

**Terms of Reference (TOR)**

**For the selection of a Consulting Firm that Undertakes Gap Analysis of Government Bandwidth Needs**

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| **Assignment Title:** | | Gap Analysis of Government Bandwidth Needs | |
| **Reference Number:** | | MInT/DE/QCBS/C-11/21 | |
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# Introduction

The Government of Ethiopia has a strong aspiration to transform its economy through effective and efficient utilization of digital technologies. In line with this, the current Digital Transformation Strategy, Digital Ethiopia 2025, that is under implementation, identified several issues to be addressed in order to realize this aspiration. As per the strategy, addressing the existing infrastructure related issues is of paramount importance. Addressing infrastructure issues starts from identifying existing connectivity gaps, utilization patterns, pain-points in the existing government network backbone, and associated policy related issues.

The Government of Ethiopia has been investing heavily to address ICT infrastructure related issues so that digital solutions that facilitate G2G, G2B, and G2C communications can be easily accessible. However, due to the uncoordinated implementation of these initiatives, several issues are witnessed. Some initiatives are planned and executed by central authorities such as the federal government and regional governments while others are initiated by specific institutions. Yet others are initiated by ministries to address an entire sector. Such approaches are not cost efficient and may lead to duplication of efforts and at times wastage of scarce resources. Therefore, basic assessment of the existing situation followed by streamlined strategies, policies, guidelines, and implementation plans will make future investments controlled, cost effective, and fit for purpose.

This document is prepared to invite consulting firms with the right professionals and expertise to conduct nation-wide assessments to identify current situation of government institutions’ ICT infrastructure development and utilization pattern in order to find out pertinent problems and subsequently address them. The solutions involve development of policies, strategies and implementation plans. In addition, as the existing government network backbone is cited as one of the bottlenecks in delivering quality digital services, this project also gives emphasis to redesigning and repurposing the existing government backbone network. Moreover, other issues that needs attention such as policy on government ICT infrastructure development and management shall also be addressed by this project. The existing broadband strategy and implementation plan that needs to be revised is also a focus of this project.

Even if there are some distinct activities to be performed in this project, the assessment and implementation domain is the same. Due to this fact, the project is divided into five distinct, yet overlapping, assignments so that consulting firm(s) can pool their resources to collect data for all assignments from similar stakeholders in one go.

# Objective of the Assignment

The main objective of this assignment is to assess the existing connectivity status and utilization practices of public institutions to design a flexible government network architecture, develop implementation strategies, and propose easy to follow ICT infrastructure development and management policies guidelines.

# Scope of the Project

This assignment mainly focuses on assessing government demand for bandwidth and developing a network design, implementation strategies, and guidelines based on a nationwide assessment of government organizations, to respond to that demand. The project is organized in such a way that the overall project is divided into 5 major deliverables. The activities that lead to the deliverables are interrelated and involve assessment of existing situations from overlapping sample areas. The detailed scope of each deliverable is given below.

## Deliverable 1: Assessment of Government Connectivity Requirements and ICT Infrastructure Utilization Patterns

As mentioned before, the government is engaged in several initiatives that are aimed at improving their ICT connectivity and utilization. However, due to the unstructured nature of the initiatives, several issues are observed including redundant expenditures, unclear targets, poor utilization of resources, and unbalanced connectivity among different sites. This assignment includes the following tasks, among others:

* Select appropriate sample institutions from federal and regional government offices
* Conduct primary and secondary data collection to assess current connectivity status and IT infrastructure utilization pattern of government organizations across the country using standardized assessment tools
* Perform a desk review to identify international best practices and global trends
* Conduct scientific analysis of collected data to determine the connectivity gap (recommended as per international best practices Vs. existing connectivity)
* Identify the pertinent pain points in connectivity and utilization (ie what are the gaps in current service provision)
* Generate a report that shows the current connectivity status and infrastructure utilization patterns
* Recommend solutions to close the gap between the existing situation and recommended trends
* Present intermediate and final results to concerned stakeholders
* Organize a series of consultative and validation workshops with relevant stakeholders
* Organize a final national dissemination event to publicize the findings and gather stakeholder inputs.

## Deliverable 2: Update National Broadband Strategy and Implementation Plan

Realizing the importance of high-speed internet to poor nations such as Ethiopia, the government had developed a 5-year broadband strategy and implementation plan in the year 2016. The strategy has identified multiple sectors and suggested recommended bandwidth at different levels. The lifetime of the document has ended and the reality on the ground has also changed significantly. Therefore, this assignment is designed to update the 2016 broadband strategy to take account of the newly competitive environment and suggest a realistic implementation plan by drawing lessons from the previous plan and from other countries. The consulting firm is expected to consult and reflect international trends (such as the ones suggested by the UN Broadband Commission) and benchmarking various countries to come up with the new strategy. In addition, the firm must assess the strengths and weaknesses of the old implementation plan prior to suggesting a better implementation plan. Thus, the firm is expected to perform the following activities, among others:

* Review the existing broadband strategy and implementation plan document
* Conduct a review of nationwide broadband connectivity status (including private sector, citizens, NGOs and government organizations)
* Conduct a desk review and benchmarking studies to identify international trends
* Present intermediate and final results to concerned stakeholders for consultation
* Organize a series of workshops to validate findings and consult stakeholders
* Develop a new Broadband Strategy and Implementation Plan
* Organize a final national dissemination event to publicize the findings.

## Deliverable 3: Assess Existing Government Backbone Network Architecture and Propose a New Design and Provide Sound Transition Plan

More than 16 years ago, the Government of Ethiopia has established a centralized government network infrastructure connecting more than 600 sites (woredas) across the country through different communication options including VSATs in the remotest parts of the country. The main purpose of the network, called *WoredaNet*, was to provide centralized services (including Internet) to all government organizations. Over time, the number of sites has dramatically increased to more than 9,000 sites. The change in number of sites, requirement of clients, and dramatic increase of number of applications running on the network, coupled with old networking devices at the client sites, has made the network performance a bottleneck to achieving the digital transformation plan of the country. Considering this, the government would like to assess pertinent pain points of the existing government network infrastructure, design a new architecture, and propose a new implementation plan. The new plan would draw upon the demand study (deliverable 1) and the updated broadband plan (deliverable 2). The consultant is expected to assess the status of the existing network infrastructure and propose a flexible, efficient, and secure backbone network infrastructure using hi-tech solutions and approaches. Therefore, the firm is expected to perform the following activities, among others:

* Conduct a nationalwide assessment to generate a digital map of existing sites connected to the government network backbone; and identify those government sites that are not currently service
* Identify pertinent pain points and issues related to the effective utilization of the backbone network (ie connectivity gaps)
* Review existing documents related to the government backbone network
* Design an improved, secure and flexible government network architecture that serves all organizations at different government levels
* Develop an implementation plan for the new government network infrastructure to be put into effect in subsequent years
* Develop draft bidding documents for a request for proposals to operators to provide bandwidth under long-term supply agreements
* Present intermediate and final results to concerned stakeholders
* Organize a series of workshops to validate findings and consult stakeholders
* Organize a final national dissemination event to publicize the findings.

## Deliverable 4: Government ICT Infrastructure Development Policy and Operation Guideline

IT infrastructure development in government institutions has been handled by different entities in the government. There are initiatives from the Ministry of Innovation and Technology (MInT) targeting the entire government organizations at Federal and Regional levels. Regions also have their own initiatives and projects addressing organizations under their span of control. Yet another implementation approach is sectoral (for example, Ministry of Health implements initiatives in the health sector across the country). Individual organizations also have IT infrastructure projects ranging from simple local area networks to large data centers. The operation modalities are also different across the country. This uncoordinated and fragmented project implementation usually results in redundant expenditures, underutilization of infrastructure, poor performance of systems, difficult collaboration among government organizations, security vulnerabilities, and unmanaged services. The government has identified lack of a ICT infrastructure development policy and standard operations guidelines, including covering procurement, as one of the major issues that led to the aforementioned issues. In line with this, the consultant is expected to develop ICT Infrastructure development policy and standardized operation guideline to be followed by government organizations. Thus, to achieve the desired objectives, the consultant is expected to perform several activities including, but not limited to following activities:

* Conduct an assessment of the current ICT infrastructure development and operation practices in government institutions
* Conduct a review of international best practices on government ICT infrastructure development
* Conduct a review of international best practices on government ICT infrastructure operation and management
* Review documents related to existing ICT infrastructure development initiatives and projects
* Review documents related to existing ICT infrastructure operation practice
* Develop a draft for a coordinated Government ICT infrastructure development policy
* Develop a draft for a coordinated Government ICT infrastructure operation and management guideline
* Present intermediate and final results to concerned stakeholders
* Organize a series of workshops to validate findings and consult stakeholders
* Organize a final national dissemination event to publicize the findings.

## Deliverable 5: National Cloud Ecosystem

As stated by many researchers, cloud computing is an evolving technology that provides a unique benefit both to the service providers and service users. Due to the benefits of cloud services, an increased utilization pattern is witnessed in Ethiopia. Following this expansion of cloud services, the question that may be raised is how and /or what type of ecosystem or implementation strategy can be in place at a national level to facilitate cloud adoption and streamline investment in ICT infrastructure development by government and private entities. The core of this is, therefore, to develop a dynamic ecosystem and implementation strategy for the cloud industry to flourish so that government organization, developers, innovators and researchers, private organization and citizens benefit from the advantage of cloud infrastructure and services. The documents that will be developed must address the following issues, among others:

* Governance, Legal and regulatory frameworks
* Standards
* Conflict resolution
* Safe/Fair Contract Terms/Conditions
* Licensing
* Classification of Cloud service providers
* Location of Data
* Cross border and territorial issues
* Skills & Awareness
* Encouraging adoption
* Vendor locking
* Market Characteristics (competitive landscape/ maturity)
* Network infrastructure, application, and data readiness
* Government readiness and roles
* Service Level Agreements
* Portability of applications
* Integration with legacy environment
* Decision Framework for Cloud Migration
* Public Cloud Procurement Guidance
* Culture change
* Alignment to government strategies
* Security requirements
* Selecting a cloud solution
* Ensuring competitiveness

As part of the ecosystem, the consulting firm is expected to develop a strategy, framework and 5-year implementation plan. The implementation plan should clearly articulate the roles and responsibilities of each stakeholder involved in the implementation process. Therefore, the project focuses on a nationwide (including Private business entities, Government institutions and the Community) assessment to develop an efficient cloud ecosystem (Framework, policy, laws, regulation, Infrastructure, etc.) so that adoption of cloud services is facilitated. The output expected from this assignment is first, to conduct an assessment and then develop an ecosystem for the cloud service industry based on the findings of the assessment. Secondly, develop a conceptual framework and implementation plan for the coming 5 years. The following activities are within the scope of the project. Please note that the list of activities is not exhaustive.

**Task 1. Identify and analyze the cloud usage scenarios and service delivery framework at the national level. This may focus on:** E-governance system; Industry specific clouds; Usage scenarios, such as e-commerce, e-Health, e-education, etc; Software as a Service (SaaS) and applications evaluation technique; Big data and analytics; Innovation ecosystem.

**Task 2. Identify and analyze cloud platform and infrastructure frameworks. This includes, but not limited to:** Cloud architectures; Compute, network, and storage systems; Cloud operation system and virtualization systems; Application and data platforms; Cloud management; Sustainability, mobility, accessibility, etc.;

**Task 3. Identify and analyze Cloud frameworks. This includes:** Cloud Service Level Agreements (SLA); Cloud brokerage platforms; Service delivery; Cloud security; Cloud Standards and interoperability frameworks (data classification frameworks, cloud decision frameworks, Supplier accreditation guideline, cloud store taxonomy, etc.); Regulation and Policy matters; Business model and strategies in cloud computing; Cloud security, anonymity, privacy, etc.

**Task 4: Identify and Develop legal framework required for smooth of cloud services. This may include:** Assessment of existing legal documents and identify gaps; Benchmarking of countries known for best practices; Develop all missing legal documents (such as proclamations, policies, directives, guidelines, standards, …) as per international best practices and identified gaps (The documents shall also indicate any modifications required to existing legal documents, if any)

**Task 5. Define and develop the national cloud computing architectural framework and implementation model. This may include:** ICT Cloud service readiness; ICT cloud service foundation; ICT cloud service acceleration; ICT cloud service governance.

**Task 6. Analyze and develop a national cloud computing program and implementation strategy. This may include:** As required, revise processes that support all phases and decision points used to incorporate cloud service at the national level; Revise the existing IT governance model and develop a cloud computing governance model relevant to the national IT or e-government strategy.; Identify and review all relevant policies across the country’s IT service to ensure alignments with the cloud service; Develop guidance for programs adopting and migrating to cloud service; Define and publish wide cloud service policy to guide programs and organizations regarding the use of cloud computing capability.

# Additional considerations

The tasks given above are interrelated to a large extent. It is the responsibility of the consulting firm to merge common activities (e.g., assessments), and to propose an appropriate sequencing, together while conducting other studies independently. The Ministry expects the consultant to clearly indicate, in its project plan, how this is done. In addition, the consultant is expected to consider the following activities:

* Conduct national assessments as per the information given above to collect primary and secondary data. For national studies, the consultant must carefully select stakeholders to be surveyed.
* Conduct desk reviews on international and national standards and best practices. For assessments that required input from other countries, the consultant shall carefully select countries that will be used for benchmarking
* Analyze collected data to generate respective reports and use it as input for further activities
* Physical survey of government networks in Addis Ababa and selected other the regions is expected, but subject to security considerations
* Perform a comprehensive and wholistic analysis of stakeholders’ existing status and their aspiration.
* For all tasks, the consultant shall consider current and cost-effective technologies
* Prepare a report on existing government IT infrastructure utilization status (deliverable 1)
* Update the national broadband strategy and implementation plan (deliverable 2)
* Prepare a report on existing government connectivity status (deliverable 3)
* Redesign existing government backbone network infrastructure using current technologies and flexible architecture including detailed transition plan.
* Develop governance framework for the government backbone network infrastructure. (deliverable 4)
* Develop government ICT Infrastructure development and management guidelines
* Identify the cloud service deployment models (Public, Private, community, and Hybrid) ideal for the country
* Identify and adopt cloud computing technical standards
* Define cyber security architecture to adequately protect the national IT service environment from a growing and evolving cyber security threats.
* Identify the high-value and low- risk opportunities in adopting cloud services.
* Develop National Cloud Policy and Strategy (deliverable 5)
* Develop national framework for cloud computing reference architecture
* Develop legal framework for national cloud adoption
* Organize consultative meetings, workshops and/or dissemination conferences to maximize stakeholder engagement.
* The consultant shall be responsible for all international certifications and/or accreditation, if required.

# Methodology

The consulting firm may come with a proven methodology to achieve the desired results. The methodology chosen and approaches to be followed shall be indicated in the proposal in detail. The consultant must clearly indicate, among others:

* How the firm plans to collect and analyze primary data from government institutions across the country
* How the firm plans to determine the gaps between the current situation and anticipated needs
* How the firm ensures that the collected primary data represents the situation in the country as a whole, including how to overcome security challenges
* How the firm plans to collect secondary data from documents and desk research
* How the firm plans to ensure that the proposed designs, strategies, or guidelines are aligned with national and international standards
* How the firm ensures proposed technologies and architectures are states-of-the-art
* How the firm makes sure that international best practices are captured in all their recommendations

# Administrative Arrangement

This assignment shall be done in consultation with Ministry of Innovation and Technology (MInT) and other pertinent stakeholders including regional ICT bureaus, telecom operators and Ethiopian Communications Authority.

# Responsibilities

## The Consulting Firm’s Responsibilities

The consultant firm shall have the following responsibilities. The consulting firm:

* Shall submit monthly status reports and any required deliverables.
* Shall build and maintain positive and professional working relationship with the focal point and other professionals assigned from the Ministry.
* Shall work on bases of knowledge transfer and experience sharing with professionals assigned from the Ministry.
* Must not be engaged in other activities that affect this assignment during the consultancy period (no conflicts of interest).
* The consultant should work closely with the MInT staff on knowledge transfer and experience sharing bases to develop the system.
* Organize workshops to collect further input on the findings.

## The Client’s (MInT) Responsibilities

The Client shall have the following responsibilities.

* Provide spaces for small meetings and discussions
* Coordinate stakeholder discussions and workshops
* Write letters of introduction to offices upon the request of the consulting firm
* Provide relevant available data and documents needed for the assignment
* Assign a team of professionals and a focal point to facilitate communication between the consultant and stakeholders
* Assign professionals to work with the consulting firm on knowledge transfer
* Make all concerned individuals available whenever needed by the consulting firm

# Knowledge Transfer

The assignments involve rigorous assessment activities and development of documents including technical design. In line with this, the consulting firm is expected to arrange knowledge transfer mechanisms in the form of:

* Recommend training required on management of Complex Government Network Infrastructure Design and Deployment for 6 IT professionals of MInT. The training would be funded separately
* Make recommendations on a study tour for 4 professionals from MInT on Cloud Services governance and Management to benchmarked countries. The study tour would be funded sepatrately.
* Make recommendation on Local Training on document development (such as Standard Operation Procedures for IT Services) for at least 20 IT experts. The training would be funded separately

The schedule may be proposed by the consulting firm but should be scheduled before the TO-BE deliverables are completed so that the professionals can provide further input to the TO-BE documents.

# Consulting Firm’s Qualifications

## Organizational Qualifications

* The consulting firm shall demonstrate strong experience in IT consultancy, design and implementation of IT solutions. The firm shall have strong experience in:
* Conducting nationwide assessments
* Conducting demand surveys of bandwidth requirement
* Developing IT strategies and implementation plans
* Designing large scale Network Infrastructures
* Designing and implementing cloud technologies
* Developing guidelines, frameworks and procedures for IT infrastructure and services
* Developing sound governance model for IT services
* The firm shall have a minimum of **5 Years’** experience in the industry.
* The firm shall present a testimony of at least **3 IT consultancy projects**, similar in scope to this assignment, among which at least **one** shall be international project.
* International firms shall submit a quality performance certification from one of the internationally recognized certification institutions.
* International firms are encouraged to partner with local companies for the purpose of knowledge transfer and to facilitate research.

## Minimum Qualification of Experts

The assignment is organized in 5 major deliverables each of which may require some sort of specialization for each deliverable. Accordingly, the consulting firm is expected to organize special teams for each deliverable that require specialization (e.g. The government backbone network design requires a team of Network, System, and security architects while the cloud strategy requires different types of cloud professionals with different specific expertise in cloud technologies). Hence, the consulting firm is expected to present its professionals by mapping the professionals with relevant deliverables, they will be working on. A professional may work on multiple deliverables. Because of the range of skills required, firms may collaborate with others in making the bid, and international firms may work with national partners.

| **S. No** | **Title** | **Academic Qualification** | **Qty** | **Experience** | **Estimated staff Month** |
| --- | --- | --- | --- | --- | --- |
|  | Project Manager | Advanced degree in any field of study (But the Master’s and/or Bachelor’s Degree shall be in Computer Science, Electrical/Computer Engineering, Information Science, Information Technology) | 1 | 10 Years in managing high (national) level consultancy or IT infrastructure development projects; evidence of participation in at least 2 similar projects shall be attached | 8 months |
|  | Senior Policy Development Expert | PHD or Master’s Degree in any field of study | 2 | 8 years’ experience in drafting high level policies, strategies, and guidelines (preferably in the IT sector) | 6 months |
|  | Senior Cloud Architect | Master’s or BSc Degree in Computer/Electrical engineering, System Engineering, Software engineering or related disciplines. | 2 | 8 years’ experience in designing cloud infrastructure, Virtualization and System design (evidence of at least 2 designed cloud infrastructures shall be attached) | 4 months |
|  | Senior Network and Security Architect | Master’s or BSc Degree in Computer/Electrical engineering, System Engineering, Software engineering or related disciplines. | 1 | 8 years’ experience in designing large scale networks that span multiple branches. (evidence of at least 2 designed network infrastructures shall be attached) | 4 months |
|  | Senior Data Analyst | Master’s or BSc Degree in Data Analytics, Statistics, Mathematics, or any other related field | 1 | 5 years’ experience in analysis of data using computer applications. | 5 months |
|  | Cloud solution Architect | Master’s or BSc Degree in Computer/Electrical engineering, System Engineering, Software engineering or related disciplines. | 1 | 5 years’ experience in designing and managing cloud infrastructure, Virtualization and System design | 5 months |
|  | System Engineers | Master’s or BSc Degree in Computer engineering/Electrical engineering, System engineering or related disciplines. | 1 | 5 years’ experience in configuring and managing systems | 4 months |
|  | Senior Cloud business developer/analyst | Master’s or BSc Degree in IT Business management, Technology Management, Industrial management | 1 | * At least 8 years as a System/Business Analyst, working in providing more detailed project objectives, systems requirements, * Business process analysis and cost-benefit analysis. Good knowledge in projects of Development and Innovation strategy, Strategy mapping, Resource allocation, Technology modeling, Technology positioning, Industry forecasting, Strategic technology planning, Cloud service feasibility analysis, cloud Deployment strategy analysis and development, Cloud service modeling, etc. | 5 months |
|  | Senior Cloud application Engineer | Master’s or BSc Degree in Computer engineering, Computer science, Information system, Electrical engineering or related disciplines | 1 | * 8 years’ experience as a cloud application engineer or similar disciplines in a multidisciplinary IT business area with a detailed knowledge and experience of data model and business rule configuration, Application software integration, Designing and building applications that properly leverage the cloud platforms and infrastructure services, cloud platform development and analysis. * Knowledge and experience on the three service models, such as: IaaS, SaaS, PaaS is also required. | 4 months |
|  | Cloud business development strategist | Master’s or BSc Degree (Information system stream), in IT Business Management, MA/MSC in IT Policy and strategic management, | 1 | 8 years of experience as a cloud strategist or related disciplines in a multidisciplinary IT business industry, with the experience and knowledge of:   * Cloud development strategy and advisory of multi-national cloud business sectors, such as: cloud service governance, cloud operating & delivery model analysis, cloud service management and project portfolio management, cloud service integration planning &execution/implementation management. * Development of organizational &operational readiness assessment for cloud adoption * Identification and analysis of applications and business processes that are most suitable to move to the cloud. * Planning and analyzing of workload migration strategies including: moving applications from physical to virtual (P 2 V) or virtual to cloud (v2C) environment. * Designing and implementing proposed solutions including: transformation road –map, Project planning, resource model, business case, Business model, governance model, IT operation model * Technical background knowledge on enterprise IT including: database system, tiered storage architecture, server and desktop virtualization, datacenter operation, network security and other similar disciplines. | 4 months |

# Duty Station

The consultant is expected to execute the assignments stationed at its own facility in Addis Ababa, Ethiopia with frequent travelling and work execution at the various federal and regional government offices. Upon request, MInT may arrange temporary duty station in its premises. But this is subject to availability.

# Reporting Mechanism

MInT will form a project implementation team that will be working closely with the consulting firm. The consulting firm shall send written report to this team every two weeks on the status of the assignments. Every two weeks the consultant is expected to give in-person presentations to the team. However, if the need arises to discuss on the status of the project out of this stated time, the consultant may request the Ministry in advance to arrange an extraordinary reporting meeting. The consultant is expected to explain its reporting plan in the proposal.

# Accountability

The consultant is accountable to the Ministry of Innovation and Technology. In addition, each potential stakeholders of this assignment will have the right to discuss with the consulting firm for any technical matters to enrichment the study deliverables. The arrangement for discussion shall be arranged through the Ministry.

# Deliverables

The project is expected to have different deliverables. The main deliverables are:

* Government Connectivity Status Report (Gap analysis with recommendation)
* Government ICT Infrastructure Utilization Practices Report
* National Broadband Strategy and Implementation Plan
* Government Backbone network utilization and connectivity status
* Government backbone network low level design and deployment plan
* Government ICT Infrastructure Development Policy
* Government ICT Infrastructure Operation and Management Guideline
* National cloud readiness assessment report
* National Cloud Policy and Strategy
* National Cloud Framework for national cloud reference architecture
* Legal framework for national cloud adoption

In addition, the following outputs are expected:

* Inception Report
* Detailed work plan for realizing the tasks and activities that are carried out to execute the assignments, with milestone agreed with client.
* Gap analysis for connectivity, and benchmarking strategy report
* AS-IS Report, mainly of the existing ecosystem related to the assignments
* National workshop reports on the draft TO-BE blueprint designs and policy documents.
* Final TO-BE report

# Duration of the Assignment

The consulting company is expected to complete all assignments within 8 months from the date of contract signing.