



REPUBLIC OF CABO VERDE

TERMS OF REFERENCE

Digital Cabo Verde Project

Technical Assistance for the Preparation of a National Strategy for the introduction of the 5G network in Cape Verde and the respective Economic Feasibility Study & Costing Model

1. Background

The Government of the Republic of Cape Verde received financing from the International Development Association (World Bank) in the amount of 20 million USD (20,000,000 USD) to finance the implementation of the CAPE VERDE DIGITAL PROJECT (DCV), which aims to contribute to transforming the country into a regional digital hub to accelerate its digital economy through improved digital infrastructure and strengthened demand for digital services and skills. The project will support the government's strategy to transform the country into a digitally enabled services economy, increasing its competitiveness and attracting more investment. Increasing supply and demand for broadband connectivity and data storage (digital infrastructure) is critical to supporting the development of public and private digital platforms and creating new services for people, businesses and governments.

The project comprises three main components, namely:

1. **Component 1: Enabling Legal and Regulatory Environment.** Support the Government of Cape Verde (GoCV) in improving the legal and regulatory environment for a digital economy.
2. **Component 2: Digital Competitiveness.** Better, equip individuals and companies across the country to be more competitive in the digital economy labor market and to stimulate innovation and productivity growth.



3. Component 3: Digital Public Services and Markets. Support activities aimed at increasing the GoCV's capacity to better deliver digital public services.

This Technical Assistance (TA) falls under component 3 of the project, more specifically under the subcomponent *Enabling Legal and Regulatory Environment, Digital Governance*. The Project will support the Government of Cape Verde (GoCV) in its recent efforts to support activities aimed at increasing its capacity to better develop the digital governance plan, in a context of providing clear indications for infrastructure connectivity, notably in the development of a roadmap to implement the 5G system on the islands.

2. Purpose of the TA

The purpose of this Technical Assistance is to assist the Ministry of Digital Economy (*Ministério da Economia Digital MED* in Portuguese) – the Client, and the Project Implementation Unit (*Unidade de Gestão de Projetos Especiais UGPE* in Portuguese) of the DCV project – in preparing the National Strategy for the implementation of 5G in Cape Verde, fully aligned with the best global practices and the country's digital transformation strategy.

To support the implementation of the DCV project, the Client seeks to design a National 5G Strategy, which must cover, among others, the following topics: (i) the potential and opportunities of 5G technology for the digital transformation of Cape Verde; (ii) a strategy for cohabitation of 4G and 5G networks, as well as the disconnection of 2G and 3G networks; (iii) the infrastructure of 5G networks and costs for their implementation, financing funds and investment mechanisms; (iv) network security and privacy measures; (v) transformation and creation of skills; and, (vi) a strategy for regulation and spectrum allocation of 5G frequencies.

3. Scope of Services and Tasks

The Firm is expected to undertake, but is not limited to the following activities:

Activity 1: National 5G Strategy

The Consulting Firm must present a proposal for the National 5G Strategy, which systematizes in detail actions necessary for the development of 5G technology in Cape Verde, with a view to boosting digital transformation in the various economic sectors, boosting industrial and technological development, contributing to the evolution of telecommunications networks and services, stimulating scientific research and innovation.

The strategy must include, but is not limited to the following sections:



- **Proposed architecture and indications of technical specifications:** The strategy must consider a solution aligned with the state of the art, which will provide a peak user transfer rate of at least 1.0 Gbps. Network architecture must be based on the Non-Stand Alone (NSA), in order to facilitate the evolution of existing operators' 4G core network to a 5G core network, as well as facilitate interoperability between 4G and 5G networks and between suppliers of these technologies.

Predict the evolution of the architecture for Stand Alone with recommendations for timings, requirements and conditions that could determine its timing on the medium-term roadmap. In this regard, consideration may be given to alignment with the economic development of vertical sectors, in order to ensure profitability, through underlying technologies such as slicing of the network for different applications and services, namely health, agriculture, security, education, IoTs and others.

Among the technical specifications, consider aspects related to energy efficiency, the environment, security and resilience of networks, the requirements for enhancing the use of 5G in Cape Verde whether in private or public networks.

Specify the transformation of the radio (NR) system, in order to enable a gradual evolution of existing infrastructures, facilitated by a strategy for using frequency spectrum that aims at efficiency in investments.

- **Network sharing:** The solutions to be proposed must also include scenarios of network sharing between at least two (2) operators, indicating the respective impacts in terms of technical complexity, implementation times and investment and operating costs. The strategy must guarantee the reduction of CAPEX and OPEX for operators. The network sharing solution must also include a management model that covers both technical exploration and cost exploration and incremental investments.
- **Security:** Solutions must include network security aspects, mainly between network functions and/or elements from different suppliers, whether for the protection of operators, as well as customers, public or private entities. This section must include an analysis on cybersecurity measures in the 5G context adopted in few benchmark countries along with some good international practices in the area. The recommendations could then be based on such analysis and further enhanced following consultations with relevant authorities and market players.
- **Consultations with relevant stakeholders:** The firm must identify relevant groups such as telecom operators, industry, public institutions, in order to build ownership and help with collective thinking and collective agreement on the action plan.



- **Impacts:** The strategy must include a detailed assessment of the potential impacts on:
 - **Existing networks:** Experience integrated into the operator's existing infrastructure – The new 5G implementation should result in the least possible impact on the operation of existing services and allow interoperability between existing networks, 4G, 3G and 2G. Identify the impacts on the various subsystems of the network, including OSS and BSS systems, whether for the implementation of a pilot network or a commercial network.
 - **The environment:** Cape Verde is a country committed to environmental issues, having created legal mechanisms to protect and defend the environment, following international recommendations and best practices. For this reason, solutions must also consider components and evidence of environmental sustainability.
 - **The society:** Roadmap that foresees social equity, in terms of broadband accessibility, promoting cohesion, reciprocity, culture, etc.
 - **Human capital:** Roadmap that provides access to services, education, skills, health, food, etc.
- **5G spectrum strategy:** The spectrum strategy must present the frequency bands identified by the ITU for 5G, the international scenario in terms of spectrum allocation for 5G, and adjacent technologies (e.g. IOT), advantages of the identified frequency bands, point out the unlicensed 5G bands , propose frequency bands to be adopted in Cape Verde, spectrum forecast for private use (companies and industries), spectrum valuation, procedure to adopt for the allocation of Frequency Usage Rights (DUF), conditions and obligations to be imposed in the DUF, both in the pilot project phase and in the post-pilot phase.
- **Technical, Economic and Financial Assessment:** The strategy must also present the technical, economic and financial feasibility study for the introduction and implementation of the 5G network in Cape Verde. The feasibility study must calculate NPV and IRR for different scenarios in the country (i.e. Optimistic, Pessimistic, and Neutral) over a 10-year period, leveraging the figures from the 5G Implementation Cost Model (Activity 2).
- **5G Pilot Project:** This strategy may also include the possibility of a plan to implement a 5G pilot project that involves mobile communications operators, companies, application developers, universities and a selection of key public services, allowing them to benefit from the 5G ecosystem. Coverage areas of the pilot project to be developed must include, at least, the Cape Verde Technological Park - Praia, the Economic and Industrial Zones (ZEEs) of the islands of São Vicente and Maio, the University of Cape Verde - Praia Campus.



Other areas should be under the recommendation of telecommunications providers. The strategy to be developed within the scope of 5G must however take into account the conditions that Legislative Decree no. 7/2005, amended by Decree-law 12/2022, of April 2013, provides for in no. 8 of its art. 102, regarding the exemption from paying spectrum fees for the development of new technologies only in non-profit projects.

- **Communication materials:** The strategy must include a launch event as well as relevant dissemination material such as ppt, infographics, printed materials...

Activity 1 Deliverables:

The activity includes, but is not limited to the following deliverables:

- 1) National 5G Strategy:** The strategy will include recommendations for a roadmap or framework for the implementation of the national 5G strategy, in the short, medium and long term, aiming to prioritize the economic sectors to be digitized with support for this technology, and ensuring sustainable support from telecommunications operators. The strategy comprises:
 - Proposed architecture and indications of technical specifications;
 - An action plan for its implementation with a governance model, timeline, results framework/ indicators as well as mandates/roles assigned to implementers and strategy review and update mechanisms;
 - Network sharing;
 - Security;
 - Impacts (on existing networks, environment, social and human);
 - 5G spectrum strategy;
- 2) Consultations with relevant stakeholders:** Full list of consultations and consultations reports.
- 3) Technical, Economic and Financial Assessment;**
- 4) Policy and regulatory reforms:** Policy and regulatory reforms related to facilitating 5G deployments (i.e. review of construction process in terms of permitting for small base stations/antennas, sharing of the street furniture such as poles, etc.)¹.
- 5) 5G Pilot Project:** The firm must propose a minimum of two 5G pilot projects in different islands, the results of which the GoCV may leverage with the relevant stakeholders.
- 6) Communication materials.**

¹ This item is key since 5G implementation involves massive densification of base stations/antennas in urban areas and deployment of this is a substantial cost and time aspect.



Activity 2: 5G Implementation Cost Model

The cost model must cover CAPEX and OPEX, for each scenario contemplated (i.e. Optimistic, Pessimistic, and Neutral). 5G OPEX referral costs must include knowledge transfer, training and Technical Assistance for at least a 10-year period. CAPEX costs must also consider the upgrades to be carried out over the years in order to support the traffic, users and 5G applications expected over the 10-year period.

Design a cost and respective financing model that is sustainable with the operators' business continuity. Costs and their models from different classes of suppliers must also be considered.

Activity 2 Deliverables:

The activity includes, but is not limited to the following deliverables:

- 1) 5G Implementation cost model.**
- 2) Data pack:**
 - i) Primary data from the cost model; and,
 - ii) Exploration of secondary data used to support key elements of the cost model.

Activity 3: Grievance Redress Mechanism (GRM)

Compliance with World Bank Group Environmental and Social Safeguards mandates the establishment of a Grievance Redress Mechanism (GRM). The firm would develop and implement a GRM according to best practice, in order to ensure that candidates, partners, and other stakeholders can file complaints and that the complaints are dealt with in the most appropriate way. The GRM would need to be made available in a transparent way in various media (paper, electronic, etc.) The GRM would add but also be interconnected to the overall DCV Project GRM under UGPE. The GRM would ensure that complaints received are promptly reviewed and addressed in a timely manner. The firm would need to develop a process to properly respond to complaints. This process, as well as the means with which people can voice their concerns, would require approval from the client, UGPE and the World Bank².

Activity 3 Deliverables:

This activity includes but is not limited to the following deliverables:

- 1) GRM, including inter alia:**

² SMEs and individuals affected by the project may also submit their complaint to the Independent Inspection Panel, which determines whether there has been, or could be, damage as a result of the World Bank's non-compliance with its policies and procedures.



- a. Grievance Redress strategy that allows easy access and confidentiality to those who complain. The firm will present evidence of the implementation of this strategy.
- b. Report on the number of complaints received and processed. The firm will prepare a report of complaints received throughout the program, how they were addressed, as well as their status at the end of the program.

4. Reporting Requirements

Inception Report

An Inception Report and a detailed Work Plan is required within 2 weeks after the signing of the contract. The Inception Report would update the methodology and the work program, including deployment of personnel that would be included in the Firm's proposal and used as a basis for agreed pricing, noting the changes and detailing any difficulties encountered, together with a proposal on how they may be overcome. The Client would review and comment on the Inception Report and provide final acceptance. The Firm's established Work Plan may be revised from time to time, but acceptance by the Client would need to be requested each time.

Progress Reports

The Firm would report on the implementation progress of the Project to the Project Coordinator at the Client through interim reports every two weeks. The interim reports would include project implementation status (description of the activities for the period and comparison of progress of work with the projected work plan), updated work schedule, major issues, and proposed corrective actions. The reports would be in Portuguese.

Completion Report

A Completion Report at the end of the assignment would be submitted immediately after activities have been completed and would summarize the activities and approach/methods used during the assignment, including a brief section on recommendations with lessons learned for future projects of similar nature.

5. Expected deliverables, reporting requirements and timeline

The selected consulting firm must carry out the project within four (4) months from the date of signing the contract. The following remuneration schedule is set for each part of the contract. Bidders should adhere to these in their proposals, within the total budget given. Deliverables completed per the remuneration schedule will be approved by the



Client, after which invoices may be submitted for payment as per the remuneration schedule below:

Component	Deliverable	Description	Type	Payment after Customer Approval	To schedule
Strategic approach	<i>E0. Initial report</i>	<i>Overview of the work to be done within the scope of work, including the –Implementation consultancy roadmap</i>	<i>Report</i>	<i>15%</i>	<i>Contract signature + 20 days</i>
GRM	<i>E1. Grievance Redress Mechanism</i>	<i>GRM Strategy and report of complaints</i>	<i>GRM and Reports</i>	<i>-</i>	<i>Contract signature + 4 weeks</i>
Assessment	<i>E2. 5G in Cape Verde - Strategy Model</i>	<i>Detailed methodology used to develop the 5G network deployment strategy for Cape Verde</i>	<i>Report</i>	<i>15%</i>	<i>Contract signature + 5 weeks</i>
Mid-term analysis	<i>E3. 5G in Cape Verde – Requirements, Architecture and Deployment</i>	<i>Definition of spectrum and network strategy for 5G and including 5G requirements 4G/5G architecture and 5G implementation strategy, for the pilot phase and commercial phase</i>	<i>Report</i>	<i>20%</i>	<i>Contract signature + 10 weeks</i>
	<i>E4. 5G in Cape Verde – Cost modeling</i>	<i>Preparation of commercial and technical cost model. This component must include existing solutions on the market, by suppliers and their respective costs.</i>	<i>Report</i>	<i>20%</i>	<i>Contract signature + 12 weeks</i>
Final Model	<i>E5. Final report</i>	<i>5G network implementation strategy for Cape Verde, final version, including Spectrum Definition and Network Strategy for 5G and including</i>	<i>Report</i>	<i>30%</i>	<i>Contract signature + 16 weeks</i>



		<p><i>5G Requirements 4G/5G Architecture and 5G implementation strategy framed in the country's digital transformation roadmap and commercial cost model and technician</i></p>			
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6. Qualification requirements for the consulting firm and team members

Experience and Reference Requirements

- a. The consulting firm must have at least 10 (ten) years of experience in preparing studies and strategies, planning and implementing mobile networks and with work similar to the object of this procedure;
- b. The firm must have a team of experts in new generation mobile networks, multidisciplinary and with proven international experience in the Electronic Communications market;
- c. Must have experience in technical feasibility studies, economic and financial, cost modeling for the implementation of 4G and 5G mobile networks, and present in your application at least 3 (three) cases of reference projects in 5G mobile network engineering;
- d. The consulting firm must provide references from previous projects, experience and knowledge about the technologies in question proving an adequate level of experience with 4G and 5G technologies;
- e. Must have knowledge and experience in implementing mobile networks in small island developing states, similar to Cabo Verde.

Quality Requirements and/or Technical Certification

- a. The technical certifications and experience of the consultancy firm (identification and enumeration of similar projects) must be included and presented within the scope of the services defined for the project, namely mobile network architecture to be carried out;
- b. It is a basic requirement to have elements of the certifications of the project team members in terms of technical modeling of 5G network costs;
- c. Additionally, technical, financial and project management certifications will be considered valuable in the proposal evaluation process. Considering the



complexity and geographic scope of the project, the existence of proven experience (through certifications) in project management will be essential.

The project team must be composed of the following (four) key specialists:

1- Team leader

Qualifications and skills:

- At least a master's degree or equivalent university degree in Economics or Telecommunications Engineering;
- An economic/financial or telecommunications engineering specialist in the electronic communications market with a minimum of 10 years of experience in developing mobile network implementation strategies;
- Experience in developing mobile network implementation strategies in island countries is desirable;
- Demonstrate at least 5 projects related to mobile network implementation studies and strategies, where 5G projects must be highlighted;
- Excellent written and spoken English;
- Mastery of written and spoken Portuguese;
- Excellent communication, writing and reporting skills.

2- Economic/financial expert:

Qualifications and skills:

- At least a master's degree or equivalent university degree in Economics, Finance or related areas;
- At least 7 years of proven practical experience in Financial or Project Management;
- Experience in financial analysis, assessment of costs and revenue streams, management and business strategies, establishing financial sales milestones;
- Have carried out at least 3 similar projects;
- Excellent written and spoken English;
- Knowledge of Portuguese is desired;



- Excellent communication, writing and reporting skills.

3- Technical expert:

Qualifications and skills:

- At least a master's degree or equivalent university degree in Electrical Engineering/Telecommunications;
- At least 5 years of proven professional experience in Mobile Network Engineering;
- At least 3 years of experience in implementing cellular networks with proven experience (plus certifications for this purpose);
- At least 3 years of experience in consultancy processes specialized in Cellular network implementation strategy with proven experience (plus certifications for this purpose);
- Have at least 3 consultant/auditor assignments related to 5G Cellular network deployment;
- Excellent written and spoken English;
- Knowledge of Portuguese is desired.

4- Cellular network deployment strategy specialist

- Have at least 7 (seven) years of proven practical experience in cellular network engineering;
- At least 5 years of experience in cellular network deployment with proven experience (plus certifications for this purpose);
- Minimum experience of 5 years in specialized consultancy processes in cellular network implementation with proven experience (in addition to certifications for this);
- Have at least 3 project assignments related to 5G cellular network deployment strategy;
- Fluency in Portuguese and English is required.



7. Organization of the assignment

The selected firm shall undertake the assignments in close consultation with the Ministry of Digital Economy MED/DGTED, which shall follow and support the assignment. The Consultant will report to Unidade de Gestão de Projetos Especiais (UGPE) for contract administration. The deliverables and the reports shall be submitted to MF-DGTED with UGPE in copy. The Reports shall be submitted in English and Portuguese Language. The working language is Portuguese.

8. Contract types

A Lump-Sum form of Contract shall be signed, payments of the Consultant remuneration are linked to approval of deliverables, and the payment of reimbursable expenses are made upon presentation of the receipt of the expenses occurred at the real cost

9. Annex

The Cape Verdean government aims to attract foreign investment and transform the country into a digital platform in Africa by 2030, with the digital economy contributing 25% of GDP (compared to the current 6% in 2022). This requires addressing challenges despite favorable factors such as high internet penetration, stable electricity supply, literacy levels, and existing digital content.

Key challenges include cybersecurity readiness and building an ecosystem to handle sensitive digital content. Cape Verde liberalized its telecommunications market in 2007, leading to increased ICT usage and benefits across various sectors.

Currently, the market consists of two companies: CVTelecom and Unitel T+, offering voice, broadband, VoIP, and pay TV services. The recent merger of CVTelecom Group companies necessitates a review of the telecommunications market.

Mobile services dominate, but ARPU has been under pressure, while fixed services show reduced penetration rates. CVTelecom has a substantial market share, contributing 2.7% to Cape Verde's GDP.

Despite positive indicators, the electronic communications sector requires continued efforts to ensure fair market conditions, consistent competition rules, innovative legal frameworks, and regulatory environments supporting emerging technologies.



To achieve its digital transformation goals, the government plans to develop a National Strategy for 5G network implementation, including an economic feasibility study, in collaboration with telecom operators and regulators. This move aims to leverage the technical advantages of 5G, such as faster speeds, lower latency, greater capacity, improved reliability, and expanded coverage, to meet Cape Verde's digital transformation needs effectively.