

**C. REVISED TECHNICAL SPECIFICATIONS AFTER PRE-BID**

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**2.0 General Technical Requirements**

- 2.0.1 Language Support: All information technologies must provide support for the English Language
- 2.0.2 DATES: All information technologies MUST properly display, calculate, and transmit date data, including, but not restricted to 21st-Century date data.
- 2.0.3 Electrical Power: All active (powered) equipment must operate on voltage range and frequency range, e.g., 220v +/- 20v, 50Hz +/- 2Hz. All active equipment must include power plugs standard in India.
- 2.0.4 Environmental: Unless otherwise specified, all equipment must operate in environments of the hospital or as specified in the technical specification.
- 2.0.5 Safety: As specified in the technical specifications
- 2.0.6 Make & Model: Mention make & model of the items/equipments being quoted in the System Inventory Table (E. Implementation Schedule).**

**2.1 Computing Hardware Specifications**

2.1.1 NA

2.1.n Shared Output and Input Devices: NA

**2.2 Network and Communications Specifications**

2.2.1 Local Area Network(S):

2.2.1.1 Equipment and software:

**2.2.1.1.1 Central (Core) L3 Switch:**

- Stackable Managed 24-Port Gigabit SFP Stackable L3 Switch with 8 Combo 1000Base-T or higher
- Ports: 24 (SFP), Combo Ports: 8 (10/100/1000 BASE-T), Open Slot for 10-Gigabit Uplink Modules: 2 or higher, RS-232 Console Port: 1, Switch Fabric: 88Gbps or higher, Packet Forwarding Rate: 65.5 Mpps or higher, Packet Buffer: 2MB or higher, MAC Address Table: 16K Entries or higher, IP v4 Routing Table: 12K Entries or higher, IP v6 Routing Table: 6K Entries or higher, Emissions: FCC Class AEN61000, VCCI,UL, IEC Should support optional stacking on 40GB speed,
- Internal/ External Redundant power supply Should support GVRP or Similar Feature/protocol; should support Layer 3 routing protocol RIP, OSPF, BGP etc for both IPv4 and IPv6.; the OS of the switch should be upgradeable and secure .
- Warranty: On site comprehensive warranty for 3 yrs.
- Switch should have virtualization feature as one or more switch can act as a single Switch.
- RACK: 24U (800mm x 800mm), floor mountable, wherein the Core Switch and Patch/Jack Panel will be mounted. The rack should have vertical and horizontal cable manager of at least 100mm depth. It should be closed in the front with glass and should have all necessary accessories like cooling fans (at least 4 numbers), 5A socket (6 numbers) on the PDU etc.

**2.2.1.1.2 Edge Switch L2:**

- Managed 24-Port Gigabit Layer 2 Switch and 4 SFP.

- 10/100/1000BASE-T Ports: 24; SFP ports: 4; RS-232 Console Port: Yes; switch should support at least 256 VLAN's or higher, with Virtual VLAN Interface. Switch Capacity: 54 Gbps or higher; 64-Byte Packet Forwarding Rate: 40 Mpps or higher; MAC Address Table Size: 8K or higher; EMI/EMC: FCC Class A, ICES-003 Class A, VCCI Class A.
- Management: CLI via console, Web-based configuration and management, RMON, SNMP, NTP
- Warranty: On site comprehensive warranty for 3 yrs.
- Should be of same make as Core switches.
- Network Rack: 12U, Wall mounted, Double Section with related accessories (like air circulation fan, PDU, cable manager, etc.)

2.2.1.2 Cabling:

**2.2.1.2.1 Category 6 UTP Cable-**

- 4 Pair with ETL test report for channel and zero bit error
- All UTP Components should be from the same OEM.
- The OEM should be ISO 9001:2000 Certified.
- In the changing needs of the global resources if the company has environmental management systems in place like ISO 14001 accreditation the same shall be added advantage.
- The cabling should be certified to have application support warranty for next 20 years or higher.
- The complete cabling system offered shall be upgradeable to the intelligent system by simply bringing in additional hardware and software.
- The bidder/OEM should be able to physically demonstrate intelligent system monitors/scanners, intelligent jack panels etc. if so required.

| <b>Characteristic</b>      | <b>Min. Required Specification</b>  |
|----------------------------|---|
| Features                   | Category 6 Unshielded Twisted Pair 4 pair 100Ω cable shall be compliant with ANSI/TIA/EIA-568-B.2-1 Additional Transmission Performance Specifications for 4-pair 100Ω Category 6Cabling. |
|                            | Category 6 UTP cables shall extend between the work area location and its associated telecommunications closet and consist of 4 pair, 23 AWG, UTP Non Plenum cable jacket.                |
|                            | The 4 pair Unshielded Twisted Pair cable shall be UL® Listed  |
|                            | The Cable Should be UL, ETL Certified, EIA/TIA 568-C.2.   |
|                            | All Category 6 cables shall meet or exceed the following characteristics:   |
| Mechanical Characteristics | Construction: 4 twisted pairs separated by internal X shaped, 4 channel, polymer spine / full separator. Half shall not be accepted.  |
|                            | Conductor Solid Copper  |
|                            | Conductor Diameter 0.56±0.005mm (23 AWG)  |
|                            | Insulator Polyolefin  |
|                            | Jacket PVC  |
|                            | Outer Diameter 6.0±0.4mm  |
|                            | Max. Operating Temp 60°C and Storage Temp 75°C.   |

**2.2.1.2.2 FACE PLATE-**

| <b>Characteristic</b> | <b>Min. Required Specification</b>                                  |
|-----------------------|---|
| Features              | Single Gang square plate, 86mmx86mm                                 |
|                       | Write on labels in transparent plastic window – supplied with plate |
|                       | Screw hole covers – to be supplied with plate                       |

|  |  |
|--|--|
|  | Plug in Icons – Icon tree – to be supplied with plate      |
|  | Should be able to support variety of jacks – UTP, STP only |

**2.2.1.2.3 INFORMATION OUTLET with ETL test report-**

| <b>Characteristic</b>             | <b>Min. Required Specification</b>  |
|-----------------------------------|---|
| Features                          | Category 6, TIA568B.2-1 – 250MHz  |
|                                   | All information outlets for 100 Ω, 22-24 AWG copper cable shall: Use insulation displacement connectors (IDC)   |
|                                   | Allow for a minimum of 200 re-terminations without signal degradation below standards compliance limits.  |
|                                   | Be constructed of high impact, flame-retardant thermoplastic with colour and icon options for better visual identification.                                 |
|                                   | With spring loaded shutter  |
|                                   | With Terminator cap   |
|                                   | IDC posts should be pointed   |
|                                   | 568A/B configuration  |
|                                   | Information outlet (RJ45 jack) should be covered under ETL Verification program for compliance with TIA568B.2-1, ETL certificate to be submitted with offer |
| Mechanical :<br>Jack<br>Connector | Plastic Housing: Polycarbonate, UL94V-0 rated or equivalent   |
|                                   | Operating Life: Minimum 750 insertion cycles  |
|                                   | Contact Material: Copper alloy  |
|                                   | Contact Plating: 50 μinches gold over 100 μinches nickel  |
|                                   | Plastic Housing: Polycarbonate, UL94V-0 rated or equivalent   |
|                                   | Operating Life: Minimum 200 Re-terminations   |
|                                   | IDC Contact Plating: Tin Plate (tin/lead)   |

**2.2.1.2.4 24 PORT JACK PANEL-**

| <b>Characteristic</b>                           | <b>Min. Required Specification</b>  |
|---|---|
| Features  | Be made of cold rolled steel, in 24 port configurations. Each jack should have spring loaded shutter inside the jack for 100% dust free environment.  |
|   | Allow for a minimum of 750 plug mating cycles   |
|   | Have port identification numbers on the front of the panel.   |
|   | Should have self adhesive, clear label holders (transparent plastic window type) and white designation labels with the panel, with optional colour labels / icons.                                    |
|   | Each port / jack on the panel should be individually removable on field from the panel.   |
|   | Should have integrated rear cable management shelf.   |
|   | Should comply to the following : TIA/EIA-568-B.2-1 Component Compliant<br>FCC Subpart F 68.5 Compliant, IEC-603-7 Compliant, ISO 11801 Class E Compliant, UL 1863, Jack Panel Should be ETL Certified |
| Mechanical<br>Characteristics<br>Jack Connector | Plastic Housing: Polycarbonate, UL94V-0 rated or equivalent   |
|   | Operating Life: Minimum 750 insertion cycles  |
|   | Contact Material: Copper Alloy  |
|   | Contact Plating: 50μ” Gold/100μ” Nickel   |
|   | Contact Force: 100g minimum   |
|   | Plug Retention Force: 11 lbf.   |
| IDC Connector                                   | Plastic Housing: Polycarbonate, UL94V-0 rated or equivalent   |
|   | Operating Life: Minimum 200 re-terminations   |
|   | Contact Material: Copper Alloy  |
|   | IDC Contact Plating: Tin/Lead Plate   |
|   | Contact Force: 100g minimum   |
|   | Wire Accommodation: 22-24 AWG solid   |

### 2.2.1.2.5 MOUNTING CORDS (3ft)-

| Characteristic                    | Min. Required Specification   |
|-----------------------------------|---|
| Features                          | Category 6 Equipment cords (Length – 3 ft.)   |
|                                   | The work area equipment cords shall, at a minimum comply with proposed ANSI/TIA/EIA-568-B.2-1 Commercial Building Cabling Standards Transmission Performance Specifications for 4 pair 100Ω Category 6 Cabling. |
|                                   | Category 6 modular equipment cords: Shall be round, and consist of eight insulated 24 AWG, stranded copper conductors, arranged in four colour-coded twisted-pairs within a flame-retardant jacket.             |
|                                   | Equipped with modular 8-position modular plugs on both ends, wired straight through with standards compliant wiring.  |
|                                   | Should have 50 micro inches of gold plating over nickel contacts.   |
|                                   | Modular cords should include a moulded strain relief boot.  |
|                                   | Should be covered by ETL verification program for compliance with TIA 568B.2-1. Certificate to be submitted with bid.   |
| Mechanical – Cable                | Conductor size: 24 AWG stranded bare copper   |
|                                   | Max O.D.: 5.6mm (.22")  |
|                                   | Jacket: PVC   |
|                                   | Temperature range: -20oC to +60oC   |
| Mechanical Characteristics – Plug | Operating life: Minimum 750 insertion cycles  |
|                                   | Contact material: Copper alloy  |
|                                   | Contact plating: 50μ" Gold/100μ"Nickel  |
|                                   | Plug dimensions & tolerances compliant with FCC Part 68 and IEC 60603-7   |
|                                   | Approvals: UL   |
| Electrical Characteristics – Plug | Max voltage: 150 VAC (max)  |
|                                   | Max current: 1.5A @ 25oC  |
|                                   | Operating temperature: -40°C to 75°C  |

### 2.2.1.2.6 MOUNTING CORDS (7ft)-

| Characteristic                    | Min. Required Specification   |
|-----------------------------------|---|
| Features                          | Category 6 Equipment cords (Length – 7 ft.)   |
|                                   | The work area equipment cords shall, at a minimum comply with proposed ANSI/TIA/EIA-568-B.2-1 Commercial Building Cabling Standards Transmission Performance Specifications for 4 pair 100Ω Category 6 Cabling. |
|                                   | Category 6 modular equipment cords: Shall be round, and consist of eight insulated 24 AWG, stranded copper conductors, arranged in four colour-coded twisted-pairs within a flame-retardant jacket.             |
|                                   | Equipped with modular 8-position modular plugs on both ends, wired straight through with standards compliant wiring.  |
|                                   | Should have 50 micro inches of gold plating over nickel contacts.   |
|                                   | Modular cords should include a moulded strain relief boot.  |
|                                   | Should be covered by ETL verification program for compliance with TIA 568B.2-1. Certificate to be submitted with bid.   |
| Mechanical – Cable                | Conductor size: 24 AWG stranded bare copper   |
|                                   | Max O.D.: 5.6mm (.22")  |
|                                   | Jacket: PVC   |
|                                   | Temperature range: -20°C to +60°C   |
| Mechanical Characteristics – Plug | Operating life: Minimum 750 insertion cycles  |
|                                   | Contact material: Copper alloy  |
|                                   | Contact plating: 50μ" Gold/100μ"Nickel  |

|                                      |   |
|--------------------------------------|---|
|                                      | Plug dimensions & tolerances compliant with FCC Part 68 and IEC 60603-7 |
|                                      | Approvals: UL   |
| Electrical Characteristics<br>– Plug | Max voltage: 150 VAC (max)  |
|                                      | Max current: 1.5A @ 25oC  |
|                                      | Operating temperature: -40°C to 75°C                                    |

#### 2.2.1.2.7 Conduiting for Cat 6 UTP-

| Characteristic | Min. Required Specification                     |
|----------------|---|
| Features       | ISI Marked PVC conduit/ casing capping of 25 mm |

#### 2.2.1.2.8 Optical Fiber Cable:

- 4 Pair with UL, ETL Certified, EIA/TIA 568-C.2 for channel and zero bit error
- All Fiber Components should be from the same OEM.
- The OEM should be ISO 9001:2000.
- In the changing needs of the global resources if the company has environmental management systems in place like ISO 14001 accreditation the same shall be added advantage.
- The cabling should be certified to have application support warranty for next 20 years or higher.
- The complete cabling system (copper as well as fiber) offered shall be upgradeable to the intelligent system if required in future by retrofitting of sensors.
- The bidder/OEM should be able to physically demonstrate intelligent system monitors (for both copper & fiber), patch cords etc. if so required.

##### a. Optical Fiber Cable (Single-Mode)-

| Characteristic                 | Min. Required Specification  |   |
|--------------------------------|--|---|
| <b>GENERAL:</b>                | The fiber type is a Matched Cladding Single Mode   |   |
|                                | Fiber dual coated with acryl ate coating.  |   |
|                                | The fiber is optimized for operation at 1310 nm and at 1550 nm.  |   |
|                                | Should fulfill the requirements of IEC 793-2: 1992, Category B 1.1, EN 188101, ITU-T Recommendation G.652  |   |
|                                | Testing methods are in accordance with the following standards: <ul style="list-style-type: none"> <li>• ITU-T G.650, IEC 793-1, EN 188 000</li> </ul> |   |
| <b>GEOMETRICAL PROPERTIES:</b> | Nominal mode field diameter  | 9.0 μm  |
|                                | Mode field diameter tolerance  | ±10%  |
|                                | Cladding diameter  | 125 μm  |
|                                | Cladding diameter tolerance  | ±1 μm   |
|                                | Mode field concentricity error   | Max.:0.8 ± 0.1μm  |
|                                | Cladding non-circularity   | Max. 2 ± 0.2 %  |
|                                | Diameter of outer coating layer  | 245 μm (without coloring layer)   |
|                                | Tolerance of coating layer diameter  | ±10 μm  |
| <b>MATERIALS</b>               | CORE   | Germanium doped core with no phosphorus i.e. reduced tendency for hydrogen degradation.                 |
|                                | COATING  | UV-curable dual layer acryl ate coating, which ensures excellent micro bending and abrasion resistance. |
|                                | Stripping force after conditioning at 23± 5 °C at 40 - 60 % RH for 24 h.   |   |
|                                | Min.   | 1.0 ± 0.1 N   |

|                           |  |                         |
|---------------------------|--|-------------------------|
|                           | Max.   | 3.5 ± 0.2N              |
|                           | Stripping force after ageing in water at 70 ± 5 °C for 168 h.  |                         |
|                           | Min.   | 1.0 ± 0.1 N             |
|                           | Max.   | 3.5 ± 0.2 N             |
| <b>OPTICAL PROPERTIES</b> | Attenuation (of cable with fibers):  |                         |
|                           | <b>At 1310 nm</b>  | <b>&lt;= 0.40 dB/km</b> |
|                           | <b>In the range 1285-1330 nm</b>   | <b>&lt;= 0.43 dB/km</b> |
|                           | <b>At 1550 nm</b>  | <b>&lt;= 0.25 dB/km</b> |
|                           | <b>Loss due to hydrogen:</b>   |                         |
|                           | Maximum induced permanent loss after 1000 h at 1 bar H2 at 70 °C and out gassing for 72 h at 70°C (valid both at 1310 nm and at 1550 nm) | 0.2 ± 0.01 dB/km        |
|                           | <b>Dispersion:</b>   |                         |
|                           | Polarisation Mode Dispersion (PMD):  |                         |
| Max.                      | 0.5 ± 0.01 ps/km   |                         |

**b. FIBER PATCH PANELS (Single-Mode)– RACK MOUNT**

| <b>Characteristic</b> | <b>Min. Required Specification</b>   |
|-----------------------|--|
|                       | Have sufficient slots accommodate duplex SC adapters individually.   |
|                       | Should have fiber management provision inside  |
|                       | Have earthing lugs and other accessories.  |
|                       | Panel cover should be slide out for easy maintenance   |
|                       | Provide self-adhesive, clear label holders (transparent plastic window type) and white designation labels with the panel, for front panel labeling.                      |
|                       | Should be upgradeable as Intelligent Patch Panel without changing the existing Patch Panel hardware by simple retro fitting of intelligent sensors as and when required. |

**c. SC DUPLEX ADAPTORS (Single-Mode)-**

| <b>Characteristic</b> | <b>Min. Required Specification</b>   |
|-----------------------|--|
| Features              | All SC adaptors should be duplex type with shutter for protection. Adapters should be snap mount for easy insertion and removal. |

**d. Optical Fiber Connectors (SC) (Single-Mode)-**

| <b>Characteristic</b> | <b>Min. Required Specification</b>  |
|-----------------------|---|
| Features              | Provide a field installable single mode connector to terminate fiber optic cables from cable-to-cable, cable-to-equipment and equipment-to-equipment. |
|                       | The connector must: Be field installable  |
|                       | Utilize a PC polishing on the tip to provide high yield during installation.  |
|                       | Meet EIA and IEC standards for repeatability.   |

**e. Optical Fiber Equipment Cords (minimum 3 meter) (Single-Mode)-**

| <b>Characteristic</b> | <b>Min. Required Specification</b>  |
|-----------------------|---|
| Features              | All optical fiber patch leads shall comprise of Single mode 9/125µm fiber with SC, fiber connectors terminated at each end. The optical fiber patch leads shall comply with the following specifications: |
|                       | Connector: Zirconia ceramic ferrule   |
|                       | Pre-radiuses and pre-polished ferrule   |
|                       | Epoxy type fiber encapsulation  |
|                       | Color-coded connector boots fitted to connectors on duplex patch leads.   |
|                       | Dust caps shall be fitted on each connector at the assembly   |
|                       | Cable: 50/125, MM   |
|                       | Strength member: aramid yarn  |
|                       | 900µm tight buffer diameter   |

**f. LIU (Single-Mode)-**

- 12 Port Fiber Patch Panel (Enclosure) with Wall Mount or Rack Mountable
- 1U standard 19" rack mount
- Removable lid also affords protection to the interface patch cords
- Designed to accommodate Simplex SC, Duplex SC & LC Adapter

**g. Transceiver (Single Mode) (should be of same make as the switch)**

**h. Optical Fiber Cable (Multi-Mode)-**

- Indoor riser rated 6 core Multi Mode, 50 micron, OM3 optical fiber cable:
- The cable should consist of 900m tight-buffered optical fibers reinforced with Aramid Yarns and sheathed in flame retardant PVC.
- Characteristics- Optical Performance
- Max. Attenuation: At 850 nm: 3.5 db/KM, At 1300 nm: 1.0 db/KM
- Min. Bandwidth: At 850 nm: 200 MHz/KM, At 1300 nm: 500 MHz/KM
- Fiber Identification: Colour Coded
- Fiber Insulation: Coloured Nylon
- Reinforcing: Aramid Yarns
- Sheath: PVC
- Diameter (Nominal): 5.6 mm
- Mass (Nominal): 38 Kg/KM
- Min. Bending Radius (Full Load): 105 mm
- Max. Tensile Strength (Short Term): 0.6 kN
- Operating Temp. Range: -10degree centigrade to + 60 degree centigrade
- Crush Resistance (Short Term) : 1.0 kN/100mm

**i. Transceiver (Multi Mode) (should be of same make as the switch)**

**j. FIBER PATCH PANELS – RACK MOUNT**

| Characteristic | Min. Required Specification  |
|----------------|--|
|                | Have sufficient slots accommodate duplex SC adapters individually.   |
|                | Should have fiber management provision inside  |
|                | Have earthing plugs and other accessories.   |
|                | Panel cover should be slide out for easy maintenance   |
|                | Provide self-adhesive, clear label holders (transparent plastic window type) and white designation labels with the panel, for front panel labeling.                      |
|                | Should be upgradeable as Intelligent Patch Panel without changing the existing Patch Panel hardware by simple retro fitting of intelligent sensors as and when required. |

**k. SC DUPLEX ADAPTORS**

| Characteristic | Min. Required Specification  |
|----------------|--|
| Features       | All SC adaptors should be duplex type with shutter for protection. Adaptors should be snap mount for easy insertion and removal. |

**l. Optical Fiber Connectors (SC)**

| Characteristic | Min. Required Specification   |
|----------------|---|
| Features       | Provide a field installable single mode connector to terminate fiber optic cables from cable-to-cable, cable-to-equipment and equipment-to-equipment. |
|                | The connector must: Be field installable  |
|                | Utilize a PC polishing on the tip to provide high yield during installation.  |

Meet EIA and IEC standards for repeatability.

**m. Optical Fiber Equipment Cords (minimum 3 meter)**

| <b>Characteristic</b> | <b>Min. Required Specification</b>  |
|-----------------------|---|
| Features              | All optical fiber patch leads shall comprise of Single mode 9/125µm fiber with SC, fiber connectors terminated at each end. The optical fiber patch leads shall comply with the following specifications: |
|                       | Connector: Zirconia ceramic ferrule   |
|                       | Pre-radiuses and pre-polished ferrule   |
|                       | Epoxy type fiber encapsulation  |
|                       | Color-coded connector boots fitted to connectors on duplex patch leads.   |
|                       | Dust caps shall be fitted on each connector at the assembly   |
|                       | Cable: 9/125, SM  |
|                       | Strength member: aramid yarn  |
|                       | 900µm tight buffer diameter   |

**n. LIU (Multi-Mode)-**

- 12 Port Fiber Patch Panel (Enclosure) with Wall Mount or Rack Mountable
- 1U standard 19" rack mount
- Removable lid also affords protection to the interface patch cords
- Designed to accommodate Simplex SC, Duplex SC & LC Adapter

**o. Conduiting/ HDPE for SM & MM Fiber**

**p. Laying, Digging/trenching, filling, splicing & terminating of fiber and other media as applicable according to industry norms are part of supply, installation & commissioning.**

2.2.2 Wide-Area Network: NA

2.2.3 Other communications equipment: NA

**2.3 Software Specifications: NA**

**2.4 System Management, Administration, and Security Specifications: NA**

**2.5 Service Specifications**

2.5.1 System Integration: NA

2.5.2 Training and Training Materials: NA

2.5.3 Technical Support:

2.5.3.1 Warranty Service: As specified in Technical Specifications.

2.5.3.2 User support / hot line: As specified in Technical Specifications.

2.5.3.3 Technical Assistance: As specified in Technical Specifications.

2.5.3.4 Post-warranty maintenance services: As specified in Technical Specifications.

2.5.4 Data Conversion and Migration: NA

**2.6 Documentation Requirements**

2.6.1 END-User documents: The network diagram for the hospitals are attached along with this Bid Document as a reference however, the bidders are advised to visit the site before submission (Instruction to Bidders (A. General) Clause 8).

2.6.2 Technical Documents: The bidder shall attach technical documents/proof of compliance for equipment/model/component quoted by them.

**2.7 Consumables and Other Recurrent Cost Items: NA**

## **2.8 Other Non-IT Goods: NA**