

2025

Internet Development Conference 2025

JAN 21-23, 2025

Internet Development Conference 2025

Executive Summary

The Internet Development Conference 2025 was held from January 21 to 23, 2025 at the Skylight Hotel Addis Ababa. The conference was organized by the Internet Society (ISOC) under the patronage of the Ministry of Innovation and Technology.

The objective of the conference was to lay the foundation for a stronger, more integrated Internet ecosystem in the IGAD region, which includes countries like Ethiopia, Kenya, Uganda, Somalia, South Sudan, and Djibouti.

Sponsored by Meta, Africom Technologies, and Linx, the three-day conference brought together key players to address the region's connectivity challenges, enhance regional cooperation, and foster the growth of a robust Internet economy.

Attended by 247 in-person and thousands of online participants, the conference identified key obstacles affecting Internet development in various IGAD countries and explored practical solutions.

It served as a platform for knowledge sharing, professional networking, and collaboration on critical initiatives such as establishing Internet Exchange Points and supporting community networks across the region.

The conference facilitated cross-border learning and the exchange of technical expertise to improve internet infrastructure; encourage collaboration among countries in the sub-region to support the implementation of the African Continental Free Trade Area; and foster the growth of community networks in underserved areas.

Presentations and panel discussions were made on seven thematic areas, namely: -

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- Digital transformation strategies
- Regulations for connecting the unconnected
- Digitization of the financial sector
- Internet infrastructure development
- Internet resilience and regional integration
- Bringing Africa's connectivity to the next level
- Internet in Education

The key action points from each thematic area are summarized below: -

Key action points regarding digital transformation strategies

- It is important to help organizations to:
 - Adopt agile methodologies
 - Foster a culture of innovation
 - Engage in continuous learning
- It is critical to help countries in the IGAD region address ongoing challenges such as limited digital skills, access disparities, and limited financial resources so that they can benefit from digital transformation.
- Stakeholders must collaborate to leverage digital technologies for sustainable growth.
- African states should: -
 - ✓ Align national strategies with continental strategies.
 - ✓ Invest in digital literacy and skills development.
 - ✓ Prioritize rural connectivity.

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- ✓ Encourage local innovation and entrepreneurship.
- ✓ Enhance collaboration and coordination.

Key action points regarding regulations for connecting the unconnected

- Establishing a regional regulatory sandbox in the IGAD region that allows cross-border testing of new connectivity solutions.
- Building the capacity of regulators in the region for better spectrum management
- Harmonization of ICT policies and regulations across the IGAD region
- Building IXPs to reduce the cost of local internet traffic, improve internet speed, reduce latency, and lower end-to-end costs.
- Building infrastructure and local data centers
- Investment in research and development to facilitate the development of locally relevant solutions to be utilized through community networks.
- Regulators should encourage sharing of infrastructure and cloud facilities to lower the cost of connectivity at the last mile.
- Regulators should consider the asymmetric regulatory model used in Brazil that encourages small operators.

Key action points regarding digitization of the financial sector

- Raising public awareness of digital financial services
- Regulating the financial sector for fair competition
- Work on cybersecurity
- Collaboration between government, financial institutions, and FinTechs

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Key action points regarding Internet infrastructure development

- Key public and private investments in infrastructure
- Nations should create regulatory environments that encourage competition
- Promotion of digital services that drive digital transformation
- Investing in data center and inland fiber network expansion in all IGAD countries.
- Considering community-centered connectivity to serve low-income communities

Key action points regarding Internet resilience and regional integration

- Expanding sub-cable infrastructure for better competition, redundancy, and access to capacity
- Expanding carrier-neutral data centers
- Increasing intra-Africa capacity and international connectivity
- Improving the Internet Resilience scores of countries by helping them expand their internal and gateway infrastructure
- Encouraging countries to have local content and services like DNS, Email, and E-Government services
- Helping nations build the right skills to ensure that the next generation of engineers in Africa will be able to design and maintain the networks in Africa.

Key action points regarding bringing Africa's connectivity to the next level

- Use Internet measurement tools such as Cloudflare to analyze and understand the connectivity status of a region or a country
- Consider the use of satellite connectivity to address remote and underserved communities

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- Work with regulators for better infrastructure information
- Regulators should:
 - ✓ Balancing competition with existing providers.
 - ✓ Ensuring economic benefits stay in Africa.
 - ✓ Addressing security concerns.
 - ✓ Promoting interoperability and competition among LEO providers.
 - ✓ Developing sustainable long-term business models.

Key action points regarding the Internet in Education

- Addressing power and device affordability-related challenges to expand digitization efforts in education
- Expanding high-quality, culturally relevant multimedia content across all grade levels and subjects
- Creating inclusive and equitable digital learning environments
- Expanding technology to all schools nationwide
- Building national research and education networks (NREN) as per the recommendations of the AU Continental Education Strategy
- Building sustainable digital learning platforms and developing the capacity of staff
- Mapping schools to know their location, the available infrastructure, and the cost of building infrastructure.

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Internet Development Conference 2025

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Contents

Executive Summary	1
Acronyms.....	11
Opening Session.....	12
Welcoming Remarks – Dr. Asrat Mulatu- President, Internet Society Ethiopia Chapter.....	12
Welcoming Remarks- Mr. Demos Kyriacou- Deputy CEO and Chief Operating Officer, Wingu Africa	12
Keynote Speech- Dr. Emmanuel C. Manasseh- Acting Regional Director, ITU Regional Office	13
Keynote Speech- Eng. Balcha Reba- Director General, ECA.....	14
Opening Speech- H.E. Dr. Belete Molla- Minister of Innovation and Technology of FDRE.....	17
Theme 1: Digital Transformation Strategies.....	19
Keynote Address.....	19
Digital Transformation Strategies: Hopes and Accomplishments in Ethiopia.....	21
Panel discussion.....	22
Key action points.....	24
Theme 2: Regulations for connecting the unconnected.....	26
Regulation for Connecting the Unconnected in the IGAD Region	26
Regulation to Connecting the Unconnected in Ethiopia	28
Regulations in Kenya.....	29
Connecting the Unconnected: Lessons from Brazil.....	30
Discussion	31

Internet Development Conference 2025

Key action points.....	33
Theme 3: Digitization of the financial sector in Ethiopia.....	35
Digitization of the financial sector.....	35
Fintech Startups/companies.....	36
Panel Discussion.....	38
Key action points.....	41
Theme 4: Internet Infrastructure Development.....	42
The critical role of internet infrastructure in fostering connectivity and digital transformation.....	42
Carrier-neutral data centers across East Africa.....	43
Community Network experience in Kenya.....	44
Community-centered connectivity: A complementary solution to connect the unconnected.....	44
Discussion.....	45
Key action points.....	47
Theme 5: Internet Resilience and Regional Integration.....	47
Regional connectivity in the East African Region.....	47
Lessons learned from 2024 cable cuts and Internet resilience in the sub-region.....	48
Discussions.....	49
Key action points: -.....	50
Theme 6: Bringing Africa's connectivity to the next level.....	51
The Region's Network-Introducing the Open Fiber Data Standard.....	51

Internet Development Conference 2025

Satellites filling the connectivity gap?	52
Measuring the Internet of the IGAD region.....	53
Discussion	54
Key action points.....	59
Theme 7: Internet in Education in Ethiopia	60
Digitizing primary and secondary schools.....	60
Ethiopia's strategy to use Internet to improve education.....	61
Improving Ethiopian education through technology: Transforming learning for the future.....	62
Leveraging "good" Internet to advance education in Kenya- the role of KENET	63
Discussion	63
Key action points.....	65
Changing the lives of people using the Internet	67
Closing Remarks.....	69
Recognition of Individuals.....	69
Closing remarks of H.E. Dr. Yeshurun Alemayehu, State Minister at the Ministry of Innovation and Technology	69
Closing Remarks by H.E. Engineer Balcha Rebba, Director General of Ethiopian Communication Authority	70
Annex.....	Erro! Indicador não definido.
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Acronyms

Abbreviation	Description
B2B	Business to Business
B2C	Business to Consumer
CDN	Content Delivery Network
DNS	Domain Name System
DTS	Digital Transformation Strategy
ICT	Information Communication Technology
IGAD	Intergovernmental Authority for Development
IGW	Internet Gateway
IoT	Internet of Things
ISP	Internet Service Provider
ITU	International Telecommunications Union
IXP	Internet Exchange Point
MInT	Ministry of Innovation and Technology

Opening Session

Welcoming Remarks – Dr. Asrat Mulatu- President, Internet Society Ethiopia Chapter

Dr. Asrat Mulatu made the first remarks at the conference. Having welcomed the participants on behalf of the vibrant four-hundred-plus members of the Internet Society Ethiopia chapter, Dr. Asrat noted that the Internet is no longer a luxury in today's world but a very lifeline of our interconnected world. He said Ethiopia stands to harness the power of the Internet to overcome challenges like poverty and inequality but acknowledged that realizing the potential requires a collective effort. He called upon the participants to join the Internet Society Ethiopia Chapter in its effort to create a digital ecosystem that is open, accessible, and secure for everyone.

Dr. Asrat said the conference delves into some of the most pressing issues facing the future of the Internet locally and elsewhere such as issues of infrastructure, leveraging the Internet to modernize the financial sector, investments needed to ensure equitable access to the Internet, building more resilient and secure Internet ecosystem, regional integration, and leveraging the Internet to enhance education and empower learners. He concluded his remarks by urging participants to actively participate, share their expertise, connect with fellow participants, and use the conference to inspire change and build a digital Ethiopia that benefits everyone.

Welcoming Remarks- Mr. Demos Kyriacou- Deputy CEO and Chief Operating Officer, Wingu Africa

Having welcomed the participants to the IDC 2025, Mr. Demos Kyriacou stated that we stand at a pivotal junction in the evolution of the digital landscape across the IGAD region. He noted how Wingu Africa has been at the forefront of this digital revolution and said the conference is a testament to its collective commitment to fostering a stronger, more integrated, and resilient Internet ecosystem throughout the region. He pointed out the specific objective of the gathering is to address regional challenges by identifying and overcoming the barriers that hinder Internet development in the IGAD

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Internet Development Conference 2025

region. Recognizing how Ethiopia has emerged as a beacon of digitalization in Africa and commending its efforts in setting ambitious goals to transform the nation into a digital powerhouse and liberalizing the telecom sector, Mr. Kyriacou expressed Wingu Africa's dedication to support Ethiopia's digital aspiration and leverage its expertise to accelerate the digital transformation of IGAD nations. He said Wingu Africa will collaborate with governments, the private sector, and international organizations to enhance regional connectivity by investing in critical infrastructure such as fiber optic networks and data centers. He stressed the importance of strengthening cybersecurity, empowering underserved communities, and providing digital literacy training.

Mr. Kyriacou concluded his remarks by calling upon participants to embrace this opportunity to shape the future of the Internet in the IGAD region and collaborate and innovate to build a more prosperous and inclusive digital society.

Keynote Speech- Dr. Emmanuel C. Manasseh- Acting Regional Director, ITU Regional Office

Having welcomed the participants to the conference and commended the organizers of the event, the acting regional director emphasized the transformative power of digital technology and the need for collaborative governance to ensure an open, inclusive, and secure Internet.

He highlighted that digital infrastructure is fundamental to economic and social progress, enabling access to education, healthcare, employment, and financial services. However, achieving universal digital connectivity requires significant financial resources, technical expertise, and proactive leadership. Innovative financing mechanisms and investment forums are essential to bridge digital infrastructure gaps and accelerate progress toward the United Nations' Sustainable Development

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Goals (SDGs). He notes that digital technology can directly or indirectly contribute to 70% of these targets.

Dr. Emmanuel stressed the importance of Internet exchange points (IXPs) in improving local connectivity by reducing costs, latency, and reliance on international data routing. He calls for regulatory environments that foster economic growth, promote innovation, and ensure digital safety and security.

Despite progress, he notes that 32% of the world's population remains offline, with only 38% of people in sub-Saharan Africa having Internet access. Gender disparities persist, and mobile Internet remains prohibitively expensive in many African countries. Affordable infrastructure and services are crucial to closing these gaps.

He references the upcoming 20-year review of the World Summit on the Information Society and the Global Digital Compact, urging IGAD countries to unite and take action toward a more accessible, affordable, and resilient Internet. He concluded his remarks by encouraging continued cooperation among stakeholders to build an inclusive digital future.

Keynote Speech- Eng. Balcha Reba- Director General, ECA

Engineer Balcha Rebba emphasized the transformative power of the Internet in economic development, education, governance, and financial inclusion while addressing the challenges that hinder widespread connectivity. He acknowledged that the IGAD region faces significant hurdles, including limited infrastructure, inconsistent regulatory policies, and cybersecurity threats. He stressed

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the need for deliberate investment, especially in rural and underserved areas, and calls for policy harmonization to create an enabling environment for innovation.

He noted that knowledge-sharing is crucial for regional digital transformation. By exchanging best practices, research findings, and technical expertise, the IGAD region can accelerate the adoption of emerging technologies. The conference serves as a platform for collaboration, allowing stakeholders to learn from one another and build a collective knowledge base.

He also stressed the importance of regional collaboration for maximizing the impact of digital initiatives. He highlights the importance of cross-border fiber optic networks, harmonized regulatory frameworks, and regional cybersecurity strategies. He urges countries to unite their resources and align their priorities to achieve far-reaching results.

Engineer Balcha said the Internet is fundamentally about connectivity, not just in a technical sense but also in building relationships between businesses, governments, and communities. He called for investments in both physical infrastructure and social partnerships to strengthen regional digital ecosystems and contribute to the global Internet landscape. He noted that despite progress, millions of people in the region remain disconnected. He stresses that Internet access should be universal, affordable, and accessible regardless of geography or income level. The digital divide impacts education, healthcare, and economic opportunities, making it imperative to close the gap through infrastructure development, sound policies, and collaborative initiatives.

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Speaking of the role of the Internet in Finance and Education, he said the Internet has revolutionized the financial sector, enabling secure transactions and expanding financial inclusion. Similarly, integrating digital tools into education can make learning more accessible and equitable. However, both sectors require resilient Internet infrastructure and regulatory frameworks to thrive.

With the increasing role of the Internet in daily life, issues of trust, security, and misinformation must be addressed. He called for strong cybersecurity measures, data privacy protections, and digital literacy programs to ensure that citizens can navigate the digital world responsibly. Additionally, regulatory frameworks must balance innovation with accountability, encouraging infrastructure investment while protecting users' rights.

Engineer Balcha discussed the potential of artificial intelligence (AI), blockchain, and the Internet of Things (IoT) to reshape industries. However, he warned that these technologies must be developed responsibly, with a focus on solving social challenges and ensuring sustainable adoption. Governments, academia, and civil society must collaborate to build a secure and inclusive digital ecosystem.

He concluded by reinforcing that the Internet is not just a technological advancement but a force for human progress. He urged stakeholders to prioritize connectivity, trust, and responsible technology development to ensure that digital transformation benefits everyone equitably.

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Opening Speech- H.E. Dr. Belete Molla- Minister of Innovation and Technology of FDRE

Having welcomed the participants to the IDC 2025, Dr. Belete emphasized the Internet's role in economic growth, social development, and connectivity. He noted Ethiopia's advancements under the Digital Ethiopia 2025 strategy, particularly the liberalization of the telecom sector, expansion of 4G and 5G services, and the increasing number of mobile broadband users. He highlighted the success of Telebirr, which has over 51.54 million users, showcasing the impact of digital innovation on financial inclusion. Additionally, private sector investments in digital infrastructure, including data centers and digital ID expansion, are contributing to the country's digital growth.

Despite these achievements, Dr. Belete acknowledged persistent challenges, such as bridging the digital divide, improving cybersecurity, and enhancing digital literacy. He introduced Digital Ethiopia 2030 as the next ambitious step in Ethiopia's digital evolution, inviting collaboration from the private sector, civil society, academia, and international partners.

He said the IDC 2025 conference aims to address these challenges by focusing on improving Internet infrastructure, fostering economic growth, empowering women and youth, and ensuring responsible Internet use. He said the event serves as a platform for collaboration, networking, and knowledge sharing among stakeholders.

Dr. Belete concluded his remarks by expressing confidence in the conference's success and its role in creating a more connected and prosperous IGAD region.

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With that, he officially opened the conference.

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Theme 1: Digital Transformation Strategies

Moderator: - Dr. Dawit Bekele, Regional Vice President- Africa, Internet Society

Panelists: - Ms. Mihret Woodmatas, Senior ICT Expert, AUC

Dr. Abiyot Bayou, Senior Advisor to the Minister, Ministry of Innovation and Technology; Data and Digital Governance Advisor at Tony Blair Institute for Global Change

Keynote Address

In her keynote speech, Ms. Mihret Woodmatas spoke about digital transformation efforts in Africa and their accomplishments at the continental level. Summarized below are the key points from her speech.

- Africa is embracing digital technologies for inclusive and sustainable development, with numerous digital transformation initiatives underway. Significant progress has been made, particularly in mobile connectivity and innovation.
- Inclusion and universal connectivity are not yet achieved. Gaps exist between coverage and usage.
- Digital Transformation Strategy for Africa (DTS) 2020-2030: The African Union Commission, with partners, developed this strategy to accelerate data transformation and bring tangible change. It builds on existing initiatives and unites key ICT players.
- DTS Objectives: Harness digital technologies and innovation to transform African societies and economies, promote integration, generate inclusive economic growth and job creation,

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bridge the digital divide, and eradicate poverty. It aims to strengthen Africa's ownership in the digital space.

- The key Pillars of DTS are: -
 - ✓ Enabling policy and regulatory framework
 - ✓ Digital infrastructure
 - ✓ Digital skills and human capacity
 - ✓ Digital innovation and entrepreneurship
- Digital education, agriculture, and health are the focus sectors that the strategy deals with.
Other cross-cutting themes include: -
 - ✓ Digital IDs (addressing the large unidentified population)
 - ✓ Local content development
 - ✓ Security and data protection policies
 - ✓ Research and development
- Strong political will, clear strategies, and dedicated financial investment are crucial for successful digital transformation.
- African governments have committed to harmonizing policies and regulations and aligning national strategies with the continental DTS. This will help create a single digital market.
- The African Union Commission is developing further strategies in areas like digital education, agriculture, health, intercontinental identity, data governance, AI, and online child safety.

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- The implementation of strategies and harmonization of policies across member states need improvement. Capacity-building efforts are ongoing, but the response from some member states is lacking.
- The Program for Infrastructure Development in Africa Priority Action Plan 2 focuses on "hard" infrastructure, including data centers and internet exchange points.
- Increased electricity access, capacity building, and stakeholder collaboration are crucial. The African Union Commission seeks more support to accelerate the implementation of the DTS and related strategies.

Digital Transformation Strategies: Hopes and Accomplishments in Ethiopia

Dr. Abiyot Bayou made a presentation titled “Digital Transformation Strategies: Hopes and Accomplishments in Ethiopia. In the presentation, Dr. Abiyot discussed Ethiopia’s National Digital Transformation Strategy along with the accomplishments and challenges in implementation.

Summarized below are the key points from the presentation: -

- Digital transformation involves integrating digital technologies into all areas of a business, fundamentally changing how it operates.
- Implementing digital transformation enhances operational efficiency, streamlining processes and reducing costs significantly.
- Digital transformation is driven by key trends such as cloud computing, data analytics, and the Internet of Things (IoT), reshaping industries worldwide.
- Digital transformation is a top priority for the Government of Ethiopia and is embedded in key development strategies.

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- Digital transformation strategies are not standalone strategies but rather continuations of nations' development strategies. They are holistic and cross-sectoral by nature but are loosely held strategies given the dynamicity and rapid changes in the digital world.
- Digital Ethiopia 2025 has identified four digital foundations, namely: Infrastructure, Enabling system, Digital platforms, and Digital ecosystem. It has also identified four pathways, namely: Agriculture, Manufacturing, Tourism, and IT-enabled services.
- Major accomplishments include foundational infrastructure, legal and regulatory environment, national governance and coordination, digital service delivery, digital finance, and improvements in public administration.
- However, there exist persistent challenges and obstacles including limited digital skills, access disparities, bureaucratic hurdles, and lack of financial resources to implement large-scale projects.

Panel discussion

After the keynote address and the presentation, the panelists sat down with the moderator and responded to questions from the stage and the audience. Summarized below are the key points from the discussion: -

On the importance of inclusion

- Governments must work to close connectivity gaps in their population. Targeted interventions are needed to do so.
- Expanding broadband access is critical. Ethiopia's Digital Strategy 2030 seeks to address issues that hinder broadband access and ensure meaningful access in rural areas.

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On addressing bureaucratic hurdles

- Attitude changes are hard to bring about.
- Some initiatives require step-by-step adoption. For example, making digital ID mandatory too early may create exclusion.
- It is a process, and it takes time.
- Several services have not been digitized which is partly an attitude problem.

On cross-border infrastructure

- AU's PIDA program is working on infrastructure development. It works on selected infrastructure projects. There are projects in the IGAD region targeting landlocked countries.
- The Africa Continental Free Trade Area is already signed and it contains digital trade protocols.

On digital literacy and access to devices

- Digital literacy is one of the pillars of the continental Digital Transformation Strategy.
- Meaningful access can't be realized without content, affordable devices, and skills. One solution for addressing the affordability of devices is manufacturing end devices in the continent.
- We have to make sure that there are not only coverages but also usage.
- Affordability of connectivity is key.

On the importance of targeting the youth

- Ethiopia's start-up strategy targets the youth, which accounts for 60% of the population.

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- Initiatives such as the 5 Million Coders initiative are meant to bring about digital inclusion and skill development.

On which comes first, digital content or devices

- Infrastructure should be there whether there is content or not. If people are trained, then they can generate content.
- A parallel approach can be adopted for content vs. device.

On monitoring the implementation of the continental digital strategy

- The AUC has mechanisms to monitor the implementation of the DTS in very member state.
- What is expected from member states is clearly stipulated.
- Not many member states respond to survey questions and report their progress.
- All documents are endorsed by member states. It is up to member states to implement them.

Key action points

- It is important to help organizations to:
 - Adopt agile methodologies
 - Foster a culture of innovation
 - Engage in continuous learning
- It is critical to help countries in the IGAD region address ongoing challenges such as limited digital skills, access disparities, and limited financial resources so that they can benefit from digital transformation.
- Stakeholders must collaborate to leverage digital technologies for sustainable growth.



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- African states should: -
 - ✓ Align national strategies with continental strategies.
 - ✓ Invest in digital literacy and skills development.
 - ✓ Prioritize rural connectivity.
 - ✓ Encourage local innovation and entrepreneurship.
 - ✓ Enhance collaboration and coordination.

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Theme 2: Regulations for connecting the unconnected

Moderator: Robel Kitaba, Network Engineering Expert

Panelists: Ms. Mavis Maundanidze, Program Officer, ITU Regional Office- Africa

Mr. Million Hailemichael, Deputy Director General, Ethiopian Communication Authority

Mr. Barrack Otieno, Chairman, Association of Community Networks in Kenya

Mr. Rhian Durate, Senior Manager for Public Affairs for Abrint- Brazilian Association of Internet Service Providers

Mr. Erkan Satik, Director of Cloud Ecosystem and Alliances, Wingu Africa

Regulation for Connecting the Unconnected in the IGAD Region

Ms. Mavis Maunganidze made the presentation. She discussed the various challenges faced by nations in the IGAD region to connect the unconnected and recommended actions to address the challenges.

Summarized below are the key points from her presentation: -

- The average IGAD regional connectivity statistics are dismal with average internet penetration and mobile penetration at 34 and 51 percent respectively while broadband subscriptions are at 8% and rural connectivity is at 23%.
- Major challenges in connecting the unconnected in the region are infrastructure deficits, regulatory barriers, and economic constraints.
- The regulatory barriers include complex licensing procedures, lack of policy harmonization, and bureaucratic inefficiencies.

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- There are regional initiatives to address the issue such as the East Africa Regional Digital Integration Project, which is financed by the World Bank, and the IGAD Regional Infrastructure Master Plan (IRIMP) which aims to develop integrated ICT infrastructure and promote regional connectivity and economic integration.
- Most countries in the IGAD region have established regulatory bodies to oversee the ICT sector and have a similar focus on improving connectivity, data protection, and cybersecurity. However, they are at varying stages of regulatory framework development and implementation and have different levels of focus on the digital economy and consumer rights. They also have diverse approaches to data protection and privacy laws.
- Suggested solutions for addressing the regulatory challenges are: -
 - ✓ Unified licensing framework and simplified licensing procedures
 - ✓ Regulatory sandboxes wherein regulators, service providers, and other stakeholders can test innovative technologies and business models under relaxed regulatory conditions
 - ✓ Technology-neutral regulation and efficient spectrum management
 - ✓ Incentivizing infrastructure sharing among telecom operators to reduce the cost of deploying new infrastructure and ensure efficient use of existing resources
 - ✓ Tax incentives and subsidies to telecom operators for deploying infrastructure in underserved areas

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- ✓ Universal Access Service policies to subsidize connectivity projects in underserved areas by collecting contributions from telecom operators
- ✓ Multi-sector regulation to improve efficiency, reduce costs, and enhance service delivery
- Other regulatory issues to consider include Public Private Partnerships, agile regulation, and harmonization of regional policies.
- Other important considerations include building Internet exchange points (IXPs), developing community networks for localized solutions to connectivity challenges, and adopting regulatory frameworks and strategies to manage spectrum and support the evolution of last-mile connectivity.

Regulation to Connecting the Unconnected in Ethiopia

Mr. Million Hailemichael, Deputy Director General of the Ethiopian Communication Authority delivered this presentation which covered the telecommunications regulatory landscape in Ethiopia and the main challenges to connectivity.

Summarized below are the key points from his presentation: -

- The Government of Ethiopia strives to make telecommunication services accessible, available, and affordable. To this end, it introduced a policy in 2018 that is pro-market liberalization and competition.
- The introduction of telecom liberalization in the country enhanced telecommunication access and service in Ethiopia resulting in significant increases in mobile subscribers, Mobile Internet Users, and fixed broadband.

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- Significant improvements were made in infrastructure development such as Internet Gateway (IGW), mobile towers, and fiber optic.
- Lack of road accessibility, lack of power in rural areas, and lack of digital literacy remain major challenges to connectivity in Ethiopia.
- Telecom operators have coverage obligations for voice, text, and high-speed data services. The coverage obligations are measured in terms of population coverage and geographic coverage.
- The Communication Service Proclamation has established a universal service fund. The fund's sources are levies and donations. The money will be distributed through a reverse auction method.

Regulations in Kenya

In this presentation, Mr. Barrack Otieno, Chairman of the Association of Community Networks in Kenya focused among other things on the key initiatives for revolutionizing the regulatory landscape in Kenya and the best practices that IGAD and Horn of Africa countries can consider.

Summarized below are the major points from his presentation: -

- Loosely defined, a community network refers to communication infrastructure designed by particular communities to address communication issues that are relevant to them.
- Among other things, community networks provide users with their only way to access the internet and help to localize income.

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- Interacting with regulators and universal access agencies is a key component of community network governance.
- The road to building a community network has three major challenges, namely: -
 - ✓ Understanding what a community network is
 - ✓ Assessing whether a community will benefit from and be able to sustain a community network
 - ✓ Planning the construction of the network
- African countries that recognize community service providers are Kenya, Uganda, and Lesotho.
- The Kenyan experience is a showcase that governments are catalysts for regulatory reforms. Furthermore, the involvement of multiple stakeholders is a key pillar for regulatory reform.
- Decentralization of data centers is key to enhancing last-mile access.

Connecting the Unconnected: Lessons from Brazil

In this presentation, Mr. Rhian Duarte discussed the Brazilian experience of using innovative regulatory approaches to ensure digital inclusion in the country. Summarized below are the key points from the presentation: -

- Brazil has a strong, vibrant, and participatory community of small and medium providers of fixed wireless and fiber broadband offering B2C and B2B solutions.

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- The number of connected homes grew six-fold in the last twenty years, reaching 53 million fixed broadband subscribers in 2024. The percentage of connected homes grew from 27% in 2010 to 84% in 2024.
- There are over 21,000 ISPs in Brazil. Most of them are small operators with only 581 ISPs having over 5,000 clients and 7 ISPs having over 1 million clients. The market is decentralized and competitive.
- Small operators are a big reason Brazil is rapidly moving forward with digital inclusion. They are driving investment in full fiber networks throughout the country with very high levels of private investment.
- Competition drives end-user benefits with average speed increasing by 2300% while price lowers by 73% in seven years.
- The innovative regulatory model that includes responsive and asymmetric regulation and pro-competition interventions is key to the achievement.
- The regulatory model focuses on minimizing abuse of market power, simplifying regulatory obligations for small operators, promoting competition and reducing barriers to new entrants, clustered evaluation of market competition, and network governance.

Discussion

After the presentations, the panelists responded to questions from the moderator and the audience.

Summarized below are the key points from the discussion session.

On the IGAD unified licensing regulatory framework

- It creates synergies and similar understanding.

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- Building key infrastructure at the regional level gives the region an edge in negotiations with international service providers.

On promoting community networks vs local providers

- Only 30% of the population can meaningfully utilize ICT. 70% of the population is unconnected or underserved.
- Community networks charge phones, provide common computers, and give access to connections. They employ youth from local communities and the money circulates in the local community.
- Community networks can grow into operators.
- Ethiopia understands the necessity of community networks but has not adopted them in any of its legal instruments yet. The telecom liberalization act was only enacted recently.
- ISPs and community networks can work collaboratively.

On the role of data centers in creating regional integration and infrastructure development

- Infrastructure and data centers are interconnected.
- More local services will help communities.

On Brazil's asymmetric regulation model

- The model was key for the development of ISPs. Smaller providers do not carry the same regulatory burden as the bigger ones. However, consumer regulations and quality regulations are the same.
- Control regulations are the only ones that are loosened for small ISPs.

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- Local IT shops in neighborhoods changed themselves into small ISPs when the regulation opened the door for them.

On the importance of a regional regulatory association

- The establishment of an IGAD regional regulatory association will help to share best practices and bring about uniformity.
- Regulators can work for a common agenda.
- There are similar experiences with water and sanitation associations in Eastern and Southern Africa. It is an opportunity to strengthen cross-border communities.

On sharing of infrastructure and competition

- Competition gives commercial advantages both to incumbents and new entrants.
- Promoting competition gives consumers options.
- Infrastructure must be shared. The competition must be on services.
- Some sort of regulation is required for the expansion of infrastructure. The private sector must be encouraged to engage in infrastructure building.

Key action points

- Establishing a regional regulatory sandbox in the IGAD region that allows cross-border testing of new connectivity solutions.
- Building the capacity of regulators in the region for better spectrum management
- Harmonization of ICT policies and regulations across the IGAD region

The banner features a purple background with a network diagram of interconnected nodes and lines. A map of Southeast Asia is visible on the right, with a location pin marking a specific area. A small yellow square is located in the top right corner.

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- Building IXPs to reduce the cost of local internet traffic, improve internet speed, reduce latency, and lower end-to-end costs.
- Building infrastructure and local data centers
- Investment in research and development to facilitate the development of locally relevant solutions to be utilized through community networks.
- Regulators should encourage sharing of infrastructure and cloud facilities to lower the cost of connectivity at the last mile.
- Regulators should consider the asymmetric regulatory model used in Brazil that encourages small operators.

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Theme 3: Digitization of the financial sector in Ethiopia

Moderator: - Dr. Beakal Gizachew, Assistant Professor, Addis Ababa University

Panelists: -

Mr. Seyoum Damtew, Director of Information System Security, CBE

Mr. Melka Girma, COO, Shega Media

Mr. Beza Mamo, Director, Payment Application, EthSwitch

Digitization of the financial sector

Mr. Melka Girma, Chief Operating Officer of Shega Media, made the presentation. Summarized below are the key points from the presentation: -

- The amount of adoption and transaction volume indicates the increasing importance of digitalization within financial services in Ethiopia.
- Key drivers of digitization in the financial sector are:
 - ✓ Government Initiatives,
 - ✓ Mobile and Internet Penetration,
 - ✓ Youth demographics.
- Mr. Melka highlighted the crucial role of data and analytics in driving innovation and decision-making within the financial sector. Leveraging big data for better customer insights, forecasting customer needs and market trends and personalized marketing is the next frontier.
- Challenges to the Digitization of Financial Services are:
 - ✓ Infrastructure and Network Efficiency,

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- ✓ Informal Digital Financial Activities,
- ✓ Awareness Issue,
- ✓ Unfair Competition Environment,
- ✓ Cybersecurity
- Key takeaways:
 - ✓ Collaboration between Government, Financial Institutions, and FinTechs is essential
 - ✓ Focus on accessibility to ensure equitable access to digital financial services
 - ✓ Leveraging data and analytics for better decision-making will take financial services to the next level

Fintech Startups/companies

Mr. Beza Mamo, Director of Payment Application EthSwitch, made the presentation. Summarized below are the key points from the presentation: -

- Fintech startups use technology to provide financial services to customers. They are disrupting the traditional financial industry by offering innovative solutions that are more convenient, affordable, and accessible to consumers.
- Fintech went hand in hand with computer and communication technology, from Telegraph and Morse Code in Fintech 1.0 to AI and Machine learning in Fintech 4.0.
- The comparative analysis of Fintech companies and traditional banks indicated that Fintech has the upper hand concerning user experience, speed of service, cost structure, and risk management.
- The role of internet infrastructure in Fintech startups is:

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- ✓ Democratizing Access to Financial Services,
- ✓ Enhancing Cross-Border Transactions,
- ✓ Fostering Innovation and Collaboration.
- The Fintech industry is rapidly evolving, driven by key trends like artificial intelligence, blockchain, and big data analytics.
- The Fintech industry grapples with challenges such as regulatory compliance, cybersecurity threats, and building customer trust.
- Fintech Startup services are categorized as:
 - ✓ Payment Services,
 - ✓ Lending Services,
 - ✓ Wealth Management Services,
 - ✓ Insurance Services.
- The Ethiopian Fintech Landscape includes:
 - ✓ Mobile Money/Payment – six startups
 - ✓ Payment Processing – nine startups
 - ✓ Lending and Saving – seven startups
 - ✓ Remittance – three startups
- The following are the roles of EthSwitch in the Fintech Startups:
 - ✓ Create interoperability between financial institutions,
 - ✓ Provide a national payment gateway,
 - ✓ Provide shared platform/ infrastructure services,

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- ✓ Implement a domestic payment scheme,
- ✓ Serve as central interconnectivity for clearing and settlement.

Panel Discussion

In the panel discussion, the panelists responded to the moderator's and the audience's questions.

Summarized below are the key points from the discussion: -

Mr. Seyoum on the status of CBE concerning digital banking services

Key indicators of digital services penetrations in CBE: -

- CBE is the largest bank not only in Ethiopia but also in East Africa, boasting over 45 million customers.
- Approximately 75% of daily transactions, totaling around 5 million, are coming through digital channels.
- Mobile banking is provided by the CBE Mobile Banking application and USSD service.
- CBEbirr provides the wallet service.

Mr. Melka on the status of Ethiopian digital finance compared to other countries and the role of Shega Media

- While Ethiopia's entry into the digital market was late, the country has achieved remarkable progress in this sector.
- Telebirr has achieved 51 million users in just four years, a remarkable feat compared to M-Pesa's 18-year trajectory to reach 40 million.
- While Nigeria boasts over 3.5 million POS terminals, Ethiopia has only 12,000 serving 45 million debit cards. This stark contrast suggests a critical need for improvements on the issuer

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side in Ethiopia to enhance card acceptance and drive greater adoption of electronic payments.

- Nigeria boasts a thriving fintech ecosystem with an estimated 200 companies, while Kenya has a robust presence with 60 to 70 fintech players. In contrast, Ethiopia's fintech landscape, though growing, currently comprises a significantly smaller number of companies, likely in the few dozen.
- India stands as a global exemplar in digital finance, particularly in its adoption of a unified platform for diverse banking and payment services.
- Shega Media contributes to the advancement of the digital finance landscape by providing valuable data analysis and insights.
- This empowers innovators, particularly those within the agricultural healthcare sector, to make more informed and effective business decisions.

Mr. Beza on the fintech maturity in Ethiopia and adoption of technologies like AI, blockchain, and big data

- Fintech maturity in the country has reached stage 3.0, indicating significant progress in the digital financial services sector.
- The efficient utilization of Merchant Presented QR codes as the primary payment method positions Ethiopia to achieve advanced Fintech maturity level
- Lending money and fraud monitoring services are tested data analytics models; however, these models need more data to be efficient in the real world.

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- The National Payment Gateway, while built on a foundation of local currency transactions, incorporates SDKs and APIs that facilitate seamless integration with international payment systems, enabling global transactions.
- The development of an AI-powered multi-tenant fraud monitoring system is currently underway.

Mr. Seyoum on the security challenges and mitigation strategies

Key security issues in digital finance:

- Inadequate digital literacy among both employees and customers leaves them susceptible to exploitation by fraudsters,
- Fraudulent funds are increasingly being diverted into untraceable cryptocurrency, posing a significant challenge for law enforcement and financial institutions,
- A key challenge in KYC is the lack of complete digital customer information, hindering effective risk assessment and fraud prevention
- AI-powered malware distribution and Cyber Attacks

Mitigation strategies:

- Implementing a single, overarching regulatory framework for all types of currencies,
- Adherence to international security standards like PCI DSS, NIST, and ISO,
- Mandatory security clearance procedures must be implemented for all purchased or in-house developed solutions,

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- Collaboration is essential for proactive fraud management and leveraging AI-powered threat intelligence

Key action points

- Raising public awareness of digital financial services
- Regulating the financial sector for fair competition
- Work on cybersecurity
- Collaboration between government, financial institutions, and FinTechs

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Theme 4: Internet Infrastructure Development

Moderator: - Dr. Ephrem Teshale

Panelists: - Mr. Ghislain Nkeramugaba, IXP Development, ISOC

Mr. Freddy Mrema, Group Director, Enterprise Sales and Marketing, Wingu Africa

Mr. Barrack Otieno, Chairman of the Association of Community Networks in Kenya

Dr. Carlos Rey-Moreno, Co-founder, Zenzeleni Networks

Ms. Tigist Damtie, CEO, 251 Cloud

The critical role of internet infrastructure in fostering connectivity and digital transformation

In this presentation, Mr. Ghislain Nkeramugaba discussed the role that internet infrastructure plays in ensuring digital transformation, the importance of building technical communities, and the role that regulatory environments play in this regard.

Summarized below are the key points from his presentation: -

- Connectivity is key to digital transformation enabling key e-services such as e-commerce, e-education, e-health, and other public/government services.
- Connectivity includes last-mile connectivity, metropolitan infrastructure, backbone infrastructure, inter-city infrastructure, cross-border infrastructure, IXPs, and DNS.
- Building technical communities is critical to building infrastructure.
- It is important to create regulatory environments that encourage competition.
- Data center and inland fiber footprints in the IGAD region are low.

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Carrier-neutral data centers across East Africa

In this presentation, Mr. Freddy Mrema discussed what Wingu Africa did with a strategic focus on East Africa, the advantages of carrier-neutral data centers, and the challenges faced in expanding carrier-neutral data centers.

Summarized below are the key points from the presentation: -

- The African data center landscape is still largely dominated by carrier-based data centers. However, the market direction is going into carrier-neutral data centers.
- 30% of African commercial facilities are now carrier-neutral.
- Carrier-neutral data centers are the perfect homes for IXPs providing a sustainable and efficient ecosystem for their growth. This results in better and more affordable Internet services.
- Some of the key challenges in expanding carrier-neutral data centers are lack of reliable and renewable energy, regulatory challenges, lack of skilled labor, and high cost of customs duties for digital infrastructure projects.
- Opportunities abound such as the proliferation of local content developers, PPP to develop new sources of renewable energy, review of college syllabi to align the work force with the market, and special tax incentives for digital infrastructure projects.

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Community Network experience in Kenya

Mr. Barrack Otieno- Chairman of the Association of Community Networks in Kenya discussed challenges faced in community network experiences. Summarized below are the key points from the presentation: -

- Lack of understanding of what community networks are is one of the challenges in expanding community networks.
- Challenges in the deployment of community networks include the cost of equipment, operational costs, inadequate power, and cost of bandwidth.
- ISPs should support community network providers through training.
- Communities of practice such as national DNS forums and local NGOs must be supported so that they continue to support interdependence and re-use of resources.

Community-centered connectivity: A complementary solution to connect the unconnected.

In this presentation, Dr. Carlos Rey-Moreno discussed how community-centered networks pose as alternatives to traditional networks to fill the gap of reliable and affordable connectivity.

Summarized below are the key points from the presentation: -

- COVID-19 has accelerated an existing trend of essential services moving online. Thus, Internet traffic volume has grown 50-60% since pre-pandemic levels.
- The COVID-19 pandemic has shown that many low-income communities around the world that lack reliable and/or affordable access to connectivity are being left further behind.



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- The large-scale, commercial, telco network model has done wonders for coverage but, on its own, is insufficient to connect everyone affordably. Community-centered providers are feasible alternative solutions in environments where traditional networks fail or are reluctant to operate.
- Community-centered connectivity providers can be community-owned (CN), publicly owned (MN), or privately owned.

Discussion

Following the presentations, the panelists responded to questions from the moderator and the audience. Summarized below are the key points raised: -

General reflections

- Data for a nation is as precious as its natural resources. It is the digital footprint of a country's population.
- Nations must utilize their data for their national interest.
- Cybersecurity is usually overlooked in data storage discussions.

On the role of local companies in fostering connectivity

- Data transaction increases by 25% every year. All these data require a reliable and secure cloud for storage. This is where local companies can play a role.

On the challenges that local cloud service companies face

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- In the Ethiopian case, the data protection proclamation does not have a detailed roadmap yet.
- There are conflicting regulations such as the prohibition on the financial sector from utilizing private clouds.
- Attitude towards the private sector is not friendly.

On what IXPs can bring to countries like Ethiopia in terms of cost and quality of connectivity

- If a nation does not have an IXP, that means all its connections take place outside the country. This has both security and cost implications.

On Tanzania's experience of expanding IXPs

- They have healthy regulatory frameworks.
- Content is stored on IXPs. Service providers were forced to store their content on IXPs
- Different governmental institutions are connected to the IXP.

On what community networks can bring to Ethiopia

- Young people can do business online, changing their as well as their families' lives.
- With a supportive legal and regulatory environment and with issues related to infrastructure and functional devices resolved, community networks can have a major impact on Ethiopia.
- Community engagement is key for community networks.

On data center awareness and power management of data centers

- Not much has been done in Ethiopia in terms of creating awareness of data centers.

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- Power management systems in modern data centers are intelligent. In modern data centers only servers, not the entire room, are cooled down. Lights get on sensing movements.

Key action points

- Key public and private investments in infrastructure
- Nations should create regulatory environments that encourage competition
- Promotion of digital services that drive digital transformation
- Investing in data center and inland fiber network expansion in all IGAD countries.
- Considering community-centered connectivity to serve low-income communities

Theme 5: Internet Resilience and Regional Integration

Moderator: - Mr. Keadu Belachew, Cloud Engineer, Fannie Mae

Panelists: - Mr. Ben Ryall, Edge Strategy Manager, Meta

Dr. Amreesh Phoker, Internet Measurement and Data Expert, Internet Society

Regional connectivity in the East African Region

In this presentation, Mr. Ben Ryall discussed the status of connectivity in Africa.

Summarized below are the key points from the presentation: -

- Sub-Saharan Africa's share of connectivity to Europe has dropped to about 60% because of price and availability issues.
- Intra-African connectivity routes have increased in the past years.

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- Increased competition is key to increasing redundancy, getting more capacity, and ensuring cross-border connectivity.
- The expansion of data centers, CDNs, and exchange traffic will lead to less dependency on Europe.
- Carrier-neutral data centers and cloud services are expanding. However, the majority of data centers in Africa are carrier data centers. Many of these data centers are server rooms of carriers.

Lessons learned from 2024 cable cuts and Internet resilience in the sub-region

In this presentation, Dr. Amreesh Phokeer recounted the outages in March and May 2024 in West and East Africa respectively, and showed the importance of improving resilience.

Summarized below are the key points from the presentation: -

- In March 2024, a suspected underwater rockslide off the coast of Cote d'Ivoire resulted in submarine cable cuts affecting 13 countries in western and southern Africa. The downtime was roughly 7 weeks.
- Lessons learned from the West African outage: -
 - ✓ Countries that had redundant routes were unaffected by the outage.
 - ✓ Cross-border terrestrial fiber links were used to reroute traffic to the redundant routes.

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- In May 2024, two fiber optic submarine cables were damaged off the coast of KwaZulu-Natal, South Africa affecting several east African countries. The cause of the damage is suspected to be the dragging of a ship's anchor. The traffic between East and South Africa was affected.
- Several IXPs in East Africa reported significant traffic drops because the IXPs host cache servers that refilled their content through the affected cables.
- Countries that were significantly impacted by the outages had lower Internet Resilience scores than those that were able to remain operational.
- Several countries in Africa do not have a locally stored cache of the top 1,000 websites.
- IXPs played a critical role in keeping local traffic flowing when submarine cables were offline.
- Having local content and services like DNS, Email, and E-Government services would improve the availability of services in the event of outages.
- Although their coverage is currently low, LEOs can help in terms of redundancy.
- Building a human network is just as important as building infrastructure. Knowing the right people to call when problems arise facilitates faster resolution of issues.

Discussions

Following the presentations, the panelists responded to questions from the moderator and the audience. Key points raised during the session were: -

- Fixed line connections are required for better bandwidth and cost reduction.
- Shared infrastructure will bring down costs. The cost savings will trickle down to the user.

On cable cuts and resilience

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- New cable systems are being laid. There are only a fixed number of ships in the world that handle cable repair. That is one reason why response and restoration time is long.
- Building IXPs is quite important. Iran's experience of ample cache storage locally is an interesting example to look at.
- Traffic is not the only measure for CDNs to store cache in a certain country. There are other measures such as quality of experience.

On satellites serving as alternatives for internet resilience

- There is only one operator of LEO satellites. That is a concentration of power on one hand. They need to build infrastructure.

Key action points: -

- Expanding sub-cable infrastructure for better competition, redundancy, and access to capacity
- Expanding carrier-neutral data centers
- Increasing intra-Africa capacity and international connectivity
- Improving the Internet Resilience scores of countries by helping them expand their internal and gateway infrastructure
- Encouraging countries to have local content and services like DNS, Email, and E-Government services
- Helping nations build the right skills to ensure that the next generation of engineers in Africa will be able to design and maintain the networks in Africa.

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Theme 6: Bringing Africa's connectivity to the next level

Moderator: - Ms Mashingo Jack, Government Digital Transformation Advisory, Tony Blair Institute for Global Change

Panelists: -

Mr. Steve Song, Senior Director, Infrastructure Mapping and Development, Internet Society

Mr. Dan York, Senior Advisor, Internet Society

Mr. David Belson, Head of Data Insight, Cloudflare

The Region's Network-Introducing the Open Fiber Data Standard

Mr. Steve Song, Senior Director of Infrastructure Mapping and Development for Internet Society, presented the current region's network status and introduced the new initiative. Summarized below are the key points: -

- Africa's Undersea Fiber Optic Cables have registered a miraculous expansion between 2009 and 2025
- While undersea fiber map is publicly available, terrestrial connection mapping is limited and not readily available, only a few operators are willing to publish their data
- The multi-stakeholder initiative, partnering World Bank, ITU, ISOC, and others, promotes the collaborative development of Open Data Standards for describing telecommunications infrastructure
- ODS benefits governments through effective investments, improved coordination across infrastructure sectors, and reduction of physical network interruption and destruction

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- Open Fiber Data Standard describes what data to publish, provides a vocabulary/structure of a network, and offers guidance and software tools for publishers and users
- The initial focus of OFDS lies in describing the national and middle-mile networks, but will ultimately encompass last-mile networks
- Internet Society is working with partners to promote the development of global initiatives to support the standard
- The next steps are to develop transparent, democratic governance mechanisms for OFDS and fundraise for its support
- Regulators should convince operators of the big-picture benefit of infrastructure information, and ensure the availability of data

Satellites filling the connectivity gap?

Mr. Dan York, Senior Advisor for Internet Society, made the presentation. Summarized below are the key points from the presentation: -

- Satellite connectivity has proven to be a life-changing solution for remote communities and natural disaster survivors.
- Almost all the communication satellites reside in the Low Earth Orbit, and all three LEO systems components: constellation, user terminal, and ground station need government approval for operation.
- SpaceX has recently dominated the LEO constellation with more than 7000 Starlink satellites, mainly due to its Starship rocket launching efficiency and capacity.

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- Although the user terminal cost is high, a promising opportunity is seen in Starlink's cheaper connectivity compared to many leading fixed ISPs in Africa.
- LEO satellites' 5-year lifespan poses a long-term sustainability question in addition to the space debris issue, impact on astronomy, and upper atmosphere effects from satellite demise during reentry
- Other concerns include economic flow to global corporations, lack of control in security and monitoring, technical issues regarding spectrums, and lack of competition in the field.
- Satellite connectivity provides a great opportunity for remote and underserved communities, true resilience can be achieved by LEO satellites for disaster and extreme weather and Fiber for long-term connectivity.
- Governments and regulators should support the Satellite option by putting relevant policies conducive to the field and by creating a competitive environment with traditional Internet Service Providers.

Measuring the Internet of the IGAD region

Mr. David Belson, Head of Data Insight from Cloudflare, introduced an analysis tool from Cloudflare.

Here are the key points: -

- Cloudflare provides Application, Zero Trust, Developer, and Network Services worldwide.
- Cloudflare Radar was launched in 2020 to build a better internet by exposing insights, threats, and trends based on the aggregate data collected by the service.
- The solution helps anyone to understand what is happening on the internet from a security, performance, and usage perspective.

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- The multi-faceted measurement of internet connectivity manages the macro/aggregated views of Internet Traffic, Connection Quality, Outages, Routing, and many more.
- All stakeholders in the industry should make use of this tool to analyze and understand the connectivity status of a region or a country.

Discussion

The panelists responded to the moderator's and the audience's questions. Summarized below are the key points from the discussion: -

Mr. Steve on innovative approaches and partnerships to address the connectivity challenges

He emphasized the importance of diversity in the ownership of infrastructure:

- Having a variety of entities owning network infrastructure (not just commercial operators) fosters competition and acts as a safety check.
- This opens up opportunities for new players in the access space, such as municipalities and cooperatives.
- Investing in fiber optic infrastructure can be a strategic move for municipalities:
 - ✓ Improves their negotiating power when attracting operators to their city.
 - ✓ Provides citizens with affordable access to internet services.
 - ✓ Requires transparency regarding existing network infrastructure to make informed decisions.
- Overall Benefits:
 - ✓ Increased transparency in network infrastructure ownership unlocks possibilities for diverse players.

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- ✓ Creates a more competitive environment, reducing reliance on a few dominant operators.
- ✓ Enhances overall network resilience.

Mr. Dan on challenges in deployment and usage of LEO satellites and the roles of regulators

Challenges of LEO Satellites:

- Portability: LEO internet kits can be expensive, and users are often locked into subscriptions.
- Local Economic Participation: Regulations requiring local participation in network infrastructure pose challenges for global LEO providers.
- Economic Flow: Concerns exist about revenue flowing to foreign corporations instead of staying in Africa.
- Limited Interoperability: Current LEO systems often work with only specific operators, hindering competition.
- Uncertain Long-Term Business Model: LEO Internet is a relatively new technology, and its long-term viability is unclear.

Opportunities from LEO Satellites:

- Subsidies and Rentals: Subsidies or rental models could make LEO internet more accessible.
- Digital Skills Development: LEO internet deployment can be coupled with digital skills training for communities.
- Resilience: LEO internet can offer greater resilience against physical disruptions compared to terrestrial networks.

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- Community Ownership: Community-owned and operated networks can empower local populations.

Key Considerations for Regulators:

- ✓ Balancing competition with existing providers.
- ✓ Ensuring economic benefits stay in Africa.
- ✓ Addressing security concerns.
- ✓ Promoting interoperability and competition among LEO providers.
- ✓ Developing sustainable long-term business models.

Mr. Dan concludes by emphasizing the importance of community-owned and operated networks for achieving true internet access for all.

Mr. Dan on pricing models for Satellite Networks

- Competitive Pricing Pressure: LEO providers can undercut traditional providers' prices in some regions.
- Lower Operational Costs: Once the constellation of satellites is launched, LEO providers have minimal ongoing infrastructure costs compared to traditional terrestrial providers who need to lay fiber or build cell towers.
- Capacity Constraints: The number of users a LEO satellite can support in a specific area is limited. This can lead to subscription pauses or limitations on data usage.

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- Traditional providers need to adapt their strategies to compete effectively. Fiber optic networks can provide faster speeds and more reliable connections, compared to LEO internet.

Mr. David on how Cloudflare Radar collects data for analysis and how the output can be useful for decision-making

- Data Sources: Valuable data is generated from various sources, primarily through user interactions with internet services.
 - ✓ Log data: Generated from website requests, user activity, and service usage.
 - ✓ Routing data: Derived from information about how internet traffic flows across the network.
- Data Analysis Applications:
 - ✓ Identifying network performance issues: Analyzing data can pinpoint areas with low connectivity, slow speeds, and high latency.
 - ✓ Understanding user behavior: Analyzing user activity can provide insights into usage patterns, preferences, and the impact of different services on network performance.
 - ✓ Improving network infrastructure: Data analysis can help identify bottlenecks, optimize routing, and improve overall network efficiency.

Mr. Steve on the network data sharing mindset of operators and inequality emanating from satellite networks

- Sharing detailed network maps can be a powerful marketing tool, displaying the reach and capabilities of a network. (Example: Airtel's "Open Network" initiative in India)

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- Establishing common standards for sharing network information can address concerns about undermining competitiveness.
- Mr. Steve expresses concern that LEO satellite constellations might exclude the development of this local network ownership ecosystem in Africa.
 - ✓ Wholesale Model: LEO constellations can be beneficial as wholesale services, providing backhaul support for local operators who can then serve entire communities.
 - ✓ Retail Model: Direct retail access to LEO satellites, like Starlink subscriptions, could exacerbate existing inequalities by making high-speed internet accessible only to the wealthy in remote communities.

Mr. Dan on network ownership issue and the role of governments in satellite network expansion

- Network Ownership by Billionaires:
 - ✓ The dominance of billionaires like Elon Musk (Starlink) and Jeff Bezos (Project Kuiper) in LEO constellations raises concerns about control and potential lack of focus on Africa's specific needs.
- Government's Role:
 - ✓ Governments play a crucial role in regulating spectrum allocation, consumer protection, and landing station permissions for LEO constellations.
 - ✓ There is the possibility of government-owned or co-owned constellations in Africa or through global cooperation, but there are also challenges like cost and global coordination.

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- Mobile Operator Pushback:
 - ✓ Existing mobile network operators might resist LEO constellations due to potential competition, as seen with Starlink's lower prices in some regions.
 - ✓ These operators might influence regulatory processes, potentially hindering LEO constellation deployment.
- Trade-offs:
 - ✓ LEO Constellations: Offer faster internet access in remote areas but might not be sustainable long-term due to high replacement costs and potential lack of local economic benefits.
 - ✓ Terrestrial Network Infrastructure: Provides local ownership opportunities and ecosystem development but can be slower and more expensive to build out in remote regions.

Key action points

- Use Internet measurement tools such as Cloudflare to analyze and understand the connectivity status of a region or a country.
- Consider the use of satellite connectivity to address remote and underserved communities.
- Work with regulators for better infrastructure information.

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Theme 7: Internet in Education in Ethiopia

Moderator: Dr. Fekade Getahun

Panelists: Mr. Yehealem Abebe, Executive Director, Partners in Education Ethiopia

Dr. Mulugeta Atinef, ICT and Digital Education, MoE Project Coordinator, e-Learning for Strengthening Higher Education (eSHE)

Mr. Mulugeta Assefa, Managing Director, BRIDGE

Professor Meoli Kashorda, Executive Director, Kenya Education Network (KENET)

Digitizing primary and secondary schools

In this presentation, Mr. Yehealem Abebe discussed what Partners in Education Ethiopia did in digitizing the education sector.

Summarized below are the major points from the presentation: -

- Interconnectivity and digital education comprise one part of the holistic model that Partners in Education adopted.
- Digitizing efforts in schools impacts both students and teachers.
- Students can understand abstract concepts through simulation, improve their language proficiency, catch-up on missed classes without teacher support, etc.
- Teachers' content knowledge and pedagogical skills improve.
- The Jara Unit, which is the world's first renewable energy-powered e-learning device that works in remote areas, was used to address device and power-related challenges.

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- Addressing challenges such as power supply and device affordability will enhance digitization efforts even more.

Ethiopia's strategy to use the Internet to improve education

In this presentation, Dr. Muluneh Atinef discussed Ethiopia's efforts to improve education by using the Internet.

Summarized below are the key points from the presentation: -

- There are several institutional voids to be filled in the education sector. EdTech plays a key role in filling those voids.
- There are several challenges to EdTech itself such as unequal access, digital skills and literacy gaps, and data standards and quality.
- The lack of classroom materials and infrastructure is also a big challenge. Of the more than fifty-six thousand schools in Ethiopia, a little more than seven thousand have computers, less than ten thousand have access to electricity, and less than two thousand have access to the Internet.
- The Ethiopian Digital Education Strategy and Implementation Plan considers alternative approaches.
- Its strategic focuses include enabling infrastructure and connectivity, data governance and analytics, platforms, and curriculum-aligned digital content.

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Improving Ethiopian education through technology: Transforming learning for the future

In this presentation, Mr. Mulugeta Assefa discussed efforts by his organization to improve education in Ethiopia through technology. He discussed the tools they developed including SparkEd Digital Library, offline educational tablets, school information management system (SIMS), learning management system (LMS), tablet for accelerated learning, and tablet for visually impaired female high school students.

Summarized below are the key points from his presentation: -

- Digital skills, content, and infrastructure must be developed in parallel.
- If connectivity is prioritized over content development, achieving full interconnectivity across all communities could take decades. It is, therefore, crucial to consider offline alternatives that make resources and content readily available.
- Ethiopia's education system faces numerous challenges including a lack of digital resources, accessibility and infrastructure, education management platforms, resource delivery, and assessment systems.
- The importance of localized educational content can't be overstated.
- The use of technology in education will increase student engagement and performance, improve teachers' efficiency through streamlined tools, enhance educational equity across regions, and produce a future-ready workforce with strong digital skills.

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Leveraging “good” Internet to advance education in Kenya- the role of KENET

Professor Meoli Kashorda discussed how KENET plays a key role in advancing education in Kenya using technology as a lever.

Summarized below are the key points from the presentation: -

- KENET’s key objectives are: -
 - ✓ Providing sustainable and affordable high-speed internet connectivity to educational and research institutions
 - ✓ Facilitating electronic communication among beneficiaries
 - ✓ Supporting the sharing of educational resources among research and education institutions
 - ✓ Facilitating teaching and learning over the internet
 - ✓ Facilitating collaboration in the development of online educational resources
 - ✓ Facilitating research collaboration among member institutions
- KENET is sustained 100% by member institutions.
- KENET was able to connect to GEANT R&E Cloud which proved quite important in obtaining quality educational resources.
- It is connected to other African and Global RENS for enhanced collaboration.
- The focus should be on learning outcomes, not digital inputs.
- It is possible to have a lot of impact by utilizing technologies such as virtual labs.

Discussion

Following the presentations, the panelists reflected on questions from the moderator and the audience. Summarized below are the key points from the discussion.

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On low school completion rate of students and how to use the internet widely in Ethiopian schools

- The low school completion rate is caused by the unavailability of nearby schools, poor quality of education, and poverty. It is important to pursue multifaceted solutions to the problem.
- Unavailability and interruption of electric power affect internet connectivity in schools. It is important to explore all options including offline options for delivering quality digital content to students.

On quality and equitable education and the use of the Internet to improve teachers' quality

- Quality of education is a grand topic. The quality of educators is one of the major factors in ensuring education quality. The role of the Internet and initiatives such as EdTech is re-skilling and up-skilling teachers.
- Artificial intelligence offers a big opportunity for teachers and supports them in preparing educational and evaluation content.
- The Ministry of Education is working to establish a central infrastructure to close the huge digital divide across different parts of the country.

On how unconnected schools can access digital content

- One solution can be downloading resources from the Internet and storing them on school computers/servers for offline access.

On how different stakeholders can collaborate and work together

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- One solution can be connecting schools. Students in some schools can build the capacity of those in neighboring schools. School administrators can gather for discussion and seek solutions.
- Universities, TVETs, and teaching hospitals can also connect similarly and collaborate.

On the importance of data centers and content development

- In Kenya, community data centers are used to store learning materials.
- Multi-format content has helped students to progress at their own pace.
- Differentiating content is quite important to address all learning styles
- There are lots of mechanisms to give content offline.

On ensuring that students benefit from available connectivity in schools

- Students must get access to connectivity where available. In some areas, it was noticed that only teachers and high-performing students use the e-learning centers.

Key action points

- Addressing power and device affordability-related challenges to expand digitization efforts in education.
- Expanding high-quality, culturally relevant multimedia content across all grade levels and subjects
- Creating inclusive and equitable digital learning environments
- Expanding technology to all schools nationwide
- Building national research and education networks (NREN) as per the recommendations of the AU Continental Education Strategy

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- Building sustainable digital learning platforms and developing the capacity of staff
- Mapping schools to know their location, the available infrastructure, and the cost of building infrastructure.

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Changing the lives of people using the Internet

Mr. Chris Locke, Managing Director of the Internet Society Foundation spoke on the third day of the event focusing on the human aspects of the Internet.

Summarized below are the key points from his presentation.

- **Connection is Key:** Mr. Locke emphasized the importance of human connection, both at the conference itself and as a fundamental purpose of the Internet. He noted that real progress often starts with these personal connections.
- **Human Experience:** The internet's power is not just about maps, technologies, and deployments, but fundamentally a human experience. Mr. Locke shared his own memory of first connecting to the internet and feeling a sense of global reach.
- **Impact on Individuals:** The story of Rebecca, who learned to crochet online and started a business, illustrates how connectivity can transform lives in unexpected ways, improving livelihoods and providing solace. He highlighted the need for affordable and accessible internet to enable more stories like Rebecca's.
- **Community Empowerment:** Mr. Locke discussed the Internet Society's work in training communities to build and manage their Internet networks. He shared the story of Amanita, who gained practical skills through a training program and secured a job. This illustrates how connectivity can empower entire communities.
- **Human Impact:** The work of connecting people has a very real human impact, even if it's sometimes hard to see beyond deployments and infrastructure. Mr. Locke argued that connectivity can bridge divides and improve lives regardless of background.

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Concluding his remarks he encouraged the audience to remember the human impact of their work, to partner with the Internet Society, and to join chapters to further this mission. He reiterated that the core of their work is making human connections.

The floor was opened for questions and answers following the presentation. Based on the audience's questions Mr. Locke discussed how the foundation could be of help for their particular needs and gave further examples from around the world on the impacts of the Internet and how Internet Society can contribute.

Internet Development Conference 2025

Closing Remarks

Recognition of Individuals

Dr. Dawit Bekele, Regional Vice President of Internet Society Africa took the floor to acknowledge the works of individuals and organizations for the success of the conference.

He recognized the following entities: -

- The Ministry of Innovation and Technology
- Wingu Africa
- Meta
- Africom Technologies
- Flawless Events
- Nadia, the contact person from the Ministry
- Speakers and panelists
- Moderators
- The ISOC team and leadership

Closing remarks of H.E. Dr. Yeshurun Alemayehu, State Minister at the Ministry of Innovation and Technology

H.E. Dr. Yeshurun Alemayehu began his remarks by acknowledging that over the past two days, conference attendees engaged in vibrant discussions about leveraging advanced technologies to transform lives and economies across East Africa. The focus was on harnessing the region's digital resources to achieve resilience and prosperity, recognizing the shared aspiration of Ethiopia, Kenya,

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Uganda, Somalia, South Sudan, and Guinea. Challenges like infrastructure gaps, limited technical support, and regulatory inconsistencies were acknowledged, but the emphasis shifted towards transforming these obstacles into opportunities through knowledge sharing and collaboration.

The state minister highlighted the importance of cross-border cooperation, particularly in support of the African Continental Free Trade Area, deeming it crucial. He stressed the need for integrated digital systems, harmonized policies, standardized frameworks, and cross-border investments to accelerate trade and empower entrepreneurs. Robust economic infrastructure, including corporate networks, was highlighted by the state minister as essential for reducing costs. The conference also celebrated the role of young people in driving innovation and developing solutions to local challenges using technologies like AI.

Dr. Yeshurun commended the organizers and participants for their contributions, and attendees left with a renewed commitment to building a stronger, more integrated, and prosperous digital future for East Africa. Despite the challenges ahead, Dr. Yeshurun emphasized that collective resolve and collaboration were key strengths in creating a future where opportunities transcend borders, and the region becomes a leader in global digital transformation.

Closing Remarks by Engineer Balcha Rebba, Director General of the Ethiopian Communication Authority

Engineer Balcha opened his remarks by expressing inspiration from the innovation, collaboration, and vision displayed over the past two and a half days, focused on building a more connected and prosperous region. He emphasized the shared journey of exploring future connectivity and digitization, from cryptocurrencies and regulations to bridging the digital divide. Discussions on

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financial sector digitization highlighted the potential for economic inclusion and bringing essential services to underserved communities.

The director general noted the progress in internet infrastructure development, as crucial for fostering innovation and ensuring inclusiveness. He underscored the importance of internet resilience and regional integration, requiring cooperation and shared resources. He also highlighted the inspiring insights on the internet's role in education, bridging knowledge gaps, and creating opportunities. The potential of the internet to improve quality of life through better access to healthcare, education, and financial services was also a key theme.

He stressed that these conversations represent a commitment to action, showcasing the power of partnerships between governments, private enterprises, academia, and civil society. He reminded attendees that shared responsibility is crucial, emphasizing that technology is only as powerful as its purpose. The mission, he stated, must remain focused on fostering connectivity, and data literacy, empowering communities and economies, and ensuring a fair internet for all.

Engineer Balcha expressed gratitude to the organizers, including the Internet Society, the Ministry of Innovation and Technology, Wingu Africa, moderators, speakers, participants, and the conference program committee. He urged everyone to leave with renewed determination to turn dialogue into action and visions into reality, shaping a future that transcends boundaries, enriches lives, and creates opportunities. He concluded by encouraging attendees to carry forward the energy and insights gained, implementing solutions that ensure the internet is a bridge connecting the unconnected, empowering the underserved, and transforming lives, emphasizing that the future is digital and, together, a more connected, resilient, and inclusive digital ecosystem can be built.

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He then officially closed the conference.