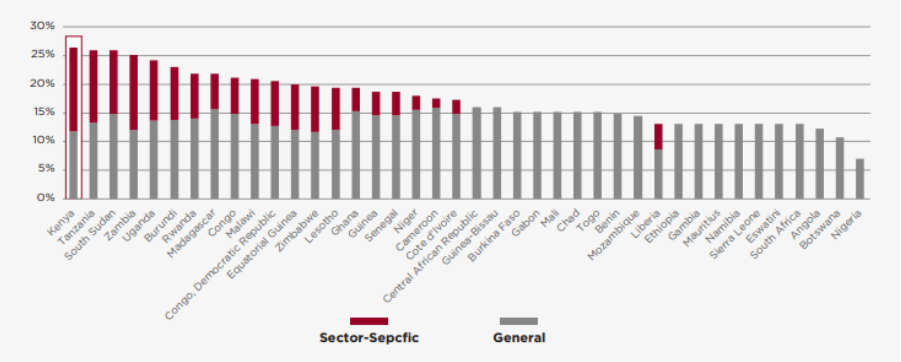
11.3 Non-sector specific taxes and duties

In 2020 the government lowered the corporate tax rate to 25% to support businesses during the COVID-19 pandemic, but this was revised back up to the original rate of 30% in 2021.

Note that VAT is of 16% is also applicable to mobile services, as well as other services like cloud, IoT and handset sales.

11.4 Overview

The GSMA has estimated that the cumulative effect of the tax structure is to make the telecoms industry in Kenya subject to the highest overall tax burden in the region.



Source: GSMA tax and digital development report 2023.

Figure 24 - Tax as a proportion of the cost of 1 Gb data basket (2022)

In Summary:

There are two issues with the taxation issue in Kenya:

- The level of tax is quite high and this raises the cost to communicate in Kenya which in turn raises the proportion of areas which are not profitable to be served. As a general rule, telecommunications should be seen as a driver of economic development to be encouraged rather than a luxury good to be taxed.
- The tax framework is subject to relatively frequent changes and this raises the level of unpredictability and therefore risk.

12 Appendix 4: Definitions and Abbreviations

Abbreviation	Full Form
ICTA	Information and Communications Technology Authority
CA	Communications Authority
GoK	Government of Kenya
CTM	Commercial Transaction Manual
KDEAP	Kenya Digital Economy Acceleration Project
NOFBI	National Optic Fiber Backbone Infrastructure
FTTH	Fiber To The Home
FTTC	Fiber To The Cabinet
NFPT1/2/3	Network Facilities Provider Tier 1/2/3
ASP	Application Service Provider
CSP	Content Service Provider
PPP	Public-Private Partnership
LEO	Low Earth Orbit
USF	Universal Service Fund
OBA	Output-Based Aid
MRRA	Multi-Round Reverse Auction
SCLS	Submarine Cable Landing Station
IXP	Internet Exchange Point
IRU	Indefeasible Right of Use
CDN	Content Delivery Network
WLA	Wholesale Local Access
WCA	Wholesale Central Access
BSA	Bitstream Access
DF	Dark Fiber
ITU	International Telecommunication Union
GATS	General Agreement on Trade in Services

BATS	Basis Agreement of Telecommunications Services
EOI	Equivalence of Inputs
OMCI	ONU / ONT Management and Control Interface
GPON	Gigabit Passive Optical Network
XG-PON	10-Gigabit-capable Passive Optical Network
XGS-PON	10-Gigabit Symmetrical Passive Optical Network
OLT	Optical Line Terminal
ONT	Optical Network Terminal
DOCSIS	Data Over Cable Service Interface Specification
HFC	Hybrid Fiber-Coaxial
TR-069	Technical Report 069 (related to CPE WAN Management Protocol)

13 List of figures

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