COMMON MARKET FOR

EASTERN AND SOUTHERN AFRICA

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Technical Requirement TOR

**For**

Supply and Installation of Containerized Data Centre

At the Common Market for East and Southern Africa

(COMESA) Secretariat Head Quarter

September 2021

Introduction

Datacentre houses computing servers and core network resources that require high availability, limited and controlled physical access to the facility, protected from fire and safety hazard, adequately supplied with power utility, controlled heat and ventilation system, to ensure critical services are always operating.

Objectives

The main objectives of this project include:

* Design, supply and Installation of a containerized Data Centre facilities and perform the necessary Civil Work.
* Training for the COMESA IT Network Staff in Datacenter Technologies.

Scope of Work

Supply and Installation of Containerized Datacenter

Putting a containerized datacentre need to address the following areas:

* Tier 3 Datacenter
* Supply of 20ft containerized data centre.
* Rack with complete accessories for cable management, power strip to distribute power to equipment within it, airflow manager
* Fire detection, alarm and suppression solution for protecting IT equipment from fire hazards.
* Power Connection to Three Phase Zambia Electricity Supply Corporation (ZESCO) power, Backup Generator, Automatic Transfer Switch and Main Distribution Board with phase monitoring.
* Air-conditioning system to keep the Datacenter cool 24/7.
* Supply and install modular and scalable UPS solution and connect power to every rack in the datacentre.
* Environmental monitoring and controls DCIM/ BMS (Temperature, Humidity, power events, etc.)
* Physical surveillance (CCTV) and monitoring screen
* Access control (Bio-metric and card Access)
* All the necessary civil works.

Training IT staffs

Official training for two COMESA IT Engineers on Data Center technologies including certification exam on

* Data Centre (CCNA Data Centre)
* CDCP - Certified Data Centre Professional
* Knowledge transfer and site engineering and post implementation support for one year.

**Note:**

* Bidders should clearly show their space utilization, components positioning, power design, heat and ventilation system ducting, cable management and physical security features
* Bidders are advised to site visit but shall bear their own site visit costs.
* At the end of the project the bidder shall produce AS BUILT DIAGRAMS of to be a datacentre.
* Bidders are expected to integrate the existing power from Zambia Electricity Supply Corporation (ZESCO) and backup Generator to the Datacenter.

General Requirement

* The bidder is expected to have an experience in data centre building
* The bidder must prepare project plan describing among others, methodology, human and material resources.
* The bidder must be equipped with the state art of design, implementation of data centre and Equipment and supporting tools.
* The bidder has to supply the required equipment with all the necessary accessories and manufacturer documentation according to the standard of tier 3 Datacenter technology.
* The bidder has to implement the cabling system so that it has to work in harmony with the existing system and should give confirmation in writing.
* Warranty for the system has to be described unambiguously at least three years.
* The bidder could describe any optional recommendation and technological materials and devices separately.
* The bidder should report periodically the progress of the project.
* The bidder responds to the data center design as turnkey solution.
* The bidders are expected to have site visit before doing their technical proposal.
* Bidders should include their quality assurance plan and manufacturer authorization letter.
* The bidder should present technical manual/document with the list of all materials that shows:
  + The detail specification of the materials used
  + Quantity of the materials used
  + Type/brand of the materials
  + Country of origin of the materials
  + Installation method used
  + Experience in similar assignment
  + Power and cooling calculation information
  + Experience in similar assignment, at least two reference letters for completed similar projects from its previous customer describing the scope of the job and price.
  + List of professional and their CV to be assigned in the job. If there is a change of professional in any case, the company should notify to COMESA at the time of award.
* The **Team Leader/Project Manager** to be responsible for the successful initiation, planning, design, execution, monitoring, controlling and closure of the project. The person should have: -
  + A minimum of MSC degree in Computer Science /IT/ Project Management or related
  + at least 8 years of project management experience in managing IT related projects
  + Understands datacenter and datacenter technologies including security aspects.
  + Ability to organize and manage project team
* The **Team members (professional staff)** should have:
  + A minimum of a bachelor’s degree in Computer Science /IT/ electrical or computer engineering
  + Experience in designing and implementation of containerized Datacenter
  + Detail knowledge and expectance on datacenter cooling system
  + Detail knowledge and experience on Fire suppression and protection system
  + Detail knowledge and experience on Power / Electrical system
  + At least 5 years of experience on each area (containerized Datacenter environment, cooling, fire protection and power installation).
  + Minimum required number of professional team members: 5 (Project manager, Datacenter environment, cooling, power, and fire protection engineers).
* The price schedule needs to be presented in separate document
* The price schedule shall clearly indicate the following:
  + List of materials with its quantity and unit cost
  + Total cost each of materials
  + Supply and installation costs.
  + Summary of material cost and installation cost
  + Grand total
* Schedule for supply and implementation of the project

Evaluation Criteria

* Bidders are required to attach technical detail of equipment, CV of professionals and reference letter from previous and current clients.
* Compliance to Technical Specification is the basis for qualification.
* Qualification and experience of professionals
* Reference letters from its previous customer clearly stating the time, scope and cost of the project.
* The prospective company should have an extensive experience and professional in the area of:
  + Data centre Design and implementation
  + Implementation of fire protection system
  + Implementation of Datacentre cooling system
  + Datacentre power system installation
  + Implementation of Datacenter physical and logical security system
  + A good track record of similar implementations
* Company Experience
  + The company needs to have at least 5 years of experience on similar projects
  + The company needs to come up with at least two reference letters from its customer describing the scope of the work and performance.
* Methodology
  + The methodology, schedule and design should be stated and presented clearly.
  + Bidders are expected to provide the list and price of missing items, if any, separately.

**Testing and Supervision**

* All devises, performance of equipment and power installed will be tested to ensure that installed hardware meet the technical specification.
* The project will be supervised by COMESA Network and System Administrators.

Technical Specification of the Data Centre Environment

The new Datacenter will be required to have the following specification:

* It is located at COMESA secretariat head quarter building, Lusaka Zambia
* 20ft Containerized data centre must be placed
* Properly installed redundant power system that feeds power to IT equipment from the direct ZESCO power and backup generator through the backup UPS power.
* The Data Center container is required to be fire proofed and rated at a minimum of 3 hour
* Heat and smoke detectors need to be installed in a proper position.
* Fire protection and suppression system should be installed on a proper position.
* Flood and humidity detectors need to be installed in the raised floor
* Temperature controllers need to be installed in the room.
* Redundant Datacenter cooling system should be installed in the Datacenter.
* Rodent repellent solution should be deployed with in the ceiling and raised floor
* Proper security mechanism CCTV and access controls
* Sun shading for the Datacenter

**Power:**

Reliability and stability of electric power can affect Data Centre Operations. A design that helps Data Centre IT Equipment from operational discontinuity in the event of an electrical power supply interruption, instability or power fluctuation, and any form of power outage is required.

The power system at the datacentre will comprises the following subcomponents

* Main Switch
* Distribution Board
* Connection to the existing Zambia Electricity Supply Corporation (ZESCO) power and other backup Generator with Automatic Transfer Switch (ATS).
* 20KVA uninterrupted power supply (UPS) with an integrated Power Distribution Unit (PDU). UPS is required to have one spare Power module. A static transfer switch should be provided for performing reverse transfer of the load from the inverter to bypass source with no interruption in the power to the critical AC load.
* Two Intelligent Power Distribution Units suited with each 42U racks; this power distribution unit is required to have minimum of 10 power outlets on each side of the rack.
* Emergency Power Off: This feature is a safety feature intended to cut off the power for all IT equipment in an emergency so as to them during fire, flood, equipment overheating due to due to Heating, ventilation, and air conditioning (HVAC) failure, etc.

**Distribution board:**

* Main distribution board should shave the following specification:
* All the necessary monitoring facilities should be there.
* Physical size needs to be designed to properly handle cable management and proper cable isolation
* Circuit breakers (monitored from DCIM / BMS) and isolation switches should be clearly sized and specified
* Surge arresting mechanism need to be included

**Grounding:**

* Bidders should propose for grounding pit or grounding treatment solution for permanent earthling method according to the national standard.
* All equipment in the datacentre need to be properly connected with the grounding system

**Power Cabling and Installation standard requirement:**

* Power cabling inside the entire Data Centre Facility shall be of high-grade copper.
* The cables and conduits used inside the Data Centre Facility shall be of Fire-Retardant low smoke Wires quality.
* Grounding wire shall be used braided copper wires inside the data Centre Facility.
* Electrical Cable rated capacity shall exceed the power requirement of fully blown configuration to be used.
* Mains & Sub-Main– Mains & sub-mains wire where called for shall be of the rated capacity and approved make. Every main and sub-main shall be drawn into an independent adequate size conduit. Adequate size draw boxes shall be provided at convenient locations to facilitate easy drawing of the mains and sub-mains. An independent earth wire of proper rating shall be provided. The earth wires shall run along the entire length of the mains and sub-mains.
* Colour Code of the Conductors – Colour code shall be maintained for the entire wiring installation.
* Fixing of the Conduits – Conduits junction boxes shall be kept in position and proper holdfasts shall be provided. Conduits shall be so arranged as to facilitate easy drawing of the wires through them. Adequate junction boxes of approved shape & size shall be provided.
* After conduits, junction boxes, outlet boxes & switch boxes are installed in position their outlets shall be properly plugged so that water, mortar, insects or any other foreign matter does not enter into conduit system.
* Conduits shall be laid in a neat and organized manner.
* Switch-Outlet Boxes and Junction Boxes – All boxes shall conform to all prevailing Industry Standards. The cover plates shall be of best quality sheets or insulating material, which should be mechanically strong and fire retardant.
* Distribution/Sub Switch Boards- must be installed for Line A and Line B within the Data Centre Facility at predetermined locations suitable for maintenance and emergency switching, bidders are responsible for the number and proper positions of the Distribution Switch Boards according to safety and security standards.
* Specifications for Circuit Breakers – the number and rating of circuit breakers must be determined by bidders. The type and quality of each breaker shall be of the best standard quality and shall be clearly determined by the bidder.

**Racks and Accessories:**

Racks being important infrastructure hardware of the datacentre facility and a platform for customized installation of all of Active IT Equipment [Servers, Storage, Switches, etc…], the data canters are required to have six movable and adjustable **42U Racks** housing IT equipment together with Cable and Power guides.

Racks must be of 42U size integrated with the following features,

* Vertical Cable Management
* Horizontal Cable Management
* Power Cable & Receptacle Management

**Intelligent Power Distribution Unit (iPDU)**

* All racks must be integrated with intelligent power distribution unit. The PDU should support both C13 and C19 type of output connection.

**Environment Management System (BMS):**

Should be able to integrate with

* Fire detection and suppression system
* Air-conditioning system (CRAC Unit), heat and humidity sensors
* Door Access System
* Surveillance Camera System
* Power System and Emergency Power Cut off System
* UPS monitoring
* All environmental management systems should send alert message to email and SMS.

**Sensors:**

All critical devices within the data centre need to be monitored. This can be achieved if the right type of sensors are designed and integrated along with the devices. Devices and environmental activities that require sensors are temperature, humidity, door sensors, water leakage and motion.

**Fire Detection and Suppression System:**

* Bidders should come up with a design for the implementation of fire detection, alarm and environmentally friendly gas agent suppression system.
* Bidders are required with the following equipment (2 zone fire alarm control pane, ionization smoke detector, Bell/beacon, flasher, break glass, gas release button, abort switch, Sensors to integrate with environment management system and access control system, Actuators, gas-release nozzles, Gas tanks, agent gas, fire resistant cable.
* Design for the installation of fire detection, alarm and suppression system should be clearly described and specified.

Automatic shutdown system should be installed for the entire equipment at the time of disaster before releasing gas to control fire.

**Datacenter Air Conditioning**

Intelligent air-conditioning system for containerised Datacenter should be integrated to Fire system and monitored by DCIM/BMS

**Physical Access Control and Security Systems:**

Integrated access control system consisting of a central management, intelligent controllers, proximity readers, power supplies, proximity cards, and all associated accessories is required to secure the Data Centre. The data centre will have two entrances to be secured with card and bio-metric access control.

Monitoring cameras should be installed in proper locations to cover all the critical areas of the data centre, the room shall have indoor IP surveillance cameras to monitor internal room and out-door IP surveillance cameras to monitor outside area (perimeter of the room).

| **No.** | **Item Description** | | **Units** | **Quantity** |
| --- | --- | --- | --- | --- |
| **1** | **Power Distribution System** | |  |  |
|  | **Emergency Power Off Switch** | | units | 2 |
|  | **Intelligent Power Distribution Unit (iPDU)**   * Input: 30A - 200, 208, 230 Output Connections: (21) C13 & (3) C19 * Cord Length: 10 feet (3.05 meters)  Mounting: Zero U Vertical | | units | 12 |
|  | **Automatic Transfer Switch (ATS)** | | units | 2 |
|  | **Main Distribution Board (MDB):**   * **Input:**   100A 3 phase, with surge protection   * **Output:** 2 x 100A - 3P+N for UPS 4 x 32 A - 1P+N+E for ACs 4 x16A 1p+N+E for Lighting, Fire System | | units | 1 |
|  | **Cable Type**   * 16mmsq 4 core Flex Cable (red, yellow, blue, black) | | meter | According to design |
| **2** | **Racking for Cable manager** | |  |  |
|  | * Movable and adjustable **42U Racks** | | Units | 6 |
|  | * Horizontal Cable Manager, 2U Single Side with Cover | | Units | 12 |
|  | * Cable Containment Brackets | | Unit |  |
| **3** | **Physical Access Control System** | |  |  |
|  | **Door Access Control System**   * Proximity Card and fingerprint reader * IP based * Fully integratee with Environment Management system, | | Units | 1 |
| * Exit button | | Units | 1 |
| * Fire proofed Door (three hour Rated protection) | | units | 1 |
| * Door returner | | units | 1 |
| * Door Sensor | | units | 1 |
| * ID card printer | | units | 1 |
| * Cards | | Unit | 50 |
| **IP Surveillance Camera (indoor and outdoor)**   * The camera support streaming crisp and clear video at resolutions up to 1920 x 1080 while maintaining low network bandwidth * Network usage with either H.264 or MJPEG compression * Video data can automatically be recorded * Day or night capability with motion detection * Support for Power over Ethernet * One month video storage for all cameras | | units | 6 |
| **4** | **Lightning** | |  |  |
| * Diffuser and 3 Fluorescent Assembly in one frame | | units | 8 |
| * 2 Gang Switch | | units | 1 |
| * 2 Core 1.5mm Cable | | meter | 50 |
|  | * According to the calculation for 500 Lux | |  |  |
| **5** | **Backup Power (UPS)** |  |  |  |
|  | 20KVA UPS |  |  | 1 |
|  | Ratings | 20 kVA/18 kW at 0.9 power factor |  |  |
|  | Topology | Double conversion |  |  |
|  | Electrical input |  |  |  |
|  | Nominal input voltage | 208V/120V, 220V/127V +10, -15% 480V/277V, 600V (480+600 with transformer) 400V models also available |  |  |
|  | Operating frequency | 50/60 Hz (45 to 65 Hz) |  |  |
|  | Electrical output |  |  |  |
|  | Nominal output voltage | 208/120, 220/120 Vac 480/227 with output transformer |  |  |
|  | Output voltage regulation | ±1% static; ±4% dynamic with 100% step load recovery within 1ms response time |  |  |
|  | Battery |  |  |  |
|  | Battery type | 9 Ah, sealed, lead-acid, maintenance-free |  |  |
|  | Battery runtime | 30 minutes with a full load |  |  |
|  | Battery replacement | Field-replaceable |  |  |
|  | General |  |  |  |
|  | Diagnostics | Full system self-test at start-up |  |  |
|  | UPS bypass | Automatic on overload or UPS failure |  |  |
|  | Communications |  |  |  |
|  | LCD display | Graphical LCD with blue backlight |  |  |
|  | LEDs | 4) LEDs for notice and alarm |  |  |
|  | Communication ports | (1) RS-232, (1) relay contact, (1) REPO,  (2) environmental input |  |  |
|  | Communication slot | (2) X-Slot communication bays |  |  |
|  | Power management software | Bundled Software Suite CD |  |  |
|  | Operating temperature | 50–104ºF (10–40ºC), 45ºC with 7.5% derating; Optimal battery performance: 77ºF (25ºC) |  |  |
|  | **Certifications** |  |  |  |
|  | Quality | ISO 9001: 2000 and ISO 14001:1996 |  |  |
| **6** | **Fire Suppression System** |  |  |  |
|  | Suppression | FM-200 or equivalent |  | 1 |
|  | Smoke detection | CB200 or equivalent |  | 4 |
|  | Cylinder | Gas Cylinder |  | according to calculation |
|  | Fire Alarm | Comply |  | 2 |
|  | Status report to Administrator | Send SMS and email |  | - |
|  | Integration with AC and UPS | Configure to send signal |  | - |
|  | Warranty | minimum three years |  | - |
| **7** | **Temperature Control System** | |  |  |
|  | * Data center (IT equipment) cooling system * 40,000 BTU cooling capacity * 600 mm wide in 42U Cabinet * In-Row technology * Modular expansion: allows capacity expansion * No raised floor required * Easy adaptation to different racks * Mountable to the side of the rack * Network manageable Integrated monitoring system * Variable Speed, Hot-swappable fans * Works 24/7 nonstop | | units | 2 |
| Temperature and Humidity Sensor | | units | 6 |
| Water leakage Sensor | | units | 2 |

Note: - the above specification and quantities are guide as per the manufacturer design and standard