
FUNDING PROPOSAL

Feasibility Study
Of the Economic and Financial Viability
Of Undersea Fiber Connectivity
To the Mano River Union Countries
(Liberia, Guinea & Sierra Leone)

Submitted by
The Ministry of Post and Telecommunications
Republic of Liberia

October 13, 2008

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1 Acronyms

ADSL	Asymmetrical Digital Subscriber Line
BCEAO	Central Bank of West African States
CFA	Unit of West African Currency
DM	Definitional Mission
EAIF	Emerging Africa Infrastructure Fund
FMFM	Frontier Markets Fund Managers
GB	Gigabits
ICT	Information and Communications Technology
IT	Information Technology
IMF	International Monetary Fund
ISP	Internet Service Provider
ITU	International Telecommunications Union
Km	Kilometers
LTA	Liberia Telecommunications Authority
LTC	Liberia Telecommunications Corporation
Mbs	Megabits
MRU	Mano River Union
MPT	Ministry of Post and Telecommunications
NICI	National Information and Communications Infrastructure
NO	National Operator
PIDG	Private Infrastructure Development Group
SAT-3/WASC	Southern Africa – Western Africa Submarine Cable
SLGSMOA	Sierra Leone GSM Operators Association
SOTELGUI	Société des Télécommunications de Guinée (Sotelgui)
SierraTel	Sierra Leone Telecommunications Company
TOR	Terms of Reference
USD	United States Dollar
VPN	Virtual Private Network
WB	World Bank
WiFi	Wireless Fidelity
WLL	Wireless Local Loop

2 Executive Summary

a Overview

Mano River Union (MRU) is an international association established in 1973 between Liberia and Sierra Leone. In 1980, Guinea joined the union. The goal of the Union was to foster economic cooperation among the countries. It is named for the Mano River which begins in the Guinea highlands and forms a border between Liberia and Sierra Leone.

The Mano River Union Countries – Liberia, Sierra Leone and Guinea (collectively referred to as MRUC) have severe lack of broadband capacity, as well as lack of affordable connectivity to neighboring countries and to the rest of the world. These three nations are the only countries in the region that do not have access to international undersea cable, such as SAT-3 off the coast of West Africa, that could provide high bandwidth, low latency connectivity to the rest of the world. The Lack of such infrastructure means that these countries are forced to rely on expensive satellite connections resulting in high local and international telecommunications costs, limited bandwidth capacity, and inter-operability problems among local carriers. MRUC have a very active mobile telecommunications sector, and several operators, including Liberia's national operator, the Liberia Telecommunications Corporation (Libtelco), have begun exploring limited fiber infrastructure. However, none of these carriers have the capacity to facilitate connectivity to low latency fiber system, such as the SAT-3 cable network.

The region, recovering from years of devastating civil conflict, lacks basic infrastructure to support governments' development goals. Limited finance and poor telecommunications network severely hamper these objectives. In the telecommunications sector, the region has made great strides toward modernization by developing policies and creating environments that are solid platforms for investment with establishment of regulatory authorities, the passing of new telecommunications laws that are consistent with international best practices. The result is expected to be more and better ICT services for the people of the entire region.

The region has a vibrant mobile telephone market, but limited fixed line infrastructure. This lack of infrastructure forces the region to depend on high cost satellite linkages for internal and external connectivity.

The project is estimated to cost in excess of US\$10 million. Because of its potential high value for exports from ITU member states, and the projects high potential for development impact, The Ministry of Post and Telecommunication of the Republic of Liberia (MPT) recommends the project to ITU for financing considerations

b Project Summary

Date: October 13, 2008

Organization: Ministry of Post and Telecommunications

Address of organization: Carey Street, Monrovia, Liberia

Purpose: Funding to provide a common access point in Liberia to connect Sierra Leone, Guinea and Liberia to SAT 3 as the most convenient backbone to enhance their respective connectivity.

Summary: This document identifies as key issue the need to establish a common connecting point in Liberia to link Sierra Leone, Guinea and Liberia to the Marine cable as a critical program to bridge the digital divide threatening the objectives of the World Summit of Information Society as well as a major obstacle to connecting Africa. These countries in the Mano River basin are the only ones that lack access to the desirable backbone in the whole of West Africa.

Creating a common connecting point in Liberia as a strategic location to link Guinea, Sierra Leone and Liberia to the marine cable is a guarantee to overcoming pressing constraints that will invariably accelerate the provision of services to all peoples of the region. Hence, this proposal seeks to address the issue of connectivity and access to the cable as an issue of major policy concern to the region.

Proposed by: Hon Jeremiah C. Sulunteh
Minister of Post & Telecommunications
Republic of Liberia

3 Background Information

a Liberia

Liberia, founded in 1847 by freed African slaves from the United States, is situated on the Atlantic Coast of West Africa with Sierra Leone, Guinea, and Côte d'Ivoire as bordering countries. Liberia has approximately 3.5 million inhabitants and is attempting to reconstruct itself after decades of civil conflict.

In 2003, with the resignation of warlord turned President, Charles Taylor, a transitional government in Liberia was formed. The Accra Comprehensive Peace Agreement signed in 2003 initiated a political transition, culminating in presidential elections in October-November 2005. When the votes were tallied, Africa's first elected female head of state, President Ellen Johnson-Sirleaf was elected. President Johnson-Sirleaf's job is formidable, governing a country with weak or destroyed infrastructure, a mostly poor and under educated population, and broad unemployment.

Liberia's two civil wars during 1989-2003 had a devastating impact on Liberia's economy, reducing real GDP to about 40 percent of its pre-war level. An estimated 64 percent of the population of 3.8 million lives below the national poverty line.

Over the past two years, the Liberian government has implemented significant reforms to rebuild its economy and reduce poverty. With high poverty rates, unemployment of around 85%, no national electricity grid, and devastated infrastructure, the country is making slow but steady progress towards sustainability with the help of the international community. The absence of infrastructure throughout the country continues to depress productive capacity, despite Liberia's rich natural resources.

Over the last five years, Liberia has worked steadily to rebuild the infrastructure and institutions destroyed by 14 years of civil war. The democratically elected government, headed by Africa's first female president Ellen Johnson-Sirleaf, has implemented significant reforms to rebuild the economy, reduce poverty, and invite foreign investment. As evidence of its progress, Liberia has cleared its obligations to the International Monetary Fund, World Bank, and African Development Bank over the past 16 months, allowing the country to receive much needed financial support from international institutions.

b Sierra Leone



Sierra Leone is located in Western Africa, bordering the North Atlantic Ocean, between Guinea and Liberia; with an estimated population of 6.3 million. Democracy is slowly being reestablished after the civil war from 1991 to 2002 that resulted in tens of thousands of deaths and the displacement of more than 2 million people (about one-third of the population). The military, which took over full responsibility for security following the departure of UN peacekeepers at the end of 2005, is increasingly developing as a guarantor of the country's stability. The armed forces remained on the sideline during the 2007 presidential election, but still look to the UN Integrated Office in Sierra Leone (UNIOSIL) - a civilian UN mission - to support efforts to consolidate peace. The new government's priorities include furthering development, creating jobs, and stamping out endemic corruption.

While Sierra Leone possesses substantial mineral, agricultural, and fishery resources, its physical and social infrastructure is not well developed. Connectivity to undersea fiber such as SAT3 could accelerate such development by facilitating access to the rest of the world. Alluvial diamond mining remains the major source of hard currency earnings accounting for nearly half of Sierra Leone's exports. The IMF has completed a Poverty Reduction and Growth Facility program that helped stabilize economic growth and reduce inflation. A recent increase in political stability has led to a revival of economic activity such as the rehabilitation of bauxite and rutile mining.

c Guinea



Guinea is located Western Africa, bordering the North Atlantic Ocean, between Guinea-Bissau and Sierra Leone; with a population of 9.8 million. Guinea gained its independence from France in 1958. Lansana Conte came to power in 1984 after the death of the first president, Sekou Toure. Guinea has maintained its internal stability despite spillover effects from conflict in Sierra Leone and Liberia.

Guinea possesses major mineral, hydropower, and agricultural resources, yet remains an underdeveloped nation. The country has almost half of the world's bauxite reserves and is the second-largest bauxite producer. The mining sector accounts for over 70% of exports. Long-run improvements in government fiscal arrangements, literacy, and the legal framework are needed if the country is to move out of poverty. Guinea is trying to reengage with the IMF and World Bank, which cut off most assistance in 2003, and is working closely with technical advisors from the U.S. Treasury Department, the World Bank and IMF, seeking to return to a fully funded program. Growth rose slightly in 2006-07, primarily due to increases in global demand and commodity prices on world markets.

4 Project – MRU Undersea Fiber Connectivity

a Objective

This proposal seeks to formalize the request made by the Government of Liberia on behalf of the Mano River Union countries during its meeting with the Secretary General in April 2008 in Geneva. The 3-man Liberian delegation led by Hon. Jeremiah Sulunteh, Minister of Posts & Telecommunications requested ITU to help fund a regional project to connect Guinea, Sierra Leone and Liberia to SAT 3 using Liberia as a common access point. His Excellency Hamadoun I. Toure acknowledged the need for the region to be connected and assured that ITU will give consideration in funding such a project.

The Project, when implemented, would provide low latency fiber connectivity the Mano River Union countries and the rest of the world, significantly reducing the current prohibitive cost of telephony and Internet services in the region. The Project will also enhance connections to neighboring countries, enabling greater communication and trade linkages to develop throughout the region.

The project seeks to accomplish the following:

- Verification of planned technical network design and specifications (including whether other planned fiber network could be used);
- Verification of estimated Project costs;
- Validation of market analysis and business plan;
- Evaluation of the regulatory and legal framework

b Justification for SAT3/WASC Connectivity

ITU involvement in this project to *connect the sub-region to the South Atlantic Telecommunications Cable No. 3/West African Submarine Cable (SAT3/WASC) is crucial in addressing the issue of the digital divide and finding sustainable solutions in meeting the communication needs of this sub-region that lags behind in meeting the benchmarks of WSIS. The respective governments in the three Mano River basin countries striving to provide services to about 20 millions of people residing within its borders are handicapped by the lack of IT infrastructures required to provide such services. In the absence of such infrastructure, the region can not easily and effectively connect individual to institutions as well as people to people in creating an information rich society. While the project has the strategic capacity to dramatically improve the provision of telecommunications services at an increased capacity and lower costs in Liberia, Sierra Leone and Guinea thereby giving the opportunity for those struggling to meet the high cost of communications to save some dimes that*

they could invest in alternative programs in helping to raise their standard of living, the project shall also induce major investment within the sub-region.

SAT3/WASC is a \$650 million high-capacity submarine cable system owned by a consortium of telecommunications operators and administered by Telkom, South Africa incumbent national operator. It was inaugurated in April 2002 and was heralded by development officials and others as the beginning of a new chapter in African economic and social development that would move Africa into the information age. For many of the countries in sub-Saharan Africa where the cable lands it is the first high-capacity undersea fiber-optic cable to connect them to the rest of the world.

c Challenges and Constraints

All countries in West Africa have access to this undersea cable system except Guinea, Sierra Leone and Liberia. A major challenge facing most of the ECOWAS nations is lack of internal infrastructure to capitalize on the new high-capacity network. It is one thing to lay fiber-optic undersea cable and bring it to the shore, it is quite another to create the internal infrastructure—be it fiber-optic cable or wireless broadband radio nodes—necessary to distribute its bandwidth. SAT3 possesses the potential for ECOWAS nations to skip the industrial development age and go straight into information age with customer-service call centers and software-outsourcing businesses providing educated West African a reason to forgo overseas opportunities and take good paying jobs at home.

Connectivity to Undersea Fiber Optic cable will offer a range of advantages to the development of the ICT and Telecommunication sector within the sub-region. It will induce and facilitate the acceleration of services at a reduced cost as well as provide the platform for a more reliable service among people with income far below the poverty line.

For many of the countries in sub-Saharan Africa, it is the first high-capacity undersea fiber-optic cable to connect them to the rest of the world. SAT3 possesses the potential to enable ECOWAS nations to skip the industrial development age and go straight into information age with customer-service call centers and software-outsourcing businesses providing the professional of West Africa a reason to forgo overseas opportunities and take good paying jobs at home. In other words, linking Guinea, Sierra Leone and Liberia to SAT3 will help to foster their socio-economic development and raise the living standard of their peoples.

d Next Step

There are several next steps needed to move the project forward. These steps will

help shape and prepare the project for procurement and implementation.

First, a technical feasibility study and technical network design needs to be developed for the three Host Countries. To date, a technical feasibility has not been conducted nor has a technical network plan been developed, other than rough designs. This feasibility study is crucial in helping to define the project and technical implementation plan.

A key question to be answered as part of the technical feasibility study is whether existing telecom operators and infrastructure owners will be allowed to own and operate fiber infrastructure, and at what cost. Currently Liberia Telecommunications Corporation (LIBTELCO) is a government parastatal. However, there has been discussion relating to the privatization. This institution is positioning itself to be able to manage such infrastructure. Critical issues including use of right of ways, maintaining a competitive open market place, etc. must be part of the study, to ensure the best, and most conducive long term effect for the development of the region. How these and related issues are addressed will have implications for the technical design as well as for the ownership, management, financing options and regulatory framework for the proposed Monrovia fiber backbone—a critical requirement for an efficient, affordable, and national ICT infrastructure.

Second, realistic and detailed estimated project costs need to be developed based upon the technical network design and project implementation plan. Documents shared with the desk study consultant provide a broad overview of the proposed project, and some estimated costs. Part of the next steps is to cost out the various components of the proposed network as well as an aggregated estimated project cost.

Third, a project financing strategy needs to be researched and put into place. There are a number of possible financing sources that could be pursued for this project. These sources include donor financing (e.g. World Bank, International Finance Corporation, African Development Bank, NEPAD, and other bilateral donor organizations and multilateral development banks) as well as public private partnership arrangements and vendor financing schemes. However, the Host Countries need assistance in determining which financing options make the most sense for the market situation and how to approach or pursue these financing options.

5 Terms of Reference and Scope

a Task1: Background Research

The Contractor shall conduct background research to thoroughly familiarize itself with the Project and to review similar studies and relevant models for this type of development activity. Particularly:

- 1.1 The Contractor shall familiarize itself with the key stakeholders and ICT environment of the Host Country as it relates to the Project;
- 1.2 The Contractor shall gather reports or background documents, relevant to the Project, from the Host Countries and from other local network operators;
- 1.3 The Contractor shall review similar projects or models for metropolitan fiber backbone networks in other countries in Sub-Saharan Africa and the lessons learned; and
- 1.4 The Contractor shall host a kick-off meeting with the Host Countries to review and agree on the method and approach for completing the Terms or Reference.

Deliverables for Task 1:

- a) The Contractor shall prepare a written report summarizing the kick-off meeting proceedings, including key comments and issues raised.
- b) The Contractor shall prepare a work plan for implementing the TOR of the Study, with timelines and major milestones to be achieved. The work plan shall be reviewed by the Host Countries.

The deliverables of Task 1 shall be included in the Final Report.

b Task2: Requirements Analysis

The Contractor shall work with the Host Countries, and other stakeholders, such as the local network operators (fixed, mobile and Internet), to evaluate the existing infrastructure and to comprehensively define the scope of the Project.

- 2.1 The Contractor shall review and assess any existing studies identified by the Host Countries or from private sector operators that examined technical requirements and options for development and construction of the Project, a fiber optic backbone, optimized for the mutual transport of voice, data and video.
- 2.2 The Contractor shall review existing telecom infrastructure within the Host Country and how existing components can be leveraged and integrated into the build-out of the Project. This shall include interviews and visual inspections of the various telecommunication operator networks and communication infrastructure in the Host Country, including:
- 2.3 The Contractor shall explore and identify existing grids that can be used for laying fiber (i.e. existing microwave networks, power grids, old rail lines, and roads) and identify any gaps in existing grids that will require new construction.

- 2.4 In consultation with the Host Countries, the Contractor shall determine the targeted population centers and locations for deploying the Project in the Host Country. Population centers likely to be included are within a five mile radius of the city center of Monrovia, and include an extension to cover the airport, some 40 kilometers away.
- 2.5 In consultation with the Host Countries, the Contractor shall determine the most likely routes and linkage points for interconnection to key partners, clients, and the other telecommunication licensees. As part of this task, the consultant shall:
- Visit and assess the telecommunications readiness of the identified key partners and clients; and
 - Identify and define the requirements for building a terrestrial spur or other technologies to link the proposed Project to each identified licensee.
- 2.6 The Contractor shall identify and define major issues and gaps in the current infrastructure, grids, equipment, technical operations, and network coverage necessary to support the build-out of the Project.
- 2.7 The Contractor shall, based on the information gathered, recommend the best choice of backbone technologies for construction of the Project, preferably a fiber optic backbone, optimized for the mutual transport of voice, data and video.
- 2.8 The Contractor shall consolidate findings into a draft requirements assessment, which shall be provided to the Host Countries for review. The Contractor shall convene a meeting with representatives of the Host Countries and other stakeholders to discuss and refine the requirements assessment. The Contractor shall revise the requirements assessment based on the outcome of the stakeholders meeting.

Deliverables for Task 2:

- a) The Contractor shall develop a written technical assessment of the current technical capabilities such as infrastructure, grids, equipment, technical operations, and network coverage. The Contractor shall indicate what is in place today that can be used to support the Project.
- b) The Contractor shall develop a written technical assessment of the gaps in the existing technical capabilities and expansion plans with respect to infrastructure, grids, equipment, network coverage, and trans-border interconnection points for the Project.
- c) The Contractor shall develop and provide recommendations for infrastructure development, technology, equipment and materials needed to support build-out of the Project.

The deliverables of Task 2 shall also be included in the Final Report.

c Task3: Technical Network Design, Specifications and Costs

The Contractor shall use the input from Task 2 to develop a detailed network design and a list of the necessary products and services required for the implementation of the fiber optic backbone infrastructure, including, but not limited to:

- Ducts, fibers, and chambers;
- Trenching, communications towers or other civil works;
- SDH and other equipment;
- Routers, gateways, and other active equipment; and
- Power and ancillary equipment.

The Contractor shall develop an implementation plan and project costs for deploying the Project in the Host Country. The Contractor shall take into consideration all options to maximize efficiencies for the Project in terms of time, resources, and costs. While preparing the implementation plan, the Contractor shall take into consideration and make a specific recommendation as to whether the Project should be implemented as a single network deployment or implemented in a segmented or phased approach.

3.1 The Contractor shall create a high level network architecture schematic focusing on optimizing the use of the any existing infrastructure while meeting the stated goals for coverage, capacity, and functionality of the Project. This schematic shall serve as a baseline reference and planning tool for the remainder of the Project efforts.

3.2 The Contractor shall develop a Project implementation plan for building the Project based on the recommended rollout schedule of individual network segments.

3.3 The Contractor shall develop a detailed budget estimate and major investment expenditures associated with the recommended network design and equipment specifications. These figures should take into account: equipment, survey, network design, transport and installation, network integration and commissioning, and documentation.

3.4 The Contractor shall develop a total cost for the Project as well as a breakdown of costs for each phase of the Project implementation plan.

Deliverables for Task 3:

- a) The Contractor shall identify the high level technology architecture, standards and network design for deploying the Project to targeted locations throughout the metropolitan area of Monrovia, Liberia.
- b) The Contractor shall prepare a detailed list of the specific products and services necessary for implementation and rollout of the Project.
- c) For each required product and service, the Contractor shall develop detailed specifications (e.g. functionality, capacity, quality guarantees, and compatibility requirements).
- d) The Contractor shall compile a list of potential suppliers for each major product and service area.
- e) The Contractor shall develop a detailed Project budget and major investment expenditures.
- f) The Contractor shall develop a schedule of Project costs and projected cash outflows based on the phased Project implementation plan.
- g) The Contractor shall provide a written report recommending optimal business, ownership and financial models that best fit and support the Host Country's priorities and goals for managing the Project on a non-restrictive access and competitive telecommunications environment.
- h) The Contractor shall identify and recommend alternative financial models that would minimize the Host Countries' debt burden in constructing and managing the Project.
- i) In close consultation with the host Countries, the Contractor shall make presentations to other stakeholders of the various scenarios and participate in discussions that will assist the stakeholders to reach a consensus on the best scenario to be adopted. In addition, the Contractor shall develop the written business case, ownership structure, and supporting justification for the business and financial model to be used for the Project based on the most likely scenario to be adopted.

The deliverables of Task 3 shall also be included in the Final Report.

d Task4: Operation Management & Implementation Alternatives

The Contractor shall conduct research to determine implementation scenarios for the Project suitable for the Host Country's overall economic, social, and telecommunications sector environment.

- 4.1 The Contractor shall identify and analyze possible scenarios of institutional organization required for the operation, maintenance and development of the proposed infrastructure.
- 4.2 The Contractor shall analyze the conditions under which network operators could share the infrastructure.
- 4.3 The Contractor shall review and assess various business, ownership, and financing models for managing the Project. This review shall include, but not be limited to: public, private, donor, government subsidies or equity stake; cost-based tariffs, non-extortionate pricing, and competitive pricing for overall economic and social efficiency; open, non-restrictive or competitive access; and combinations thereof. Potential models that the Contractor shall review include: competitive public-private partnership, cooperative public-private or private partnership, or government-supported build out..
- 4.4 The Contractor shall review and assess approaches supported by industry best practices and lessons learned, such as universal services funds, various financing options, or other incentives that could be engaged to support the build-out of segments on the Project that are not financially attractive on a stand alone basis.

Deliverables for Task 4:

- a) The Contractor shall provide a written report recommending optimal business, ownership and financial models that best fit and support the Host Country's and the Host Countries' priorities and goals for managing the Project on a non-restrictive access and competitive telecommunications environment.
- b) The Contractor shall identify and recommend alternative financial models that would minimize the Host Countries' debt burden in constructing and managing the Project.
- c) In close consultation with the Host Countries, the Contractor shall make presentations to other stakeholders of the various scenarios and participate in discussions that will assist the stakeholders to reach a consensus on the best scenario to be adopted. In addition, the Contractor shall develop the written business case, ownership structure, and supporting justification for the business and financial model to be used for the Project based on the most likely scenario to be adopted.

The deliverables of Task 4 shall also be included in the Final Report.

e Task5: Regulatory and Legal Framework

The Contractor shall analyze the impact of the current regulatory and legal framework upon the market assessment. Specifically:

5.1 Regulatory Framework and Licenses: Description and assessment of the regulatory framework. Assess whether the licenses obtained or to be obtained by the Host Countries adequately cover its intended scope of operations. Assessment of which other permits the Host Countries may require, e.g. interconnection rights and agreements, environmental assessments and/or permits, etc.

5.2 The Contractor shall assist the Host Countries in reviewing the existing ICT regulatory framework and policies in the Host Country that impact build-out, management and operation of the recommended Project.

5.3 The Contractor shall review the Host Country's existing interconnection cost and pricing models, including cost-based, market-based and other models specifically related to interconnection of operators within the Host Country as well as interconnection of neighboring countries to the Project.

Deliverable for Task 5:

a) The Contractor shall prepare a written report that recommends and explains the regulatory framework, and its impact on the project.

The deliverables of Task 5 shall also be included in the Final Report.

f Task 6: Environment Impact Assessment

The Contractor shall perform a preliminary review of the Project's environmental impacts consistent with local requirements in the Host Country and those of the financiers. This review shall identify potential negative impacts, discuss the extent to which they can be mitigated, and develop plans for a full environmental impact assessment if and when the Project moves forward to implementation stage. Specifically, the Contractor shall focus on developing plans for a full environmental impact assessment related to the buildings and sites for communications towers, their emissions, and power requirements, and their location in regards to schools, water sources, hospitals and other internationally recognized site location restrictions relative to human habitation.

Deliverable for Task 6:

The Contractor shall prepare a report on its preliminary review of the short and long term environmental impacts. Measures for environmental control and mitigation, and treatment facilities shall be proposed, including their costs.

The complete findings of Task 6 shall also be included in the Final Report.

g Task 7: Development Impact Assessment

The Contractor shall report on the potential development impact of the Project in the Host Country. The Contractor shall focus on the potential economic development outcomes if the Project is implemented according to the Study recommendations. While specific focus should be placed on the immediate impact of the Project, the Contractor shall include, where appropriate, any additional developmental benefits of the Project, including spin-off and demonstration effects. The Contractor's analysis of the potential benefits shall be as concrete and detailed as possible. The development impact factors are intended to provide the Project's decision-makers and interested parties with a broader view of the Project's potential effects on the Host Country. The Contractor shall provide estimates of the Project's potential benefits in the following areas:

(A) Infrastructure/Industry - The Contractor shall provide a statement on the infrastructure impact. The contractor shall provide a high level estimate of the economic benefits to the communication industry in the Host Country, in terms of various measures such as the potential of service development and time to market.

(b) Market-Oriented Reforms - The Contractor shall provide a description of any regulation, laws, or institutional changes that are recommended and the effect they would have if implemented.

(c) Human Capacity Building - The Contractor shall address the number and type of positions that would be needed to construct and operate the proposed project, as well as the number of people who will receive training and a brief description of the training program.

(d) Technology Transfer and Productivity Enhancement - The Contractor shall provide a description of any advanced technologies that will be implemented as a result of the Project that includes a quantitative description of any efficiency that would be gained whenever possible.

(e) Other - The Contractor shall identify any other developmental benefits of the Project, including any spin-off or demonstration effects.

Deliverables for Task 7:

The Contractor shall create a report on the developmental impact and the advantages of building a modernized, convergent and shared telecommunication infrastructure in the Host Country.

h Task 8: Final Report

The Contractor shall ensure that the Final Report is submitted in accordance with Clause I of Annex II of the Grant Agreement. The Final Report shall be a substantive and comprehensive report of work performed to carry out all of the tasks set forth in the Terms of Reference and shall include, among other things, an Executive Summary and all deliverables. Each task of the Terms of Reference shall form a separate chapter of the Final Report.

The Final Report shall also include a comprehensive list of suppliers, including potential sources of equipment and services, relevant to the implementation of each component of the Project as outlined in the Study.

The Contractor shall submit the Final Report in English and in French. The Contractor shall provide, in English and in French, 8 (eight) hard copies and one (4) electronic version of both the confidential and public versions of the Final Report to the host Countries and shall provide copies to ITU as required

6 Finance and Budget

a Budget for Feasibility Study and Technical Assistance

Projected Budget - MRU Undersea Fiber Connectivity Feasibility Study						
	Project Manager	Telecom Engineer	Financial Advisor	Regulatory Expert	Sub Total	Total
Daily Rate - US\$	\$1,500	\$1,500	\$1,700	\$1,400		
Task 1: Background Research	8	4	4	2	18	\$27,600
Task2: Requirement Analysis	4	10	2		16	\$24,400
Task3: Network Design, Equipment Specifications & Project Cost	6	16	4	1	27	\$41,200
Task4: Business & Management Models	6	5	12	1	24	\$38,300
Task5: Regulatory Framework	2			8	10	\$14,200
Task6: Environmental Impact Assessment	4	10		2	16	\$23,800
Task7: Developmental Impact	4	2	1	1	8	\$12,100
Task8: Final Report	6	5	3	2	16	\$24,400
Total Days	40	52	26	17	135	
Total Days on Location	30	22	10	8	70	
Total Labor Cost						\$206,000
Other Direct Cost			Type		Unit Cost	
International Airfare RT to/from Region			Trip	6	3000	\$18,000
International Airfare RT within Region			Trip	8	1000	\$8,000
Lodging				70	160	\$11,200
Meal & Incidentals				70	90	\$6,300
Ground Transportation				30	150	\$4,500
Internet access/copies/communications				40	60	\$2,400
Translation - French/English, English/French						\$20,000
Total Direct Costs						\$64,400
Total Cost of Technical Assistance						\$276,400

b Implementation Financing

- a) The Contractor shall provide a written report recommending optimal business, ownership and financial models that best fit and support the Host Country's priorities and goals for managing the Project on a non-restrictive access and competitive telecommunications environment.

- b) The Contractor shall identify and recommend alternative financial models that would minimize the Host Countries debt burden in constructing and managing the Project.
- c) In close consultation with the Host Countries, the Contractor shall make presentations to other stakeholders of the various scenarios and participate in discussions that will assist the stakeholders to reach a consensus on the best scenario to be adopted. In addition, the Contractor shall develop the written business case, ownership structure, and supporting justification for the business and financial model to be used for the Project based on the most likely scenario to be adopted.

7 Requirements and Qualifications of Contractors

The Feasibility Study Team should have proven and demonstrated expertise in the following areas:

- Academic background and confirmed experience in telecommunications engineering, economics and law (30 percent),
- Creating feasibility studies that consider the technical, economic, legal and institutional impacts associated with the deployment of a fiber optic backbone infrastructure (25 percent),
- Knowledge of telecommunication strategies, policies, and African telecommunication reforms (25 percent),
- Procurement of large scale telecommunication technologies (10 percent),
- Deployment of fiber optic infrastructure and related systems integration (10 percent).
- Assessment of project for environmental and social matters to IFC performance standards (5 percent)

The following positions should be presented for this assignment.

Project Manager

Job Purpose: The Project Manager will have overall responsibility and serve as the single point for coordination and quality of the Technical Assistance.

Major Skills and Requirements:

- An established record of providing technical direction and leading multi-disciplinary teams.
- Significant developing country experience, particularly in Sub-Saharan Africa, in identifying constraints to the telecommunications and ICT sector;

- Experience working on regulatory and policy frameworks for the telecommunications industry.
- The Project Manager must have a strong background and skills, with an in depth understanding of the technical, business and construction issues involved in national or large scale telecom and ICT backbone projects.
- Strong communication skills, both oral and written.

- Proven project management experience interacting with senior level government officials, and with handling difficult political situations.
- Requires at least a Bachelors degree in Business, Finance, Computer Science or other relevant subject matter, as well as five to ten years industry experience.

Telecommunications Engineer

Job Purpose: The Telecommunications Engineer(s) will take the lead technical role in surveying and analyzing the proposed plan against Liberia's existing infrastructure, conducting a requirements analysis, identify any missing gaps, assessing interconnection points, and proposing technical recommendations.

Major Skills and Requirements:

- Strong understanding of large telecommunication infrastructure projects.
- The individual should have been instrumental in planning telecommunications infrastructure as well as overseen or at least participated in the implementation of the selected vendor networks and systems.
- Extensive knowledge of data, broadband, radio or satellite communication concepts and technologies is required.
- Demonstrated expertise in architecting and developing detailed technical design specifications and standards.
- Demonstrated experience in developing implementation plans, budgets and cost estimates for complex telecom or ICT projects.
- Requires at least a Bachelors degree in Computer Science, Telecommunications, or Electrical Engineering, as well as five to ten years industry experience in telecommunications and infrastructure corporate operations.
- Telecom Engineer with knowledge and experience in developing countries and the Sub-Saharan region, while not a specific requirement would be a plus.

Financial Advisor

Job Purpose:

The Financial Advisor will take the lead in assessing and recommending business models, ownership structure and related financing options for LTC's fiber backbone infrastructure for Monrovia. The Financial Advisor will also assist in developing a detailed project financing strategy and identifying possible financing sources.

Major Skills and Requirements:

- A financial advisor or investment banker who has experience working with teams of attorneys, tax and management consultants in preparing business cases, ownership structures, and financing agreements;
- Demonstrated experience in advising companies on marketing and financing arrangements;
- Strong communication skills, both oral and written;
- Proven experience interacting with senior level government officials and business executives, and with handling difficult political situations

Requires at least a Bachelors degree in Business, Finance or other relevant subject matter, as well as five to ten years industry experience.

Telecommunications Regulatory Expert and/or Telecommunications Lawyer

Job Purpose:

The Consultant may propose either a Telecommunications Regulatory Expert and/or a Telecommunications Lawyer. This function will take the lead role in providing technical assistance and analysis for identifying additions or recommended adjustments to the regulatory, policy and legal framework for implementing the fiber optic ring that promotes affordable, non-restrictive access, and a competitive telecommunications environment.

Major Skills and Requirements:

- Strong background in telecommunications field, preferably with regulatory and operating company practices.
- Knowledge of modern management practices in the telecommunications industry.
- Extensive knowledge of cost and pricing models, tariffs, open access models, and interconnection agreements for the telecommunications industry.
- Demonstrated knowledge of best practices in promoting universal access.
- Strong communication skills, both oral and written.
- Proven project management experience interacting with senior level government officials and with handling difficult political situations.
- Regulatory Expert with knowledge and experience in developing countries and the Sub-Saharan region, while not a specific requirement would be a plus.

- Ability to assess or to guide the company in developing environmental and social action plans and assessments complying not only with local laws and regulations but also with World Bank performance standards

8 Conclusion

The project will help translate the objectives of Connect Africa to help bridge the digital divide and other objectives of the World Summit on Information Society within the sub region. It will help to accelerate the concept of ICT4Development and also enhance the provision of basic services to the people.

The construction of the requisite IT infrastructure remains the major missing link in providing access to the people of the sub-region. The intervention of ITU to help construct a common access point for Guinea, Sierra Leone and Liberia at a strategic designated point in Monrovia will encourage regions to collaborate in tackling some of the basic projects that a single national government could not address in the short run.

The project is not expected to have any adverse impact on the environment. However, the build-out of the landing point will require an examination of existing infrastructure (i.e. telecommunications, power, etc.) and existing right-of-way in respective countries that could be used to lay fiber for the access points. It is also envisioned that, wherever possible, the fiber route will be laid on existing infrastructure. or in parallel with the roadways. Civil works construction or trenching will be required. Therefore, environmental considerations should be evaluated during the feasibility study for such facts as grid-plans, power supply, road access, and other potential environmental impacts.

Liberia Ministry of Post & Telecommunications takes the lead and specifically requested the International Telecommunications Union (ITU) help in conducting a Feasibility Study and providing technical assistance related to the following key requirements for developing and deploying connectivity to undersea fiber optic cable system.

9 Glossary of Technical Terms

ADSL – *Asymmetrical Digital Subscriber Line* is a data communications technology that uses copper telephone lines but with faster data transmission speeds and over short distances.

Fiber Optics – An optical fiber is a glass or plastic fiber that carries light along its length. Optical fibers are widely used in fiber optic communication, which permits transmission over longer distances and at higher data rates than other forms of communications.

ISP – *Internet Service Provider* is a business or organization that provides access to the Internet and related services to customers.

PPP – *Public Private Partnership* is when a government service is funded and operated through a partnership with government and one or more private sector companies.

SAT-3 - Submarine communications cable linking Portugal and Spain to South Africa, with connections to several West African countries along the route. It forms part of the SAT-3/WASC/SAFE cable system, where the SAFE cable links South Africa to Asia.

VoIP – *Voice over Internet Protocol* is the routing of voice conversations over the Internet or any other IP-based network.

VPN – *Virtual Private Network* is a private communications network often used within or between several companies and organizations to communicate securely.

WiFi – *Wireless Fidelity* is a certification for technologies that meet the IEEE 802.11 specifications and was originally licensed by the Wi-Fi Alliance. It is used primarily for wireless devices such as laptops but is increasingly being extended to new, advanced services.