



**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA



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TERMS OF REFERENCE FOR THE APPOINTMENT OF A SERVICE PROVIDER FOR THE SUPPLY, DELIVERY, INSTALLATION, CONFIGURATION AND COMMISSIONING OF NETWORKING AND IT EQUIPMENT FOR QUEEN NONESI CAMPUS.

1. BACKGROUND

Ikhala TVET College invites suitably qualified and experienced service providers to submit bids for networking and IT equipment for Queen Nonesi Campus. The College operates multiple campuses in rural and semi-urban areas, requiring robust, durable solutions compliant with South African standards. All installations must minimize disruption to College activities and adhere to relevant regulations. Bidders must provide itemized specifications, pricing, and labor estimates for installation.

2. OBJECTIVE

- Upgrading existing IT and network infrastructure to meet current College standards and support evolving operational needs (e.g., expanding network coverage to new Bungalows, installing fibre networks, or providing Wi-Fi access).
- Procuring equipment that is compatible with the organization's existing architecture and potentially moving towards standardized solutions.
- Ensuring high availability and reliable performance of all systems through the supply of high-quality equipment, installation, and ongoing maintenance and support services.
- To provide training for College ICT staff on equipment operation and maintenance.
- To achieve cost-effective solutions with a focus on energy efficiency and scalability.

3. SCOPE OF WORK

The successful bidder shall supply, install, test, and commission all items. This includes:

- Site assessments at Queen Nonesi Campus.
- Supply and Delivery of equipment at Queen Nonesi Campus.
- Installation, including cabling, mounting, configuration, and integration with existing infrastructure.
- Testing
- Handover with documentation, warranties (minimum 3 years on equipment), and training for up to 5 staff members.

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- **Timeline:** Commence within 30 days of award; complete within 60 days.

Exclusions: Major building modifications; ongoing maintenance beyond warranty.

4. INDIVIDUAL ITEM SPECIFICATIONS

Item 1: Cat 6A Cabling for 66 Network Points

Description:

High-performance structured cabling system to support multi-gigabit Ethernet and PoE for Ubiquiti WiFi 6/7 APs.

Technical Specifications:

- **Cable Type:** Cat 6A F/UTP or S/FTP shielded twisted pair for EMI mitigation in campus environments.
- **Standards Compliance:** ANSI/TIA-568.2-D, ISO/IEC 11801 Class Ea, supports 10GBASE-T up to 100m.
- **Conductor:** 23 AWG solid bare copper; LSZH outer jacket for fire-safety compliance.
- **Performance:**
 - Bandwidth: minimum 500 MHz
 - PoE++ (802.3bt) safe; supports up to 90W without thermal degradation
 - Insertion loss and crosstalk meeting Cat6A limits
- **Hardware:**
 - Shielded keystone jacks (tool-less preferred)
 - 24-port Cat6A patch panels (1U) with cable managers
 - Duplex faceplates with clear labelling windows
- **Testing:**
 - Full certification using Fluke DSX-5000/8000
 - Test results to be provided at handover
- **Installation:**
 - Proper earthing of shielding

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- Cable trays, trunking and routing to avoid interference sources
- Labelled at both ends according to structured cabling standards

Item 2: 25U Vented Cabinet

Description:

Rack enclosure for hosting core switching, UPS modules and related equipment.

Technical Specifications:

- **Form Factor:** 25U floor-standing cabinet, 600mm (W) × 800–1000mm (D).
- **Construction:**
 - Cold-rolled steel frame
 - Perforated front and rear doors (>70% ventilation)
 - Lockable doors with secure key system
- **Load Capacity:** ≥ 800 kg static rating.
- **Features:**
 - Adjustable 19" mounting rails
 - Top and bottom cable entry with grommets
 - Earthing/grounding kit
 - Brush-type cable entries for dust reduction
- **Cooling:**
 - 4-fan top/side fan tray
 - Provision for temperature monitoring probe
- **Standards:**
 - EIA-310-E, IP20
- **Accessories:**
 - 8–12-way industrial PDU
 - Caster wheels and levelling feet

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- Bolt-down brackets (optional)

Item 3: 12u Vented Cabinet

Description:

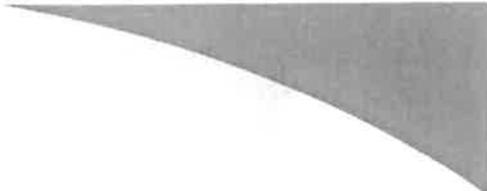
Compact rack cabinet for housing PoE switches and fibre termination equipment near distribution points.

Technical Specifications:

- **Form Factor:** 12U wall-mount 600 × 600–800 mm depth.
- **Build:**
 - Welded steel
 - Vented side panels
 - Lockable front door (tempered glass or perforated steel)
- **Load Capacity:** ≥ 100 kg.
- **Features:**
 - Reversible door
 - Adjustable rails
 - Cable entry points with brushes
- **Thermal Management:**
 - 2-fan tray with thermostat recommended
- **Accessories:**
 - 1–2 fixed shelves
 - Grounding kit
 - Rear cable management ring
- **Compliance:**
 - EIA-310 standard
 - Indoor IT equipment use

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Item 4: Basic Biometric Access Control System

Description:

Secure access control for server room with audit logging.

Technical Specifications:

- **Reader Technology:**
 - Biometric fingerprint and/or facial recognition
 - RFID (13.56 MHz) tag/card support for fallback
- **Capacity:**
 - ≥ 1,000 users
 - ≥ 50,000 event logs
- **Connectivity:**
 - TCP/IP
 - RS-485 or Wiegand 26/34 for controller integration
- **Functions:**
 - Anti-passback
 - Duress alarm
 - Tamper detection
 - Time-zone-based access permissions
- **Software:**
 - Web-based management interface
 - Role-based administration
 - Exportable audit trail
- **Power:**
 - 12V DC with UPS/battery backup (min 4 hours)
- **Durability:**
 - Indoor: IP40

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- If mounted externally: IP65 required
- **Compliance:** CE, FCC, POPIA-aligned data security support.

Item 5: Outdoor Fibre Optic Cable – 300m

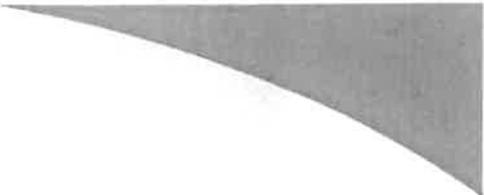
Description:

Outdoor-rated optical fibre for building interconnects.

Technical Specifications:

- **Fibre Type:** OS2 single-mode G.652D (preferred for campus backbone).
- **Construction:**
 - Steel wire armoured (SWA) or light-armoured for burial/direct-duct installation
 - Gel-filled loose tube
 - UV-resistant PE jacket
 - Rodent-resistant
- **Core Count:** 8–12 cores for future expansion.
 - **Optical Performance:**
 - Attenuation: ≤ 0.35 dB/km @ 1310 nm
 - Bend-insensitive fibre for tight routing
- **Compliance:**
 - ITU-T G.652D
 - IEC 60794
 - SANS fibre installation standards
- **Termination:**
 - LC/UPC preferred
 - Fusion splicing to pigtails in outdoor or indoor enclosures
 - **Accessories:**
 - Fibre termination box
 - Splice protectors

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Trenching/ducting where required

Item 6: 24-Port PoE+ Managed Switch (2 Units)

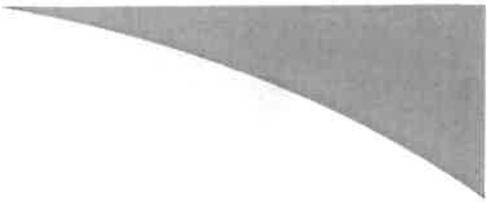
Description:

Mid-tier intelligent access switch supporting Ubiquiti WiFi 6/7 deployment and PoE+ requirements.

Technical Specifications:

- **Ports:**
 - 24 × Gigabit Ethernet (10/100/1000 Mbps)
 - IEEE 802.3af/at PoE+ on all ports
 - Total PoE budget ≥ 370–400 W
- **Uplinks:**
 - 2–4 × SFP (1G) or preferably 2 × SFP+ (10G) to avoid uplink bottlenecks
- **Switching Features:**
 - Layer 2 + Layer 3 Lite (static routing, inter-VLAN routing)
 - VLANs (802.1Q), QoS, IGMP snooping v2/v3
 - STP/RSTP, LLDP, DHCP snooping
- **Management:**
 - Web GUI + CLI via SSH
 - SNMP v2/v3
 - Central management support (UniFi compatible if Ubiquiti)
- **Stacking:**
 - Physical or virtual stacking preferred
- **Power:**
 - Internal PSU
 - Optional redundant PSU or RPS input
- **Compliance:** CE, RoHS, IEEE 802.3az (energy-efficient)

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Item 7: 48-Port PoE+ Layer-3 Switch (1 Unit)

(Must not be a bottleneck for Ubiquiti U7 WiFi 7 APs and high client loads.)

Description:

High-capacity distribution/core switch providing PoE+ for large AP loads, 10G uplinks, and enterprise management.

Technical Specifications:

- **Ports:**
 - 48 × Gigabit Ethernet with PoE+ (30W/port)
 - Total PoE budget target: ≥ 740W or highest available in product class
- **Uplinks:**
 - 4 × 10Gb SFP+ uplink ports for backbone capacity
- **Switching & Routing:**
 - Full Layer 3: static routing + dynamic (OSPF/RIP) optional
 - VLANs, ACLs, DHCP snooping, IGMP snooping/querier
 - Jumbo frame support
- **Performance:**
 - Switching capacity: ≥ 176 Gbps
 - Forwarding rate: ≥ 130 Mpps
- **Redundancy:**
 - Dual hot-swappable power supplies (mandatory)
 - Hot-swappable fans preferred
- **Management:**
 - Web UI, CLI (SSH), SNMP v3
 - Central controller compatibility (e.g., UniFi Network)
- **Compliance:**
 - CE, RoHS, IEEE 802.3az



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- Rack-mountable (1U)

Item 8: Ubiquiti WiFi 7 Access Points (10 Units)

Description:

Enterprise WiFi 7 access points for high-density indoor teaching and administrative spaces.

Technical Specifications:

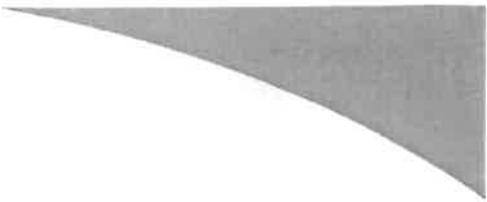
- **Wireless Standard:** IEEE 802.11be (WiFi 7)
- **Bands:** Tri-band: 2.4 GHz, 5 GHz, 6 GHz
- **Features:**
 - 4x4 MU-MIMO / OFDMA
 - Up to ~10–11 Gbps aggregate throughput
 - Advanced roaming (802.11k/v/r)
 - WPA3 Enterprise
 - Band steering & airtime fairness
- **Power:**
 - PoE+ (802.3at)
- **Management:**
 - Managed via UniFi Network Controller
 - Zero-touch provisioning
- **Hardware:**
 - Ceiling/wall mount kit included
 - Indoor model (U7 Pro) unless outdoor APs required
 - **Coverage:**
 - 150–200 m² typical per AP (environment dependent)

Item 9: WiFi Management / Controller (1 Unit)

Description:

Central management controller for UniFi APs and switches.

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Technical Specifications:

- **Function:**
 - Single console for all UniFi WiFi, switching, user management, VLANs
- **Capacity:**
 - Manage ≥ 50 APs and ≥ 500 concurrent clients
- **Features:**
 - Guest portal, vouchers, captive portal
 - Traffic analytics and monitoring
 - Auto-provisioning and configuration templates
 - Secure remote cloud access
- **Hardware:**
 - 1 \times 1GbE port
 - Supports AC power or PoE (if applicable)
- **Model Suggestion Range:**
 - Ubiquiti UniFi Dream Machine SE / Cloud Key Gen2 Plus / other UniFi OS appliance (no specific pricing)

Item 10: A4 Colour MFP Printer

Description:

Multifunction colour printer for departmental use.

Technical Specifications:

- **Functions:** Print, Copy, Scan, Fax
- **Speed:** 30–40 ppm (A4) colour & mono
- **Print Engine:**
 - 1200 \times 1200 dpi
 - Automatic duplexing
- **ADF:**

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- 50-sheet RADF or DADF
- **Connectivity:**
 - Gigabit Ethernet
 - WiFi (optional)
 - Mobile printing: AirPrint, Mopria
- **Consumables:**
 - High-yield colour and black toners
 - Monthly duty cycle \geq 50,000 pages
- **Security:**
 - Secure print release
 - PIN or card authentication
- **Compliance:** Energy Star 3.0

Item 11: 8kVA Rackmount Smart Hybrid Inverter

Description:

Rack-mountable online double-conversion UPS for critical server and network infrastructure.

Technical Specifications:

- **Capacity:**
 - 8 kVA / 6.4 kW
 - Pure sine wave output
- **Topology:**
 - Online double-conversion
 - Zero transfer time
- **Runtime:**
 - Minimum 10 minutes at full load
 - Expandable via external battery modules
- **Interface:**

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- LCD display
- SNMP/Network card for monitoring
- **Power:**
 - 230V single phase
 - Surge & overload protection
- **Features:**
 - Hot-swappable batteries
 - Bypass mode
 - Automatic voltage regulation
- **Compliance:** IEC 62040-3
- **Form Factor:** 4U–6U rackmount

Item 12: 12,000 BTU Inverter Air Conditioner

Description:

Energy-efficient cooling for server room environment.

Technical Specifications:

- **Cooling Capacity:** 12,000 BTU/h (3.5 kW).
- **Compressor:** Inverter-driven for energy efficiency.
- **Performance:**
 - SEER \geq 16
 - R410A or newer refrigerant
 - **Hardware:**
 - Wall-mounted indoor unit
 - Outdoor condenser unit
- **Features:**
 - Auto-restart
 - Timer, sleep mode

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- Quiet operation (<40 dB indoor)
- **Electrical:**
 - 220–240V single-phase
 - Surge protection recommended
 - **Compliance:**
 - SANS 941
 - NRCS approved

Item 13: Solar Panels for 8kW Hybrid Inverter.

Description: convert sunlight (photons) directly into usable direct current (DC) electricity through the photovoltaic effect.

Technical Specifications:

- 550MBT/144V is a 550W bifacial solar panel
- 144 half-cells
- Monocrystalline Construction
- Approximately 21.5% efficiency
- 8-10 panels per string for voltage
- 15-year warranty
- 25 years linear

Include:

- Mounting Racks
- Wiring
- Installation
-

Delivery Address: P.O Box 9222, Queenstown, 5320

Prepared By:

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Mr. N.O Majavu

ASD (ICT)

Approved By:

.....


Mr M. Dupreez

ADP (Academics)

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