LIBERIA INFORMATION AND COMMUNICATIONS TECHNOLOGY (ICT) POLICY

(2019-2024)

The policy that seeks to support economic development through fully integrated Information Communication Technology that ensures total social inclusion for all Liberians

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CHAPTER 1

Executive Summary

This policy amends the National Telecommunications ICT Policy of 2010. While the 2010 policy laid the basis for future policy development, technology developments have continued, and new priorities have emerged that are critical to the sustainable development of the ICT sector. The new policy over the next five years (2019 to 2024) aims to address these developments and support the social and economic development of Liberian society under the key pillars of ***Structure, Empower*** and ***Transform (SET).*** In summary, the key objectives of the policy are to:

1. Expand ICT infrastructure and establish a national fiber optic backbone to connect all 15 county capitals and cross-border connectivity with reliable links;
2. Address last mile challenges to ensure universal access to voice services and broadband, supported by the adoption of infrastructure sharing and dig-once policies and effective use of the Universal Access Fund to meet the needs of underserved areas;
3. Leverage the assets of all telecommunication operators to support improved connectivity in Liberia;
4. Ensure Government has access to efficient connectivity services along with a Data Center and backup facilities to serve the needs of all government departments;
5. Ensure critical ICT infrastructure is well protected and effective response mechanisms are in place to deal with cybersecurity issues and other physical disasters e.g. epidemics;
6. Foster the development of efficient Government E-services and online applications for supporting the growth of Liberia's economy;
7. Establish a National Education and Research Network (NREN) for all tertiary and secondary education institutions to provide access to high speed internet and digital educational services
8. Support human capacity building and local innovation in science, digital skills and technology leading to the creation of new jobs;
9. Use ICT to drive inclusion of women, marginalized and indigenous groups;
10. Boost the development of a vibrant E-commerce and digital services sector;
11. Enable citizens of Liberia to explore the full use of the broadband services making them a competitive, knowledge driven and well-informed society;
12. Improve access to information and transparency through the design and implementation of open data initiatives; and
13. To localize administrative, technical and ensure effective management of the.lr country code (cc) top level internet domain (TLD) to support Liberia's ICT development agenda

The vision of this policy is to facilitate Liberia's transformation into a knowledge-based economy and inclusive information society with enhanced social development for all. The policy thus recognizes the critical barriers that must be overcome in Liberia to achieve progress towards the SDG connectivity target and other regional commitments.

The Government's role in the ICT sector will be addressed over the next 5 years as outlined below.

1. Strategic leadership and coordination in promoting the use of ICT. To be most effective, this should be driven by the office of the Head of State;
2. Ensuring there is an enabling environment and sufficient backbone infrastructure for the commercial deployment of ICT services. This is the responsibility of the Ministry of Posts and Telecommunication (MoPT) and the regulatory authorities;
3. Providing support for ensuring access is affordable and available to all members of Liberian society;
4. Supporting the adoption of ICT within government, both for internal administration and for transactions with the public and business. This extends to providing connectivity to government institutions, hosting data and supporting the development of relevant e-government applications

In recognition that some functions are currently being performed under various institutions, this policy recommends that the following roles are enhanced with relevant changes where necessary to align with the policy's objectives (see Section 6).

Given the dynamic nature of the ICT Industry, this policy will be revisited on an annual basis by a cross-sectoral, inclusive multi stakeholder policy review team assembled by the MoPT. The review would identify new trends and emerging technologies which need oversight by the Ministry and propose modalities for their adoption or regulation.

CHAPTER 2

PREAMBLE

In 1978, a Legislative Act was passed which renamed the Ministry of Postal Affairs as the Ministry of Posts and Telecommunications (MoPT) with a mandate for the following:

1. To provide postal services throughout the country and beyond;
2. To serve as well as subscribers of all communication facilities in Liberia;
3. To provide administrative policy as well as guidelines for postal services and Telecommunications;
4. To serve as the bridge between the Liberian Government and the International Community in the areas of Postal and Telecommunications Services.

The passage of the Telecommunications Act of 2007 provided the Ministry with a mandate to produce a National Telecommunications and ICT Policy outlining Liberia's vision to utilize ICT for overall institutional economic growth and development of the sector. This policy was the National ICT and Telecoms policy of 2010 adopted by Cabinet. This policy embellishes the Telecommunications Act of 2007 which devolved.the regulatory functions to the Liberia Telecommunications Authority (LTA). It also resulted in the Liberia Telecommunications Corporation (LIBTELCO) being the designated National Operator to provide telecommunications services such as data and video communications, as well as high-speed broadband networks services, including e-services with several outlined objectives to support the Pro-Poor Agenda for Prosperity and Development (PAPD).

In order to ensure the rapid development of Liberia's economy, the Government of Liberia (GoL) has recognized the ICT sector as an enabler of social and economic development, prompting the need to update the 2010 policy to make it relevant to the current exigencies of the state, and in support of the ICT objectives of the Pro-Poor Agenda for Prosperity and Development (PAPD) 2018-2023. In this respect, the 2019-2024 ICT Policy updates the 2010 policy and draws on emerging trends in the ICT sector, particularly the rise of convergence technology, digital broadcasting, E- services, new technologies and provision of universal access to boost social inclusion.

The new ICT policy draws on international best practices in supporting ICT-led development and matches the objectives and vision of the GoL to Structure, Empower and Transform (SET) Liberia into a knowledge-based economy as part of its goal to become a middle-income country by 2030.

The drafting of this ICT Policy has incorporated the inputs and feedbacks of many stakeholders consulted in regional and national meetings, and in the public consultations held in Monrovia, Buchanan, Gbarnga, Tubmanburg and Zwedru during the course of 2017 / 2018.

1.0 INTRODUCTION

This policy amends the National ICT and Telecommunication Policy of 2010. While the 2010 policy laid the basis for future policy development, technology developments have continued, and new priorities have emerged that are critical to the sustainable development of the sector which need to be addressed. Issues of increased importance include the strategy to construct a national terrestrial fiber backbone, the strategy to accelerate the provision of universal and equitable access, the strategy to develop local content, and e-government services, as well as managing the Liberian country code Top Level Domain. This also requires support for building a national data center, setting standards for access to essential facilities, a framework to implement e-services and a strategy to build human capital.

The key issues that the ICT policy aims to address are:

- To develop Liberia's critical ICT infrastructure in order to open up the potential for wealth creation across the private sector generally, and to empower its citizens, thereby helping to achieve the goal of becoming a middle-income country by 2030
- To speed up Liberia's use of ICT which currently lags behind West African neighbors and others in the continent. These countries have seen ICT increase economic and social activity in banking and financial services, communications, health and education
- To help correct the significant disparities in access and affordability to ICT services both within and beyond the capital of Monrovia

The growth and sustainability of the ICT sector requires an updated ICT policy that encourages all stakeholders to play a committed role in the areas of infrastructure development, broadband Internet development, human capacity and digital skills, content development, uptake and strategic use of services and products, online safety and privacy, quality of service and efficiency of broadband networks and social inclusion of all citizens.

In support of the Pro-Poor Agenda for Prosperity and Development (PAPD) ICT objectives, and in building on the initial framework established by the 2010 ICT Policy, this policy develops a strategy and vision to further Liberia's position as an information society and knowledge economy by 2023 and a middle-income country by 2030. Unlike its antecedent, which was an aspiration, this policy focuses on driving the implementation of a vision of Liberia transformed into an information society underpinned by a strong ICT ecosystem.

Structured around 15 thematic areas, this policy seeks to provide all stakeholders across government, private sector, civil society and communities with a clear roadmap to drive economic, social, cultural and political transformation through effective use of ICT.

1.1 Thematic Policy Focus Areas:

1. Policy, Legal, and Regulatory Framework;
2. ICT Infrastructure;
3. Broadband and Internet;
4. Spectrum Management;
5. Information safety and Cybersecurity;
6. Universal Access and Service;
7. Mainstreaming Gender and Women in ICT;
8. Access and Use for Mainstreaming ICT for Youth;
9. Access and Use for Mainstreaming Persons with Disabilities;
10. Human resource development;

11. Innovation, Research and Development;
12. Local Content Development;
13. Investment and Funding;
14. Consumer Privacy, Data Protection and Child Protection;
15. Enhancing Government Services across All Sectors.

1.2 Enabling ICT for Development (ICT4D) in Liberia

ICT plays a critical role in enabling socio-economic development with positive impacts on job creation, delivery of health care, education and research, and civic participation. However, getting the most of out of these technologies requires comprehensive policies that take a multi-sectoral view of ICT[1]. For example, this includes the areas of education, health, finance, empowerment and social transformation, employment and social development. The Government of Liberia is therefore committed to addressing critical ICT infrastructure gaps through the use of several policy instruments and actions that make use of supply side and demand side measures. It is expected that by providing the required ICT platforms and integrated support for an 'ICT4D strategy', this will contribute to building a cohesive and economically independent society.

1.3 Alignment of ICT Policy and Liberia's Socio-Economic Development Agenda

In order to ensure that this policy is successful, it has been aligned with the Government's existing development agenda – the Pro-Poor Agenda for Prosperity and Development (PAPD). More specifically, it seeks to support the key pillars of the country's long-term vision for socio-economic development "Liberia Rising 2030", including economic transformation, human development, governance, and cross cutting issues (e.g., gender equality and persons with disabilities). In addition, the development of this policy was done in consultation with other line ministries so as to create alignment with key sectoral strategies.

1.4 Global, Regional, National Trends and Commitments

"Everyone should have access to the Internet." That is what 93 member states of the United Nations agreed to in September 2015, when they signed on to the Sustainable Development Goals (SDGs), which set the global development agenda for the next 15 years. With an explicit target in SDG 9c of universal and affordable access across the world's Least Developed Countries (LDCs) by 2020, it implicitly assumes universal and affordable access - access for everyone, everywhere by 2020. Bold action will be required to achieve this and to ensure that access to ICT can be the engine of development that is expected across all SDGs. Many national and regional agreements and commitments are aligned to this global vision of universal and affordable access to all, including those among the ECOWAS countries and at the African Union level.

The situation is no different in Liberia, and with this policy, the government aims to realize its commitment to becoming a leader in the use of ICT by securing universal, affordable and equal access to all citizens.

This policy recognizes that there are many critical barriers that must be overcome in Liberia to achieve progress towards this goal and to the SDG connectivity targets and other regional commitments. For example, gender inequalities in ICT access can be a key barrier, as shown in a 2015 study by the Web Foundation's Women's Rights Online[2] initiative which found that poor urban women in the developing world are nearly 50% less likely to access the internet than men[3]. Similarly, limited digital literacy levels, lack of local content and the absence of affordable energy supply are all significant barriers that need to be dealt with.

[1] World Bank (2016) World Development Report 2016: Digital Dividends. Washington DC: World Bank
[2] Web Foundation (2015) Women's Rights Online: Translating Access into Empowerment
[3] http://webfoundation.org/about/research/womens-rights-online-2015/

This policy also acknowledges the need to take into account fast moving technology developments in the ICT space such as the rapid growth of Internet of Things (IoT), Machine to Machine (M2M) services, Net Neutrality, Big Data, Cybersecurity, OTT providers, Cryptocurrencies and Blockchain Technologies. As these evolve, the policy must be quick to anticipate change and react appropriately.

Finally, the policy focuses on the regulatory environment necessary for growth of the ICT sector, while clarifying the role of government, regulators, businesses and civil society organizations to contribute to this collective vision of an information society in Liberia - a society where all citizens are afforded the ability to access and use the internet safely to improve their lives.

2.0 LIBERIA'S VISION FOR ICT 2019-2024

2.1 Vision and Mission Statement

The vision of the ICT Policy is:

"To transform Liberia into a regional knowledge- based economy and inclusive information society with enhanced social development for all."

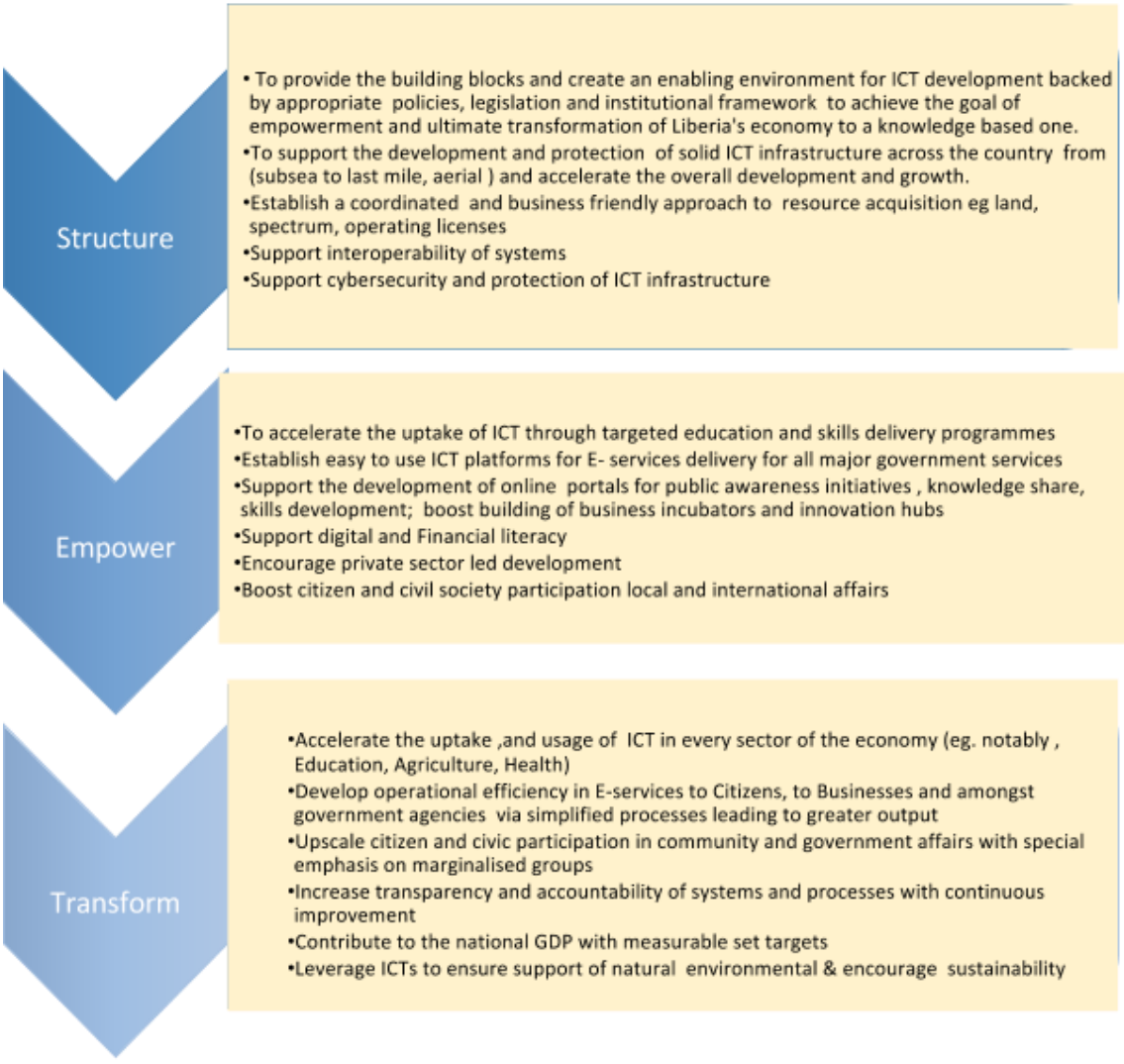
The mission of the ICT Policy is:

"To enable fully integrated Information Communication Technologies that support economic development and social inclusion for all Liberians."

The vision and mission aim to ensure the presence of resilient infrastructure that supports expanded connectivity to attract investment and promote employment opportunities. This requires an ICT policy that encourages all stakeholders to play a committed role in the areas of Infrastructure development, internet broadband development, human capacity and digital skills, content development, uptake and strategic use of services and products, online safety and privacy, quality of service and efficiency of broadband networks and social inclusion of all citizens.

The vision and mission are defined by the three pillars: ***Structure, Empower, Transform*** **(SET).** This also serves as a guide for development of cross sectoral policies as well as for a successful ICT sector. It includes a sector review mechanism that emphasizes accurate data gathering, benchmarked assessments, and dissemination through sector reports. The policy also covers the role of private sector, civil society, development partners and the media in a multi stakeholder effort to achieve the **SET** goals as shown in the graphic below.

Figure 2.0 Summary of the SET agenda



2.2 Policy Principles

1. ICT is fundamentally important for stimulating national socio-economic development, modernization and globalization of Liberia's economy;
2. Effective use of ICT can ensure the fullest participation by all sections of the population in governance, national growth and development;
3. Adequate national ICT infrastructure is a precondition to achieving the objectives of national inclusion and participation;
4. An enabling Legal and Regulatory Framework facilitates investment and growth of the ICT sector;
5. Human Resource Development and digital literacy are essential to achieving Liberia's goal of becoming an information knowledge society;

6. Collaboration between the private ICT Industry and Government is important in achieving Government's development goals and objectives.

2.3 Summary of Targets

Actionable Issues	Measurable Targets
Improving Policy/Regulatory Framework	● Complete review of existing policies and laws with a plan for harmonization where necessary ● Enact harmonization of existing policies/laws ● Update existing and draft new policies and laws as required (e.g., digital financial services, electronic transactions, protection of children etc. and others as needed)
Cyber-security	● Establish a national cyber-security advisory committee ● Draft cyber-security policy ● Adopt cyber-security Legislation
Digital Financial Services	● Draft a national policy on interoperability of telecom networks for digital financial services.
Consumer Protection	● Draft consumer and child protection policy
Expanding and improving ICT infrastructure	● Map existing and planned fiber and passive utility infrastructure – backbones, road, rail, towers, pipelines etc ● Adopt a "dig once" regulation (i.e requirement for inclusion of ducts in all new and resurfaced and existing roads where possible and a mandatory provision for use by third parties of any telecom ducts laid by operators) ● Adopt infrastructure sharing guidelines for all ISPs and mobile network operators to encourage for colocation of equipment ● Ensure rights of way access over public land infrastructure ● Complete the implementation of key infrastructure programs (e.g., national terrestrial backbone network, metro-fiber ring, etc. as listed in section 7.2) ● Establish effective national management of the .lr ccTLD
Broadband access and use – Initial Targets	● Adopt affordability target of 1GB of mobile prepaid data priced at less than 2% of average monthly per capita income ("1 for 2" target) ● Achieve "1 for 2" target for mobile broadband affordability ● 15% of Liberians regularly access and use mobile broadband services (3G and higher). For example being an achieved speed of > 512 kbps, this will definition will be reviewed regularly ● 35% of Liberians regularly access and use mobile broadband services (3G and higher) ● 10% of Liberians access and use fixed broadband services ● Speed of fixed and mobile services to public institutions, the private sector and the public should be affordable and sufficient to meet their needs for efficient and timely data transfer
Spectrum Management	● Update 5 -year spectrum management plan

Universal Access and Universal Access Fund	● Implement the USF ● All Universal Access projects disbursements and financial reports published and easily accessible to the public ● All Liberians have local access to affordable voice services and data
Gender and Women and ICT	● Baseline research on national access and use of ICT including among women, girls, and other marginalized groups ● National plan to improve gender equity in access and use
Education	● Complete an inventory of Internet access (and type of access) of all schools and at all levels ● Improve Internet access in schools by 20% over current level ● Establish an information system to identify and list the skills (ICT) that are required for different jobs to be used by the Ministry of Education in the design of its training courses. ● All secondary schools offer at least 1 ICT related course or program ● Tertiary education institutes to offer ICT certification ● Proportion of teachers trained to teach subjects using ICT increase by 50% over current level
Innovation and Research	Working with the Ministry of Education: ● Complete map of key public, private and other sponsored infrastructure and services that support innovation and research ● Develop public+private investment and support plan for a National Research and Education Network (NREN), and support for targeted innovation activities and spaces.
Reform of ICT governance structure	● MoPT to review existing legislation and complete feasibility plan for implementation of revised governance structure for the ICT sector ● Enact structural reforms
Health and ICT	● 50% of all clinics and hospitals have Internet access ● 100% of all clinics and hospitals have Internet access ● E- health strategy including a Health Information System
Local government	● All County Service Centers have Internet access ● All Superintendent offices have Internet access ● IFMIS platform expanded to all counties with reliable internet access (broadband)
Ministries, Agencies, and Commissions (MACs) -	● All MACs in Monrovia have Internet Access ● All MACs in counties have Internet access ● The CIO put in place a common standard for website development for all MACS ● Ensure ICT architecture systems design enforces consistency across MACs to help ensure interoperability ● Establish a redundancy plan and maintenance policy in all MAC information systems to ensure reliability in Ministry connections and server/applications ● All MACs should have enhanced web presence on all online platforms

3.0 SECTOR STATUS

3.1 ICT Market Indicators

According to the International Telecommunications Union (ITU), in 2000 the proportion of Liberians with a mobile phone subscription was just 0.05%, while the proportion of the population that used the Internet was only 0.02%. By 2018, the proportion of mobile phone subscribers had risen to 78%, while those with a mobile 3/4G SIM card increased to 44%. 2017 data by the GSMA indicates approximately 50% of the population had access to a 3G mobile network signal, while only 17% could access a 4G signal at the end of the same period.[6]

Unfortunately, no data is available to examine access and use in terms of gender or income groups. However, a study focusing on cyber-cafe users in Monrovia found that 90% of respondents were male and half were between the ages of 25-34.[7] As in other countries with a similar level of economic development, internet affordability is a challenge. According to the ITU, the average income earner in Liberia had to spend as much as 13% of their monthly income to purchase a 500MB mobile prepaid data plan in 2015.[8]

3.2 Wireless Market

Liberia's wireless market is liberalized, open to new operators and currently has two major Mobile Network Operators (MNOs): Lonestar Cell MTN, Orange GSM (previously Cellcom), which provide 3/4G services in Monrovia as well as in some locations outside the capital, and 2G services in most populated parts of the country. Libtelco has also been a part of the wireless market.

LTA's 2016 market assessment[9] found that the mobile voice and data market was 'highly concentrated' by industry standard measures used to assess the level of competition in the telecom sector and this was prior to the purchase of Novafone by MTN, which reduced the mobile market to two players. Nine private ISPs provide wireless broadband services mainly to businesses in Monrovia, primarily via WiFi frequencies and VSAT. The networks of the operators generally use microwave transmission to link their switching facilities due to the lack of a national fiber backbone, and as a result the capacity that can be provided to the end-user is limited.

3.3 Wireline Market

Liberia's wireline market is under-developed, and apart from the National Operator Libtelco's 100-200 fiber local loops, there is no fixed access network. Certain licensees (Libtelco, Orange) use fiber to connect their core networks to the ACE cable facility. Progress has been made in bringing International fiber capacity to the country, with the landing of the

[4] ITU (2017) World Telecommunication/ICT Indicators Database. Geneva: International Telecommunications Union.
[5] Refers to unique subscribers and not number of connections; GSMA Intelligence 2017.
[6] GSMA Intelligence 2017.
[7] World Bank (2013) "Cables, Commissions, and Cybercafés: ICT in Post-Conflict Liberia," http://www.infodev.org/infodev-files/resource/InfodevDocuments_1206.pdf
[8] ITU (2016). Measuring Information Society Report 2016. Geneva: International Telecommunications Union.
[9] LTA (2016) Public Consultation Document on the Definition of Relevant Telecommunications Markets P7. http://www.lta.gov.lr/doc/CONSULTATION_DOCUMENT_ON%20DEFINITION_OF_RELEVANT_TELECOMS%20_MARKETS.pdf

African Coast to Europe (ACE) cable in Monrovia and the establishment of the Cable Consortium of Liberia (CCL) to operate it. This resulted in substantial declines in the cost of international bandwidth[10].

3.4 Interconnectivity

International

International fiber connectivity is solely provided through the ACE submarine fiber landing station in Monrovia. An alternative connection to other submarine cables is required to provide greater reliability and so an additional terrestrial route to Cote d'Ivoire, where many different submarine cables land, is being planned by GOL as part of the first phase of the domestic backbone deployment. In addition it is expected that the domestic backbone when it is ultimately complete, will also provide cross-border fiber links with Liberia's other neighbors - Guinea and Sierra Leone. Furthermore the planned regional high tension electricity grid, CLSG, will provide additional routes to Cote d'Ivoire, Guinea, Senegal and Sierra Leone, with onward connectivity to the rest of the region by the end of 2018.

Domestic Fiber Backbones

Deployment of a national backbone is a top priority, necessary to ensure inclusion of the whole country in access to affordable internet services. There are currently no national terrestrial fiber backbone or metropolitan fibre network presently operating in Liberia, although some mobile operators have built their own microwave links across the country. A metro fiber network covering the capital, Monrovia, is now in the late stages of deployment, in collaboration with Google's Project Link by C-Squared[11]. As indicated above, a national fiber backbone is planned in the near future which will be deployed in phases. The first phase will link Monrovia to towns along the route to Cote d'Ivoire, where it will connect with backbones linking to Abidjan in order to provide security for international links. Subsequent phases will connect the remaining districts. In addition the CLSG high tension regional power grid that is currently being built, is expected to provide part of the needed terrestrial domestic network as well as additional cross-border links. A detailed costing and feasibility study[12] for the 2,366km national fiber optic backbone has been completed, and the means for financing the deployment of the backbone are being investigated, as well as potential institutional models for its operation.

Local Interconnection

The planned metropolitan area fiber network now being deployed by C-Squared will increase broadband speeds and accessibility in Monrovia. In addition the Liberia Internet Exchange Point (IXP) is now in place, is anticipated to reduce latency, improve performance, decrease the cost of network operations and provides support for additional services.

3.5 Broadcasting

Currently there is one public and 8 private TV stations, and about 100 radio stations across Liberia[13]. A Broadcasting Regulatory Bill is currently at its final stages at the Senate[14]. Public consultations have been concluded with a view to establishing a separate broadcasting regulatory authority falling under the Ministry of Information, Tourism and Culture. The new authority will regulate content, while broadcast frequency allocation will be done by the LTA

[10] Wholesale prices declined from about USD 2000/Mbps/month to less than USD 50 / Mbps /Month

[11] http://www.csquared.com . 75km of Phase 1 completed, 25km of Phase 2 completed. Core network completed and commissioned

[12] Consultancy Services for Conducting a Feasibility Study for the Deployment of a National ICT Backbone Network. June 2016 (Internal to MoPT/WARCIP)

[13] According to Internews - http://internews.org/updates/liberia-radio-station-maps and according to CIA world facts,

[14] Feedback from discussions with deputy Minister of Information, Tourism and Culture on 13th June 2017

to ensure harmonization in the spectrum space in line with international practice.

3.6 Institutional Structures

3.6.1 Ministry of Posts & Telecommunications

The Ministry of Post and Telecommunications (MoPT) formulates policy of general applications for sector growth and development. It sets the policy agenda of the sector and collaborates with other GoL institutions, private sector players, civil society organizations and other such stakeholders in developing sector policies. The Ministry is the head of the sector and advises Government of Liberia (GoL) on telecommunications and ICT matters. It represents GoL on ICT policy at international conferences.

3.6.2 Liberia Telecommunications Authority

The Liberia Telecommunication Authority (LTA) is the independent regulatory authority for the sector. Established by the 2007 Telecom Act, its primary responsibility is to implement GoL's policies on the sector. It is required to, among other duties, develop Regulations, Orders and Rules to govern the sector in implementing National ICT policies. Key among its primary responsibilities are to:

1. Manage national spectrum in line with ITU regulations;
2. Protect consumer rights and promote competition;
3. Determine essential facilities and develop regulations to govern their use;
4. Develop regulations on co-location and infrastructure sharing;
5. Develop regulations on mobile number portability;
6. Develop regulations on universal access programs;
7. Develop regulations on the use of the Liberia country code Top Level Domain (ccTLD);
8. Ensure that licensing conditions support market expansion;
9. Ensure service affordability and transparency and accountability in the sector;
10. Ensure that ICT equipment imported into the country meets international standards;
11. Provide both market and technical analysis that will assist in making policy decision;
12. Establish quality of service criteria;
13. Represent GoL at local and international forums relating to regulatory issues in ICT;
14. Establish a national ICT statistics repository;
15. Advise the MoPT on emerging policy trends and compliance of operators to ICT policy.

3.6.3 The National Operator, LIBTELCO

The GoL owned Liberia Telecommunications Corporation, also known as LIBTELCO was designated as the National Operator under the Telecommunications Act of 2007. What sets the National Operator apart from other operators is its responsibility to provide a secure government network to facilitate internal communication within the civil service. Although Libtelco also currently operates at both the retail and wholesale levels in competing with private operators, this role is currently being evaluated with a view to leveraging GoL's investment in Libtelco while ensuring continuity in the provision of connectivity services to government. According to the LTA 2016 report, Libtelco has established a fixed network based on fiber in Monrovia and has been building out fiber local loops to serve larger customers in Monrovia[15].

The Policy requires Libtelco to get the concurrence of, and work in harmony with the Ministry

of Posts and Telecommunications (MoPT) and the Liberia Telecommunications Authority (LTA) before embarking on any major sector undertaking that may have implication on policy and regulation.

3.6.4 Service Providers/ Local Operators

Access providers are an integral part of the sector. They include both mobile network operators (MNOs) and commercial Internet Service Providers (ISPs). New entrants to the market are anticipated, including data center operators, the Monrovia Project Link (Google/C-Squared) metro fiber network operator, and potentially a Carrier of Carrier's company to provide national open access fiber infrastructure services on a wholesale basis.

3.6.5 CCL

The Cable Consortium of Liberia (CCL) operates as a public private partnership to ensure effective utilization and operation of the ACE submarine cable landing. The level of share ownership determines the capacity available to the shareholders. CCL is majority owned by the government with the remainder held by the major commercial network operators. The ownership breakdown of CCL is as follows: the Government of Liberia (55%), Libtelco (20%) and the three mobile network operators (MNOs): Lonestar (10%), Orange (10%) and Novafone (5%)[16]. The detailed study for the divestiture of shares in CCL has been completed and a majority of the Government shares in the consortium will be sold, with a minority share being for retained for state administration and for providing capacity to the planned national research and education network (NREN) which will need at least 1Gbps initially but does not have the resources to pay commercial rates for capacity.

3.6.6 The Ministry of Mines and Energy and Ministry of Public Works

The Ministry of Mines and Energy and Ministry of Public Works will collaborate with telecom operators and the energy companies to ensure the co-location of fiber with power line and other passive infrastructure, and to ensure that the barriers to obtaining the necessary Rights of Way are minimized.

3.6.7 Local ICT firms

ICT firms based in Liberia which provide consultancy, software and hardware solutions and other services are also part of the sector. These firms play a key role in providing specialized services such as portal development, website management, local content development, and providing expertise in building networks.

4.0 POLICY OBJECTIVES AND STRATEGIES

The primary aim of the ICT policy is to ensure that citizens of Liberia are able to take full advantage of the tremendous potential for ICT to accelerate development, and to create new wealth and jobs. To achieve this mission and realize the vision for this policy, a number of policy objectives have been identified covering the sub sectors of Telecommunications, Broadcasting, Postal, Information Technology, Information Management Services as well as other cross cutting and emerging areas. Subsequent strategies for these policy objectives are also enlisted.

4.1 Broad Policy Objectives

The broad objective is to provide an overarching framework for an ICT revolution that will SET Liberia on to a knowledge-based economy by 2024. The specific objectives of this National ICT Policy include the following:

1. To expand ICT infrastructure to all the counties of Liberia connecting all county capitals and sub-counties with reliable broadband connectivity by 2024;
2. To ensure a coordinated and harmonized deployment of ICT infrastructure avoiding unnecessary duplication of infrastructure;
3. To foster the development of efficient E-services in Government and public services for supporting the growth of Liberia's economy;
4. To develop policy and procedures for active cybersecurity defense measures for all ICT infrastructure and ensure public-private coordination and compliance;
5. To promote co-ordination between ICT policy administrators and CIOs in the public sector;
6. To foster local innovations in science, digital skills and technology leading to the rapid creation of many new jobs and wealth;
7. To drive inclusive development of women, marginalized and indigenous groups
8. To boost the development of a vibrant E-commerce and digital finance sector;
9. To support convergence in the ICT sector with appropriate legislation eliminating duplication of roles and obligations;
10. To actively promote universal access to both voice and Internet using the most appropriate and up to date technologies backed by innovative funding;
11. To support the development of relevant and appropriate legal framework for implementation of ICT policies;
12. To provide supporting guidelines and legislation for a seamless *analog to digital TV* broadcast switchover in line with ITU standards and timelines;
13. To ensure the country adequately participates in regional and international ICT fora in order to promote ICT development and the people of Liberia derive maximum benefit from such international cooperation;
14. To ensure the active adoption of ICT in all sectors critical to the transformation of Liberia's economy notably education, health, power, roads and transport, meteorology, agriculture, mining, trade and industry, commerce etc.;
15. To enable citizens of Liberia to take advantage of the full use of broadband services making them a competitive and well-informed citizenry and to enable the socio-economic development of the country;
16. To reinforce government initiatives to boost innovation, support transparency, empower citizens, encourage accountability, and fight corruption with Open Data.

4.2 Policy Key Action Areas

Summary of Targets

The priorities for the ICT sector in Liberia are driven by the development challenges and priorities as outlined in the National Development Plan (NDP), and taking into account regional and international goals, in particular the Sustainable Development Goals (SDGs) and the government strategy to ensure Liberia becomes a middle-income country by 2030. Based on these, the following are the priority action areas to be completed by 2024 under this policy:

1. Extension of the national backbone infrastructure to connect all 15 county capitals with redundant/duplicate links (to ensure reliability), as well as addressing last mile challenges to ensure universal access to broadband;
2. Building of the foundation for fiber networks in each county in the post 2024 period;
3. Establishing a Government Data Center with backup facilities;
4. Adopting Infrastructure sharing and dig-once policies;
5. Ensuring critical infrastructure is protected - establishing a Cybersecurity and Privacy division to manage the development and enforcement of national security policies, and develop a Computer Emergency Response Team (CERT);
6. Facilitating the increased role and participation of women, youth and persons with disabilities in ICT;
7. Establishing publicly available online e-government services and Open Data systems;
8. Ensuring all Laws reflect needs for promoting e-commerce, ensuring online data privacy, child protection and admissibility of electronic evidence in court.

4.3 Summary of Targets

Actionable Issues	**Measurable Targets**	**Timeline (after adoption of ICT policy)**
Improving Policy/Regulatory Framework	• Complete review of existing policies and laws with a plan for harmonization where necessary • Enact harmonization of existing policies/laws • Update existing and draft new policies and laws as required (e.g., digital financial services, electronic transactions, protection of children etc. and others as needed)	• Year 1 • Year 1 • Year 2
Cyber-security	• Establish a national cyber-security advisory committee • Draft cyber-security policy • Adopt cyber-security Legislation	• Year 1 • Year 2 • Year 3
Digital Financial Services	• Draft a national policy on interoperability of telecom networks for digital financial services.	• Year 4
Consumer Protection	• Draft consumer and child protection policy	• Year 2
Expanding and improving ICT infrastructure	• Map existing and planned fiber and passive utility infrastructure – backbones, road, rail, towers, pipelines etc • Adopt a “dig once” regulation (i.e requirement for inclusion of ducts in all new and resurfaced roads, and mandatory provision for use by third parties of any telecom ducts laid by operators) • Adopt infrastructure sharing guidelines for all ISPs and mobile network operators to allow for colocation of equipment • Ensure rights of way access over public land infrastructure • Complete the implementation of key infrastructure programs (e.g., national terrestrial backbone network, metro-fiber ring, etc. as listed	• Year 1 • Year 1 • Year 2 • Year 1 • Year 5

	in section 7.2) • Establish effective national management of the .lr ccTLD	• Year 1
Broadband access and use – Initial Targets	• Adopt affordability target of 1GB of mobile prepaid data priced at less than 2% of average monthly per capita income ("1 for 2" target) • Achieve "1 for 2" target for mobile broadband affordability • 15% of Liberians regularly access and use mobile broadband services (3G and higher) • 35% of Liberians regularly access and use mobile broadband services (3G and higher) • 10% of Liberians access and use fixed broadband services • Speed of fixed and mobile services to public institutions, the private sector and the public should be sufficient to meet their needs for efficient and timely data transfer	• Year 1 • Year 5 • Year 1 • Year 5 • Year 5 • Year 5
Spectrum Management	• Update 5 -year spectrum management plan	• Year 2
Universal Access and Universal Access Fund	• Implement the USF • All projects disbursements and financial reports published and easily accessible to the public • All Liberians have local access to affordable voice services	• Year 1 • Year 2 • Year 5
Gender and Women and ICT	• Baseline research on national access and use of ICT including among women, girls, and other marginalized groups • National plan to improve gender equity in access and use	• Year 1 • Year 2
Education	• Complete an inventory of Internet access (and type of access) of all schools and at all levels • Improve Internet access in schools by 20% over current level • Establish an information system to identify and list the skills (ICT) that are required for different jobs to be used by the Ministry of Education in the design of its training courses. • All secondary schools offer at least 1 ICT related course or program • Tertiary education institutes to offer ICT certification • Proportion of teachers trained to teach subjects	• Year 1 • Year 5 • Year 1 • Year 5 • Year 4

	using ICT increase by 50% over current level	• Year 4
Innovation and Research	Working with the Ministry of Education: • Complete map of key public, private and other sponsored activities that support innovation and research • Develop public+private investment and support plan for a National Research and Education Network (NREN), and support for targeted innovation activities and spaces.	• Year 1 • Year 2
Reform of ICT governance structure	• MoPT to review existing legislation and complete feasibility plan for implementation of revised governance structure for the ICT sector • Enact structural reforms	• Year 1 • Year 1
Health and ICT	• 50% of all clinics and hospitals have Internet access • 100% of all clinics and hospitals have Internet access • E- health strategy including a Health Information System	• Year 3 • Year 5 • Year 2
Local government	• All County Service Centers have Internet access • All Superintendent offices have Internet access • IFMIS platform expanded to all counties with reliable internet access (broadband)	• Year 2 • Year 5 • Year 5
Ministries, Agencies, and Commissions (MACs) - *Connectivity*	• All MACs in Monrovia have Internet Access • All other MACs in counties have Internet access	• Year 1 • Year 5
Ministries, Agencies, and Commissions (MACs) - *Online services*	• The CIO should put in place a common standard for website development for all MACS • Ensure ICT architecture systems design enforces consistency across MACs to help ensure interoperability • Establish a redundancy plan and maintenance policy in all MAC information systems to ensure reliability in Ministry connections and server/applications • All MACs should have enhanced web presence on all online platforms	• Year 1 • Year 1 • Year 1 • Year 4

5.0 Policy Focus Areas

5.1 Policy, Legal and Regulatory Framework

5.1.1 Introduction

Currently, there are various uncoordinated policies guiding various aspects of the Liberian ICT sector, in addition to laws relating to different areas of the sector. Apart from the fact that these policies and laws are in need of alignment, gaps exist in support for the converged ICT sector. For the identified activities to take place efficiently, it is also necessary that the legal framework is standardized with requirements of the information economy and international best practices for engendering trust and confidence amongst players. The ICT regulator needs to be seen as independent, effective, transparent and fair in ensuring adherence to legal provisions and regulatory practices.

5.1.2 Policy Objectives.

1. Review existing legislation and facilitate, where necessary, the enactment of laws that would enhance the development of ICT sector for national growth;
2. To facilitate the enactment of appropriate legislation that ensures protection of physical ICT infrastructure, addresses cyber-security, and enhances national security;
3. To prevent the occurrence of multiple regulations and taxation, the occurrence of which is a disincentive to investors;
4. Legal or regulatory interventions must not stifle creativity or impede free flow of information, but necessary checks and balances must still exist;
5. Legal provisions must be standardized with needs of the information economy and with international norms. Regulatory regime must be equitable, transparent, progressive and customer-centric.

5.1.3 Strategies

The MOPT shall:

1. Review and harmonize all existing laws relating to ICT;
2. Enact new laws, where necessary, to anticipate future development and growth of the ICT sector;
3. Adopt a law to protect critical infrastructure.
4. Implement the regional (ECOWAS) texts on cybersecurity regulations
5. Ensure regulations are in place to govern electronic financial transactions and e-payments
6. Provide support for technical training for those responsible for implementing the policy

5.2 ICT Infrastructure Strategy

5.2.1 Policy Objectives

1. To facilitate and support development of efficient and secure nationwide ICT infrastructure that provides affordable broadband connectivity and accelerates socio-economic development;
2. To connect all national and county government networks to the national fiber backbone;
3. To provide reliable, accessible, secure and reasonably priced international ICT Infrastructure;
4. To ensure every part of Liberia is serviced by the most appropriate and efficient technology.

It is imperative that Liberia has pervasive and affordable ICT Infrastructure in order to support national development goals and global competitiveness. This policy identifies the means to address the critical priorities to facilitate sector growth and development. To help address the limited availability and high cost of ICT infrastructure in Liberia the national ICT policy focuses on the following areas:

i.* International & *National ICT backbones and Broadband infrastructure;

To ensure there is sufficient access to international and national broadband capacity in Liberia, virtually every wireless base station in the country will need to be connected to a reliable backbone network that has at least two physically independent domestic and international links. This will require a pervasive national fiber backbone with redundant loops, connected to the ACE cable and to the international capacity available across Liberia's borders. This infrastructure needs to be available to all commercial networks at wholesale prices, which will be minimized through infrastructure sharing regulations and dig-once policies (see below).

In addition, international capacity will be provided to the civil service, health sector and the envisaged education and research network, through government's share of the backbone infrastructure.

ii. Last Mile Solutions

There is an increasing demand for high capacity internet in homes, offices and other such locations across the country. Building a fiber network as a national backbone does not in itself address these needs. A robust strategy to deliver fiber or high capacity fixed wireless links to individual end users will be required. LTA will issue the requisite licenses to enable firms to compete with operators in delivery of fixed links to end users, to achieve the objective of ensuring access to high capacity last mile solutions.

iii. Rights-of-Way (ROW)

Connectivity has become a critical national priority and every household, business, institution and other such person deserves to have such access. Obtaining rights-of-way by operators, firms and their designees to use public space in delivering connectivity to end users must be rapid, and fees for use must be cost based. The policy encourages private landowners to work with operators in facilitating the building of masts or laying of fiber through their private land. Standards, codes and reporting requirements for ROW need to be established and be easily accessible and transparent.

iv. Affordable Universal Access to ICT

For every Liberian to have affordable access to ICT it will be necessary to reduce the cost of access and increase coverage. This will require increased competition in the sector along with cooperation of all stakeholders to drive down prices, and a combination of private and public funds to build out the network into the remote areas. The Universal Access Fund managed by the LTA will support initiatives to ensure that voice and Internet access is available to every Liberian citizen, including through the provision of affordable public access through Wifi hotspots and public access facilities where needed, especially in rural areas.

v. Security and Reliability of critical ICT infrastructure

Implement Cybersecurity and Privacy standards for critical infrastructures, to include the establishment of a Computer Emergency Response Team (CERT). In addition, standards for building communication towers, laying ducts and fiber cables will be developed to ensure conformity, and compliance for confidentiality, integrity and reliability of the infrastructure and access equality. The Internet Exchange Point (IXP) that has been established at CCL is also part of Liberia's critical infrastructure. The IXP ensures that local traffic stays local, and that alternative routes should be always available.

vi. Leveraging new national physical infrastructure (including power)

Co-ordination of fiber network build-out with deployment of other linear utility infrastructure such as roads, rail lines, power lines and pipelines is required, along with dig-once policies, to minimize the costs of achieving the necessary coverage. The Infrastructure Working group convened by the Ministry of Public Works and Transport, which includes representatives from all relevant government departments, will be upgraded to a National Engineering Coordinating team (NECT) hosted under Ministry of Public Works and Co-chaired by MoPT to coordinate all civil works and projects, such as roads, railways, utility ducts and aerial cables to ensure all new utility infrastructure includes provisions for ducts and/or masts, and that the correct standards are adhered to in their deployment. At the same time, mechanisms to set reasonable prices for the use of the infrastructure, and to support their maintenance will also be established by the NECT.

vii. ***Integrating ICT Infrastructures in Transport and Energy Project Construction Budgets***

Civil work for laying fiber constitutes a significant part of the cost of laying fiber, while inclusion of ducts in the design of new construction, such as road or power projects, represents an almost trivial additional cost. Supported by the NECT, collaborative efforts between the Ministry of Posts and Telecommunications, Regulator (LTA), Ministry of Public Works and the Ministry of Finance and Development Planning will ensure that all future public construction work includes the cost of a telecom or general utility duct. This will help to vastly reduce the cost of laying fiber and will fulfill the dig-once policy for purpose of efficiency and the integrity of the environment. The planning approvals process will integrate dig once principles to ensure other social infrastructure and all public buildings include the necessary ducts to facilitate broadband access. Of particular priority here is the new road that is planned between Ganta and Zwedru.

viii. ***Financial systems infrastructure***

To ensure all Liberians can become full network citizens they also require access to carrier neutral funds transfer and e-payments platforms which in turn require up to date banking and finance regulations.

ix. ***Tower guidelines and Co-location***

LTA will ensure that wireless communications and broadcasting towers are not arbitrarily constructed and where technically feasible, carriers co-locate as much as possible. The rationale for co-locating is to maximize scarce resources, minimize environmental impact and reduce operational costs to ensure affordability of service. LTA will therefore ensure that no new mobile communication tower is built without its approval and that all towers are available for sharing at reasonable tariffs. Guidelines will be formulated in an inclusive multi stakeholder approach in conjunction with the LTA, Ministry of

Public Works, Environmental Protection Agency (EPA), local governments and operators/ owners of technology towers and buildings. Guidelines will specify tower heights, proximity to sensitive structures (eg schools, hospitals), co-location, and decommissioning. Where relevant the guidelines will comply with existing LTA regulation on infrastructure deployment.

x. *National Data Center*

The National Data Center (NDC) is another core infrastructure for supporting e-Governance. It seeks to consolidate services, applications and infrastructure to provide efficient electronic delivery of Government to Government (G2G), Government to Citizens (G2C) and Government to Business (G2B) services delivered by various Ministries, Agencies and Commissions (MACs) through a common platform seamlessly supported by core connectivity infrastructure.

5.2.2 Summary of Strategies

The MOPT shall:

1. Promote the expansion and timely upgrade of ICT infrastructure;
2. Support the accelerated deployment of fiber optic, wireless backbone and last mile connectivity links;
3. Support the deployment of Infrastructure that ensures high bandwidth availability, and universal access throughout the country;
4. Provide efficient and effective access to all public right- of -way and tower zoning;
5. Encourage the development and interconnection of all National Databases;
6. Ensure appropriate protection for ICT infrastructure nationwide through the implementation of standard Cybersecurity and Privacy policies;
7. Remove bottlenecks and ensure expedient access to all Right –of- Way (ROW) over public land, and access to other state-owned infrastructural resources;
8. Coordinate with other infrastructure projects (e.g., fiber or duct laid during road works);
9. Ensure sharing of fiber backbones, ducting, right- of- way, and cell towers and other passive infrastructure;
10. Target public infrastructure investment to bridge market gaps, through consultation with market players and other stakeholders;
11. Ensure that subsidized infrastructure is competitively and transparently procured and offers access or capacity to all market players in a non-discriminatory way, so as to achieve end-user affordability;
12. Champion the rapid deployment of affordable reliable energy supply, critical to develop the ICT industry;
13. Coordinate the integration of all national e-Government network infrastructure and services;
14. Establish processes toward more advanced services such as Dedicated/Shared Servers, managed professional Services, Database services;
15. Ensure that LTA develops a general information management system for all infrastructure locations and establishes processes for timely submission of data by licensees;
16. Provide institutional support for addressing the incidence of multiple taxation and other regulatory burdens in the ICT sector;
17. To facilitate the development of co-location and tower deployment guidelines, including safe disposal after decommissioning.

5.3 Broadband Internet

5.3.1 Policy Objectives

1. To promote affordable broadband to all households based on the agreed “1 for 2” affordability target (1 GB of a standard mobile data package should not cost more than 2% of average monthly income).
2. To promote the uptake of internet and broadband services for development and national transformation
3. To ensure the development of an exhaustive broadband policy and implementation strategy to speed up ICT Uptake.

Two key factors that will be addressed in the need for more rapid deployment of broadband and internet services are:

a) <u>Competition policy</u>

This policy will promote the development of a solid competition policy to ensure that ultimately consumers have a choice of options to ICT services at an affordable cost. This policy process will involve a multi stakeholder approach incorporating good international practices to encourage a level playing field and open competition by ensuring market players are fair, transparent and non-discriminatory. The LTA will develop regulations to discourage anti-competitive behavior including collusion, with appropriate punitive measures for breaches.

b) <u>Affordability Targets</u>

One of the chief reasons for low broadband uptake is the high cost of access. In order for the government to assess the effectiveness of the strategies below in improving broadband affordability and access, it is important to have clear definitions and targets for affordability. The initial definition is based on analysis developed by the Alliance for Affordable Internet[4] which proposes that 1GB of mobile prepaid data should cost at most 2% of average monthly per capita income (or “1 for 2” target). At this level, low-income groups are more likely to be able to afford an entry-level mobile data plan.

5.3.2 Summary of Strategies

1. Encourage supply of initiatives such as infrastructure availability, particularly last mile connectivity access is pervasive across the country;
2. Ensure good competition rules are set up by the regulator to promote affordable services and to support the entry of Liberian businesses into the access market;
3. Set and review broadband penetration targets to gauge progress;
4. Promote demand-side services in both the private and public sector with strong emphasis on E-government services and Business process outsourcing (BPO);
5. Encourage infrastructure sharing;
6. Create incentives to service providers (both mobile and fixed) to ensure faster roll out of services;
7. Use Universal Access funds to plug gaps in voice and broadband supply, as well as to support demand side initiatives, including the provision of electricity where needed

[4] A4AI (2016) “Redefining Broadband Affordability: Adopting a "1 for 2" Target to Enable Universal, Affordable Access.

to support connectivity requirements;
8. Facilitate the smooth deployment of new technologies to promote broadband in particular rural broadband.

5.4 Radio Spectrum Management

Radio spectrum consists of the electromagnetic frequencies which are used for communication signals travelling through the air. Radio spectrum is a natural resource that will deplete when used and will be wasted if used inefficiently. Therefore, the management of this resource is critical if it is to be used to further Liberia's ICT and ultimately national development goals.

Spectrum management has four key functions. They are spectrum planning, spectrum engineering, spectrum authorization and spectrum monitoring. Spectrum management should be carried out in a transparent and evidence-based manner.

5.4.1 Strategy to Implement Radio Spectrum Management

LTA will continue to plan and manage Liberia's spectrum in an efficient and effective way, developing regulations as needed to guide its allocation, assignment, and to monitor its use. Identifying frequencies for mobile broadband networks resulting from the migration to digital TV broadcasting is one way to ensure the efficient management of national spectrum. LTA will provide for spectrum needs in broadcast, air navigation, marine, weather reporting and health (x-ray), among others. LTA will also ensure that all radio frequencies set aside by ITU, such as the Search and Rescue frequency, the Industrial Scientific and Medical (ISM) Band and other such bands allocated for specified programs under ITU regulations are dedicated for those purposes in Liberia.

LTA will also promote innovative and flexible approaches to spectrum allocation in line with International Telecommunication Union (ITU) that takes into consideration convergence of various radio communication services and that enables the unique development of broadband services.

5.4.2 Spectrum Monitoring

Spectrum monitoring is essential for spectrum managers to effectively plan and use frequencies, avoid incompatible usage, and identify sources of harmful interference. Spectrum is a national strategic resource requiring and its effective management can be complex. LTA has recently acquired spectrum monitoring equipment and will use it to prevent illegal use of spectrum, which is subject to criminal prosecution.

LTA will also continue to invest in the development of the technical human resource capacity to carry out spectrum monitoring.

5.5 Information Safety and Cyber-Security

Given the emphasis the Government of Liberia places on ICT and related infrastructure as a means of achieving national development goals, it is crucial that security requirements needed to meet GoL's mission and operational functions, including the confidentiality, integrity, and availability (CIA) of all systems and data assets are implemented. GoL should draw on knowledge from experts in the public and private sectors, national and international who are thought leaders in technology, security, privacy, law and business. This security must also maintain the openness of the Internet, opportunities for innovation, and fundamental values of freedom of expression, privacy, and access to information; all of which are critical to the positive socio-economic impacts of the Internet. In this context, it is clear

that cyber-security threats are rapidly evolving, and an effective policy must be flexible enough to deal with existing, emerging and evolving threats. In addition, information security concepts need to be factored into ICT adoption and development strategies at all levels to ensure security issues are addressed in all government systems. This would involve the development of a common approach by all government CIOs and include the Ministry of Defense.

5.5.1 Policy Objectives

1. Engage in regional and international collaboration to protect Liberia's cyberspace;
2. Establish a national cybersecurity advisory committee made up of a cross section of stakeholders including private sector, women and youth;
3. Secure the rights and privacy of consumers online;
4. Establish norms and rules for ensuring privacy of information held by MACs and the private sector;
5. Ensure that systems are in place for the protection of children online;
6. Protect the rights of businesses online;
7. Anticipate cyber-attacks and mitigate risks of shutdowns or downtime of the internet by foreign or local actors;
8. Establish a national cybersecurity strategy;
9. Ensure the protection of critical physical ICT infrastructure against vandalism and theft and establish processes for recovery and business continuity;
10. Ensure the LTA establishes procedures for registration of SIM Card in line with national identification processes and international standards subject to periodic review.

Currently, the level of institutional and technical resources allocated to the country's cyber-security needs are insufficient. A first step will be to perform a risk-based assessment to identify and document GoL's national critical ICT infrastructures, systems and data assets for proper protection against exploits.

In order to develop the appropriate institutional framework to address the country's cyber-security needs, the government will develop tools and strategies at three levels. First, in terms of national security, the government will continually and actively assess threats that can undermine the country's sovereignty. This can include threats against government infrastructure and institutions. Second, at an organizational level, it is important to consider threats against private sector, civil society and other organizations.

The government will provide support for these groups where possible and will explore options to incentivize these groups to improve their cybersecurity practices, including provision of support for human resource development. An institutional framework will be developed to maintain the integrity, resilience, and security of all ICT infrastructure and assets across the GoL and the country as a whole in an integrated and comprehensive manner. This will require improved inter-agency cooperation in keeping with the sectoral structure outlined below. Finally, in terms of individual citizens, the government will ensure that efforts are made to raise awareness and improve online safety for all. This will include legislation to protect user data and devices from unauthorized access, theft, and misuse.

5.5.2 Policy Strategies Summary

1. Ensure that the pursuit of government's cyber-security objectives do not undermine the fundamental openness of the Internet;
2. Encourage the development and implementation of the government's cyber-security objectives in partnership with private sector and civil society and youth organizations wherever possible;
3. Establish a cyber-security advisory council drawing on experts within government, the private sector, academia, judiciary, security services, youth organizations and civil society to best advise the government on the implementation of these policy objectives while also raising awareness within government of the latest cyber-security concerns and issues. This committee will host regular (more than once per year) public consultations on cyber-security in Liberia;
4. Develop an appropriate legal framework based on above objectives of this policy that protects consumers' data and devices (updating any previous parliamentary bills) within one year of the approval of this policy; the subsequent law is to be reviewed and updated as required every two years;
5. Ensure government and private sector abide by these cyber-security policy objectives in order not to undermine the fundamental human rights of any citizen, particularly those most likely to be subject to online abuse and harassment such as women and girls;
6. Collaborate with key foreign partners regionally and globally and within 1 year of approval of this policy join the West African Computer Emergency Response Team (CERT);
7. Ensure that all critical physical infrastructures are protected against vandalism and theft with appropriate legal penalties;
8. Facilitate regular training/ knowledge share on key cybersecurity matters with the judiciary and security services so they are adequately equipped to deal with breaches/emerging issues.

5.6. Universal Access and Service

5.6.1 Policy Objectives

1. Secure Affordable and Universal Access to both voice and broadband services for all citizens, with special attention to vulnerable and disadvantaged populations such as women, rural dwellers, those with disabilities and the poor;
2. Ensure prudent management of the Universal Access Fund;
3. Review and assess access gaps to ensure that the Fund addresses these gaps;
4. Support rural infrastructure expansion, as well as investments in vulnerable and disadvantaged urban communities and areas;
5. Promote and support demand stimulation projects to increase Liberia's ability to develop into an information and knowledge society.

Universal Access and Service are key to the growth of the ICT sector countrywide and to closing access gaps in voice and broadband. The Government is committed to ensuring that ICT services are available throughout the country and will support the universal service availability and the widest access to such services. In order to increase the level of access to ICT, the Government will provide the enabling environment for private sector entities to play a complementary role towards achieving universal access targets, including specific targets to close the rural-urban and gender digital divides.

In 2015 the LTA established regulations on the Universal Access Fund which saw its creation, management and deployment with policy backing by the National Universal Access

Program Strategy 2014 (NUAPS), the National ICT and Telecommunications Policy 2011 (ICT Policy), and sections 22 and 23 of the Telecommunications Act of 2007 of the Republic of Liberia (Act)[5]. The Universal Access Fund is governed by the Universal Access Governing Board, with its management carried out by the Universal Access Implementation Committee, while implementation of projects and management decisions are carried out by the Universal Access Project Implementation Unit (PIU).

5.6.2 Summary of Strategies

1. Establish mechanisms to support an array of public access solutions, including community networks;
2. Establish links between universal access fund supported initiatives and ICT focused projects to provide connectivity and support use in community organizations such as schools, health clinics, libraries, and local government offices;
3. Infrastructure expansion: Capital investment in construction of high-capacity telecommunications networks to reach remote and unserved areas;
4. Determine clear and transparent criteria for the development and selection of projects funded from the USF;
5. Establish transparent and open decision procedures for applications and disbursements of USF funds;
6. Support programs to promote public awareness, digital skills and uptake of broadband services to support government service delivery and economic development outcomes;
7. Conduct a review of the outcomes of the USF every 2 years.

[5] Regulations on the Universal Access Fund. http://www.lta.gov.lr/doc/LTA%20REGULATIONS%20ON%20UAF.pdf

5.7 Mainstreaming Gender and Women in ICT

5.7.1 Policy Objectives

1. Ensure that all analysis conducted for the purposes of developing ICT policies and plans integrate gender and gender considerations, from network deployment analysis to universal access strategies and priorities[6];
2. Endeavour to improve the availability of gender disaggregated data on access and use of ICT;
3. Involve gender advocates and experts in the policy and planning process from the start to ensure women-centric policy development;
4. Establish time-bound targets to achieve gender equality in access across all areas of policies and plans, from skills building to adoption and use;
5. Consider allocating a percentage of the resources available to support women-centered activities, including resources to promote and support women ICT entrepreneurs, digital literacy training for women and girls, and targeted public access and other projects to support access and use for women and girls;
6. Ensure that all skill building and training programs are developed considering the needs of women and girls across all educational levels. These programs should consider what themes would be most relevant to participants; offer training opportunities for all levels, from basic skills to more advanced coding and design; consider the location of programs and the gender of trainers;
7. Establish quotas to ensure the equal participation of women and other disadvantaged groups in all programs supported by national policies and plans, especially rural and poor populations;
8. Establish a scholarship programme to improve access to training by women.

Women are 50% less likely to be online than men, and this gender digital divide looks to be getting worse with time[7]. The effects extend beyond access (the cost to connect to the Internet, and to afford the devices) to other barriers to women's access and use of the web which include lack of digital literacy as well as norms and attitudes presenting cultural barriers to the uptake of Internet by women and girls in communities. This divide is impacting how women use and appropriate digital technologies. One ten-country survey found that women are 30-50% less likely than men to speak out online, or to use the web to access information related to their rights. Women are also 25% less likely to use the Internet for job-seeking than men.

Gender-responsive ICT policies are a strategic opportunity to curb and close the digital gender divides. These are policies designed with the specific challenges women faced in mind, and that commitment to setting clear, time bound targets on connecting women, budgetary allocation to support the implementation of the set targets, as well as research that is disaggregated by gender. If Liberia is to achieve universal access for all its citizens, then it is imperative that existing gender gap in access and use of ICT are progressively minimized.

5.7.2 Summary of Strategies

Conduct a gender gap audit to offer a preliminary baseline assessment of the state of access and use of the internet by women and girls in Liberia. This would be initiated in specific

[6] http://www.un.org/womenwatch/daw/egm/ict2002/reports/Paper-NHafkin.PDF

[7] See http://webfoundation.org/2016/10/digging-into-data-on-the-gender-digital-divide/

geographies, such as those with the highest rate of connectivity, and scaled to a nationwide assessment.

Invest in household survey research that will help inform how Liberian citizens access and use the internet. This research should be designed to have gender-disaggregated data that assists with analyzing how access and the use of the Internet varies by gender, income level, education level, age and other identified demographic factors.

5.8 Mainstreaming ICT Youth

The youth are critical catalysts in Liberia's socio - economic development plans, and are acknowledged as an ICT-oriented generation. For Liberia to harness the huge potential that ICT offers, it is important to leverage ICT for positive youth orientation and development, as well as to ensure that the youth use ICT responsibly and productively[8]. According to population statistics[9], 44.3% of Liberia's populations fall under the 15 years group, making it necessary to ensure a strong ICT foundation critical to National development.

5.8.1 Policy Objectives

The Government will:

1. Promote the use of ICT, in partnership with Youth-focused bodies particularly Ministry of Youth and Sports (MoYS) and relevant MDA's to deliver information and content that emphasize citizen agency and socio-economic development;
2. Support the delivery of programs designed to ensure that the youth focus on productive application of ICT;
3. Promote incentive and support schemes targeted at youth entrepreneurship initiatives in ICT;
4. Ensure the online safety mechanisms are in place to support youth use of technology; and increase awareness among youth about cyber-security issues;
5. Promote the utilization of ICT in education delivery and management; and its incorporation in education curriculum at all levels.

5.9 Mainstreaming ICT and Persons with Disabilities

5.9.1 Policy Objectives

1. The government will ensure that all of its ICT infrastructure and services (including e-government services, public access facilities, documentation, records, universal access initiatives, etc.) are accessible to all including the disabled;
2. Support research and development of assistive ICT and services that are affordable for disabled persons;
3. All public communications from the MoPT will be available in accessible formats for disabled persons by default (and without the need for any specific request to do so).

One estimate suggests that as much as 20% of Liberians live with a disability (e.g., physical, mental, or sensory)[10] and ensuring that this group can effectively access and use ICT is a requirement if the country is to achieve the goals outlined above. As a signatory to the Convention on the Rights of Persons with Disabilities, the government is also obligated to ensuring that ICT are accessible for all (i.e., can be used as effectively by a person with disability as a person without one).

[8] http://www.youthpolicy.org/national/Liberia_2012_Revised_Youth_Policy_Presentation.pdf
[9] http://countrymeters.info/en/Liberia#population_2016
[10] SIDA (2014) " Disability Rights in Liberia" http://www.sida.se/globalassets/sida/eng/partners/human-rights-based-approach/disability/rights-of-persons-with-disabili ties-liberia.pdf

5.9.2 Strategies

1. Use the USF to support the access and use of assistive technologies where required;
2. Consult with disabled people's organizations on a periodic basis to ensure these policy objectives are being met;
3. Implement an ongoing training program for IT staff within government to be aware of and understand how to make the government's ICT facilities and services accessible to all including the disabled;
4. Develop and implement a program to make all Government of Liberia websites accessible to disabled persons (e.g., following the Web Content Accessibility Guidelines formulated by the World Wide Web Consortium);
5. The MoPT will work with mobile network operators and other internet service providers to support the provision of services and content that are accessible by disabled persons;
6. Ensure the MoPT's public procurement guidelines require that all products and services (where relevant) support access and use by disabled persons.

5.10 Human resource development

5.10.1 Policy Objectives

1. Increase the size and quality of ICT-skilled human resource base in Liberia;
2. Use ICT to improve the quality of delivery of education and training in all areas including distance learning, as well as to enhance the learning experience itself;
3. Establish a national public ICT literacy campaign and expand and improve adult-education, lifelong learning and both general and digital literacy; programs, notably for retraining and re-skilling the existing workforce;
4. Making the use of ICT as part of everyday life without excluding those that need skills development;
5. Encourage and support ICT training for political decision-makers, community and civil society leaders, as well as private and public sector executives;
6. Give special attention to providing new learning and ICT access opportunities for women and youth, the disabled and disadvantaged, particularly disenfranchised and illiterate people, in order to address social inequities;
7. Develop and deploy a nationwide e-Education system that supports schools, higher education/training facilities across the country by interconnecting them with each other and with relevant knowledge centers, providing curriculum integration while also generating information to better shape policies, strategic plans and tactical decisions for developing education and vocational training;
8. Foster interest among Liberia academia sectors to conduct research and development activities related to ICT;
9. Incentivize industry with ICT specialization to conduct their own training programs and to contribute to institutional training programs;
10. Encourage that tertiary institutions offer degree courses in ICT.

Like many countries around the world, Liberia suffers from insufficient numbers of skilled and experienced experts in ICT and in other professions that rely on ICT. In the spirit of this policy,
Liberia must nurture building the ICT skills and capabilities of its population, even if importing needed skills may be required. In addition, the country must align its educational priorities with those of a knowledge-based information society, which requires educational and vocational training programs to meet the needs of our labor markets.

It is important to note that ICT also brings new opportunities to enhance education for all, including targeted interventions that may focus on disadvantaged groups, as well as an array of opportunities to support curriculum development, teaching methodologies, simulation laboratories, lifelong learning and distance education, digital skill training, among others. If planned well, ICT can advance a human resource development strategy to transform the country's human capital.

Establishing the National Research and Education Network (NREN) as an internet service provider for schools, research groups and tertiary educational institutions will help to mitigate the challenge of the lack of high capacity access for these institutions. This will be supported with the provision of international capacity at cost, through the government's share of CCL.

5.10.2 Summary of Strategies

The Government will support the creation of the necessary capacity by:

1. Integrating IT subjects in the curriculum at all levels of education and securing access to ICT platforms in the education system;
2. Establishing educational networks for sharing educational resources and promoting e-learning at all levels;
3. Facilitating Public Private Partnerships to mobilize resources in order to support e-learning initiatives;
4. Promoting the development of integrated e-learning curriculum to support ICT in education;
5. Promoting distance education and virtual institutions, particularly in higher education and training;
6. Facilitating sharing of e-learning resources between institutions;
7. Integrating e-learning resources with other existing resources;
8. Encouraging the establishment of ICT Centers of Excellence;
9. Encouraging and supporting ICT training for decision makers, community and civil society leaders;
10. Creating opportunities and providing assistance for the disadvantaged, people with special needs, women and the youth to acquire IT skills;
11. Enhancing capacity for research and development in ICT, especially in partnership with Academia in Liberia;
12. Introducing incentives and measures to improve the training in the broadcasting and media to ensure qualitative and quantitative growth of the broadcasting sector;
13. Liaise with Ministry of information, Tourism and Culture as well as national professional bodies, CSOs for media practitioners to participate in setting standards in broadcasting content. Also encourage media training institutions to provide structured specialized programs that cater for people with talent for creative writing, film production, animation creative and technical aspects of broadcasting;
14. Engaging of women, youth and children, communities in underserved areas, and other disadvantaged groups, including people with disabilities, through e-inclusion and e-accessibility activities and programs;
15. In order to have global competitiveness of ICT products and services the government will encourage universities (particularly state-owned tertiary institutions) to establish degree courses in ICT and post-graduate and postdoctoral ICT research positions on attractive terms in order to attract world-class researchers;
16. Increase affordable Internet access at educational institutions of all levels.

5.11 Innovation, Research and Development

5.11.1 Policy Objectives

1. Adapt technical co-operation to the transfer of ICT to Liberia;
2. Link innovation, research and development with investment opportunities in the ICT sector;
3. Ensure that strategies for innovation, research, and development are aligned with human research development;
4. Facilitate partnerships between public and private sectors.

For the ICT sector to be fully functional and to promote innovation, a focus on research and development is paramount. While nascent in Liberia, the opportunity to plan for the establishment and implementation of well-resourced Innovation Hubs remains an important ingredient to support innovation and entrepreneurship in the country.

A review of the experience of the iLab in Monrovia with a view to establish processes will help inform future policy on local innovation and research and development.

5.11.2 Summary of Strategies

1. Develop a database of innovation, research and development activities in Liberia;
2. Develop a strategy document with measurable targets through a multi-stakeholder approach involving private sector, academia, public sector;
3. Establish support for hubs, connected spaces and accelerators;
4. Work with relevant Ministries eg Finance and Development Planning, Commerce and their respective agencies to review policies on taxes on ICT hardware and software needed by startups;
5. Consult at critical decision-making and investment consideration stages with innovators and operators for sound policy co-creation and reform to unlock ICT potential in the country; this calls for government to be open, accountable, transparent and collaborative;[11]
6. Ensure that government can be a reliable consumer of local tech innovations as a means of demonstrating commitment to supporting the local technology innovation ecosystem and, given the strong social focus underpinning so much of these hubs' work, contribute to solving pressing social issues;
7. Establish government funding for activities across the innovation ecosystem, to scaling successful initiatives. This kind of financial support would ease the infrastructure cost burden borne by hubs, such as rent and telecommunications and also be impactful by making more funding available for the hubs to seed their incubated innovations and support experimentation in early and growth stages;
8. Fund independent and multidisciplinary research, with an emphasis on e-learning tools, digital literacy and software education.

[11] http://www.makingallvoicescount.org/publication/technology-innovation-hubs-policy-engagement/

5.12 Local Content Development

5.12.1 Policy Objectives

1. To create a critical mass of locally relevant content and applications that are useful to the public in Liberia;
2. To ensure that Liberians have access to online resources that reflect local culture and preserve cultural heritage;
3. To stimulate local production of audiovisual material in entertainment and education;
4. Facilitate processes for intellectual property rights;
5. Encourage synergies between local start-ups and ICT operators

Provision of locally relevant content is vital for meeting the needs of the public in Liberia. Aside from the development of e-government services, the government will promote the production of cultural, educational and scientific content and the development of local cultural industries suited to the linguistic and cultural context of the users.

5.13 Investment and Funding

5.13.1 Policy Objectives

1. To create an enabling environment and facilitate foreign direct investment as well as national private sector investment in the ICT industry;
2. To further increase competition in the ICT sector;
3. To encourage public-private partnerships for the development of ICT;
4. To provide funding of government ICT projects through appropriate budgetary allocation;
5. To explore new and emerging sources of funding e.g., crowd-sourcing.

Investment and funding are critical to the success of any national ICT development plan and programs. Typically, sources for such funding would include Government, the private sector, as well as international organizations. Government has the critical role of creating an enabling environment that will attract investment and funding from these various stakeholders and will foster a conducive environment for the functioning of impactful and sustainable PPP initiatives.

Although the ICT sector has witnessed increased investments over recent years, the current policy and regulatory framework could be improved to address the uncertainty that tends to discourage investors, consequently depriving the sector of the necessary funding required for ICT improvement and expansion.

5.13.2 Summary of Strategies

1. Partnerships between the government and the private sector have tremendous potential for the qualitative delivery of ICT infrastructure projects, innovation, skills acquisition, and outreach of government services to Liberians;
2. Private sector participation has been identified as a major catalyst in ICT development across the globe. However, often times, there is confusion as to the roles, levels of contribution, and rules of overall engagement thus leading to fragmented outcomes. Liberia is therefore yet to take full advantage of the enormous potentials inherent in public-private-partnership in ICT development. The necessary enabling environment should therefore be created for the realization of these benefits.

5.14 Consumer Privacy and Data Protection

5.14.1 Policy Objectives

An effective consumer protection policy seeks to:

1. Ensure that consumers are empowered to make informed decisions at the point of sale;
2. Services offered and acquired are fit-for-purpose;
3. Ensure access to effective redress, including ensuring that online transactions have the same legal status as traditional physical interactions;
4. Ensure that consumer interests and privacy are protected by the regulatory body.

The UN Guidelines on Consumer Protection were revised in December 2015 to emphasize importance of enhancing "consumer confidence in electronic commerce by the continued development of transparent and effective consumer protection policies, ensuring a level of protection that is not less than that afforded in other forms of commerce." Liberia does not have a Consumer Protection Act. Laws protecting consumers are in different legal instruments, for example, the Liberia Telecommunications Authority Act has sections that seek to address the protection of consumers against fraudulent practices.

Data Protection

Data are important for decision making, research purpose and for other analysis. It can either be personal or non-personal. Data protection is necessary to protect consumer rights and privacy. Liberia's data protection policy is based on the universal data protection principles. Some of the principles are:

1. Personal data will be processed fairly and lawfully;
2. Personal data will be obtained only for one or more specified and lawful purposes, and will not be further processed in any manner incompatible with their purpose or those purposes;
3. Personal data will be adequate, relevant and not excessive in relation to the purpose or purposes for which they are processed;
4. Personal data will be accurate and where necessary, kept up to date;
5. Personal data processed for any lawful purpose or purposes will not be kept for longer than is necessary for that purpose or those purposes;
6. Appropriate technical and organizational measures will be taken against unauthorized or unlawful processing of personal data and the protection of children;
7. Data collectors will be required to disclose use of personal data to consumers.
8. Collected personal data will be rigorously protected from unauthorized access by any parties

5.14.2 Policy Strategies

The scope of the consumer protection policy should include a framework based on:

1. Consumer protection rules that bind service providers and content platforms in furthering the interest of consumers;
2. Access to fair and timely dispute resolution mechanism, preferably outside of the service provider, that offers expedient redress without undue cost or burden to the consumer;
3. A monitoring system that enables the regulator to report on important industry statistics and service quality measures to facilitate ability to amend regulatory frameworks when and if necessary;
4. Ensure the LTA and other relevant regulatory authorities for digital services establish

regulations and procedures for protecting consumers of ICT services from unfair and deceptive marketing practices, and from unwarranted use of private customer information. Such procedures will be reviewed on a regulate basis to ensure its relevance in protecting consumers;

5. Update existing laws or enact new legislation to define the legalities of online transactions, requirements for child protection and to ensure the admissibility of electronic evidence in court.
6. Ensure that rules developed cover, but not limited to, services and/or activities in: advertising point of sales, billing, information disclosure, contractual requirements, complaints procedures, financial sector, privacy protection, customers with disabilities, and data protection.

5.15 Enhancing Government Services across All Sectors

The overall goal of e-Government is to make the Government more result-oriented, efficient and citizen-centered. The e-Government strategy will focus on redefining the relationship between Government and citizens with the objective of empowering the citizens through increased and better access to government services. The e-Government initiative should be a shared vision between the National and County Governments and the private sector and the implementation process will involve all stakeholders.

The broad objectives of e-Government in all aspects of National and County governments will be to:

1. Improve collaboration between Government agencies and enhance efficiency and effectiveness of resource utilization;
2. Improve Liberia's competitiveness by providing timely information and delivery of Government services;
3. Reduce transaction costs for the Government, citizens and the private sector through the provision of services electronically;
4. Provide for access to information held by public institutions, provide for information security and protection of personal information;
5. Ensure automation of Government services and the extension of the establishment of one-stop centers for accessing all Government information and services by the citizens; to sub-counties;
6. Digitized Community service centers to provide information on available government services (health, education, budget, culture, etc.);
7. Establish e-Government Governance Structure;
8. Establish e-Government Regulatory and Legal Framework;
9. Integrate ICT services into the overall government development objectives, priorities and programs;
10. To reinforce government initiatives to boost innovation, support transparency, empower citizens, encourage accountability, and fight corruption with Open Data;
11. To empower citizens, through transparency, accountability and public participation reforms through an Open Government Initiative (led by the Ministry of Information, Cultural Affairs, and Tourism (MICAT)

Examples of e-Government e-Services that have been developed include IFMIS, Health Information Systems, Concessions Information Management System (CIMS), a National Identity System, a National e-Portal and Fleet and Asset Management System[12].

[12] Page 7, Final Report of Stakeholders Workshop on Short-term Priority of ICT Projects Jointly Convened by the Ministry of Posts & Telecommunications, Liberia Telecommunications Authority and USAID-Liberia, 15th

5.15.1 E- Government Programmes

1. Document all operational processes in all government institutions;
2. Design and document the business/ operational IT solutions for identified processes;
3. i.e. data/information architecture; business architecture; application architecture; technology architecture;
4. Develop and document standardized integration and migration plans;
5. Identify and document common information to be shared among institutions and how it can be accessed;
6. Use of the second level domain.gov.lr by all MACs for their websites and email addresses.

5.15.2 E- Liberia Project

The E-Liberia Project Management Office at MoPT was created under the sponsorship of the World Bank to kick start e-government initiatives. It is focused on implementing the central e-government projects as well as supporting entity level initiatives including Project Design, Acquisition, Project Management, Contract Management etc. The office shall be staffed with professionals with proven capacities in various ICT and telecom disciplines.

These disciplines will include skills and insight in E-Services, E-Health, E-Learning and various other citizen services.

5.15.3 E- Health

Traditional administration of health services has proven to be inefficient and less responsive to the needs of its diverse stakeholders. The Ebola Virus Disease that claimed the lives of thousands of our citizens exposed the inadequacy in our health system and the vulnerabilities to which health workers are exposed to under such a system. To address this challenge, Government of Liberia will design and adopt a comprehensive Health Information System to facilitate effective administration and clinical practices, using integrated ICT platforms.

A robust health-focused research institutions to enable healthcare workers to undergo periodic refresher programs to enable them to conform to medical ethics and remain abreast with contemporary practice will be established by the Ministry of Health.

5.15.3.1 Strategy for Implementation

1. The Government of Liberia (GoL) will encourage investment in National Fiber Backbone as a platform to promote socio-economic development services such as health programs;
2. GoL will use the National Universal Access Program to support the construction of ICT infrastructure in areas partially or wholly inaccessible to communication services, which can be used to further promote health program;
3. Ministry of Health will design a national e-Health strategy aligned with the use of ICT that will address the needs of an institutional framework driving health services and programs, including a Health Information System comprising patient data records;
4. The Ministry of Health will ensure that all development partners align their programs with its strategic plan. Silo/unilateral operations by any partner will be discouraged.

Building resilient health programs depend on interoperable systems that are scalable. It also requires continuous training and manpower development to meet the growing needs of the public. The ultimate objective of e-health programs and services is to provide high quality and people friendly health services across counties, districts, chiefdoms and villages using a standardized health information system as will be articulated in the national e-health strategy.

5.15.4 E- Education

The Ministry of Education (MoE) will adopt an e-Education Policy as a cardinal part of its reform agenda. MoE has situated e-Education at the heart of its strategy to transform the educational sector which remains driven by traditional education instructional practices. The shift from teacher-focused instruction to relying on supervision for the use of ICT platforms to provide educational services is e-education. Its strength is based on the fact that this generates efficiency in connecting teachers and learners together, facilitating access to quality information to expand the opportunities for learning.

While computer literacy and skills to navigate the internet are necessary, e-education requires those skills to be used to access, analyze, integrate and communicate those pieces of information in a clear and logical manner.

5.15.4.1 Strategy for Implementation

1. Ministry of Education will design a national e-Education strategy aligned with the use of ICT that will address the needs of institutional framework driving education services and programs;
2. The Government of Liberia will encourage investment in the National Fiber Backbone as a platform to promote economic services such as e-Education programs;
3. GoL will use the National Universal Access Program to support the construction of ICT infrastructure in areas partially or wholly inaccessible to communication services to promote access and connectivity that can benefit e-education;
4. MoE will develop a new curriculum to capture all the ingredients that go with e-Education;
5. MoE to establish an ICT center of excellence to provide support to teachers;
6. The Commission on Higher Education will require all post-secondary education institutions to develop an e-learning environment that will enable students and teachers to explore knowledge.

5.15.5 E-Agriculture

ICT have the potential to revolutionize the management of the agriculture sector and improve food security. As such, the GoL is committed to improving information sharing flows between farmers, consumers, and agriculturists, which will lead to higher crop yields; production that is more responsive to consumer needs; and greater market access. ICT can also be used to improve crop planning as well as the following: monitoring and forecasting production yields; tracking and locating livestock throughout the country; create a database to register livestock levels and prevent theft; and control the spread of diseases.[13]

5.15.5.1 Strategy for implementation

Establish a national e-Agriculture strategy to incorporate the following:

1. Computerize all records related to agricultural management;

[13] Liberia ICT policy 2010

2. Create an online agricultural information portal to provide strategic information on agro-technologies and techniques, weather forecasting, pricing and marketing information;
3. Work with the private sector to find a cost-effective means of meeting the communication needs of the sector;
4. Develop and maintain a nation-wide geographical information system to monitor agricultural land use and manage natural resources at national and district levels (see section 5.15.6 on Open Data);
5. Encourage farmers and agriculturalists to conduct transactions of their products on the Internet;
6. Link rural agricultural producers to markets;
7. Monitor the sustainable utilization of natural resources in agriculture production
8. Create opportunities for adoption of modern weather and meteorological technologies.

5.15.6 E-commerce Programs

Electronic commerce or e-Commerce is a commercial transaction that involves the transfer of information across the Internet. Its four market areas are business to business (B2B), business to consumer (B2C), consumer to consumer (C2C) and consumer to business (C2B). E-commerce has the potential to drive the country's overall economic expansion and social development. Using an effective e-commerce strategy, it can attract travel in favor of our growing tourism industry while facilitating financial and international business through courier services and transshipment. Such positioning would also offer opportunities to fully expose local businesses to the global marketplace.

5.15.6.1 Strategy for Implementation

1. The Ministry of Commerce will collaborate with MoPT, LTA and all stakeholders including the National Investment Commission in ensuring the appropriate laws are in place in Liberia to support electronic transactions and provisions for ensuring data protection and privacy for users, such as updating the general business laws and penal codes;
2. The Ministry of Commerce will develop e-Commerce strategy for the development of e-commerce industry in Liberia;
3. The Ministry of Posts & Telecommunications will provide a unique physical address to homes, institutions and businesses to facilitate the activities of e-Commerce;
4. The Ministry of Posts & Telecommunications will facilitate the availability of broadband internet access;
5. The Government of Liberia will encourage investment in National Fiber Backbone as a platform to promote economic services such as e-Commerce programs;
6. GoL will make use of the National Universal Access Program to support the construction of ICT infrastructure in areas partially or wholly inaccessible to communication services to benefit market expansion through e-commerce.

5.15.6.2 Open Data Initiatives and digitization of government information systems

Open data is data that is available online in a format that can be easily accessed, used, and shared by anyone at no charge or other restrictions. Open data can be critical for new entrepreneurial opportunities, promoting scientific research, increasing civic engagement with government, and increasing public accountability. As such, the GoL seeks to employ open data initiatives where possible to support its national development goals.

5.15.6.3 Strategies for Implementation

1. The Government of Liberia will promote the design of processes to build government

datasets in open data formats and licenses;
2. GoL will support the use of open datasets for data mining;
3. The Government of Liberia will implement an open data platform to share datasets across government and with the public (an objective that is already in the Open Government Partnership action plan lead by the Ministry of Information, Cultural Affairs, and Tourism (MICAT);
4. The GoL will design a mechanism to encourage the development of public, private, and civil-society led digital commercial services using these datasets;
5. Based on the above principles, a Land Information System (LIS) would be established with an associated Graphical Information System (GIS) to support government, private sector and public need for information on land ownership/tenure, as well as for more effective and efficient planning for agriculture and natural resource management;
6. Similarly, an integrated information system covering all concessions across the different MACs would be established to avoid overlapping of activities and issues stemming from lack of coordination;
7. Similarly, digitization of the electoral process – voter registration, results reporting etc would take place.

6.0 Sectoral Structure

Currently, the mandate for the ICT portfolio is within the Ministry of Posts and Telecommunication. However, this limits its mandate in carrying out the objectives set out in this policy. The Government will ensure MoPT's mandate is sufficient to see the **SET** agenda to fruition.

6.1 Government Institutional Structures to achieve SET

1. MoPT, being a ministry with a broad mandate having oversight on telecommunications, information technology, broadcasting infrastructure (masts and spectrum), and postal services;
2. A Chief Information Officer (CIO) for the government based at the Executive Office and supported by a CIO Council comprising all MAC CIOs and a Secretariat. CIOs in each ministry will have dual reporting functions - to the CIO Council, and to their Ministry (see below);
3. The LTA continues as the ICT regulator with responsibility for telecommunications, broadcasting radio frequencies, and with possibility of postal services were the posts to be made autonomous;
4. The National Engineering Coordinating team (NECT) hosted by Ministry of Public Works and co-chaired by MoPT to coordinate ICT planning on all civil works, to agree on standards, and ensure ICT infrastructure is incorporated in all roads (existing, resurfaced and new roads), rail, electricity lines, etc.;

6.2 Role of Government

The key roles of government in the ICT sector are:

1. Strategic leadership and coordination in promoting the use of ICT. To be most effective, this should be driven by the office of the Head of State;
2. Ensuring there is an enabling environment for the commercial deployment of ICT infrastructure; This is the responsibility of the MoPT and the regulatory authorities;
3. Providing support for ensuring access to voice and data services is affordable and available to all members of Liberian society; This is the job of the regulatory

authorities and the Universal Access Fund;

4. Supporting the adoption of ICT within government, both for internal administration and for transactions with the public and business; this extends to providing connectivity to government institutions, hosting data and supporting the development of relevant e-government applications.

6.3 The Role of the National ICT Governing Board

Given the importance and cross-cutting role of ICT, it is important that coordination takes place at the top executive level guided by representatives from each of the key stakeholder ministries. Hence, this policy establishes a National ICT Governing Board, to include MOPT, Ministry of Public Works, Ministry of Finance and Development Planning, LTA, Ministry of State, Mobile Network Operators and representatives from the Civil society. The National ICT Governing Board shall be responsible to set the mandate and the programs of the ICT sector. The board shall be headed by the Minister of Posts and Telecommunications.

ICT Champions and the CIO Council

The President of Liberia shall assume the leadership of the National ICT Champion network. All heads of public institutions such as Ministries, Agencies and Academic Institutions shall play equally supporting roles in their various institutions as local ICT Champions to promote the usage of ICT in Government. As such, the executive line ministries shall nominate a CIO from each ministry who will become a part of the CIO Council.

The CIO Council shall be responsible for interpreting the vision of the ICT Governing Board which represents the vision of the country. All stakeholders including government Ministries and agencies shall ensure budgetary allotment to support ICT objectives and programs in their respective organizations.

Functions of the CIO

- The CIO shall be responsible for formulating programs in pursuit of the vision of the ICT Governing Board. This shall include:
- Setting standards for computer hardware and software within government, i.e. approved operating system(s), type and version of office tools and type(s) of network equipment.
- Providing adequately protected Internet and email access for use by government offices employees as well as intra-government ministries;
- Creating an efficient and cost-effective intra-government communications and information sharing system (ICT-enabled tools for sharing, collaborating on and storing documents and electronic transactions
- Setting and ensuring compliance with basic computer security procedures (to viruses hampering the use of ICT by the government);
- Defining a government enterprise architecture across ministries that includes:
    - Where software applications need to be integrated or have interfaces; which software applications will be shared across the government (e.g., those related to human resources and payroll);
    - Which ministries are responsible for which data bases; and how databases will be defined (e.g., to ensure that individuals and businesses are consistently identified across ministries);
    - Ensuring that security, confidentiality and risks are well assessed, as well as

putting in place rules with the appropriate strategies to enforce them;

- Managing the procurement processes related to ICT to not fall behind technologically because of a slow process; not stifle innovation; and how to use technology to help strengthen Liberia's own small ICT sector;
- Establishing a transparent governance process related to the use of ICT that will balance decentralized actions with the need to manage standards and rules centrally;
- Strengthening transparency; improve citizen participation in government and support the growth of Liberia's businesses – instilling a strong focus on customer satisfaction regardless of who the customer is (e.g., an internal government unit, a citizen, resident or business);
- Setting performance measures to enable the GoL – and citizens – to monitor how well the GoL is doing in using ICT to achieve its Poverty Reduction Strategy;
- Building the capacity of GoL's employees to use ICT effectively and also provide them adequate compensation and incentives.

Program Management Office (PMO):

The structure of the PMO is designed to better support the implementation of the Government of Liberia e-Government strategy. In implementing this structure, it is imperative to cater for alignment in the current infrastructure, organization structure and availability of resources within MoPT. As part of MoPT, the PMO set-up is called "e-Liberia Office".

The Project Management Office - e-Liberia Office is a directorate under the Ministry of Posts and Telecommunication and supports the e-Government Strategy implementation through monitoring projects delivery, controlling the relation with vendors, managing the procurement process, ensuring compliance with policies and standards, auditing projects at hand over, knowledge management and sharing for areas related to project management. The PMO plays the following roles:

Functions of the PMO:

- Provide technical advice, updates and recommendations to ensure that appropriate methods, tools, products and applications, framework policies for e-Government that cover the planning, development and maintenance of information systems and technology, are consistently communicated across, adopted and used effectively across MACs.
- Develop business cases for new technologies required to enhance or maintained the level of performance, thereby assessing the financial impact and requirement
- Provide e-Services solutions, options and alternatives to MACs exploring e-services delivery to the end-users
- Conduct requirements gathering and business analysis to translate MACs user business needs into technical requirements.
- Coordinate the communication exchange between MACs (inter and intra) on eServices projects and developments
- Engage project sponsors and stakeholders and facilitate project processes such as Change Management, Business Process Re-engineering
- Manage the content and advice the MACs on the content management on the eGovernment Portal.
- Encourage the adoption of Government-wide Shared Services and promote the benefits of sharing information across the MACs.

6.4 The Role of the Ministry

To align and coordinate the development of ICT infrastructure across the different ICT sectors and ensure overall coordination, formulation, implementation, review, and oversight of the National ICT Policy. This includes coordination with the independent regulatory authorities (LTA, IBA), as well as the Universal Access Fund, and the National ICT Agency, to achieve the objectives of this policy.

Additional roles include:

1. Carrying out periodic Impact Analysis of ICT initiatives to advise policy;
2. Ensure the collation, openness and availability of comprehensive and accurate ICT data in collaboration with other Ministries and agencies;
3. Establish the periodic review of policies and its continual alignment to the overall vision and mission of the GoL through an inclusive multi stakeholder consultation process;
4. A name change to the Ministry of Communications (with post implied) will better position the Ministry to broaden its scope in the digital space. The change of name would take place in the near future but in the interim the MoPT would assume the responsibility of the objectives set out in this policy.

6.5 The Role of the ICT Regulator

Periodic policy reviews should be undertaken to strengthen the role of the LTA in light of ongoing technology convergence which brings together Telecommunications and broadcasting sub-sectors/ sub-divisions and emerging digital services. In the interim the LTA will continue to perform the regulatory role for the telecommunications and broadcast infrastructure sector. The requisite changes in policy and laws[14] should be carried out to ensure LTA's is able to carry out its stated objectives including the following:

1. Ensure there is a level playing field and no barriers to entry for the provision of communication services;
2. Ensure those unserved by affordable services are able to connect themselves, with the support of The Universal Access Fund if necessary;
3. Continue leadership of the Universal Access Fund to advance connectivity in underserved areas;
4. Promote and protect investment in the industry with fair and competitive management practices;
5. Establish and enforce quality of service standards including technical ones;
6. Ensure the prudent/efficient allocation and management of spectrum including fair, transparent and competitive good practices;
7. Make provisions to allocate spectrum to smaller providers and increase competition for unserved areas;
8. Develop guidelines to promote efficient and effective infrastructure sharing and open access;
9. Protect the consumer via awareness and the development of consumer protection standards in line with international good practices;
10. Carry out periodic assessment of the sector and publish results in an open and easily accessible format;
11. Carry out evidenced based research and forecasts and advise the MoPT on policy for the ICT sector;
12. Pursue an infrastructure sharing policy to guide growth of independent infrastructure

[14] The current Telecommunications Act 2007 has stated objectives the LTA is working toward

management companies, encourage innovation competition and open access across all ICT owned infrastructure across multiple sectors;

13. Develop a strategy to manage the Postal Sector.

6.6 The role of Independent Broadcasting Regulator

Broadcasting content will be regulated by an independent broadcasting regulator under the Ministry of Information, Tourism and culture. The LTA will however continue to be responsible for the orderly and efficient management, allocation, assignment and use of radio frequencies, including all civilian, non-civilian and commercial uses of radio frequencies.

The LTA has implemented the broadcast frequency management function since the establishment of the Authority and has the requisite skills and human capital to implement this responsibility. The LTA has worked with the ITU and has developed Liberia's National Table of Frequency Allocations, the National Frequency Register and National Radio Spectrum Plan. Liberia is informed by international and regional best practice and needs to retain radio spectrum management with the LTA to avoid regulatory uncertainty in the Telecommunications/ICT sector, duplication of functions and the waste of scarce national resources.

6.7 The Role of Libtelco

The government has made considerable investments in Libtelco for which it is currently evaluating the most effective strategy moving forward in order to leverage this investment to the benefit of the country. One option is that Libtelco could be responsible for operating the necessary ICT infrastructure so that all government agencies are fully interconnected nationally, and to regional and international networks such as the ECOWAS Wide Area Network (ECOWAN). Another option would be to privatize Libtelco so that it can compete effectively with other players in the market. These and other options will be assessed in 2020 to ensure government's investment in Libtelco is leveraged for the benefit of the Liberian people.

6.8 The Role of the Universal Access/Service Fund

The core mandate of Universal Access/Service Fund is to channel collective industry financial resources toward investments that will fill gaps in access and stimulate overall market expansion[15]. The USAF therefore, can be viewed as equivalent to a financial institution, such as a commercial bank or investment fund: it manages capital assets, evaluates and defines projects for investment opportunities, and provides financing to implementing contractors, whose operations must be overseen and evaluated to ensure the Fund's resources are well spent. In fulfilling this mission, the LTA is responsible for USAF's management and will thus employ human and technical resources of comparable quality and magnitude to similar organizations in the public and private sector. Legislative and regulatory changes may be needed in order to give the USAFs the flexibility to support initiatives and programs. The fund's responsibilities include the following:

[15] " The role of USAF in broadband strategies" http://a4ai.org/wp-content/uploads/2015/03/A4AI-USAFs-2015_Final-v.2.pdf

1. Establish strategic planning and internal operating procedures, which guide management and staff, as well as public stakeholders, in the Fund's mission and activities;
2. Provide an annual gap analysis of underserved and unserved areas in collaborations with the Regulator and requisite ministries (eg. Interior, Health, Education);
3. Establish and implement a strategy for closing gaps to achieve universal access objectives in a fair and transparent manner;
4. Undertake periodic assessment of initiatives and publish annual reports;
5. Provide adequate technical resources and support, such as internal equipment and software, field personnel and equipment, access to outsourced expertise, etc;
6. promote cooperation with the ICT industry and government, to obtain necessary sector data, regulatory and policy support, and collaboration on partnership projects;
7. Establish autonomy and authority in both administrative budgeting and allocation of Fund resources, without undue political interference or constraints and delays in budgeting and spending;
8. Employ appropriate and trained personnel, with sufficient skills and resources to perform the various essential roles (*e.g.,* finance, market analysis, procurement, project management, monitoring and evaluation, etc.).

6.9 The Role of Government Ownership in Operating Companies

6.9.1 Libtelco

As indicated in 6.7 above, the strategy for the future of Libtelco is currently being evaluated.

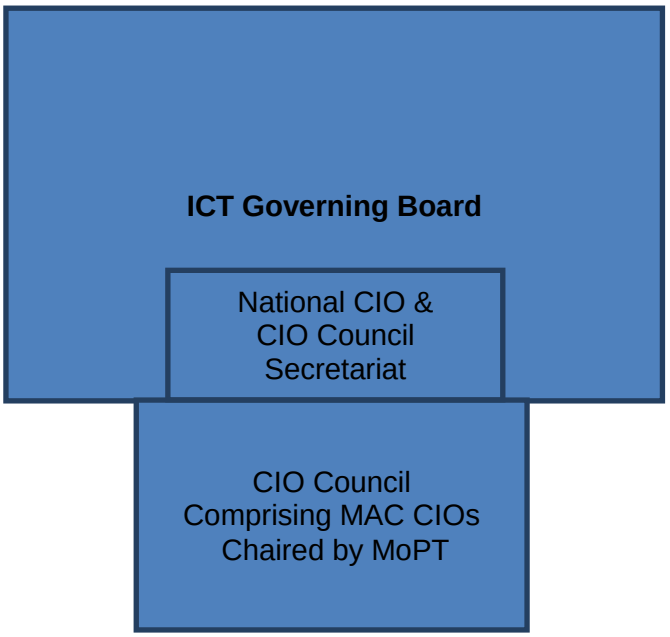
6.9.2 Cable Consortium Liberia (CCL)

The government is currently a partial shareholder in CCL and although it would likely retain a minority share for its own international traffic and for the academic-research sector, it is expected to divest the remainder to existing and new operators. To stimulate healthy competition, operators should be granted access in a non-discriminatory manner with connectivity to international internet capacity. Options that will be considered include:

1. To create a "Consortium-within-the-Consortium", for small ISPs
2. To allow small operators to invest directly in CCL.

6.10 Specific Specialized Governments Institutions

This national ICT policy must be relevant to all sectors of the economy and society. Understanding how the ICT policy will contribute to advance each government institution's agenda is critical to ensuring full support and engagement by all institutions. Indeed, the ICT sector is an engine of economic and social development. To ensure full coordination and progress, as indicated above, a cross-Ministerial CIO Council would be established to monitor progress and address any challenge that may be faced through the period of implementation. The following diagram provides a simple illustration of the collaborative nature of this effort, which requires the participation and support of all the government institutions responsible for each of the areas noted.



6.11 Summary of Proposed Roles of Institutions

Role of Cabinet and Executive (ICT leadership)

Given the importance and cross-cutting role of ICT, it is important that coordination takes place at the top executive level guided by representatives from each of the key stakeholder ministries. This will take the form of the appointment of a CIO to the Presidency and sponsorship by the Vice President for an inter-ministerial ICT task team to assist with coordination and resource sharing in the ICT development activities of each ministry in alignment with the National vision, targets and reporting. The Executive will ensure the availability of resources to requisite ministries to facilitate ICT services and most importantly be a leading user and anchor tenant of ICT services.

Role of the Ministry of Posts and Telecommunications

To formulate, align and coordinate the development of ICT policy and infrastructure across the different ICT sectors and ensure the implementation of this Policy. This includes responsibility for the regulatory authority (LTA,) and the Universal Access Fund. Additional roles may include:

1. Carrying out periodic Impact Analysis of ICT initiatives to advise policy;
2. Ensure the collation of comprehensive and accurate ICT data in collaboration with other Ministries and agencies;
3. The periodic review of policies and its continual alignment to the overall vision and mission of the GoL through an inclusive multi stakeholder consultation process.

The Role of the ICT Regulator

Periodic policy reviews will continuously be undertaken to strengthen the role of the LTA in light of ongoing and emerging technology convergence which brings together oversight of the telecommunications, Information Technology, and broadcasting sub-sectors. The LTA will continue to perform the regulatory role for the telecommunications sector, along with management of spectrum for broadcasting. The requisite changes in policy and laws will be carried out to ensure LTA is able to carry out its objectives.

Recommendations for Proposed Changes in Government Institutional Structures

1. The Chief Information Officer (CIO) for the government would be based within the Executive Office of the President. The CIO's responsibility will be to ensure the coordinated and efficient adoption of the use of ICT platforms within all government MACs and SOEs. CIO in each ministry, agency and commission will have dual reporting functions - to the Executive CIO, and to the head of their respective institutions;
2. The Liberian Telecommunications Authority (LTA) would continue to be the regulator for the Telecoms sector, which includes, broadcasting frequency allocation;
3. The CIO Council is tasked with oversight on government connectivity provision, as well as setting standards and strategy for government applications;
4. The current Infrastructure working group of the Ministry of Public Works would be upgraded to a National Engineering Coordinating Team (NECT) hosted under Ministry of Public Works but co-chaired by MoPT to coordinate all civil works and project such as roads, railways, utility ducts and aerial cables etc to agree on standards, ensure ICT infrastructure is incorporated in designs and deployment;
5. A set of targets would be established for the adoption and use of ICT in government, which would include:
    a. The national CIO shall l put in place common standards for website development for all MACs and SOEs by year 1 of approval of this policy;
    b. Establish a redundancy plan and maintenance policy in all MACs and SOEs information systems to ensure reliability in all MACs and SOEs connections and server/applications – year 1;
    c. Ensure ICT architecture systems design enforces consistency across MACs and SOEs to help ensure interoperability – year 1;
    d. All MACs and SOEs should have a web presence that is current and updated - year 1;
    e. All MACs and SOEs should transition from web presence to providing *interactive web* service by year 2;
    f. All concerned MACs and SOEs should transition from interactive web service to providing *transaction services* by year 3;
    g. All MACs and SOEs should have *enhanced web presence* by year 4[16].

[16] More on E-Government stages of E-government to E-society processes here :http://www.unpan.org/Library/MajorPublications/UNEGovernmentSurvey/PublicEGovernanceSurveyintheNews/tabid/651/mctl/ArticleVie w/ModuleId/1555/articleId/22305/Government-to-Egovernment-to-Esociety.aspx

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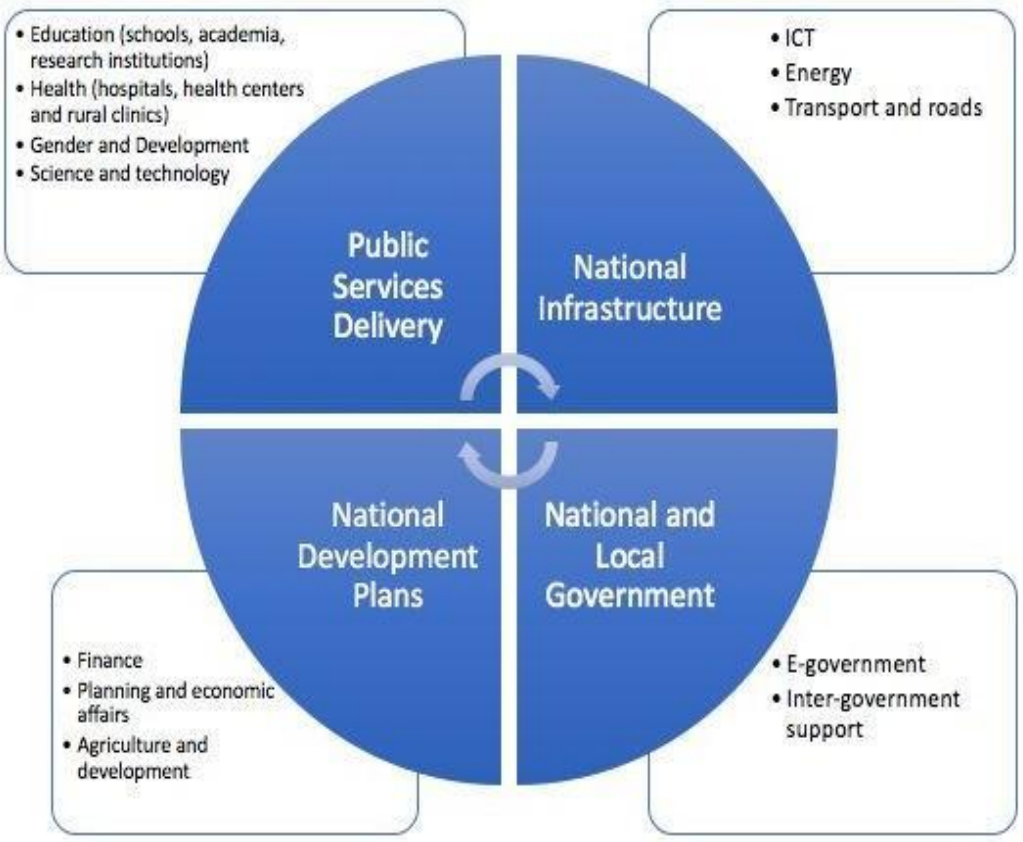
It is im*portant to note that other entities/stakeholders are also crucial to ensure support aimplementation of this policy, including, among others:*

1. Parliamentarians
2. Broadcasting Council/Commission
3. Development Partners
4. Private Sector (potentially a new Association or Chamber)
5. Civil Society organizations
6. Media organizations

The National ICT Policy Support National Development Plans and Requires Cross Ministerial Coordination



CHAPTER 3

7.0 POLICY IMPLEMENTATION AND REVIEW

This Policy should serve as a foundation to:

1. Develop action plans for the ICT sector;
2. Serve as a guide for developing cross-sectoral policies, and specific implementation guidelines as appropriate.

7.1 Strategy for Implementation

Implementation is key to ensuring that this policy achieves its objectives. Successful implementation must be backed by adequate resource allocation, an effective monitoring and review framework complete with key performance indicators, and policy targets outlined in section 4.3. These reviews should be conducted in a transparent and open manner. The responsibility for coordination of this policy will be carried out by the CIO Council as mentioned in section ***6.3*** above.

7.2 National Priorities in the ICT and Telecommunication Sector

The table below presents the priority programs in the ICT sector over the next five years. It also identifies actors that will play key roles in achieving them.

No.	Name of Project	Objective	Implementation Strategy	Responsible Party
1	National Fiber Terrestrial Backbone	To build a network that will facilitate national connectivity and broadband access	Create a Carrier of Carrier's company	MoPT, LTA, LIBTELCO with private sector players
2	Metro Fiber Ring for Monrovia	To improve broadband access in greater Monrovia	Investment is required	C-Squared and partners
3	National Universal Access Program	To expand access to voice and data services nationwide through market forces and also through subsidies	For MoPT to establish national universal access program	LTA, Licensed Service Providers, LTA and other partners
4	Mobile Number Portability	To enable user to maintain number irrespective of carrier	Develop regulation	LTA
5	Infrastructure Co-location	To share infrastructure including cost	Develop regulation	LTA
6	National Data Center	To provide a secure	Provide funding to support its	MoPT, LTA, MFDP (Finance),

		infrastructure that supports high availability data hosting services	creation	Libtelco
7	Government-wide Network	To provide secure network for e-gov services	Create funding ICT through national budget	MFDP, Libtelco Operator(s)
8	National Research and Education Network	To provide broadband access to secondary, tertiary educational and research institutions	Consortium of colleges and universities	An entity so created to implement this program, ISP and LTA
9	Human Capacity Development	Establish degree programs in ICT disciplines at the state-owned Universities and Colleges	University of Liberia (UL), W.V.S. Tubman University	Within relevant colleges/tertiary institutions
10	Implement e-services	To remove inefficiency in government, (i.e. health, commerce and education programs)	Establish e-gov, e-health, e-education and e-commerce programs	MACs, Chamber of Commerce, LIBA, other
11	National Biometric ID Card System	To provide a platform for the unique identification of all	Provide funding to achieve this objective	MIA MFDP, National Identification Registry (NIR)

7.3 Infrastructure Requirements

7.3.1 A National Fiber Backbone and Metropolitan Area Network

Access to National Fiber Backbone and Metro Fiber Area Network and also to Internet Exchange Point on an open-access principle basis provide further opportunity for building a digital Liberia. It supports innovation and service delivery across both the public and private sectors. These infrastructures are enablers that can make possible the building of an information society.

While a national Internet Exchange Point is in place, the absence of a national backbone and metro area network threaten further development of the sector. The national backbone and the metro network are capital-intensive. Innovative strategy that relies on PPP is one possible way to address this gap.

7.3.2 National Data Center

The National Data Center (NDC) is another core infrastructure for supporting e-Government. It seeks to consolidate services, applications and infrastructure to provide efficient electronic delivery of Government to Government (G2G), Government to Citizens (G2C) and

Government to Business (G2B) services. These services can be delivered by various Ministries, Agencies and Commissions (MACs) through common delivery platform seamlessly supported by core connectivity infrastructure such as Metro Area Network (MAN) and Government Wide Network (GovNet).

The NDC will provide critical functionalities including the provision of central repository of national data, secure data storage, online delivery of services, citizen service portal, web hosting, National Intranet Portal and Disaster Recovery platform.

7.3.2.1 Implementation Strategy

The National Data Centre will be housed in a secure environment with access to high speed internet and constant supply of electricity. It will consist of a primary Data Centre that will be situated in Monrovia with secondary ones replicated across the counties. These facilities will be supported by a Network Operating Centre capable to provide monitoring and control over all applications and network services originating from the National Data Centre. It will also contain a Security Operating Centre to support MACs intranet and Internet Security Operations. It will also provide several storage area networks for the storage needs of all MACs that will be hosted at the Data Centre. Establishing a national data center to meet the needs of data intensive entities such as LRA, CSA, NRADA, NEC, MFDP, MOH, MOE, MIA, and MOT among others, is cost efficient as opposed to each entity constructing its own.

7.3.3 Government-Wide Network (GovNet)

A Government-wide Network (GovNet) is a communication network established to facilitate the seamless transfer of information between Ministries, Agencies and Commissions for the provision of online services to the public at minimal cost. The objectives of GovNet are to:

1. Reduce overall telecommunication costs for the Government of Liberia;
2. Enforce standard compliance to discourage MACs from setting up their own networks;
3. Improve secure communications amongst stakeholders across government;
4. Reduce the transaction costs associated with the provision of public services and information.

8.0 RESOURCE MOBILISATION

The initial resource mobilization phase will consist of a mapping process to identify which targets are being worked on already and which have been completed – e.g the spectrum plan and digital financial policy are already largely completed. In addition, an assessment would be made of the level of implementation and enforcement of the relevant existing laws. Following this, an assessment of the cost implications of achieving the targets set out in the policy would be carried out by each concerned MAC, along with identification of potential sources of funds. An assessment would also be made of the potential for raising the necessary resources through a specific levy applied to the ICT sector or through the USF to provide support for the action items.

Actionable Issues	Potential Resources to Support Implementation (Estimated cost for each line to be determined by relevant MACs)
Improving Policy/Regulatory Framework	• National budget, development aid and technical assistance
Expanding and improving ICT infrastructure	• Private sector, PPPs, USF
Broadband access and use	• National budget, development aid and technical assistance, private sector, USF
Spectrum Management	• National budget
Cyber-security	• National budget, development aid, USF
Universal Access & Universal Access Fund	• Sector contributions, national budget, international contributions
Gender and Women and ICT	• Sector contributions, national budget, international contributions
Human Resources	• National budget
Innovation and Research	• National budget, development aid and technical assistance, private sector
Consumer Protection	• National budget, development aid and technical assistance
Reform of ICT governance structure	• National budget, development aid and technical assistance, private sector

9.0 MONITORING AND EVALUATION

Failure to monitor the implementation of ICT policy measures at an early stage can delay ICT developments and reduce the effectiveness of policy measures. Key components of an ICT policy review include: identifying key challenges and solutions; implementing mechanisms for ICT policies, plans and programs; monitoring and review, coordination mechanisms; and institutional framework and stakeholder analysis.

In addition, data collection will be a key element to ensure quality monitoring of progress towards achieving agreed targets. It is important to consider and secure a number of key elements: reliable sources of data, clear definition of indicators associated with agreed targets, and transparent and robust methodologies (see table below for a brief overview).

Data collection for monitoring progress needs to consider a number of dimensions

The realization of the outputs of this policy will require consistent monitoring and evaluation of the outcome indicators that will help policymakers to:

1. Quantify achievements regarding the implementation of ICT policy measures as foreseen in national ICT plan(s);
2. Identify critical success factors, international best practices and conditions, as well as reasons for failure to be able to adjust and reform ICT policies; and
3. Formulate new policy decisions to support and accelerate ICT penetration in government, businesses and the society

The Ministry together with the LTA and other key sector stakeholders will carry out monitoring and evaluation at different levels of the impact of implementation of this policy. A monitoring and evaluation framework will be developed to ascertain medium and long-term impact of the policy across Government arms. The policy will receive a mid-term review at year 3 and a long term review in year 5 in order to provide opportunities for adjustment and refining based on new challenges, opportunities and resources.

10.0 CONCLUSION

This ICT policy is an overarching one that underpins ICT development across all sectors of the economy. Accordingly, it is being developed at a crucial time in Liberia's development post war and Ebola. During the drafting phase, a number of consultations were undertaken with various ministries from Commerce, Health, Education, Public Works, Finance Development and Planning, Internal Affairs, Gender. These consultations revealed various levels of ICT development either in regulation or policy at different stages within ministries and agencies that need to be harmonized under one policy. This makes the document cross-sectoral.

To ensure complete inclusivity of all opinions and ideas, regional consultations and validation were undertaken in Zwedru, Gbarnga, Tubmanburg, Buchanan and Monrovia. The policy l aims to SET Liberia on its path to become a knowledge driven, informed society with improved social Inclusion.

11.0 ANNEXES

I. ICT Policy Components - Responsibility Of Other Ministries And Agencies (Affirmation Sheet)
II. List of reference materials
III. Selected target dates
IV. List of Consultations
V. Suggested members of the Cross-Ministerial Committee
VI. List of acronyms
VII. Glossary of Terms

I. ICT Policy Components - Responsibility of Other Ministries And Agencies (Affirmation Sheet)

Actionable Issue: Improving Policy/Regulatory Framework			
Measurable Targets	**Responsible Ministry/Agency/Commission**	Timeline	**Status**
Complete review of existing policies and laws with a plan for harmonization where necessary	• Ministry of Posts & Telecommunications • Liberia Telecommunications Authority	Year 1	Pending
Enact harmonization of existing policies/laws	• Ministry of Posts & Telecommunications • Liberia Telecommunications Authority	Year 1	Pending
Update existing and draft new policies and laws as required (e.g., digital financial services, electronic transactions, protection of children etc. and others as needed)	• Ministry of Posts & Telecommunications • Liberia Telecommunications Authority	Year 2	On-going

Actionable Issue: Cyber-security			
Measurable Targets	**Responsible Ministry/Agency/Commission**	**Timeline**	**Status**
Establish a national cyber-security advisory committee	• Ministry of Posts & Telecommunications • Ministry of National Defense • Liberia Telecommunications Authority	Year 1	On-going
Draft cyber-security policy	• Ministry of Posts & Telecommunications • Ministry of National Defense • Liberia Telecommunications Authority	Year 2	Pending
Adopt cyber-security Legislation	• Ministry of Posts & Telecommunications • Ministry of National Defense • Liberia Telecommunications Authority	Year 3	Pending

Actionable Issue: Digital Financial Services			
Measurable Targets	**Responsible Ministry/Agency/Commission**	**Timeline**	**Status**
Draft a national policy on interoperability of telecom networks for digital financial services.	• Ministry of Posts and Telecommunications CBL • MFDP • Other stakeholders	Year 4	Pending

Actionable Issue: Consumer Protection			
Measurable Targets	**Responsible Ministry/Agency/Commission**	**Timeline**	**Status**
Draft consumer and child protection policy	• Ministry of Posts and Telecommunications • Ministry of Commerce • Ministry of Gender, Children and Social Protection	Year 2	Pending

Actionable Issue: Expanding and improving ICT infrastructure			
Measurable Targets	**Responsible Ministry/Agency/Commission**	**Timeline**	**Status**
Map existing and planned fiber and passive utility infrastructure – backbones, road, rail, towers, pipelines etc	• Ministry of Posts & Telecommunications • Liberia Telecommunications Authority • LIBTELCO • MPW • Private Sector Service Providers	Year 1	Pending
Adopt a “dig once” regulation (i.e requirement for inclusion of ducts in all new and resurfaced and existing roads where possible and a mandatory provision for use by third parties of any telecom ducts laid by operators)	• Ministry of Posts & Telecommunications • Liberia Telecommunications Authority • LIBTELCO • MPW • Private Sector Service Providers	Year 1	Pending
Adopt infrastructure sharing guidelines for all ISPs and mobile network operators to allow for colocation of equipment	• Ministry of Posts & Telecommunications • Liberia Telecommunications Authority • LIBTELCO • MPW • Private Sector Service Providers	Year 2	Pending
Ensure rights of way access over public land	• Ministry of Posts & Telecommunications	Year 1	Pending

infrastructure	• Liberia Telecommunications Authority • LIBTELCO • MPW • Private Sector Service Providers		
Complete the implementation of key infrastructure programs (e.g., national terrestrial backbone network, metro-fiber ring, etc. as listed in section 7.2)	• Ministry of Posts & Telecommunications • Liberia Telecommunications Authority • LIBTELCO • MPW • Private Sector Service Providers	Year 5	On-going
Establish effective national management of the .lr ccTLD	• Ministry of Posts & Telecommunications • Liberia Telecommunications Authority • LIBTELCO • MPW • Private Sector Service Providers	Year 1	On-going

Actionable Issue: Broadband Access and Use – Initial Targets			
Measurable Targets	**Responsible Ministry/Agency/Commission**	**Timeline**	**Status**
Adopt affordability target of 1GB of mobile prepaid data priced at less than 2% of average monthly per capita income ("1 for 2" target)	• Ministry of Posts & Telecommunications • Liberia Telecommunications Authority • Private Sector Service Providers	Year 1	Pending
Achieve "1 for 2" target for mobile broadband affordability	• Ministry of Posts & Telecommunications • Liberia Telecommunications Authority • Private Sector Service Providers	Year 5	Pending
15% of Liberians regularly access and use mobile broadband services (3G and higher)	• Ministry of Posts & Telecommunications • Liberia Telecommunications Authority • Private Sector Service Providers	Year 1	On-going
35% of Liberians regularly access and use mobile broadband services (3G and higher)	• Ministry of Posts & Telecommunications • Liberia Telecommunications Authority • Private Sector Service Providers	Year 5	On-going
10% of Liberians access and use fixed broadband services	• Ministry of Posts & Telecommunications • Liberia Telecommunications Authority • Private Sector Service Providers	Year 5	On-going

Speed of fixed and mobile services to public institutions, the private sector and the public should be sufficient to meet their needs for efficient and timely data transfer	• Ministry of Posts & Telecommunications • Liberia Telecommunications Authority • Private Sector Service Providers	Year 5	On-going

Actionable Issue: Spectrum Management			
Measurable Targets	**Responsible Ministry/Agency/Commission**	**Timeline**	**Status**
Update 5 -year spectrum management plan	• Liberia Telecommunications Authority	Year 2	On-going

Actionable Issue: Universal Access and Universal Access Fund			
Measurable Targets	**Responsible Ministry/Agency/Commission**	**Timeline**	**Status**
Implement the USF	• Ministry of Posts & Telecommunications • Liberia Telecommunications Authority • Private Sector Service Providers	Year 1	On-going
All project disbursements and financial reports published and easily accessible to the public	• Ministry of Posts & Telecommunications • Liberia Telecommunications Authority • Private Sector Service Providers	At least annually after start of fund operations	On-going
All Liberians have local access to affordable voice services	• Ministry of Posts & Telecommunications • Liberia Telecommunications Authority Private Sector Service Providers	Year 5	On-going

Actionable Issue: Gender and Women and ICT			
Measurable Targets	**Responsible Ministry/Agency/Commission**	**Timeline**	**Status**
Baseline research on national access and use of ICT including among women, girls, and other marginalized groups	• Ministry of Gender, Children and Social Protection	Year 1	Pending
National plan to improve gender equity in access and use	• Ministry of Gender, Children and Social Protection	Year 2	Pending

Actionable Issue: Education			
Measurable Targets	**Responsible Ministry/Agency/Commission**	**Timeline**	**Status**
Complete an inventory of Internet access (and type of access) of all schools and at all levels	• Ministry of Education	Year 1	Pending
Improve Internet access in schools by 20% over current level	• Ministry of Education	Year 5	On-going
Establish an information system to identify and list the skills (ICT) that are required for different jobs to be used by the Ministry of Education in the design of its training courses	• Ministry of Education	Year 1	Pending
All secondary schools offer at least 1 ICT related course or program	• Ministry of Education	Year 5	On-going
Tertiary education institutes to offer ICT certification	• Ministry of Education	Year 4	On-going
Proportion of teachers trained to teach subjects using ICT increase by 50% over current level	• Ministry of Education	Year 4	On-going

Actionable Issue: Innovation and Research			
Measurable Targets	**Responsible Ministry/Agency/Commission**	**Timeline**	**Status**
Complete map of key public, private and other sponsored activities that support innovation and research	• Ministry of Education	Year 1	Pending
Develop public + private investment and support plan for a National Research and Education Network (NREN), and support for targeted innovation activities and spaces.	• Ministry of Education	Year 2	Pending

Actionable Issue: Reform of ICT governance structure			
Measurable Targets	**Responsible Ministry/Agency/Commission**	**Timeline**	**Status**
Ministry of Posts and Telecommunications to review existing legislation and complete feasibility plan for implementation of revised governance structure for the ICT sector	• Ministry of Posts and Telecommunications	Year 1	Pending
Enact structural reforms	• Ministry of Posts and Telecommunications • National Legislature	Year 1	On-going

Actionable Issue: Health and ICT			
Measurable Targets	**Responsible Ministry/Agency/Commission**	**Timeline**	**Status**
50% of all clinics and hospitals have Internet access	• Ministry of Health	Year 3	On-going
100% of all clinics and hospitals have Internet access	• Ministry of Health	Year 5	On-going
E- health strategy including a Health Information System	• Ministry of Health	Year 2	On-going

Actionable Issue: Local Government			
Measurable Targets	**Responsible Ministry/Agency/Commission**	**Timeline**	**Status**
All County Service Centers have Internet access	• Ministry of Internal Affairs	Year 3	On-going
All Superintendent offices have Internet access	• Ministry of Internal Affairs	Year 5	On-going
IFMIS platform expanded to all counties with reliable internet access (broadband)	• MFDP • Ministry of Internal Affairs	Year 5	On-going

Actionable Issue: Ministries, Agencies, and Commissions (MACs)			
Measurable Targets	**Responsible Ministry/Agency/Commission**	**Timeline**	**Status**
All MACs in Monrovia have Internet Access	• Each relevant MAC	Year 1	On-going
All other MACs in counties have Internet access	• Each relevant MAC	Year 5	On-going
The CIO put in place a common standard for website development for all MACS	• Chief Information Officer	Year 1	On-going
Ensure ICT architecture systems design enforces consistency across MACs to help ensure interoperability	• Chief Information Officer	Year 1	On-going
Establish a redundancy plan and maintenance policy in all MAC information systems to ensure reliability in Ministry connections and server/applications	• Chief Information Officer	Year 1	Pending
All MACs should have enhanced web presence on all online platforms	• Each relevant MAC	Year 4	On-going

II. List of reference materials

A4AI (2016) "Redefining Broadband Affordability: Adopting a "1 for 2" Target to Enable Universal, Affordable Access. Washington DC: Alliance for Affordable Internet.

A4AI (2016) The role of USAF in broadband strategies" Available at: http://a4ai.org/wp-content/uploads/2015/03/A4AI-USAFs-2015_Final-v.2.pdf

Asia-Pacific Cybersecurity Dashboard; A Path to a Secure Global Cyberspace. www.bsa.org

Consultancy Services for Conducting a Feasibility Study for the Deployment of a National ICT Backbone Network. June 2016

Consumer Protection, GSMA Mobile Policy Handbook. https://www.gsma.com/publicpolicy/handbook/consumer-protection

ECOWAS (2015). reviews Strategy for ICT growth and development, News report. Available : https://www.ecowas.int/ecowas-reviews-strategy-for-ict-growth-and-development/

EU spectrum Policy - https://ec.europa.eu/digital-single-market/node/173

Finland (2013) Education Policy Outlook. OECD, Available : http://www.oecd.org/edu/EDUCATION%20POLICY%20OUTLOOK%20FINLAND_EN.pdf

Frempong G.(2010). Ghana ICT Sector performance Review 2009/2010, *Towards Evidence-based ICT Policy and Regulation Volume Two, Policy Paper 8, 2010. Available : http://www.researchictafrica.net*

Ghana Data Protection Act 2012, Available at : https://dataprotection.org.gh

GoL. (2011). National Telecommunications & ICT Policy 2010-2015. Monrovia, Liberia: Ministry of Post and Telecommunications, Government of Liberia.

GoL. Liberia National Vision 2030, Summary Report.

Government of Mauritius (October 2010) Open Access Policy,, available at http://www.telcomit.gov.mu

Government of Rwanda (2005), An integrated ICT led Socio-Economic plan for Rwanda 2006-2010,The NICI- 2010

Government of Rwanda (2014) National ICT Strategy and Plan NICI 2015, Available : http://www.rdb.rw/uploads/tx_sbdownloader/NICI_III.pdf

Government of Rwanda (2015). ICT for Rwanda Agriculture (ICT4Rag) Strategy (2016-2020)

GSM Association (2017). GSMA Intelligence Database. Available at : https://www.gsmaintelligence.com/

International Telecommunications Union (2007). Cybersecurity guide for developing countries Edition 2007 pp 9,41, 81-97

ITU (2013). Regulation and Consumer Protection In A Converging Environment.

ITU (2016) Trends in Telecommunications reform 2016,ITU publication. Available upon request: http://www.itu.int/pub/D-PREF-TTR.17-2016

ITU (2016), ICT Development Index, ITU, available at http://www.itu.int/net4/ITU-D/idi/2016/

ITU (2016). Measuring Information Society Report 2016. Geneva: International Telecommunications Union.

ITU (2017) World Telecommunication/ICT Indicators Database. Geneva: International Telecommunications Union.

Kenya Draft ICT Policy discussions 2016. (July 12 2016) Kenya ICT Action Networks (KICTAnet) Available at: https://www.kictanet.or.ke

Liberia's New National Development Strategy : Planning for Stronger Results in a Low Capacity Context. 2013, World Bank Institute (WBI); Available : https://openknowledge.worldbank.org/handle/10986/16456

Liberia's Policy for the Telecommunications and Information Communications Technology (ICT) 2010. Available at : http://www.eliberia.gov.lr

Microsoft Corporation (2014). New Report outlines Cybersecurity challenges in Developing countries, Microsoft Corporate blogs, Available : http://blogs.microsoft.com/on-the-issues/2014/01/16/new-report-outlines-cybersecurity-challenges-in-developing-countries/#7FcWatS2ygLC1isV.99

National Information and Communication Technology (ICT) final policy 2012, Federal Republic of Nigeria, August 2012. Available : http://a4ai.org/wp-content/uploads/2014/03/Approved_ICT_Policy-2012.pdf

Nigeria's broadband plan 2013-2018, A submission made by the presidential Commission on broadband. Available at : https://www.researchictafrica.net/countries/nigeria/Nigeria_National_Broadband_Plan_2013-2018.pdf

OFCOM (2012) The Postal Services (universal Postal services) Order. Available: https://www.ofcom.org.uk/_data/assets/pdf_file/0027/71784/annex6.pdf

OFCOM (2016) Spectrum Management. Available :https://www.ofcom.org.uk/spectrum/spectrum-management

OECD (2008). Enhancing Competition in Telecommunications: Protecting and Empowering Consumers.

OECD (2014) Digital Government Toolkit, Digital Government Good practices: Mexico ICT Policy, available at http://www.oecd.org/gov/mexico-ICT-policy.pdf

Republic of Kenya (2016) Draft National ICT Policy, available : http://icta.go.ke

Republic of Mauritius (2012).National Broadband Policy (2012-2020 (NBP2012),

Sambuli, N. and Whitt, J.P. (2017) Technology innovation hubs and policy engagement. Making All Voices Count Research Report. Brighton: Institute of Development Studies.

Seychelles (2016).National ICT policy,, Connected to the community, Connected to the world.

Available : http://www.ict.gov.sc/resources/policy.pdf

SIDA (2014) " Disability Rights in Liberia" Available at:

http://www.sida.se/globalassets/sida/eng/partners/human-rights-based-approach/disability/rights-of-per

sons-with-disabilities-liberia.pdf

Spectrum Management and Licensing : GSMA Mobile Policy Handbook
-https://www.gsma.com/publicpolicy/handbook/spectrum-management-and-licensing

Trinidad and Tobago (2013). Draft Trinidad and Tobago National ICT plan 2014-2018 (SMARTT). Available :
http://ICTymposiumtt.gov.tt/wp-content/uploads/2012/07/smarTT%20Draft%20ICT%20PLAN%202013- 12-10.pdf

UNCTAD (2016). United Nations Guidelines for Consumer Protection.

Web Foundation (2015) Women's Rights Online: Translating Access into Empowerment. Available at http://webfoundation.org/about/research/womens-rights-online-2015/

World Bank (2013). "Cables, Commissions, and Cybercafés: ICT in Post-Conflict Liberia," http://www.infodev.org/infodev-files/resource/InfodevDocuments_1206.pdf

Yong-Hwan Lee (ICT as a key engine for development: good practices and lessons learned from Korea,- Information Solutions Group (ISG). Available at:
http://siteresources.worldbank.org/INTEGOVERNMENT/Resources/NoteKoreaICT.doc

III. List of Consultations

The following organizations and sites were consulted:
Ministry of State for presidential Affairs: www.emansion.gov.lr
Ministry of Post and Telecommunications : www.mopt.gov.lr
Ministry of Information Culture and Tourism:
Ministry of Health:
Ministry of Education:
Ministry of Public Works:
Ministry of Internal Affairs
Ministry of Youth and Sports
Minister of Commerce and Industry
Ministry of Finance : www.mof.gov.lr
Liberia Telecommunications Authority: www.lta.lr
National Investment Commission
Digital Liberia

IV. Selected target dates (To be confirmed)

V. Suggested members of the Cross-Ministerial Committee (TBC)

VI. List of acronyms

A

ACE - African Coast to Europe
API - Application Programming Interface
ATU- African Telecommunication Union
ACE - African Coast to Europe

B

BPO - Business process outsourcing

C

CCL - The Cable Consortium Company of Liberia
CERT - Computer Emergency Readiness Team
CIMS - Concessions Information Management System
CIO - Chief Information Officer
CLSG - Côte d'Ivoire, Liberia, Sierra Leone and Guinea
CSA - Civil Service Agency

E

ECOWAN - ECOWAS Wide Area Network
ECOWAS - Economic Community of West African States

G

G - Gigabyte
G2B - Government to Business
G2C- Government to Citizen
G2G - Government to Government
GDP - Gross Domestic Product
GSM - Global System of Mobile Communications
GoL - Government of Liberia
GovNet - Government Wide Network
GSMA - Global Systems Mobile Association

I

IBA- Independent Broadcasting Authority
ICANN - Internet Corporation for Assigned Names and Numbers
ICT - Information Communications Technology
IFMIS - Integrated Financial Management Information System
ISM - Industrial, Scientific and Medical
ISP - Internet Service Providers
IT - Information Technology
ITU - International Telecommunications Union
IXP - Internet Exchange Point
IXPN - Internet Exchange Point Network

L

LBA - Liberia Broadcasting Association
LDCs - Least Developed Countries
LIBTELCO - The Liberia Telecommunications Corporation
LRA - Liberia Revenue Authority
LTA - The Liberia Telecommunication Authority

M

M2M - Machine to Machine
MAC - Ministries, Agencies and Commissions
MAN - Metro Area Network

MB - Megabyte
MDAs - Ministries, Departments and Agencies
MFDP - Ministry of Finance & Development Planning
MIA - Ministry of Internal Affairs
MNOs - Mobile Network Operator(s)
MOE - Ministry of Education
MOH- Ministry of Health
MoPT - Ministry of Post and Telecommunications
MOT - Ministry of Transport

N
NDC - National Data Center
NEC - National Elections Commission
NREN - National Research/Education Network
NUAPS - National Universal Access Program Strategy

P
PIU - Project Implementation Unit
PPP - Public Private Partnership(s)

R
ROW - Rights-of-Way

S
SET - Structure, Empower and Transform
SDGs - Sustainable Development Goals

T
TV - Television

U
UN - United Nations
UPU - Universal Postal Union
USAF - Universal Service and Access Fund
UAF - Universal Access Fund

V
VSAT - Very Small Aperture Terminal

VII.Glossary of Terms

A

Accelerator- Places or institutions designed to accelerate or fast track the growth of start-ups to the market. Users/entrepreneurs in this space are provided with the appropriate tools to see thei innovations go to market.

B

Benchmarking - The continuous process of measuring product, services and practices against recognized leaders.

Business Process Outsourcing (BPO) - Entrusting one or more IT integrated-type business processes to an external service provider.

Broadband - A signaling method that handles a wide range of frequencies, thus allowing the transmission of high quality audio and visual signals.

Broadcasting - Transmission of visual and audio content, from a source and for reception by multiple members of the public or group.

Co-location - refers to a situation where different operators share common infrastructure like towers, power, security, space etc to achieve logistic and financial advantage.

Computer - Means any electronic, magnetic, optical or other high-speed data processing device or system which performs logical, arithmetic and memory functions by manipulations of electronic, magnetic or optical impulses, and includes all input, output, processing, storage, software and communication facilities which are connected or related as a system or network.

Computer Emergency Response Team (CERT) - This is a name given to expert groups that handle computer security incidents.

Country Code Top-Level domain (ccTLD) - is an Internet top-level domain generally used or reserved for a country or a sovereign.

Convergence Technological convergence is the tendency for different technological systems to evolve toward performing similar tasks.

Digital Broadcasting - is the practice of using digital data rather than analogue waveforms to carry broadcasts over television channels or assigned radio frequency bands. It is becoming increasingly popular for television usage (especially satellite television).

Digital literacy - refers to the ability to locate, organize, understand, evaluate, and analyze information using digital technology.

Duct- Also referred to as a **utility** tunnel, **utility** corridor. a passage built underground or aboveground to Communications **utilities** like fiber optics, cable television and telephone cables are carried. Other ducts carry **utility lines** such as electricity, water and sewer pipes.

E

e-Commerce - The transfer of value for goods and /or services through electronic media.

e-Education - the delivery of training or education program by electronic means, it involves the

use of a computer or electronic device to provide material.

e-Government - Government's use of ICT to enhance the management of its activities and delivery of services.

e-Health Health services and information delivered or enhanced through the use of ICT.

e-Learning - learning conducted via electronic media, usually the Internet.

F

Fixed Wireless - The operation of wireless devices or systems used to connect two fixed locations with a radio or other wireless link.

G

Global System for Mobile Communications (GSM) - is a standards based network for mobile communications system operating at 900 – 1800 mhz.

Google Project Link - a Google initiative via the company C-Squared that aims to spread internet access to developing areas across the world. Through the project, Google is building fiber optic networks in areas that don't already have access to fast and reliable internet. The fiber will connect existing, local networks to the undersea cables that pipe internet between continents, which Google hopes will allow the area's internet service providers and mobile operators to begin expanding and improving their services.

H

Hardware The physical interconnections, systems and devices required to store and execute software programs.

Hub - Physical spaces designed to foster the success of tech projects. They are often shared spaces with the cost of running these places shared amongst users or sponsored by a funder

I

Incubator- Incubators are places designed to accelerate the growth of start-ups and in specific reference to ICT, users are given additional skills to grow their ideas

Information and Communications Technology (ICT) - is an umbrella term that includes any communication device or application, encompassing radio, television, cellular phones, computer and network hardware and software, satellite systems, as well as the various services and applications associated with them, that provide access to information.

Information and Communications Technology for Development (ICT4D) - The application of information and communications technologies to support social, economic, political, environment and other development related programs and interventions.

Information Society - describes a modern population that is conversant with — and actively using — information and communications technology. A society where the creation and exchange of information is a key social and economic activity.

International Telecommunications Union (ITU) - The United Nations agency that is responsible for coordinating shared global use of spectrum, setting global telecommunications standards and also for ICT development.

K

Knowledge Management - the efficient handling of information and resources within government

and related agencies.

L

Liberalization - the relaxation of Government regulation or formerly rigid or constraining degree of regulation. This creates greater freedom to market entry, providing the operators with greater flexibility to invest, alter operations and services, and fix or negotiate tariffs.

License - An authorization granted by a regulatory authority for the provision of ICT services or for use of the radio frequency spectrum.
Licensee- The acquirer of a license by a regulatory authority subjected to the obligations of the license

N

National ICT statistics Repository - A publicly available database of relevant ICT access and use indicators for the country with data disaggregated by gender, region, and other relevant demographics.

O

Open Access - a network providing wholesale access to telecommunications capacity on transparent and non-discriminatory terms.

P

Portal - A Website that provides a one - stop shop to a variety of services by transferring the user to the selected application.
President: Democratically elected head of the Republic of Liberia.

Private Operator: Licensee of a telecommunications system that provides ICT services.

Public Private Partnership (PPP) - is a partnership approach bringing government and the private sector together, sharing assets, risks and rewards, to delivery a project/service/initiative of mutual benefit.

Q

Quality of Service - is most commonly used to denote the measure of performance within a communications network against international standards.

R

Radio Spectrum - The word spectrum refers to a collection of various types of electromagnetic radiations of different wavelengths. Spectrum or airwaves are the radio frequencies on which all communication signals travel. Radio frequencies are used for different types of services like space communication, mobile communication, broadcasting, radio navigation, mobile satellite service, aeronautical satellite services, defence communication etc. Radio frequency is a natural resource, that will deplete when used, and will be wasted if used inefficiently.

Radio Spectrum Management - involves the ongoing transparent and evidenced-based allocation, assignment, and monitoring of spectrum use.

Regulation - refers to a rule or directive made and maintained/enforced by an authority

S

Software - a collection of computer programs and associated data that provides the instructions for telling a computer what to do, and how to do it to achieve a particular outcome..

Service Provider: A person or entity under permit or license by the LTA or LBA that to provides

an ICT service to the public or who owns or operates an ICT network used to provide ICT services to the public.

T

Telecommunication -means any transmission, emission or reception of signs, signals, writing, images, sounds, pictures, data or information of any kind by wire, radio, optical or other electromagnetic means of communications[17]

[17] From Telecommunications Act 2007. www.lta.gov.lr

Telecommunications service- means any provision of the voice and data transmission; SIM cards and Prepaid accessories; equipment and facilities to customers; or any form of transmission of signs, signals, text, images or other intelligence by means of a telecommunications network, but does not include a broadcasting service;

U

Universal Access Service - refers to the practice of providing baseline level of ICT services to every resident to increase access to advanced telecommunications services as far as possible, to all the people without discrimination on any basis with adequate facilities at reasonable cost throughout Liberia.

Universal Service Obligation - a legal requirement that sets specific minimum levels of attainment for service elements that serves substantially all persons.

Universal Access Fund (UAF) - a fund created to facilitate the achievement of national policy goals for universal service and universal access to Information and Communication Technologies (ICT) in rural, un-served and under-served areas in Liberia.

V

Very Small Aperture Terminal (VSAT) - a very small satellite transmitting and receiving station that can transfer data, video, and voice via satellite using different frequency bands to increase internet coverage within Liberia.