



**REPUBLIC OF KENYA
MINISTRY OF HEALTH**

**EAST AFRICA'S CENTERS OF EXCELLENCE FOR SKILLS AND
TERTIARY EDUCATION IN BIOMEDICAL SCIENCES**

**PROPOSED CONSTRUCTION OF EAST AFRICA'S KIDNEY INSTITUTE
COMPLEX AT KENYATTA NATIONAL HOSPITAL (KNH) GROUNDS
NAIROBI, KENYA**

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INFORMATION COMMUNICATION AND TECHNOLOGY (ICT)
SYSTEMS INSTALLATION
(ALL RATES EXCLUSIVE OF TAXES)**

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PART A: GENERAL SPECIFICATION

1.1 General:

The site of the proposed project shall be situated at Kenyatta National Hospital, Off Ngong Road, Nairobi.

1.2 Reference Sites:

The offered equipment shall have been sold in Kenya in sufficient quantities to provide good proof of a Tenderer's capability of handling similar projects. Tenderers shall supply a detailed record of similar equipment that have been installed by them.

In addition to ensure continued support of the proposed equipment from the manufacturer, the Tenderer must submit documentary evidence that they are indeed authorised and accredited distributor/reseller of the manufacturer.

1.3 Cable Management:

The necessary infrastructure for the Proposed Systems shall be done by the Electrical Sub-Contractor, however additional requirements should be necessary the Sub-Contractor shall provide all the working drawings showing all the necessary conduit/trunking cable ways.

1.4 Systems Requirements:

The systems shall comprise but not limited to the following:

- Structured Cabling
- IPTV System

1.5 Commencement of Works:

The Tenderer in submitting his bid shall be deemed to have allowed for commencing the works on site immediately upon appointment.

1.6 Scope of the Sub-Contract Works:

The Sub-Contract Works shall comprise the supply, delivery, erection, testing, commissioning and setting to work of the complete **systems** as detailed in this Specification and accompanying Sub-Contract Drawings.

The Tenderer shall include for all apparatus and appliances not particularly called for in this Specification or on the Sub-Contract Drawings but which are necessary for the successful completion and satisfactory functioning of the Sub-Contract Works.

It is deemed that if, in the opinion of the Sub-Contractor at the time of tendering there exists a discrepancy in the Specification, Drawing or both, that the Sub-Contractor clarifies this difference with the Engineer before tendering.

The Tenderer shall provide as an integral part of his bid a statement of compliance in which he shall clearly declare any items of the Specifications to which his offer does not comply and an alternative which is included in the offer.

The Sub-Contractor shall be obliged to liaise with other parties involved in the project and to provide any necessary information as and when required.

No claims for extra payment shall be accepted from the Sub-Contractor due to his failure to adhere to the above requirements.

The work to be installed under the Sub-Contract shall comprise but not restricted to the supply and installation of the following complete as specified elsewhere in this Specification:

1. Data cabinets
2. Patch cords
3. Cables UTP and fiber
4. Termination modules
5. Active equipment
6. Patch panels
7. Routers
8. Wireless devices
9. TV Headend
10. IP Telephony Devices
11. Etc.

All equipment as far as is practicable shall be designed and manufactured by a single preferred manufacturer. In any case equipment shall be of uniform standards compatible in operation and spare parts trained support and maintenance facilities being available. In this regard the Tenderer shall produce a letter of guarantee and commitment from the equipment manufacturer for production at tender opening. Any tender without such a commitment letter shall be rejected.

1.7

Ordering of Materials:

The Sub-Contractor shall order materials from quantities taken from his own approved working drawings and not from the quantities shown on the Sub-Contract Drawings or in the Specification.

1.8

Builder's Work Requirements:

All chasing, cutting away and making good of walls and slabs shall be by the Main-Contractor.

1.9 **Tender Return Items:**

Drawings and publications illustrating the systems and equipment being offered against the schedules shall be returned with the Tender, together with a comprehensive description of the systems being offered to meet the requirements detailed elsewhere in the Specification.

1.10 **Standards and Regulations:**

The design, manufacture, selection, installation, testing, commissioning and subsequent maintenance of all equipment and materials described in this Specification shall comply with internationally recognised standards.

1.11 **Documentation:**

Record Drawings, Operating instructions, log book and certificates of installation and commissioning shall be provided adjacent to the control and indicating equipment at the end of the Sub-Contract.

Operating and Maintenance Instructions shall be provided before the system is accepted. The instructions shall describe the system operation, zoning, routine care and maintenance, fault finding procedures and the function and settings of all controls.

The instructions shall include a full set of drawings, other manufacturer's handbooks and proprietary items and a complete list of spare parts provided and which are available. Full details shall be provided of all manufacturers and Sub-Contractors.

1.12 **Defects Liability and Spares:**

The Sub-Contractor shall provide a comprehensive routine and emergency call out service for the defects liability period, and shall confirm the response time to be provided. This service shall include routine examination and any adjustments, cleaning, replacement of parts as required to keep the system in full working order.

All equipment shall have a minimum 1 year warranty period from the manufacturer.

The Tenderer shall include details of a proposed Maintenance Sub-Contract to provide regular maintenance from the start of the defects liability period, in accordance with this specification. The Client is not bound to accept the offer from the Sub-Contractor.

An appropriate set of spares shall be provided, including consumable and modular items, which can be replaced by on-site maintenance staff. A list of the proposed spare parts shall be provided with the Tender.

1.13

Inspection, Testing and Commissioning:

The Sub-Contractor shall inspect, test and commission the works in accordance with the equipment manufacturer's recommendations. The results of all tests shall be recorded on the standard test forms unless otherwise specified.

Before completion of the installation the Sub-Contractor shall submit to the Engineer for acceptance, a method statement of the procedure to be used for testing and commissioning, which has been agreed with the equipment manufacturers.

Before cables are terminated each cable shall be tested for continuity, insulation resistance, polarity and markings. Following satisfactory testing, cables shall be terminated in the equipment only by the manufacturer's appointed representative.

Power supplies shall be tested prior to making connections to the control equipment. The Sub-Contractor shall allow for all necessary attendance during the testing and commissioning of any ancillary systems interconnected with the security system.

PART B: PARTICULAR CONDITIONS**2.1****Location of Site**

The site of the proposed project shall be situated at Kenyatta National Hospital, Off Ngong Road, Nairobi.

2.2**Commencement of the Works**

The Tenderer in submitting his bid shall be deemed to have allowed for commencing the works on site immediately upon appointment.

2.3**Scope of Sub-Contract Works**

The Sub-Contract shall comprise the supply, delivery, installation, testing, commissioning and setting to work of the complete voice, data and image /video system as detailed in this Specification and accompanying Contract Drawings.

The Tenderer shall include for all apparatus appliances and accessories not particularly called for in this Specification or on the Contract Drawings but which are necessary for the successful completion and satisfactory functioning of the Contract Works.

It is deemed that if, in the opinion of the Sub-contractor at the time of tendering there existed a discrepancy in the Specification, Drawing or both, that the Sub-contractor clarifies this difference with the Engineer before tendering.

The tenderer shall provide as an integral part of his bid, a statement of compliance in which he shall clearly declare any items of the Specification to which his offer does not comply and an alternative which is included in the offer.

The Sub-contractor shall be obliged to liaise with other parties involved in the project and to provide any necessary information as and when required.

The Sub-contractor shall, where applicable mark the details of structural, duct or conduit provisions for the installation of their cables or equipment.

No claims for extra payment shall be accepted from the Sub-contractor due to his failure to adhere to the above requirements.

The work to be installed under the Sub-contract shall comprise but not restricted to the supply and installation of the following:

- Structured cabling
- Active equipment
- Unified communication

- IP Television system
- IP Telephony Devices

All equipment as far as is practicable shall be designed and manufactured by a single preferred manufacturer.

In any case equipment shall be of uniform standards compatible in operation and spare parts, trained support and maintenance facilities. In this regard the Tenderer shall produce the necessary letter of **Product and Applications Assurance Warranty**.

2.4 Ordering of Materials

The Sub-contractor shall order materials from quantities taken from his own approved working drawings and not from the quantities shown on the Contract Drawings or in the Specification. The tenderer shall ensure that all correct parts are ordered and installed.

2.5 Builder's Work Requirements

All chasing, cutting away and making good of walls and slabs will be by the Main Contractor.

The Sub-Contractor shall however be responsible for ensuring that the Builder's work has been carried out accurately and in accordance with his requirements.

2.6 Orientation

The Tenderer shall allow for the orientation of the Client's representatives to a level where they are sufficiently confident and proficient in managing, trouble- shooting and maintenance of the systems.

The orientation shall be carried out immediately after installation and shall be taken into consideration in assessing the completion of the project and release of payments.

The Sub-contractor shall be deemed to allow for any costs associated with the orientation.

2.7 Tender Return Items

The tenderer shall submit the following together with the tender:

- Drawings and publications illustrating the systems being offered against the schedules.
- A comprehensive description of the control systems being offered to meet the requirements detailed elsewhere in the Specification.
- The Manufacturers Catalogues showing such details as dimensions, colours and configurations.

- Other documents referred elsewhere in this specification.

2.8

Standards and Regulations

The design, manufacture, selection, installation, testing, commissioning and subsequent maintenance of all equipment and materials described in this Specification shall comply where applicable with the requirements of:

- [i] Institute of Electrical and Electronic Engineers [IEEE]
- [ii] Communication Commission of Kenya (CCK).
- [iii] Kenya Bureau of Standards (KBS).
- [iv] CENELEC.
- [v] International Standards Organisation/International Electro technical Commission [ISO/IEC] IS 11801.
- [vi] The following Electronic Industries Association/Telecommunications Industry Association [EIA/TIA] Standards:
 - (a) 568B – Commercial Building Telecommunications wiring standards.
 - (b) 569 – Commercial Building Standard for Telecommunications pathways and spaces
 - (c) TSB-67 – Transmission Performance Specifications for Field Testing of Unshielded, Twisted Pair Cabling Systems.
 - (d) 72 - Centralised Optical Fibre Cabling Guidelines.
 - (e) 75 – Cabling Practices for Open Offices.
- [vii] Underwriter’s Laboratories [UL] Cable Certification and follow up Programme.

2.9

Site Visit

The Tenderer must visit the site and shall be deemed to have satisfied himself with regard to conditions under which the Sub-Contract Works shall have to be carried out.

2.10

Defects Liability, Spares and Maintenance

Contract.

The Sub-Contractor shall provide a comprehensive routine and emergency call out service for the defects liability period, and shall confirm the response time to be provided. This service shall include routine examination and any adjustments, cleaning, replacement of parts as required to keep the system in full working order.

The tenderer shall include details of a Maintenance Contract to provide regular maintenance from the start of the defects liability period, in accordance with this specification. The Sub-

contractor should note that the Client may wish to enter into a negotiation with him/her and is therefore not bound to accept the charges proposed.

2.11

Warranty

The Sub-Contractor shall submit an extended Product Warranty and Applications Assurance of at least 15 years for the installation where applicable.

The Extended Product Warranty from the Manufacturer shall include but not restricted to the following conditions:

- (a) That the registered cabling installation shall be free from manufactured defects in material or workmanship under normal and proper use.
- (b) That all approved passive cabling products of the registered installation meet or exceed the (Near End Cross Talk) NEXT, PSNEXT, ELFEXT, PSELFEXT, return loss, bandwidth and attenuation/loss specifications of the ISO/IEC IS 11801 (1995), CENELEC EN 50173 1995 and TIA/EIA 568-B and their approved amendments.
- (c) That the installation will meet or exceed the PSNEXT, ELFEXT, PSELFEXT, return loss, attenuation and NEXT requirements of ISO/IEC 11801(1995), CENELEC EN 50173 (1995) and TIA/EIA 568-B and their approved amendments for copper cabling.
- (d) That the installation will meet or exceed the attenuation/loss and bandwidth requirements of ISO/IEC is 11801 (1995), CENELEC EN 50173 (1995) and TIA/EIA 568-B and their approved amendments for fibre cabling.

The Applications Assurance shall cover but not restricted to the following conditions:

- (a) That the registered structured cabling system will be free from failures, which prevent operations of the specific application(s) for which it was originally designed. This shall not include failures due to electronic hardware and/or software.
- (b) Applications specified in the current and future versions of the manufactures structured cabling system performance specifications.
- (c) Any application introduced in the future by standards or user forums that use the ISO/IEC IS 11801 or TIA/EIA 568-B UTP or fibre components and UTP or fibre link/channel specifications for cabling.

2.12

Workmanship

The installation and method of fixing of all device covered by this specification shall be coordinated with building fabrics and finishes to which they are fixed.

Work shall be done to the highest standards of care within the industry and shall be subject to inspection and acceptance by the Engineer.

Inspection by the Engineer shall not relieve the Sub-Contractor from any responsibility for the proper supervision and execution of the work described in this specification.

All components of the installation shall be installed in a neat manner. Wiring colour codes shall be strictly observed and terminations shall be uniform throughout the system. Identification markings and systems shall be uniform. TIA/EIA 606 administration guidelines shall be used as standard for all structured cabling system wiring.

2.13

Documentation

The Sub-contractor shall provide a theoretical and practical orientation prior to the final commissioning covering the following subjects:

- The generic cabling system [general description, technical specifications, standardizations etc.]
- Link performance measurements (what, how, test equipment etc.).
- Network administration (purpose, needs etc.).
- Maintenance of the generic cabling system (trouble shooting, spare parts etc.).
- Training manuals for all the above installations.
- Troubleshooting manual for all the installed systems.
- Any other documents necessary for the above installation.
- Any other training found indispensable, desirable by the Sub-contractor to recommend by the manufacturers.

The Sub-Contractor shall also provide a complete, organised and uniform documentation. Each document shall be technically correct and shall refer to the quoted equipment only. The contents shall be structured in a logical way. Computer based documentation shall be preferred.

The documentation shall contain but not restricted to:

- General description of the installation and product specification. It shall contain general layouts per floor with locations of outlets, floor distributors and horizontal cabling. Backbone details, detailed layout of each distributor and its patch panel shall be included.
- Test and measuring reports.
- Connectivity diagrams.
- Network Administration documents.

- Operation manuals.

2.14

Inspection, Testing and Commissioning

The Sub-contractor shall inspect, test and commission the Structured Cabling System works in accordance but not limited to relevant IEEE, TIA/EIA, ISO/IEC, CENELEC, ASTM and Communication Commission of Kenya [CCK] and Telkom Kenya [TKK], the inspection, Testing and Commissioning section of the Main Contract and the equipment manufacturer's recommendations. The results of all tests shall be recorded on the standard test forms unless otherwise specified.

Before completion of the installation the Sub-contractor shall submit to the Engineer for acceptance, a method statement of the procedure to be used for testing and commissioning, which has been agreed with the equipment manufacturers.

Before cables are terminated each cable shall be tested for continuity, insulation resistance, polarity and markings. Following satisfactory testing, cables shall be terminated in the equipment only by the manufacturer's appointed representative.

The Sub-contractor will provide a cabling management system for system administration. This will enable the Client to accurately identify and keep a record of all the components that comprise the cabling system as well as pathways, telecommunication closets and other spaces in which it is installed.

The Sub-contractor shall provide the following to assist the Client in network administration:

- Ensure consistent colour coding per telecommunication outlet, patch panel etc.
- A unique identifier assigned to every part of the cabling system (cables, outlets distributors etc.).
- A label at each telecommunication outlet the numbering of outlets based on floor and work area numbers.
- A label at each cable end to indicate corresponding telecommunication outlet.
- A cable schedule for each distributor indicating the cable number, its source and destination, its type and current use. This schedule shall be ordered both by cable number and destination.
- A complete patch list for all cross-connections.
- A full set of "as built" drawings.(printed and on CD)

The tenderer shall submit a list of equipment/tools for carrying out the installation and testing of the system.

3.1**Overview**

The structured cabling shall consist of the following:

- Incoming services provisions (ISP)
- Backbone installations
- Horizontal cabling installations
- Active equipment (switches, Wi-Fi Access points)
- Protection system

3.2**Incoming Connection (ISP)**

Two reliable internet providers shall be engaged to allow for 100% redundancy. The contractor shall allow for attendance to follow up with connection with the ISP.

The ISP's will be configured for the following;

Load Sharing: Use the two links with a distributed load of connections going out from the Security Gateway. Connections coming in are alternated. The bandwidth monitor will have the ability to configure the best relative link for the current load.

Primary/Backup: One link will be used for incoming and outgoing connection one as the Primary and the other as a backup. If one ISP is in use then the other is shut down

3.3**Cabling General**

- a) All cables must pass through conduits or trunking.
- b) All cables and connectors shall be labelled.
- c) No distortion due to kinks, sharp bends or excessive hauling tension shall be allowed.
- d) Cables shall be run in a manner eliminating any possibility of strain on the cable itself or on the terminations.
- e) Cables shall have no joints or splices.
- f) Cables shall be kept at a minimum distance of 150mm from items liable to become hot or cold.
- g) Bending radii shall be not less than eight times the overall cable diameter.
- h) The manufacturers hauling tension shall not be exceeded.
- i) All cable ties and fixings shall be tightened to support the cable loom without distortion of the cable sheath.
- j) The fibre optic cable shall be multi-mode optimal speed and with graded index, and of nominal size 62.5/125 micron.

- k) Fibre optic cable shall have a core/cladding diameter on nominal 850nm and 1300nm optical wavelength.
- l) The optic cable shall be of appropriate core with each core terminated on both ends.
- m) The enhanced UTP 4 pair shall be of cat 6 grade and exceed ANSI/TIA/EIA-568-Aj and ISO/IEC 11001 standards. Cat 6 structured cabling shall be used throughout the entire installation.

3.4 Backbone Installations

3.4.1 Fibre Cable

This shall originate from the **Core Switches** located in the communication room and terminate in the **Access Switches** within the floors.

The Sub-Contractor shall supply and install 8 core multimode armoured fibre optic cable. It shall support all the applications outlined in the system overview. It shall have the following characteristics.

- Wavelength 62.5/125 micron
- 8 core loose tube
- Corrugated armour

The tenderer shall observe the bending radius and pulling strength requirements of all backbone cables during handling and installations. The cable shall run in suitably sized ducts provided by others.

3.4.2 Cabinet/Closets

The new distribution enclosure shall consist of Standard Cabinets with lockable transparent front door and a cooling fan. These shall be located as shown on the contract drawings.

The distribution unit will contain the patch panels with fibre optic and RJ 45 connectors, distribution frames with insulation displacement connection [IDC] modules and the auxiliary equipment (cable organizers, power distribution bar, earthing, fans, etc.)

Cabinets shall be able to contain each type of active equipment for possible future development. The tenderer shall take into consideration the active equipment at the Administration point and shall allow space for this.

The Sub-contractor shall connect the trunk cross-connect and the distribution cross-connect the common equipment such as IPBX or Server computer in the equipment rooms.

The mounting hardware must provide vertical and horizontal wire ways for cross-connect wires.

3.4.3

Modular RJ45 Patch Panel

The patch panel will have standard dimensions (19”) in order to guarantee the fitting in a standard rack, box or cabinet. To avoid installation errors the Insulation Displacement Connection [IDC] contacts shall be marked with the same colour code as the cables and the outlets.

Patch panels shall be full CAT 6 with more than 40 dB NEXT measured at 200MHz between every pair combination thus capable of supporting applications of up to 200 MHz as specified in the ISO/IEC JTC1/SC25 IS 11801.

The patch cords will be arranged in a patch guide (cord organizer) to achieve a well-ordered network management.

The RJ45 patch panel shall have RJ45 jack termination in front and Insulation Displacement Connector (IDC) at the rear of the module.

The panels shall be available in different standard port configurations. The modular jack panel will have an insertion life of 750 cycles minimum. When configured in worst case 100 meter channels with full cross-connects and consolidation points with other products proposed in this tender, the connecting block shall be capable of delivering the minimum Guaranteed Channel Performance.

3.4.4

Patch Cords & Work Areas/Cables

Modular Patch Cords shall be provided:

- Between the patch panels and the applications such as IPBX patch panel.
- Between the patch panel and the active LAN equipment.
- Between the patch panel and the video /controllers.

Inspection Displacement Connection patch cords provided shall have built-in exclusion features to prevent accidental polarity reversals and split hairs.

Work area cables shall also be provided for interconnecting the telecommunication outlet and the terminal equipment.

Generic patch cords shall have transmission characteristics specified up to 1200 MHz and have the same nominal characteristics as the cable used in the horizontal cabling to ensure a homogeneous cabling system.

The patch cords and the work area cables shall be of the same type to limit the number of spare parts.

They shall be available in stranded screened version and in different lengths of 3m and 1m. Generic patch cords and work area cables shall consist of 4 pair's flexible cable with fully populated 8 pin module connectors at both ends and equipped with a moulded strain relief.

The total length of patch cord, an equipment cable and a work area cable of the same link will not exceed 10m.

All cords shall conform to the requirements of TIA/EIA568-B, IS1180-1 and EN50173, Horizontal cabling Section and be part of the Underwriters Laboratories [UL] LAN Certification and Follow-up programme.

3.5 Horizontal Cabling Installations

3.5.1 Copper Cable

Horizontal cabling shall be run in a star topology format and will not exceed 90 metres from the patch panel to the outlet.

All horizontal cables used for each outlet shall be 4-pair CAT 6 unshielded twisted pair (UTP) unless otherwise stated.

During handling and installation the Sub-contractor shall observe the bending radius and pulling strength requirement of the 4-pair unshielded twisted pair (UTP) cable.

The cable run between the telecommunication outlet and the patch panel shall be continuous without any joints or splices.

In raised floors or suspended ceilings without cable trays/conduits, the Sub-contractor shall bundle the wiring with plastic cable ties at appropriate distances. Where appropriate 'J' hooks shall be used to support the cables.

All communication cabling used throughout this project shall comply with the requirements as outlined in the appropriate local codes. All cabling shall meet the relevant fire performance standards for the environment in which they are installed.

All cables shall be terminated testing and labeled in an alphanumeric sequence at all terminations. All copper cable terminations shall comply with and be tested to TIA/EIA 568-B, TSB-67 standards and TIA/EIA 606 respectively.

Cables shall terminate on the wall or trunking plates as shown on the Contract Drawings.

All cables used shall meet or exceed Guaranteed Class E Channel Performance values when configured as a worst-case channel.

Cables shall be tested for the following parameters:

- Characteristics impedance
- Cross talk attenuation
- DC loop resistance
- Attenuation
- Propagation time
- Immunity to EMI
- EM radiation

3.5.2

Telecommunication Outlets

Voice and data communication outlets shall consist of two gang utility outlet boxes/plates equipped with 8-Pin modular [RJ 45] jacks. All horizontal cabling shall terminate on termination blocks at their associated wiring closet.

All telecommunication outlets for 24 AWG (American Wire Gauge) copper cable shall be modular 8-position/8-conductor outlets. The outlets shall be able to support universal applications in a multi-vendor environment accepting modular RJ 45 plugs.

All unused module locations shall be provided with blank module inserts.

All telecommunications outlets shall conform to TIA/EIA 568-B, IS11801 and EN50173 requirements. Where an outlet is configured in worst-case of 100-metre channel, the telecommunication outlet shall be capable of delivering a minimum Guaranteed Channel Performance of Class E.

Telecommunication outlets shall be compatible with CAT 6 – when the outlet is mated with a CAT 6 plug, the connection performance shall be CAT 6 or better

The Sub-contractor shall supply the wiring and/or cords, connectors and extension cords.

3.5.3

Administration Centres

The administration system shall consist of RJ 45 modular stackable patch frames for termination of copper cables and /or IU combination on shelf for the termination of optical fibre as indicated in the Bills of Quantities.

3.6

Edge/Access Switches

- 10/100/1000BASE-T auto-sensing Gigabit Ethernet switching ports
- Power over Ethernet: Up to 30 watts per port
- SFP+ (10Gb/1Gb) ports
- Switch Fabric Capacity 176.0 Gbps
- VLAN support for tagging and port-based as per IEEE 802.1Q; protocol-based VLANs
- Quality Of Service, Multicast, Access Control Lists
- iSCSI optimization and monitoring

- Industry-standard CLI accessible via Telnet, SSH, or local console (RJ45 Yost) and Robust HTTP GUI Management
- Redundant Power Supply
- Lifetime Warranty

3.7

Distribution Switch specifications:

- 10/100/1000BASE-T auto-sensing Gigabit Ethernet switching ports
- SFP+ (10Gb/1Gb) ports
- 2 Stacking Ports
- Switch Fabric Capacity 128.0 Gbps
- VLAN support for tagging and port-based as per IEEE 802.1Q; protocol-based VLANs
- Quality Of Service, Multicast, Access Control Lists
- iSCSI optimization and monitoring
- Industry-standard CLI accessible via Telnet, SSH, or local console (RJ45 Yost) and Robust HTTP GUI Management
- Redundant Power Supply

3.8

Core Switch:

Performance and capabilities shall but not limited to the following minimum requirements;

- Up to 928 Gbps wired switching capacity with 250 Mpps of throughput
- Up to 20 Gbps of wireless termination capacity. Support for up to 100 access points and 2000 wireless clients on each switching entity
- Up to two 40 Gigabit Ethernet uplinks (Quad Small Form-Factor Pluggable Plus [QSFP+])
- Up to 4 no blocking 10 Gigabit Ethernet uplinks (Small Form-Factor Pluggable Plus [SFP+])
- SFP support on uplinks to offer flexibility for up to 4 Gigabit Ethernet ports
- 384 ports of no blocking 10/100/1000
- PoE+ (30W) capabilities on all ports in a line card simultaneously
- Cisco UPOE (60W) capabilities on all line card slots
- Energy Efficient Ethernet (IEEE 802.3az)
- 196 ports of no blocking Gigabit Ethernet SFP (4 uplink ports plus 192 line card ports)
- 100 ports of 10 Gigabit Ethernet SFP+ (4 uplink ports plus 96 line card ports)
- Up to 128,000 FNF entries in hardware
- SD card support for flexible storage options
- 256,000 routing entries for high-end campus access and aggregation deployments
- IPv6 support in hardware, providing wire-rate forwarding for IPv6 networks
- Dual stack support for IPv4/IPv6 and dynamic hardware forwarding-table allocations for ease of IPv4-to-IPv6 migration
- Scalable routing (IPv4, IPv6, and multicast) tables and Layer 2 tables

- Scalable and dynamic allocation of Access Control List (ACL) and Quality of Service (QoS) entries to use 8 queues per port and comprehensive security policies per port
- SD-Access: The Supervisor Engine 9-E forms the foundational building block for SD-Access – Cisco’s leading enterprise architecture, which includes:
- Policy-based automation from edge to cloud
- Segmentation and micro-segmentation made easy, with predictable performance and scalability
- Automation through the Cisco Application Policy Infrastructure Controller – Enterprise Module (APIC-EM)
- Policy through the Cisco Identity Services Engine (ISE)

3.9

Protection System - Earthing

The Sub-contractor shall provide adequate earthing (grounding) for both electrical safety and Electromagnetic Compatibility (EMC) Performance, which are subject to national and local regulations.

It is the responsibility of the Sub-contractor to ensure that the cable raceways i.e. trunking, metal ducts are properly earthed to reduce EMI. The Sub-contractor is expected to earth all the cabinets, closure and racks.

It is the Sub-contractor obligation to liaise with the Electrical Sub-contractor to establish the type of earthing used for this particular project.

4.1 Overview

The system shall consist of the following:

- Incoming services connection (ISP)
- Active equipment (Headed Switch)

4.2 Incoming Connection (ISP)

The sub-contractor shall allow for reliable services provider to be engaged at least two providers. The free to air and subscribed services provider shall be engaged by sub-contractor to client's preference. The contractor shall allow for fully attendance with the providers.

The sub-contractor shall allow all necessary accessories not included in the bills of quantities to make the system complete of the provision of the services to clients satisfactorily and to Engineers' approval.

4.3 Digital Content Manager (Headend Switch)

The administration system shall consist a rack mountable data switch with telecommunication termination points for termination of copper cables and /or IU combination of optical fibre as indicated in the Bills of Quantities.

The Headend switch shall have capacity to broadcast quality and high density transrating and transcoding of MPEG-2 and H.264 compressed video and audio services i.e.

- Multiple feed receptions of DVB - T2, multi-decryption and processing of MPEG-2 services.
- Flexible and versatile remultiplexing, grooming, and scrambling of DVB and ATSC services.
- Highly reliable and efficient transport of SDI video, AES Audio, and ASI transport stream signals

The switch shall come as rack mountable with hot-swappable and redundant power supplies. The unit has four individual slots. These four slots can contain any combination of the following cards:

- GbE I/O Card
- ASI I/O Card & ASI SFN Card
- Dense Receiver Decrypter Card
- Transcoder and Logo Insertion card (MPEG-2 to AVC)
- Multi Format Processor (MFP) Card – in a Dual Layer or a Single Layer variant
- IP Video Gateway Cards

The following list the expected features and Benefits of the system;

- 60 Gbps internal processing throughput, with a potential future I/O capability of up to 40 Gbps
- User hot-swappable power supplies and fans
- Redundant load-sharing power supplies, supports both AC and DC power supplies

The acceptable Management include but not limited to the following;

- SNMP traps
- ROSA management
- Easy control using web browser
- Ethernet interface for communication with management system and web browser
- IPsec
- General-purpose inputs

4.4 Multi Format Processor Card

The Multi Format Processor Card shall provide high reliability and excellent video quality of IP-based headend deployment with the flexibility of Asynchronous Serial Interface (ASI), IP, satellite, or Advanced Television Systems Committee (ATSC) off-air inputs, along with ASI or IP outputs with capacity to process up to 144 SD or 48 HD channels.

The cards shall include but not limited to the following features;

1. Any-to-Any Processing
 - a. Transcoding and rate-changing of MPEG-2 and H.264, HD, and SD services in single-program and multiprogram transport streams
 - b. Transcoding any input to multiple H.264 adaptive bit rate (ABR) resolutions
 - c. Transcoding of HD services to SD video, regardless of the codec
 - d. Logo insertion of up to 3 logos per channel
 - e. Insertion of Encoder Boundary Points (EBP)
 - f. Transcoding of audio services between MPEG-1 layer II, Dolby Digital (AC-3), Dolby Digital Plus (EAC-3), and Advanced Audio Coding (AAC) formats
 - g. Automatic real-time audio leveling
2. High-Density Processing
 - a. Adds transcoding for up to 72 SD or 24 HD programs
 - b. Allows up to 300 ABR output profiles to be added per 2RU chassis
 - c. Ad insertion for any screen
3. Premium Picture Quality Processing

- a. Advanced filtering capabilities: Motion Compensated Temporal Filtering (MCTF) and pre-deblocking filtering to remove noise and macro-blocking artifacts from video sources
- b. Adds premium quality transcoding for up to 24 SD or 12 HD programs

5.1 Overview

The Voice over Internet Protocol (IP) PBX System shall be a complete telephony system that will provide telephone calls over IP data networks. All conversations shall be sent as data packets over the network. The technology shall include advanced communication features but will also provide significant scalability and robustness.

The system shall consist but not limited to the following:

- Incoming services connection (ISP)
- IPBX (router ISDN, VioP)
- Telephony Devices

5.2 Incoming Connection (ISP)

The contractor shall allow two or more reliable services providers to be engaged to allow for 100% redundancy. The contractor shall allow for attendance to follow up with connection with the ISP.

The sub-contractor shall allow all necessary accessories not included in the bills of quantities to make the system complete of the provision of the services to clients satisfactorily and to Engineers' approval.

The following is the description of the major components of the IP PBX system.

5.3 Enterprise Call Manager Communication Server Software

The Sub-Contractor shall supply a complete switchboard and Call Manager Communication Software as part of the system capable of delivering the expected feature set. As a minimum the system shall be able to support the following features and services.

5.4 Features

Calling line ID including customization, Call Routing, Least Cost Routing, Call Forwarding on Busy and on No Answer, Call Transfer, Data Network Integration and Click to Dial, Advanced Music on Hold with an option to program music of minimum 2 minutes and capability to have external music on hold interface, Call Waiting, Call Transfer when not online, Call Conferencing with support for multiple 3 party conference and support for meet-me conference (Min. 6 users), Do Not Disturb, Find Me/Follow Me, On the Fly Recording Call Return and Voicemail Call back

5.5

Primary Services

- a) Centralized Call Processing
- b) The IP PBX system shall be able to support initially 400 IP users with expansion capacity of up to 1,000.
- c) The IP PBX system shall be able to support 20 trunk lines.
- d) The system shall be able to support full outlook and e-mail integration including voice mail to Email.
- e) The system shall have support for business critical applications and unified communication applications which shall include IP Contact Centre/Call Centre, unified messaging.
- f) The system shall have support for integrated services such as conferencing, one number follow me, personal call directory, recorded announcement, network-wide attendant and messaging.
- g) The system shall have an IP PBX based unified communication security solutions that offer comprehensive threat protection, strict policy enforcement, robust access control, and privacy of confidential data.
- h) As the Sub-Contractor plans for the security of the system, they should bear in mind the current security software used at AFA i.e. antivirus, firewall etc.
- i) The Sub-Contractor shall indicate the licensing regime applicable to the IP PBX system. AFA shall prefer cost effective licensing which will allow for grow-as you-want - Licensed per extension one-off payment.
- j) The system shall be able to interoperate with IP Phones, PSTN Gateways, SIP Trunks, IP Trunks, Analogue Trunks and Microsoft products such as Exchange 2016 or lower versions. The system shall have a CTI server to be able to provide call management on every desktop. The system shall make it possible for the following feature to be integrated:
 - a. Pop-up of incoming calls with caller ID on ISDN line, List of incoming/outgoing and answered/unanswered calls.
 - b. Click to dial.
 - c. Integration with MS outlook to dial from Outlook contacts.
 - d. Support in future, unified messaging to have Voicemail as .wav (or equivalent) file in email client.
 - e. Support in future, supervision feature to have status Free/Busy/forwarded etc) of all users.
- k) The system shall have multi-party conference with clock to conference and multiparty video conferencing.
- l) The system shall be flexible enough to allow AFA configure any preferred numbering plan, including capability to support all extension on Direct Inward Dialing (DID) numbering.

5.6

Secondary Services

- Cell Phone Integration
- Extension Groups
- Time of Day Routing
- Extension Call Recording
- Voice call recording for help desk purposes.
- Extension Range Flexibility
- Voicemail Bypass
- Intuitive VoIP Ready
- Announcement Interface

5.7

Phone Sets

The system shall be able to support extensive user equipment including cordless, soft phones, IP, digital and analogue phone set support to meet diverse end-user requirement. Specifically the system shall be able to support the following; Digital Sets, Analogue Sets, IP phones (IP Key phones / Soft phones), SIP Phones (SIP desk phones / soft phones), DECT Phones and V-WLAN WIFI Sets.

- a) The Digital/IP sets shall have large display and permanently-labeled feature buttons: e.g. Speaker, Mute, Volume, Headset, Contacts, Home, History, Message, Phone. Executive phones will have a feature for video calls.
- b) The Sub-Contractor shall supply IP Phone sets capable of being powered through Power over Ethernet (PoE).
- c) The Sub-Contractor shall supply client software for IP soft phones to be installed on desktop and laptop computers. The Sub-Contractor shall also supply all associated accessories for each IP soft phones that is: - mouth pieces, mikes, earpieces, headphones and holders.

5.8

Operations and Management Console Software

- a) The system shall have a secure Web based IP PBX management system for easy system administration. It shall also be password protected and accessible over the network.
- b) Multiple Country number selection.
- c) Talk Time Management
- d) Call Account Management
- e) Call Detail Records - Call Logs

5.9

Automated Call Distributor

The system shall be able to support an automated call distributor with the following features;

- Automatic call attendant
- Call menu
- Call forwarding

- Call transfer
- Managing extensions
- Call parking
- Support auto attendant (16 ports) with the option to upgrade it to multiple trees, by way of software upgrade only with no additional hardware.

5.10 GSM Gateway

The system shall have a GSM Gateway which shall be used to route call straight to mobile networks.

5.11 Unified Messaging Gateway

The system shall have a Unified Messaging Gateway which shall be used to link with Microsoft Exchange 2013, higher or lower versions

5.12 Interactive Voice Response System (IVRS)

The system should be supplied with an Interactive Voice Response system to give callers automated support or guide them on accessing various services offered by the Authority.

5.13 Redundancy Requirements

In order to meet availability that is commensurate to world best practices, AFFA proposes a redundancy arrangement as indicated in the high level configuration attached at annex of this document.

5.14 Training Requirements

The Sub-Contractor shall provide a professional certification on Certification Partners Convergence Technologies Professional (CTP) or an equivalent certification relevant to Unified communication systems for five (5) technical staff members before the actual implementation of the Unified communication system.

The training so provided shall be of highest standard, preferably conducted at the manufacturers training facility for the communication system. The training shall be coupled with tours of sites where similar solutions have been implemented.

In additional to this training the Sub-Contractor shall provide on-the-job training to all AFFA technical staff to be assigned to the Unified Communication System project during the implementation of the system.

5.15 Documentation

The Sub-Contractor shall supply, together with the equipment, a set of documentation to be used for purposes of operation and maintenance of the IP PBX systems.

PART F

BILLS OF QUANTITIES

6.1**GENERAL NOTES TO TENDERERS**

1. The Bills of Quantities form part of the contract documents and are to be read in conjunction with the contract drawings and general specifications of materials and works.
2. The prices quoted shall be deemed to include for all obligations under the sub-contract including but not limited to supply of materials, labour, delivery to site, storage on site, installation, testing, commissioning (**excluding 16% VAT**).
3. All prices omitted from any item, section or part of the Bills of Quantities shall be deemed to have been included to another item, section or part thereof.
4. The brief description of the items given in the Bills of Quantities are for the purpose of establishing a standard to which the sub-contractor shall adhere. Otherwise alternative brands of **equal** and **approved** quality will be accepted.
5. Should the sub-contractor install any material not specified here in before receiving **written approval** from the Project Manager, the sub-contractor shall remove the material in question and, **at his own cost**, install the proper material.
6. The grand total of prices in the price summary page must be carried forward to the **Form of Tender for the tender to be deemed valid**.
7. The Bills of Quantities are divided generally into three sections:-

a. Contractual Requirements – Bill 1

Sub-contractors contractual requirements as called for the bill of quantities shall be priced and included in the tender. However the Tenderer is free to include and price any other items he deems necessary taking into consideration conditions he is likely to encounter on site.

b. Installation Items – Other Bills

The brief description of the items in these Bills of Quantities should in no way modify or supersede the detailed descriptions in the contract Drawings, conditions of contract and specifications. The unit of measurements and observations are as per Volume 1 or as indicated in the Bills of Quantities.

c. Summary

The summary contains tabulation of the separate parts of the Bills of Quantities carried forward with provisional sum, contingencies and any prime cost sums included. The sub-contract shall insert his totals and enter his grand total tender sum in the space provided below the summary.

BILLS OF QUANTITIES**SECTION D.W. 1.0 TITLE: PRELIMINARIES & CONTRACTUAL REQUIREMENTS**

Item	Description	Unit	Qty	Rate	KShs.
D.W. 1	<u>CONTRACTUAL REQUIREMENTS</u>				
A.	Preparation of working drawings, printing and distribution.	Sum			
B.	Preparation of 'As Installed Drawings", printing and distribution as specified. Drawings to include: (a) Blue Prints - 4 sets of each. (b) AutoCAD on CD – 2 No. (c) Operational Instructions, manuals and test certificates	Sum Sum Sum			
C.	Allow Kshs. 4,200,000.00 Provisional sum for overseas factory inspection to cater for 6 No. persons (Client Rep- 1 No., SDPW Electrical Engineer – 2 No., User Departments Reps – 2 No., Consulting Electrical Engineer – 1 No.) for Structured cabling	Sum			4,200,000.00
D.	Any other item necessary to complete the installations in this section (please state)	Sum			

SECTION D.W. 2 TITLE: BACKBONE CABLING

Item	Description	Unit	Qty	Rate	KShs.
D.W. 2.1	Incoming services				
A.	Allow provision of ISPs for data and VIOP telephone services (At least two per ISP for redundancy) as per client's preference	Sum			
B.	Allow for routers and terminating the services to the server complete with the associated accessories	Sum			
C.	Pulling and termination of the above cables.	Sum			
D.	Fibre consumables	Sum			
E.	Labelling, Documentation and Certification of the above works.	Sum			
F.	Testing & Commissioning of the above works.	Sum			
G.	Any other item to complete the installation in this section [Please state].	Sum			
Total Carried Forward to Main Summary of Prices					

SECTION D.W. 2 TITLE: BACKBONE CABLING

Item	Description	Unit	Qty	Rate	KShs.
D.W. 2.2	Backbone Cabling Cont'				
A.	6 Core Outdoor single mode fibre optic cable from Existing Kenya Hospital to Server Room	M	580		
B.	Allow tapping from the existing services to new building	Sum			
C.	Pulling and termination of the above cables.	Sum			
D.	Fibre consumables	Sum			
E.	Labelling, Documentation and Certification of the above works.	Sum			
F.	Testing & Commissioning of the above works.	Sum			
G.	8 core Single mode Armoured indoor fibre optic cable as follows:				
	▪ Server to Basement Floor 19U Cabinet 1	M	180		
	▪ Server to Basement Floor 19U Cabinet 2	M	200		
	▪ Server to Basement Floor 15U Cabinet 3	M	70		
	▪ Server to Ground Floor 19U Cabinet 1	M	150		
	▪ Server to Ground Floor 19U Cabinet 2	M	170		
	▪ Server to Ground Floor 19U Cabinet 3	M	250		
	▪ Server to Ground Floor 15U Cabinet 4	M	50		
	▪ Server to First Floor 19U Cabinet 1	M	170		
	▪ Server to First Floor 19U Cabinet 2	M	190		
	▪ Server to First Floor 19U Cabinet 3	M	260		
	▪ Server to First Floor 15U Cabinet 4	M	60		
	▪ Server to Second Floor 19U Cabinet 1	M	190		
	▪ Server to Second Floor 19U Cabinet 2	M	240		
	▪ Server to Second Floor 19U Cabinet 3	M	270		
	▪ Server to Second Floor 15U Cabinet 4	M	60		
	▪ Server to Second Floor 15U Cabinet 5	M	95		
H.	Fibre consumables (connectors, adapters, termination kit etc) for the above cables.	Item	1		
I.	Any other item to complete the installation in this section [Please state].	Sum			
Total Carried Forward to Main Summary of Prices					

SECTION D.W. 3.0 TITLE: HORIZONTAL CABLING

Item	Description	Unit	Qty		KShs.
D.W. 3.1	Horizontal Cabling				
A.	CAT 6 UTP cable: <ul style="list-style-type: none"> ▪ Basement ▪ Ground Floor ▪ First Floor ▪ Second Floor 	M M M M	7605 24660 18405 19665		
B.	Data Cabinet as Giganet or approved equivalent: 42 U c/w with fan and 5 No 13A power outlets as ANSI for server room	No.	3		
C.	42 U c/w with fan and 5 No 13A power outlets as ANSI <ul style="list-style-type: none"> ▪ Basement ▪ Ground Floor ▪ First Floor ▪ Second Floor 	No. No. No. No.	2 3 3 3		
D.	15 U c/w with fan and 3 No 13A power outlets as ANSI <ul style="list-style-type: none"> ▪ Ground Floor ▪ First Floor ▪ Second Floor 	No. No. No.	2 1 2		
E.	CAT 6 UTP Copper 1 M patch cords for data cabinets <ul style="list-style-type: none"> ▪ Basement ▪ Ground Floor ▪ First Floor ▪ Second Floor 	No. No. No. No.	169 548 409 437		
Total Carried Forward to next page					

Item	Description	Unit	Qty		KShs.
F.	CAT 6 UTP Copper 3 M patch cords for work stations and BMS Points				
	▪ Basement	No.	67		
	▪ Ground Floor	No.	191		
	▪ First Floor	No.	155		
	▪ Second Floor	No.	147		
G.	CAT 6 UTP Copper 1 M patch cords for TV, Master Clock, Public Address & Wireless Access Points				
	▪ Basement	No.	86		
	▪ Ground Floor	No.	213		
	▪ First Floor	No.	125		
	▪ Second Floor	No.	165		
H.	Cable Managers:				
	▪ Basement	No.	1		
	▪ Ground Floor	No.	2		
	▪ First Floor	No.	20		
	▪ Second Floor	No.	2		
I.	Twin outlet CAT 6 CT coupler shuttered with blue and red icons complete with gang horizontal plastic face plate:				
	▪ Basement	No.	46		
	▪ Ground Floor	No.	180		
	▪ First Floor	No.	137		
	▪ Second Floor	No.	142		
J.	Twin outlet CAT 6 CT coupler shuttered with blue and red icons complete with gang horizontal plastic face plate for TV Points:				
	▪ Ground Floor	No.	55		
	▪ First Floor	No.	12		
	▪ Second Floor	No.	89		
Total Carried Forward to next page					

Item	Description	Unit	Qty		KShs.
K.	RJ45 point wired to Nurse Call points complete with necessary termination kits (wiring already included in item A above): <ul style="list-style-type: none"> ▪ Ground Floor ▪ First Floor ▪ Second Floor 	No. No. No.	105 80 101		
E.	Twin outlet CAT 6 CT coupler shuttered with blue and red icons complete with gang horizontal plastic face plate for Master Clock Points: <ul style="list-style-type: none"> ▪ Basement ▪ Ground Floor ▪ First Floor ▪ Second Floor 	No. No. No. No.	20 64 44 27		
F.	Twin outlet CAT 6 CT coupler shuttered with blue and red icons complete with gang horizontal plastic face plate for BMS Points: <ul style="list-style-type: none"> ▪ Basement ▪ Ground Floor ▪ First Floor ▪ Second Floor 	No. No. No. No.	21 11 18 5		
Total Carried Forward to Main Summary of Prices					

SECTION D.W. 3.0 TITLE: HORIZONTAL CABLING

Item	Description	Unit	Qty		KShs.
D.W. 3.3	Horizontal Cabling - Con't				
A.	RJ45 point wired to CCTV points complete with necessary termination kits (wiring already included in item A above): <ul style="list-style-type: none"> ▪ Basement ▪ Ground Floor ▪ First Floor ▪ Second Floor 	No. No. No. No.	38 55 65 31		
B.	Twin outlet CAT 6 CT coupler shuttered with blue and red icons complete with gang horizontal plastic face plate for Public Address System Points: <ul style="list-style-type: none"> ▪ Basement ▪ Ground Floor ▪ First Floor ▪ Second Floor 	No. No. No. No.	62 86 62 42		
C.	RJ45 point wired to Access Control points complete with necessary termination kits (wiring already included in item A above): <ul style="list-style-type: none"> ▪ Basement ▪ Ground Floor ▪ First Floor ▪ Second Floor 	No. No. No. No.	5 24 10 7		
D.	Twin outlet CAT 6 CT coupler shuttered with blue and red icons complete with gang horizontal plastic face plate for Wireless Access Points: <ul style="list-style-type: none"> ▪ Basement ▪ Ground Floor ▪ First Floor ▪ Second Floor 	No. No. No. No.	4 8 7 7		

Total Carried Forward to next page

Item	Description	Unit	Qty		KShs.
E.	Pulling of above Cables.	Sum			
F.	Termination and testing of above cables.	Sum			
G.	Labelling both patch cords and outlets.	Sum			
H.	Documentation and certification.	Sum			
I.	Any other item to complete the installation in this section [Please state].	Sum			

Total Carried Forward to Main Summary of Prices

SECTION D.W. 4.0 TITLE: ACTIVE EQUIPMENT

Item	Description	Unit	Qty		KShs.
<p>D.W. 4.1 A.</p>	<p>Active Equipment</p> <p>Supply and installation of 4500 Series Cisco core Switch as Supervisor 9E or approved equivalent with SDN Readiness, LISP Readiness, Native Wireless Controller Support and the associated management software with total redundancy.</p> <ul style="list-style-type: none"> ▪ Cat 4500 E-Series 10-Slot Chassis, fan, no ps ▪ Catalyst 4500 1000W Hot Swappable AC Power Supply ▪ BS-1363 to IEC-C19 14ft Uk ▪ Catalyst 4500 E-Series Sup 6-E Lite ▪ Catalyst 4500 E-Series 48 -Port GE (SFP) ▪ Cisco StackWise technology to provide scalability and resiliency with 480 Gbps of stack throughput ▪ Cisco Stack Power technology ▪ Dual redundant, modular power supplies and three modular fans ▪ SFPs, ODEs etc 	No.	1		
B.	<p>Supply and Installation of 48 port auto sensing POE switch compatible with CAT 6 systems complete as Cisco 3850 Series or approved equivalent with copper cable connectors.</p> <ul style="list-style-type: none"> ▪ 48 10/100/1000 Mbps data PoE+ models ▪ Five optional uplink modules with 4 x GE, 2 x 10 GE, 4 x 10 GE, 8 x 10 GE or 2 x 40 GE QSFP+ ports ▪ Cisco Stack Power technology ▪ Dual redundant, modular power supplies and three modular fans 	No.	3		
	▪ Basement	No.	6		
	▪ Ground Floor	No.	8		
	▪ First Floor	No.	7		
	▪ Second Floor	No.			
Total Carried Forward to next page					

Item	Description	Unit	Qty		KShs.
C.	48 Port Patch Panel compatible with CAT 6 systems as follows:	No.	24		
D.	IP Based Wireless access Point as Cisco Aironet 3800i AP or approved equivalent	No.	28		
E.	Any other item necessary to complete the Installation (Please state).	Sum			
F.	All Active equipment shall carry minimum 2year warranty on parts and labour.				
Total carried forward to Main Summary of Prices					

SECTION D.W. 5.0 TITLE: ACTIVE EQUIPMENT - IPTV HEADEND

Item	Description	Unit	Qty		KShs.
<p>D.W. 5.1 A.</p>	<p>Active Equipment - IPTV Headend</p> <p>Allow for Supply, installation, test and commission of Cisco DCM Series 9902-Digital Content Manager headend switch or approved equivalent complete with a least 300 licenses and the associated management software with total redundancy and transcoder cards to support advanced video processing functions.</p> <ul style="list-style-type: none"> ▪ 1no. Transcoder Card ▪ 1no. Satellite Input and CI decryption Card ▪ 1no. 8-VSB Input Card ▪ SFP Plug-ins – CWDM types ▪ SFP Plug-ins – 1000 BT copper ▪ SFP+ Optical Plug-ins (Note 2) ▪ Video SFP Plug-ins ▪ SFP+ Electrical Plug-ins All Class 1 SFP plug-ins according to IEC 60825-1 <p>B. Antennas Direct - ClearStream 2V Long-Range HDTV Antenna or approved equivalent</p> <p>C. Supersonic - Outdoor HDTV Antenna for digital free to air channels or approved equivalent</p> <p>D. Allow provision for TV contents services (At least two subscribed provider for redandancy and exclusive locally available Free to Air Channels) as per client's preference</p> <p>E. Allow for programing, testing, and documentation</p> <p>F. Any other item necessary to complete the Installation (Please state).</p>	<p>No.</p> <p>No.</p> <p>No.</p> <p>Sum</p> <p>Sum</p> <p>Sum</p>	<p>1</p> <p>1</p> <p>1</p> <p></p> <p></p> <p></p>		

Total carried forward to Main Summary of Prices

SECTION D. W. 6.0 - IP TELEPHONY

Item	Description	Unit	Qty	Rate	KShs.
D.W. 6.0	IP Telephony Allow for supply, Installation, testing, configuration & Commissioning of the following items complete as specified:				
A.	Unified Communication Server as Cisco Business Edition 6000 or approved equivalent complete with expansion/legacy cards and associated accessories to complete the installation	No.	1		
B.	GSM routers	Sum			
C.	IP phone operator Console	No.	1		
D.	IP Phones as Cisco IP Phone 8865 or approved Equivalent	No.	16		
E.	IP Phones as Cisco IP Phone 8851 or approved Equivalent	No.	25		
F.	IP Phones as Cisco IP Phone 8845 or approved Equivalent				
	▪ Basement	No.	13		
	▪ Ground Floor	No.	61		
	▪ First Floor	No.	34		
	▪ Second Floor	No.	29		
G.	Wireless Phone	No.	5		
H.	Termination and testing of above system.				
I.	Labelling of the above system.				
J.	Documentation and certification.				
K.	Any other item necessary to complete the installation in this section	sum			
L.	Any other item necessary to complete the installation in this section	sum			

DATA & VOICE SYSTEMS INSTALLATION
MAIN SUMMARY OF PRICES

Item	Description	Unit	Qty	Rate	KShs.
D.W.1	SECTION 1 Preliminaries & Contractual Requirements				
D.W.2	SECTION 2 Backbone Cabling.				
D.W.3	SECTION 3 Horizontal/Internal Cabling				
D.W.4	SECTION 4 Active Equipment				
D.W.5	SECTION 5 Active Equipment - IPTV Headend				
D.W.6	SECTION 6 IP Telephony System Installation				
	Sub - Total				

Total Carried Forward to Main Summary of Volume I

7.1

Documentation Requirements

Document	With Bid	Before Manufacture	During FAT	Upon Delivery
Preliminary general arrangement drawing (with dimensions)	YES			
QA / QC Plan in accordance with ISO 9001:2008		YES		
General arrangement drawing (with dimensions)		YES		
Schematics/Line diagrams for construction	N/A	YES	N/A	N/A
Recommended Spares List	N/A	N/A	N/A	YES
Routine Test Reports / Certificates			YES	
Type Test Reports / Certificates	N/A	N/A	YES	N/A
Commissioning Procedure	N/A	N/A	N/A	YES
As-built General arrangement drawing			YES	
As-built Schematics			YES	
Site Test Reports / Certificates				YES
Special Test Reports / Certificates	N/A	N/A	YES	NO

7.2**Technical Schedule**

The tenderer **MUST SUBMIT** comprehensive manufacturer's technical brochures and performance details for all items listed in this schedule (fill forms attached).

ITEM No.	Description	Remarks
A	UTP Cables	
B	Fiber cables	
C	Data Cabinets	
D	Active Devices	
E	Telecommunication modules	
F	IPTV Headed Switch	
G	IP PBX Server	
H	Telephony Devices	

PART H:
DRAWING SCHEDULE

8

PART E: DRAWING SCHEDULE

8.1

DRAWING SCHEDULE:

As shall be provided during tender process