TERMS OF REFERENCE

A.   BACKGROUND

The Government of Rwanda (GoR) is set to receive funding (US$ 200 million) from the World Bank (WB) and the Asian Infrastructure Investment Bank (AIIB) to accelerate country-wide digital transformation. The proposed "Rwanda Digital Acceleration Project" (henceforth referred to as the 'the Project') seeks to expand digital adoption, bringing more Rwandans online by addressing the major barriers that dampen demand for digital services and spearheading a series of interventions that promote digital inclusion and access to broadband. The Project will also enable Rwanda to leverage critical enabling digital platforms and data-driven solutions to improve the efficiency of public service delivery and expand the adoption of digitally enabled e-services. Finally, the Project will also increase Rwanda's capacity to support digital innovation and productivity gains, by strengthening the local digital innovation and entrepreneurship ecosystem.

The GoR seeks to connect every school in Rwanda to broadband by 2024, as part of wider plans for education reform to improve teaching and learning, and therefore aims to connect as many public schools as possible under the aforementioned Project. The Project is set to finance internet capacity, but also enabling digital infrastructure. While progress has been made in connecting schools, a recent survey conducted by GIGA suggests that around 1,796 schools still lack access to broadband. Moreover, many of the schools that are yet to be connected lack the enabling digital infrastructure to be connected, and to make use of connectivity once online. To facilitate deployment and ensure effective usage, but also to maximize inclusion and coverage, several schools will therefore need to benefit from a complete digital infrastructure support package, including access to electricity and basic IT equipment, to bridge the lingering school connectivity gap.

The envisaged school digital infrastructure development scheme will aim to support sustainable approaches to schools' digital infrastructure development and high-speed broadband connectivity deployment, leveraging the participation of various stakeholders and greater private sector involvement, in particular. It will also need to be well-attuned to education sector reform plans, including enabling education technology (Edtech) and e-learning initiatives envisioned when scoping the minimum technical requirements for digital infrastructure required, such as minimum internet capacity and performance, and IT equipment requirements etc. Expanding digital infrastructure is viewed as key to empowering teachers and learners by enabling access to digital tools and rich digital educational resources and content.

Currently, there are several Government initiatives aimed at connecting and equipping schools with digital infrastructure, including the One Government Network (OGN) that has connected many public schools to broadband through the bulk purchase of capacity, the Smart Education Project that has focused on connecting higher learning institutions (HLIs) and adjacent schools to fiber through targeted infrastructure investments, and the GIGA Rwanda project that has mapped the status of school connectivity and will pilot new business model for school connectivity. Government schemes such as Smart classrooms have also been rolled out in some schools, as well as the purchase of IT equipment for teachers. Interventions financed under the Project will need to consider and build on these efforts, leveraging synergies and lesson learnt, wherever feasible, to maximize both coverage in terms of access to broadband Internet at a defined minimum standard for connected schools and impact in terms of effective usage and long-term sustainability. This includes reviewing implementation models used so far but also exploring alternative ones.

In this respect, the national research and education network (NREN) is also viewed as being a critical vehicle for supporting the sustainability of school connectivity investment made under the Project and it is therefore set to benefit from targeted capacity building and technical assistance under the Project to support its operationalization from an institutional perspective. The Rwandan NREN was established as a physical network in Rwanda in 2008, which is connected to the 10-gigabit SEACOM cable landing in Kenya and the Mtunzini Gateway point of presence (PoP) in Tanzania. The existing network is also connected to the regional network of sub-Saharan NRENs, UBUNTUNET, and benefits from a PoP in Kigali, which is in turn connected by a link from Kampala to Dar es Salaam that was deployed to provide added redundancy. While progress has been made in connecting HLIs through physical investments made to date, many still face challenges in acquiring and maintaining access to affordable broadband Internet services, which hampers plans to further digitize the education sector and support digital learning, which has proved essential in the COVID-19 context.

Moreover, while the network exists physically, the operational structures to support the effective management of a vibrant Rwandan research and education community is underdeveloped. As noted above, the Smart Education project is set to extend the underlying connectivity infrastructure of the NREN. However, the GoR is in need of technical assistant to develop a new tailored strategic and operational plan to support the successful and sustainable operationalization of the network. This will include assessing the support required from the NREN to strengthen campus infrastructure to fit the needs of an advanced and digital learning environment, but also exploring the specific links to supporting sustainable school connectivity that will be financed under the Project, and possible business models for the NREN.

The Project's implementation will be led by the Rwanda Information Society Authority (RISA), under the Ministry of ICT and Innovation (MINICT), who leads on digital infrastructure deployment, in close collaboration with the Education sector, and other relevant stakeholders.

B. OBJECTIVE OF ASSIGNMENT

The hired consultancy is expected:

1. To assist RISA in conducting a detailed study to assess school digital infrastructure needs and readiness to be connected to high-speed broadband, and subsequently design a detailed operational plan that will facilitate Project investments to improve schools' underlying digital infrastructure, and expand access and usage of broadband among public schools, in the context of enabling wider digital adoption as well as supporting education sector reform, which will be informed by an overarching plan for school digital infrastructure development prepared by the Consultancy.

2. To assist in developing a detailed strategic business plan for the sustainable operationalization of the NREN, which explores its links to school connectivity.

C. DETAILED SCOPE OF WORK

The consultancy is expected to perform the following key tasks, as part of this assignment:

1. **Conduct a detailed diagnostic assessment and mapping of educational institutions' digital infrastructure,** including their readiness to be connected as well as their underlying and future digital infrastructure needs, which may include but not be limited to electrification, basic IT equipment such as computers, tablets, projectors, etc., and high-speed connectivity services.
   This assessment will capture details of the current state of digital readiness and connectivity access among education institutions, and will support the identification of

suitable models for the GoR to achieve its connectivity and education objectives, including defining the minimum standard for a connected school, infrastructure and IT equipment technical requirements and business models recommended to ensure sustainable roll-out and maintenance (that may depend on the institution category/level in question).

This mapping exercise will thus cover both schools and HLIs, as it pertains to developing a detailed implementation plan for Project investments to connect schools and a strategic plan for the NREN. Analysis should be disaggregated by type of institution, including category (public, private, government-aided school), level of education (from pre-primary, primary, secondary, technical and vocational training, to tertiary), and also cover geographical settlement (urban,rural). The assessment will consist of the following key elements:

a. **A mapping of the current context to determine existing gaps.** The consultancy will build on existing data on school infrastructure from the school data management system (SDMS) and the connectivity mapping initiated under the UN GIGA project and by the MINICT to support further development of a geo-referenced map, reflecting the location of schools and HLIs under the aegis of the GoR, with detailed information on current electricity access, IT equipment availability, the current user base in each of these institutions, existing digital applications/software used for their operation (for both administration and teaching purposes), and current Internet bandwidth access, including technology and connectivity models used. The consultancy should also look at the cost of current services.

b. **A demand forecast to determine future needs**. The consultancy should review GoR policy and reform objectivities (including but not limited to plans for EdTech, teacher training, improving education outcomes, and e-service delivery for schools) to determine the future digital infrastructure needed. The consultancy is also expected to undertake an in-depth demand assessment and forecast for the education sector (covering a 5-year time horizon), which will complement a wider demand forecast due to be commissioned by RISA.

c. The consultancy is expect to leverage direct surveys, benchmarking with similar contexts, data held by reputed and recognized operators, government and other relevant sources, to define a robust forecasting model that can reasonably hold ground over a 5-year time horizon. This analysis should be used to establish future targets for digital infrastructure development in the education sector, including minimum technical and performance requirements based on the category and type of institution. The assessment should also take a geographical approach, where districts can be used as a possible atomic unit from which to extrapolate a demand forecast, which will enable said analysis to feed into a wider demand forecast being conducted.

d. **A technical review of existing school digital infrastructure development models used** that covers existing initiatives aimed at strengthening school digital infrastructure, including plans for electrification, expansion of the OGN, the Smart Education and GIGA Rwanda projects.

   The consultancy will inter alia assess the private sector engagement approaches applied, looking at the connectivity, electrification and IT equipment deployment and management models used, including related service procurement frameworks, and payment recovery methods currently applied to support maintenance and sustainability. The consultancy should review models, looking at type of service, technology, and consider factors such as current price, technical support, reliability, and coverage of solutions used.

   This analysis should be used to identify lesson learnt, scope for improvement and possible synergies. Ultimately, this review should also explore opportunities for

applying innovation in school digital infrastructure development and high-speed broadband connectivity deployment.

    e. **An interactive digital infrastructure map, focused on the education sector,** based on the comprehensive assessment undertaken. The map should provide indicative numbers of the user base in schools, coverage of the different ongoing initiatives as it related to existing and planned infrastructure and IT equipment deployment. The map should also reflect demand projections for electricity access, IT equipment, high-speed broadband Internet connectivity, with geo-referenced location of schools to be connect provided, including priority location and relevant technical specifications. The latter may also be informed by work conducted under point 2 below.

2. **Make recommendations on how to best deploy and manage digital infrastructure for schools**, **by preparing an overarching national plan for school digital infrastructure development**, building on the findings of the upfront analysis undertaken. Recommendations made should establish the business, financial, procurement, management and governance models to be used, and suitable technical requirements. The consultancy should help the GoR to weigh different models/scenarios, presenting pros and cons, based on agreed selectivity filters.

   The models selected should *inter alia* be consistent with GoR policy and legal frameworks; support open, flexible, transparent and non-discriminatory access to any core network infrastructure deployed by the private sector; encourage competition and maximize private sector participation (e.g. in roll-out and maintenance) to ensure sustainability.

   The consultancy should consider the climate footprint of technology/infrastructure solutions chosen; consider Government's capacity for managing the model selected (including existing human resources, sectoral ownership, and suitable governance arrangements to ensure cross-sectoral/development partner coordination); risks between contracting parties; and costs/available funding for related initiatives.

   The consultancy should also consider appropriate phasing in relation to infrastructure deployment, in view of government's efforts to ensure the inclusion of underserved schools that currently are ill-equipped. In making recommendations, the consultancy should also present best practice models, based on examples from other countries. The plan proposed should be informed by and include the following elements:

       a. **A detailed technical analysis.** The consultancy should propose the most appropriate structure for schools' digital infrastructure development in view of type/category of school, other contextual factors such as rural or urban location, as well as consider different technology alternatives as part of a detailed technical analysis that identifies the most suitable combination of digital infrastructure solutions from the standpoint of coverage, alignment with school basic infrastructure readiness and needs, ability to reach remote areas with minimal infrastructure requirements, cost-effectiveness, performance, security and resilience etc.

       This technical analysis should include a **definition of the minimum standard for a connected school.** In the quest to connect all schools, there is a need to define a minimum standard for what should be qualified as a connected school. It should also include detailed technical specifications for technical models and solutions recommended. The potential of school digital infrastructure to impact surrounding communities should also be assessed. Existing assessments should be leveraged such that design proposals can include revenue forecasts based on these expected increases in infrastructure usage.

       b. **An overarching budget, with financial and sensitivity analysis**, including estimates for upfront investments (CAPEX) and operating costs (OPEX) associated with the models considered. This analysis should also consider the

commercial viability for the private sector and available public and possible donor funding. The consultancy should estimate the Net Present Value (NPV) and Internal Rate of Return (IRR) associated with any investments recommended and the break-even point where there may be anticipated cash flows based on options considered. The financial analysis must clearly identify all unitary costs of the elements involved.

c. **A market assessment and sounding** that identifies likely bidders and documents potential service providers' views on financial and technical aspects of contracting expected to inform the selection of the most suitable procurement models.

3. **Prepare detailed implementation and procurement documentation for school connectivity and digital infrastructure related Project investment**, based on models recommended and Project financing available. Once the most appropriate model to be followed has been adopted, as part of the overarching national plan for school digital infrastructure development, the consultancy is expected to provide:

a. **A detailed work plan** for school connectivity and digital infrastructure related activities to be financed by the Project, which considers how deployment will be coordinated and phased with other connectivity investments made under the Project such as bulk capacity purchase for local government offices and roll-out of a new GovNet. This plan should include a description of suitable **institutional and coordination arrangements** for implementation, along with outputs and outcomes that are expected at different stages of implementation, and **metrics that can be used to track progress**. This includes defining realistic targets for schools to be connected by the Project. The consultancy must outline the support that private sector partners may require from the GoR to ensure successful roll-out (e.g. facilitating any regulatory interventions, permissions, and access) and define any **governance norms** applicable to the scheme. It must also define the operational resources needed for implementation, including budget and human capacity. This will feed into the wider project implementation manual (PIM).

b. **A detailed budget and costs analysis**, including the value of contracts associated with implementation (based on the technical requirements defined, and geographic distribution/number of connected school sites targets etc.), including any unitary prices rates applicable. This will feed into the overall Project budget.

c. **A short training needs analysis and plan** in respect to the knowledge that RISA and other key stakeholder will require to effectively manage implementation of related activities.

d. **Support for the development of relevant procurement documents**. This will include drafting inputs to bidding documents that allow relevant services, equipment and works to be procured in respect to implementing activities proposed. In view of making procurement as competitive as possible, the firm is encouraged to leverage minimum technical specification for performance and capacity, but make specification technology and vendor agnostic, when drafting related documentation.

4. **Draft a strategic and detailed business plan for the sustainable operationalization of the Rwandan NREN,** building on the findings of the upfront analysis undertaken. This plan should also be based on an analysis of the current Rwanda NREN model, benchmarking its services and operations to regional and global counterpart and related best practice. The plan should focus on how to support sustainability and maximize the impact of the NREN, intended to increase digital adoption by the Rwandan education and

research community, and inform future business planning. The consultancy will help define the most suitable approach for connecting all HLIs, research centers, teaching hospitals, etc. to the NREN and analyze its membership scheme, where annual contributions are envisaged to help support network operation and maintenance, as well as the launch of other value added services. The plan should explicitly explore how the NREN could be leveraged to support the proposed school digital infrastructure scheme envisioned. The consultancy should also recommend any additional technical assistance that the NREN might require to support next steps in implementing the plan developed, drafting requisite terms of reference for such support, and estimating its cost.

5. A critical element of the assignment is also **knowledge transfer** to the RISA team as well as other relevant stakeholders. The consultancy should therefore ensure that this is infused in work undertaken, whenever possible. Tasks are to be executed in a result-oriented manner with the sole objective of achieving outputs and outcomes associated with the assignment.

Deliverables produced should be informed by **stakeholder consultation**, which should be documented.

D. TIMELINE AND EXPECTED DELIVERABLES

The Consultancy is expected to complete the assignment in full within 24 weeks (or 6 months), and deliver the following deliverables, based on the indicative timeline below:

- Project inception report – within 2 weeks of commencing the assignment
- First interim report, featuring a detailed diagnostic assessment and mapping of educational institutions' digital infrastructure – within 8 weeks of commencing the assignment
- Second interim report, containing recommended design options for a national school digital infrastructure development scheme, with connected school standard defined – within 12 weeks of commencing the assignment
- Third interim report, with implementation and procurement documentation for school connectivity and digital infrastructure related Project investments – within 18 weeks of the commencing the assignment
- Fourth interim report, featuring a detailed business plan for the sustainable operationalization of the Rwandan NREN and related analysis – within 22 weeks of commencing the assignment
- Final report covering the assignment in full, including final digital map – 24 weeks

E. PROCEDURES FOR REPORTING

The consultancy will submit all deliverables noted above to the Head of the Single Project Implementation Unit (SPIU) at RISA, and also submit short weekly project updates to the assigned focal point in the SPIU. As requested, the consultancy may also be responsible for presenting to a team of relevant stakeholders to validate reports submitted.

F. LOCATION

The consultancy must be available to work in Rwanda (e.g. through in-field missions). However, given the status of travel, due to Covid-19, part of the assignment can be delivered remotely (e.g. the stakeholders consultations). Collaboration with local experts or having at least one expert to be based in Rwanda for the duration of the assignment, is strongly encourage, as this will also facilitate collection of requisite inputs, knowledge of local context and support knowledge transfer.

G. REQUISITE EXPERIENCE AND QUALIFICATION: FIRM & CORE TEAM

The consulting firm selected must demonstrate:

- A track record of completing an assignment in the last 5 years with similar scope and context, preferably in a development country context.
- Extensive experience of working on digital initiatives in the education sector, including on issues such as school connectivity, NRENs, and EdTech,
- A track record of working with education and ICT sector players.
- A track record of advising Governments and the public sector player on digital infrastructure and education issues is preferred.
- Expertise in conducting sectoral diagnostics pertaining to ICT/education, as well as related market and business analysis, as well as supporting program design.
- Familiarity with best practice approaches in respect to leveraging digital technology in education as well as knowledge of latest trends.
- Expertise in developing national strategic, operational, and business plans with high development and social impact for private and public sector clients related to digital infrastructure development.
- Clear understanding of the assignment and plan for its successful execution demonstrating ability to produce high quality analytics and detailed operational plans.

The firm shall propose a team comprising of at minimum, a Team Leader, a three Technical Specialists (with various profiles), and a Financial Specialist, alongside any additional staff deemed appropriate to successfully completing the assignment. All team members must be fluent in English.

The Team Leader / Lead Specialist shall have:
- At least a master's degree in ICT, Engineering, Economics, Management, or related field.
- At least 10 years' experience working on issues pertaining to digital and/or education, preferably at the intersection of the two, with some experience in a development context.
- Demonstrated project management experience in respect to similar tasks covered by the TOR, which includes leading and completing at least 2 comparable assignments.
- In-depth technical knowledge of the digital infrastructure required by the education sector is considered an advantage.
- Experience in conducting sectoral diagnostics, plans and project in respect to the use of digital infrastructure in the education sector.
- Proven ability to engage effectively with different stakeholders in the ICT and education sectors.
- Experience of advising government and public sector clients, is considered advantageous
- Prior experience of working with developing countries, including in Africa, is desirable.

The Technical Specialist (Education Technology) shall have:
- At least a master's degree in Education, ICT, or related field.
- At least 8 years' experience working on issues pertaining to digital education, with some experience in a development context.
- Demonstrated knowledge of the education sector, including digital needs of the sector and familiarity with best practice approaches for introducing technology in education,

and for use of teaching and learning, including familiarity with the latest trends in EdTech.
- Experience in conducting sectoral diagnostics and developing plans and project in respect to the use of digital infrastructure in the education sector, preferably with national scope, and in a development context.
- Track record of supporting at least 1 similar assignment.

The Technical Specialist (Connectivity and Networks) shall have:
- At least a master's degree in ICT, Engineering or comparable field.
- At least 10 years' experience in the ICT sector, focusing on infrastructure planning.
- Experience of conducting connectivity needs assessment and demand forecasts
- Experience of developing network and IT specifications.
- Understanding of the business, financial and procurements models used in the digital connectivity sector.
- Familiarity with the connectivity models used by the education sector is consider advantageous
- Track record of supporting at least 1 similar assignment.

The Technical Specialist (Energy Solutions) shall have:
- At least a master's degree in engineering or comparable field.
- At least 10 years' experience in the energy sector, focusing on infrastructure planning.
- Experience of conducting electrification needs assessment and demand forecasts
- Experience of developing technical energy specifications.
- Understanding of the business, financial and procurements models used in the energy sector.
- Familiarity with the electrification models used by the education sector is consider advantageous

The Financial Specialist shall have:
- A Master's degree in Finance, Economic, Business, or equivalent.
- At least 8 years' experience of which at least 5 must have been spent on drafting/reviewing financial models for investment decisions.
- Experience of preparing businesses cases for national infrastructure investments, including in a development context.
- Experience of preparing detailed optional budgets for large-scale investment projects.

In all cases, references must be supplied for cited experience, which will be verified.

H. CLIENT'S RESPONSIBILITIES

The Client shall provide the following to the best of its ability:
- All available data and literature considered relevant for accomplishing identified tasks, at its disposal, including relevant data collected by Government.
- Introductions to key officials within the relevant government ministries, agencies and departments (MDAs), as applicable, ensuring cooperation from stakeholders whose activities and programs may be considered relevant to the assignment.
- Respond to information request in a timely manner.
- Timely validation of deliverables, targeting a one-week validation timeline per deliverable.