

**KLE ACADEMY OF HIGHER EDUCATION AND RESRARCH**

**Network Up-gradation**

**Technical Specification Document**

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1. **Overview**

* The KLE ACADEMY OF HIGHER EDUCATION AND RESEARCH, Belagavi is planning to revamp and upgrade their ICT Network backbone systems to a robust and scalable network that can support 10 Gig (Gigabit Ethernet) uplinks
* It is desired that the physical layer should provide flexible, scalable, high-performance network infrastructure.
* The network infrastructure design for backbone should be developed to meet 3 tier architecture. A centrally located Data Center / Main Distribution Area will connect all Blocks Horizontal Distribution Area by Fiber Connectivity.
* The Design of ICT systems Backbone shall follow below standards guidelines,
  + TIA 1179 – Healthcare Facility Telecommunications Infrastructure Standard
  + ANSI/TIA 568 - Commercial Building Standards for Telecommunication
  + ANSI/TIA 569 – Pathways and Spaces
  + ANSI/TIA 606 – Administration
  + ANSI/TIA 607 – Bonding and Grounding
* This technical specification document describes product and system specifications for Fiber backbone (to support 10G), Copper Cabling, Containment and raceways systems and Network Racks / Cabinets.
* The products should be UL/ ETL rated for third party verifications and listed for RoHS (Resistant of Hazardous Substances)
* Bid security Amount 2 % of the bid price
* Payment - In consideration for the Services, the university will pay the vendor the agreed upon amount as per the final quotation (the "Payment"), payable in the following installments:

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| MileStone | Deliverables Included | Amount in % |
| 0 | Advance For the Project | 0% |
| 1 | After delivering the materials | 20% |
| 2 | After installation, testing ,configuration & commissioning | 60% |
| 3 | After technical review by Team | 20% |

* Training to Client: Corporate Training has to provide by the OEM/ Vendor for the minimum 10 Employ.

1. **Structured Cabling System Manufacturer Qualification Criteria**
2. The Optical Fiber and Copper cabling systems manufacturer should be ISO 9001 ISO 14000 Certified.
3. The cabling and associated hardware Material should have been manufactured in OEM’s own manufacturing facilities, not outsourced.
4. All factory test reports for cables / Racks should be available online from a publicly accessible portal as and when required by the customer. The reports shall have the performance parameters clearly mentioned for Copper and Fiber.
5. There should be minimum 10 years extended product warranty and Application Assurance as a part of certification of entire installed cabling system.
6. The OEM of passive components should be present in India from at least past 10 years.
7. All proposed passive products should have data sheets available on the OEM’s website. URL of each product to be submitted along with the bid.
8. All passive components / Racks should be RoHS complied. Declaration of – ROHS compliant should clearly be mentioned on data sheets of each Passive Components.
9. **Approved brands for ICT Systems**
10. Firewall – CISCO/PALOALTO/CHECKPOINT/SOPHOS/FORTIGATE
11. Network Switches and Wireless Components –CISCO CATALYST / EXTREME NETWORKS / ALCATEL LUCENT / HPARUBA / RUCKUS COMMSCOPE
12. Passive Connectivity – CommScope – SUSTIMAX Solutions
13. Racks / Enclosures – APC / Schneider / APW/ NETRACK
14. **Installation Partner / System Integrator Qualification Criteria**
15. The Contractor / Installer / System Integrator should be authorised channel partner of the OEM Suppliers mentioned above.
16. The Contractor / Installer should have completed minimum 3 University / Healthcare institutions of similar size.
17. The Contractor / Installer should be able to produce minimum 3 references of clients with whom they have worked for more than 100 Fiber and 1000 Copper Port counts.
18. The Contractor / Installer should have own inhouse team of structured cabling installers for copper and fiber systems. (NO sub-contract / outsourcing)
19. The Contractor / Installer should have minimum 3 certified and trained cabling installers of selected manufacturer for better technical and project management expertise.
20. The Contractor / Installer / System Integrator should produce OEM trained certificate for Installer
21. **Installer / System Integrator Scope of Work (Brief)**

1. Supply, Installation, Testing and Commissioning of Structured Cabling Systems that include,

1) Fiber and Copper Cabling

2) Trays and HDPE Pipes

3) Mounting of active equipment and patching

4) Labelling and Web enabled documentation

5) Testing with cable analyser and OLTS for fiber

2. Complete responsibility of installation and Testing / commissioning of the components.

3. Production of all drawings and technical documentation, prior to completion and delivery, which shall include, but shall not be limited to:

1) Layout drawings (locations, lengths, adjacencies, and dimensions + sections/elevations) Technical Specifications

2) Numbering layout

3) Schematic Diagram for ALL ICT / ELV / BMS Network Systems

4) Cable tray, Pathway Layout, Telecom Room Locations with dimensions

5) Rack Elevations, Telecom Outlet layout

4. Full technical documentation, submittals for all equipment and obtaining appropriate technical review by University IT Team.

5. Design, co-ordination, supply, testing (factory and site) and commissioning (factory and site), delivery, offloading, positioning and installation of ICT Systems.

6. Submission of technical datasheets, shop drawings, scheme of operation, technical brochures of all the equipment/components etc. and obtaining approval on the same from the Consultant before the start of the work at site. This shall include necessary schematic/architecture for all systems.

7. Handover of completed systems along with submission of completion documents in soft copies with all test-reports, catalogues, instruction/ operation/ maintenance manuals and “as built” drawings and documents as part of Handover process.

8. The installer must submit complete installation report and test reports once complete with installation.

1. **Technical Specifications – Cabling Products**

6.1 Single Mode Fiber

1. Minimum 12- core Single mode OFC, Tight buffered, LSZH, Yellow Color.
2. Fiber Optic Cable: 9/125μm, OS2, AS PER ITU-T G.652.D, G.657.A1(Bend Insensitive)
3. Gel-Free cable is tested in accordance with Telcordia GR-409
4. Fiber cable Diameter Over Jacket should be maximum 18 mm, Tensile Strength should be 396 N (long term) and 1320 N (short term) and Compression of the fiber cable should be minimum of 10 N/mm.
5. Flame test method, the cable should be Certified /compliant to IEC 60332-3, IEC 60754- 2, IEC 61034-2.
6. The Attenuation shall be 0.3 dB/km @ 1310nm and 0.4 dB/km @ 1550nm.
7. Installation temp shall be at least between the range of -10- and +60-degree C. Operating Temp shall be at least between the range of -20- and +70-degree C.
8. The storage Temp shall be at least between the range of -40- and +70-degree C.

6.2 Fiber Patch Panels and Pigtails

1. The fiber patch panel Shall have 4 slots to accommodate 4 adapter plates or 4 MPO / non MPO cassettes for 1U panel, 8 slots to accommodate 8 adapter plates or 8 MPO cassettes for 2 U panel.
2. Shall have front trough for easy patch cord management and labelling identification.
3. Depth of the Fiber Patch Panel should not exceed 35 cm.
4. The fiber shelf shall be sliding for easy access to the fiber connection for maintenance.
5. The shelf should be able to accommodate 48 fiber splice trays which can be mounted on top of each other if required.
6. The shelf shall have at least 8 knockouts for easy cable access. The knockouts will prevent rodents from entering the fiber shelf.
7. Pigtails / Adaptors / Cassettes - Regulatory Compliance: RoHS 2011/65/EU
8. Safety Standard: UL
9. Optical Performance – SM

* Insertion Loss, Typical: 0.30 dB
* Return Loss, Min: 55.0 dB

1. Ferrule Geometry: Pre-radiused
2. The adapters shall have hinged shutters on them for dust protection.
3. Pigtails shall have 12 (Twelve) different colors: Blue / Orange / Green / Brown / Slate / White/ red/ black/ yellow/ violet/ rose/ aqua
4. Ultra Low Loss Singlemode, LC/UPC Uniboot to LC/UPC Uniboot, 2.0 mm Duplex Fiber Patch Cord, Low Smoke Zero Halogen/Riser
5. Patch cords using Uniboot technology combine, modularity, flexibility with easy insertion and removal from connectivity
6. Uniboot connectors feature an adjustable polarity via a manual and independent rotation of each single connector body without exposing the fibers
7. Uniboot technology features a push-pull mechanism operated by squeezing the connector boot
8. Fiber Mode Singlemode Fiber Type G.652.D    |   G.657.A2, TeraSPEED®
9. Insertion Loss, maximum 0.25 dB
10. Operating Temperature -10 °C to +60 °C (+14 °F to +140 °F) Environmental Space Dual Rated LSZH/Riser.
    1. Category 6 A Cabling Systems
       1. Cat 6 A Cables
11. The Cable should meet ANSI/TIA 568C.2 Category 6 A Specifications.
12. The cable should consist of Eight 23 AWG copper conductors. Copper Clad Aluminum or any other combinations are not allowed.
13. The nominal Outside diameter should be maximum or lower to 7.5 mm.
14. The cable shall be Low-Smoke Zero Halogen (LSZH) and
15. must comply with the following Fire Safety standards IEC 60332-3-22, IEC 60754-2 and IEC 61034-2 .
16. The cable and cordage shall be "True UTP" components that do not include internal or external shields, screened components, or drain wires. No Special Grounding requirements
17. NEXT - Minimum 3 dB headroom
18. Should support a minimum of 4 connector Channel with a minimum 3 dB guaranteed NEXT
    * 1. Cat 6 A Patch Panels and Outlets
19. Shall be 24 port panel capable of terminating 24 CAT 6 A U/UTP cables.
20. Shall be UL Listed.
21. The panel shall be equipped with a removable rear mounted cable management bar and front and rear labels.
22. Operating Temperature Range = 14°F to 140°F (-10°C to 60°C)
23. Storage Temperature Range = -40°F to 158°F (-40°C to 70°C)
24. The 8-pin modular (RJ-45) jacks shall comply with IEC 60603-7-4
25. The Category 6 outlets shall be backward compatible with Category 5E cords and cables.
26. The information outlet shall have a Current Rating of 1.5 A at 20°C.
27. The information outlet will have insertion life of 750 cycles minimum.
    * 1. Cat 6 A Patch Cords
28. The system must support patch cord lengths of 1 meter minimum and equipment cords of 2 meter minimum and The Patch cords shall be solid core construction for better performance.
29. Cords shall be equipped with 8-pin modular plugs on each end.
30. Nominal cordage diameter shall be maximum or lower than 7.5 mm.
31. The patch cord shall be Low-Smoke Zero Halogen (LSZH) and
32. must comply with the following Fire Safety standards IEC 60332-3-22, IEC 60754-2 and IEC 61034-2.
33. The cordage shall be UTP components that do not include internal or external shields, screen components, or drain wires.
    1. Cable Trays
34. All Indoor cable tray should be solid metallic secured container with removable cover.
35. Material of construction should be Mild Steel, Hot Rolled with galvanized zinc coating.
36. The thickness for cable trays shall be considered minimum 2 mm.
37. Height of the tray should be 100mm & its Nominal Width should be 300mm, 450mm.
38. The cable trays shall be supplied in standard lengths of 2500 mm or 3000 mm.
39. The cable tray accessories include Vertical Elbows, Horizontal Bends, Adjustable Bends, Crosses, Tees and Reducers, etc,
40. All accessories shall have minimum bending radius of 600 mm.
41. Galvanizing: All cable trays, tray accessories, tray covers & tray supports including washers, etc. shall be hot dip galvanized.
42. Standard for Cable tray Steel IS: 2062, IS: 1079, IS: 811, IS: 513, IS: 808, IS: 1730, IS: 8910, ASME,
43. Standard for Bolts, Screws, Nuts, Washers, Fasteners IS: 1364, IS: 1367, IS: 1368, IS: 2016
44. Standard for hot dip galvanizing IS: 2629, IS: 2633, IS: 4759, IS: 4826 12. Galvanizing: All cable trays, tray accessories, tray covers & tray supports including washers, etc. shall be hot dip galvanized.
    1. Wall Mount Racks.
45. 19" wall mounting extruded aluminum rack with size (HxWxD) 15U H x 600mm W x 650mm D - Grey colour, Single fan, side openable panel, top ventilation.
46. Lockable front toughened glass door - 1no.
47. Side doors openable - 2no.
48. 230V A/C 90CFM fan with finger guard - 1 nos.
49. Fan Finger Guard - 2 nos
50. AC power strip with 5/15 Amp 6 sockets - 1 nos
51. 19" Horizontal PVC cable manager - 2 nos. 8. Earthing kit - 1 nos. 9. Stationary shelf - 1nos.
52. Hardware packet - 2 nos
53. **Technical Specifications - Active Components.**

University Active Components requirements.

University Current fiber seems to be has OM1 fiber backbone which does not support higher ethernet speed requirements like 10 Gbps. All switches are a mix of managed and unmanaged, small business category from different OEMs.

Primary objective of the project is to upgrade backbone to OS2 singlemode fiber which can support 10 Gig up to 400 meters. Similarly all switches need to be upgraded to enterprise range supporting 1 Gbps on access and 10 Gbps on servers and uplinks.

All switches should support SNMP management using Cisco Prime or any other Network Management software. Wireless Access points should be WiFi 6 capable of cloud management and monitoring.

The design proposed is collapsible backbone with 48 port 10 Gbps and 8 x 10 Gbps SFP28 and 12 port 10Gbps SFP28 fiber switch for servers. The core switch selected supports 1 Tbps stack with power redundancy and high buffer for Server aggregation. Switch is capable of handling large number of Vlans and routing tables. On the access front all switches are with 10 Gig uplinks with all security features available consistent with core switch configuration.

At any given rack location at least one access switch with POE capability should be available for deployment of Wireless Access Points.

* 1. **Preferred OEMs**

1. **Firewall Minimum support up to 3000 concurrent users**

**CISCO/PALOALTO/CHECKPOINT/SOPHOS/FORTIGATE**

1. **Enterprise Network Switches: All SNMP class manage Switches only (No Smart or Web Managed Switches):**

**CISCO CATALYST / EXTREME NETWORKS / ALCATEL LUCENT / HPARUBA / RUCKUS COMMSCOPE/JUNIPER**

1. **Wireless Network AP-Minimum number of simultaneous user should be above 60)**

**(All categories of Aps and Controller should be of same OEM)**

**Wireless Access point: All SNMP class managed Enterprise Wireless Access point ( Wifi 6 Grade only)**

**CISCO CATALYST / EXTREME NETWORKS / ALCATEL LUCENT / HPARUBA / RUCKUS COMMSCOPE**

* 1. **Firewall**

|  |  |
| --- | --- |
| **Sr No** | **Minimum Technical specification**  **(Minimum support upto 3000 concurrent users)** |
| **1** | **General Requirement** |
| 1.1 | Must have a 64-bit hardware platform & based on Multi-Core Architecture with Optimization for excellent throughput for all your key processes |
| 1.2 | The Proposed solution should have option for visibility into encrypted traffic flows, support for TLS 1.3 without downgrading the performance. |
| 1.3 | The device should be having security functions like Firewall, VPN (IPsec Site to Site &SSL Client VPN), Gateway level antivirus, Category based web and application filtering, Intrusion prevention system, Traffic shaping, DoS/DDoS. |
| 1.4 | Solution should offer with Central management solution with option to manage multiple firewalls from day one. |
| 1.5 | Solution should support Multiple WAN link balancing multiple Internet connections, auto-link health check, automatic failover, automatic and weighted balancing, and granular multipath rules, should support more than two ISP |
| **2** | **Hardware & Performance Requirement** |
| 2.1 | The appliance should support 4 x GbE copper 4 x 2.5 GbE copper 4 x SFP+ 10 GbE fiber |
| 2.2 | Firewall should have a minimum Firewall Latency (64 byte UDP) of 3 μs |
| 2.3 | Firewall must support at least 16 million concurrent connections |
| 2.4 | Firewall must support at least 3, 50,000 new sessions per second processing. |
| 2.5 | Firewall should support up to 30 Gbps of Firewall IMIX throughput. |
| 2.6 | Firewall should support integrated IPS throughputs of minimum 25 Gbps. |
| 2.7 | Firewall should have a minimum Firewall throughput of 75 Gbps. |
| 2.8 | Firewall should have a minimum Threat Protection throughput 6.5 Gbps. |
| 2.9 | Firewall should have a minimum NGFW throughput of 20 Gbps. |
| 2.10 | Firewall should have a minimum Ipsec VPN throughput ofminimum 60 Gbps |
| **3** | **General Features** |
| 3.1 | Firewall should support CLI and GUI based access to the firewall modules. |
| 3.2 | Should support Local authentication and integration with third party authentication solutions like, Active Directory, LDAP Server, RADIUS, TACACS+, eDirectory and Kerberos |
| 3.3 | Centralized, daily updates, automatic and manual updates or offline update. |
| 3.4 | Advance Threat Protection should have Inst ant identification and immediate |
| **5** | **Web Filtering** |
| 5.1 | Firewall should support minimum of at least 90+ predefined categories. |
| 5.2 | Should have flexibility to create network, user, Web and app-based traffic shaping (QoS) policy. |
| 5.3 | Exceptions based on network objects defined. |
| 5.4 | Notification of custom messages or URL redirection. |
| **6** | **Intrusion Prevention System** |
| 6.1 | IPS should protect for 7000+ Signatures database. |
| 6.2 | Firewall should block attacks such as DoS- SYN, IP/ICMP/TCP/UDP related attacks. |
| 6.3 | Solution should have IPS deep packet inspection engine with an option to select |
| 6.4 | IPS patterns which can ne applied firewall rule for better protection and should have option to create custom signature |
| 6.5 | Firewall should block attacks such as DNS cache poisoning, FTP bounce, improper commands. |
| **7** | **Application Control** |
| 7.1 | Firewall should have feature to identify, allow, block or limit usage of applications beyond ports and protocols. |
| 7.2 | Firewall should provide protection against Block potentially unwanted Applications |
| 7.3 | Application signature database of minimum 3500+ Applications for Application Control |
| **8** | **SD WAN** |
| 8.1 | Should have inbuild SD WAN technology with application path selection and routing, which is used to ensure quality and minimize latency for mission-critical applications |
| 8.2 | The Solution should support performance-based SLAs to automatically select the best WAN link based on jitter, latency, or packet-loss |
| 8.3 | Should support multiple WAN link options including VDSL, DSL, cable, LTE/cellular, and MPLS |
| 8.4 | Should provide real-time insights into latency, jitter and packet loss for all WAN links |
| 8.5 | Should maintain application sessions when link performance falls below thresholds and should make a transition to a better performing WAN link |
| 8.6 | Should have a central SDWAN Orchestration platform to create Multiple site-to-site VPN tunnels between network locations using an optimal architecture like hub-and-spoke, full mesh, or some combination. |
| 8.7 | Central Orchestration should have wixzards for easy and quick creating of VPN Tunnels |
| **9** | **Logging & Reporting** |
| 9.1 | Firewall logs must contain information about the firewall policy rule that triggered the log |
| 9.2 | Firewall must provide at a minimum basic statistic about the health of the firewall and the amount of traffic traversing the firewall. |
| 9.3 | Firewall should have support to log (in detail) all connections which are blocked or pass through the firewall. |
| 9.4 | Firewall should have support to generate performance statistics on real-time basis. |
| 9.5 | Firewall should have the capability to produce report s which measure usage. |
| 9.6 | Should Support 1000+ drilled down reports on the appliance |
| **10** | **OEM Criteria** |
| 10.1 | Proposed solution should have presence in Gartner's Magic Quadrant for Network Firewalls in latest reports |
| 10.2 | Should have ISO 9001:2015 or above certificate |
| **11** | **Licenses** |
| 11.1 | Five Year Subscription license for Firewall, Advanced Threat Protection (ATP), Intrusion Prevention System (IPS), Anti-malware, Web and App visibility control, and protection, onsite NBD support , security and software updates. License period will be counted after activation. |

* 1. **Core / Aggregator Switches (all L3/L2 Switches should be of same OEM)**

Layer3 48 Port Multigigabit Switches

1. Layer – 3 48-port Switch supporting 1/10 Gbps SFP+ on all ports
2. Uplink port should be Minimum - 4x 40G
3. Stackable switches with minimum 1 Tbps stack bandwidth
4. Stackable up to Max 6 units
5. Prop. Stacking or Virtual stacking capability
6. Minimum 650W or higher AC Power Supply with Power Cord
7. Support for Redundant Power Supply
8. Switching capacity 2Tbps or Higher
9. Support 228K or more MAC Address
10. Multicast routing scale – 6000
11. 32 MB Packet Buffer
12. IPv4 Routing 32K or more
13. IPv6 Routing 16K or more
14. DRAM 8GB or more
15. Flash 32GB or more
16. VLAN IDs Minimum4K
17. Jumbo Frames 9216 or more.
18. 5 Years of 8 x 5 X NBD warranty
    1. **Layer-2 Access Switches**
       1. Switches - Layer 2 Switches - 24 port Non-PoE
19. 24 port switch with 1Gbps per port
20. 4 x 10 Gbps SFP+ Uplink Port
21. Support for Stacking up to 8 Units
22. Stacking Bandwidth at 80Gbps Minimum
23. Switching Capacity 128 Gbps or More
24. MAC addresses 16,000
25. IPv4 routes 256 or higher
26. IPv4 routing entries 2000 or more
27. IPv6 routing entries 128 or more
28. Multicast routing scale -1000
29. Packet buffer 1.5 MB or more
30. DRAM 1 GB or more
31. FLASH 1 GB or more
32. VLAN IDs 4K or more
33. Jumbo frames 9216 or more
34. 5 Years of 8 x 5 X NBD warranty
    * 1. Switches - Layer 2 Switches - 24 Port -Full PoE **(Minimum 380W PoE Budget)**
35. 24 port switch with 1Gbps PoE per port
36. 4 x 10 Gbps Uplink Port
37. Support for Stacking up to 8 Units
38. Stacking Bandwidth at 80Gbps Minimum
39. Switching Capacity 128 Gbps or higher
40. MAC addresses 16,000
41. IPv4 routes 256 or higher
42. IPv4 routing entries 2000 or higher
43. IPv6 routing entries 128 or higher
44. Multicast routing scale -1000
45. Packet buffer 1.5 MB or higher
46. DRAM 1 GB minimum
47. FLASH 1 GB minimum
48. VLAN IDs 4K or more
49. Jumbo frames 9216 or more
50. 5 Years of 8 x 5 X NBD warranty
    * 1. Switches - Layer 2 Switches - 12 Port Non-PoE

1. Compact 12 port 1 Gbps per port Fanless switch

2. 2 x 10 Gbps Uplink Port

3. Switching Capacity 70 Gbps

4. MAC addresses 32000

5. IPv4 routes 14,000

6. IPv4 routing entries 4000

7. IPv6 routing entries 2000

8. Multicast routing scale -1000

9. Packet buffer 6 MB

10. DRAM 512 MB minimum

11. FLASH 256 Mb minimum

12. VLAN IDs 4096

13. Jumbo frames 9198

14. 5 Years of 8 x 5 X NBD warranty

* 1. Modules
     1. 10GBASE SFP+ Module for Singlemode Fiber Cable

Support 10 Gbps on OS2 cable up to 400 meters

Hot Swappable in SFP+ Ports

* + 1. 10GBASE-T SFP+ transceiver module for Category 6A cables

Support 10 Gbps on up to 30 meters on CAT6A

Support 10 Gbps on up to 100 meters on CAT6A

* + 1. 10GBASE-CU SFP+ Cable minimum 2 meters Twinax cable, passive, 30AWG cable assembly
  1. Wireless Access Point (All categories of Aps and Controller should be of same OEM and

All SNMP class managed Enterprise Wireless Access point (Wifi 6 Grade only)

* + 1. WIFI Access Points – 2 Radios

1. Wireless Access Point with **Minimum WIFI 6**
2. Should be Centrally managed through Wireless Controller / cloud
3. Radio Specification Dual band (2.4 GHz & 5GHz)
4. Spatial streams 2x2:2
5. UL/DL-OFDMA, TWT support, BSS coloring
6. SU-MIMO, UL/DL MU-MIMO support
7. Maximal ratio combining (MRC) and beamforming
8. Aggregate frame rate – Minimum 1.7Gbps
9. Interface- Port 2 x 1Gbps
10. Power - 802.3af PoE or DC power adapter
11. 5 Years of 8 x 5 X NBD warranty
    * 1. WIFI Access Points – 4 Radios
12. Wireless Access Point with WIFI 6
13. Should be Centrally managed through Wireless Controller / cloud
14. Radio Specification Dual band (2.4 GHz & 5GHz)
15. Spatial streams 2x2:2 + 4x4:4
16. UL/DL-OFDMA, TWT support, BSS coloring SU-MIMO, UL/DL MU-MIMO support
17. Maximal ratio combining (MRC) and beamforming
18. Band Steering
19. Aggregate frame rate – Minimum 2.9 Gbps
20. Interface Port - 1 x mGig 2.5 Gbps & 1 x 1Gbps
21. Power - 802.3af/at PoE or DC power adapter
22. 5 Years of 8 x 5 X NBD warranty.
    * 1. WIFI Access Points – 2 Radios

1.Ruggedized Outdoor Wireless Access Point with WIFI 6

2.Should be Centrally managed through Wireless Controller / cloud

3.Radio Specification Dual band (2.4 GHz & 5GHz)

4.Spatial streams 2x2:2 + 4x4:4

5.UL/DL-OFDMA, TWT support, BSS coloring

6.SU-MIMO, UL/DL MU-MIMO support

7.Maximal ratio combining (MRC) and beamforming

8.Aggregate frame rate – Minimum 2.9 Gbps

9.Interface- Port 1Gbps SFP & 2.5Gbps Rj-45

10.Power - 802.3af PoE or DC power adapter

11.5 Years of 8 x 5 X NBD warranty

7.6 Cloud Wireless Controller Specifications

(should be of the same OEM as that of the Aps)

(It should support Minimum up to 2000 Access points in a single site)

|  |  |
| --- | --- |
| **S/N** | **Technical Specification** |
| 1 | The offered Access Points should be managed by Cloud based WLC of same OEM and the Cloud based WLC should support advanced policy capabilities for guest access and BYOD as well as advanced analytics for smarter decision making. |
| 2 | Cloud based WLC should support Multi-site management, Multi-tenancy services, Auto Provisioning, Application visibility and control. |
| 3 | Cloud based WLC should support Real-time monitoring and analysis of critical network performance indicators through intuitive visual widgets. |
| 4 | It should support Geo-location node map to shows nodes and device status in geographical context using Google map. |
| 5 | It should support real-time detailed topology for each tenant across multi-site deployment. |
| 6 | It should have feature to show Network Topology and Geo Location topology view. |
| 7 | It should support Layer 2 VPN IPSec encryption and tunneling services between AP and cloud based WLC. |
| 8 | It should have provisioning for Administrative management to be secured over HTTPS/SSL with different levels of administration. |
| 9 | It should provide insight in the network health with advanced graphical analytics on most problematic switches based on device state (CPU, memory, temperature etc.) |
| 10 | It should support IoT Inventory assisted with cloud- based Endpoints fingerprinting service gives a full spectrum visibility of all connected devices across the network with complete contextual information |
| 11 | It should support Contextual information of all connected devices including key attributes such as device type, vendor, hardware version, network location and time information |
| 12 | It should support IoT Policy Enforcement with access role profiles automates network-wide access based on IoT classification |
| 13 | The offered Cloud based WLC solution should be Compliant with General Data Protection Regulation (GDPR) & California Consumer Privacy Act (CCPA) |
| 14 | The offered Cloud based WLC solution should be Compliant with ISO/IEC certifications for cloud security. |
| 15 | Cloud based WLC solution should be ISO 27001, 27017, 27002 certified. |
| 16 | It should support Mobile apps for Device on-boarding and geo location tagging. |
| 17 | WLC, AP, Switches and NMS should be from same OEM |
| 18 | It should provide application analytics for network wide application inventory, monitoring and use, allowing a better understanding of bandwidth consumption between business critical and non- professional applications. |
| 19 | It should Improve user experience and business outcome with embedded analytics engine, showing in depth application use reports and key measurement indicators |
| 20 | It should allow centralized policy enforcement and application- use policy by applying QoS policy enforcement such as rate limiting, blocking and application prioritization |
| 21 | Five Year Subscription license for Aps and cloud controller , , onsite NBD support , Piece to piece replacement for 5 Years |  |

1. **Server Room Facilities.** 
   1. Racks and Accessories
      1. Server Racks

1. Rack 42U/600/1200 with Heavy grade Aluminium vertical profiles connected to rigid steel end frames at top and bottom Fully recessible 19inch mounting angle pairs at front & rear with U marking , Cable management systems attach to equipment mounting rails inside enclosure that align with mounting U space and provide channel for routing and managing cables . Cable access slot at top and bottom panel with removable gland plates. Removable side panel with slam latches and indents for improved strength, Rack in total complete knock down structure -Black Colour – 1 Nos.

2. Front fully Perforated Door 42U/600, Hexagonal perforation and maximum cell opening ratio with improved strength. – 1 Nos Technical Specifications.

3. Rear Spilt fully Perforated Door 42U/600, Hexagonal perforation and maximum cell opening ratio with improved strength and 3 point Lock – 1 Nos

4. Front Panel Hardware (Pkt of 20) – 2 Nos

5. Earthing Kit – 1 Nos

6. Castor Normal & Brake – 1 No

7. Fan Housing Unit 90 CFM 4 Fan – 1 Nos

8. Fan 90 CFM 230 VACS – 4 Nos

9. Shelf Heavy Duty 725MM – 2 Nos

10. 1Ph 230V, 32A, Zero U, Standard Vertical Rack Mount Power Distribution Unit with 12 x Indian Round Pin socket, 5/15A, 32A MCB, 7.36 KVA rating, 3 meter Power cord, Unterminated. – 1 Nos

11. CABLE MANAGER, 1U, 19INCH PVC CLOSED – 4 Nos

12. 1Ph, 230V, 32A, Zero U, Standard Vertical Rack Mount Power Distribution

Unit with 12 x C13 socket, 32A MCB, 7.36KVA rating, 3 meter Power cord,

Unterminated. – 1 Nos

13. KB TRAY, ROTARY19 INCH/1000D+SLIDES – 1 Nos

14. Metal Vertical Cable Manager 42U - Front Side Right + Left. – 1 Nos

15. Window Moulding – 12 Nos

* + 1. 2 Post Open Racks

1. 3 in (76 mm) Channel x 7ft (2134 mm) H - 19 in (482.6 mm) AI Equipment Rack (45U) 12- 24 Tapped Rails, Black – 1 set

2. Vertical Cable Management Kit, 6in X 84in (152mm X 2134mm) Double Sided, With Doors, Silver – 2 Nos.

3. GROUTING BOLT M10x100 SET OF 4 – 1 set

4. HARDWARE PKT OF 20NOS – 1 Nos

5. LADDER KIT 1 MTR WITH ACCESSORIES -(86-1824) CABLE RUNWAY 1 MTR - 02

Nos, (87- 6318) RUNWAY MOUNTING KIT - 01 No, (87-6329) LADDER CLOSING

BKT - 02 Nos, (86- 1828) WALL BKT SET OF 2 - 01 No, RUNWAY JOINING BKT

RIGHT ANGLE - 04 Nos

6. 1Ph 230V, 16A, 2U, Standard Rack Mount Power Distribution Unit with 6 x

Indian Round Pin socket, 5/15A, 16A MCB, 3.6 KVA rating, 3 meter Power cord

with Indian Plug – 1Nos

7. CANTILEVER SHELF,19 INCH,1U/255mmD – 1 Nos

1. **Installation.**

9.1 Work Area Outlet

1. Cables shall be coiled in in-wall or surface-mount boxes if adequate space is present to house cable coil without exceeding Manufacturer’s bend radius.

a. No more than 12 inches (300 mm) of UTP slack shall be stored in in-wall box, modular furniture raceway, or insulated walls.

b. Excess slack shall be loosely configured and stored in ceiling above each drop location when there is not enough space present in outlet box to store slack cable. Technical Specifications

2. Cables shall be dressed and terminated in accordance with ANSI/TIA-568-C.0, Manufacturer's recommendations, and best industry practices.

3. Pair untwist at termination shall not exceed 0.125 inch (3.175 mm).

4. Bend radius of cable in termination area shall not be less than 4 times outside diameter of cable.

5. Cable jacket shall be maintained to within one inch (25 mm) of pin termination point

9.2 IT Rooms / IT Enclosures

1. Cables shall be dressed and terminated in accordance with ANSI/TIA-568-D.0,

Manufacturer's recommendations, and best industry practices.

2. Pair untwist at termination shall not exceed 0.125 inch (3.175 mm). a. The bend radius

of cable in termination area shall not be less than 4 times outside diameter of cable.

3. Cables shall be neatly bundled and dressed to their respective panels or blocks.

4. Each panel or block shall be fed by individual bundle separated and dressed back to

point of cable entrance into rack or frame.

5. Cable jacket shall be maintained as close as possible to termination point.

6. Each cable shall be clearly labelled on cable jacket behind patch panel at location that

can be viewed without removing bundle support ties.

* 1. Cables labelled within bundle, where label is obscured from view shall not be

acceptable.

9.3 Horizontal Cabling:

1. Cable raceways shall not be filled greater than required by ANSI/TIA-569-B maximum

fill for raceway type.

2. Cables shall be installed in continuous lengths from origin to destination (no splices)

except for transition points, or consolidation points.

3.Where transition points or consolidation points are allowed, they shall be in accessible

locations and housed in enclosure intended and suitable for purpose.

4. Cable’s minimum bend radius and maximum pulling tension shall not be exceeded.

5. If J-hook or trapeze system is used to support cable bundles, all horizontal cables shall

be supported at 48 inch (1 200 mm) to 60 inches (1 500 mm) maximum intervals. At no

point shall cable(s) rest on acoustic ceiling grids or panels.

6. Horizontal distribution cables shall be bundled in groups of no more than 25 cables.

Cable bundle quantities of more than 25 cables may cause deformation of bottom

cables within bundle and degrade cable performance.

7. Cable shall be installed above fire-sprinkler systems and shall not be attached to

system or any ancillary equipment or hardware. Cable system and support hardware

shall be installed so that it does not obscure any valves, fire alarm conduit, boxes, or

other control devices.

8. Cables shall not be attached to ceiling grid or lighting fixture wires. Where support for

horizontal cable is required, install appropriate carriers to support cabling.

9. Cables shall be identified by self-adhesive label and meet requirements of ANSI/TIA-

606- A1. Cable label shall be applied to cable behind faceplate on section of cable

that can be accessed by removing cover plate. Technical Specifications

10. Unshielded twisted pair cable shall be installed so that there are no bends smaller

than four times the cable outside diameter at any point in run and at termination

field.

11. Pulling tension on 4-pair UTP cables shall not exceed 25 lbf (111 N) for a four-pair

UTP cable.

12. The horizontal cable shall have 10ft (3 meter) of service loop neatly and secured

with Velcro at the MDA/HDA locations. It shall be supported by ladder rack or

appropriate cable supports.

9.4Copper Termination Hardware

1. Cables shall be dressed and terminated in accordance with ANSI/TIA-568-D.0, Manufacturer's recommendations, and best industry practices.
2. Pair untwist at termination shall not exceed 0.125 inch (3.175 mm).

a. The bend radius of cable in termination area shall not be less than 4 times outside diameter of cable.

1. Cables shall be neatly bundled and dressed to their respective panels or blocks.
2. Each panel or block shall be fed by individual bundle separated and dressed back to point of cable entrance into rack or frame.Ll
3. Cable jacket shall be maintained as close as possible to termination point.
4. Each cable shall be clearly labelled on cable jacket behind patch panel at location that can be viewed without removing bundle support ties.
5. Cables labeled within bundle, where label is obscured from view shall not be acceptable.

9.5 Grounding System

1. Telecommunications main grounding bus bar (TMGB) and Bonding Backbone shall be

designed and/or approved by qualified Installer with three separate and distinct systems for the site.

a. ac grounding electrode (GEC) ground electrode conductor connects equipment to grounding electrode.

b. Equipment grounding system maintains 0V on all equipment enclosures and power supplies and acts as intentional path for fault condition.

c. Telecommunications bonding infrastructure

2. Follow requirements of ANSI/J-STD-607-B.

3. All service providers must be consulted to determine any special grounding

requirements.

9.6 Identification and Labelling

* + - Apply machine generated approved labelling for racks, cables, panels and outlets:
      1. Designate cables origin and destination and unique identifier for cable by patch panel number and patch panel port number.
      2. Racks and patch panels shall be labeled to identify numeric sequence within the TR space that shares the cable system infrastructure. The top patch panel (front) on the left most rack shall be labeled P1 and all other patch panels in the same space shall follow sequence from left to right, and top to bottom i.e.P1, P2, P3…
      3. All work area face plates shall be labeled according to the patch panel number and patch panel port where the cable is terminated in the TR as: P1-22 P1-23 (example).
    - Outlet, patch panel and wiring block labels shall be installed on, or in, space provided on device as designed.
    - Adhesive Labels
      1. Adhesive labels shall meet the legibility, defacement, and adhesion requirements specified in UL 969. Additionally, labels shall meet the general exposure requirements in UL 969 for indoor use. Outside plant labels shall meet the exposure requirements listed in UL 969 for indoor and outdoor use.
      2. Cable labels should have a durable substrate, such as vinyl, suitable for wrapping. It is recommended to use labels with a white printing area and a clear “tail” that self laminates the printed area when wrapped around a cable. The clear tail should be of sufficient length to wrap around the cable at least one and one-half times.
      3. All characters shall be machine generated using a legible font large enough to read. All ink shall be permanent, non-fading, non-bleeding.
    - Insert Labels
      1. Insert labels shall meet the legibility, defacement, and general exposure requirements specified in UL 969. Outside plant labels shall meet the exposure requirements listed in UL 969 for indoor and outdoor use. An insert label shall be securely held in place under the normal operating conditions and usage to which the labelled infrastructure element is subjected.
      2. All characters shall be machine generated using a legible font large enough to read. All ink shall be permanent, non-fading, non-bleeding.
    - Pathway ID Tags
      1. Each pathway, (conduit, cable tray, etc.), shall be appropriately tagged at both ends at strategic locations where midspans are accessible/visible.
      2. Each tag shall be 2/32” (1.5875mm) thick stainless steel, 2” (50.8mm) to 2½” (63.5mm) in diameter and include a 5/32” (3.96875mm) hole for the fastener.
      3. Authorized fasteners shall be wire-link chain or beaded chain.
      4. Letters shall be stamped or engraved, 4/32” (3.175mm) high, and be consistent with the specified labelling scheme.
    - Rack Labels
      1. Engraved, plastic laminated melamine, 3/32” (2.38125mm) thick, engraved black letters on white face. Letters shall be ½” (12.7mm) high. Labels shall be attached utilizing stainless steel #10 screws at the top of the rack mounted on the front and back of the rack.

9.7 Fiber Connectivity

* + 1. Use 6 core fiber cable.
    2. Use additional 6 core when in need of additions or redundancy.
    3. Conduit / Tray required for all fiber backbone cable.
    4. All fiber cables shall provide no more than 5’ (1524mm) of spare cable at each end.
    5. No splices will be acceptable in fiber cables, except for the installation of factory pigtails.
    6. All fiber cables shall be neatly dressed and secured at racks and cabinets.
    7. All pulls of fiber optic cable shall be made with a recording tension meter and breakaway swivel.
    8. Where 250 micron coated fiber is field terminated, breakout kits that build up the fiber to a minimum 900 microns shall be used.
    9. All fiber will be factory polished LC terminations requiring pigtail fusion slice.
    10. Fiber type can be Single Mode (SM) within the Building and for inter building Connectivity as per applications and length requirements.
    11. Indoor/outdoor rated for building-to-building backbone
    12. OTDR testing required with no more than 6dB loss across the building distributor or campus distributor end points.
    13. All building fiber and pathways shall be engineering and installed as home-run backbone to each TR from the Entrance Facility (EF), Main Equipment Room (ER) or Campus Distributor (CD) end point.
    14. Fiber slack shall be neatly coiled within the fiber termination panel. No slack loops shall be allowed external to the fiber panel(s). Fiber cables shall be neatly bundled and dressed to their respective panels.
    15. Each cable shall be clearly labelled within the enclosure so that the label can be viewed when the panel is opened. Cables labelled within the bundle shall not be acceptable.
    16. Dust caps shall be always installed on the connectors and couplings unless physically connected.

9.8 Innerduct Installation

* Under slab and Underground Raceways: outdoor or indoor innerduct.
* Above-Ground Raceways, Exterior and Interior: indoor innerduct.
* Interior Exposed Locations, Including Cable Tray Installations:
* Cable Tray to Equipment-Mounting Transitions: split-corrugated innerduct.
  + - Pull innerduct through conduit and wireways, or place innerduct in cable trays using continuous un-spliced lengths of innerduct between manholes, pull boxes, and/or section termination points.
    - Cut innerduct square; deburr cut ends.
    - Bring innerduct to the shoulder of fittings and couplings and fasten securely.
    - Wipe innerduct and fittings clean and dry before joining. Apply full, even coat of cement to entire area that will be inserted into fitting. Let joint cure according to cement manufacturer’s instructions.
    - Provide suitable innerduct slack in manholes, handholes, pull boxes, and at turns to ensure that there is no kinking or binding of the tubing.
    - Make changes in direction of communications innerduct runs with sweeps of the longest possible radius and at least 10 times the inside diameter of the innerduct.
    - During innerduct placement avoid excessive tension which can deform the innerduct. Inspect the innerduct following placement and replace any damaged sections.
    - Innerduct Mountings, Hangers, and Attachments: When exposed indoors or in manholes, hold innerduct firmly in place using independent support.
      1. Install straps, hangers, and other similar fittings adequate to support loads and so as not to damage innerduct.
      2. Do not fasten innerduct supports to steam pipes, water pipes, duct work, ceiling grid support wires, or other utilities.
      3. Do not allow innerduct sag to contact the ceiling grid or light fixtures. Underground Conduit Installation: After innerduct is installed in conduit entering structures, seal all openings inside conduit around innerduct at first box or outlet to prevent the entrance of gases, liquids, or rodents into the structure. Use suitable plastic-expandable compound, e.g., duct water seal.
    - Manhole and Handhole Installation:
      1. At locations where innerduct will be continuous through a manhole or handhole, allow sufficient slack for securing the innerduct to the side of the vault while maintaining the required minimum bend radius. Secure the innerduct to the racking.
      2. At manholes serving as a junction location, pull the exposed end of the innerduct to the far end of the vault, install manufactured duct plugs, and secure to cable racks.
      3. At other locations where the ends of innerduct sections appear in a manhole or handhole, join the pull tape, and then splice innerduct sections together using watertight couplings which do not reduce the inside diameter of the innerduct.
      4. Innerducts must be labelled and use same larger duct and innerduct conduit path throughout the route, to ensure physical continuity and eliminate cable crossovers within the manholes.
    - Indoor conduit installation
      1. Arrange innerduct neatly, cut to proper length, and remove surplus. Provide trained and bundled innerduct pigtails extending at least 18” (457.2mm) beyond exposed conduit openings. Refer to Specifications Section 260533, Raceways and Boxes.
      2. At locations where the ends of innerduct sections appear in a pull box, join the pull tape, and then splice innerduct sections together using couplings which do not reduce the inside diameter of the innerduct.
    - Indoor Exposed Installation: Tie-wrap innerduct to one side of vertical ladder rack every 24” (609.6mm) minimum, and to one side of horizontal ladder-type cable tray every 5’ (1524mm) minimum.
    - Following installation, visually inspect innerduct, remove any burrs at openings, and, if necessary, clean innerduct interior.
    - Label innerduct at regular intervals.

1. **Field Quality Control**
   1. **Field Tests**

1. Testing to be in accordance with ANSI/TIA standards and Manufacturer’s system warranty guidelines and best industry practice.

a. If any of these are in conflict, discrepancies shall be brought to attention of Architect/Consulting Engineer for clarification and resolution. a. Test complete system for defects in installation.

b. Verify cabling system performance under installed conditions according to requirements of ANSI/TIA-568-C:

c. All pairs of each installed cable shall be verified prior to system acceptance.

d. Any defect in cabling system installation including but not limited to cable, connectors, feed through couplers, patch panels, and connector blocks shall be repaired or replaced to ensure 100% useable conductors in all cables installed.

2. Category 6A cable links shall be tested for compliance to requirements of ANSI/TIA-568-D), The test shall be performed by a certified testing unit approved by the manufacturer for all warranties and certifications.

3. Backbone multimode fiber cabling shall be tested at both 850 nm and 1300 nm.

* 1. **Test and Evaluation Reports**

1. Printouts generated for each cable by wire test instrument shall be submitted as part of documentation package. Installer may furnish this information in electronic form.

a. Media shall contain electronic equivalent of test results as defined by the Section along with software necessary to view and evaluate test reports.

2. Submit documentation within ten (10) working days of completion of each testing phase. This is inclusive of all test results and record drawings.

3. Draft drawings may include annotations done by hand. Final copies of all drawings shall be submitted within thirty (30) working days of completion of each testing phase.

4. Proved copies of original test results as in hard copy and soft copy formats.

* 1. **Test Documentation**

1. Provide electronic format documentation within three (3) weeks after completion of project. 2. Documentation shall be clearly marked on outside front cover with following:

a. "Project Test Documentation".

b. Project name.

c. Date of completion (month and year).

3. Test results shall include following:

a. Record of test frequencies.

b. Pass/Fail status (\* Star Passes are NOT acceptable).

c. Cable type.

d. Conductor pair and cable (or outlet) I.D.

e. Measurement direction.

f. Reference setup.

g. Crew member name(s).

h. Test equipment name, manufacturer, model number, serial number, software

version.

i. Last calibration date:

1. Unless Manufacturer specifies more frequent calibration cycle, annual

calibration cycle is required on all test equipment used on project.

2. Document shall detail test method used and specific settings of equipment

during test as well as software version being used in field test equipment.

1. **Bill of Material**

Bidder needs to provide Techno-Commercial offer.

1. Technical offer: - Should include Technical Data Sheet of the product, Compliance sheet and Materials being quote along with quantity in the provided format.
2. Commercial Bid: - Should include Commercial offer only along with quantity in the provided format

**12.1 Supply of Material**

**12.2 Installation, Configuration& Commissioning of Material**

***For any clarification Contact IT Department KLE ACADEMY OF HIGHER EDUCATION & RESEARCH, Belagavi***

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