KENYA REVENUE AUTHORITY

ISO 9001:2015 CERTIFIED

TERMS OF REFERENCE

Upgrade of Data Center Facility Infrastructure

I. Introduction

KRA business operations are fully reliant on ICT systems and hence the need to ensure maximum uptime and availability of its IT Infrastructure and business systems throughout the year, currently hosted at the primary and secondary sites.

The primary data center commissioned in 2017 has a challenge in adaptability to accommodate new resource intensive workloads to support AI. The increasing demand for the adoption of Artificial Intelligence (AI), Machine Learning (ML), advanced analytics, and high-performance computing (HPC) workloads imposes significantly higher thermal loads on data center infrastructure compared to traditional enterprise IT systems. Existing cooling systems designed for conventional workloads (typically 5–7 kW per rack) are no longer sufficient to support AI compute densities, which commonly exceed 10–30 kW per rack and may continue to rise.

Upgrading the cooling infrastructure to AI-ready standards is therefore critical to ensure operational resilience, system reliability, regulatory compliance, and future scalability.

II. Objective(s)

The primary objective of this initiative is to upgrade the existing data center cooling infrastructure to an AI-ready cooling environment capable of reliably supporting high-density, GPU-based AI workloads, while ensuring thermal resilience, energy efficiency, compliance with industry standards (ASHRAE TC 9.9), protection of ICT investments, and scalability for future growth, without compromising availability, performance, or business continuity of mission-critical systems.

Additionally, the initiative is to replace the aged data center infrastructure management (DCIM) to enhance monitoring and visibility of the data center components to ensure maximum uptime and availability of data center services. The initiative will also address data center challenges/gaps related to fire suppression and cabling systems.

This will entail, and not limited the following;

a) Upgrade of the Air Conditioning System to AI ready.
b) Replacement of the obsolete Data Center Monitoring Solution (DCIM).
c) Enhancing the fire suppression system to include additional areas (Generator Rooms) at the primary site.
d) Upgrade of Data Center Cabling Systems (at both Data Centers)

III. Scope of Works

Successful bidder will be required to undertake the following at minimum to ensure that the implementation of the modern data center facility infrastructure is completed in line with industry best practices, compliant with organizational and regulatory requirements

a) Assessment and Design:

- The bidder to undertake a detailed assessment of the existing data center infrastructure, with a view of identifying existing gaps and challenges.
- Designing the target futuristic robust architecture software defined Data Center Facility infrastructure to serve KRA up to 5 years.

b) Implementation

- The bidder to supply/deliver all the required hardware and software components for the Air Conditioning, DCIM and Fire Suppression System.
- In liaison with the KRA technical team, successful bidder to undertake an Original Equipment Manufacturer (OEM) led deployment of the systems
- Perform quality assurance and validation by the OEM of the solution is mandatory requirement.
- Proper training of the Technical Staff on the new solution to ensure smooth transition and migration.
- Handholding and handover of the solution to KRA Data Center Team.
- The successful bidder is required to provide a mandatory four (4) year post warranty support and maintenance of all the solution hardware and software components.

c) Migration Strategy:

- Development of a phased migration plan to ensure continuity of service.
- Updating or replacing software, protocols, and security measures as necessary.
- Testing and Validation:
- Post-migration load testing of the HVAC system to validate load performance, redundancy, and failover capabilities.

d) Training and Documentation:

- Provide OEM led offsite training to at least fifteen (10) Data Center staff on the new Air Conditioning Systems, DCIM solution and the Fire Suppression System.
- Document the new solutions and migration procedures.

IV. Methodology

The bidder to provide a methodology for a seamless delivery of the solution that will entail and not limited to the following phases;

a) Planning and Assessment**:**
   - Evaluate the current environment to determine compatibility and gaps in its capabilities.
   - Define key performance indicators (KPIs) for the new architecture.

b) Design Phase**:**
   - Develop a high-level design of the new cooling system and DCIM.
   - Choose appropriate hardware, considering capacity, redundancy, and scalability.

c) Implementation:
   - Deploy new hardware and software components in phases to ensure smooth transition.
   - Reconfigure existing systems (Fire Suppression) to fit into the new architecture.

d) Testing and Verification:
   - Conduct stress testing, failover testing, and latency measurements.
   - Verify the solutions meets the predefined KPIs.

e) Training and Handover**:**

- Conduct staff training sessions.
- Provide comprehensive documentation on the new architecture.

V. Deliverables/Milestones/Outcomes

The project will produce the following deliverables:

a) Project Plan: Detailing timelines, phases, and milestones.
b) Design & Architecture Documentation: Including diagrams of proposed air conditioning, DCIM and Fire Suppression Systems
c) Migration Roadmap: A detailed guide for the phased implementation.
d) Post-Migration Testing Report: Including test, results and any issues encountered.
e) Operational Documentation: Including HVAC, DCIM configurations, troubleshooting guidelines, and operational procedures.
f) Training Materials: Guides and materials for Data Center staff training.

VI. Organization and Staffing

Bidders are expected to provide a brief description of their company, including experience in delivering similar projects by highlight Company's track record in the implementation of leave and spine architecture

a) Project Manager(1):

Bidders are expected to provide an individual responsible for leading the implementation of the proposed solution, ensuring that the project stays on schedule, meets all specifications, and adheres to quality standards.

Roles

i. Planning and Scheduling: Develops comprehensive project plans outlining tasks, timelines, and milestones to ensure structured progress.
ii. Budget Management: Oversees financial resources, ensuring that the project remains within the allocated budget.

iii. Team Coordination: Leads the project team, assigns tasks, and ensures effective communication among members.
iv. Risk Management: Identifies potential risks and implements strategies to mitigate them, safeguarding the project's success.

Key competence

i. Degree in Electrical/Electronic Engineering, Computer Science or Information Technology related field
ii. Professional certification in project management e.g. Prince2 , PMP or any other relevant internationally recognizable certification

b) Key Technical Personnel/Staff/Project Implementation Team

Include short biodata (CVs) of the key team members who will be involved in the project. Mention their qualifications, years of experience, and specific roles in previous similar projects.

a. Cooling Specialist (2):

Role

i. Design the new Data Center Precision Cooling System.
ii. Perform initial assessments and identify hardware requirements.

Key competence

i. Degree in engineering or Information technology related field
ii. Professional certification in Data Center Cooling Systems
iii. Eight (8) years' experience in precision cooling implementation

b. DCIM Specialist: (2):

Role

i. Handle the installation and configuration of proposed DCIM System.
ii. Assist with testing and troubleshooting during the migration process.

Key Competence

i. Degree in engineering, Computer Science or Information technology related field
ii. Professional Certification in DCIM certification.

iii. Seven (7) Years in DCIM deployment

TABLE 1: VENDOR EVALUATION CRITERIA

	Requirement	Evaluation Criteria	Max Score	Bidder Response
1	**Company Experience.** The bidder should have demonstrated expertise in implementing Precision Air Conditioning Systems, Data Center Facility Monitoring Solution (DCIM) in a Tier 3 Data Center. Provide evidence of having previously implemented **Three (3)** projects of similar operational capacity and scope. The project should involve implementing Air Conditioning and DCIM in an organization of similar size or bigger to KRA , and must have been done within the last five (5) years.	Bidders MUST submit recommendation letter for the project cited with corresponding copy of signed Contract or LSO to support. In addition, the recommendation letter should have: i. Contacts: postal address, telephone and email of the contact person. ii. A brief description of the project delivered. 1.5 Marks LSO/Contract 1.5 Marks for recommendation letter (for each project)	9	
2	**Resource/Personnel Qualifications.** One(1) dedicated project manager with the following qualifications; **Academic Qualifications**: 1) University Degree in (Computer Science, IT, electronics or related fields) **Professional Qualifications** 2) Professional Certification in Prince2, PMP, or any other recognized project manager certifications. **Relevant experience.**	3 Marks for Qualified Staff (1 mark for degree, 2 marks for product professional certification, 3 Marks for relevant experience) **Relevant experience** • Over 3 years– 3 Marks for each qualified staff • 2-3 years – 2 Marks for each qualified staff	6	

	3) The project manager should preferably have over three (3) years of experience in the managing and coordination of implementation of IT projects	• 1-2 years – 1 Mark for each qualified staff Bidders MUST attach a copy of the CV supported by copies of degree certificates and copies of the product specific professional certification for each technical staff.		
	Minimum three (3) Technical staff with the following academic and professional qualifications: **Academic Qualifications** 1) All the three (3) MUST have relevant University Degree in (Computer Science, IT, electronics or related fields) **Professional Qualifications** 2) **Two (2)** technical staff with Valid OEM Technical certification in specific Air Conditioning Solution proposed under this procurement. 3) **One (1)** technical staff with Valid OEM Technical certification in the specific DCIM solution proposed under this procurement. **Staff Relevant experience.** 4) Each Qualified staff above should preferably have over three (3) years of experience in the implementation; support and maintenance in the relevant field i.e. Air Conditioning Solution & DCIM respectively.	3 Marks for each Qualified Staff (1 mark for degree/ diploma, 2 marks for product professional certification) Bidders MUST attach a copy of the CV supported by copies of degree/diploma certificates and copies of the product specific professional certification for each technical staff. Relevant experience • Over 3 years– 3 Marks • 2-3 years – 2Marks for each qualified staff • 1-2 years – 1 Mark for each qualified staff Note: Bidders MUST submit a copy of the CV for each staff clearly indicating the years of experience in implementing and	18	

		supporting Air Conditioning Solution & DCIM respectively, and the applicable sites.		
4	**Technical Approach/ Methodology.** Bidder should demonstrate a good and clear understanding of KRA's Requirements in this tender. Bidder should propose an approach/ methodology and a work plan to capture the requirements and ensure they are comprehensively addressed in their proposed solution.	Bidders to demonstrate/provide evidence of a clear and detailed understanding of the solution, including: a) Technical Approach /Methodology of carrying out the assignment – 3.5Marks b) Work plan (Bidder MUST provide work plan for the implementation and support of the solution – 3.5 Marks	7	
5	**Detailed Design & Architecture of the** Air Conditioning Solution & DCIM System.	Bidder should submit the proposed design and architecture for the Air Conditioning & DCIM solutions quoted covering the three [3] data centres and including high-availability (HA) implementation.	10	
Total Score = 50 marks **Cut-off Score = 37.5**			**50**	

TABLE 2: MANDATORY TECHNICAL REQUIREMENTS.

Instructions to Bidders:

1.Bidders MUST complete the Table below in the format provided.

2.Bids MUST meet all mandatory (MUST) requirements in the Tables below in order to be considered for further evaluation.

3.Bidders MUST provide a substantial response or clear commitment to meeting the requirements for all features irrespective of any attached technical documents in the table format (bidders Response) below. Use of Yes, No, tick, compliant, blank spaces etc. will be considered non-responsive.

4.Bidders who do not comply with any of the below requirements will NOT be considered for further evaluation.

5. All the prospective bidders are expected to undertake a mandatory site survey to confirm and determine the exact quantities and cable lengths.

General Requirements for AC & DCIM

S/No	Requirement	Mandatory Specifications	Bidders' response
1	Product	**The Proposed Air Conditioning & DCIM Solutions MUST be a reputable and widely deployed international brand.** ALL products, Licenses and services MUST be sourced through the authorized OEM channels. Bidders MUST ensure that ALL components of the proposed solution **ARE NOT** scheduled to reach their end of life/support within 5 years from the date of bid submission In this regard, Bidders MUST submit a Product introduction brief that includes the following details: Specific Brand, product, series, model etc. and relevant supporting brochures.	

2	Hardware and Software Requirements	The proposed solution MUST be based on dedicated OEM Hardware and software appliances deployed in High Availability (HA) across Data Center(s) (Primary, Secondary and DR). The hardware appliance must be rack-mountable in standard 42U Rack.	
3	Training and capacity building	Successful bidder MUST provide Manufacturer Authorized administrator training (classroom) for twenty (15) KRA staff for all the solution components, leading to professional certification in the solution. Training proposals MUST include Course outline to be covered and duration.	
4	Vendor Support	Successful bidder MUST provide Unlimited Vendor onsite and online Implementation, Maintenance and Support Services covering the entire solution throughout the contract period on a 24*7*365 Basis. The vendor's staff providing support MUST have attained relevant OEM certifications. Bidder MUST demonstrate competence in delivering the solution by having acquired a high product partnership level with the OEM. The successful bidder MUST also be backed by professional technical support from the OEM throughout the contract period. In this regard, Bidders MUST provide a letter from the OEM certifying the partnership Levels and commitment from the OEM referencing this tender and indicating OEM's willingness to provide oversight and support through the contract period.	

5	OEM Support & Local Presence	KRA runs mission critical services on a 24*7*365 basis. In order to guarantee availability of OEM online and onsite support on a 24*7*365 basis, OEMs for quoted products are required to have Local presence in Kenya and MUST have qualified technical staff with relevant professional training, experience and certifications in the implementation and support of the solution. Bidders MUST provide details of the Local office including location and staffing. Successful bidder MUST ensure that ALL products (Hardware, Equipment, interfaces, accessories, Software and Services) MUST be covered under OEM technical support services throughout the contract period, including direct access to Manufacturer's technical assistance team, online troubleshooting / support tools.	

REQUIREMENTS & TECHNICAL SPECIFICATIONS FOR UPGRADING THE DATA CENTER AIR CONDITIONING

A. General Requirements

Ref No.	Minimum Requirement & Specifications	Bidder Response
A1	The units should be designed specifically for continuous 24×7 data center white space operation supporting high-density AI/GPU workloads	
A2	The system shall support near-100% sensible cooling suitable for AI workloads	
A3	Unit operation shall be certified at an altitude of 1,700m above sea level without derating	
A4	Refrigerant shall be R410A or low-GWP equivalent compliant with environmental regulations	
A5	The System should be compliance with ASHRAE TC 9.9 for Thermal Guidelines for Data Processing	

	Environments. The bidder Must demonstrate compliance to this standard.	
A6	The units to replace the current aged units installed in various rooms (4 x Power Rooms) and containments (2 x 24 Racks, 1 x 6 racks) within the data center	

B. Cooling Capacity & Efficiency

Ref No.	Minimum Requirement & Specifications	Bidder Response
B1	Total cooling capacity shall be ≥ **45 kW**	
B2	Sensible cooling capacity shall be ≥ **42 kW**	
B3	Net sensible cooling capacity shall be ≥ **40 kW**	
B4	Sensible Heat Ratio (SHR) shall be ≥ **0.95**	
B5	Energy Efficiency Ratio (EER) shall be ≥ **4.0 kW/kW**	
B6	Unit shall maintain performance at **condensing temperature ≤ 52°C**	
B7	The System should be compliance with ASHRAE TC 9.9 for Thermal Guidelines for Data Processing Environments. The bidder Must demonstrate compliance to this standard.	

C. Air Temperature & Humidity Control

C1. Supply Air Conditions

Ref No.	Minimum Requirement & Specifications	Bidder Response
C1.1	Supply air temperature shall be **22–24°C**	
C1.2	Supply air relative humidity shall be **30–50%**	
C1.3	The System should be compliance with ASHRAE TC 9.9 for Thermal Guidelines for Data Processing Environments. The bidder Must demonstrate compliance to this standard.	

C2. Return Air Conditions

Ref No.	Minimum Requirement & Specifications	Bidder Response
C2.1	Unit shall support return air dry bulb temperatures up to **45°C**	
C2.2	Unit shall operate without alarms or derating under high delta-T conditions	
C2.2	The System should be compliance with ASHRAE TC 9.9 for Thermal Guidelines for Data Processing Environments. The bidder Must demonstrate compliance to this standard.	

D. Airflow & Fan System

Ref No.	Minimum Requirement & Specifications	Bidder Response
D1	Indoor fans shall be **EC variable-speed fans** with N+1 redundancy	
D2	Total airflow capacity shall be **≥ 12,000 m³/h**	
D3	External static pressure capability shall be **≥ 100 Pa**	
D4	Fan motor efficiency shall be **≥ 90%**	
D5	Fan speed shall dynamically modulate based on thermal load	
D6	The System should be compliance with ASHRAE TC 9.9 for Thermal Guidelines for Data Processing Environments. The bidder Must demonstrate compliance to this standard.	

E. Compressor & Refrigeration System

Ref No.	Minimum Requirement & Specifications	Bidder Response
E1	Compressors shall be **inverter-driven variable-speed (VS)**	
E2	System shall have **minimum two compressors or N+1 redundancy**	
E3	Refrigeration circuits shall be **≥ 2 (preferred)**	

E4	Load modulation range shall be **20–100%** without efficiency degradation	
E5	The System should be compliance with ASHRAE TC 9.9 for Thermal Guidelines for Data Processing Environments. The bidder Must demonstrate compliance to this standard.	

F. Condenser Unit (Outdoor)

Ref No.	Minimum Requirement & Specifications	Bidder Response
F1	Condenser design ambient temperature shall be ≥ **45°C**	
F2	Condenser capacity shall be ≥ **120% of net sensible load**	
F3	Condenser fans shall be **EC / variable speed** with N+1 redundancy	
F4	Floating head pressure control should be provided	
F5	The System should be compliance with ASHRAE TC 9.9 for Thermal Guidelines for Data Processing Environments. The bidder Must demonstrate compliance to this standard.	

G. Filtration & Air Quality

Ref No.	Minimum Requirement & Specifications	Bidder Response
G1	Air filtration shall be minimum G4 with option for M5	
G2	Filter clogging / status monitoring should be supported	
G2	The System should be compliance with ASHRAE TC 9.9 for Thermal Guidelines for Data Processing Environments. The bidder Must demonstrate compliance to this standard.	

H. Controls, Monitoring & Integration

Ref No.	Minimum Requirement & Specifications	Bidder Response
H1	Unit shall support advanced control algorithms for rapid AI load fluctuation	
H2	Integration with **DCIM, BMS, and EMS** shall be supported and configured before commissioning.	
H3	Communication protocols shall include **BACnet/IP, Modbus TCP, SNMP, REST APIs**	
H4	Alarms for temperature, airflow, power, and component failure shall be provided	
H5	The System should be compliance with ASHRAE TC 9.9 for Thermal Guidelines for Data Processing Environments. The bidder Must demonstrate compliance to this standard.	

I. Architecture Compatibility & Scalability

Ref No.	Minimum Requirement & Specifications	Bidder Response
I1	Unit shall support **hot aisle/cold aisle containment**	
I2	Unit shall be compatible with In-Row cooling and RDHx	
I3	Modular capacity expansion shall be possible without service interruption	
I4	The System should be compliance with ASHRAE TC 9.9 for Thermal Guidelines for Data Processing Environments. The bidder Must demonstrate compliance to this standard.	

J. Documentation & Compliance

Ref No.	Minimum Requirement & Specifications	Bidder Response
J1	Manufacturer datasheets and performance curves shall be submitted	
J2	Compliance statement against ASHRAE TC 9.9 shall be provided	

J3	Factory test certificates and warranty details shall be included	
J4	The System should be compliance with ASHRAE TC 9.9 for Thermal Guidelines for Data Processing Environments. The bidder Must demonstrate compliance to this standard.	

1. REQUIRMENTS AND TECHNICAL SPECIFICATIONS FOR DATA CENTER INFRASTRUCTURE MANAGEMENT (DCIM) SOLUTION.

Item	No	Minimum Requirements	Bidder Response
System Architecture & Platform General requirements		**The proposed DCIM solution should be deployed with support for the following general Requirements;**	
	G-01	The solution should support on premise, hybrid, or private cloud deployment. However, the supplied to be deployed on-premise at the Primary Data Center. The bidder to provide the requisite compute and storage hardware (in High Availability) for the solution with a five (5) year support and maintenance and storage retention of at least two (2) years.	
	G-02	Support deployment directly on physical servers, or as a VMs; or Containers	
	G-03	System backup shall be automatically be created and pushed to remote storage	
	G-04	The DCIM solution should be web-based and accessible via HTML5 browsers without client agents	
	G-05	The solution architecture should be modular and scalable	
	G-06	The solution to be deployed in high Availability with no single point of failure	
	G-07	The solution to support multi-site management from a single console	
Models Library		**The solution shall include a built-in, comprehensive library of data center equipment manufacturers and models, covering IT, power, and cooling infrastructure as follows;**	
	ML-01	Models Library: Ability to import and synchronize updates to the library	

	ML-02	Models Library: Updated monthly with new models by the DCIM Vendor	
	ML-03	Models Library: Ability to manage a comprehensive list of data center equipment manufacturers and models and associated attributes including 1. Make 2. Model number, 3. Asset class type, 4. Mounting type, 5. Physical dimensions, 6. RU height, 7. Weight, 8. Front image, 9. Rear image, 10. Data port specifications, 11. Power supply specifications. 12. Airflow direction 13. Server CPU, RAM, Disk details.	
	ML-04	Models Library: Ability to add, clone and edit models from the user interface	
	ML-05	Models Library: Ability to add new assets with the items characteristics automatically populated. (i.e. the number of data and power ports shall be shown on a new item created from a model in the library and other server specifications like CPU, RAM and Disk size)	
	ML-06	Models Library: Ability to develop a company standard library such that only models that are in the company standard library are available for users to select from when adding a new asset	
	ML-07	Models Library: Ability to use provided or customize images. Port placement shall be identifiable on the images	
	ML-08	Equipment Template Library with pre-defined templates for rack, floor-mounted devices, servers, switches, routers, Rack PDUs, RPPs, PDUs, UPSs, CRAC, HVAC, floor tiles… etc.	
	ML-09	Models Library: Ability to define and manage rules for models such that a model specification can automatically change when deployed in different locations	
Asset Import		**The solution should be deployed with tools to make integration with the existing data sources easier.**	
	AI-01	Asset Import: Ability to track and manage all data center assets including: Cabinets, racks, devices, network equipment, cable plant patch panels, UPS, floor PDU, RPP, panel boards, electrical busways, electrical	

		outlets, rack PDUs, CRAC units, and environmental probes	
	AI-02	Asset Import: Import to any field in the database (data mapping)	
	AI-03	Asset Import: Conduct validation on each row independently from other rows such that good rows are imported and invalid ones are not. Generate a new import file with all invalid rows	
	AI-04	Asset Import: Import Asset details including custom fields, data ports and connections, power ports and connections and structures cabling, Panel Breaker schedules and data center locations	
Asset Management		**The solution shall provide comprehensive asset and configuration visibility, enabling KRA to maintain an accurate, centralized inventory of all physical and logical assets.**	
	AM-01	Asset Management: Add new assets to the database based on the models defined within the library	
	AM-02	Asset Management: Bulk update the asset information via GUI and import within the database	
	AM-03	Asset Management: Track 1. Cabinet assignment, 2. RU position assignment, 3. Asset dimensions, 4. Detailed asset front and rear images	
	AM-04	Asset Management: Track asset-related data including: 1. Make, 2. Model, 3. Asset tag (barcode), 4. Serial number, 5. Purchase date	
	AM-05	Asset Management: Track asset-related maintenance information include: 1. SLA, 2. Maintenance contract, 3. Maintenance contract start date, 4. Maintenance contract end date	
	AM-06	Asset Management: Create unlimited number of user-defined custom fields. Field type shall include pick list, multi-select pick list, Boolean, date and text area.	
	AM-07	Asset Management: Ability to lay out the UI for the user defined custom fields and arrange them in sub-tabs and panels with customizable titles. Use drag and drop to	

		arrange the fields in the panel and to size and move the panels.	
	AM-8	Asset Management: Move items between racks without need for re-provisioning via GUI and bulk import	
	AM-9	The system shall store detailed asset attributes, configuration data, relationships, and lifecycle information, and shall support easy import, creation, modification, and bulk updates of asset records using automated, built-in tools and standardized libraries	
	AM-10	Asset Management: Create and manage configuration of power supplies including power supply names, color codes, connector type, nameplate Watts, nameplate Amps, budgeted Watts, budgeted Amps, and power factor	
Search		**The proposed solution should support asset database search capabilities as follows;**	
	SE-01	Search: Ability to search and filter to locate an asset or circuit	
	SE-02	Search: Ability to export search results	
	SE-03	Search: Ability to limit search criteria based on asset or circuit attributes	
	SE-04	Search: Ability to combine search criteria and use operators such as OR, AND, >, >=, <, <= and =. Ability to search on exact match, contains, begins with, ends with	
	SE-05	Search: Ability to customize the search results table: re-order columns, sort, change column width, show or hide columns	
	SE-06	Search: Ability to save the customization and filter parameters in to named views that can be retrieved by name and shared with other users	
	SE-07	Search: Ability to search and locate the best location (cabinet and U position) for an asset, utilizing available space, cooling, network and power capacity to optimize capacity utilization and avoid stranded capacity	
	SE-08	Search: Ability to search and locate an IT device to perform power control	

Visualization		**The solution should provide of a view of the entire floor map and drill down on individual assets. Easily search and filter the information to be viewed;**	
	VI-01	Floor Plan Management: Ability to import and export an unlimited number of AutoCAD and Visio drawings representing the floor layouts for different sites or rooms	
	VI-02	Floor Plan Management: Ability to configure a floor map, a bird's eye view of the room layout including row, POD, rack, door (enclosure, cabinet), environmental sensors, IT devices with association to the individual PDU outlets	
	VI-03	Floor Plan Management: Ability to render the floor layout in both 2D and 3D view	
	VI-04	Floor Plan Management: Ability to link floor map objects to a database	
	VI-05	Floor Plan Management: Ability to drill down from the floor map view to show the elevation of rows and racks	
	VI-06	Floor Plan Management: Ability to drill down from the floor map view to show individual racks and contents	
	VI-07	Floor Plan Management: Color code floor plan objects based on consumption and capacity criteria such as RU space, weight, temperature, humidity, budgeted power, and real-time power	
	VI-13	Floor Plan Management: Set threshold on the color-coded Floor Plan Reports that indicate the status based on real-time measured values and events for available RU space vs. configurable thresholds, occupied space vs. configurable thresholds, cabinet capacity, weight per cabinet, weight capacity per cabinet, static load per cabinet, max temperature per cabinet fronts/rears, measured amps per cabinet, budgeted power per cabinet, and a health map	
	VI-08	Floor Plan Management: Color-code floor plan objects and cabinet contents based on the values for a chosen field such as status, model, customer, type, function, etc. as well as custom fields	

	VI-09	Floor Plan Management: Export the complete or filtered data center inventory into a delimited file (.csv)	
	VI-10	Floor Plan Management: Ability to recognize the layers from the imported drawing and toggle each layer on or off and save the layer state	
	VI-11	Floor Plan Management: Ability to select one or more layers that depict a cable tray and render it at a given elevation above the cabinets or under the raised floor.	
	VI-12	Floor Plan Management: Ability to download the Floor Layout to AutoCAD format (.dwg), edit it to update changes and re-import	
	VI-13	Asset Views: Ability to search on any standard or custom item field and render the results in the 3D view by making the cabinets translucent and showing the only the cabinet contents that match the search criteria	
	VI-14	Asset Views: Ability to save one or more set of search parameters into named views for later retrievable. Ability to search such view with other users	
	VI-15	Asset Views: Show cable plant and electrical connectivity between floor objects	
	VI-16	Asset Views: Have a user configurable time lapse video to show hourly, daily, and monthly temperature or pressure readings, represented as a thermal map view, similar to radar weather maps	
	VI-17	Asset Views: Visualize the thermal map on three planes - top, middle, and bottom of rack	
	VI-18	Cabinet elevations: Ability to view multiple cabinet elevations in one view based on multiple criteria including physical adjacent (row), user-defined logical grouping of cabinets, and cabinet RU usage.	
	VI-19	Power Circuit Views: Summary view of a given cabinet including budgeted power, heat output, total weight, items in cabinet, available RUs, and largest contiguous RUs	
	VI-20	Power Circuit Views: Summary view of the types of ports, total number of ports, and	

		total number of available ports for a given port type	
	VI-21	Power Circuit Views: Summary view of connection path information including inlet/outlet, power path connections, amps (r/b/m), and source	
	VI-22	Power Circuit Views: Summary view of the power source including the number of breaker poles, the rated/budgeted/measured amps at the power outlet, the origination source, and sub-panel name	
Connectivity Management		**The solution shall provide end-to-end power chain mapping and visualization, enabling users to model, view, and trace electrical power paths from individual IT loads (server level) through intermediate components up to the primary power source (power bank). The power chain mapping should include physical, logical, and redundancy relationships as follows;**	
	CM-01	Data Connectivity: Visually build data circuits between any combination of devices, network equipment, and patch panels including all hops in a single circuit	
	CM-02	Data Connectivity: Intelligence to allow and disallow connections based on fixed compatibility requirements such as connector types, protocols, and speeds.	
	CM-03	Data Connectivity: Set connections based on user-defined criteria such as color codes, groupings, and VLANs	
	CM-04	Data Connectivity: Distinguish all ports that are in use or ports that do not match the connectivity criteria	
	CM-05	Data Connectivity: Manage structured cabling (copper and fiber patch panels) within sites and between sites	
	CM-06	Data Connectivity: When displaying a data circuit terminating on a switch, allow to trace through the uplink port(s) to the upstream switch or router	
	CM-07	Data and Power Connectivity: Display the circuits in the 3D visualization to visualize the relationship between items	

	CM-08	Power Connectivity: Visually build power circuits between power supplies, rack PDU sockets, and electrical outlets	
	CM-09	Power Connectivity: Intelligence to allow and disallow connections based on the availability of budgeted power through the entire power chain upstream to the UPS	
	CM-10	Power Connectivity: Intelligence to allow and disallow connections based on the ratings of connectors and breakers through the entire power chain upstream to the UPS	
	CM-11	Power Connectivity: Intelligence to allow and disallow connections based on fixed compatibility requirements such as power and data connectors	
	CM-12	Power Connectivity: Visually trace power circuits including all hops in the power chain	
	CM-13	Power Connectivity: Alert the user as to where the bottleneck is in the power chain in the event a circuit cannot be built due to lack of available budgeted power	
	CM-14	Power Connectivity: Generate a list of equipment that would be impacted if the selected piece of equipment, e.g. a Floor PDU, Panel or breaker	
Power Management		**The solution should easily visualize and manage power to include the following;**	
	PM-01	Powerchain: Ability to manage all nodes in the power chain including: UPS, PDU, RPP, panel board, busways, circuit breakers, electrical outlets, rack PDUs, rack PDU breakers/fuses, rack PDU sockets	
		Powerchain: Ability to manage all nodes in the power chain for Direct Current systems including: DC Power Plant, BDCBB, BDFB, Fuse Alarm Panels and Rack Invertors	
	PM-02	Powerchain: Ability to visualize the power path in a graphical diagram, including associated values at each node in the power path including budgeted and measured power	

	PM-03	Powerchain: Ability to manage 3-phase power along all nodes in the power chain using various 3-phase conventions including L1/L2/L3, A/B/C, and color codes	
	PM-04	Panel Boards: Ability to configure AC and DC panel boards with any number of circuit breaker pole positions using all international conventions including odd/even and sequential	
	PM-05	UPS: Ability to create UPS banks and gang multiple UPS units into a single UPS bank	
	PM-06	UPS: Ability to define redundancy level within UPS bank	
	PM-07	PDU: Ability to track various PDU configurations including PDU with multiple panel boards, PDU with RPPs, PDU with busways.	
	PM-08	DC Power: Ability to configure DC Power plants with multiple rectifiers, battery strings and output panels	
	PM-09	DC Power: Ability to calculate output power from rectifier based on individual Rectifier capacity, Rectifiers redundancy and allowing for battery charging capacity	
	PM-10	DC Power: Ability to calculate estimated Battery Run Time based on the number of battery strings, battery model and specifications, battery age and present load on the plant	
	PM-11	Rack PDU: Ability to track various rack PDU configurations, define socket types, and branch circuit breakers/fuses.	
	PM-12	PDU: Ability to track capacity: nameplate budgeted and measured usage for the entire PDU and each individual branch circuit.	
	PM-13	PDU: Ability to make configuration updates in bulk including PDU rescanning, decommissioning and maintenance.	
	PM-14	PDU: Ability to roll back or restore PDU configurations in bulk	
	PM-15	PDU: Ability to change PDU administrator passwords in bulk	
	PM-16	PDU: Ability to automatically discover PDUs	

	PM-17	PDU: Ability to automatically discover a range of PDUs	
	PM-18	PDU: Polling path redundancy	
	PM-19	Power Path Report: Ability to provide information on systems dependent on a specified ATS/UPS/PDU/Power Strip	
	PM-20	Power Report: Ability to track and report current power costs and associated costs by platform, application or business unit which is useful for bill-back	
	PM-21	Power Report: Remote capability for graceful OS shutdown in event of an emergency	
	PM-22	Power Report: Remote power supply outlet control (on/off)	
	PM-23	Traps: Ability to set a trap receiver	
	PM-24	Traps: Ability to forward traps to another system	
Real-time Monitoring		**Tools to ensure uptime and availability**	
	RT-01	Real-time Monitoring: Display real-time monitoring in a unified view	
	RT-02	Real-time Monitoring: Capability to create customized dashboards for event viewing (site, rack, asset power consumption at port level)	
	RT-03	Real-time Monitoring: Define and monitor for thresholds violations on inlet current, unbalanced current %, rack pdu breaker state change, rack PDU breaker current, temperature, humidity, and rack power load.	
	RT-04	Real-time Monitoring: Enable user-defined polling intervals	
	RT-05	Real-time Monitoring: Poll data center devices using SNMP v3 protocol	
	RT-06	Real-time Monitoring: Poll power consumption, temperature, humidity, airflow, pressure, contact closures, door locks, water, and smoke continuously based user-defined intervals and store historical results in the database	
	RT-07	Real-time Monitoring: Poll UPS, PDU, Remote Power Panels (RPPs), Busways, CRAC, BCMs, and environmental sensors to capture instantaneous data	

	RT-08	Real-time Monitoring: Identify hot spots	
	RT-09	Real-time Monitoring: Maintain and reference historical environmental data indefinitely	
	RT-10	Real-time Monitoring: Collect data for watts, amps, voltage, watt hours, power factor, carbon footprint, cost, airflow, air pressure, humidity, temperature. This data shall be collected at the inlet, outlet, phase, and breaker	
	RT-11	Real-time Monitoring: Circuit capacity and utilization	
	RT-12	Real-time Monitoring: Thermal & Energy Analytics	
	RT-13	Real-time Monitoring: Ability to receive event notifications via http delivery.	
	RT-14	Real-time monitoring: Ability for managed PDUS to respond to SNMPv3 Informs, acknowledging their receipt.	
	RT-15	Monitor for events (if supported by Traps from your Rack PDUs) including:	
		1. Server Reachable (Not Reachable, Not Reachable Clear)	
		2. Inlet Over/Under Peak Current (Critical, Warning, Unavailable, Critical Clear, Warning Clear, Sensor Unavailable Clear)	
		3. Inlet Over/Under Unbalanced Current (Critical, Warning, Unavailable, Critical Clear, Warning Clear, Unavailable Clear)	
		4. Inlet Over/Under Active Power (Critical, Warning, Unavailable, Critical Clear, Warning Clear, Unavailable Clear)	
		5. Inlet Over/Under Apparent Power (Critical, Warning, Critical Clear, Warning Clear, Unavailable, Unavailable Clear)	
		6. Inlet Over/Under Power Factor (Critical, Warning, Unavailable, Critical Clear, Warning Clear, Unavailable Clear)	
		7. Inlet Over/Under Frequency (Critical, Warning, Unavailable, Critical Clear, Warning Clear, Unavailable Clear)	
		8. Inlet Over/Under Phase Angle (Critical, Warning, Unavailable, Critical Clear, Warning Clear, Unavailable Clear)	

		9. Inlet Over/Under Residual Current (Critical, Warning, Critical Clear, Warning Clear)	
		10. Power Quality (Critical, Warning, Critical Clear, Warning Clear)	
		11. Inlet Over/Under Voltage Line (Critical, Warning, Unavailable, Critical Clear, Warning Clear, Unavailable Clear)	
		12. Outlet Over/Under Peak Current (Critical, Warning, Unavailable, Critical Clear, Warning Clear, Unavailable Clear)	
		13. Outlet Over/Under Unbalanced Current (Critical, Warning, Unavailable, Critical Clear, Warning Clear, Unavailable Clear)	
		14. Outlet Over/Under Active Power (Critical, Warning, Unavailable, Critical Clear, Warning Clear, Unavailable Clear)	
		15. Outlet Over/Under Apparent Power (Critical, Warning, Unavailable, Critical Clear, Warning Clear, Unavailable Clear)	
		16. Outlet Over/Under Power Factor (Critical, Warning, Unavailable, Critical Clear, Warning Clear, Unavailable Clear)	
		17. Outlet Over/Under Phase Angle (Critical, Warning, Unavailable, Critical Clear, Warning Clear, Unavailable Clear)	
		18. Outlet Over/Under Voltage Line (Critical, Warning, Critical Clear, Warning Clear, Unavailable Clear)	
		19. Outlet Power State (Unavailable, Off, On, Unavailable Clear, Off Clear, On Clear)	
		20. Circuit Breaker Peak Current (Critical, Warning, Unavailable, Critical Clear, Warning Clear, Unavailable Clear)	
Workflow and Change Management		**Tool to manage, monitor and report on change requests**	
	WF-01	Change Management: Generate requests to add, move or change assets and connections	
	WF-02	Change Management: Ability to review, reject, or approve requests	
	WF-03	Change Management: Generate work orders (tickets), assign to users, reserve space, define due dates, track status, and keep an audit trail	

	WF-04	Change Management: Generate e-mail notifications for every state change in the change management process	
	WF-05	Change Management: Produce reports of changes and work order status	
	WF-06	Change Management: Integrate with third party ticketing systems to import tickets, assign work orders, and track status updates	
Integration		**The solution shall support open, standards-based web services APIs (e.g., REST/JSON) to enable seamless integration as follows;**	
	IN-01	APIs to enable integration with third-party change management and ticketing systems	
	IN-02	Integration with third-party systems to allow it to read and query the database using ODBC views	
	IN-03	Integration with CMDB systems to provide asset Item create, read, update and delete	
	IN-04	Web Services API that enables integrations with 3rd party systems and allow them to created, read, update and delete on various objects in the database	
	IN-05	Web Services API that enables power control and reading of events	
3Dashboards		**The solution should provide built-in chart views and dashboards as follows;**	
	RD-01	Dashboards: Ability to view pre-defined key performance indicator (KPI) charts displaying information on the status of the enterprise health, asset inventory, space, power, cooling and connectivity within the data center	
	RD-02	Dashboards: Ability to choose which KPIs to display on their own dashboard view. The information to view must be aligned with their permission set	
	RD-03	Dashboards: The pre-defined KPI charts shall include:	
		1.Count of device, number of items, % of used racks, % of active power, PUE, Average Active Power, and Average Inlet Temperature	

		2. Asset Inventory KPIs shall include charts for Items Added per Week, Item Age, and the breakdown of Items by Type	
		3.Capacity KPIs shall include charts for Number of Used vs Open Rack/Chassis Slots, Top Customers/Racks, Floor Space Usage, Fragmentation	
		4.Power Status KPI charts shall include a budget power consumed	
		5. Cooling KPI Charts shall include cooling capacity, ASHRAE conformance, Inlet Temperature/Humidity	
		6. Connectivity KPI Charts shall include used vs. open network/data ports, top racks with open ports by connector, report of data circuits by number of hops, and connected items by power supply or redundancy.	
	RD-04	Dashboard: Set of pre-configured dashboard widgets	
	RD-05	Dashboard: Ability to create personal dashboard pages and copy any number of widgets to it and save with the preferred parameters	
	RD-06	Dashboard: Ability to share dashboards with other users or set some dashboards in a list of favorites	
	RD-07	Widget: Ability to create own custom widgets within the DCIM using HTML	
	RD-08	Widget: Ability to use SQL commands to query ODBC tables and displays results in a report	
	RD-9	Widget: Downloadable library of custom widgets that can report on virtually any data within the system	
	RD-10	Widget: Ability to drilldown on details of widget data and filter based on columns of the additional detail. In addition to filtering, ability to sort, group and re-order columns. When grouping, ability to count, sum, or calculate min, max, and average for each group	
	RD-11	Widget: Ability to drill down to obtain detail information about a specific widget display	
	RD-12	Widget: Ability to include one or more widgets in a report that can be	

		automatically generated and sent via email on a set reoccurring schedule	
	RD-13	Reports: Ability to generate reports from all dashboard widgets, print to PDF, and export reports to Excel	
	RD-14	Reports: Ability to generate custom reports	
Standard PDU Reports		**The solution should support the following standard report templates out-of-box as follows;**	
	SR-01	Health Map: Used as a base to color code and display racks based on event severity. If the rack itself, or any PDUs or sensors contained in the rack have warning or critical active events, the rack is shown as warning (yellow) or critical (red) level	
	SR-02	Active Events: Displays the 10 highest severity and active events in a list	
	SR-03	Power/Energy Report: Reports and charts that show:	
		1.Active Power (W)	
		2.Current (amp)	
		3.IT Energy (kWh)	
		4.CO2 Footprint (CO2 Kg)	
		5.IT Energy Cost (Ksh or other currency)	
		6.Total Energy Including Cooling (kWh)	
		7.Total Energy Cost Including Cooling (Ksh or other currency)	
	SR-04	Environmental Conditions Report	
		1.Temperature Charts showing Outlet and outlet temperature as well as Outside Air Temperature	
		2.Humidity Charts including Outlet Humidity (%), Outlet Humidity (%), and Outside Air Humidity (%)	
		3.Air Flow and Pressure Charts including Air Flow (m/s) and Air Pressure (Pa)	
	SR-05	Rack Failover Report: Shows which racks may completely lose power when one of the two redundant power sources fails or is turned off for maintenance. Simulates a failover situation, and indicates a prediction for your rack's highest utilization percentage.	
	SR-06	Device Chart: Displays a default setting of average active power over the past 24 hours	

	SR-07	Capacity Forecast Chart: Tracks maximum active power of a data center. Based on the capacity settings, the chart displays how many days of supply remain before your data center reaches capacity, or it will indicate that you have adequate capacity	
	SR-08	Capacity Gauge: Shows how much power a selected node of your data center has consumed over a specified time period. The gauge shows a tick mark for minimum, maximum and average power consumed during the time period. The dial points to the real time active power reading.	
	SR-09	Cooling Utilization: Cooling charts enable you to compare your data center's sensor readings against industry recommendations - ASHRAE 2011	
	SR-10	PUE Trend Chart: Allows you to see how your data center's PUE has changed over a time period you select. Either daily or monthly calculations may be used. The length of the trend depends on how much data Sunbird's DCIM Monitoring has collected, as well as your selection.	
	SR-11	Facilities Chart: Electrical Utilization - The Facilities chart widget enables you to display active power or energy readings for one or more facilities objects, such as a CRAC, floor PDU, floor UPS, power panel, or standalone meter, in your data center.	
	SR-12	Rack PDU Energy Trends including Active Power, IT Energy, Line Current, and Circuit Breaker Current	
	SR-13	Rack IT Devices: A list of all devices that are connected to one or more outlets or circuits. Devices that have associated circuits display the current and active power of the circuit. The outlets associated with each device display beneath the IT device. There is a checkbox for each outlet, to select it for power control operations. Each outlet shows a Trend chart showing the active power trend.	
	SR-14	PDU Elements: A list of all outlets in the rack, or all outlets on the PDU, respectively	

	SR-15	Rack Energy and Environmental Trends: Shows Energy and Environmental Trends, the first and last data points in the trend and the minimum and maximum values in the trend. Environmental, temperature and humidity charts are shown one per sensor	
	SR-16	Rack PDU Readings: Power readings for the PDU	
	SR-17	Cab (Rack) Detail Report: Displays either a text-based or visual representation of the cabinet elevations for the cabinets. Includes additional cabinet details such as the make, model, size, weight, and so on	
	SR-18	Cab (Rack) Resource Report: Information on cabinets and the resources that are associated with them such as power ports, network equipment reports, comm ports, and so on	
	SR-19	Items (Inventory) Report: A list of all items being maintained. Additionally, information specific to each item, such as the item type, function, administrator, etc. is captured in this report. This report can be filtered to display information based on criteria you specify	
	SR-20	Item Details Report: Displays either text-based representations of items or, when available, images of the items being managed. Includes additional device details such as the make, model, etc.	
	SR-21	Power and Network Connections Report: View connection information for all cabinets (All Connections in Cabinets Report) or specific types of connectors that are connected to specific items (What Connects to an Item Report)	
	SR-22	Power Report - View power data for all cabinets being managed	
Capacity Views		**The solution should be have the ability to determine capacity at every point in the network/power chain to include the following;**	
	CV-01	Summary view of a given cabinet including budgeted power, heat output, total weight, items in cabinet, available RUs, and largest contiguous RUs	

	CV-02	Summary view of the types of ports, total number of ports, and total number of available ports for a given port type	
	CV-03	Summary view of connection path information including Outlet/outlet, power path connections, amps (r/b/m), and source	
	CV-04	Summary view of the power source including the number of breaker poles, the rated/budgeted/measured amps at the power outlet, the origination source, and sub-panel name	
Audit Trails / Logging		**Protection of the data center to ensure only the right people have the access they need. Logging should be enabled to ensure audit trails are available for compliance and tracking as follows;**	
	AT-01	Ability to log all asset related changes for auditing purposes	
	AT-02	Log is filterable, sortable, searchable	
User Security and Access		**The solution to ensure only the right people/personnel have the access they need as follows;**	
	US-01	System Administrative Access: Ability to support administrative access through a web browser	
	US-02	System Administrative Access: Ability to support administrative access through a Web Application	
	US-03	Role-based Permissions: Ability to provide for global and local role-based permissions for location, cabinet, chassis down to a single asset, including: ○ Site Administrator ○ Administrator ○ Gatekeeper ○ Operator ○ Viewer ○ Manage Library ○ Bulk Import ○ Request Bypass ○ Manage IP Address ○ Data Circuit Manager	

		○ Power Circuit Manager ○ Power Control ○ Create Analytics ○ Create Dashboards ○ Create Event Notifications	
	US-04	User Accounts: No limit to the number of user accounts that can be created. Each of these accounts shall have their own unique login user name and password	
	US-05	User Groups: The system shall support user groups to organize users within the DCIM system	
	US-06	Local and Remote Authorization: The system shall provide Lightweight Directory Access Protocol (LDAP) and Active Directory (AD) integration with KRA Active directory	
	US-07	Authentication and Encryption: The system shall allow configuration to restrict web interface and SSH access by IP address	
	US-08	Defaults: Ability to configure default preferences for location, dashboard and measurements	
Cabinet and Containment Security		The solution to include the enhancement of the access to the rack containment by deploying an Electronic Access Control(EAC) of the as follows;	
	CCS-01	Electronic access control via RFID cards and card readers.	
	CCS-02	Electronic card readers can be decommissioned and recommissioned	
	CCS-03	Electronic cards can be activated, deactivated and reassigned to users	
	CCS-04	Ability to manually lock/unlock doors	
	CCS-05	Reporting on status and audit	
	CCS-06	Centralized door control rights and privileges	
	CCS-07	PDUs with door sensors: Door and door sensors are automatically created and mapped to the PDU	
Licensing		**The bidder to provide the licensing and maintenance models available to entail the following;**	
	LI-01	Based on cabinets and monitored devices	

	LI-02	No license restrictions or limitations on users, sites or floor space	
	LI-03	No license fee for a non-production or test system	
	LI-04	Perpetual licenses	
	LI-05	Availability of software updates, maintenance patches and upgrades during the contract period.	
Technical Support , maintenance and Training		The bidder should provide/include details of support and technical training for data center staff. This should to include but not limited to the following;	
	TS-01	Ability for support through telephone, email, remote, and on-site support	
	TS-02	Ability to request solution enhancements	
	TS-03	OEM Led Labs offsite Technical Training is a compulsory for 10 staff with certification	
	TS-04	Availability for participation via user groups.	
	TS-05	Online support portal with the ability to manage tickets, free training videos and customer forum	

2. TECHNICAL SPECIFICATIONS FOR FIRE SUPPRESSION SYSTEM FOR GENERATOR ROOMS

The scope of this work is for the design, supply, installation, testing, and commissioning of automatic fire suppression systems for two (2) generator rooms housing three (3) diesel generators rated at 450 kVA each.

No	Category	Minimum Technical Requirement	Bidder's Response
1	Scope	Extend the current fire suppression systems to the two (2) generator rooms housing 3 × 450 kVA diesel generators. The bidder Must undertake a site survey to determine the requirements to ensure seamless integration with the existing fire suppression system.	

2	Room Zoning	Each generator room shall be treated as a separate fire zone with no shared suppression release mechanisms.	
3	Standards	The solution should comply with NFPA 37, NFPA 850, NFPA 2001 / 12, NFPA 17/17A, ISO 14520, BS EN 15004, KEBS and local authority requirements.	
4	Suppression Agent	Approved clean agent, dry chemical, aerosol, or water-mist system suitable for diesel generator fire risks.	
5	Coverage	Zoned protection for engine, alternator, exhaust/turbocharger, fuel system, and generator enclosure.	
6	Detection	Linear heat detection, flame detectors (UV/IR), and smoke detection for each generator room.	
7	Control Panel	Dedicated fire suppression control panel per room or common panel with fully independent zones.	
8	Integration	Interface with generator shutdown, fuel shut-off valves, Fire Alarm System, DCIM and BMS.	
9	Activation Logic	Fire in one room shall not shut down generators in the other room unless explicitly required.	
10	Alarms	Audible and visual alarms provided inside and outside each generator room.	
11	Release Stations	Manual release and abort stations provided for each generator room.	

12	Piping & Nozzles	Corrosion-resistant piping and vibration-rated discharge nozzles suitable for generator use.	
13	Power Supply	Mains power with battery backup providing minimum 24 hours standby and one full discharge.	
14	Fail Safe	System shall remain operational during power failure and indicate all faults.	
15	Environmental	Operate reliably between 0°C to +55°C and up to 95% non-condensing humidity.	
16	Life Safety	Time delays, abort switches, signage, and compliance with occupied-room life safety requirements.	
17	Testing	Factory and site acceptance testing conducted separately for each generator room.	
18	Documentation	As-built drawings, cause-and-effect matrix, O&M manuals, and test certificates.	
19	Training	Off-site technical training for five (5) data center operations teams on operations, emergency response, and maintenance of the system.	
20	Warranty & Support	Successful bidder MUST provide Unlimited Vendor onsite and online Implementation, Maintenance and Support Services covering the entire solution for three(3) years on a 24*7*365 Basis. The vendor's staff providing support MUST have attained relevant OEM certifications. Bidder MUST demonstrate competence in delivering the	

		solution by having acquired a high product partnership level with the OEM. The successful bidder MUST also be backed by professional technical support from the OEM throughout the contract period. In this regard, Bidders MUST provide a letter from the OEM certifying the partnership Levels and commitment from the OEM referencing this tender and indicating OEM's willingness to provide oversight and support through the contract period.	

3. UPGRADE OF DATA CENTER CABLING SYSTEMS

A. PROJECT BACKGROUND

KRA currently operates a 54-rack primary data center and a 30-rack secondary data center environments distributed across three physical containments, with a total of 3,456 fiber ports and 1,728 copper ports serving critical business applications. The existing infrastructure utilizes a dual-CPZ (Centralized Patching Zone) architecture with redundant paths (CPZ-A and CPZ-B) connecting to separate switch racks at the primary side and End of Row architecture at the secondary site, providing essential high-availability for our operations.
However, our current infrastructure faces several critical challenges (as shown in APPENDIX I) that necessitate immediate modernization:

Key Challenges Identified:

1) Documentation Deficiencies
    a) Manual tracking of approximately 5,184 physical connections
    b) Error-prone change management processes
    c) Limited visibility into physical layer connectivity

2) Operational Inefficiencies
    a) **85% documentation accuracy rate** leading to troubleshooting delays
    b) No real-time monitoring of physical connections
    c) Inability to detect unauthorized changes or security breaches

d) Limited capacity planning capabilities

3) Technology Gaps
   a) Legacy OM4 fiber infrastructure without monitoring capabilities
   b) Manual documentation methods prone to human error
   c) No integration between physical and logical network layers

4) Business Risk Exposure
   a) Average 4 hours/month of unplanned downtime
   b) 40+ hours/quarter spent on audit preparation
   c) High risk of compliance violations due to inadequate tracking
   d) Difficulty in proving regulatory compliance

B. BUSINESS DRIVERS FOR MODERNIZATION:

1) Operational Excellence
   a) Provide support 100G-ready CPZ(s)
   b) Increase documentation accuracy from 85% to 100%
   c) Enable real-time infrastructure monitoring
   d) Implement automated change management workflows and improve audit posture
   e) Enable predictive capacity planning through intelligent physical infrastructure (IPI).

2) Risk Mitigation
   a) Detect unauthorized physical access within 1 second
   b) Provide complete audit trails for compliance requirements
   c) Reduce unplanned downtime by 75%
   d) Eliminate manual documentation errors

C. PROJECT SCOPE

The initiative will entail the enhancement of data center cabling infrastructure as follows;

1. Supply and installation of intelligent fiber and copper patch panels ,Category 6A compliant, providing real-time connectivity monitoring, automated change management, and integration with centralized DCIM / infrastructure management software
2. Installation of additional data points for both copper and fiber as highlighted in Table 1 & 2 below in both primary and secondary data centers, to address the existing capacity gaps.

1) Intelligent Patching System Specifications

a. Core System Components

No	Item	Minimum Specifications	Bidder's Response
1	Enterprise Server	Virtual appliance, 8 vCPU, 16 GB RAM, 500 GB storage	
2	Database	SQL Server 2019 / PostgreSQL required for >500 monitored ports	
3	Web Client	HTML5 Browser-based, mobile responsive	
4	API Gateway	REST API v2 for DCIM / ITSM integration	

b. Intelligent Monitoring Capabilities

No	Feature	Minimum Technical Specifications	Bidder's Response
1	Connection Intelligence	a) Real-time port status b) Automatic discovery c) Historical MAC audit log d) Zero-touch documentation	
2	Performance Awareness	a) Link up/down b) Fiber loss monitoring c) Error trending (fiber)	
3	Security	a) Unauthorized disconnect alerts b) Port-based security enforcement c) User accountability & audit trail	
4	Integration	The solution to be deployed with the following integration capabilities; a) REST API (DCIM/ITSM) b) SNMP traps (NMS)	

5	Alerts	The solution to be configured with all alerts as defined in the alerts matrix (to be developed jointly with KRA Team).	

2) Enhancement of Data Points

No	Technical Specification Requirement	Bidder's Response
1.0 GENERAL REQUIREMENTS		
1.1	Scope: Supply, installation, termination, testing & commissioning of intelligent fiber/copper cabling in primary & secondary DCs. Compliance with ANSI/TIA-942-B, ISO/IEC 24764.	
1.2	Conduct a mandatory pre-bid site survey. Submit survey report with proposal.	
1.3	All materials and workmanship to comply with listed ANSI/TIA, ISO/IEC, and NEC standards.	
1.4	Provide min. 25-year manufacturer's warranty for cabling, min. 5-year for intelligent system electronics.	
1.5	Deliver as-built drawings, test reports, labelling docs, O&M manuals.	
2.0 INTELLIGENT INFRASTRUCTURE SYSTEM		
2.1	System to include intelligent patch panels, zone/rack managers, central management software.	
2.2	Central software must provide real-time monitoring, auto-documentation, alerts, and DCIM integration. Specified platform: **Siemon Lighthouse**.	
3.0 FIBER OPTIC SPECIFICATIONS		

3.1	Use OM4 50/125µm laser-optimized multimode fiber. OFNR/OFNP jacket as required. LC Duplex connectors.	
3.2	Intelligent Fiber Patch Panels: Siemon LightStack or equal. Per-port monitoring, LC Duplex, rack-mountable.	
3.3	100% OTDR & OLTS testing. Max attenuation: ≤1.5 dB @850nm, ≤1.0 dB @1300nm.	
4.0 COPPER CABLING SPECIFICATIONS		
4.1	Use Cat 6A UTP/FTP, TIA Cat 6A/Class EA compliant, 23 AWG solid copper, and CMP/CMR jacket.	
4.2	Intelligent Copper Patch Panels: Siemon HD8 iPatch or equal. Per-port monitoring, 8-position modular.	
4.3	100% tested with Level III/VI certified tester. Full TIA Cat 6A Channel/Permanent Link compliance.	
5.0 PRIMARY SITE CONFIGURATION		
5.1	From each Server Rack: **18 OM4 to CPZ A + 18 OM4 to CPZ B**. Terminate in LightStack enclosures.	
5.2	From each Server Rack: **12 Cat 6A to CPZ A + 12 Cat 6A to CPZ B** factory pre-terminated Z-MAX 6A copper trunk cable. Terminate in HD8 iPatch panels. **NB:** All copper cables MUST be factory pre-terminated Z-MAX 6A copper trunk cable	
5.3	a) From each CPZ: **48 OM4 (Multimode LC) to Switch Rack A + 48 OM4 (Multimode LC) to Switch Rack B**. Terminate in LightStack enclosures.	

	b) From each CPZ: **48 OM4 (Multimode LC) to Network Rack A + 48 OM4 (Multimode LC) to Network Rack B**. Terminate in LightStack enclosures.	
5.4	a) From each CPZ: **48 Cat 6A to Switch Rack A + 12 Cat 6A to Switch Rack B**. Terminate in HD8 iPatch panels. b) From each CPZ: **48 Cat 6A to Network Rack A + 12 Cat 6A to Network Rack B.** Terminate in HD8 iPatch panels. **NB:** All copper cables MUST be factory pre-terminated Z-MAX 6A copper trunk cable	
5.5	Deploy required Zone Managers for intelligent system aggregation per rack/zone.	
6.0 SECONDARY SITE CONFIGURATION		
6.1	From each equipment rack to EoR: **18 OM4 + 12 Cat 6A to Net Rack A**, and **18 OM4 + 12 Cat 6A to Net Rack B**. **NB:** All copper cables MUST be factory pre-terminated Z-MAX 6A copper trunk cable	
6.2	**Between Net Racks A & B: 18 OM4 + 24 Cat 6A** . All on intelligent panels. **NB:** All copper cables MUST be factory pre-terminated Z-MAX 6A copper trunk cable	
6.3	Each Network Rack to contain fiber enclosures, copper panels, and Zone Managers for all links.	
7.0 INSTALLATION REQUIREMENTS		
7.1	Adhere to min. bend radius, max pull tension, and EMI separation guidelines. Use Velcro ties only.	

7.2	Implement TIA-606-C labelling scheme. Physical labels must match software database.	
7.3	Ground and bond all metallic components per TIA-607-C and NEC Article 250.	
8.0 COMMISSIONING, INTEGRATION & TRAINING		
8.1	Fully commission intelligent system: all ports discovered, mapped, and reporting status in software.	
8.2	Integrate intelligent management software with existing DCIM (asset sync, alert forwarding, etc.).	
8.3	Provide 8 hours of administrator training for software, change management, and alerts.	
8.4	The bidder to ensure and facilitate OEM led offsite technical training on support and maintenance for at least ten (10) data center staff at an OEM authorized training center, with certifications.	
9.0 ACCEPTANCE CRITERIA		
9.1	100% of links pass certification. Intelligent system reports 100% port accuracy. All alarms functional.	
9.2	Deliver complete as-built drawings, test reports, warranty certificates, training certificates.	

D. POST-QUALIFICATION/DUE DILIGENCE

The Procuring Entity may conduct post-qualification/due diligence on the lowest evaluated bidder before the award of the contract. This process may include, but is not limited to:

1. Verification of Documentation – Confirming the authenticity of certifications, reference letters, and any other supporting documents submitted with the bid.

2. Reference Checks – Engaging with past and current clients to verify performance, service delivery, and adherence to contractual obligations.
1. Financial Capability Assessment – Evaluating the financial strength of the bidder to ensure their ability to sustain the project, including a review of audited financial statements.
2. Reference Site Validation – Reconfirming the ability of the bidder to provide the proposed product(s) and support, in accordance with the stated service levels, through a mandatory site visits to the provided reference sites by the evaluation team.

Failure to satisfactorily pass the post-qualification and due diligence process may result in the disqualification of the bidder, and the Procuring Entity reserves the right to consider the next lowest evaluated bidder or take any other appropriate action in accordance with procurement laws and regulations.

FINANCIAL REQUIREMENT

• N/B: Bidders to provide a detailed breakdown of how they have arrived at the total cost

• Grand Total Cost –To be carried Forward to the FORM FIN 2 Summary of Costs

APPENDIX I:
CURRENT VS FUTURE STATE WITH INTELLIGENT INFRASTRUCTURE

Table 1: Primary Site

No	Parameter	Current Configuration	Upgraded Configuration (additional ports)	Intelligent Capability
1	Fiber Ports per Rack to CPZs	24 × OM4	a) 18 × OM4 to CPZA b) 18 × OM4 to CPZB **Applicable to 2 x 24 Rack Server Containments**	LightStack intelligent monitoring
2	Copper Ports per Rack to CPZs	12 × Cat 6A	a) 12 × CAT6A to CPZA b) 12 × CAT6A to CPZ B **Applicable to 2 x 24 Rack Server Containments**	HD8 iPatch real-time monitoring
3	Fiber Ports per CPZ to Switch Racks	156 × OM4	a) 48 × OM4 to Switch Rack A b) 48 × OM4 to Switch Rack B c) 48 × OM4 to Network Rack A d) 48 × OM4 to Network Rack B	LightStack intelligent monitoring
4	Copper Ports per CPZ to Switch Racks	168 × Cat 6A	a) 48×CAT6A to SwitchRack A b) 48×CAT6A to SwitchRack B c) 48×CAT6A to Network Rack A d) 48×CAT6A to Network Rack B	HD8 iPatch real-time monitoring
5	Monitoring	Manual records	Automated real-time	Siemon Lighthouse
6	Change Management	Manual tickets	Automated logging	Zero-touch documentation
7	Security	Physical access only	Port-level alerts	Unauthorized disconnect alarms

Table 2: Secondary Site

No	Parameter	Current Configuration	Upgraded Configuration	Intelligent Capability
1	Fiber Ports per Rack to End of Row Rack	12 × OM4	a) 18 × OM4 to Network Rack A	LightStack intelligent monitoring

			b) 18 × OM4 to Network Rack B	
2	Copper Ports per Rack to End of Row Rack	6 × Cat 6A	a) 12 × CAT6A to Network Rack A b) 12 × CAT6A to Network Rack B	HD8 iPatch real-time monitoring
3	Fiber Ports from Network RackA to Network Rack B	None	18 × OM4	LightStack intelligent monitoring
4	Copper Ports from Network RackA to Network Rack B	None	24 × CAT 6A	HD8 iPatch real-time monitoring
5	Monitoring	Manual records	Automated real-time	Siemon Lighthouse
6	Change Management	Manual tickets	Automated logging	Zero-touch documentation
7	Security	Physical access only	Port-level alerts	Unauthorized disconnect alarms