

VOLUME 4 of 6

STRUCTURED CABLING AND IP PBX, INSTALLATION WORKS

PROPOSED OFFICE SPACE AT NSSF ANNEX HOUSE 10TH FLOOR FOR
PRIVATISATION COMMISSION

W. P. ITEM No. D107 NB/NB/1902 JOB No. 10759 A

*TENDER SPECIFICATIONS AND BILLS OF
QUANTITIES FOR SUPPLY, INSTALLATION, TESTING
AND COMMISSIONING OF STRUCTURED CABLING
AND IP-PBX, INSTALLATION WORKS*

SEPTEMBER, 2020

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NOTE:

TENDER EVALUATION CRITERIA

***The tenderer who shall be domestic subcontractor to the Main Contractor upon award of the tender.
Tenders to refer to the evaluation criteria provided in volume 1 of the tender.***

SECTION B

GENERAL SPECIFICATIONS

OF

MATERIALS AND WORKS

GENERAL SPECIFICATIONS OF MATERIALS AND WORKS

1. General
2. Standard of Materials
3. Workmanship
4. Procurement of Materials
5. Record Drawings
6. Regulations and Standards
7. Setting out Works
8. Testing on Site

1. GENERAL

- 1.1. This specification is to be read in conjunction with any other information herein issued with it. Bills of quantities and schedule of unit rates shall be the basis of all additions and omissions during the progress of the works.

2. STANDARD OF MATERIALS

- 2.1. Where the material and equipment are specifically described and named in the Specification followed by approved equal, they are so named or described for the purpose of establishing a standard to which the contractor shall adhere.
- 2.2. Should the contractor install any material not specified herein before receiving approval from the proper authorities, the Engineer shall direct the contractor to remove the material in question immediately. The fact that this material has been installed shall have no bearing or influence on the decision by the Engineer.
- 2.3. All materials condemned by the Engineer as not approved for use, are to be removed from the premises and suitable materials delivered and installed in their place at the expense of the Contractor. All materials required for the works shall be from branded manufacturers, and shall be new and the best of the respective kind and shall be of a uniform pattern.

3. WORKMANSHIP

- 3.1. The workmanship and method of installation shall conform to the best standard practice. All work shall be performed by a skilled tradesman and to the satisfaction of the Engineer. Helpers shall have qualified supervision.
- 3.2. Any work that does not in the opinion of the Engineer conform to the best standard practice will be removed and reinstated at the contractor's expense.
- 3.3. Permits, Certificates or Licences must be held by all tradesmen for the type of work; in which they are involved where such permits, certificates or licences exist under Government legislation.

4. PROCUREMENT OF MATERIALS

- 4.1. The contractor is advised that no assistance can be given in the procurement or allotment of any materials or products to be used in and necessary for the construction and completion of the work.
- 4.2. Contractors are warned that they must make their own arrangements for the supply of materials and/or products specified or required.

5. RECORD DRAWINGS

- 5.1. These diagrams and drawings shall show the completed installation including sizes, runs and arrangements of the installation. The drawings shall be to scale not less than 1:50 and shall include plan views and section.
- 5.2. The drawings shall include all the details which may be useful in the operation, maintenance or subsequent modifications or extensions to the installation.
- 5.3. Three sets of diagrams and drawings shall be provided, all to the approval of the Engineer.
- 5.4. One coloured set of line diagrams relating to operating and maintenance instructions shall be framed and, mounted in a suitable location.

6. REGULATIONS AND STANDARDS

- 6.1. All work executed by the contractor shall comply with the current edition of the “Regulations” for the Electrical Equipment of Buildings, issued by the Institution of Electrical Engineers, Electric Power Act, Kenya Bureau of Standards (KeBS), Institution of Electrical Engineers (I.E.E) Wiring Regulations, Current recommendation of CCITT and CCIR, and with the Regulations of the Local Electricity Authority and the Communications Authority of Kenya (CAK)
- 6.2. Where the sets of regulations appear to conflict, they shall be clarified with the Engineer.

7. SETTING OUT WORK

- 7.1. The contractor, at his own expenses, is to set out works and take all measurements and dimensions required for the erection of his materials on site; making any modifications in details as may be found necessary during the progress of the works, submitting any such modifications or alterations in detail to the Engineer before proceeding and must allow in his tender for all such modifications and for the provision of any such sketches or drawings related thereto.

8. TESTING ON SITE

- 8.1. The contractor shall conduct during and at the completion of the installation and, if required, again at the expiration of the maintenance period, tests in accordance with the relevant section of the current edition of the Regulations for the electrical equipment of buildings issued by the I.E.E of Great Britain, the Government Electrical Specifications No. 1 and No.2, Electric Supply Company’s By-Laws, Communications Authority of Kenya (CAK) requirements or any other supplementary Regulations as may be produced by the engineer.
- 8.2. Any faults, defects or omissions or faulty workmanship, incorrectly positioned or installed parts of the installation shall be rectified by the contractor at his own expense.

SECTION C

SCHEDULE OF CONTRACT DRAWINGS

SCHEDULE OF CONTRACT DRAWINGS

DRAWING NO.	DRAWING TITLE
As shall be issued by the Engineer	

NOTE:

Tenderers are advised to inspect the electrical drawings at the office of the **Chief Engineer (Electrical) – Ministry of Transport, Infrastructure, Housing & Urban Development, State Department of Public Works**, at Chief Engineer's (Electrical) office, Hill Plaza Building, Community area, Nairobi along Ngong road, during normal working hours.

The drawings shall however be availed, on award of the tender, to the domestic sub-contractor.

SECTION D

PARTICULAR AND TECHNICAL SPECIFICATIONS

OF

MATERIALS AND WORKS

PARTICULAR AND TECHNICAL SPECIFICATIONS OF MATERIALS AND WORKS
FOR STRUCTURED CABLING WORKS

TELECOMMUNICATIONS DISTRIBUTION SYSTEM – STRUCTURED CABLING

PART 1/1

A. GENERAL TECHNICAL SPECIFICATIONS

- a. Section Includes: Equipment, materials, labor, and services to provide telephone and data distribution system including but not limited to:
 1. Telephone and data cabling terminations
 2. Optical fiber and terminations
 3. Data/voice outlets
 4. Terminal blocks/cross-connect systems
 5. Equipment racks and cabinets
 6. System testing
 7. Documentation and submissions
 8. Surface trunking, cable ladder
 9. Core switch, edge switches
- b. Provide all equipment, materials, labor, and services, not specifically mentioned or shown, which may be necessary to complete or perfect all parts of the installation. Ensure that they are in compliance with requirements stated or reasonably inferred by the contract documents.

1. REFERENCES

- a. Design, manufacture, test, and install telecommunications cabling networks per manufacturer's requirements and in accordance with NFPA-70 (*National Electrical Code®*)/IEE Regulations, state codes, local codes, requirements of authorities having jurisdiction, and particularly the following standards: ANSI/NECA/BICSI-568 -- Standard for Installing Commercial Building Telecommunications Cabling ANSI/TIA/EIA Standards.
 - 1) *ANSI/TIA/EIA-568-B.1 -- Commercial Building Telecommunications Cabling Standard, Part 1: General Requirements*
 - 2) *ANSI/TIA/EIA-568-B.2 -- Commercial Building Telecommunications Cabling Standard, Part 2: Balanced Twisted Pair Cabling Components*
 - 3) *ANSI/TIA/EIA-568-B.3 -- Optical Fiber Cabling Components Standard*
 - 4) *ANSI/TIA/EIA-569-A -- Commercial Building Standard for Telecommunications Pathways and Spaces*
 - 5) *ANSI/TIA/EIA-606(A) -- The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings*
 - 6) *ANSI/TIA/EIA-607(A) -- Commercial Building Grounding and Bonding Requirements for Telecommunications*

- 7) *ANSI/TIA/EIA-526-7 -- Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant*
- 8) *ANSI/TIA/EIA-526-14A -- Measurement of Optical Power Loss of Installed Multimode Fiber Cable Plant*
- (9) *ANSI/TIA/EIA-758(A) -- Customer-Owned Outside Plant Telecommunications Cabling Standard*
- (10) *ISO/IEC 1101 Amendment 2*

b. Local codes, rules, regulations, and ordinances governing the work, are as fully part of the specifications as if herein repeated or hereto attached. If the contractor should note items in the drawings or the specifications, construction of which would be code violations, promptly call them to the attention of the Project Manager in writing. Where the requirements of other sections of the specifications are more stringent than applicable codes, rules, regulations, and ordinances, the specifications shall apply.

1. PERMITS, FEES, AND CERTIFICATES OF APPROVAL

- a. The Contractor to include the cost of application and pay for building permit.
- b. As prerequisite to final acceptance, supply to the client certificates of inspection from an inspection agency acceptable to the owner and approved by local municipality and utility company serving the Project Manager.

2. SYSTEM DESCRIPTION

- a. A telecommunications cabling system generally consists of one telecommunications outlet in each workstation, wall telephones in common and power socket outlet.
 - b. The typical work area consists of a single-gang plate with two standards compliant work area outlets.
 - c. One work area outlet consists of one (1) four-pair data Category 6 cable or above, installed from work area outlet to the data cabinet. Terminate data cables on modular patch panels located in the appropriate data cabinet.
 - d. One work area outlet consists of one (1) four-pair screened (ScTP) cable installed from work area outlet to the data termination rack in the cabinet. Terminate data cables on rack mounted modular patch panels.
- 2.1 Vertical/horizontal copper backbone cabling consists of multiple pair unshielded twisted-pair installed from the main cross-connect (MC) to the horizontal cross-connect (HC) and/or from the MC to the intermediate cross-connect (IC) to the HC.
- 2.2 Vertical/horizontal backbone cabling consists of 62.5/125 μm multimode optical fiber cable installed from the MC to the HC and/or from the MC to the IC to the HC.
- 2.3 Vertical/horizontal backbone cabling consists of 50/125 μm multimode optical fiber cable installed from the MC to the HC and/or from the MC to the IC to the HC. *Specification Note: State what this backbone will be utilized for. Examples are voice telecommunications service, premises switching equipment, data communications, etc.*

3. SUBMITTALS

- a. Submit to the P.M shop drawings, product data (including cut sheets and catalog information), and samples required by the contract documents. Submit shop drawings, product data, and samples with such promptness and in such sequence as to cause no delay in the work or in the activities of separate contractors. The engineer will indicate approval of shop drawings, product data, and samples submitted to the engineer by stamping such submittals "APPROVED" with a stamp. Submitted shop drawings shall be initialed or signed by the contractor, showing the date and the contractor's legitimate firm name.

1) By submitting shop drawings, product data, and samples, the contractor represents that he or she has carefully reviewed and verified materials, quantities, field measurements, and field construction criteria related thereto. It also represents that the contractor has checked, coordinated, and verified that information contained within shop drawings, product data, and samples conform to the requirements of the work and of the contract documents. The engineer/designer remains responsible for the design concept expressed in the contract documents as defined herein.

2) The P.M approval of shop drawings, product data, and samples submitted by the contractor shall not relieve the contractor of responsibility for deviations from requirements of the contract documents, unless the contractor has specifically informed the engineer/designer in writing of such deviation at time of submittal, and the engineer/designer has given written approval of the specific deviation. The contractor shall continue to be responsible for deviations from requirements of the contract documents not specifically noted by the contractor in writing, and specifically approved by the engineer in writing.

3) The P.M approval of shop drawings, product data, and samples shall not relieve the contractor of responsibility for errors or omissions in such shop drawings, product data, and samples.

4) The P.M review and approval, or other appropriate action upon shop drawings, product data, and samples, is for the limited purpose of checking for conformance with information given and design concept expressed in the contract documents. The engineer's review of such submittals is not conducted for the purpose of determining accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the contractor as required by the contract documents.

The review shall not constitute approval of safety precautions or of construction means, methods, techniques, sequences, or procedures. The P.M approval of a specific item shall not indicate approval of an assembly of which the item is a component.

b. Shop drawings: Submit the following:

Coordinate with Part 2.

- 1) *Backbone (riser) diagrams*
- 2) *System block diagram, indicating interconnection between system components and subsystems*
- 3) *Interface requirements, including connector types and pin-outs, to external systems and systems or components not supplied by the contractor*
- 4) *Fabrication drawings for custom-built equipment*

c. Product Data -- Provide catalog cut sheets and information for the following:

Coordinate with Part 2.

- 1) *Wire, cable, and optical fiber*
- 2) *Outlets, jacks, faceplates, and connectors*
- 3) *All metallic and nonmetallic raceways, including surface raceways, outlet boxes, and fittings*
- 4) *Terminal blocks and patch panels*
- 5) *Enclosures, racks, and equipment housings*
- 6) *Over-voltage protectors*
- 7) *Splice housings*

d. Samples-- Submit samples as required by the Engineer.

e. Project record drawings:

1) Submit project record drawings at conclusion of the project and include:

- (a) *Approved shop drawings.*
- (b) *Plan drawings indicating locations and identification of work area outlets, nodes, data cabinet rooms, and backbone (riser) cable runs.*
- (c) *Cross-connect schedules including entrance point, main cross-connects, intermediate cross-connects, and horizontal cross-connects.*
- (d) *Labeling and administration documentation.*
- (e) *Warranty documents for equipment.*
- (f) *Copper certification test result printouts and diskettes.*
- (g) *Optical fiber power meter/light source test results.*
- (h) *Operation and maintenance manuals:*

4. QUALITY ASSURANCE

1.1 The contractor shall have worked satisfactorily for a minimum of five (5) years on systems of this type and size.

1.2 Upon request by the P.M, furnish a list of references with specific information regarding type of project and involvement in providing of equipment and systems.

- 1.3 Equipment and materials of the type for which there are independent standard testing requirements, listings, and labels, shall be listed and labeled by the independent testing laboratory.
- 1.4 Where equipment and materials have industry certification, labels, or standards (i.e., NEMA - National Electrical Manufacturers Association), this equipment shall be labeled as certified or complying with standards.
- 1.5 Material and equipment shall be new, and conform to grade, quality, and standards specified. Equipment and materials of the same type shall be a product of the same manufacturer throughout.
- 1.6 Subcontractors shall assume all rights and obligations toward the contractor that the contractor assumes toward the client and P.M.

5. WARRANTY

- 5.1 Unless otherwise specified, unconditionally guarantee in writing the materials, equipment, and workmanship for a period of not less than fifteen (15) years from date of commissioning of the project for active components.
- 5.2 Transfer manufacturer's warranties to the owner in addition to the General System Guarantee. Submit these warranties on each item in list form with shop drawings. Detail specific parts within equipment that are subject to separate conditional warranty. Warranty proprietary equipment and systems involved in this contract during the guarantee period. Final payment shall not relieve you of these obligations.

6. DELIVERY, STORAGE, AND HANDLING

- 6.1 Protect equipment during transit, storage, and handling to prevent damage, theft, soiling, and misalignment. Coordinate with the client for secure storage of equipment and materials. Do not store equipment where conditions fall outside manufacturer's recommendations for environmental conditions. Do not install damaged equipment; remove from site and replace damaged equipment with new equipment.

7. SEQUENCE AND SCHEDULING

- 7.1 Submit schedule for installation of equipment and cabling. Indicate delivery, installation, and testing for conformance to specific job completion dates. As a minimum, dates are to be provided for bid award, installation start date, completion of station cabling, completion of riser cabling, completion of testing and labeling, cutover, completion of the final punch list, start of demolition, owner acceptance, and demolition completion.

8. USE OF THE SITE

- 8.1 Access to building wherein the work is performed shall be as directed by the P.M. The client will occupy the premises during the entire period of construction for conducting his or her normal business operations. Cooperate with the client to minimize conflict and to facilitate the owner's operations.

Schedule necessary shutdowns of plant services with the main contractor, and obtain written permission from the client.

Proceed with the work without interfering with ordinary use of streets, aisles, passages, exits, and operations of the client.

PART 2/1 - PRODUCTS

1. MANUFACTURERS

Provide products of manufacturers as named in individual articles. Where no manufacturer is specified, provide products of manufacturers in compliance with requirements.

2. FABRICATION

Fabricate custom-made equipment with careful consideration given to aesthetic, technical, and functional aspects of equipment and its installation.

3. SUITABILITY

Provide products that are suitable for intended use, including, but not limited to environmental, regulatory, and electrical.

4. VOICE/DATA TELECOMMUNICATIONS SERVICE BACKBONE CABLE

a. Solid copper, 24 AWG, 100 Ω balanced twisted-pair (UTP) backbone cable, with mechanical and transmission performance specifications that meet or exceed ANSI/TIA/EIA-568-B.2

b. Multimode 62.5/125 μm diameter tight-buffered optical fiber, with fiber counts as indicated on drawings, with mechanical and transmission performance specifications that meet or exceed ANSI/TIA/EIA-568-B.3

5. VOICE TELECOMMUNICATIONS STATION CABLE

a. Solid copper, 24 AWG, 100 Ω balanced twisted-pair (UTP) Category 6e cables with four individually twisted-pairs, which meet or exceed the mechanical and transmission performance specifications in ANSI/TIA/EIA-568-B.2 up to 100 MHz.

6. DATA STATION CABLE (Copper)

a. Solid copper, 24 AWG, 100 Ω balanced twisted-pair (UTP) Category 6e cables with four individually twisted-pairs, which meet or exceed the mechanical and transmission performance specifications in ANSI/TIA/EIA-568-B.2 up to 100 MHz.

b. Solid copper, 24 AWG, 100 Ω balanced twisted-pair, screened (ScTP) cables with four individually twisted-pairs, which meet or exceed the mechanical and transmission performance specifications in ANSI/TIA/EIA-568-B.2 (Annex K) up to 100 MHz.

7. DATA STATION CABLE (Optical Fiber)

a. Multimode 62.5/125 μm diameter tight-buffered optical fiber, with the required number of fiber counts, with mechanical and transmission performance specifications that meet or exceed ANSI/TIA/EIA-568-B.3

8. UNDERGROUND TELECOMMUNICATIONS CABLE (Copper)

If you have copper cables installed outside between buildings, be certain to specify overvoltage protectors on both ends of the cable. See article, **OVERVOLTAGE PROTECTORS**.

Solid copper, 24 AWG 100 Ω balanced twisted-pair, gel-filled duct cable, in sizes as indicated on the drawings, which meet or exceed the mechanical and transmission performance specifications listed in ANSI/TIA/EIA-568-B.2 and ANSI/TIA/EIA-758(A).

9. UNDERGROUND TELECOMMUNICATIONS CABLE (Optical Fiber)

Single mode 8.7 μm to 10 μm diameter, armored, gel-filled optical fiber, with number of usable fibers as shown on drawings, which meet or exceed the mechanical and transmission performance specifications listed in ANSI/TIA/EIA-568-B.3 and ANSI/TIA/EIA-758(A).

10. VOICE/DATA – COPPER & OPTICAL FIBER WORK AREA OUTLETS

Edit for items that will actually be used on the project.

Pick a color for the faceplate and each type of jack, or make them all one color.

Determine which pinning standard is to be used, T568A, T568B, or USOC. If not otherwise specified, specify T568A. Use either 10c with SC connectors or 10d (1) for ST connectors. SC connectors are preferred. Use ST connectors to match existing cable plant if required.

Single-gang mounting plate with two (2) openings containing the following devices:

- a. Data Outlet - 8-pin modular, category 6e, unkeyed, black, pinned to either T568 (A or B) standards.
- b. Optical Fiber Connectors – simplex ST - ST adapter.
Provide two optical fiber adapters for each faceplate

11. VOICE/DATA WORK AREA OUTLETS (Copper only)

Single-gang mounting plate with four (4) openings containing the following devices:

Data Outlet - 8-pin modular, Category 6e, unkeyed, black, pinned to either T568 (A or B) standards.

12. VOICE ONLY WORK AREA OUTLET

Single-gang faceplate with 8-pin modular, category 6e, unkeyed, ivory telephone jack, pinned to either T568 (A or B) standards

13. TERMINATION BLOCKS

For items that will actually be used on the project: Coordinate with MC, IC and HC layout drawing.

- a. Product(s) as approved by the P.M: Wiring blocks are to be in following configurations:
 - 1) List dimensional configurations
 - 2) ER – List pairs categorized for PBX portion of ER and pairs field terminated for backbone and CO portion of ER

Provide wiring troughs between ER frame sections.

14. PATCH PANELS

Specification Note: Alter quantities to match job requirements.

19 in. rack mountable, 24-port 8-pin modular to insulation displacement connector (IDC) meeting Category 6e performance standards, and pinned to either T568 (A or B) standards. Typical examples of IDC connections are the 110, BIX, and Krone.

15. WALL MOUNTED OPTICAL FIBER PATCH PANELS

Specification Note: Alter quantities to match job requirements

Wall-mounted optical fiber termination panel with 12-fiber capacity, hinged door, cable strain relief, slack storage, and two 6-port SC or approved alternative connector panels with adapters and provisions for two splice trays.

16. RACK MOUNTED OPTICAL FIBER TERMINATION PANEL

Specification Note: Alter size to match job requirements. Coordinate with connector type.

19 in. rack mounted 72-port rack-mounted optical fiber termination panel with cable strain relief, grounding lugs, slack storage and three 12-port duplex SC or approved alternative connector panels with adapters and provisions for six (6) splice trays.

17. *SPLICE TRAYS*

Sized for single mode and multimode fibers, nonmetallic with clear plastic cover, 12-fiber splice capacity, compatible with splice enclosure and splicing method.

18. OPTICAL FIBER CONNECTORS

Ceramic tipped field installed 568SC connectors, which meet or exceed the performance specifications in ANSI/TIA/EIA-568-B.3. Various alternative field installed connector designs, which meet or exceed the performance specifications in ANSI/TIA/EIA-568-B.3 (Annex A).

19. OPTICAL FIBER JUMPERS

Dual 62.5/125- μm (*and/or single mode*) optical fiber jumper cable, 1 m long with 3.0 mm Duplex 568SC optical fiber connectors on each end.

Dual 62.5/125- μm (*and/or single mode*) optical fiber jumper cable, 1 m long with approved alternative duplex optical fiber connectors on each end.

20. OPTICAL FIBER PIGTAILS

62.5/125 μm (*and/or single mode*) optical fiber pigtail 1 m long with 3.0 mm single 568 SC optical fiber connectors on one end

21. OPEN FRAME EQUIPMENT RACK

Open frame, 19 in. equipment rack, 7 foot 6 in. overall height with flange base, mounting rails drilled front and back and tapped to EIA standards, and a front-rack mountable 10 outlet multiple outlet electrical strip or 42u enclosed glazed.

22. EQUIPMENT RACKS/CABINETS

Specification Note: Use 19 in. or change to 23 in. as required. If using wall-mounted racks or cabinets, add required specifications here. Add and delete features as required.

a. The 19 in. equipment rack shall have the following minimum requirements:

- 77 in. (44 rack spaces) of panel space
- Welded frame construction
- Locking front and rear doors
- Adjustable front and back equipment mounting rails drilled and tapped to EIA standards
- 10 position electrical outlet strip
- Removable side panels
- Top mounted, thermostatically controlled exhaust fan
- Smoked acrylic front door.

23. LISTED BUILDING ENTRANCE PROTECTORS

Use when copper cables are run outside of building.

Use appropriate protector modules.

Building entrance terminal utilizing a two (2) foot fuse link between the outside cable plant splice and the protector module with IDC type input and output terminals, 100-pair capacity and female mounting base, equipped with 230 volt solid state protector modules. Provide sufficient protector modules to completely populate all building entrance terminals.

24. SPLICE HOUSING

Use this or something else. Delete splice modules if used for optical fiber cables.

- a. Encapsulated, re-enterable splice housing, sized as required with bonding straps, accessories, end caps and encapsulant as required
- b. Splice modules (such as 710 series or MS²) for use within splice housing

25. SPARES

Change quantities to suit job size. Edit to match that which is actually specified.

a. Furnish the following spare equipment and parts:

Terminal block connectors, if required

Test set cords, if required

Install one test cord set in each telecommunications closet

Five (5) percent of base bid quantity of each type of jack shall be provided

Five (5) percent of base bid quantity of each type of outlet

Five thousand (5000) ft of each type of station cable

One thousand (1000) ft of one-pair cross-connect wire for each telecommunications closet

One thousand (1000) ft of two-pair cross-connect wire for each telecommunications closet

Five (5) percent of base bid quantity of protector modules

EXECUTION

1. PRE-INSTALLATION SITE SURVEY

a. Prior to start of systems installation, meet at the project site with the P.M and representatives of trades performing related work to coordinate efforts. Review areas of potential interference and resolve conflicts before proceeding with the work. Facilitation with the Client will be necessary to plan the crucial scheduled completions of the equipment room and telecommunications closets.

b. Examine areas and conditions under which the system is to be installed. Do not proceed with the work until satisfactory conditions have been achieved.

2. HANDLING AND PROTECTION OF EQUIPMENT AND MATERIALS

a. Be responsible for safekeeping of your own, such as equipment and materials, on the job site. The client assumes no responsibility for protection of above named property against fire, theft, and environmental conditions.

3. PROTECTION OF OWNER'S FACILITIES

a. Effectively protect the client's facilities, equipment, and materials from dust, dirt, and damage during construction.

b. Remove protection at completion of the work.

4. INSTALLATION

Receive, check, unload, handle, store, and adequately protect equipment and materials to be installed as part of the contract. Store in areas as directed by the owner's representative. Include delivery, unloading, setting in place, fastening to walls, floors, ceilings, or other structures where required, interconnecting wiring of system components, equipment alignment and adjustment, and other related work whether or not expressly defined herein.

Install materials and equipment in accordance with applicable standards, codes, requirements, and recommendations of national, state, and local authorities having jurisdiction, and *National Electrical Code®* (NEC) and with manufacturer's printed instructions.

Adhere to manufacturer's published specifications for pulling tension, minimum bend radii, and sidewall pressure when installing cables.

- 1) Where manufacturer does not provide bending radii information, minimum-bending radius shall be 15 times cable diameter. Arrange and mount equipment and materials in a manner acceptable to the P.M and the client.
 - e. Penetrations through floor and fire-rated walls shall utilize intermediate metallic conduit (IMC) or galvanized rigid conduit (GRC) sleeves and shall be fire stopped after installation and testing, utilizing a fire stopping assembly approved for that application.
 - f. Install station cabling to the nearest telecommunications room (TR), unless otherwise noted.
 - g. Installation shall conform to the following basic guidelines:
 - 1) Use of approved wire, cable, and wiring devices
 - 2) Neat and uncluttered wire termination
 - h. Attach cables to permanent structure with suitable attachments at intervals of 1200-1500mm. Support cables installed above removable ceilings.
 - i. Install adequate support structures for 10 foot of service slack at each TR.
 - j. Support riser cables every floor and at top of run with cable grips.
 - 1) Limit number of four-pair data riser cables per grip to fifty (50)
 - k. Install cables in one continuous piece. Splices shall not be allowed except as indicated on the drawings or noted below:
 - l. Provide over voltage protection on both ends of cabling exposed to lightning or accidental contact with power conductors.

Specification Note: *Insert any other specific installation requirements here, such as hook and latch fasteners instead of cable ties, etc.*

5. GROUNDING

Edit as required.

- a. Grounding shall conform to ANSI/TIA/EIA 607(A) - *Commercial Building Grounding and Bonding Requirements for Telecommunications, National Electrical Code®*, ANSI/NECA/BICSI-568 and manufacturer's grounding requirements as minimum.
- b. Bond and ground equipment racks, housings, messenger cables, and raceways.
- c. Connect cabinets, racks, and frames to single-point ground which is connected to building ground system via #6 AWG green insulated copper grounding conductor.

6. LABELING

Use 6d if the type of termination block permits labels. Otherwise use 6e.

Use 6g if the owner does not have a standard for outlet numbering.

Use 6h if required. Alter time as requested.

Labeling shall conform to ANSI/TIA/EIA-606(A) standards. In addition, provide the following:

- a. Label each outlet with permanent self-adhesive label with minimum 3/16 in. high characters.
- b. Label each cable with permanent self-adhesive label with minimum, 1/8 in. high characters, in the following locations:
 - 1) Inside receptacle box at the work area.
 - 2) Behind the communication closet patch panel or punch block.
- c. Use labels on face of data patch panels. Provide facility assignment records in a protective cover at each telecommunications closet location that is specific to the facilities terminated therein.
- d. Use color-coded labels for each termination field that conforms to ANSI/TIA/EIA-606(A) standard color codes for termination blocks.
- e. Mount termination blocks on color-coded backboards.
- f. Labels shall be machine-printed. Hand-lettered labels shall not be acceptable.
- g. Label cables, outlets, patch panels, and punch blocks with room number in which outlet is located, followed by a single letter suffix to indicate particular outlet within room, i.e., S2107A, S2107B. Indicate riser cables by an R then pair or cable number.
- h. Mark up floor plans showing outlet locations, type, and cable marking of cables. Turn these drawings over to the owner two (2) weeks prior to move in to allow the owner's personnel to connect and test owner-provided equipment in a timely fashion.
- i. Three (3) sets of as-built drawing shall be delivered to the owner within four (4) weeks of acceptance of project by the owner. A set of as-built drawings shall be provided to the owner in magnetic media form (3.5" floppy disks) and utilizing CAD software that is acceptable to the owner. The magnetic media shall be delivered to the owner within six (6) weeks of acceptance of project by owner.

7. TESTING

Testing shall conform to ANSI/TIA/EIA-568-B.1 standard. Testing shall be accomplished using level IIe or higher field testers.

Test each pair and shield of each cable for opens, shorts, grounds, and pair reversal. Correct grounded, and reversed pairs. Examine open and shorted pairs to determine if problem is caused by improper termination. If termination is proper, tag bad pairs at both ends and note on termination sheets.

- 1) Perform testing of copper cables with tester meeting ANSI/TIA/EIA-568-B.1 requirements.
- 2) If copper backbone cable contains more than one (1) percent bad pairs, remove and replace entire cable.

Use 2 or 3 as required.

- 3) If copper cables contain more than the following quantity of bad pairs, or if outer sheath damage is cause of bad pairs, remove and replace the entire cable:

CABLE SIZE	MAXIMUM BAD PAIRS
<100	1
101 to 300	1 – 3
301 to 600	3 – 6
>601	6

- 4) If horizontal cable contains bad conductors or shield, remove and replace cable. Initially test optical cable with a light source and power meter utilizing procedures as stated in ANSI/TIA/EIA-526-14A: *OFSTP-14A Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant* and ANSI/TIA/EIA-526-7 *Measurement of Optical Power Loss of Installed Single mode Fiber Cable Plant*. Measured results shall be plus/minus 1 dB of submitted loss budget calculations. If loss figures are outside this range, test cable with optical time domain reflectometer to determine cause of variation. Correct improper splices and replace damaged cables at no charge to the owner.
 - 1) Cables shall be tested at 850 and 1300 nm for multimode optical fiber cables. Cables shall be tested at 1310 and 1550 nm for single mode optical fibers.
 - 2) Testing procedures shall utilize “Method B” – One jumper reference.
 - 3) Bi-directional testing of optical fibers is required.
- d. Perform optical time domain reflectometer (OTDR) testing on each fiber optic conductor. Measured results shall be plus/minus 1 dB of submitted loss budget calculations.
 - 1) Submit printout for each cable tested.
 - 2) Submit 3.5 in. disks with test results and program to view results.
- e. Where any portion of system does not meet the specifications, correct deviation and repeat applicable testing at no additional cost.

FIELD QUALITY CONTROL

- a. Employ job superintendent during the course of the installation to provide coordination of work of this specification and of other trades, and provide technical information when requested by other trades. This person shall maintain current RCDD® (Registered Communications Distribution Designer) registration and shall be responsible for quality control during installation, equipment set-up, and testing.
- b. At least 30 percent of installation personnel shall be *BICSI Registered Telecommunications Installers*. Of that number, at least 15 percent shall be registered at the *Technician Level*, at least 40 percent shall be registered at the *Installer Level 2*, and the balance shall be registered at the *Installer Level 1*.
Specification Note: Use this or insert manufacturer’s requirements for installer qualifications to meet extended warranty program requirements.
- c. Installation personnel shall meet manufacturer’s training and education requirements for implementation of extended warranty program.

B. PARTICULAR SPECIFICATIONS FOR STRUCTURED CABLING WORKS

1.0 SITE LOCATION

The site of the proposed works is located at **10th Floor, NSSF Annex House – Nairobi County**

2.0 DESCRIPTION OF THE PROJECT

The works to be carried out comprise the following;

- i) Proposed supply, installation, testing and commissioning of a structured cabling system to cater for computer data points and telephone points.
- ii) Configure and set up the structured cabling system to be used on LAN,
- iii) Produce test result, warranty certification, reports and as installed drawings. The Network will be capable of supporting approximately 280 data/voice points.
- iv) The works shall include inter-wiring, programming and activating all voice points.

3.0 REGULATIONS

The contractor shall, in execution and completion of the works in the detailed design for which he is responsible, comply with the provisions of the following as necessary and relevant;

- a) ISO/IEC, CCK, ATM CENELEC 11801
- b) ANSI/EIA/TIA 56
- c) Latest Edition of IEE Regulation
- d) Kenya Bureau of Standards
- e) Electric Power Act and Rules made there under.

4.0 WORKING DRAWINGS

The Contractor shall submit to the Project Manager working drawings for the proposed system for approval. The drawings will show the locations of and identifiers for all cable routing and terminations, telecommunication outlets/connectors. Location of core switch and Edge switches.

5.0 NETWORK CABINETS

- a) To be located on each floor in designated rooms as indicated in the electrical drawings.
- b) Must be metallic (appropriately sized as specified in the BQ) with a front clear glass, freestanding, complete with lock and key and the following accessories;
 - Cable Management channel rack
 - Cable support hooks
 - Cable support rings and straps
 - Cable duct cover
 - Feed through cable panels
 - Vented equipment shelving
 - Blank filler panels
 - Hinged wall mounted brackets
 - Glass viewing window
 - Colored Designation strips

- Management lock and key
- Cooling extractor fans
- Caster wheels
- Inbuilt 2-gang power socket outlet

6.0 ACTIVE CONTROL EQUIPMENTS

6.1 ACTIVE CONTROL EQUIPMENT: ROUTER:

The active control equipment should have the following minimum specifications:

Feature	Description
Aggregate Throughput	100 Mbps to 300 Mbps
Total onboard WAN or LAN 10/100/1000 ports	3
RJ-45-based ports	2
SFP-based ports	2
Enhanced service-module slots	1
Doublewide service-module slots	0
NIM slots	2
OIR (all I/O modules)	Yes
Onboard ISC slot	1
Default memory double-data-rate 3 (DDR3) error-correction-code (ECC) DRAM (Combined control/services/data planes)	4GB
Maximum memory DDR3 ECC DRAM (Combined control/services/data planes)	16 GB
Default memory DDR3 ECC DRAM (data plane)	NA
Maximum memory DDR3 ECC DRAM (data plane)	NA
Default memory DDR3 ECC DRAM (control/services plane)	NA
Maximum memory DDR3 ECC DRAM (control/services plane)	NA
Default flash memory	4 GB
Maximum flash memory	16 GB
External USB 2.0 slots (type A)	1
USB console port -type B mini (up to 115.2 kbps)	1
Serial console port - RJ45 (up to 115.2 kbps)	1
Serial auxiliary port - RJ45(up to 115.2 kbps)	1
Power-supply options	Internal: AC and PoE

Redundant power supply	N/A
AC input voltage	100 to 240 VAC autoranging
AC input frequency	47 to 63 Hz
AC input current range, AC power supply (maximum)	3 to 1.3A
AC input surge current	60 A peak and less than 5 Arms per half cycle
Typical power (no modules) (watts)	42
Maximum power with AC power supply (watts)	250
Maximum power with PoE power supply (platform only) (watts)	530
Maximum endpoint PoE power available from PoE power supply (watts)	250

6.2 ACTIVE CONTROL EQUIPMENT: SAN SWITCH

The active control equipment should have the following minimum specifications:

Feature	Description
Form factor	Standalone or 1U rack mount
Ports	Up to 24 SFP/SFP+ ports. 8 ports licensed by default; up to two optional 8-port license packs.
Media types	8 Gb FC SFP+ transceivers: short-wave (SW), long-wave (LW), extended long-wave (ELW).
Port speeds	2/4/8 Gbps auto-sensing, full-duplex (8 Gb FC SFP+ transceivers)
FC port types	Full Fabric mode: FL_Port, F_Port, M_Port (Mirror Port). E_Port requires an optional license. Brocade Access Gateway mode: F_Port and NPIV-enabled N Port.
Data traffic types	Unicast (Class 2 and Class 3), multicast (Class 3 only), broadcast (Class 3 only).
Classes of service	Class 2, Class 3, Class F (inter-switch frames).
Standard software	Full Fabric mode (standalone: single-switch fabric), Access Gateway (requires 24 ports be licensed), Advanced Zoning, Adaptive Networking, Advanced Diagnostic Tools.
Optional software	Full Fabric E_Port (multi-switch fabric), ISL Trunking, Fabric Vision, Extended Fabric.

Performance	<p>Non-blocking architecture with wire-speed forwarding of traffic:</p> <p>2.125 Gbit/sec line speed, full duplex</p> <p>4.25 Gbit/sec line speed, full duplex</p> <p>8.5 Gbit/sec line speed, full duplex</p> <p>Up to 192 Gbps aggregated throughput</p> <p>Up to 0.7 microseconds local switching latency</p>
Scalability	<p>Maximum number of switches in the fabric: 239</p> <p>Maximum frame size: 2,112-byte payload</p> <p>Maximum number of frame buffers per switch: 700</p> <p>Maximum number of ports per ISL trunk: 8 (Requires an optional license)</p>
Cooling	Three 2+1 redundant non-hot-swap fans. Non-port to port side airflow.
Power supply	One fixed 75 W AC (100 - 240 V) power supply (IEC 320-C14 connector).
Hot-swap parts	SFP/SFP+ transceivers.
Management ports	One 10/100 Mb Ethernet port (UTP, RJ-45); one RS-232 port (RJ-45); one USB port (for additional firmware/log/configuration files storage).
Management interfaces	EZSwitch Setup; Web-based GUI (Brocade Web Tools); CLI; SMI-S; SNMP. Optional Brocade Network Advisor (available from Brocade).
Security features	Secure Socket Layer (SSL); Secure Shell (SSH); Secure Copy (SCP); Secure FTP (SFTP); user level security, Role-based Access Control (RBAC); LDAP, RADIUS, and TACACS+ authentication; access control lists (ACLs); IP security (IPsec)
Hardware warranty	One-year customer-replaceable unit, parts-only warranty with 9x5 next business day terms.
Software maintenance	One-year software support and subscription license.
Dimensions	Height: 43 mm (1.7 in.); width: 429 mm (16.9 in.); depth: 307 mm (12.1 in.)
Weight	4.2 kg (9.3 lb) without SFPs.

6.3 ACTIVE CONTROL EQUIPMENT: 48 PORT PoE SWITCH

The active control equipment should have the following minimum specifications:

Feature	Description
Downlinks total 10/100/1000 or PoE+ copper ports	48 ports full PoE+
Uplink configuration	4x 10G fixed uplinks
Default primary AC power supply	PWR-C5-1KWAC
Fans	Fixed redundant
Software	Network Essentials
Chassis Dimensions	1.73 x 17.5 x 11.3 in 4.4 x 44.5 x 28.8 cm
Virtual Networks	1
Stacking bandwidth	80 Gbps
Total number of MAC addresses	16,000
Total number of IPv4 routes (ARP plus learned routes)	11,000 (8,000 direct routes and 3,000 indirect routes)
IPv4 routing entries	3,000
IPv6 routing entries	1,500
Multicast routing scale	1,000
QoS scale entries	1,000
ACL scale entries	1,500
Packet buffer per SKU	6 MB buffers for 24- or 48-port Gigabit Ethernet models
Flexible NetFlow (FNF) entries	16,000 flows on 24- and 48-port Gigabit Ethernet models
DRAM	2 GB
Flash	4 GB
VLAN IDs	1024
Total Switched Virtual Interfaces (SVIs)	512
Jumbo frames	9198 bytes
Wireless bandwidth per switch	N/A
Switching capacity	176 Gbps
Forwarding rate	261.9 Mpps
Mean time between failures (hours)	346,270
Modules	c9200-nm-4x network module 10g sfp+ module

6.4

ACTIVE CONTROL EQUIPMENT: LAYER 3 - 24-PORT POE SWITCH

The active control equipment should have the following minimum specifications:

Feature	Description
Model	C9200L-24P-4X-E
Downlinks total 10/100/1000 or PoE+ copper ports	24 ports full PoE+
Uplink configuration	4x 10G fixed uplinks
Default primary AC power supply	PWR-C5-600WAC
Fans	Fixed redundant
Software	Network Essentials
Chassis Dimensions	1.73 x 17.5 x 11.3 in 4.4 x 44.5 x 28.8 cm
Virtual Networks	1
Stacking bandwidth	80 Gbps
Total number of MAC addresses	16,000
Total number of IPv4 routes (ARP plus learned routes)	11,000 (8,000 direct routes and 3,000 indirect routes)
IPv4 routing entries	3,000
IPv6 routing entries	1,500
Multicast routing scale	1,000
QoS scale entries	1,000
ACL scale entries	1,500
Packet buffer per SKU	6 MB buffers for 24- or 48-port Gigabit Ethernet models
Flexible NetFlow (FNF) entries	16,000 flows on 24- and 48-port Gigabit Ethernet models
DRAM	2 GB
Flash	4 GB
VLAN IDs	1024
Total Switched Virtual Interfaces (SVIs)	512
Jumbo frames	9198 bytes
Wireless bandwidth per switch	N/A
Switching capacity	128 Gbps
Forwarding rate	190.4 Mpps
Mean time between failures (hours)	390,310
Modules	c9200-nm-4x network module 10g sfp+ module

7.0 NTU Specifications

Type:	HDSL
Max Data Transfer Rate:	2Mbps
Mode of Operation:	DCE
Connector:	DB37
Interface Cable:	DB37-DB15

8.0 NETWORK MANAGEMENT SYSTEM

Bidders must propose the manufacturers Network Management system for centralized configuration, maintenance and troubleshooting of active equipments. Third party standalone systems should not be offered as part of the solution. Features and functionalities of the system should include the following:

- a) Should be compatible with Microsoft windows/Linux operating systems
- b) Graphical User Interface for central Management and network viewing
- c) Network discovery and inventory management
- d) VLAN, multicast, security and load-balancing/fail over configuration
- e) Downloading and saving of log file from the device flash memory
- f) Centralized upgrade/backup and archiving of active devices
- g) Export of network topology to JPEG or other standard formats.

9.0 CABLES

10.1) UTP CABLE

The UTP cable must be category 6A compliant UTP cable, with the following specifications;

- a) 4-pair cables with 100-ohm impedance.
- b) Compliant to standards such as TIA/EIA – 268-B. 2-1 and IEC 61156-5
- c) Made of polyethylene insulation
- d) Pulling force should support up to 50N/mm²
- e) Low Smoke Zero Halogen outer sheath

10.2) OPTICAL FIBRE CABLE

The fibre cable must be 8 core multimode fibre with the following specifications: -

- a) Cable size: 8 core.
- b) Termination: SC Duplex connectors.
- c) Graded Index: Nominal 62.5/125 micro. m

10.0 CAT 6 PATCH PANELS

The Contractor shall provide factory made patch panels, cat 6 complete with cable management and front designation strips, 110 PCB mounted connectors and integral RJ mounted jack sockets.

11.0 FIBER PATCH PANELS

All Backbone Fiber links to individual floors should be terminated on Fiber Patch Panels. Connector interfaces should support ST, Sc simplex, Sc duplex, FC, LC or MT-RJ.

12.0 BACK BONE

Backbone cabling inclusive of switches and all necessary accessories shall be carried out in readiness for the termination of edge switches.

The Backbone cabling shall be flexible and allow for easy 'add on's' for future expansions. Hence enough capacity shall be allowed for future expansion.

13.0 EDGE/FLOOR SWITCHES

These shall be per floor/wing and have enough capacity for expansion

14.0 COMPLETION AND COMMISSIONING OF STRUCTURED CABLING WORKS

13.1 Upon completion of the installation, all cabling links must be tested for the following parameters, using Level Three testers: -

a) **Category 6 Cable Tests**

1. Wire Map
2. Length
3. Insertion Loss (Attenuation)
4. NEXT Loss
5. PSNEXT Loss
6. ELFEXT Loss, pair-to-pair
7. PSELFEXT Loss
8. Return Loss
9. ACR (Attenuation to crosstalk ratio)
10. PSACR
11. Propagation Delay
12. Delay Skew

b) **Fibre Optic Cable Tests**

1. Link attenuation (insertion loss)
2. Length

Any failing link must be diagnosed and corrected. The corrective action shall be followed with a new test to prove that the corrected link meets the performance requirements.

The results should be recorded in one or several measure books showing test results of the cable components. In addition, the measurements must be recorded on two soft copies (CD-ROM).

13.2.0 All components must be tested and a Completion Certificate issued stating the following:

- a. Number of outlets
- b. Type of cable
- c. Date completed
- d. Type of Warranty

In addition, an "as-built" package must be submitted with the following information

- a. Updated floor plans
- b. Wire/cable routing schematic
- c. Facility assignment records
- d. Horizontal cable test results
- e. Fibre Backbone test results

16.0 Documentation

The contractor shall avail documentation (2 copies) detailing the layout and devices or components of the system and must include all information for maintenance technicians to run, service, extend or maintain the network. In particular, the documentation must be structured and contain the following:

- a. Synopsis of the cabling (primary and secondary)
- b. Charts of the distribution highlighting the details of the elements that have been installed
- c. Detailed map of socket layout (2 Soft copies on CD-ROM should be availed)
- d. Reports on measurements (2 Soft copies on CD-ROM should be availed)

The CD-ROMs provided shall include the software tools required to view, inspect and print any selection of test reports.

17.0 Warranty and Support

- 3.1 The Contractor will be required to give a per link warranty of at least fifteen (15) years for the structured cabling infrastructure and must provide a site certification certificate from the manufacturer of the cabling infrastructure not more than 30 days after completion of tests.
- 3.2 In the event of failure of the core switch, the contractor will be required to deliver any necessary parts on the next business day after determining that parts replacement is required, during the standard work week (8 hours a day, 5 days a week). This support will be carried out by a field engineer and will run for a period of Twenty Four months from the date of commissioning of the LAN.
- 3.3 The contractor will be required to provide a sixty months warranty on the edge switches from the date of commissioning of the LAN.

18.0 ADDITIONAL NOTES

Tenderers should take note of the following

- a) The network should be capable of carrying data, voice and video. QOS should be considered as part of installation and configuration of the network.
- b) All active LAN equipments should be from the same manufacturer for seamless integration, management and maintenance.
- c) Each floor should have a telecommunication Closet to house the necessary structured cabling components and active equipments.

19.0 BROCHURES AND TECHNICAL LITERATURE

Tenderers **must** enclose together with their submitted bids brochures detailing technical Literature and specifications of the active components of the structured cabling system. The brochures shall be used to evaluate the suitability of these components.

Any bid submitted without the brochures shall be considered technically non-responsive, and may subsequently be disqualified.

PART 2/1: PARTICULAR AND TECHNICAL SPECIFICATIONS – IP-PBX EQUIPMENT

	CLAUSE	DESCRIPTION
	PART 1	
1.00		Particular specifications
1.01		Site location
1.02		Scope of the works
1.03		Climatic conditions
1.04		Bond for IP-PBX with provisional type approval
1.05		Regulations
1.06		Position of Services and Equipment
1.07		Setting to work and Regulating Systems
1.08		Identification of Plant Components
1.09		Working Drawings
1.10		Record Drawings
1.11		Tests
1.12		Quality Materials
1.13		Training
1.14		Equipment Guarantee
1.15		Patent Rights
	PART 2	
2.00		Technical Specifications for the IP-PBX
2.01		Scope of the Works
2.02		Minimum Requirements
2.03		Equipment Finish
2.04		Interference Suppression
2.05		Door Keys
2.06		Equipment Hardware
2.07		Equipment Software
2.08		System Features
2.09		Web Based Company Receptionist
2.10		Call Control
2.11		Voice Mail & Voice Mail to Email
2.12		Voice Recording
2.13		Conferencing
2.14		Faxing
2.15		Distributed Office Setup
2.16		Paging/PAS
2.17		Multi Trunking
2.18		SIP Trunking
2.19		Call Routing
2.20		Barge IN & Listen
2.21		Whisper
2.22		Reports
2.23		Third Party Integration

2.24	Multi Phones Connectivity
2.25	IP PBX/Call Manager
2.26	Attendant Console
2.27	Telephone Instruments
2.28	Numbering System
2.29	Exchange Lines
2.30	ISDN Tie lines
2.31	System Maintenance
2.32	Power supply
2.33	List of Main Requirements for the IP - PBX
2.34	Other Minimum Requirements for the IP - PBX
2.35	Brochures and Technical Literature
2.36	Items to be Stated by the Tenderer.
2.37	Statement of Compliance.

PART 2/1

1.00 PARTICULAR SPECIFICATIONS – IP-PBX EQUIPMENT

1.01 DESCRIPTION OF THE SITE

The site of the proposed works is located at **10th Floor, NSSF Annex House – Nairobi County**

1.02 DESCRIPTION OF THE PROJECT

The works comprise the Supply, Installation, Testing and Commissioning of new IP-PBX Equipment, Telephone Instruments and the associated cabling works.

1.03 CLIMATIC CONDITIONS

The following climatic conditions apply at the site of the Contract Works and the equipment, materials and installations shall be suitable for these conditions:

Mean Maximum Temperatures 32°C

Mean Minimum Temperature 17.4°C

Range of Relative humidity 39% - 97%

Salt in the atmosphere 0.02%

Altitude 1095M above sea level

Latitude /Longitude 00°21' N/37°35' E

Solar Radiation, February Mean Max 630 Langleys

Extremely heavy rains fall at certain periods of the year and the contractor shall be deemed to have taken account of this factor both in his prices and his planning of the execution of the contract works.

Equipment de-rating factors for the temperature and altitude shall be stated.

1.04 BOND FOR IP PBX WITH PROVISIONAL TYPE APPROVAL

Where the IP-PBX offered for this tender does not possess full type approval from C.A.K but has provisional type approval, the tenderer will be required to submit the name of a separate surety who will be willing to be bound to the Kenya Government in an amount equal to the full value of the IP-PBX project for a period of 18 months from the date the IPBX is commissioned into service. The surety will be subject to the approval of the government

1.05 REGULATIONS

The contractor shall, in the execution and completion of the works in the detailed design for which he is responsible comply with the provisions of the following as necessary and relevant:

- Communication Authority of Kenya (*formerly CCK*)
- The Kenya Communications Act
- The Electronic Power Act and the Rules made there under.
- The Kenya Power and Lighting Company Limited's Bye-Laws.
- The current edition of the "Regulations for the Electric Equipment of Buildings" issued by the Institution of Electrical Engineers.
- The requirements of the Chief Inspector of Factories for the Kenya Government.
- Kenya Bureau of Standards (KEBS) Standard Specifications and Codes of Practice, or other equal and approved standard specifications and codes.
- The Bye-Laws of the Local Authority.
- Any other regulations applicable to Electric and Electronic Installations or Communications systems in Kenya.
- The Employer's Safety Regulations.

1.06 POSITION OF SERVICES AND EQUIPMENT

The route services and approximate positions of apparatus are shown on the contract drawings but their exact positions shall be determined by approved dimensional details on working drawings or on site by the P.M.

The contractor shall ascertain on site that his work will not foil other services or furniture and all services through the ducts must be readily accessible for maintenance and arranged to allow maximum access along the ducts. Any work which has to be redone due to negligence in this respect will be the contractor's responsibility.

1.07 SETTING TO WORK AND REGULATING SYSTEMS

The contractor shall carry out such tests of the contract works as are required by KEBS Standard Specifications and Codes of Practice, I.E.E Regulations or equal and approved codes, or the competent Authority.

No testing or commissioning shall be under taken except in the presence of and to the satisfaction of the P.M. unless approved otherwise by him (contractor's own preliminary and proving tests are exempted).

The contractor shall include in his tender for the costs for testing and commissioning the contract works as herein described. He shall submit for approval to the P.M. a suitable programme for testing and commissioning. The P.M. and the Employer shall be given ample warning as to the dates on which testing and commissioning will take place.

The proving of any system of plant or equipment as to compliance with the specification shall not be approved by the P.M. except at his discretion until tests have been carried out under operating conditions appertaining to the most onerous conditions specified except where the time taken to obtain such conditions is unreasonable or exceeds 12 months after practical completion of the contract works.

1.08 IDENTIFICATION OF PLANT AND COMPONENTS

The contractor shall supply and install identification labels to all plant and to all switches and items of control equipment with, where no excessive heating is involved, white Traffolyte or equal labels engraved in block lettering denoting the name/function and/or section controlled. Where heating is likely to distort Traffolyte, approved aluminum labels with stamped or engraved lettering shall be used.

The labels shall be mounted on equipment and in most suitable positions. They shall be in English or in internationally understood symbols capable of being read without difficulty. The labels shall conform to descriptions used on record drawing. Details of the lettering of the labels and the method of mounts or supporting shall be forwarded to the P.M. for approval prior to manufacture.

1.09 WORKING DRAWINGS

The contractor shall prepare such working Drawings as may be necessary. The working Drawings shall be completed in such details not only that the contract works can be executed on site but also that the P.M. can approve the contractor's designs and intentions in execution of the contract works.

Approved working drawings shall not be departed from except where provided for. Approval by the P.M. of working Drawings shall neither relieve the contractor of any of his obligations under the contract nor relieve him from correcting any errors found subsequently in the approved working Drawings or elsewhere associated therewith or with the works.

1.10 RECORD DRAWINGS

During the execution of works on site the contractor shall, in a manner approved by the P.M. record on working or other Drawings at site all information necessary for preparing Record Drawings of the installed contract Works. Marked-up working or other Drawings and other documents shall be made available to the P.M. as he may require for inspection and checking.

Record Drawing shall include but are not restricted to the following drawings or information: -

- Working Drawings amended as necessary but titled "Record Drawings" and certified as a true record of the as installed" contract works.
- Fully dimensioned drawings of all plant and apparatus.

System Schematic and trunking diagrams showing all salient information relating to control and instrumentation.

- Wiring diagrams of individual plant, apparatus and switch and control boards. These diagrams to include these particular to individual plant or apparatus and elsewhere applicable those applicable to system operation as a whole.

One reproducible copy of the Record Drawings of the contract works and Schematic Diagrams shall be provided not later than one month afterwards.

Notwithstanding the contractor's obligation referred to above, if the contractor fails to produce to the P.M.'s approval of the Record Drawings, within one month of partial or Practical Completion the Employer shall be at liberty to have these drawings produced by others. The cost of obtaining the necessary information shall be deducted from the out-standing payments due to the contractor.

1.11 TESTS

Both on completion of his work and at the end of the guarantee period the contractor shall carry out such tests as may be required in the presence of the P.M. or his representative, or the competent Authority and shall provide all necessary Instruments, labour and materials to do so. The Contractor shall pay such charges related to such tests if any.

1.12 QUALITY OF MATERIALS

Materials and apparatus required for the complete installation as called for in the specifications or Contract Drawings shall be supplied by the contractor unless specified otherwise.

Unless otherwise specified all materials (including equipment, fittings, cables) shall be new, of the best quality and approved origin.

1.13. TRAINING

In the direction and to the satisfaction of the P.M. the contractor shall arrange for the training of the attendant console operators, users and the administrators at the site or the contractor's office on the workings of the IP based PABX. The cost of such training shall be included in the contractor's prices.

1.14 EQUIPMENT GUARANTEE

The contractor shall undertake in writing to rectify free of charge, all faults arising from faulty components, materials, design or workmanship by the manufacturer or contractor whichever is applicable. This liability shall be for a minimum period of one calendar year from the date of acceptance of the equipment. Twelve months limitation notwithstanding, the period of liability shall not end until all defects which appear during the liability period have been rectified.

PATENT RIGHTS

The contractor shall fully indemnify the Government of Kenya, against any action, claim or proceeding relating to infringement of any patent or design rights, and shall pay any royalties which may be payable in respect of any article or any part thereof which shall have been supplied by the contractor to the P.M. and in like manner the government of Kenya shall fully indemnify the contractor against any such action, claim or proceeding for infringement or alleged infringement under the works the design thereof which shall have been supplied by the P.M. to the contractor, but this indemnity shall apply to the works only, and any permission or request to manufacture to the order of the P.M. shall not relieve the contractor from liability should he manufacture for, or supply to other buyers.

2.00 TECHNICAL SPECIFICATIONS

2.01 SCOPE OF THE WORKS

The contractor shall supply, deliver, unloaded, test, commission, and guarantee and be liable for defects, and be responsible for the initial maintenance, all as specified herein, of the new **IP-PBX** and all its associated accessories. The IP-PBX will be fully IP, ISDN native and with time multiplexing architecture.

The contractor shall supply and install associated items of plant and equipment other than those clearly stated to be supplied by others. He shall supply and install all accessories, whether described in the specification or not, essential to the completion of the works to the satisfaction of the P.M.

All equipment supplied shall be type approved by CAK and the installation shall be approved by the Communications Commission of Kenya (the competent Authority). The tenderer shall be responsible for all negotiations with and payments to the commission. He shall also pay all fees.

2.02 MINIMUM REQUIREMENTS

This specification defines minimum requirements, but bidders who offer superior facilities will be considered.

Any tender that does not comply with the minimum requirements will be rejected.

2.03 EQUIPMENT FINISH

The equipment finish shall be the responsibility of the contractor, who shall be responsible for its protection during erection and in the course of making good to the building finishes after equipment erection.

2.04 INTERFERENCE SUPPRESSION

The equipment and all its accessories shall be suppressed so as not to interfere with any communications, radio, T.V., Security or electro-medical equipment, recording or computer systems.

2.05 DOOR KEYS

The contractor shall keep the IP-PBX suite locked at all times when his staff are not present and shall at the conclusion of the contract hand over all keys to the P.M.

2.06 EQUIPMENT HARDWARE

The tenderer shall quote for a multimedia application fully **IP-PBX**. The equipment must be Rack mountable Server, with 4GB RAM, 500GB HDD, Core 2 Duo Processor. The equipment must operate on a dual processor configuration with duplicated components so that the PABX services will not be lost due to failure of a single component.

The components to be duplicated should but not limited to:

- Communication Sever
- Power Supply Modules
- Main Control Cards
- Hard Disc Drives
- Memory storage expansion card
- Switching unit

2.07 EQUIPMENT SOFTWARE

The equipment shall be preloaded with core software for driving it and giving it full operating flexibility. The list of features and services should be comprehensive and extensive and comprising the following:

- System features
- Operator features
- Standard telephone features
- Executive telephone features
- System administration features
- IP Network features
- Data features
- Special applications features

2.08 SYSTEM FEATURES

The system features shall include but not limited to the following facilities:

- Automated Attendant
- Black List
- Blind transfer
- Call Details Record.
- Call Forward on No Answer
- Call Forward Variable
- Call Monitoring
- Call Parking
- Call Queuing
- Call Recording
- Call Retrieval
- Call Routing (DID & ANI)
- Call Snooping
- Call Transfer Call Waiting
- Caller ID and Caller ID on Call Waiting
- Database Store / Retrieve
- Database Integration
- Dial by Name
- Direct Inward System Access
- Distinctive Ring
- Distributed Universal Number Discovery (DUNDi™)
- Do Not Disturb
- Fax Transmit and Receive
- Music On Transfer
- Flexible Extension Logic

- Interactive Directory Listing
- Interactive Voice Response (IVR)
- Local and Remote Call Agents
- Music On Hold
- Caller ID Blocking
- Conference Bridging

2.09 WEB BASED COMPANY RECEPTIONIST (CALL QUEUE AND IVR (INTERACTIVE VOICE RESPONSE

- Calls in queue, pick which calls to answer.
- Active Calls Show the list of active calls and engaged extensions.
- Availability, IP Phone/soft phone status like off-hook, on-hook, ringing.
- Call Park.
- Drag and Drop call transfer.
- Voicemail transfer.
- Call Toggle – Allows the operator to shift between calls
- Music on Hold per queue.
- Caller Experience – Let the caller hear the phone ring instead of listening to music on hold.
- Ringing Options – Ring All, Round Robin, Fewest Calls, Least Recently Called, Random, and In Order.
- Extension Dialing – Allow the callers to dial an extension at any time.
- Send to Voice Mail.

2.10 CALL CONTROL

- Call Transfer – you can easily transfer incoming calls or active calls to another extension. Set the transfer rules for incoming calls so you can check the call list, then transfer, transfer without checking, or send the call straight to voicemail.
- Call Pick up – You can set up Call Pickup groups so some employees can pick up calls ringing on other extensions by dialing a short code on their own phones. You determine who has this permission and which calls they can pick up.
- Do not disturb.
- Hold – Put a call on Hold using the button on your IP phone, or from the Switchboard. You can customize the Music on Hold that plays until you resume the call.
- Call Parking – Put a call on Hold using the button on your IP phone, or from the Switchboard. You can customize the Music on Hold that plays until you resume the call.
- Parallel Ringing.
- Follow me.

2.11 VOICE MAIL & VOICE MAIL TO E-MAIL

- Voice Mail Set up.
- Voice Mail Access.
- Voice mail to email or to any email client.

2.12 VOICE RECORDING

Automatically record calls coming in, going out, or even internally, based on the settings you define.

2.13 CONFERENCING

1. 3 Way conferencing from the IP Phone.
2. Meet me conference- With a Meet Me Conference Center, each of your phone extensions can have its own conference room.
3. Dial-in Conference.
4. Dial-out Conference

2.14 FAXING

1. Outgoing Fax.
2. Incoming Fax.

2.15 DISTRIBUTED OFFICE SETUP

Connects Multiple Offices through MPLS or VPN. Branch offices can be added to the IP server through an INTERNET connection.

2.16 PAGING/PAS

Dial a code to connect to a separate overhead paging and announcement system.
Dial a code and connect directly to a built-in one-way announcement speaker on one or more phones.

2.17 MULTI TRUNKING

Connect with PRI ISDN E1, T1. with Analog/PSTN/CO Lines. Connect with GSM Trunk.

2.18 SIP TRUNKING

- Ready to use the sip-trunking and as well the SIP Client
- Create Multiple VOIP accounts.

2.19 CALL ROUTING

- Location Based routing.
- Skill Based routing.
- DID Based Routing.

2.20 BARGE IN & LISTEN

Barge in: Barge in on both channels. The manager channel is joined onto the spied-on and bridged channel, and all parties can hear each other.

Listen: Monitor an agents call/ Extensions. The manager can hear both the spied-on and bridged channels, but they cannot hear the manager.

2.21 WHISPER

Whisper to the agent. The manager can hear both the spied-on and bridged channels, and the spied-on channel (agent) can also hear the manager, but not the bridged channel, hence “whisper.”

2.22 REPORTS

Complete report on day to day, weekly reports, Monthly report, Extension wise report,

2.23 THIRD PARTY INTEGRATION

Connects any 3 party Integration Like, CRM.
ERP.
SMS.
Click to Call.

2.24 MULTI PHONES CONNECTIVITY

Connect with different Phones Like: IP PHONE.
Analog Phone
Soft Phone
Smart Phone (Mobiles).
DECT phones

2.25 IP PABX/ CALL MANAGER

Proprietary IP Phones must be compatible with the Network equipment.

Feature	Description
Form Factor	Rack mountable 1u
Server Scalability	2 Way
CPU	Intel Xeon Silver 4114 / 2.2 GHz
Number of Cores	10 core
CPU Qty	2
Max CPU Qty	2
CPU Upgradability	Upgradable
Installed Size	L3 cache - 27.5 MB
Cache Per Processor	13.75 MB
RAM	
Installed Size	64 GB
Technology	DDR4 SDRAM - ECC
Effective Memory Speed	2666 MHz
Memory Specification	PC4-21300
Compliance	

Form Factor	DIMM 288-pin
Slots	24 (total) / 20 (empty)
Features	Registered, single rank
Configuration Features	4 x 16 GB
HDD	
Type	HDD - hot-swap
Capacity	8 x 300 GB
Interface Type	SAS 12Gb/s
Spindle Speed	10000 rpm
Storage Controller	
Type	RAID
Controller Interface Type	SATA 6Gb/s / SAS 12Gb/s
RAID Level	RAID 5
Buffer Size	2 GB
Networking	
Ethernet Ports	4 x Gigabit Ethernet
Ethernet Controller	Intel I350
Data Link Protocol	Ethernet, Fast Ethernet, Gigabit Ethernet
Expansion/Connectivity	
Bays	8 hot-swap 2.5" SFF
Slots	1 (total) / 1 (free) x PCIe 3.0 x24 - half-length, half-height (x16 mode / NCSI support) 1 (total) / 1 (free) x PCIe 3.0 x24 - three-quarter-length, full-height (x16 mode) 1 (total) / 1 (free) x mLOM
Interfaces	2 x USB 3.0 1 x VGA - DB-15 1 x serial - RJ-45 (1 rear) 2 x LAN (10Gigabit Ethernet) - RJ-45 (2 rear) 1 x management (NIC) - RJ-45 (1 rear) 1 x KVM (1 in front)
Included Accessories	Rack rail kit
Compliant Standards	CISPR 24, EN55024, AS/NZS 60950-1, ICES-003 Class A, UL 60950-1 Second Edition, ACPI 4.0, EN 60950-1 Second Edition, IEC 60950-1 Second Edition, VCCI Class A, FCC CFR47 Part 15 A, GB 4943-2001, CNS 13438 Class A, CAN/CSA C22.2 No. 60950-1 Second Edition, KN35, Directive 2014/35/EU, Directive 2014/30/EU, AS/NZS CISPR 32 Class A, KN32 Class A, EN 55032 Class A, CISPR 32 Class A, EN 300386, EN61000-3-3, EN61000-3-2
Power	
Device Type	Power supply - hot-plug
Power Redundancy	Yes
Power Redundancy Scheme	1+1

Installed Qty	2
Max Supported Qty	2
Power Provided	770 Watt
Software	Cisco Unified Communications Virtualization Hypervisor Plus Embedded License 6.x (2-cpu)
Service & Support	Limited warranty - replacement - 3 years - response time: next business day

2.26 ATTENDANT CONSOLE (PC)

The attendant consoles will serve the purpose of receiving calls to all pilot numbers and redirecting them to the appropriate destination. Each pilot number will direct calls into a queue, and each queue will be served by one or more attendant. The attendants will be able to transfer calls to all users within the network, with a few exceptions (who would be reachable through a personal assistant) which will be communicated during the implementation phase.

The attendant console will be a PC application accompanied by a physical desk phone. This will enable;

- Attendants to be able to login and logout from the system
- Attendants to be able to change their state to ready / not ready or similar status
- Attendants to be able to view the presence status of all users
- Attendant to be able to monitor their queues
- Supervisors to be able to monitor all activities of the attendants

Note that each site will have one supervisor, who will be able to monitor the attendants and access reports on the activities at the switchboards.

Minimum Technical Requirements for Attendant Consoles

Feature	Description
Queues	Support for 40 queues Support for 50 Attendant Consoles clients
Features	Presence and search, phonetics Redundancy for the attendant console servers Support for in queue messaging Support for call park Support for Silent Whisper Support for presence information

Directories	Support for the Corporate directory and ability to transfer calls directory to contacts in the directory Must be able to support 150,000 directory entries
Client Software	Must be able to run on a PC with Windows 2000/XP/Windows 7/10
Cisco Unified Attendant Consoles 11.x	1
SWSS UPGRADES Cisco Unified Attendant Consoles 11.x	1
Cisco Unified Attendant Console Advanced 11.x - 1 Lic	2
SWSS UPGRADES Cisco Unified Attendant Console Advanced	2
Support	The system must come with 3 year software warranty. Proof of manufacturers support for t is required

2.27 **TELEPHONE INSTRUMENTS**

The acquiring of telephone instruments has been liberalized. However, they must be Type-approved by the CAK and the tenderer must obtain the necessary approval.

2.27.1 **EXECUTIVE IP-PHONES**

The executive telephone instruments shall be IP- type, keypad or touchpad dialing and shall have, but not limited to, the following operating characteristics: -

Feature	Description
Network Ports	Should have two 10/100/1000 network port for network connectivity, with one port being used for a co-located PC. The two ports should be switched; supporting at least two VLANs Should support separating voice and data into different VLANs.
Display	The phone must deliver VGA presentation for calling, video calling, and applications. Should have a graphical TFT color touchscreen display with 24-bit color depth, 640 x 480 effective pixel resolutions, and backlighting.

Video Support	<p>Must support video calling Frame rate - 30 fps (maximum) using H.264/AVC for video Frame or picture formats</p> <ul style="list-style-type: none"> ▪ SQCIF (128 x 96 pixels) ▪ QCIF (176 x 144 pixels) ▪ QVGA (320 x 240 pixels) ▪ SIF (352 x 240 pixels) ▪ CIF (352 x 288 pixels) ▪ VGA (640 x 480 pixels)
Bluetooth headset	Must support Bluetooth headset users within 10m/30 feet of their desktop, so you can walk around the office as you speak
XML Applications	Must support web based XML and MIDlet-enabled applications applications
Phone Buttons	<p>Must have a minimum of</p> <ul style="list-style-type: none"> • At least 10 speed dial and programmable feature keys • Applications, Directories, and Voicemail • Conference, Transfer, and Hold • Volume Up or Down • Back-lit Mute, speakerphone, and headset • Back, End Call, and 5-way navigation pad
User features	<p>User selectable ring tones Customizable backgrounds Adjustable volume Should be wall-mountable or have a foot stand for placing on a flat desk</p>
Protocol Support	Must support SIP Must support DHCP, DNS, TFTP, HTTP, HTTPS H.264/AVC for video
Codec Support	Should support G.711a, G.711 μ , G.729a, and G.729ab and iLBC audio-compression codecs
QoS	<p>IEEE 802.11e and Wi-Fi Multimedia (WMM) Traffic Specification (TSPEC) Enhanced Distributed Channel Access (EDCA) QoS Basic Service Set (QBSS)</p>
MWI	Must visual Message Waiting Indicator
Certificates	Should support X.509v3 certificates and these must be installable / removable from customer site

Device Authentication and Signaling Encryption	Transport layer security (TLS) with Advanced Encryption Standard (AES)-128 encryption should be supported
Media Encryption	Secure Real-Time Transport Protocol (SRTP) with AES-128 encryption should be supported
Power	Must be able to be powered using IEEE Power over Ethernet 802.3af and 802.3at
Other User Features	<p>Abbreviated dialing</p> <p>Adjustable ringing and volume levels</p> <p>Adjustable display brightness</p> <p>Application launch pad</p> <p>Auto-answer</p> <p>Auto-detection of headset</p> <p>Barge in</p> <p>Callback</p> <p>Call forward</p> <p>Call history lists</p> <p>Call park</p> <p>Call pickup</p> <p>Call timer</p> <p>Call waiting</p> <p>Caller ID</p> <p>Corporate directory</p> <p>Conference</p> <p>Direct transfer</p> <p>Extension mobility service</p> <p>Fast-dial service</p> <p>Group call pickup</p> <p>Hold</p> <p>Intercom</p> <p>Immediate divert</p> <p>Join</p> <p>Last-number redial</p> <p>Malicious-caller ID</p> <p>Message-waiting indicator</p> <p>Meet-me conference</p> <p>Music on hold</p> <p>Mute</p> <p>On- and off-network distinctive ringing</p> <p>Personal directory</p> <p>Predialing before sending</p> <p>Privacy</p> <p>Redial</p> <p>Ring tone per line appearance</p> <p>Service URL</p> <p>Shared line</p> <p>Time and date display</p> <p>Transfer</p> <p>Vicemail (single button access)</p>

Support	The system must come with 3 year software and hardware warranty. Proof of manufacturers support for this is required
Software Updates	The bidder will be expected to upgrade the system at no extra charge when software upgrades (minor and major updates) are available from the manufacturer during the warranty period. Note that charge here relates to both the manufacturer's licenses and bidders services. Proof of manufacturers support for software upgrades is required

2.27.2 CONFERENCE PHONE

Feature	Description
Graphical display	480x128-pixel backlit 24-bit color LCD, 3.9-in. (9.9-cm) diagonal
Ethernet switch	10/100 BASE-T via an Ethernet injector
Keys	The phone has the following keys: <ul style="list-style-type: none"> · Four context-sensitive soft key bars · Two-way navigation bar and select button · Standard keypad · Volume-control bar · Large mute key for ease of access
IEEE PoE	IEEE PoE Class 3; compatible with both IEEE 802.3af and 802.3at switch blades; supports both Cisco Discovery Protocol and Link Layer Discovery Protocol - Power over Ethernet(LLDP-PoE)
Call Control Support	Native support in Cisco Unified Communications Manager 12.0(1); DevPack required for Cisco Unified Communications Manager 10.5.2, 11.0, and 11.5
Graphical display	480x128-pixel backlit 24-bit color LCD, 3.9-in. (9.9-cm) diagonal
Physical dimensions (H x W x D)	10.9 x 10.9 x 2.4 in. (278 x 278 x 61 mm)
Weight	4.07 lb (1.85 kg)
Audio codec support	G.711 a-law and mu-law, wideband (G.722), G.729a, G.729ab, Internet Low Bitrate Codec (iLBC), OPUS
Acoustics	Frequency: Speaker, 100 Hz to 20 kHz; microphones, 100 Hz to 12 kHz, ±3 dB Max adjustable volume: 89 dB within 0.5 m
Call Features	<ul style="list-style-type: none"> • Dialing • Adjustable ring tones and volume levels • Barge • Call forward • Call history lists • Call timer

	<ul style="list-style-type: none"> • Call waiting • Caller ID • Corporate directory Conference • Hold • Music on Hold (MoH) • Mute • Predialing before sending • Redial • Shared line • Speed dial (Favorites) • Time and date display • Transfer • Voicemail (messages)
Quality-of-Service (QoS) options	The phone supports Cisco Discovery Protocol and 802.1Q/p standards and can be configured with an 801.1Q VLAN header containing the VLAN ID overrides configured by the admin VLAN ID
Network Features	<ul style="list-style-type: none"> • Session Initiation Protocol (SIP) for signaling • Session Description Protocol (SDP) • IPv4 • IPv6 • User Datagram Protocol (UDP) (used only for Real-Time Transport Protocol streams) • Dynamic Host Configuration Protocol (DHCP) client or static configuration • Gratuitous Address Resolution Protocol (GARP) • Domain Name System (DNS) • Trivial File Transfer Protocol (TFTP) • Secure HTTP (HTTPS) • VLAN • Real-Time Transport Protocol (RTP) • Real-Time Control Protocol (RTCP) • Cisco Discovery Protocol • LLDP (including LLDP-MED) • Switch speed auto-negotiation
Security Features	<ul style="list-style-type: none"> • Secure credential storage • Image authentication • Random bit generation • Manufacturer-Installed Certificates (MICs)

	<ul style="list-style-type: none"> • Secure boot • SHA-256 enabled for advanced security features • Ethernet 802.1X supplicant options: Extensible Authentication Protocol – Flexible Authentication via Secure Tunneling (EAP-FAST) and Extensible Authentication Protocol – Transport Layer Security (EAP-TLS) • Signaling authentication and encryption using TLS v1.2 • Media authentication and encryption using SRTP • HTTPS for client and server • Secure Shell (SSH) Protocol server
Phone Casing	Acrylonitrile Butadiene Styrene (ABS) textured plastic; Cisco cosmetic class A
Network Ports	Should have one 10/100 network port for network connectivity. If it has two, the second port should be disabled. This is required for security purposes as these areas will not be secure.
Speakerphone	The IP Conference Phone should have full-duplex high-quality wideband speakerphone technology. Should have Automatic Gain Control, comfort-noise generation, silence suppression and voice activity detection, Echo Suppression, and dynamic noise reduction, which reduces noise by up to 9 dB from constant noise sources such as fans or heating, ventilation, and air conditioning (HVAC) systems.
Wired Microphone	The microphones should extend the operational range of the IP Conference Phone with even coverage around the periphery of the device with 7 feet of additional reach.
Loudspeaker	Should have a two-way high-fidelity loudspeaker system that provides superior speech clarity.

Volume Control	The Volume Control buttons should provide for easy, decibel level adjustments for the speakerphone and ringer.
XML Applications	Must support web based XML text and audio applications
Directory Access	Must be able to access corporate directory
User features	User selectable ring tones
Protocol Support	Must support DHCP, DNS, TFTP, HTTP, HTTPS
Extension Mobility	Must support extension mobility
Device Authentication and Signalling Encryption	Transport layer security (TLS) with Advanced Encryption Standard (AES)-128 encryption should be supported
Media Encryption	Secure Real-Time Transport Protocol (SRTP) with AES-128 encryption should be supported
Support	The system must come with 3year software and hardware warranty. Proof of manufacturers support for this is required
Configuration options	Ability to configure IP address assignment statically or through the DHCP client.
Software Updates	The bidder will be expected to upgrade the system at no extra charge when software upgrades (minor and major updates) are available from the manufacturer during the warranty period. Note that charge here relates to both the manufacturers licenses and bidders services. Proof of manufacturers support for software upgrades is required
Certificates	Should support X.509v3 certificates and these must be installable and removable from customer site
Device Authentication and Signalling Encryption	Transport layer security (TLS) with Advanced Encryption Standard (AES)-128 encryption should be supported
Media Encryption	Secure Real-Time Transport Protocol (SRTP) with AES-128 encryption should be supported

Media Encryption	Secure Real-Time Transport Protocol (SRTP) with AES-128 encryption should be supported
Power	Must be able to be powered using an IEEE 802.3af PoE-compliant source
Support	The system must come with 3year software and hardware warranty. Proof of manufacturers support for this is required
Configuration options	Ability to configure IP address assignment statically or through the DHCP client.
Software Updates	The bidder will be expected to upgrade the system at no extra charge when software upgrades (minor and major updates) are available from the manufacturer during the warranty period. Note that charge here relates to both the manufacturers licenses and bidders services. Proof of manufacturers support for software upgrades is required

2.27.3 LOBBY IP PHONE

Feature	Description
Network Ports	Should have one 10/100 network port for network connectivity. If it has two, the second port should be disabled. This is required for security purposes as these areas will not be secure
Display	Graphical monochrome display with resolution of 192 x 64 pixels or higher .
XML Applications	Must support web based XML text and audio applications .
User features	User selectable ring tones Customizable backgrounds Adjustable volume Should be wall-mountable or have a footstand for placing on a flat desk
Codec Support	Should support G.711a, G.711 μ , G.729a, and G.729ab and iLBC audio-compression codecs
QoS	IEEE 802.1 p/q tagging and switching
Extension Mobility	Must support extension mobility
MWI	Must visual Message Waiting Indicator
Certificates	Should support X.509v3 certificates and these must be installable / removable from customer site .

Device Authentication and Signaling Encryption	Transport layer security (TLS) with Advanced Encryption Standard (AES)-128 encryption should be supported
Media Encryption	Secure Real-Time Transport Protocol (SRTP) with AES-128 encryption should be supported
Directory Access	Must be able to access corporate directory
Power	Must be able to be powered using IEEE 802.3af PoE-compliant sources or via a local power source (240V 50Hz)
Support	The system must come with 3 year software and hardware warranty. Proof of manufacturers support for this is required
Software Updates	The bidder will be expected to upgrade the system at no extra charge when software upgrades (minor and major updates) are available from the manufacturer during the warranty period. Note that charge here relates to both the manufacturers licenses and bidders services. Proof of manufacturers support for software upgrades is required

2.27.4 STANDARD IP-PHONES

Feature	Description
Network Ports	Should have two 10/100 network port for network connectivity, with one port being used for a co-located PC. The two ports should be switched, supporting at least two VLANs Should support separating voice and data into different VLANs.
Display	Must support a high-resolution (320 x 222), graphical monochrome 4-bit grayscale display.
XML Applications	Must support rich XML-based applications applications
Phone Buttons	Must have a minimum of <ul style="list-style-type: none"> • At least 2 speed dial and programmable feature keys • Applications, Directories, and Voicemail keys • Volume Up or Down • Back-lit Mute, speakerphone, and headset
Protocol Support	Must support SIP Must support DHCP, DNS, TFTP, HTTP, HTTPS H.264/AVC for video
Codec Support	Should support G.722, G.711a, G.711 μ , G.729a, and G.729ab and iLBC audio-compression codecs
MWI	Must visual Message Waiting Indicator
Certificates	Should support X.509v3 certificates and these must be installable / removable from customer site

Device Authentication and Signaling Encryption	Transport layer security (TLS) with Advanced Encryption Standard (AES)-128 encryption should be supported
Media Encryption	Secure Real-Time Transport Protocol (SRTP) with AES-128 encryption should be supported
Power	Must be able to be powered using IEEE Power over Ethernet 802.3af
Other User Features	<ul style="list-style-type: none"> Abbreviated dialing Adjustable ringing and volume levels Adjustable display brightness Application launch pad Auto-answer Auto-detection of headset Barge in Call back Call forward Call history lists Call park Call pickup Call timer Call waiting Caller ID Corporate directory Conference Direct transfer Extension mobility service Fast-dial service Group call pickup Hold Intercom Immediate divert Join Last-number redial Malicious-caller ID Message-waiting indicator Meet-me conference Music on hold Mute On- and off-network distinctive ringing Personal directory Predialing before sending Privacy Redial Ring tone per line appearance Service URL Shared line Time and date display Transfer Voicemail (single button access)

Support	The system must come with 3 year software and hardware warranty. Proof of manufacturers support for this is required
Software Updates	The bidder will be expected to upgrade the system at no extra charge when software upgrades (minor and major updates) are available from the manufacturer during the warranty period. Note that charge here relates to both the manufacturer's licenses and bidders services. Proof of manufacturers support for software upgrades is required

2.28 NUMBERING SYSTEM

The numbering scheme will be:

Level 0 Access to IP PBX Telephone Operator

- "9 Access to the main exchange
- "8 Night service
- "7 Spare for future ISDN tie line access
- "6 ISDN - Tie line access
- "5 Spare for extensions
- "4 Extensions
- "3 Intercom
- "2 Extensions
- "1 Spare for special facilities.
- "10 plus code for feature de-activation.
- "11 plus code for feature activation.

2.29 EXCHANGE LINES

Exchange lines shall be arranged for first party release. The IP based PABX must be capable of processing the number of digits required for international calls in accordance with CCITT and CCIL recommendations.

A device shall be fitted to sense main exchange dial tone as there may be considerable delay in receiving this after the seizure of a free exchange line.

2.30 ISDN TIE LINES

The lines will provide access to all extensions and the operator. They are to be for auto-auto working through signaling and first party release. Tones are to be returned over to tie lines.

Disconnect loop signaling is at present employed with a maximum loop resistance of 2000 ohms.

2.30 SYSTEM MAINTENANCE

Test Equipment and Tools

PABX routine test set and a set of maintenance tools are to be supplied. The tools and spare parts are to be listed in Appendices "A" and "B" of the Bills of Quantities.

Maintenance Features

The IP- PBX shall have the following system maintenance features:

- Line status monitoring device
- Station message data recording port
- System Working report
- On site system administration using a compatible terminal and attendant console.
- Remote system administration capability
- Automatic on-line diagnostic testing

Maintenance diagnostic software programmes shall be provided which can be run as required whilst the IP - PBX is in normal service.

Maintenance and Operating Manuals

On practical completion of the works, the contractor shall furnish two sets of copies in soft copy and hard copy forms each of maintenance and operating manuals relating to the IP - PBX installed. The hard copy manuals shall be legibly written in English and properly bound with hard cover.

They will include but not limited to the following:

- System description
- Fault finding procedure
- Maintenance and servicing periods and procedures
- Schematic and wiring diagrams of the equipment
- Record drawings

2.31 POWER SUPPLY

Rectifier

The IPBX shall be fed through an integrated rectifier and an AC –DC converter fed from 240V A.C. 50Hz power supply. The rectifier will be equipped with the following devices:

- Security device to monitor the minimum and maximum authorized values of the output voltage. When one of the thresholds is reached, the power supply to the IP- PABX must cut itself automatically “Floating” and automatic “Equalization” device with manual command of the “Equalization” mode and automatic switch back to “floating” mode once the battery is loaded.

The rectifier will be sized to supply power to the IP - PBX and simultaneously allow re-loading of the battery within 10 Hours maximum.

UPS

A UPS of suitable rating is required. It shall have a response time of NOT more than 0.1 seconds and a correction range from -12% to +12% with surge/spike protection.

Earthing

An independent telecommunication earth shall be provided for the IP-PBX . The earth lead cable shall not be less than 6mm² and shall terminate to copper earth electrode(s) in a concrete manhole (300mm x 300mm) with a suitable concrete cover. The earth impedance shall not exceed 4 ohms.

2.32 LIST OF MAIN REQUIREMENTS FOR THE PROPOSED IP- PBX.

ITEM	FACILITY DESCRIPTION	INITIAL CAPACITY	ULTIMATE CAPACITY
1.	No. of IP Extensions	250	1,500
2.	No. of Exchange Lines (Trunks)	8	16
3.	(i) GSM lines (Safaricom, Airtel and Orange) complete with lines.	3	16
	(ii) Wireless backup for the pilot exchange line.	1	4
4.	PC Operator Consoles	1	2
5.	Operator Head Sets	2	4
6.	Operator Hand Sets	2	4
7.	ISDN PRI-E1 of 30 channels complete with suitable Modem	1	2

2.33 OTHER MINIMUM REQUIREMENTS FOR THE IP PBX

The IP based PBX shall: -

1. Be fully IP enabled and equipped
2. Be VOIP ready
3. Be ready to connect to LAN and also support branch connectivity where WAN/internet service is available.
4. Be ISDN ready and equipped
5. Must be able to **support five digits'** extensions numbering plan
6. Have at least 50% power failure trunk transfer facility
7. Must be capable of offering unified communication services (voice, video & data convergence)
8. Be capable of connecting/transferring an incoming call to a mobile service when the extension user is not at his desk.
9. Have a battery bank of at least 8 hrs. autonomy.
10. Have direct inward dialing system access facilities and data communication services.
11. be of compact modular design with sub-lines pre-wired and easily removable
12. Be equipped with flexible music on hold
13. Have call forwarding automatic call transfer, three party conference among other standard features.
14. Be equipped with mains power supply Anti-surge, over-voltage and under-voltage protection devices and lightning protectors for all cards.

15. Have on screen fault indication facility.
16. Be **type approved by the Communications Authority of Kenya**. The bidder is required to submit the CAK type approvals.
17. Be **compatible** for connection to Telkom / Orange (Kenya) Ltd, Safaricom networks etc.

2.34 BROCHURES AND TECHNICAL LITERATURE

Tenderers **Must** enclose together with their submitted bids brochures detailing technical Literature and specifications of the IP- PBX and IP network telephone instruments and the UPS. The brochures shall be used to evaluate the suitability of IPBX and the associated accessories. **Any bid submitted without the brochures shall be considered technically non-responsive, and shall subsequently be disqualified.**

2.35 ITEMS TO BE STATED BY THE TENDERER

Delivery period from date of award of contract..... weeks

Period required for installation from receipt of equipmentweeks

What is the name and model number of the proposed IP based PABX for which you have tendered?

In which countries is the PABX and it PCB's manufactured.....
.....

With what standards does the IP based PABX comply?

Is a full stock of spares available in Kenya?

For how many years is the continuity of spare parts guaranteed? (A minimum of 10 years is required) years

What is the busy hour traffic capacity of the IP- PABX assuming no delay in main exchange dial tone?

What is the maximum ambient temperature in which the IP pBX will function satisfactorily?

Is air conditioning required for the IP-PBX?

Is protection against high transient line voltage incorporated?

How many pairs are required per extension line?

Is the operator's console suitable for a blind operator?

What is the warranty period offered?
(Note: 12 months is the minimum)

Is an MDF incorporated in the PABX?

Is the POE incorporated in the PABX?

Capacity of the standby battery in A.H.....

Output of charger in Amps

Provide a comprehensive list of other places and contacts where the proposed IP-PABX is installed and working (a separate sheet may be used)
.....
.....

Provide a list of branch offices and contacts for purposes of future maintenance when the proposed IP-PABX is installed and extended to the counties and sub- counties (a separate sheet may be used)
.....
.....

PART 3 TECHNICAL SPECIFICATIONS FOR ACCESSORIES

3.1 SPECIFICATIONS FOR LIGHT DUTY UPS

ITEM	DESCRIPTION	MINIMUM REQUIREMENTS	BIDDER'S SPECIFICATIONS
A	GENERAL SPECIFICATIONS		
1	Make	BRANDED	
2	Model		
3	Country of Origin		
4	Manufacturer's brochure and specification	Must be supplied	
B	TECHNICAL SPECIFICATIONS		
5	Rating	650VA	
6	Input voltage swing	220 – 270V ac	
7	Output voltage	220-240V ac	
8	Output frequency	50-60HZ auto-sensing	
9	Protection	❖ Output overload ❖ Input/output short circuit	
10	Communication Interface	Serial port communication support	
11	Design	❖ Automatic voltage regulation ❖ Mains isolation ❖ User replaceable batteries ❖ Static-automatic bypass ❖ Maintenance bypass	
12	Battery Module	❖ 25 minute backup time ❖ 3 year lifetime ❖ Sealed lead acid type preferred ❖ Automatic periodic battery tests ❖ Short recharge time (maximum 5 hours for 100% run time) ❖ Protection against excessive discharge	

Other Items to be supplied:

- 1) Power Supply extension cable complete with 13A 3pin plug and 4x13A switched socket outlets panel which is complete with inbuilt overcurrent/overvoltage/surge protection

SECTION E

SCHEDULE OF UNIT RATES

SCHEDULE OF UNIT RATES

1. The tenderer shall insert unit rates against the items in the following schedules and may add such other items as he considers appropriate.
2. The unit rates shall include for supply, transport, insurance, delivery to site, storage as necessary, assembling, cleaning, installing, connecting, profit and maintenance in defects liability and any other obligation under this contract.
3. The unit rates will be used to assess the value of additions or omissions arising from authorised variations to the contract works.
4. Where trade names or manufacturer's catalogue numbers are mentioned in the specification, the reference is intended as a guide to the type of article or quality of material required. Alternative brands of **equal** and **approved** quality will be accepted.
5. 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 and all taxes (including **16% V.A.T, 3 % Withholding tax and all other taxes applicable at the time of tender**).

SCHEDULE OF UNIT RATES

(To be completed by the Tenderer)

ITEM	DESCRIPTION	QTY/	UNIT	RATE(KSHS)
1.	4 core Single mode fiber cable	1	M	
2.	6 core Single mode fiber cable	1	M	
3.	4 core Multi mode fiber cable	1	M	
4.	6 core Multi mode fiber cable	1	M	
5.	4 core Single mode fiber outdoor cable	1	M	
6.	6 core Single mode fiber outdoor cable	1	M	
7.	4 core Multi mode fiber outdoor cable	1	M	
8.	6 core Multi mode fiber outdoor cable	1	M	
9.	Cat 6e UTP 8-Pair outdoor cable	1	M	
10	Data Cabinet			
	a) 12U Data Cabinet	1	No.	
	b) 22U Data Cabinet	1	No.	
	c) 32U Data Cabinet	1	No.	
11.	d) 9U Data Cabinet	1	No.	
12	Single port Cat 6E angled Faceplate	1	No.	
13	CAT 6E UTP 4-Pair Cable	1	M	
14	CAT 6A STP 4-Pair Cable	1	M	
15	wireless gateway module completes with accessories & line	1	Item	
16	Wireless module complete with accessories & line	1	Item	
17	Wireless gateway (48 circuits)	1	No.	

SECTION F

BILLS OF QUANTITIES

BILLS OF QUANTITIES

A) PRICING OF PRELIMINARIES ITEMS

Prices will be inserted against item of preliminaries in the Contractor's Bills of Quantities and specification. These Bills are designated as Bill No.1 in this Section. Where the Contractor fails to insert his price in any item he shall be deemed to have made adequate provision for this on various items in the Bills of Quantities. The preliminaries form part of this contract and together with other Bills of Quantities covers for the costs involved in complying with all the requirements for the proper execution of the whole of the works in the contract.

The Bills of Quantities are divided generally into three sections:

(a) Preliminaries – Bill No.1

Contractor's preliminaries are as per those described in section C – Contract Preliminaries and General Conditions of Contract. The Contractor shall study the conditions and make provision to cover their cost in this Bill. The number of preliminary items to be priced by the Tenderer has been limited to tangible items such as site office, temporary works and others. 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

- (i) 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.
- (ii) The unit of measurements and observations are as per those described in clause 1.0 5 of the section C.

(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 Contract shall insert his totals and enter his grand total tender sum in the space provided below the summary.

This grand total tender sum shall be entered in the Form of Tender provided elsewhere in this document.

SPECIAL NOTES TO THE BILLS OF QUANTITIES

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 and all taxes (including **16% V.A.T, 3 % Withholding tax and all other taxes applicable at the time of tender**).
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.
4. The brief descriptions of the items given in the Bills of Quantities are for the purpose of establishing a standard to which the sub-contractor shall adhere to. Otherwise alternative brands of **equal and approved** quality will be accepted.

Should the sub-contractor install any material not specified here-in before receiving **approval** from the Project Manager, the sub-contractor shall remove the material in question and, **at his own cost**, install the proper material.

5. The grand total of prices in the price summary page must be carried forward to the **MAIN Summary Page**.
6. Tenderers must enclose, together with their submitted tenders, detailed coloured manufacturer's Brochures detailing Technical Literature and specifications on all the equipment they intend to offer e.g. Standby Battery and UPS, Data Switches, Routers and IP-PBX.

The brochures are to be used to ascertain the suitability of the components offered by the bidders. Bidders not complying with this requirement shall be considered technically non-responsive and shall subsequently be disqualified.

PROPOSED OFFICE SPACE AT NSSF ANNEX HOUSE 10TH FLOOR
W. P. ITEM No. D107 NB/NB/1902 JOB No. 10759 A

IP PBX AND STRUCTURED CABLING INSTALLATION WORKS

BILL No. 2: IP PBX WORKS

SCHEDULE No. 1 - IP PBX EQUIPMENT

Item	Description	Qty	Unit	Rate	Amount (Kshs.)
1.0	Supply, install, test and commission an IP PBX Cisco Business Edition 6000H or equal and approved equivalent as specified in particular specifications in section ‘‘D’’.	1	No.		
2.0	Supply, install, test and commission a battery set for the IP PBX. above with enough capacity to serve all auxiliary equipment linked to the IP PBX for a period of minimum 8 hours .	1	No.		
3.0	Supply, install, test and commission an AC Voltage stabilizer for the IP PBX and all auxiliary equipment. Connected to the IP PBX	1	No.		
4.0	Provide telecommunication earth to the IP PBX	1	No.		
5.0	Supply, Install, Test and commission a Modem for ISDN PRI for the IP PBX	1	No.		
3.3	Any other items necessary to complete the structured cabling satisfactorily. (List and give quantities of the items) a)..... b)..... c)..... e).....				
	Sub-total for IP PBX C/F to Bill No.1 Collection page				

SCHEDULE No. 2:- IP TELEPHONE INSTRUMENTS

Item	Description	Qty	Unit	Rate	Amount (Kshs.)
	Supply, Install, Test and Commission the following items:				
1.0	IP Standard telephone instruments complete with telephone cord and all other necessary accessories as Cisco 7821 Specs or equal and approved equivalent as specified in particular specifications in section “D”.	32	No.		
2.0	IP Executive telephone instruments complete with telephone cord and all other necessary accessories as Cisco 8861 or equal and approved equivalent as specified in particular specifications in section “D”.	6	No.		
3.0	IP Conference telephone instruments complete with telephone cord and all other necessary accessories as Cisco IP Phone 8832 or equal and approved equivalent as specified in particular specifications in section “D”.	2	No.		
4.0	IP Lobby/Reception phone instruments complete with telephone cord and all other necessary accessories as Cisco IP Phone Cisco 8851 or equal and approved equivalent as specified in particular specifications in section “D”.	2	No.		
5.0	Attendant Console as Cisco Attendant Console 11.X complete with telephone cord and all other necessary accessories as specified in particular specifications in section “D”.	1	No.		
6.0	Allow for terminating, testing and Labeling all circuits.	1	Item		
Sub-total for IP Telephone Instruments C/F to Bill No. 2					
Collection page					

SCHEDULE No. 3:- TELEPHONE CALL MANAGEMENT SYSTEM

Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs.)
	<p>Supply and install the following:</p> <p>1.0 Desktop Computer with technical specifications as described in particular specifications</p> <p>2.0 1500VA Rack Mountable Medium Duty UPS with technical specifications as described in particular specifications</p> <p>3.0 Call management software capable of supporting the proposed IP PBX, and with technical specifications as described in particular specifications</p> <p>4.0 Allow for interconnecting the IP PBX. SMDR port and the Desktop computer through RS232 serial link, and for interconnecting the Desktop Computer</p> <p>5.0 Allow for testing and Commissioning of the Telephone Management system to the satisfaction of the Project Manager</p>	1	No.		
	<p>Sub-total for Telephone Call Management System C/F to Bill No. 2 Collection page</p>				

BILL No. 2: COLLECTION PAGE

Item	Description				Amount (Kshs.)
1.0	Sub total for Bill No. 2: Schedule No. 1 (IP PBX EQUIPMENT) B/F Page F-3				
2.0	Sub total for Bill No. 2: Schedule No. 2 (TELEPHONE INSTRUMENTS) B/F Page F-4				
3.0	Sub total for Bill No. 2: Schedule No. 3 (TELEPHONE CALL MANAGEMENT SYSTEM) B/F Page F-5				
	Sub-total for IP PBX Installation Works C/F to Main Summary Page				

BILL No. 3: STRUCTURED CABLING WORKS

Item	Description	Qty	Unit	Rate	Amount (Kshs.)
1.0	<u>Horizontal Data Cabling</u>				
1.1	24 port Fibre Optic patch panel as Siemon or approved equivalent.	3	No.		
1.2	24 port category 6A UTP (19".0) patch panel to ANSI/TIA/EIA-568A, colour black as Siemon or approved equivalent.	1	No.		
1.3	48 port category 6A UTP (19".0) patch panel to ANSI/TIA/EIA-568A, colour black or approved equivalent.	4	No.		
1.4	1M RJ45-RJ45 Cat 6A UTP factory terminated patch cord as Siemons or approved equivalent .	120	No.		
1.5	3M RJ45-RJ45 Cat 6A 4-Pair stranded UTP factory terminated patch cord as Siemons or approved equivalent to be used in cabinet.	120	No.		
1.6	2U horizontal cable managers as Siemon or approved equivalent.	8	No.		
1.7	Category 6A 4pair, 24 AWG, UTP, 10 ohm cable, must exceed ANSI/TIA/EIA-568-B1 requirement as Siemon or approved equivalent.	1200	M		
1.8	Category 6A angled faceplate, SINGLE port white colour complete with fixing screws as Siemon or approved equivalent.	120	No.		
1.9	Self adhesive Labels for cable labelling (PACKETS OF 200 LABELS EACH)	2	Item		
2.0	<u>Active Components and Cabinets</u>				
2.1	42U metal cabinet with a perforated metal door complete 4No fans, power socket 6No, grounding kits and castors.	1	No.		
2.2	Ditto but 22U cabinet.	2	No.		
	Sub-total carried forward to the next page				

Item	Description	Qty	Unit	Rate Kshs	Cost Kshs
Sub-total carried forward from the previous page					
2.3	24 port PoE Switch as Cisco Catalyst Model No. Catalyst C9200L-24P-4X-E with SFP modules or equal and approved equivalent as specified in particular specifications in section “D”.	2	No.		
2.4	48 port PoE Switch as Cisco Catalyst Model No. Catalyst C9200L-48P-4X-E with SFP modules or equal and approved equivalent as specified in particular specifications in section “D”.	1	No.		
2.4	Wireless Access Point as Cisco Catalyst Model No. Catalyst 9120 with SFP modules or equal and approved equivalent as specified in particular specifications in section “D”.	3	No.		
3.0	<u>General Requirements</u>				
3.1	Earthing the system at the Cabinet level	1	Item		
3.2	1500VA Rack mountable Uninterruptible power supply unit with LCD display	3	No.		
3.3	10KVA rack mounted UPS power supply as specified in particular specifications	1	No.		
3.4	Any other items necessary to complete the structured cabling satisfactorily. (List and give quantities of the items)				
	a).....				
	b).....				
	c).....				
	e).....				
Sub-total for Basement Floor C/F to main summary page					

SCHEDULE No. 2:- FIBER OPTIC INTERLINKS, BROCADE SWITCH AND ROUTER

Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs.)
4.1	Install indoor 8 core single mode fiber cable interlinking switches on every floor in the new library block and between data cabinets on the same floor	100	Lm		
4.2	Splicing kits for terminating the fiber cable to the different switches SFP ports.	2	No		
4.3	Install fiber trays in each of the cabinets	4	Item		
4.4	PoE SAN Switch - as Lenovo B300 FC SAN Switch or equal and approved equivalent as specified in particular specifications in section "D".	1	Item		
4.5	PoE Router as Cisco ISR 4331 VSEC with SFP modules or equal and approved equivalent as specified in particular specifications in section "D".	1	Item		
4.6	Allow for structured cabling termination at all computer terminals, attendance in power connections, testing and commissioning of the network to TSD-ISN standards.	1	lot		
4.7	Provide for fiber cable testing, preparing and presenting warranty and documentation, cabling layout diagrams, indelible point labels and preparing and submitting individual test results (for each point and for all point to be submitted as a bound report). Attach printed results and soft copy	1	lot		
4.8	Grounding and bonding kit complete with 50mm diameter copper bounding bar and 6mm thick green and yellow wire. The Earthing the system is to be to the approval of the Engineer.	1	Item		
4.9	Any other items necessary to complete the structured cabling satisfactorily. (List and give quantities of the items) a)..... b)..... c)..... d)..... e).....				
	Sub-total for Fibre Optic Interlinks and Backbone Core Switch C/F to main summary page				

SCHEDULE No. 3:- GENERAL REQUIREMENTS

Item	Description	Qty	Unit	Rate (Kshs)	Amount (Kshs.)
5.1	Training, Certification and Warranties i) Preparation of technical Solution/ proposal ii) Certified training of personnel iii) Warranty iv) Certification of structured cabling	1	Item		
5.2	Any other items that may be necessary as per your proposal a) b) c) d)				
	Sub-total C/F to main summary page				

Bill No. 3 : COLLECTION PAGE

Item	Description	Amount (Kshs.)
1.0	Sub-total Bill No. 3: Schedule No. 1 STRUCTURED CABLING WORKS B/F from page F-8	
2.0	Sub-total Bill No. 3: Schedule No. 2 (FIBER OPTIC INTERLINKS, STACKABLE MANAGED SWITCH AND ROUTER) B/F from page F-9	
3.0	Sub-total Bill No. 3: Schedule No. 3 (GENERAL REQUIREMENTS) B/F from page F-10	
	Total for Structured cabling C/F to main Summary Page	

MAIN SUMMARY PAGE

Item	Description	Cost Kshs
A	Sub-total Bill No. 2: IP PBX WORKS B/F from page F-6	
B	Sub-total Bill No. 3: STRUCTURED CABLING WORKS B/F from page F-11	
C	Allow for training of 2No. technical staff from Public Works Directorate and 4No. Clients staff on usage and operation of the installed systems	
D	Labelling: Allow for labelling all telecommunication cables, active devices and telecommunication points and all necessary documentation	
E	Allow for 3No. Sets working drawings	
F	Allow for 3No. Sets of as installed drawings	
H	Allow a Provisional Sum of Kshs. 500,000/- for contingency sum to be used at the discretion of the Project Manager	
I	Total for data & voice communication works c/f to Grand Summary Page	

SECTION G
TECHNICAL SCHEDULE
OF
ITEMS TO BE SUPPLIED

TECHNICAL SCHEDULE

1. The technical schedule shall be submitted by tenderers to facilitate and enable the Project Manager to evaluate the tenders, especially where the tenderer intends to supply or has based his tender sum on equipment which differs in manufacture, type or performance from the specifications indicated by the Project Manager.
2. The filling of this schedule forms part of Technical Evaluation of the tenders, and bidders shall therefore be required to indicate the type/make and country of origin of all the materials and equipment they intend to offer to the employer in this schedule.
3. Any bid returned with unfilled Technical Schedule shall be considered technically non-responsive, and the bidder shall automatically be disqualified.

TECHNICAL SCHEDULE OF ITEMS TO BE SUPPLIED

(To be completed by the Tenderer as a Mandatory Requirement)

ITEM	DESCRIPTION	TYPE/MAKE	MODEL	COUNTRY OF ORIGIN
1	Patch panels			
2	Patch cords			
3	CAT 6A Cables			
4	Wireless Access Points			
5	Cable managers			
6	Faceplate			
7	Edge Switch			
8	Core Switch			
9	Discases			
10	Fibre Optic Cable			
11	UPS			
12	Data Cabinets			
13	Computer Set			
14	IP-PBX Machine			
15	IP Standard Telephone instruments			
16	IP Executive Telephone instruments			

ITEM	DESCRIPTION	TYPE/MAKE/CATALOGUE No.	MODEL	COUNTRY OF ORIGIN
1.0	Patch panels/patch cords			
2.0	Network Video Recorder			
3.0	CAT 6A cables			
4.0	Network Switches a) Core Switch b) Edge Switch			
5.0	Fiber Cable			
6.0	Cameras a) Dome b) PTZ c) Bullet			
7.0	LED panel display			
8.0	Computer			
9.0	UPS			
10.0	LCD Projectors			
11.0	Projectors Screen			

SECTION H

STANDARD FORMS

CONTENTS OF SECTION H

	<u>TITLE</u>	<u>PAGE</u>
1.	Key Personnel	H/1
6.	Schedule of Contracts completed in the last five (5) years	H/2
7.	Schedule of on-going projects	H/3
8.	Contractor's Equipment	H/4
9.	Details of Litigation or Arbitration Proceedings	H/5

NOTE:

1. Tenderers must duly fill these Standard Forms as a mandatory requirement as they will form part the evaluation criteria.
2. Any tender returned with **unfilled Standard Forms** shall be considered **non-Responsive and shall automatically be disqualified.**

KEY PERSONNEL

Qualifications and experience of key personnel proposed for administration and execution of the Contract.

POSITION	NAME	HIGHEST QUALIFICATION <i>(Attach proof)</i>	YEARS OF EXPERIENCE (GENERAL)	YEARS OF EXPERIENCE IN PROPOSED POSITION
1.				
2.				
3.				
4.				
5.				
6.				
7.				

I certify that the above information is correct.

.....

Title

.....

Signature

.....

Date

CONTRACTS COMPLETED IN THE LAST FIVE (5) YEARS

Work performed on works of a similar nature, complexity and volume over the last 5 years.

<i>PROJECT NAME</i>	<i>NAME OF CLIENT</i>	TYPE OF WORK AND YEAR OF COMPLETION	VALUE OF CONTRACT (KSHS.)

I certify that the above works were successfully carried out and completed by ourselves.

.....

.....

.....

Title

Signature

Date

SCHEDULE OF ON-GOING PROJECTS

Details of on-going or committed projects, including expected completion date.

<i>PROJECT NAME</i>	<i>NAME OF CLIENT</i>	<i>CONTRACT SUM</i>	<i>% COMPLETE</i>	<i>COMPLETION DATE</i>

I certify that the above works are currently being carried out by ourselves.

.....

Title

.....

Signature

.....

Date

**SCHEDULE OF MAJOR ITEMS OF CONTRACTOR'S EQUIPMENT PROPOSED FOR
CARRYING OUT THE WORKS**

ITEM EQUIPMENT	OF	DESCRIPTION, MAKE AND AGE (Years)	CONDITION (New, good, poor) and number available	OWNED, LEASED (From whom?), or to be purchased (From whom?)

DETAILS OF LITIGATION OR ARBITRATION PROCEEDINGS IN WHICH THE TENDERER HAS BEEN INVOLVED AS ONE OF THE PARTIES IN THE LAST 5 YEARS

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.